

**DETECTION AND PREVENTION OF CHRONIC DISEASE  
UTILIZING MULTIPHASIC HEALTH SCREENING  
TECHNIQUES**

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**HEARINGS**  
BEFORE THE  
**SUBCOMMITTEE ON**  
**HEALTH OF THE ELDERLY**  
OF THE  
**SPECIAL COMMITTEE ON AGING**  
**UNITED STATES SENATE**  
EIGHTY-NINTH CONGRESS  
SECOND SESSION

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SEPTEMBER 20, 21, AND 22, 1966



Printed for the use of the Special Committee on Aging

U.S. GOVERNMENT PRINTING OFFICE

69-803 O

WASHINGTON : 1966

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# DETECTION AND PREVENTION OF CHRONIC DISEASE UTILIZING MULTIPHASIC HEALTH SCREENING TECHNIQUES

TUESDAY, SEPTEMBER 20, 1966

U.S. SENATE,  
SUBCOMMITTEE ON HEALTH OF THE ELDERLY  
OF THE SPECIAL COMMITTEE ON AGING,  
*Washington, D.C.*

The Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging met at 10 a.m., pursuant to call, in room G-308, New Senate Office Building, Senator Maurine B. Neuberger (chairman) presiding.

Present: Senators Neuberger, Williams, Moss, and Yarborough.

Committee staff members present: Thomas S. Biggs, Jr., staff counsel; William E. Oriol, professional staff member; Patricia G. Slinkard, chief clerk; and Diane La Bakas, minority research assistant.

Senator NEUBERGER. It is against my principles to be late, but we have had a lot of excitement for our attractive mobile unit outside, so I would like to get started as rapidly as we can.

This is a meeting of the Subcommittee on Health of the Elderly, and we are also pleased to have with us Senator Williams of New Jersey, chairman of the Subcommittee on Consumer Interests of the Elderly, and Senator Yarborough, a member of that subcommittee and of this one, also.

Senator WILLIAMS has just been the first subject for screening in the mobile unit that a lot of us are going to experience today. What are your comments, Senator Williams?

Senator WILLIAMS. I only went through part of the tests, Senator Neuberger, the glaucoma test, and I will say right now I am a little bleary from the drops that are necessary for the proper testing. I think probably Senator Yarborough will come through as a better health specimen than I. I know he has important responsibilities in another committee at this point; the poverty program is being considered in another committee, so I will defer to Senator Yarborough.

Senator YARBOROUGH. Thank you, Senator Williams.

With your long work with the elderly, and as chairman of the Migratory Labor Subcommittee, I know that you have been very much interested in public health for another great group of Americans, the migratory laborers and their children. We all know of your great work on this Subcommittee on Health of the Elderly and in public health. As a member of this subcommittee and of the Public Health Subcommittee also, we have studied this problem and we have benefited by the chairmanship of the distinguished Senator from Oregon.

We will miss her greatly when she is gone. She has long been interested in the field of public health. She has manifested that not only

on this committee, but on other committees and in many public appearances in the field of health and the causes of illnesses. We are thankful for her leadership. We will say we will regret very much when the Senator from Oregon is gone. Her work has been notable here in the prevention and detection of cancer and in other fields, but I think this brings a new dimension to this study when we put on the road this type of a diagnostic complex; put it into one mobile unit so that a person going through that unit gets many of the most advanced techniques used in the large hospitals.

To me this is a great advance in American medicine and particularly in protection. We know from experience that the elderly often fear ill health when they don't have it. In the declining years and declining physical vigor, they imagine all kinds of ailments they don't have, and they don't have the money to go to hospitals and doctors.

With this testing unit—many, of course, with advancing years can find out just what those ailments are, or if their ailment merely is a decline due to old age and they have no disease that is subject to medical treatment. I think this is a great advance not only in treatment, but in ascertaining whether it is necessary, resulting in mental reassurance for the people who find they have nothing that is subject to medical treatment in the hospitals.

I thank the Senator for her fine leadership, particularly in this field of public health.

Senator NEUBERGER. Thank you, Senator Yarborough.

Senator YARBOROUGH. I regret that I am going to have to leave because we are in a conference, executive session on the poverty bill in the Committee on Labor and Public Welfare, and I have been asked to chair that executive session trying to bring out to the floor of the Senate the Senate's bill on the War on Poverty. I am supposed to begin chairing that committee at 10:15.

Senator NEUBERGER. There is a lot of related interests in health and poverty, so we will excuse you.

All right. Senator Williams?

Senator WILLIAMS. Well, Madam Chairman, I appreciate this opportunity to give a short statement. I hope that I can summarize and include my full statement in the record.

Senator NEUBERGER. It is so ordered.

(Statement follows:)

**STATEMENT BY SENATOR HARRISON A. WILLIAMS, JR., ON THE DETECTION AND PREVENTION OF CHRONIC DISEASE UTILIZING MULTIPHASIC HEALTH SCREENING TECHNIQUES**

Madam Chairman, I appreciate this opportunity to speak briefly at a hearing which—because of its subject, timeliness, and scope—merits the attention of the entire Nation.

Our subject literally deals with life and death.

We seek to detect and prevent chronic disease before it weakens or overwhelms its victims and eventually destroys them.

We can and must believe that a great nation, in an age of technological marvels, can enter an age of health maintenance, rather than relying almost solely on health repair.

Our subject is timely—very timely—because the long battle over Medicare has forced each one of us to think about the health of our population, particularly our elderly population.

Now that we have Medicare, and now that the emotional arguments against it have dwindled, even if they are not dead, we can see it for what it is: A vital,

overdue, but limited program to assure payment for certain costs faced by people who are ill at age 65 or over.

Medicare doesn't do a blessed thing to prevent disease. It merely helps us cope with the damage caused by disease, and it can't do even that unless the victim is well past the age when most chronic diseases begin.

I think more and more people will eventually ask why we should wait for chronic illness to strike before we really begin to cope with it. In terms of dollars lost, this approach makes no sense. In terms of lives lost or blighted, it makes even less.

We should now at last be more able to look at our national health problems more objectively and more comprehensively than we were in the long and sometimes exhausting battle over Medicare.

And it is about time.

For the reasons I've discussed, I am glad that this Subcommittee is conducting a study of far-reaching scope and depth.

As I understand it, the final record will include testimony, statements, and exhibits from many of our foremost authorities in medicine, biochemistry, sociology, and automated equipment.

We have need of such impressive brainpower, and we'll have need of public understanding as Congress faces up within the near future to many unresolved national health problems.

I would like to add that I have already introduced one proposal intended to provoke national discussion on the need for early detection and prevention of chronic disease. I am pleased that many of the witnesses at this hearing are familiar with the bill—the Adult Health Protection Act, or "Preventicare," as it has been nicknamed.

My proposal calls for free, voluntary, comprehensive health tests for anyone past age 50. We would establish centers and local units using the latest in modern equipment.

Before and since February, when I introduced this bill, I have been engaged in lively correspondence with many experts who have given me additional insight into the problems and potential of such a program. I'm happy to say that there appears to be much more potential than problems.

Undoubtedly, however, there will be much opportunity for refinement of the original problem. With this in mind, I'll look forward to the statements we are about to hear.

I would also like to introduce into the record statements discussing projects that will, I am sure, be of interest to the Subcommittee.

One comes from the General Hospital at Perth Amboy, New Jersey, where the Pathology Department is already using computer techniques and where plans are being developed for the full-scale screening of all persons admitted to the Hospital.

I am also enclosing a statement from the Division of Health of the Township of Woodbridge, where a community screening program is being developed in consultation with the Public Health Service.

I think these programs show the widespread interest in preventive medicine in my own State of New Jersey, and I am happy to bring them to the attention of the Subcommittee.

My final comment is a word of appreciation to Senator Neuberger who, in the final months of her Senate term, has taken on such a demanding assignment. But, to anyone who knows of her long and effective interest in health and the public good, her decision is also completely understandable and typical of her standards of service to others.

Senator WILLIAMS. I certainly join Senator Yarborough in congratulating you for calling and conducting this hearing; because of its subject, timeliness, and scope, it merits the attention of the entire Nation.

We are here because it has become obvious, I think, that we have thought for much too long in terms of health treatment.

The time has come for us to think in terms of life-long health maintenance and maintenance is possible only if we do far more than we are now doing to detect and prevent chronic disease.

Now that Medicare is finally at work, we should be able to think more comprehensively. For my part I have already introduced a bill in-

tended to help us prevent chronic disease. We call it Preventicare, and it would offer a free health screening test to anyone past age 50 who wants it.

I am sure that Preventicare is not the final answer to all our problems. Our deliberations in the next 3 days should throw considerable light upon it and possible changes in the original proposal.

At this point I would like to enter into the record the statements referred to in my prepared remarks.

DIVISION OF HEALTH, TOWNSHIP OF WOODBRIDGE,  
Woodbridge, N.J., September 20, 1966.

Mr. WOODRUFF PRICE,  
Administrative Assistant to Senator Harrison Williams,  
Old Senate Office Building,  
Washington, D.C.

DEAR MR. PRICE: In regard to our recent telephone conversation of September 19, 1966, please find enclosed a brief description of the comprehensive Medical Screening Program, which the Division of Health in Woodbridge Township has established.

Woodbridge Township has a population of approximately one hundred thousand (100,000) people, and it is estimated that there are approximately seventeen thousand (17,000) people over the age of fifty (50).

The comprehensive screening program is designed to set up health screening facilities for the residents of Woodbridge over the age of fifty. The screening program will consist of a complete medical history and the following screening procedure:

Height	Electro-cardiograph
Weight	Chest X-ray
Blood pressure	Cytology studies
Visual screening	Urinalysis
Audiometer testing	Blood chemistry
Dental screening	

The program will be staffed by one internist, a general practitioner, one Public Health nurse, and a coordinator.

We have been in touch with the Gerontology Branch of the Public Health Service, which has shown much interest in this type of medical program functioning out of a public health department. It is for this reason that we are in the process of signing a contract with the Gerontology Branch, which will enable us to receive thirty thousand dollars (\$30,000) to organize and maintain this program for the first year. It is hopeful that after the first year, we might be able to sustain the program thru a grant from the Community Health Service Program.

It must be kept in mind that after an individual answers the medical history and has the various tests performed, all positive findings will be made known to him and to his private physician. Subsequently the patient will be encouraged to be seen by his private physician. No treatment will be carried on by the Health Department. We are most interested in keeping in close contact with the physician afterwards to determine the patient's progress and more accurately evaluate the efficacy of this type of program.

I hope that this information is what you are looking for, and if there are any further questions, please feel free to contact our office at any time.

Sincerely,

ANTOINE T. ATTALLA, M.D.,  
Director, Division of Health.

PERTH AMBOY GENERAL HOSPITAL,  
Perth Amboy, N.J., September 16, 1966.

Senator HARRISON WILLIAMS,  
U.S. Senate Office Building,  
Washington, D.C.

DEAR SENATOR WILLIAMS: At the request of your aide, Mr. W. Price, I am setting forth below in some detail what we here at Perth Amboy General Hospital are doing and plan to do in the laboratory in relation to automation, the use of com-

puters in the laboratory, and the evaluation of the so-called Laboratory Profile. I think, however, that before I go into an outline of these plans, I should discuss briefly our reasons for the changes we are making.

The concept of the laboratory playing a role in preventive medicine with so-called "multiphasic screening programs," "biochemical profile" or a "Laboratory Profile" is not a new one to pathologists. As an early form of screening tests to detect unsuspected diseases, pathologists have been doing urinalyses, tests for the diagnosis of syphilis and routine blood counts on all patients admitted to their hospitals for years.

Since 1960, pathologists concerned with the Section on Pathology and Physiology of the American Medical Association have been surveying by screening tests those physicians attending the annual American Medical Association convention. There are numerous pilot studies already published of the results of laboratory screening tests and the relatively high percentage of pickup of abnormal results noted on routine screening tests on both in-patients and out-patients. Here in our hospital a small pilot study was done utilizing four different procedures in studying 348 patients routinely admitted to the hospital. We noted in one or more of the tests that 43 percent of the patients had abnormal findings.

Thus, it became apparent to us that there was an important medical need for the performance of a routine laboratory testing profile on all patients admitted to our hospital. It further became apparent that these services should be available for all patients on a routine and economical basis. Certainly with our present methods of providing this, the cost for the patient would be exorbitant. Consequently, our interest in automation and the use of computers. We now have nine different test procedures automated in our laboratory. Recently, the availability of automation and the application of computers for use in the laboratory has allowed us to perform a greater number of patient tests without an increased cost to the patient. It is our intention and hope that when our complete program is finished, we will be offering approximately twenty-five routine laboratory determinations for every patient admitted to the hospital. However, this will cost the patient no more than the routine five tests we now administer.

The program has been developed in several phases as follows:

#### PHASE I—PROVIDE A LABORATORY ADMISSION PROFILE ON AN ECONOMIC BASIS FOR ALL PATIENTS ADMITTED TO PERTH AMBOY GENERAL HOSPITAL

##### STEP 1

Provide, within a few hours after admission, a laboratory admission profile consisting of twelve tests (fasting blood sugar, blood urea nitrogen, sodium, potassium, chloride, carbon dioxide, lactic dehydrogenase, hemoglobin, hematocrit, white blood count, complete urinalysis, and V.D.R.L.). In order to accomplish this shortly after admission, a separate crew of laboratory workers will be hired to work from 3:00 P.M. to 11:00 P.M. so that these tests can be drawn when the patient is admitted to the hospital and the work done in the afternoon and evening shift and the reports placed on the patient's chart before midnight so that the doctor will have them the following morning. This we intend to have in effect by October 15, 1966.

##### STEP 2

Introduce additional automated tests by at least eight tests, i.e.: Total protein, albumin, S.G.O.T., uric acid, alkaline phosphatase, calcium, red blood count, and bilirubin. Target date—January 1, 1967. *Note:* These tests will be done by the use of automated equipment, that is, autoanalyzers.

#### PHASE II—THE ACQUISITION OF COMPUTERS FOR THE DEVELOPMENT OF A DATA PROCESSING SYSTEM

##### STEP 1

Development of the Data Acquisition System. This system consists of acquiring a computer or computer-like equipment to obtain the electrical signals generated by the automatic chemical analyzers and either converting them to machine readable form to be handled by a second computer as described in Phase II for reporting, or reading them directly into a computer to handle Steps

1 and 2. Target date—October 1, 1966. It is expected that by May, 1967, the necessary equipment will be installed in the laboratory and working effectively.

#### STEP 2

The development of the so-called Laboratory Information System. This includes the acquiring of a computer and the writing of programs so that all information concerning the patient is stored in the computer. On a periodic basis (daily) all of the laboratory information about this patient including the present day's work and all previous work on the patient can be listed in easily readable form, with the test arranged in medically logical order. In addition, throughout the day so-called "ward reports" will be rendered.

### PHASE III—EXPANDING SCOPE OF PROGRAM TO INCLUDE MASS SCREENING

#### STEP 1

We plan an expansion of the above program to provide these benefits with large mass screening capabilities to handle (1) private out-patients, (2) out-patients from our own out-patient care clinic, as well as patients in cooperation with various public health programs for preventive medicine, and (3) industrial health care programs in relation to local companies. Target date—July 1, 1967.

#### STEP 2

We hope that numerous physiologic data will be available, such as the routine chest X-ray, cytology screening, EKG, spirometry tests, routine eye examinations, hearing examinations, etc. This program would necessitate construction of additional space, including a large out-patient clinic and additional staff consultants in the various specialties involved in these tests. In addition a para-medical personnel would have to be added. Planning target date—October 1, 1966. Pilot program target date—July 1, 1968.

### PHASE IV—JOINT RESEARCH

The research related to this program has already begun on a limited basis in affiliation with the School of Engineering of Rutgers University. There are numerous potentialities for vitally important research projects, such as the establishment of normal values based on patients' age, sex and other variable factors. When all our laboratory data is in machine readable form with the ability to store, evaluate, retrieve and correlate findings with disease patterns, the possibilities for practical research will be unlimited.

At present, in conjunction with Professor Walter Welkowitz, Ph. D., who is in charge of the Biomedical Engineering Program of the School of Engineering of Rutgers, the State University, the following research applications have been undertaken:

1. All of our surgical pathology diagnoses since January, 1965, and all of our autopsy diagnoses since May, 1964, have been coded and converted to machine readable form and are now stored in the central facility at Rutgers. We thus have the ability to evaluate and correlate diagnoses based on numerous variables.

2. All of the results of our bacterial cultural studies and antibiotic sensitivity studies since January 1, 1966, have been similarly coded and placed in machine readable form. We have already made several studies with this data that will help the physician in picking the appropriate antibiotic with which to treat a patient two days before he will have any definitive cultural or antibiotic studies. The results of this work are in the process of being submitted for publication.

3. Utilizing a terminal to a large computer in New York City (Quik Tran Service), we have now devised a system to calculate and give preliminary diagnosis from our routine protein electrophoresis studies on a daily basis.

I, as a pathologist, am excited about the most recent advances in automation and data processing and the prospects they hold for enhancing our roles as physicians and for improving medical health care at a cost the patients can afford.

I must, however, offer a word of caution. First, I have been particularly fortunate at Perth Amboy in obtaining the help and support of a forward-looking dynamic hospital administrator, Mr. Robert Hoyt. Not all pathologists are as fortunate. Most pathologists must compete with other medical facilities for the hospital dollar, and at least in the past they have not had a free hand in

developing expensive programs such as I have outlined above. Secondly, I have also been fortunate in obtaining certain limited donations and I have applied for foundation grants. Again, this simply is not practical for most pathologists. Thirdly, these programs may not be practical in the setting of the small hospital. And finally, I want to make clear that we are, in a very real sense, pioneering. The programs we have instituted are largely experimental. It is neither wise nor practical to bring about widespread change in this vital area without the proper foundation, and without an adequate testing period. Nevertheless, even with these qualifications in mind, I think we can all look forward to exciting and rewarding advances in this field—advances that will require even greater skills, industry and knowledge on the part of pathologists and yet that will greatly advance the care of patients.

Sincerely yours,

HUGO C. PRIBOR, M.D., Ph. D.,  
*Director of Laboratories.*

Senator WILLIAMS. I hope I can spend a lot of time with you, Madam Chairman, in these hearings, and you have a group of witnesses that could not be excelled. The witness list is one of the best I have seen. I think that we can be very hopeful that we can be helpful to a healthier Nation through these discussions, these hearings, and legislation that might follow.

Senator NEUBERGER. Thank you.

Senator Williams has long been in the forefront on this very subject matter that we are discussing today and we do appreciate his continuing interest in the subject.

Today we are beginning hearings and receiving testimony from a list of very distinguished witnesses who have had experience with modern health testing methods.

I will repeat again for those who have just come in that this is the Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging.

Let me emphasize that this committee has no legislation before it. It is rather unique in holding hearings of this kind to have such distinguished witnesses as we have. It is an unusual approach to a hearing of this size, so it is very gratifying to me as chairman to have had the response that has been forthcoming from the doctors, deans, and social workers who have come to explore an idea with us.

It is not so much a new idea with some of them, but for Members of the Senate, including Senator Moss of Utah who has joined us, the record that we hope to develop and the idea we are here to explore is whether or not it is possible to apply modern testing methods such as automated or semiautomated procedures to the detection of chronic illnesses. There may be no easy answer to the question, but we need the light of informed discussion.

As I studied the need for this hearing and made preparations for it, three factors became apparent:

1. We in the United States live within, as one doctor has put it, a golden age of treatment and a dark age of preventive medicine; and that

2. There are significant stirrings and some practical work now underway on screening programs intended to alert the public and practitioners to the need for early recognition of chronic disease; and finally

3. That it is time that we explore the national interest in all efforts that will reduce the price we pay for permitting disease to debilitate its victims before we finally deal with it.

In the United States the cost of illness, disability, and death is now about \$93.5 billion annually. That sum, the latest available estimate from HEW, includes the probable losses in income related to death or disability.

If we were to do absolutely nothing about reducing the incidence of chronic disease within the next 10 years, our total for the direct costs of death and disability would almost double by 1975.

We have passed Medicare and medicaid. One program rescues the elderly from calamitous costs of some health care after 65. The other assures some treatment to those most in need of it.

You know, we have provided for a heart, stroke, and cancer treatment coordination program.

President Johnson has promised that early next year he will offer new ideas for better delivery of health treatment. He has also appointed a commission to study medical manpower shortages.

But when do we turn the corner from treatment to prevention?

When will we maintain health as devotedly as we now fight disease?

When will we make the most of our medical manpower by reducing the time spent in taking routine tests and histories?

What we are here to explore is, can we adapt our computer and automation technology to screen millions of Americans every year and thus finally encourage an entire Nation to think in terms of preventing illness?

I will move at this point to include those letters and supporting material in our hearing record, if there is no objection.

I will also say that the authors of many of the letters responded with an enthusiasm which is most encouraging. (See Appendixes.)

We are very sorry that Congressman John Fogarty will not be present to testify. The press of business in the House of Representatives requires his presence there. He has however, submitted a statement which will be included in the record at this point.

(The statement referred to follows:)

STATEMENT OF HON. JOHN E. FOGARTY, A MEMBER OF CONGRESS FROM THE STATE OF RHODE ISLAND

Madam Chairman and members of the Subcommittee on Health of the Elderly: during the next few days, you will hear much about preventive medicine, about early detection of chronic diseases, and about the "new look" in health testing with electronics and automation.

What you hear may not sound as dramatic as the story of some new "miracle cure." A relatively simple pressure test on the eye, a blood test, an X-ray or cell smear may sound routine and unexciting. But, when these are combined with other procedures of preventive medicine we create great power to delay, minimize or prevent the crippling, the blinding or even the fatal consequences of many chronic diseases. Add all this to the fact that the chronic diseases are fast emerging as the greatest health threat confronting the Nation today, and we begin to see how truly enormous and far-reaching are the implications of the health protection story.

Each year I listen to the testimony of the Public Health Service with respect to the appropriations needed to strengthen our attack on the chronic diseases. Each year I become increasingly concerned with the seriousness of the problem and with its continued growth. We simply are not moving fast enough even to stand still against the insistent menace of cancer, heart disease, arthritis, diabetes and a whole host of their fellows. We have yet to turn the tide of chronic diseases, and we cannot do it by merely reacting to these conditions after they have hit full stride. The key is to catch them before they start or when they are just appearing.



As long ago as 1947 four major professional organizations issued this joint statement: "The basic approach to chronic disease must be preventive. Otherwise the problems created by chronic diseases will grow larger with time, and the hope of any substantial decline in their incidence and severity will be postponed for years."

In the 20 years since this declaration many others with similar conclusions have followed. But our progress toward broad application of preventive medicine has been halting and painfully slow. We have in fact had more endorsements of the concept than action to back it up.

Furthermore, we are told and it is true that we don't have enough trained manpower to meet the immediate demands for treatment of those already sick and in distress. We are told that we don't yet know enough about the chronic diseases to deal with them effectively. We don't *have* to be told of the depth of public resignation and apathy to the chronic diseases.

So many people have for so long accepted arthritis or heart diseases or other serious chronic ailments as just as much a part of growing old as baldness or bifocals.

Certainly, our knowledge is incomplete. We have to give the research scientist time and full support to find more answers. We have to care for those already sick—we have to deal with apathy and resignation. But we also have to break a vicious chain. We have to stop the upward climb of the chronic diseases in order to catch up with the burden of sickness and disability we already bear. And we are not helpless in this effort. We have vast, untapped potential as well as considerable knowledge of chronic disease.

We already know, for example, how to prevent thousands of deaths from cervical cancer; we can stop many of the personal and social evils caused by unnecessary blindness or sight impairment caused by glaucoma; we do not have to permit the hopeless invalidism we now accept in thousands of survivors of stroke or heart attack.

But with mounting demands for treatment from the already sick and with proportionately fewer professionals to provide the care, how do we meet the problem?

Endorsements, slogans and exhortations alone will not succeed. We learned this long ago in providing better care for the young. With our children we are not content merely to preach the values of preventive medicine. Neither are we willing to accept excuses about manpower shortages and incomplete knowledge as a substitute for action. As a result, serious sight and hearing impairments are prevented, crooked limbs are straightened, and rheumatic hearts repaired. We are not doing enough, no doubt, but by comparison, vastly more for children than for adults.

What makes the child when he becomes 40 or 50 or 60 less worthy of protection, less entitled to all that medical science makes possible to keep him productive and useful and free from suffering and death before his time?

What I have said is not to belittle the spectacular gains that have been made in therapeutic medicine. We can be justifiably proud of the achievements in this area—and we continue to be challenged to find still more effective ways to treat illness when prevention has not or cannot be achieved.

Medicare is truly a major part of our progress in providing better care to adults. It is heartening to know that at least a part of the burden of sickness is being lifted from the shoulders of older people. More than this, most of us believe that many of our senior citizens will now get needed treatment which before was unsought through fear of financial embarrassment.

We hope that the current attack on the killer diseases—heart, cancer and stroke—through development of the Regional Medical Centers concept will extend the best and latest curative methods throughout the Nation, not just within the walls of the relatively few and most advanced teaching hospitals, clinics and research centers.

All this is solid progress—and vital. Certainly, I am not saying we need less progress in treatment. Rather, we need more progress in prevention. For in a very real sense, the long-range goal of medical science is not the treatment of disease but the preservation of health.

One pioneering development in preventive medicine I had the privilege of observing not long ago is an imaginative program being carried out by the Kaiser Permanente Health Foundation in California. There we saw a health testing program which utilizes automated equipment and computer techniques for providing a comprehensive battery of tests to large numbers of persons with a

minimum of time and cost. The findings help the physician complete the health examination of more individuals in less time by providing him with documented results of many tests performed by technicians on apparently well persons. This program was supported by a Public Health Service grant, and I am sure you will be hearing more about it in later testimony.

Recent advances in the field of automation clearly present us with most welcome opportunities to make medical testing services more widely available, to heighten their effectiveness, and I hope, to bring down costs. I suspect, however, that we still have a long way to go to achieve general acceptance of some of these new-fangled approaches to medical care. Although Americans have a reputation for loving gadgetry and mechanical contrivances, we are still conservative about making changes in what we consider to be basic institutions. For this reason, the role of the innovator in such fields as education and medicine—(especially the latter)—is not always easy or comfortable.

Nevertheless, the trend is clear—automation must be wedded to medical care and the public will come to accept new methods of receiving care. Otherwise, we will not meet the challenge of making available to every American the best that medical research has to offer and doing so in time to prevent or curb the risk of disease and disability. Meeting this challenge to stretch limited resources, to satisfy the rising demands for health protection for growing numbers of people—all this must be the next major phase in the development of health care in this Nation.

It is my fervent hope and belief that the expert witnesses whom you have called upon will deal with these issues in detail during these important hearings. Along with you, I will be looking for answers to some very serious problems.

What, for example, are the values and limitations of periodic health appraisal in preventing untimely death, long-term illness and disability? Can we measure these? Is it really impractical to think of preventive care for all of our adult population? Is it really a question of simple arithmetic—too many examinations X(times) too many people X(times) too few doctors? Can we bring to bear the results of research and new developments in medical technology so that what looks at times to be an impossible equation emerges as just another difficult problem to be solved? Can we afford the time required (under the best of circumstances) for massive preventive programs when we have so many sick people who need more and better attention right now? Conversely, can we afford the loss of life or lessened capacity to live as productive human beings which will surely continue if we do not pay greater heed to health protection for the adult?

I had the opportunity of expressing my convictions about health protection when I introduced the Adult Health Protection Act in the House. (Your colleague, Senator Harrison Williams, introduced a companion bill in the Senate.)

My bill would authorize the Surgeon General of the Public Health Service to make grants to medical schools, community hospitals, health departments, and other nonprofit agencies to establish and operate adult health protection centers. It would authorize grants for the establishment and operation of these centers for a period of five years.

The system envisioned in my bill will do more for preventive medicine and health protection than anything yet proposed. In addition to many other features, it will bring modern instrumentation and computer use to bear on the recognized, growing health problem represented by chronic illness and the increasing scarcity of professional health personnel.

I propose for the first time to provide Federal assistance in the establishment and operation of regional and community health protection centers for the detection of disease; to provide assistance for the training of personnel to operate such centers; and to provide assistance in the conduct of certain research related to such centers and their operation.

While these adult health protection centers are intended to provide an efficient means for the detection of abnormalities or indications of disease, they would not replace *full examinations*. Their purpose is to place in the hands of the examining physician a summary of basic data and to place promptly under a physician's care a person with indications of disease conditions.

The health protection centers would conduct training programs in the operation of technical disease detection procedures and would research and develop new disease detection tests and equipment. Additional grants to the centers would be authorized for operational research and for the establishment of internships to give on-the-job training to physicians, nurses, and technical personnel. The centers would also conduct community education programs on preventive health care.

Finally, a 12-man Advisory Council on Adult Health Protection would be established to advise the Surgeon General of the Public Health Service in the administration of this program. This Council will include men who are leaders in the fields of medicine, public health, public welfare, or representatives of national organizations concerned with the interests of the aging. And it shall include one or more national leaders known for their dedication to the national interest and the welfare of the Nation's citizens.

The basic idea behind the act, put simply, is this: to launch a genuine, nationwide preventive medicine campaign. By making these testing services available to any person age 50 or above, on a voluntary basis, we will encourage men and women approaching retirement to take regular health examinations and we will facilitate the giving of full examinations by practicing physicians.

When I introduced my bill in the House, I said essentially what I have said here: that the chronic diseases pose the greatest threat to health today, that prevention and early control is our only true weapon against these diseases and that, as a result, the means must be found to extend the best of preventive medicine to the greatest numbers of those who run the risk of chronic illness and disability.

I firmly believe this, and I believe, too, that these hearings will serve to speed the day when preventive medicine will be practiced more than it is preached to the end that all Americans will not only live longer but *enjoy* longevity.

Senator NEUBERGER. From talks with many of the witnesses who will now testify, we know that the topic of these hearings has generated excitement and interest in the medical community. We believe the time has come for us to share that mood with the Senate and the people of this Nation.

Our leadoff witness is Dr. Robert Ebert, who is dean of the Harvard Medical School. In addition, Dean Ebert serves as a trustee or director of numerous societies and foundations and he is a member of the President's National Commission on Health Manpower.

So, I welcome you, Dean Ebert, as our leadoff witness. If you will, come up here to this table, please. I am sure the witnesses will say, and I want to say it also, that I believe, in exploring this problem, we should differentiate between screening tests and a physical examination, and I think we have to keep that in mind.

Dean Ebert.

#### STATEMENT OF ROBERT H. EBERT, M.D., DEAN, HARVARD MEDICAL SCHOOL, CAMBRIDGE, MASS.

Dr. EBERT. Senator Neuberger, Senator Williams, I wish, first, to thank you for the privilege of appearing before this committee. I would agree with all of the remarks that have been made about its intrinsic importance.

I thought what I would do this morning, with your approval, is to attempt to put this, the matter of early disease detection, multiphasic screening, in some perspective in terms of health needs. I think all of us would agree that our Nation's most important asset is people and while we are blessed with great natural resources, only people can really be creative and productive and our ultimate future depends upon the welfare of our citizens.

If this human asset is to be nurtured, the best possible environment must be created for the individual and this must include adequate health services for all.

A defense can be made for any program which contributes to the Nation's health and if our resources were limitless, there would be little point in assigning priorities to one program or another. Since we must

face the limitations of money and manpower, some choice must be made and priorities must be set on the basis of what is feasible and what accomplishes the most for the Nation's health. No one would argue that disease prevention is the most valuable contribution which medicine can make to society. The work of Enders, Weller, and Robins followed by the development of a vaccine against polio by Salk and Sabin was a far more important contribution to the health of the world than all the treatments devised for the acute and chronic care of the polio victim.

Similarly, immunization against smallpox, diphtheria, and most recently, measles, represents milestones in the prevention of disease. Immunization has not been the only weapon in the conquest of disease. Mosquito control can prevent malaria, pure water can control typhoid fever and other enteric infections, and adequate nutrition can eliminate beriberi and pellegra. It is probable that the control of air pollution and elimination of smoking could eliminate certain kinds of cancer, as well as emphysema. It does not take a statistician to prove the advances you can make in the field of health.

Perhaps the next most important contribution which medicine can make is the specific cure for illnesses which may be fatal or which have a high morbidity. By far the greatest excess of great curative medicine has been in the field of disease. Rapid cure of syphilis thereby created the means of controlling this crippling disease. It remains a public health problem, but the development of potent drugs such as isodycin and streptomycin not only offers a cure, but an additional weapon against the spread of the disease. There are other examples of advances which have been made in the field of curative medicine, but these represent two of the most dramatic.

Unfortunately there are many diseases which we cannot prevent and many which we cannot cure. Hopefully the money spent on biological research will provide the basic understanding for the ultimate conquest of these diseases. Meanwhile, it would seem reasonable to apply as widely as possible the medical knowledge and skill which we possess to cure the diseases we know how to cure and to curtail, whenever possible, the progress of disease for which there is no specific cure. Yet it is the daily experience of anyone working in a large general hospital to see the late stages of disease which, if discovered earlier, might have been controlled so as to prolong productive life. Death and chronic debilitating illness are always tragic, but the tragedy is compounded if the physician knows that the patient sought medical attention too late. As a Nation we will always wish to provide the best care we can afford for the chronically ill, but it should be noted that the treatment of the end stages of disease is the least productive investment a nation can make in the field of health. There is a limit to the amount of money and manpower which any nation can devote to health. It would seem reasonable, therefore, that the highest priority should go to disease prevention and to early detection and early treatment of disease.

I hope I have made it clear that I consider the early detection of disease as one of greatest importance for I would now like to address myself more directly to this subject.

In the past there has been much interest and considerable activity in disease detection, but for the most part this has been done on a cate-

gorical disease basis. The National TB Association, State and local health departments, together with the U.S. Public Health Service, have for years carried out an important program of early detection of TB. The American Cancer Society has fostered programs of early detection of cancer and similarly other societies concerned with one or another disease have developed and financed programs for the early detection of specific diseases. These programs have contributed much, but they are limited in approach, since each is concerned with a single disease or organ and is less interested in the broad problem of preserving health.

In the more recent past—that is, since 1949—there has been considerable interest in multiphasic screening as the method of case finding.

As one examines some of the reports written in the early 1950's, certain advantages are emphasized repeatedly.

First of all, multiphasic screening is a more efficient and economical method of case finding than the categorical disease approach.

Second, it tends to be more favorably received by the public for there is less concern about a single disease. Very often the screening for TB or cancer, the actual fear of the disease, will sometimes prevent the person from being screened; when it is a multiphasic screening, I think that these kinds of fears of a specific disease is less.

Senator WILLIAMS. This is psychological.

Dr. EBERT. The other thing which has been interesting to note, one survey that has been made for glaucoma is that most of the patients who came in to find out if they had glaucoma were people already under treatment for glaucoma, and what they were really doing was checking the findings of their own physicians.

Sometimes the categorical search is not as effective.

Senator WILLIAMS. I think I understand what you are talking about. If you have a general area of examination, there is more likelihood that you will be amenable to taking the general examination that includes all of the components, rather than coming in for a specific test.

Dr. EBERT. Yes. The third thing is that the discovery of many cases of unsuspected chronic illness, particularly of disease in early stages, when treatment is most effective, has been obviously one of the stated advantages.

In addition, I think it conserves to a degree the patient's time. I hope you found it conserves your time rather than going through all of these separately, and it also conserves medical manpower, because quite clearly a wide range of tests can be done, lots of them by automation, and many of them by the use of technicians, and it saves the more highly skilled manpower which doesn't need to devote itself to this particular kind of screening, except in the interpretation.

Now, in addition to these advantages, a number of qualifications are made by those who have commented on this method.

One is—and I think you referred to this, Senator Neuberger—that it does not substitute for a periodic health examination. This is a screening; it is not really diagnosis. What it attempts to do is to either indicate that there may be disease present or there probably is no disease present, at least of the diseases that have been screened for, but it does not as a rule make a specific diagnosis.

Let me give an example of this. A screening film, X-ray of the chest, may show a spot in the lung. That by itself does not tell you

what that spot is, because it could be TB, it could be cancer, it could be histoplasmosis, it could be a variety of other things. It could be a patch of subsiding pneumonia. But it does pick it up at a stage when it would not otherwise be found. I stress the point that this needs to be followed with further study if it is to be meaningful.

Senator WILLIAMS. That is why we emphasize the screening that we suggest in the legislation which, of course, this committee cannot report. But screening is a preliminary to referral to the physician who can follow the finding.

Dr. EBERT. Right. But I think it should be stressed that very often disease is picked up which otherwise would go unsuspected. I think this is the point.

Senator WILLIAMS. What this preventive idea does is really put the warning light up and when the warning light is up, then the physician would be brought in to analyze finally just what the warning signal means. Is that not right?

Senator NEUBERGER. Yes.

Dr. EBERT. Another qualification or at least a warning that has to be made is that there has to be constant attention to the accuracy of the methods which are used so that the number of false positives or false negatives, that is to say, positives where there is no disease, negatives where there is, should be as low as possible, because obviously a false negative—that is to say, an interpretation of no disease—being present when it is, is clearly giving the patient a false sense of security; and equally a false positive can be psychologically quite disturbing to the patient and to the physician.

But the point is, this is simply a technical matter of how one works out the screening methods and this is within the limits of the technology. It can be done but, the point really is, there has to be careful appraisal of the accuracy.

I think today the technology of multiphasic screening should really present no great difficulties if done properly, because the development of things like the AutoAnalyzer permits rapid and accurate diagnosis.

Senator NEUBERGER. Auto-what?

Dr. EBERT. This is a machine called the AutoAnalyzer. What it does, it can very rapidly do a variety of blood chemistry studies, that is, blood sugar, nonprotein nitrogen, blood proteins. It can do a gamut of them and it can do them all on one sample of blood and can do them automatically, so they obviously save a great deal of time in terms of technicians, and this obviously can be applied on a large scale.

Senator NEUBERGER. I have just been told by staff counsel that the AutoAnalyzer is going to be demonstrated for us tomorrow. That is good.

Dr. EBERT. Right. In addition, it is possible to do certain kinds of psychological testing more rapidly and effectively than it was possible in the past. Obviously more advances are going to be made in this kind of automation of testing that will, and studies at the present time are going on in this area.

But the two most important problems, I think, in any program which applies itself to early detection of disease is, first of all, the technique for sampling the population or providing it to the population; and, secondly, the followup.

In order to do adequate screening of any sort, it is important to know what population is being screened and in a sense who is coming. If you do this, for example, out on the street corner, which is one of the ways in which screening has always been done, there is a kind of a preselection by the person themselves and very often it may very well be the person who least needs the screening. That is not always true, but there is a kind of self-selection, and to be most effective, screening should be done with populations which can be defined.

In other words, screening in factories, all people over 40, or screening—perhaps the most important area, and this sounds like a contradiction, but nevertheless it is true, that probably the most fruitful screening that can be done is in hospitals—patients in hospitals and out-patients.

The reason I say this is because in the first place, it is already a selected population of people who at least think they are ill, and secondly, unless screening is done, many diseases go undetected.

Senator WILLIAMS. Now, could I interject here?

Dr. EBERT. Please.

Senator WILLIAMS. We have this mobile unit right now within 300 feet of where we sit. It is on the street. This is rather comprehensive screening for potential illness or disease. How long is this unit going to be here—3 days? Three days.

You know, they are clamoring—the staff people, the secretaries, the men on the staff—to get an appointment and frankly they are trying to use influence. The schedule is filled, and they are trying to use influence to get a chance to be tested.

Dr. EBERT. I think this is absolutely right, Senator Williams, but I think this is precisely the point I wanted to make, that the people most knowledgeable about health and those who really have the best access to medical care today are the likely ones that are going to be screened.

In other words, the difficulty is getting the screening done in areas and with populations who have very little in the way of health services and don't know how to use them, because a part of this is obviously health education, and I think the population that one sees here is a group better motivated to preserving their health than many others.

Senator WILLIAMS. Now, this is a District of Columbia Public Health unit and this unit, evidently, moves around town. It has reached 30,000 people. I just don't understand waiting until they get to the hospital.

Dr. EBERT. Well, let me give you the example of this. I am not suggesting this is the only place where screening should be.

Senator WILLIAMS. I should not interrupt you. I have to go to make a quorum in the Labor Committee.

Dr. EBERT. I am used to being interrupted and I don't mind it at all.

Senator WILLIAMS. I understand.

Dr. EBERT. But the point really is, let me give you the example of screening chest X-rays.

Now, many patients who come into hospitals because of a particular illness would not in the normal course of events have a chest X-ray, because it would not be indicated. But it has been found that the most productive place to take chest X-rays on a screening basis is in the hospital.

Senator WILLIAMS. Now I am beginning to understand you. I hate to be personal about matters dealing with health. My father has been ill for 4 years, 5 years, with prostrate condition. Even though he has been in the hospital—in and out—several times, it was only recently they found that he had diabetes. This is exactly the point—

Dr. EBERT. This is exactly the point I am making, and this is a very easy place to do this kind of screening for all of these other things which really you are not there for, but it can be simply done and this is why I say this is one place where one can do the screening and actually the other thing really that one can do is, one can also follow it up, because no screening program will really be of any substantial value in terms of health maintenance unless there is an adequate followup of abnormal findings. There have to be adequate medical resources in the community which are available to the patient.

One is faced with the dilemma that the population with the easiest access to medical care is the one which is perhaps the least important to screen. There is more undetected disease in the central and in certain rural areas than in the suburbs, but there are also fewer health services.

So the point I want to make is it really doesn't do a great deal of good to screen if one does not make sure that there is the opportunity to follow up the findings.

Let me give you an example of this. This is a story told by one of my colleagues who is now with me and was in the Public Health Service for a good many years. As a young man he worked in a rural area on a venereal disease control project, and being an eager young man, he also thought he would do a little screening. So, among other things, he tested for diabetes and he found, one of the first days he spent in the clinic in a small town, a patient who had diabetes. It is easily diagnosed and easily proven, and he went to his superior and said, "Look, here is a woman with diabetes and we have to do something about it."

The supervisor said, "Why don't you go home with her?" So he did. He took a bus and they went back to the home and he found that she lived in a house which had no plumbing, no facilities, and there was only one doctor within an area of about 40 miles. He came back and he said, "Well, it was perfectly clear she could not be treated. There was no possibility of treating her with diet, there was no possibility of treating her with insulin."

This is an extreme example, but the point I want to make is unless one looks at both parts of this problem, that is to say, the part of early detection so that one can find disease early enough to treat, but also how you provide the care once it is detected, then I think it will not be the most productive effort that one could make.

Senator WILLIAMS. We need not more medical schools, but more opportunity for young people want to go to medical school to get into medical school?

Dr. EBERT. This is true, Senator Williams, and I think we need, as you have indicated, we need more physicians, we need more schools and we need actually to utilize more effectively the talent that we have.

Senator WILLIAMS. You know what happens to me. Maybe it happens to Senator Neuberger, too. Parents or young people come to me to try to help them get into medical school. Now, what can we do about getting anybody into medical school? So, these are limited, indeed.

Dr. EBERT. Right.



Senator WILLIAMS. We are undermanned. What would you say we are undermanned in terms of—physicians for population in this country?

Dr. EBERT. Well, this is a very difficult question to answer, Senator Williams, because it depends upon how—

Senator WILLIAMS. Is there not a rule of thumb, one doctor for every—what—1,000 population?

Dr. EBERT. Roughly. The point really is, though, and I think this is pertinent in a sense to this whole hearing, these formulas are based on, in a sense, the utilization of physicians as it has been over the last 50 years.

I think we have learned how to use people more efficiently or potentially we could. The very fact you can do this kind of multiphasic screening, and do it well without even having a doctor in attendance most of the time, proves you can provide efficient service most of the time if it is organized.

I think what it boils down to, we need more physicians, I would agree; we need more schools and the schools in existence are going to have to expand their schools.

Second, we need more people in the supporting health professions; and third, we need, and we need it badly, some effective and efficient ways of providing the care, particularly in areas which are undermanned and understaffed in terms of health and manpower. And I think in this latter part, in determining how you can best organize care, is the creation of models from various areas. This is one of the most productive places where this sort of screening could be done, because I think this is a terribly important part of health maintenance.

All I am saying is there is another step to it which is equally important, and that the two must really go together.

Senator WILLIAMS. I apologize for interrupting, but I just got a call. I have to go up there. Let me ask you this: How many applications for the Harvard Medical School do you have and how many can you take annually?

Dr. EBERT. We take about 120—

Senator WILLIAMS. And your applications run what?

Dr. EBERT. Around 1,200. In all fairness, however, I want to say that most of these people get into other medical schools that we do not take.

Senator WILLIAMS. Well, I will never bother you. I do not think it is our job. I apologize that I have to leave. This was very helpful testimony.

Senator NEUBERGER. Fine, you come back.

The more each witness talks, I know the more I am going to see how much I don't know and the questions we need answered. I do not want to detain you much longer, except to ask if Harvard Medical School, per se, is doing anything in this area or are you just interested in it?

Dr. EBERT. No; I think that as far as a specific motivating reason is concerned, there have been various activities that have gone on in the school in the past. Dr. David Rutstein has written about this and has been involved in the evaluation of multiphasic screening and determining it.

We are in the process, which is something which is somewhat closely related, to try to determine something about the health needs of the

populations which are teaching hospital curve and see whether we cannot organize better the services which are provided for these people or doing this or working with the people in Cambridge at the Cambridge City Hospital; the top three medical schools are working closely with the mayor and the city trying to help solve the problems of health by the Boston City Hospital.

I think there has always been an awareness on the part of the Harvard-affiliated hospitals of their responsibility to the community. I think, in addition, now we wonder if we should not look at this from the point of view of trying to develop models of how we can provide care more efficiently and, hopefully, more cheaply and also how we can detect disease early as a part of this.

Senator NEUBERGER. Thank you very much. We have Dr. George James, dean of the Mount Sinai School of Medicine.

We are certainly glad to see you again. I think you have changed hats since we met last. Dr. James and I have worked together in the area of preventive disease and the evils of cigarette smoking.

#### STATEMENT OF DR. GEORGE JAMES, DEAN, MOUNT SINAI SCHOOL OF MEDICINE

Dr. JAMES. That is right.

Senator NEUBERGER. Dr. James is the dean of the Mount Sinai School of Medicine in New York, one of our country's very distinguished physicians. I knew him as Commissioner of Health for the City of New York. He is a very close colleague of our good friend Dr. Leona Baumgartner, whom we all know in this field so well.

He serves as a consultant to the President's Office of Emergency Planning and to the U.S. Public Health Service.

In addition, he is chairman of the APHA committee on health manpower. Dr. James has long been interested in prevention of disease and we are indeed fortunate to have him with us today to give testimony on the subject.

Dr. JAMES. Senator Neuberger and members of the Senate subcommittee; I am delighted to be here to talk about a matter which is of very keen interest to me and has been throughout my career. What I will try to do today is outline the scope of preventive medicine within the total field of medical care, indicate its importance, describe some useful approaches to its exploration and emphasize the need to give greater priority to them.

I think it is important to note that today the full force of modern medicine is able to effect a major, year-by-year impact upon the trend of only a very few of the 20 leading causes of death and against none of the major causes of disability. The fullest application of what we are now capable of doing in therapy holds less promise than the hope offered by the new approaches of some future day.

The key to our present handling of chronic disease revolves around the institution. It is doubtful whether we can afford to continue to build institutions fast enough to meet the growing problem of chronic disease among our aging population.

I am reminded that by the year 1970 it is estimated we will have over 10,000 people in New York City over the age of 85, which is more than we have nursing home beds available for them, if they all have

to be put there, and there are large numbers of people over 65 that will also need institutional care unless we can do something about it.

Now, because of the relative impotence, then, of modern medicine to make a major impact against our modern cripples and disablers, we find it more useful in the medical and public health field to consider that the present quality of medical care is poor.

You can consider it is good if you go backward. But when you consider the diseases which lie ahead, you will have to say it is poor. It is poor because it is so far incapable of dealing effectively with our present killers and cripples. We need to look for some new approaches.

Obviously, one of these approaches is basic research, but also the field of preventive medicine must be explored. In order to understand disease better I think we need to consider it in its total history, and this begins with the earliest predisposing factors of disease and lasts until the last implication of the disease has occurred.

The first stage is composed of the risk factors, the one in which Senator Neuberger and I have labored together, the role of cigarette smoking being the first phase in the natural history of six or more major diseases.

Almost by definition, the population has been indifferent to the adequate practice of measures recommended for the control of our major chronic diseases. Our cigarette consumption has not decreased, our exercise output not increased, our highway speeds remain too fast, our middle-aged weight too consistently elevated, our fatty diets unchanged. Were these recommended measures well practiced, we would not have to present them as major challenges.

Third, because significant industrial interests in this Nation are deeply involved in any modification of the habits of our people, there is a natural reluctance to resist the upset of the economy of vast areas of our Nation in the absence of absolute, final proof. This is just the very type of absolute proof we are never likely to get, because of the complexity and impracticability of the studies required to achieve it.

Nevertheless, far more can be done to control first stage factors by the more complete use of human ingenuity. Fluoridation of public water supplies has engineered dental caries control. Seat belts and other automobile safety features can reduce the toll from highway accidents. Research in cigarette filtration and the chemical content of tobacco may someday reduce the toll from lung cancer and heart disease, and the food industry even now possesses the technical knowledge which would make possible an extensive reduction in the saturated fat content of the average diet without affecting palatability.

The second aspect of disease, the stage 2, begins as these processes start to develop within the patient. By means of detection tests, scientists are becoming increasingly adept at finding these early, symptomless signs of early illness. In fact, many of these same tests can also detect changes so early that they are more nearly indicators of a possible risk factor than a developing disease. Valid detection tests, as Senator Neuberger has mentioned, exist for a large number of illnesses: diabetes (our seventh leading cause of death), glaucoma (our second leading cause of blindness), hypertension, coronary heart disease, anemia, tuberculosis, lung cancer, syphilis, nephritis, cervical cancer, gout, and many more. Some indicators of first-stage risk, such

as higher-than-average blood sugars, serum cholesterol, and uric acid may also be a first step in a program for the maintenance of health.

To the charge that final research proof is lacking, that detection tests actually do lead to a saving of lives, we have a simple reply. The existing scientific data proving the value of the control of risk factors and early treatment after the use of a detection test are every bit as good as the data upon which we base the application of many well-established clinical measures after chronic disease strikes.

The patient with a coronary occlusion is put to bed, given oxygen, heart stimulants, and possible anticoagulants. The research proof for the validity of any of these measures is quite inadequate. Second, early detection allows us to work with a clinically well patient, offering the hope for keeping him so, instead of fighting an incapacitating illness requiring extensive rehabilitation at much social and financial cost. Third, we cannot condone the principle of the value of ignorance. Even were we impotent to be of assistance, the knowledge of the existence of early disease or risk factors must be considered as an observation of high relevance to the possibility of eventual control. Here is an area over which we must throw more light, where more research must be done—denial of its existence, failure to recognize its presence firmly closes the door to hope for its exploration. As indicated above, our record in the control of chronic disease limited to the clinical approach is not so good that we can afford to ignore the opportunity for fresh approaches.

One overriding difficulty in detection programs has been the lack of patient interest. Even in sophisticated New York City, where an active health department is engaged in the widespread development of detection programs, the following data are highly revealing:

Each year the New York health department clinics detected only one-fortieth of the estimated existing but unknown cases of carcinoma of the cervix, one-fiftieth of the unknown cases of diabetes, one two-hundredth of the unknown cases of glaucoma and only one-half of the unrecognized cases of infectious tuberculosis, where they have one of the largest and most comprehensive programs.

The solution of this problem lies more in our ability to engineer the technique to the normal habits of our population rather than in massive programs of health education. The straddling of crowded city streets with tuberculosis X-ray trailers has proved far more effective in producing high chest X-ray yields than health education and an appointment system.

A routine program of "Pap" testing of all female admissions to the inpatient and outpatient services of a general hospital has proved far more productive than instructive talks before women's clubs.

Senator NEUBERGER. May I interrupt right here?

Dr. JAMES. Of course.

Senator NEUBERGER. The thing I noticed when I first started reading about the screening setups that are now available was that they did not include a Pap test and one other test that I thought was essential—I have forgotten now.

Anyhow, is this a shortcoming? I realize it is not a physical exam, we are trying to keep that difference very much in mind but should not every woman patient who goes through a screening test have a Pap test?

Dr. JAMES. Yes; I would definitely say so. What we would like to see is that every individual who comes to medical attention, who is a female, at the adult age, would receive a Pap test as a routine part of the procedure. If this were a routine part of admission procedure of all patients, we would not now be having 300 deaths from this cause in New York City.

Senator NEUBERGER. You could easily save 300 preventable deaths from that disease?

Dr. JAMES. Yes; and the cost of hospitalization of these patients is probably well over \$1 million a year. Terminal cancer of the cervix is a long, drawn out affair.

Senator NEUBERGER. And yet will it be very expensive to add a Pap test?

Dr. JAMES. It has some inherent costs, of course, but the cost is by no means prohibitive, and we are very happy that more and more hospitals are beginning to do this. They began doing it when the patient is admitted to the obstetrics and gynecological, but some hospitals have begun doing it for all female patients, not only to the inpatient admissions and hopefully to the outpatients.

Senator NEUBERGER. I think your sentence is perfect—

A routine program of "Pap" testing of all female admissions to the inpatient and outpatient services of a general hospital has proved far more productive than instructive talks before women's clubs.

Dr. JAMES. Right. We have to engineer the services somewhat to fit in with the way people normally live. If they have to get up in the morning with the idea in mind of going for a test, we do not get as many as if we arrange the test to fit into their normal way of life.

Senator NEUBERGER. Thank you.

Dr. JAMES. The third stage of the natural history of disease is the regular clinical medicine period. It is what most people think of when they think of medicine, doctors, Medicare, veterans medical care, and what medical schools are supposed to teach.

But clinical medicine is greatly dependent upon the symptoms for its opportunity to get at the patient.

However, in chronic disease the symptom is a poor indicator of both the significance of the disease and the best time at which to attack it. One study of patients with cancer indicated that people from certain cultures are twice as willing to seek medical care after a given symptom as those raised in a different cultural pattern right within the United States.

Moreover, in many types of cancer and numerous other chronic diseases the practice of waiting for the symptom to appear can greatly lessen the chances for survival and increase the risk of disability.

Just to complete the four stages—the fourth stage of the natural history of disease is the chronic period when hope of cure is replaced with the goals of disability limitation, rehabilitation, and readjustment of the individual and his environment in a way which will permit him maximum of self-sufficiency, dignity, and social usefulness. Ideally, a full-scale medical care program for our population should proceed as follows:

One, all first stage risk factors should be identified and regimens established to modify as many of them as possible.

This is exceedingly difficult with the risk factor involved in chronic disease, but, nevertheless, as I have listed earlier in the testimony, but not read here, there are some things which can be done and, as a matter of fact, some are underway.

Two, if we fail at this stage in the risk factors then we should attempt to detect early stage 2 disease processes so that prompt therapy can be started.

Three, if we fail here and symptoms do develop, then we must offer the best of stage 3 clinical medicine.

Four, if our best is not enough to effect a cure, then we must apply the rehabilitation, environment-adjusting, disability-limiting medicine of stage 4.

So really we should try to attack these diseases before they start and in their early stages and then clinically if we miss preventing or detecting them. Finally if we reach the rehabilitation phase, we must then do what we can.

It is important to treat the whole patient and not just the symptom. I like to tell the story about a woman who has a cut finger and comes to the emergency room. If the physician, as he characteristically does, limits his treatment to the care of that finger, he is treating the finger and not the patient.

If the doctor had observed this woman in the waiting room he would have noticed she was reading a magazine by holding it at arms' length, thus he missed an opportunity to treat a patient in the fourth stage of the disease "farsightedness."

If he had observed her finger closely, he would have noted deep nicotine stains, and thus could have begun instituting control measures for excessive cigarette smoking, the first stage of several major chronic illnesses. Then, if he had performed a "Pap" smear, he might have detected and cured the second stage of early cancer of the cervix. What he actually did was to limit his program to third stage medical care to a finger. He failed to treat the whole patient.

The best medicine of the future will probably, therefore, be practiced on a population basis. People may someday begin taking as good care of themselves as they now do of their automobiles, which are generally sent for at least a spring and fall checkup. Each of us at all times is in various stages of the natural history of a dozen or more diseases. Generally, the term "preventive medicine" has been reserved for the attacks upon the first two stages of disease. However, in a larger framework we might accept as preventive medicine any procedure which interrupts the natural history of disease at any stage in favor of the patient. Certainly, as we view the relative impotence of modern stage 3 medicine to deal effectively with our major killers and disablers, we must do all we can to expand our still meager efforts during stages 1 and 2.

The best medicine of the future will probably see whole families coming periodically to receive detection and treatment by teams of specialist physicians and medical auxiliaries using the latest technologies. Detection tests will no doubt play a large role in this arrangement. Both the risk factors and early disease processes detected will become the subject for the same intensity of research, education, and therapy which now characterizes our approaches to third stage clinical medicine. Until we can demonstrate our effectiveness against these

serious illnesses, we cannot afford to omit any promising lead. We certainly cannot afford to ignore a large portion of the natural history of those very diseases which we are dedicated to understand better and to control.

One of the most productive ways to aid this program would be to give selective attention and support to the creation of the future trained leaders in preventive medicine. This could be done by offering major support to the places where these men can be trained and where research in these fields can be done—the department of community medicine in the schools of medicine and public health. While the further development of the relevant technology is encouraged, while more research funds for preventive medicine studies are provided, it is hoped that the Congress will make possible a major support program for those departments. They are now generally neglected and weakly staffed. Here the trained manpower for the future of preventive medicine can be recruited and provided, and here can develop the ferment of research activity which will provide the new knowledge about its potential and promise.

Senator NEUBERGER. Your concluding footnote is of great interest. As you now are a dean of a school of medicine, what is the attitude of a medical student—does he visualize himself working in the field of preventive medicine or does he visualize himself developing a heart operation or a cure? He wants to be at the other end of it, does he not?

Dr. JAMES. Yes, he tends to accept as his models the professors of his own institution and, therefore, he finds many more highly skilled individuals in the glamorous fields and there are very few people around to teach him the glammers of a preventive medicine field. There are some notable exceptions that I feel if we can get good people to go into preventive medicine, if we can build up the depths in the medical school, we will be able to attract students to this particular field.

I might add again as a personal footnote that this is part of the reason I went into medical education, to see if this could be done.

Senator NEUBERGER. You can just see on the face of it a starry-eyed young man facing many years in school and probably going into debt to get this education. He does not see himself as one who prevented somebody from getting cancer or emphysema, because then he would be an unsung hero. It is a kind of natural trait. It is like a saying around the Congress that no statues are ever erected to people who save money and yet they may be playing an important role in the whole scheme of things.

I do appreciate your testimony and thank you so much for being one of our early witnesses on this subject.

Our next witness is Dean Walter Beattie, dean of the school of Social Work of Syracuse University. He has a very deep and continuing interest in gerontology and is the past president of that society.

We welcome you and your comments.

#### STATEMENT OF WALTER BEATTIE, DEAN, SCHOOL OF SOCIAL WORK, SYRACUSE UNIVERSITY

Dr. BEATTIE. Thank you very much, Senator Neuberger.

I am very pleased and privileged to be here, because I am most concerned with what I would call the DCD's of chronic illnesses; that is,

the social determinants, concomitants, and derivatives of chronic disease and their meaning to the individual, his family, and community.

The chronic diseases and our approaches to chronic disability and long-term care is challenging the traditional goals and methods of medical care and social service. The longstanding goals of prevention, treatment and rehabilitation are undergoing a critical examination. The fact that you are considering the role of multiphasic health screening techniques for the early presymptomatic detection of chronic diseases is a significant stride in this direction. The establishment of programs which have as their goals the prevention and early treatment of the chronic diseases should do much to prevent the tragic social consequences of such diseases for all in the population, and in particular for those in their later years.

To speak of the social dimensions of multiphasic screening is to emphasize that our ultimate concern should not be limited to the detection of chronic disease, important as this may be. Our ultimate concern should and must be the full social functioning of each individual to the highest level possible within his inherent potentials and capacities. We must apply existing knowledge to provide each individual the opportunity for full participation in our society and to permit him the right of self-direction and self-mastery. Our ultimate objective must be the right of all persons to enter into family and community life.

Multiphasic health screening at a presymptomatic disease level is essential. It must, as part of the screening and detection procedures, include an identification of those social and environmental situations which are interdependent with disease. In recent years we have come to recognize the interdependence of health and illness with the social conditions and circumstances in which the individual lives. I would, therefore, like to underscore the importance of concerning ourselves with the social factors inherent in chronic disease and its prevention. It is imperative that medical followup to multiphasic health screening include the applications of social treatment and preventive measures to those social-environmental situations which are associated with such diseases.

Let me be specific as to some of the social and human values which are threatened and often destroyed by the chronic diseases and long-term illness. While such diseases should not be defined or equated with aging, it must be acknowledged that among today's elderly is to be found a higher incidence of a variety of chronic diseases and disabilities than is to be found among the overall population. Many of the tragic conditions found among today's aged are closely associated with our past and present emphasis on treatment of chronic disease after the fact. Today we have the opportunity through scientific and technical advances, to apply multiphasic health screening techniques to the total population and to prevent among tomorrow's elderly the social breakdown which is much too often the concomitant of chronic disease.

Let me turn, first, to the individual and, secondly, to the community and society to underscore those social dimensions of chronic disease which should be considered in assessing the importance of applying multiphasic health screening to prevent long-term illness. To the individual, far too often long-term illness results in the loss of self-mastery and an increased emphasis on dependency—physical, psy-



chological, emotional, economic and social—in a society which places a high value on independence. With acute illness, dependency is short lived and temporary, with chronic disease it all too often becomes the lifelong consequence of the disease and of our failure to apply preventive and rehabilitative measures. Among many of today's aging we see the ultimate consequences of chronic disease. Much of this reflects our societal failures where, for the individual, long-term illness means a breakdown in his social roles and relationships. Our approach has meant, in general, a change in social surroundings, away from the individual's own home and family to a room, and ultimately to a bed in an institution. Here we should note that our definition of facilities for the care of the aging and chronically disabled is mainly in terms of beds and not in terms of people, their social needs and conditions.

Related to the above is the depersonalization of the individual which occurs when chronic disease leads to long-term physical impairment and long-term care. Individuals lose their social and self-identity and become stereotyped according to the labels which we so effectively use to reject such persons from our community life. When man thus becomes isolated from his fellow man, he loses that which makes him a human being. All men must belong to a social group. As a society, our approach to aging and long-term illness is that of dehumanizing and depersonalizing the very essence of the human being.

To the community and society the social significance of chronic disease must be that of the loss of our basic human resources. Our goal should be to conserve such resources and to enhance their contributions to the society. Not only is the individual who is affected by chronic disease and chronic disability—and I would distinguish between the two—a loss to his family and community, but his state of dependency, to which I have already referred, becomes an additional strain on our already limited manpower resources. I am sure all of you are aware of the great scarcity of professional and technical manpower in the helping professions, including those concerned with medical care and social service. By 1975 it is estimated that one-half of our population will be either under 18 or 65 years and over. We must take appropriate steps to assure that these, the higher consumers of health and social services, will have appropriate health, welfare and educational resources available to them. If we do not apply preventive measures to illness and promotional measures to health, we will be further handicapped in the optimum use of our present and future manpower resources. If, through multiphasic health screening measures, we can prevent some of the breakdown in the health and social conditions of those in their middle and later years, we should be able to free our manpower for other requirements of our society.

Our past approaches to chronic disease, long-term illness and aging have emphasized limited treatment goals along with custodial care. Greater emphasis has been placed on the building of facilities than on the provision of a full and comprehensive range of health and social services. Through multiphasic health screening, which has as its goal the prevention of long-term illness and the promotion of health, our fiscal resources can be more appropriately used for services.

American society is increasingly composed of four-generation families with much evidence of five-generation families emerging as more and more older persons live a fuller lifespan and as earlier ages for

marriage occur among the younger population. Again, this has many implications in regard to health and social service goals and our programs and methods to implement them. The tensions and strains developing among each of our generations as to their reciprocal roles and responsibilities to one another is evident. Today's 40-year-old is too often concerned with his responsibilities toward his 60- or 70-year-old parent who, in turn, is facing retirement and who is also concerned about his 85- to 90-year-old parent. At the same time the 40-year-old may be anxious about his 20-year-old child who is getting married or indeed having a first child. The prevalence of chronic disease and the tensions of long-term illness of those in such families too often results in social breakdowns which could indeed be prevented through the application of medical and—I would like to underscore this—social knowledge at all stages of the lifespan. Public policy and program development in the medical care and social service areas cannot be intelligently considered without a consideration of the changing structure and composition of the American family and the intergenerational aspect of such policies and programs. Again multi-phasic health screening must be considered in regard to such changes and the positive implications it could have for the individual, the family and the overall society.

Much has been written in recent years of the interdependence of some of the chronic diseases with poverty. Studies have revealed that the hard-core problems associated with health and illness are associated with the hard-core problems of society. All too often our public policy is developed in one area of social concern which negates the efforts of public policy in another area of public concern. The social problems associated with chronic disease and with aging in our society are interrelated. Public housing for the elderly was designed to assure adequate housing standards for those large numbers of our elderly persons too impoverished to afford on the open market safe and decent living arrangements. Public assistance for the aging was designed to provide for limited, but essential, income for those elderly persons who cannot survive otherwise. I should note that in the majority of our States such assistance grants are below the levels of survival needs. All too often, when the old-age assistance grant is increased a few dollars, the public housing rental charge is also increased. Again, many elderly persons, including those in public housing, because of the fear of outliving and exhausting meager economic resources and of not being able to maintain their limited households and the security such households represent, an older person may attempt to "save" by cutting down on food expenditures. Such attempts at saving all too often contribute to malnutrition which, in turn, contributes to long-term and costly illness and disability, forcing the individual to exhaust his remaining financial resources, gives up his housing and reduces his social activities and associations.

If I could depart right here from my prepared statement, I would like to say in several communities where I have worked professionally with health and welfare programs, I have found many persons in the area of public housing suffering from malnutrition but with very little identity of this in any of the health and welfare services programs working with them as clients. Public assistance, public health programs and so forth, none of them taking the long view and

really trying to determine the social concomitants that are related to the chronic disabilities.

Here again, if multiphasic health screening measures could be applied to all in the population, especially those in their middle and later years, it should do much to reduce the tragedies which I know from personal experience exist in the majority of our communities and households throughout this Nation.

Our need is to mount a comprehensive program truly aimed at the prevention of chronic disease. Multiphasic health screening is essential to such a program. We must move from our more traditional treatment and rehabilitation approaches to the provision of services which will have as their goal the treatment of health and social functioning and the prevention of illness and social dependency.

I would like to urge this committee to carefully consider the use of multiphasic health screening within the context of a variety of social conditions.

Here I will depart a little from Dean Ebert, not because what he says is not so, but I would broaden the scope by trying to get at target groups where we already know there are social conditions highly associated with the chronic diseases, and attempt to ferret these out and try to measure whether we treat the person or treat the person *in* his social condition as part of the followup. I would like to emphasize this, because I think in the social services we have developed techniques for a diagnostic screening. Although we have not automated such techniques, I believe, that with appropriate financial support we could further our work in this direction.

To do this, not only must we provide multiphasic health screening as a basic community health service, but we must recognize that such screening has to include social diagnoses and evaluation if it is to be effective. It is essential that we demonstrate new approaches to the organization and provision of preventive health and social services. It is imperative, therefore, not only that such services be provided, but that we direct our attention to the training of persons capable of doing this and provide the fiscal resources necessary for their training.

Thank you.

Senator NEUBERGER: I appreciate your testimony a great deal. I think to give us a well-rounded picture as we study this problem, it is necessary to hear people of your profession, as dean of the School of Social Work at Syracuse University, to add to the ideas of the medical profession.

I was interested in your statement that it has been found that, when a few dollars are added to old-age assistance, the cost of housing goes up. This reminds me that Dr. David Rutstein, whom Dean Ebert referred to as head of the Department of Preventive Medicine at Harvard, said they noted at NIH that every time the Congress approved greater, wider appropriations for study of disease, and cures and treatments, the cost of medical equipment goes up.

Your reference to the poverty, the social problems, actually typifies why a good many members of the committee cannot be here. It is no accident that the missing committee members are also working on the poverty program today; that they are interested in these two things simultaneously.

Dean BEATTIE: I think this is a very important thing that we try to fit whatever programs we develop into an overall goal rather than to

have them fragmented. At the local level, communities face great problems of how to put these programs together, and I think if we truly want to prevent chronic disease, then I think we have to mount this within the framework of the social and family situations.

Senator NEUBERGER. Thank you, Dean Beattie.

The next witness will be Rev. Robert P. Slattery, who is the director of the Cardinal Ritter Institute, St. Louis, Mo.

For some years now, I should tell the audience that the Committee on Aging has been keenly interested in practical programs conducted for older Americans. In Greater St. Louis there is the Cardinal Ritter Institute; it is a separate department of Catholic Charities. It has pioneered in several important new programs and particularly the home care project underway. We are very honored to have Rev. Robert P. Slattery, who is director of that institute, here today.

**STATEMENT OF REV. ROBERT P. SLATTERY, DIRECTOR, CARDINAL RITTER INSTITUTE, ST. LOUIS, MO.**

Reverend SLATTERY. I should preface my remarks by saying this statement is of His Eminence Cardinal Ritter, and he asked me to express his regrets that his attendance was not permitted here today.

In 1863 Lord John Acton wrote:

There is an outward shell of variable opinions constantly forming around the inward core of irreversible dogma, by its contact with human science or philosophy, as a coating of oxide forms around a mass of metal where it comes in contact with the shifting atmosphere. The church must always put herself in harmony with existing ideas, and speak to each age and nation in its own language \* \* \* From time to time a very extensive revision is required, hateful to conservative habits and feelings; a crisis occurs, and a new alliance has to be formed between religion and knowledge, between the church and society.

The late Pope John XXIII and Pope Paul VI have spoken loudly, clearly, and often on the reconstruction of the social order that is demanded by the crisis of our times.

Two of the basic tenets flowing from the recognition of need for reform—or updating of the church—and seen as essential ingredients in forming this necessary alliance with the world of today are—

One, the ever-present need for a critical and practical appraisal of the situation of the church in all its social, economic, health, and cultural settings.

In brief, living in our own times, accepting the inevitable results of the evolution of human society and finding ways of adapting our individual skills and our relations with one another to the circumstances in which we actually live.

And, two, an openminded, sustained, and humble discussion that would cross all denominational barriers, a positive attempt to discuss differences and seek unity.

To paraphrase Pope Paul's message to the Catholic University of America on his recent visit to the United States: Catholic agencies should pursue their work in full concert with all other efforts being made in the United States. Great progress has already been achieved in interagency collaboration which is productive of mutual respect and esteem.

In light of this general framework the church through its organizational structure seeks to extend its interest and concern to all men of good will and seek solutions for common community problems.

One important area of great concern and interest is the matter under discussion today; namely, a national program for the early detection of tendencies toward chronic illness.

At the onset I must state that my remarks on this subject reflect the thoughts of an interested observer and reporter—not those of an expert in the health field.

It is generally agreed that the problem of chronic disease seriously affects the welfare of the community—both young and old alike. It has been increasing in the past 10 years. Chronic illness, particularly in the aging population, has brought social, economic, and medical problems of vast proportions. A considerable body of documentation has demonstrated its serious effect on large numbers of people, its long and costly disability process and the fact of it becoming the leading cause of death.

Aware of the growing number of older persons and the concomitant increase in chronic illness, Catholic Charities of St. Louis has given serious thought and study to meet the shifting needs of people confronted with this problem.

Beginning in 1950, Catholic Charities, with the assistance of both local and national consultants, conducted a complete and thorough survey of the needs of the aging in Greater St. Louis, and the ability of existing resources to meet those needs. This survey considered each institution and nursing home separately and every patient or client was individually interviewed.

Carefully studied and reviewed in each instance were the buildings themselves, their conformity to standards, and their suitability to the purposes for which they were being used; intake procedures and methods; financing; programs, which included medical care, diet, recreation, nursing, and rehabilitation; and staff.

Also studied at that time were the nine Catholic hospitals and their aged and chronic sick patients as well as hospital programs for the aging.

This survey included also the study of a total parish and the aging living in their own homes or with relatives in that parish. This was intended to broaden the scope of the survey to include all aging, both those caring for themselves or living with their relatives, as well as those who needed the help of an agency or institution.

Because of the increasing number of aging in our area and as a result of these surveys, services and programs were developed and expanded. Institutional buildings were remodeled or improved to meet current standards; volunteer programs were developed; a hotel was purchased and remodeled to provide residential care for 240 aging people; 1 institution was converted from a combined maternity hospital, infant home, and home for the aged to an institution offering both residential and nursing care for the aged; and another changed from residential to nursing care.

A decade of valuable study experience and the recognized need for specialized services to the aging in the Greater St. Louis area culminated in 1961 in the establishment of a separate department of aging in the Catholic Charities organizational structure. In January 1965, the agency acquired its own distinct status and is now known as the Cardinal Ritter Institute of St. Louis—with the primary goal of providing creative care for the older person.

Some of the chief functions of the institute are :

It assists 23 institutions, homes for the aged, nursing homes, and hospitals in planning and developing programs and services for the aged and chronically ill in the Greater St. Louis area.

It provides creative care for the individual older person including nursing, social work, and home health aide and other paramedical services.

It develops programs such as home care for the older person. This latter program, home care, was made possible through a 3-year grant award from the U.S. Public Health Service in 1964 for the purpose of establishing, operating, and evaluating a non-hospital-based, community-oriented comprehensive home care program for the aged and/or chronically ill.

The jurisdictional boundaries of this program have already expanded from one local cooperating hospital to three at present with the inclusion of seven additional hospitals in the very near future. The ultimate plan would include all St. Louis City and County and neighboring county, and this program, I might add, is also certified under the Medicare law.

In brief, the institute seeks to demonstrate the effectiveness of a comprehensive home care program by achieving these objectives :

To keep the older person in the familiar surroundings of his own home.

To keep the older person out of nursing homes and homes for the aged as long as possible.

To free hospital beds for the acutely ill.

To prevent medical indigency by preserving the older person's resources.

To prevent or postpone disability.

In the general area of prevention of chronic illness, several notions can be stated. First, our approach has been oriented more toward prevention of progression rather than prevention of occurrence of chronic illness.

For example, the home care program has provided an excellent opportunity to demonstrate this prevention of progression approach for the aged and/or chronically ill. This approach takes into account the acute conditions and accidents which aggravate chronic illness. It accomplishes this end by use of the trained professional and nonprofessional members of the home care team in detecting symptoms which forecast conditions of acute illness or potentially hazardous conditions in the home.

The results, obtained on this score by varied research methods, have thus far been encouraging. In particular, one home care team member, the home health aide, has proved to be an invaluable informational source in this regard.

In addition, the information obtained by this method is relayed to the patient's private physician at regular intervals or sooner—all dependent upon the nature of the patient's progress or nonprogress. Armed with this material and aware of the constant monitoring by home care team members, the physician's time and effort is maximized and he, therefore, can provide better quality care to the patient.

Similarly, a program of prevention—partly prevention of progression and partly prevention of occurrence—is conducted in the institu-

tional settings in the archdiocese of St. Louis. It consists of a thorough social and physical examination required of every new applicant and repeated regularly. This serves the purpose of determining the applicant's eligibility for the home and, if found eligible, helps decide what services are required.

The examples cited demonstrate a concern and familiarity with the personal health and social catastrophes that beset the aged and the chronically ill person. While helping the individual cope with his particular problem is important, we feel that we have a more important obligation; namely, to help the community cope with the underlying causes that create the problem of chronic illness. This means developing a clear understanding of the problem locally, the resources that can be brought to bear, and joining with other agencies, both private and public, in mounting an effective attack on the conditions which deny security and opportunity to the older person.

In keeping with the letter and spirit of the foregoing thought, the Cardinal Ritter Institute seeks the first goal of prevention—prevention of occurrence. It sees that the only hope of stopping the progress of chronic illness lies in early detection systems with proper followup procedures. We see early detection systems with appropriate followup as a tremendous aid in pinpointing the precise level of care for the patient along the health care continuum.

For example, the data obtained from the detection system, properly assessed and followed up with the physician's diagnostic evaluation, would give some better clues to proper patient placement—whether a home care program, or nursing home, or custodial home, or hospital is the proper environment in terms of the total medical and social picture elicited.

In addition, the institute in an attempt to maximize delivery of quality health care has submitted a demonstration proposal to the Administration on Aging. The proposal presents an organizational restructuring as a means of utilizing in a maximum way the scarce professional personnel and institutions available and at the same time making sure that people are receiving the level of services which they need and are not "overplaced" or "underplaced."

It is an attempt to get away from the fragmented service pattern so common to the health field today and the creation of a new living organizational structure—not one inured to a past social environment.

We, therefore, don't see the implementation of an early detection system for chronic illness being determined by limited health care personnel. In fact, we see this prevention aspect as a fertile area for new job opportunities—opportunities for the vast untapped reservoir of the disadvantaged groups in society.

In light of the preceding it becomes quite clear that chronic illness which virtually incapacitates people completely and permanently is one of the great challenges confronting the Nation today. For some the statistics on the mounting tide of chronic illness and its damaging effects may seem distant or academic in nature only. If, however, one could go behind the statistics to the individual or individuals affected—one would then be better able to measure its damaging effects by seeing it engulf the individual or family in pain of despair or death—by seeing it sap the foundation of family life and community life in all parts of the country.

If we have the necessary foresight and fortitude to disavow our present fireman's approach to the problem of chronic illness, we truly recognize the shifting pattern of illness today and give proper recognition and attention to the maintenance of good health as a priceless possession for ourselves and for our children. If the development of a national plan for early detection and prevention of chronic illness could be implemented which would but partially alleviate or minimize the awesome social, economic, health, and personal losses, it would be a blessing to the Nation. It would be a first step but a meaningful one to restore the worker to industry, the citizen to society, and the man to himself.

If I may be permitted a digression—the St. Louis Football Cardinals were blessed with victory over their opponent 2 Sundays ago because they used a pretty good “prevent defense” against the long pass in the closing quarter of play. It may not always work but when it does—there is joy and happiness in St. Louis. The point is that perhaps we ought to consider the merits of a national “prevent defense,” as it were, against chronic illness.

In sum, we wholeheartedly support and endorse a national plan for prevention and detection of chronic illness.

Let us subscribe to Emerson's dictum, namely that—

The first wealth is health. That sickness is poor spirited and cannot serve anyone; that it must husband its resources to live. But health answers its own ends, and has to spare; runs over and inundates the neighborhoods and creeks of other men's necessities.

Further, borrowing from and applying the practical wisdom of the late Pope John XXIII to the challenge before us, let us strive more to find points of agreement in this area than to explore every minor area of difference. Let us never, “under pretext of the better or the best, omit to do the good that is possible and therefore obligatory.” Let us as Pope John stated, “Put our hands to the plow, and not spend our days merely wringing them.”

Our involvement in this health prevention effort is motivated by a desire to serve. We feel that we have a contribution to make, and we seek to make it.

The beautiful words of Pope Paul VI before the United Nations come to mind here:

We have nothing to ask for, no questions to raise; we have only a desire to express and a permission to request; namely, that of serving you insofar as we can, with disinterest, with humility, and love.

In a sense, we offer the treasures of the church; the service of our institutions and agencies, the support of our people, the depth of our experience, the guidance of our beliefs, the comfort of our love. We want to participate in the great health and social welfare efforts of our day.

Senator NEUBERGER. Thank you very much for bringing this fine message and testimony from Cardinal Ritter.

Now, I know that you are bringing the message for him and you have already professed that you are not an expert in this area, but I am fascinated with one of the points in the Cardinal's remarks, and that was the home care program, I think this is one of the areas that we are far behind in from a federally supported standpoint, and the



use of trained and professional and nonprofessional members in the home care team.

I gather that you employ nonprofessionals?

Reverend SLATTERY. Yes.

Senator NEUBERGER. And are you satisfied with their performance? What can they do and how can they help?

Reverend SLATTERY. Well, I think they help in two ways. We have had some earlier testimony about the scarcity of trained professional personnel. One manner of easing this scarcity or alleviating it is to let trained people do what only trained people can do and not have them doing a lot of busy work that others could be doing. So I think they make our trained people more valuable.

I think they have a real contribution to make personally. For example, the home health aide is like a nurse's aide whom we train and send into the home. She does the little items of personal service on a short-term basis. But she spends more time than the nurse does. She gets to be a friend of the person. I think she can observe; that is, she can be trained to observe. She can be trained to notice what to look for and then report back to the professional, to the nurse or the doctor. In effect she can be utilized not only for service, but also for factfinding, for observation purposes.

We have had a lot of fine experience with volunteers, we call them friendly visitors, people that we train and supervise and send into the home as a good neighbor. I think they have done a lot on a voluntary basis to prevent institutionalization, to relieve isolation and loneliness, to look for the changes in people, the deterioration or improvement that might be occurring in both social and physical areas.

Senator NEUBERGER. Of course, you have used the word "trained" people a lot. You do not just send them out, you tell them what to look for. I think that is very helpful. This has been suggested in some of the poverty programs, as you know, that some of the aged people who are not able to live on social security or may not have it, might very well be partly rehabilitated by working in this area. So I was particularly interested to know that you have the experience behind you of making use of these people.

Would you say that some of them might be welfare cases if they were not trained?

Reverend SLATTERY. Certainly, yes, Senator. Part of our program right now is in cooperation with the poverty program. We are training 75 home health aides, these are older people, 45 years of age and older who come from the lower income, poverty-level group.

Senator NEUBERGER. That might not otherwise be employable?

Reverend SLATTERY. That is right; had no skills, no abilities, and were getting older.

Senator NEUBERGER. I think it is a wonderful contribution. May I say that one of your Senators, Senator Long, is a member of this committee. He expressed his regrets that he could not be here because he is very proud of your work in St. Louis and has told us a great deal about it.

You have a very well organized program for health care and some preventive medicine.

Do you feel that a federally assisted detection program could be made to work in conjunction with your existing program?

Reverend SLATTERY. We certainly do. We think it not only should be made to work, but would be a very valuable asset to it.

Senator NEUBERGER. Thank you.

Reverend SLATTERY. The big problem, I think, today, about which one of the earlier witnesses talked, is the scarcity of nursing homes and how this scarcity is going to get worse. We have to use our resources for people who really need them. This is why we started a home care program. It is in lieu of building another nursing home and filling it up in 3 months.

We feel that we have a lot of good resources—a dozen or so homes for the aged and 9 or 10 hospitals—but we have to use them for people who really need them. And, of course, early detection and so on would help us screen out and help us develop the potential of these services to their utmost.

Senator NEUBERGER. You know, of course, working in this field, that one of the requirements of the Medicare law is that before a patient is assigned to a nursing home he must spend 3 days in a hospital. Of course, that is a screening process.

I questioned that part of the law even though people working in the area felt it was necessary. But it does seem a waste to take hospital beds for 3 days for a screening process to determine if this patient should go to a nursing home. I wish we could do it some other way.

Reverend SLATTERY. Do not think we are just using 3 days in the hospital to qualify people for Medicare, but it is happening, I think.

Senator NEUBERGER. I don't know. But the pitiful thing is that some people already in nursing homes under private payment and who might qualify to go there would have to be taken out of the nursing home, put in the hospital, spend 3 days there, and then reassigned back, if that was found necessary.

Of course, there are some reasons for it, too. I am sure there are people who would come and ask to go to a nursing home who, maybe, did not need to, and this gives the doctors backup to say the patient does not need to be in a nursing home, or to tell some child who wants to put an aged parent away, that such is not necessary.

Your testifying here today on this St. Louis situation interests me a great deal.

Reverend SLATTERY. Thank you, Senator.

Senator NEUBERGER. I think we have had an interesting morning, in spite of the fact I was late, we have concluded ahead of time. We have heard from Dean Ebert, Dean James, Dean Beattie, and Reverend Slattery. So we are beginning to have a broad picture drawn for us.

The committee will resume at 1:30 when the opening witness will be Dr. DeBakey, of Houston, Tex.

We stand in recess until that time.

(Whereupon, at 11:50 a.m. the subcommittee recessed, to reconvene at 1:30 p.m. the same day.)

#### AFTER RECESS

(The subcommittee reconvened at 1:30 p.m., Senator Maurine B. Neuberger, chairman of the subcommittee, presiding.)

Senator NEUBERGER. The afternoon session of the hearing will now come to order.

The first witness will be Dr. DeBakey, of Houston, Tex.

Dr. DeBakey is well known to all of us. He is professor and chairman of the Department of Surgery at Baylor University. He is the senior attending surgeon at Methodist Hospital in Houston, Tex.

Dr. DeBakey has been the recipient of numerous awards in the last several years for work with the artificial heart pump. He was Chairman of the President's Committee on Heart Disease, Cancer, and Stroke. We welcome you and appreciate your appearance here this afternoon, Dr. DeBakey.

I would like to introduce your own Senator, whom I am sure you know.

Senator YARBOROUGH, do you have any remarks you wish to make?

Senator YARBOROUGH. It is a great pleasure to serve on this committee with you and I would like to have introduced my constituent, but you have done such a wonderful job I will not take much time.

Senator NEUBERGER. Thank you.

Senator YARBOROUGH. He is one of the outstanding surgeons in the history of the human race. His great work was already known before his most recent development of the artificial heart, the recent very startling successful operation on a young lady from Mexico City. I believe, Dr. DeBakey, she has now returned to Mexico City?

Dr. DEBAKEY. Yes, sir.

Senator YARBOROUGH. Of course, his earlier work that has now become part of acceptable surgery of repairing arteries in the neighborhood of the heart to save many lives and add useful years to some of our most productive citizens is well known. His accomplishments in the field of remedial surgery and substitutive surgery, I don't know the technical, medical names, but substituting parts for a wornout part of the body of some inanimate materials that will function well in the human body and that it will not reject, I think, opened new vistas of surgery. It is beyond the field of surgery; it is in what we might call restorative medicine, is that what you call it, Dr. DeBakey?

Dr. DEBAKEY. Yes.

Senator YARBOROUGH. I think his research primarily in the field of the human heart will have broadening influences in all fields of human medicine. It is a great honor, Dr. DeBakey, to serve on this committee and to have you take time to come and offer your counsel and advice out of your wealth of worldwide experience and worldwide service.

I will not take time in the record to recite the places you have been as recipient of honors around the world or recite the parts of the world you have served. I know, Madam Chairman, I personally was invited to the Argentine as a guest of the Argentine Government to see their highest civilian award bestowed on Dr. DeBakey. That is just one illustration of the worldwide recognition for this man.

He is in a fortunate position, due probably to modern methods of communication, of having his great work recognized in his own lifetime, something that citizens of past ages were generally not so fortunate in having.

It is an honor to have you here, Dr. DeBakey.

Senator Neuberger. Senator Yarbrough, we want to say we know how proud you are in Texas to have Dr. DeBakey, but we feel he belongs to the Nation and the world as well as to Texas, so we will accept him for all of us. I would like to remind the audience that this is the Subcommittee on Health of the Elderly of the U.S. Senate Special

Committee on Aging; that we have no legislation before us; but are hearing testimony from professional witnesses which may help us to evolve some.

Following Dr. DeBakey we hear from Dr. Rappoport, Dr. Peeples, and Dorothy Rice.

Dr. DeBakey, we welcome your testimony.

**STATEMENT OF MICHAEL E. DEBAKEY, M.D., PROFESSOR AND CHAIRMAN, DEPARTMENT OF SURGERY, BAYLOR UNIVERSITY COLLEGE OF MEDICINE**

Dr. DEBAKEY. Thank you, Senator Neuberger. I want to express my appreciation of the privilege of appearing here in support of your study of modern health screening methods intended to detect and prevent chronic illnesses in the elderly. I wish to thank Senator Yarborough for his very kind statements, and his sympathy to our cause and our efforts in the advancement of medical knowledge. It is always a pleasure to appear before this committee with its deep concern for health, particularly in the growing area of the elderly.

Perhaps because of the advances made in the past in the health area, most people in our population are living to the ages we regard as elderly, although I am beginning more and more to think of these ages as not so elderly. I think one of the objectives in dealing with this problem is to keep people over 65 active, not only from a health standpoint, but economically active.

I think the interest you are taking in this effort is of increasing importance, and anything we can do to develop better ways of dealing with this problem, either by mass screening or by techniques to detect a larger proportion of illnesses at an earlier stage, is invaluable.

Now, as far as the multiphasic screening and detection techniques are concerned, there has been a considerable amount of experience with various types and I hope there will be greater research in this area. I think if we are going to make these types of detection more effective with greater yield, it will be necessary to apply more sophisticated techniques than at the present.

The yield from screening techniques available today is not sufficient to make them economical on a widespread basis. For this reason, it is extremely important that efforts be directed toward more effective screening methods and more research in these areas.

Hopefully, we can develop better computerized methods of screening, for greater economy.

There have been considerable developments in this area, particularly in laboratory methods, in which the application of computers has reduced cost and, I think, improved efficiency.

I would hope this would be more effective in the multiphasic screening techniques, and there are, it seems to me, ways we can make advances in this area.

Perhaps the greatest disease in the elderly is in the vascular area: namely, diseases of arteries. These constitute by far the most common cause of disability and death, much greater than those, for example, due to malignant diseases. They are insidious developments for the most part, but at some point they may be catastrophic; for example, a heart attack or stroke is predominantly due to arteriosclerosis or atherosclerosis.

The methods for detecting their early development requires considerably more research. There are means by which this can be done; for example, through arteriography, a method of visualizing the arteries.

Senator NEUBERGER. What do you call it?

Dr. DEBAKEY. Arteriography. But at the moment we have not developed this technique for mass screening, and here is an area in which more research needs to be done to simplify greatly, make more readily available to large populations this method of detecting diseases of the arteries. It is a very precise method and one that can detect not only the early stages of these diseases, but perhaps foretell by further studies whether or not a patient is going to have a stroke or even a heart attack.

We are just beginning to get this kind of information, but more needs to be done in this area. But this simply exemplifies the need for more aggressive effort in this general area of detection, and development of better methods of finding diseases, to provide more effective prevention. Obviously, it is impossible to prevent something you cannot expect is going to take place, but if you can detect it early enough you can find means of preventing it.

This is true, for example, in the stroke area, in which we have had considerable experience. As you may recall from the report of the President's Commission on Heart Disease, Cancer, and Stroke, we indicated it would be possible to reduce the incidence of strokes considerably if detection centers could be developed all over the country and the available knowledge directed toward a large segment of the population.

We have obtained from various past studies enough information to be able to tell what type of patient may be a candidate for a stroke, and we can by various tests even detect the types of lesions that lead to a stroke.

The problem, of course, is to apply this knowledge on a practical basis to a large segment of the population. One way is to provide these centers throughout the country. Another is to be able to bring the patients into these centers.

One of the other problems related to large mass screening and techniques is the public response to the screening method. There is a general tendency to be apathetic toward these various tests on the part of the public, particularly when the yield in terms of detection is often low.

We would like to keep the yield low, obviously, to maintain a healthy population. At the same time, it is essential that we devise ways and means to reach the public with the methods we develop. I think this also requires further investigation, further study.

I think we can improve considerably both the types of tests we do and their application in a more effective detection program. But I would like again to emphasize the importance of this whole subject—the need for greater investment of Federal funds in this area through the Public Health Service, which has the know-how and has been quite effective in applying what has been available. So I strongly urge you to continue your interest and concern in this area. It is extremely important, in my opinion, in raising the health standards of this country and in relieving the country of a tremendous economic and human loss.

We estimated that the annual costs to the Nation in heart disease, cancer, and stroke areas alone was well over \$30 billion, and I think this is a conservative estimate.

Senator NEUBERGER. What is that based on? The loss of time—

Dr. DEBAKEY. Yes; it is based upon both the direct costs of supporting the disabled individuals in hospitals or elsewhere, and the loss of output by members of the labor force due to these diseases.

I think it is also important to realize that these diseases that we are talking about affect a fairly large segment of the people under 50, so we are finding more and more arteriosclerosis, which was at one time thought to be a disease of the elderly, affects a high proportion of people under 65. I would say, for example, that at least one-fourth of patients with heart disease occurs in this group. Thus, among those struck down by these diseases, about one-fourth are in the most active period of their lives.

Senator NEUBERGER. I know since your report on heart disease, cancer, and stroke I find myself—and I hope this is not a new routine tendency—reading the obituaries and when anybody dies, to be interested in the age. We have the terrible example of the Moyers boy at 39. It is shocking to me to find people younger than I am dying of heart disease. And I presume that is why it all adds up to why it is the greatest killer, I guess, now.

Dr. DEBAKEY. Yes, and you see, Senator, we are going to see more of this in my opinion, because we are finding means of prolonging people's lives by reducing their chances of dying from infectious diseases, such as pneumonia, smallpox, and diphtheria. We are screening out these causes of death and people are becoming increasingly subject to diseases we used to regard as chronic degenerative diseases, such as heart disease and emphysema.

Senator NEUBERGER. That is the other thing I watch for, if it gives the cause of death, heart disease, lung disease, emphysema. I watch it. Young people really, in their 40's or 50's, who are dying. They seem to be needless deaths.

Dr. DEBAKEY. What is even worse, Senator, the tremendous amount of disability they produce. The patients not only cannot work, they have to be taken care of, and this is a tremendous burden, particularly in the increase in cost of medical care. I think this is a very important area and I want to urge you to take a very aggressive approach to this problem.

Senator NEUBERGER. Something you said I would like to ask about.

I am interested to know that you think there is some value in screening, I am sure for a lot of other things other than your specialty, that it is not just an exercise in going through an area, but the thing you said that particularly I am pleased to hear is that you hope, through research, that we can select out the type of patient and therefore detect a potential stroke. Did you say that?

Dr. DEBAKEY. Yes, I did, and we have reason to believe that this can be done and what is needed, of course, is to obtain more information, by research, on ways and means of doing this.

We are engaged in many centers in a collection of data to develop certain patterns in which the criteria and the characterization of these conditions can be developed in what we might call a profile, where they can be selected out, even on a computer basis. I have also indi-

cated a more precise way of screening in which the diseased arteries can actually be visualized.

We are just beginning to develop arteriographic visualization of the whole body, where the entire vascular system of the body is visualized in a precise way.

Senator NEUBERGER. When you are speaking of arteriography—

Dr. DEBAKEY. It consists essentially of an injection of dye that shows up on an X-ray like a map. It maps out the arteries of the whole body from the very small arteries to the very large ones. It may be considered as an arterial map and can pinpoint the site of the disease quite precisely.

Even if we collect this data without developing it on some computerized method of screening, it may not be effectively applied. We have the necessary knowledge but not the technology to do it.

What we need to do is improve the technology on a widespread basis. Then we will have in addition to methods of characterizing these diseases, a more precise way of visualizing them and this could offer tremendous opportunities of detection that we do not have today.

Senator NEUBERGER. Your speaking of the technology that is lacking reminds me that a doctor at Harvard Medical School told me recently they are working in conjunction with some of the people at MIT. I said what I thought of MIT's engineering and that sort of thing, and he said, yes, but we are doing that in medicine. It came to the point whether either Harvard was going to have to build an engineering laboratory or MIT a department of medicine. So, the two have come so closely together.

Dr. DEBAKEY. That is quite true, Senator. It is true of our center and a number of other centers in this country. As a matter of fact, you might say engineering is so essential to a good medical center that it is impossible to do without it.

Senator NEUBERGER. Senator Yarborough, do you have any questions?

Senator YARBOROUGH. Dr. DeBaKey, if it is not intruding too much in the field of your private practice, if it is I am certain you will tell me so, would you mind giving us a rough estimate in the thousands of about how many heart patients you estimate you have treated in the course of your practice in one way or another? I do not mean limited to surgery, through medicine, prescribing?

Dr. DEBAKEY. Well, Senator, I think it must be close to 15,000.

Senator NEUBERGER. 15,000?

Dr. DEBAKEY. Yes.

Senator YARBOROUGH. Now if we had had these tests, do you think that they would have had any effect on the number of cases—if we had tests several years earlier in the field of preventive medicine to anticipate trouble?

Dr. DEBAKEY. Oh, yes, Senator. I am convinced that if we had had the knowledge and the tests to detect many early stages of disease, a large number of illnesses could have been avoided. No doubt about it, in my mind.

Senator YARBOROUGH. You have spoken about one expression you used I believe a moment ago, which was the yield in terms of detection is relatively low in these tests. In other words, most of the people tested are found to be within their limits for age and so forth normal, you say normal, not—

Dr. DEBAKEY. You see, Senator, this is because the methods of detection in screening are too gross to pick up many of these problems in a sufficiently early stage to be effective, and, of course, as you know, a typical story is told about the man who goes to the doctor for an examination and is told he is doing fine, and he walks out of the door and drops dead.

This has happened. It simply means that many of the tests we do now are not sufficiently refined to screen out some of the things at an early enough stage. This is why we have to do more in the way of developing better techniques of detection, too.

Senator YARBOROUGH. The fact the map test you described, taking the dye and getting a picture of the entire circulatory system, would detect certain abnormal conditions that are not shown.

Dr. DEBAKEY. Exactly, before any symptoms or before the individual feels or knows anything is wrong or before any signs are shown. This is what I mean by more precise detection, and this is possible. This is something we already have demonstrated as feasible.

As I say, we have the knowledge about it. It is just that we do not have the technology to do it in a simplified manner on a widespread basis, but we will if we get more active support.

Senator YARBOROUGH. An artery swelled out beyond its normal size you can detect that on this map system?

Dr. DEBAKEY. Right.

Senator YARBOROUGH. Would that be detected on any other methods of detecting?

Dr. DEBAKEY. We may not be able to detect that by any other method. In fact, one of the most ancient of diseases is called aneurysm. This is a ballooning out of the artery. This was described several thousand years ago and has been known throughout medical history as a dangerous disease, one for which there was no cure until recently, when we did develop ways and means to remove it and replace it with an arterial substitute.

The danger of this lies in the fact that it ruptures very often without any previous signs and a person bleeds to death internally before anything can be done. We know it may have been present for even several years before it ruptures, but it may give no sign of its presence.

Senator YARBOROUGH. Do you think that is what cost us the loss here of one of the ablest men to serve in this body, Senator Estes Kefauver, one of the ablest men, I think, in the Government?

Dr. DEBAKEY. This is one of the most tragic examples of this disease.

Senator YARBOROUGH. I think of another benefit here, Dr. DeBakey, you say that in most of these cases nothing would be found that called for medical attention. Would not the ease of mind in those people be one of the valuable byproducts of these tests, particularly old people beginning to worry about their health. If the tests show that they are in perfectly normal condition for their age bracket, this is valuable.

Dr. DEBAKEY. You are quite right, Senator. I have seen this in my own personal experience with many patients who come back to me after we have operated upon them, for example, for some of these conditions, and we do these kinds of tests on them, in this way, for arteriosclerosis, and this gives us a precise way to reassure them that their arteries are in good condition. And there is nothing more reassuring to a patient than to know that.



Senator YARBOROUGH. And it adds to their productive capacity?

Dr. DEBAKEY. Absolutely. I have had many of them go back to work after they have retired, return and resume full activity.

Senator YARBOROUGH. Thank you for this very valuable contribution.

Senator NEUBERGER?

Senator NEUBERGER. I have one more question. I cannot let you go without referring to the success of the artificial heart. If there were some early detection in those cases, would you have been able to still forestall the heart difficulty or not? Or is that pathologically impossible?

Dr. DEBAKEY. Well, no, not at all, Senator. For example, we know certain forms of heart diseases due, say, to rheumatic fever, and this is a condition we could prevent if we could do it on a mass detection basis and methods for doing this are available. If we could also treat these people at an early stage, we would prevent most rheumatic heart disease. We could prevent it today.

Senator NEUBERGER. So we have a real goal to work for then?

Dr. DEBAKEY. You certainly have, and I want to assure you we are grateful for what you are doing in this regard and you certainly can count on our support.

Senator NEUBERGER. Thank you very much.

Did you have a question, Senator Williams?

Senator WILLIAMS. I just had the honor of having Dr. DeBakey on a television program, so I have asked you all the questions I should ask you today.

Senator NEUBERGER. All right. Thank you and we will go on to the next witness.

Is Dr. Rappoport here?

(No response).

Senator NEUBERGER. If Dr. Rappoport is not here, then we will move on to the next witness, who is Dr. William Peeples?

Dr. Peeples is the commissioner of health for the State of Maryland and we are glad to have you here, Dr. Peeples, to add to our knowledge.

#### STATEMENT OF WILLIAM J. PEEPLES, M.D., COMMISSIONER, MARYLAND DEPARTMENT OF HEALTH

Dr. PEEPLES. Thank you, Senator Neuberger, Senator Williams.

I have submitted a statement to you and would just like to make a few comments in addition to those that Dr. DeBakey has so aptly presented.

Senator NEUBERGER. We would be glad to accept your entire statement for the record. If you would like to abridge it or comment on it in any way you want to, that will be fine. But it will appear as presented.

(The statement referred to follows:)

PREPARED STATEMENT OF WILLIAM J. PEEPLES, M.D., M.P.H., COMMISSIONER,  
DEPARTMENT OF HEALTH, STATE OF MARYLAND

I am Dr. William J. Peeples, Commissioner of Health for the State of Maryland, 301 W. Preston Street, Baltimore, Maryland, 21201.

Screening tests are procedures which sort out those persons who may have abnormalities from those who probably have none. Multiple screening is the

simultaneous use of two or more screening tests. Its major aim is the early detection and subsequent treatment of disease found. Screening programs were first developed as case finding tools in the control of syphilis and/or tuberculosis. Techniques and tests are now available which make it possible to screen for many diseases. The term multiple or multiphasic screening refers to the use of some of these tests when an individual is screened for more than one disease at a single visit.

The fact that any given test, technique or procedure is available as an aid in the diagnosis of a particular disease does not automatically qualify this test for use as a screening tool or device. The primary purpose of screening is *not* diagnostic. It is directed at selected populations of apparently well individuals. It is a selective elimination to find those people who should undergo diagnostic procedures. A screening procedure must be reasonably capable of selecting from a large population those persons *most likely* to have the disease for which the procedure is used. Such individuals, many of whom are unaware of any illness, are then referred to their physicians for definitive diagnosis. This enables the person with suspicious screening findings to obtain maximum benefits from early diagnosis and treatment. Studies have shown that screening tests have brought many people with asymptomatic but significant disease, especially chronic diseases, to medical attention.

We are still using in Maryland the 70 mm. chest X-ray to detect tuberculosis and certain cardiovascular and pulmonary diseases, and we are using various serologic tests to detect the presence of undiagnosed syphilis. The State Health Department is also using an especially prepared kit where women can obtain satisfactory material themselves to detect the presence of cervical cancer. This is being done on a state-wide basis at the present time. Women thirty to forty-five years of age are sent one of the kits. The kit is used as directions indicate, and are returned to the laboratory for examination. Results of the test are sent to the woman's physician and in the case of positive findings, further examination is required for diagnosis.

Vision and hearing screening have been used in Maryland, especially among children, for many years in the school health programs throughout the State. Screening has been taking place on a routine basis for years in many Maryland schools for preschool children and in day care centers and Project Head Start, for a condition known as amblyopia ex anopsia, which is a particular eye affliction leading to blindness affecting children of preschool age. This is an effective screening test, one which can readily detect the condition and lead to its correction if found early. Vision screening and hearing screening are also, of course, carried out in the schools for the school aged child.

Other screening tests have been utilized on a sporadic basis in Maryland—those for glaucoma, the detection of diabetes, obesity, anemia, hypertension and other such conditions.

Although we do not know the complete extent of chronic illnesses which affects populations of various ages within the State of Maryland, we do have certain information regarding mortality among certain age groups from various chronic illnesses. Maryland, for instance, is in the highest quintile for the United States in adjusted death rates per 100,000 population for major cardiovascular diseases affecting both white males and white females for 1959 through 1961. This is also true for arteriosclerotic heart disease in white females. However, in white males the death rate is in the next to the highest quintile.

Maryland also falls within the next to the lowest quintile for adjusted death rates for cerebrovascular diseases in white males and in white females. With hypertensive heart disease, both white males and females in Maryland are in the highest quintile for the United States. With rheumatic fever and other forms of heart disease, Maryland falls into next to the lowest quintile for the United States.

There is no evidence that cancer incidence in Maryland is any different from other areas of the United States, especially for the types of cancer which can be readily detected by screening methods. At the present time these types of cancer which are amenable to techniques leading to early diagnosis are the cervix uteri, the breast, oral cavity, and possibly the urinary bladder. Skin cancer, of course, is usually readily visible and only must be looked at and biopsied in order to make a diagnosis of cancer of the skin.

With regard to other forms of chronic illness, we have little information as to the true extent of these forms of illness. However, in populations which have been surveyed for glaucoma, diabetes, tuberculosis and other conditions, there

is no reason to believe that Maryland's rates of incidence are any greater or any less than the rest of the country. More information is needed as to the real extent of chronic illnesses. Where tests have been utilized for glaucoma and for diabetes, the percentage of incidence in Maryland has been found to be approximately 1% for diabetes and approximately 2% for glaucoma in those populations above thirty-five years of age.

I believe that multiphasic screening programs are feasible and that they urgently need to receive further development. Our plans in Maryland include establishing in county health departments, centers for multiple screening examinations. There are many populations within the State of Maryland who should, and could, be afforded this type of screening. School bus drivers, for instance, those who are medically indigent, other disadvantaged persons by reason of income such as those who are being currently examined under the Office of Economic Opportunity programs, selected persons for certain driving tests; all could be subjected to multiphasic examinations. Several local health departments in Maryland have already begun multiphasic screening. We hope that this program will expand greatly whether or not federal funds become available to help support it.

It is my belief that there should be *no age limit* established for adult persons to be eligible for multiphasic screening programs. Although it is true that with most chronic illnesses the incidence of a specific chronic illness increases with age, this is not always true and should not be used as the rationale for establishing certain age limits or limiting age groups who should undergo multiphasic examination. Cancer of the cervix uteri, for instance, is not present usually in any great number of women age fifty or over, but the twenty-one to forty-five year age group is the one which should be most carefully screened for cervical cancer. Glaucoma also occurs early in life and mostly below the age of fifty. Fifty percent of all chronic illnesses have made their start before forty-five years of age. It appears to me, therefore, that there should be no age limit established, but that the program of multiphasic screening should be thought of as a health protective program, disease finding, and containing the principle of early correction and treatment if possible for the entire adult population of the United States. There are extensive programs carried on by the Children's Bureau and in most health agencies for children, those under twenty-one years of age. It is my belief that multiphasic screening examinations should encompass the span of adult life between twenty-one and sixty-five and upward for all.

The effect of this program would be to provide centers for multiphasic screening which might be utilized by physicians, by certain groups within a community to avail themselves of these tests. The medical profession has not been enthusiastic about the use of multiphasic screening procedures except for tuberculosis, syphilis, and the more tried and true tests. On the other hand, many physicians do not employ these screening tests in their own offices on patients who routinely come to them for treatment. Many patients are never tested for glaucoma; there are also many others who never receive a Papanicolaou smear for cancer of the cervix; others have never received vision or hearing screening tests other than occasional, very crude approximations. I would suggest that it is important that the practicing physician be involved in multiphasic screening and that, insofar as possible, his office be used as a source of referrals for screening tests. A blood sugar determination is a good example. The test could be taken in the physician's office, sent to a center for analysis, and the result returned to the physician. Ideally, multiphasic screening examination should be connected with a subsequent medical history and physical examination. Those persons who, for example, are coming to the doctor for the first time or coming in for an annual checkup could be routed through the multiple screening examination prior to having a physical examination and medical history by the physician. I believe this type of involvement of the private physician would result in a better acceptance of the principle of multiphasic screening which could be applied as a valuable adjunct to medical practice.

Naturally, any multiphasic screening program should have positive or negative medical results sent *only* to the private physician of the patient involved. The physician should follow up doing whatever is necessary to make the diagnosis, if one is to be made of a suspected disease. There should be no interference from the agency performing the multiphasic screening tests with this procedure. Only if the physician requests it, should any follow up or assistance be given by a health department or other agency. *Complete confidentiality of records is a must in any multiphasic screening program.*

Since there is a great shortage of medical manpower existing in this country and since multiphasic screening does not require highly trained technicians to perform most of the tests done, this offers a resource to the medical and public health profession which would possibly strengthen a diminishing manpower situation in the field of health, especially if such screening tests were performed prior to regular visits of patients to the physician's office. Much time could be saved by having these tests done prior to that examination. In addition, those chronic illnesses which are remediable could be detected at any early stage thereby reducing the length and severity of disability and the cost of medical care.

Multiphasic screening is the most practicable large scale method available for securing early diagnosis and applying preventive medical knowledge to the control of many chronic illnesses and disabilities.

**Dr. PEEPLES.** One comment Dr. DeBakey made was in relation to the aged.

With respect to multiple-screening procedures I would like to try to impress on you, and I think I wrote Senator Williams several communications about this, that age should not be a factor.

**Senator NEUBERGER.** Age?

**Dr. PEEPLES.** Age should not be a factor in the application of multiple-screening tests. Certainly there are a number of diseases which afflict individuals, attack individuals, which Dr. DeBakey indicated in regard to arteriosclerosis and the like at an earlier age than age 50, 40, or 30, and I would urge that if this technique is adopted and applied that it be applied to all adults regardless of age.

There are certainly adequate programs in the country now for the screening of children, the detection of handicapped children of all types. This has been supported by the Children's Bureau, by health departments and interested foundations, groups, all over the country. I feel we have a very comprehensive health program available for children, but such is not the case for adults, and for this reason I would like to emphasize what I feel is a need for including all adults in some type of overall preventive health service.

**Senator NEUBERGER.** I suppose that we think of it as more for the older population for the reason that we know that just the budgeting and the mechanics of general population screening is beyond us now, and so since many of these ailments compass age 40, which I don't think is old, but that is what we are sort of limited to now just because of the practical problems involved.

**Dr. PEEPLES.** I realize that this is a problem of budgeting and of funds, and service availability; on the other hand, for, cancer of the cervix, detection beyond age 40 is often too late.

**Senator NEUBERGER.** Yes.

**Dr. PEEPLES.** And there are still many, many women in this country who, though this test has been available for the last 25 years, still have not ever had the test. I feel that this type of program should emphasize not only the test itself, but the educational process that this is a protective device where, as Senator Yarborough said, ease of mind is one of the very beneficial effects of screening. A negative examination is worth a great deal to the individual.

Now I would also like to emphasize the fact that a good history is quite important, that this is one screening device that can be utilized and done primarily by the individual. Whereas, we have many diagnostic tests such as some of those mentioned by Dr. DeBakey of arteriography and so on, those tests are very difficult to administer and they

are very difficult to interpret and they are not without some difficulty in interpretation.

A good history, however, can be subjected to computer techniques and such things as a small stroke, which may occur with very little symptomatology, can be detected by a good history with further diagnosis to see where the thrombus or clot originated that caused the small stroke.

I would like to say something about pulmonary disease also. This is a disease which has had the highest rise in mortality in the last decade. I know, Senator Neuberger, that you have been interested in carcinoma of the lung from smoking, cigarette smoking, and I think if anything, emphysema and chronic obstructive lung disease is probably caused even more so by cigarette smoking. This can be detected by pulmonary function tests which are relatively simple and easy to do.

Unfortunately we do not know too much about what to do for the individual once we find him with emphysema, to prevent him from progressing with the disease, other than to stop smoking cigarettes. But nevertheless here is a disease where there needs to be a great deal of not only research, but professional education and certainly a lot of case finding. I feel that if infection can be prevented in this group of people, that much of their disability and ultimate death can be prevented.

I feel that State and local health departments should be involved in multiple screening. We have seen particularly the need for this in Maryland and I believe most other State health agencies have.

As far as chronic illness is concerned, this to me is the only real application of specific preventive measures that can be used in control of chronic disease.

I feel that State and local health departments are and can be helpful in presenting chronic disease programs and preventing chronic disease in the future.

Senator NEUBERGER. Any questions?

Senator WILLIAMS. What is the State of Maryland doing, following your analysis of State and local responsibility? Are you able to gear up a multiphasic screening process?

Dr. PEEPLES. Yes, sir; we have been using, Senator Williams, certain screening procedures for a number of years for TB, the chest X-ray for TB, serology for detection of syphilis, vision and hearing screening, particularly for children, for a number of years.

Senator WILLIAMS. How do you reach them? How do you go about this? What are the mechanics of the operation—bringing people to you or you to the people?

Dr. PEEPLES. We usually go to the people. We are hoping, however, and we have already begun this, to institute certain screening procedures in local health departments where the people might come to us.

In the case of the several million chest X-rays, we have gone to the people in terms of a mobile unit. I am afraid that we really do not get the population that really needs to be reached if we are going to find TB; finding a clear chest is certainly worthwhile, but if you are looking for TB primarily, you do not necessarily find it by placing your mobile screening unit in a shopping center.

Senator WILLIAMS. You get a concentration of people, but perhaps not that group most likely to be affected?

Dr. PEEPLES. Right.

We have begun in Maryland a program, which will extend statewide, of sending out a kit for the detection of cervical cancer in women. We have tried to get the names and addresses of women, county by county, from 25 to 45 years of age, and these women are mailed a kit and are given instructions as to how to use it. Once they have obtained the specimen from the vagina, with the cervical washings, which is aspirated back into the little container it comes in, the kit is placed in a box and is sent to the laboratory, spun down and the cells examined to see if there is any evidence of cervical cancer.

This has been almost as successful as the Papanicolaou smear and it is one test that is a screening test nonetheless. It can be administered by the woman herself and if any suspicious findings turn up, the woman can then be directed to her physician for "Pap" smear, further investigation and diagnosis. This is being carried on throughout the State.

Senator WILLIAMS. What percentage return do you get on the number of kits mailed out?

Dr. PEEPLES. At the moment we are getting between 55- and 60-percent return on these kits. They cost about 25 cents.

Senator NEUBERGER. And in that 60 percent do you find some cancer potential?

Dr. PEEPLES. Suspicious findings in about seven to eight specimens per thousand.

Senator NEUBERGER. Is that test one in which some potential cancer might be overlooked, still is not quite the same as a "Pap" test?

Dr. PEEPLES. It is not thought to be quite as good as a "Pap" test, Papanicolaou's smear. On the other hand, it was used in the Public Health Service clinic that was set up as a demonstration in Memphis, with a similar type of technique. They believed that it was superior to the Papanicolaou smear. On the other hand, realizing the limitation of the individual and probably being able to do this not too well since they only do it once, I would say that it is not as good as a "Pap" smear performed in a physician's office or a clinic. But nonetheless, I think it is an excellent educational technique as well as a good case-finding technique.

Senator WILLIAMS. Would you conclude that it would be far preferable to have centers where people could come in and have a comprehensive screening rather than this sort of one-disease approach?

Dr. PEEPLES. Yes. The type of screening that has been afforded at the Kaiser Foundation in Oakland, San Francisco, is certainly desirable. I believe that this could be done prior to physical examination by a regular physician, or private physician, with these results furnished to him.

This would be of tremendous help, an adjunct to medicine though I believe there is some resistance in the general medical profession toward multiple screening. They feel they have been left out, that it interferes with the practice of medicine.

Senator NEUBERGER. Is that general, though?

Dr. PEEPLES. It is certainly general in our State. They have not responded at all well to general screening examinations.

Senator NEUBERGER. What is it, a sensitivity, a touchiness about moving in on their area?

Dr. PEEPLES. They believe that it could result in interference with their patients and they feel that if this is to be done, they want to direct these things themselves for their own patients.

Senator WILLIAMS. Is this from the medical profession?

Dr. PEEPLES. This is from the medical profession.

Senator WILLIAMS. I would think they would much rather have a patient they can cure than a patient they would have to stand by and bury.

Senator NEUBERGER. It is a little jealousy, I suppose. That is why I keep emphasizing about this, that it is not a physical exam, it is a screening process. You still need the doctor very much.

Dr. PEEPLES. To make the diagnosis.

Senator WILLIAMS. And he will get probably a lot of patients earlier than he would otherwise, and they will be subject to cure and not drastic remedies, be it medicine or surgery.

Dr. PEEPLES. I feel that one avenue that might encourage better participation of the physicians would be for them to form a nonprofit organization in a community and establish their own multiple-screening examinations whereby their patients, prior to coming into their office for physical examination or treatment or what-have-you, would go through this. Screening could follow treatment for an acute illness.

Senator WILLIAMS. We have legislation not before us really, but will be before another committee at some point. I would think the nonprofit group you suggest might qualify under the legislation that we propose, that probably will not be considered this year.

That is a most intelligent approach, I would think. And I think the American Medical Association is the leading professional group of doctors that are being increasingly aware of the partnership role.

Do you not think so, Senator Neuberger?

Senator NEUBERGER. I think it has been evident.

Senator WILLIAMS. They have been most cooperative in medicare, I believe.

Senator NEUBERGER. Now, lately.

Senator WILLIAMS. After the fact.

Senator NEUBERGER. Thank you, Dr. Peeples, very much.

I understand Dr. Rappoport is here, so we welcome him to the witness stand.

Dr. Rappoport is from Youngstown, Ohio. He is a member of the board of governors of the College of American Pathologists and is here representing that College of American Pathologists.

**STATEMENT OF ARTHUR E. RAPPOPORT, M.D., MEMBER, BOARD OF GOVERNORS, COLLEGE OF AMERICAN PATHOLOGISTS; ACCOMPANIED BY PAUL GEBHARDT, COUNSEL, COLLEGE OF AMERICAN PATHOLOGISTS, CHICAGO, ILL.**

Dr. RAPPOPORT. Senator Neuberger, I have with me the counsel of our college, Mr. Paul Gebhardt, and we thank you for the opportunity of appearing here.

As you know we are having our annual meeting here in Washington at this time and Mr. Gebhardt was interested in coming here.

I believe you have a copy of my statement.

Senator NEUBERGER. Yes; it will be submitted for the record and you can paraphrase it if you wish and it will appear whichever way you wish to handle it.

(Dr. Rappoport's statement follows:)

PREPARED STATEMENT OF ARTHUR E. RAPPOPORT, M.D., MEMBER, BOARD OF GOVERNORS, COLLEGE OF AMERICAN PATHOLOGISTS, CHICAGO, ILL.

Madam Chairman, I am a member of the Board of the College of American Pathologists and have been authorized to reply to your request for comments about these programs.

I might say at the outset that we at the College are very pleased to see the interest of your Subcommittee in this very important subject. As you probably know, the College of American Pathologists (CAP) has a long history of positive and affirmative action in the development and acceptance of automation and computer technology in the clinical pathology laboratory.

For example, as Chairman of the Committee on Laboratory Management and Planning, I presented at the Annual Meeting of CAP and the American Society of Clinical Pathologists (ASCP) in Chicago in 1962 probably the first symposium of its kind devoted to data processing, automation, cost accounting, improved administration, control of cost and productivity and similar administrative techniques in the laboratory.

Similarly, in 1964, I organized a Symposium on Electronic Data Processing in the Laboratory, "Computer Assisted Pathology," which was presented in Miami at the Joint Annual Meeting of CAP and ASCP. Further developments in Electronic Data Processing and Automation techniques were reported, and a model laboratory was established in the meeting area (Americana Hotel) demonstrating computerized and automated devices. This was presented as a joint activity by myself as symposium chairman and the IBM Corporation, to which I have been a consultant for the past three and one-half years.

At the 1966 Joint Annual Meeting of CAP and ASCP on September 19, another presentation on Computerized and Automated Laboratory Medicine is being presented by Mr. Constande of IBM and me to demonstrate the newly described IBM 1080 Data Acquisition System for Clinical Laboratory, which shows the marked advances made since 1964 in the art of computerized automated (cybernetic) laboratories.

And as Chairman of the Committee on Laboratory Management and Planning of CAP, I have published many brochures on the science of laboratory management, such as "Workshop on Laboratory Planning and Design," "Management Skills for the Pathologist," "Manual for Laboratory Planning and Design," etc.

In general, organized medicine and pathologists in particular have been practicing preventive medicine, or epidemiology (screening), for many years. Routine CBC's, Urinalyses, VDRL's, Blood Sugars, PTT's, PKU and the like have been routine in major institutions for a considerable length of time. One of the major problems hindering their expanded and universal acceptance has been the limitations imposed upon pathologists by inadequate funds for either automated devices, personnel or space. It should be recognized that the laboratory, although furnishing substantial financial surplus to the hospital, nonetheless competes very vigorously for the hospital budget dollar, and all too frequently the administrator diverts laboratory income to cover losses in his clinical departments. This situation is widespread and unfortunate. The responsibility for adopting advanced modern techniques thus lies largely with hospital administration. Despite these problems, the overwhelming number of automated techniques and devices that have been put on the market and sold have been bought and are being used by pathologists.

Another fact to be considered is the need for a substantial volume of tests to justify the investment in some of these sophisticated and expensive machines. Single, small hospitals with inadequate volume really are not economically suited for the utilization of these devices. In many instances, however, pathologists, due to their own initiative and enterprise, have consolidated numerous small hospitals' laboratory activities in a centralized place where automated tests can be performed economically for all participants at one time.

The enthusiasm of lay people for these automated devices must be tempered by the professional's critical judgment in order to assure that large quantities of money are not needlessly squandered. We in the field are the first to admit



that there have been numerous casualties along the trail of automation. Many years ago an instrument called the Hemoscope, which was the forerunner of automated cell counting devices, hit the market with a tremendous impact. A large number of pathologists invested in this instrument only to find it completely inadequate. Similar experience was encountered by numerous pathologists in connection with another instrument which had to be withdrawn from the market. It is currently being re-worked by a much larger company able to spend the necessary funds for its development.

It should be stressed that the AutoAnalyzer itself is only about eight to ten years old. During most of that time, it has been restricted to single and double simultaneously-performed tests, and it is only within the last few months that the Multi-12 Channel Analyzer has been available. Production is relatively slow. I do not think there are more than 50 in action throughout the whole country, although I am told that orders are outstanding for several hundred more. I understand that there are "bugs" which require considerable training by the operator to correct.

The Hycel Mark 10 has just been announced by the Hycel Corporation in Houston, Texas. It has yet to be installed, and I think that the earliest date for delivery is sometime in March or April, 1967. This is a substantial company, and I am sure that it will be successful, but I know from past experience that there will be many headaches before this instrument becomes fully operational.

A similar situation exists in the introduction and use of computers in laboratories. There is a great intelligence and experience gap between concept and performance. I believe that our 1080 IBM Data Acquisition System for the Clinical Laboratory presents the first substantial integrated laboratory testing and data handling system, and we have been working on its development for over five years. Delivery will take place late in the spring of 1967, and until then I have the only prototype in the world. It is successful, but the gestation period has been long and painful.

Pathologists have been leaders in the development of these instruments. In my own laboratory, for instance, we have cooperated in this venture by a recent publication on the simultaneous performance of LDH and SGOT by light and fluorescent spectrophotometry published in the American Journal of Clinical Pathology.

While Research and Development has been vigorous, the test results must always be examined scrupulously and critically by doctors for clinical relevance and accuracy. These functions are the most important of all and require the application of clinical judgment by the pathologist. In the last analysis, the best test of quality control is the appropriateness of a result in the light of clinical findings. Where variance is assumed to exist, it can only be settled by going back to the patient himself. This can be done only by physicians performing scrupulous and intensive history taking, physical examination and clinical evaluation.

This function of the pathologist is becoming paramount as the flood of laboratory information threatens to inundate the general practitioner and specialist. The ability to assemble laboratory results in an intelligent, scientific, reasonable and coherent fashion is becoming a major responsibility and activity of clinical pathologists. The increase in the number of tests has been matched also by the increase in the variety of procedures and the enhancement of their sophistication.

Because of this, we are currently investigating the possibility of T.V. viewers which can recover from the patient's computer files a complete analysis of all his laboratory work, chronologically arranged and put together so as to be clinically relevant. The result will resemble somewhat the T.V. screens in airports, indicating flight activity. In spite of the seeming simplicity of the process, every airline traveler has been impressed by the errors in flight numbers, departure times and gate numbers. Similarly, error control and the creation of systems to eliminate them are absolutely essential when dealing with such a vital commodity as human health.

The patient requires safeguards against errors in laboratory technique, data transmission or handling, computer failure or laboratory instrument failure which escape direct observation. One in the health sciences cannot accept the comic error recently reported in a school in Arizona which scheduled seven lunch periods for each student as a result of computer confusion. In health, two "lunch periods" is one too many. One must safeguard against the dissemination of wrong information which would cause fear and anxiety among patients because of unanticipated abnormal results. Doctors have enough trouble with cancer-

phobia, hysteria, and emotional magnification of psychosomatic complaints, and they should not be burdened with wrong results which might lead to the same end. Only by critical evaluation of the computerized and automated tests can such disastrous results be avoided. One false test, indicating the presence of a severe disease (such as cancer) in an otherwise normal person cannot be accepted for many reasons, including the horrible psychologic impact on that patient falsely labeled by the computer.

Multiphasic health screening offers definite advantages, but we must evaluate and define them as specifically as we can. Each decade seems to have its own health priorities, and we should examine clusters of specific diseases. There is no need to carry out certain batteries of tests on twenty-year-olds and expect them to be appropriate for sixty-year-olds. Thus, a great deal of planning and weighing of test choices must be carried out before wholesale application is initiated.

The cost is an enormously vital matter and one which, as mentioned above, is really not controllable by pathologists. There must be due consideration given to the possible "payoff" of such screening programs. The trade-off in value of one screen versus another screen must be determined. If you carry the analogy of "screen" to its ultimate, the relative closeness or fineness of the "screen" is merely a matter of adding more and more "wires (tests) to the grid." Each one of the wires would involve substantial cost, and it would be necessary to cost account the practicability or desirability of adding very large numbers of parameters that could be checked.

Problems concerning multiphasic screening are numerous and serious. The sheer size of the program, if undertaken, advises a very slow and methodical approach in order that the entire program does not founder.

Moreover, considerable apathy, disinterest and lack of concern on the part of a substantial part of the population can be expected. Notice the neglect in the use of seat belts, in going to the dentist on time, in buying eyeglasses, and in obtaining routine "Pap" smears. These patterns suggest that our citizens will not necessarily accept such examinations willingly, even when they are completely free and immediately accessible.

The financial requirements would be enormous. The existing shortage of manpower would be potentiated. The ability to serve small isolated communities would be markedly diminished. The loss of records and patient contact would be great because of the mobility of the American population. There would be great consumption of professional time in screening large numbers of neurotic, psychoneurotic, hysteric and hypochondriac people. Even if specific abnormalities were detected in such groups, the ability to follow up and initiate further definitive diagnostic studies or therapy would probably be extremely difficult, if not impossible.

This program could be made to work within organized groups, which is one of the reasons Permanente has been relatively successful. The approach could be used in industry, unions and the armed services (Army, Navy, Air Force) where it could be made mandatory. For the rest of the population, participation might well be relatively poor. This opinion is based on programs already in effect. During so-called Diabetes Week, Glaucoma Week and Cancer Detection Week, the voluntary response by citizens varies from poor to barely satisfactory unless great public relation exertions are made.

An area where such programs could be carried out efficiently would be within hospitals. Here pathologists have been carrying out fine programs for many years. However, we have encountered considerable opposition to such practices by the third-party insurance organizations (Blue Cross, Blue Shield), who require definite clinical indications or a diagnosis for performance of screening procedures. It must not be forgotten that in most instances, a well taken history and physical examination by a physician plus several well chosen procedures can elaborate the basic disease process, and a complete screening is neither necessary nor warranted.

In summary, annual health physical examinations and the use of laboratory analysis to determine the health of patients are well accepted by the medical profession. Expansion of this process along the lines proposed for multiphasic screening is feasible and can be done, but one must be aware of the enormous problems which would have to be solved. Large amounts of funds would be required. It would require a great expenditure of technical and professional talent, and there is a real danger that much of it might be completely wasted if not properly used.

I hope this answers the questions in your letter. I will be happy to reply to any further questions you may have when I appear before your Subcommittee on Tuesday, September 20.

Sincerely,

ARTHUR E. RAPPOPORT, M.D.

Senator NEUBERGER. How is your meeting going? I have read the program. You are having a tremendous meeting there.

Dr. RAPPOPORT. We would be delighted if you would recess and come on over. As a matter of fact, this might serve the purpose of your study rather nicely.

In the exhibit area you will find most of the equipment we are currently utilizing in our laboratory studies on display or being used and also there are numerous sessions going on indicating the kind of studies that I am sure will be of real concern and interest to your committee. So this invitation is standing. We will be there until the end of the week, I believe. I will give you my button, Senator—

Senator NEUBERGER. I do not think we are going to have any votes today so I am going to try to get up there.

Dr. RAPPOPORT. I hope you do.

As I understand it, having spoken to Senator Williams' assistant, the issue here or the problem is how best shall we use modern health screening methods utilizing computers and automated devices and how can we bring the best health to the most people earlier, more economically, and with a due regard for the requirements of the situation.

I would like to talk for a moment, if I may, about mechanics and techniques, because one hears a great deal about automation and computers.

The college, of course, has been extremely interested in the question of automated devices, management practices and I believe that our CAP, College of American Pathologists, has a long history of education in the use of these devices and attempting to introduce widespread use.

As an example I am chairman of the committee on laboratory management and we have been exceedingly active in automation and the devices that we use for performing tests on a, you might say, mass screening basis.

For instance, we have given numerous sessions at similar meetings on management, cost accounting, automated devices and so forth.

In terms of computer activity I can say I have been a consultant to the IBM Co. for about 3½ years in attempting to create devices which will couple computers to automation and create what we call a cybernetics laboratory. So we are somewhat well advanced and informed about the use of computers.

The college at similar meetings in Miami and last year at Chicago and once again this year, have held symposia and several thousand of our pathologists have heard us discuss the introduction and the use or the misuse or the abuse or the exploitation of automated devices and computers.

As a matter of fact, at this very session yesterday, IBM and I announced the newest development; namely, the so-called 1080 system which I will say I participated in its creation in which we take the signals from automated devices, put it into computers and identify the patient so that we can eliminate a great deal of paperwork and a great deal of delay, and put the information in a machine-readable sense.

You get the point. It is cybernetics, the ultimate, you might say, in automation and computer application.

So, we have, I think, a great deal to say about how these instruments can be used. We have justified their introduction and we have been trying to teach our membership of about 4,000 pathologists how to do it, largely through the publication of management manuals, management in the lab, computer assistant pathology, management skills, and the like.

Laboratory planning and design, and the creation or the architecture of that piece has been an important point.

Now to get to the immediate question, the question of screening. Pathologists have been carrying on screening procedures in a somewhat limited fashion, we will agree. Patients in the hospitals get a routine blood count, a routine urinalysis, urology, PTT—it is for the purpose of checking whether or not you are going to have any trouble if you started bleeding, you see, during an operation.

Of course you know about PKU, checking babies for possible mental retardation immediately upon birth. These are either mandatory by law or accepted as good principles.

Senator WILLIAMS. Pathology, I thought, dealt with the analysis of tissue; am I wrong in that?

Dr. RAPPOPORT. Maybe I better start over again. Here is what a pathologist is: A guy like me, several others, 4,000 of them at the Washington Hilton now, who are the doctors' doctor, we run the laboratories, we are chemists, we are in the microbiology profession, biochemical procedures; we examine the tissues at operation or immediately after operation. We do the Pap smears. In fact, we were leaders in the development of these smear techniques. It is also true we perform the autopsy in the event that death ensues, and that we are the scientists of the medical profession.

Senator WILLIAMS. I just had a glaucoma test this morning out in the mobile unit that is set up outside of the Senate Office Building here.

Dr. RAPPOPORT. Yes, sir.

Senator WILLIAMS. Do you get into that field of examination?

Dr. RAPPOPORT. Well, we do not get into the determination as to whether you have glaucoma, but when the eye is enucleated which I hope it will not be necessary to do—

Senator WILLIAMS. You mean taken out?

-Dr. RAPPOPORT. Well, the end result of glaucoma is blindness, you may lose the eye.

Senator WILLIAMS. Removal, I agree with you. I hope I don't, either.

Dr. RAPPOPORT. Then, of course, it would be up to the pathologist to examine that eye, grossly and under the microscope to determine whether or not glaucoma is there. It is our job to make the diagnosis, Senator Williams.

Senator WILLIAMS. Did you see that mobile unit out there?

Dr. RAPPOPORT. I think it is marvelous.

Senator WILLIAMS. Did you see the various tests listed on the billboard on the mobile unit?

Dr. RAPPOPORT. I did not see it but I am aware of it.

Senator WILLIAMS. I wonder how much deals with pathology and how much deals with other disciplines of medicine.

Dr. RAPPOPORT. There is no discipline of medicine, Senator Williams, that pathology does not have its finger on. In the ultimate I think the definitive scientific determination of diagnosis or the assessment of therapy is our business, our job, and it is up to us to establish the accuracy and validity of results.

Senator WILLIAMS. I am going to send someone out to get a list of the various things that are being examined for out here. Everybody in the two Senate Office Buildings wants to be included in the screening.

Is this the whole list?

I just wanted to see whether—what they do at Kaiser and what this little mobile unit is doing is broader than the pathologists' job. That is all I wanted to find out.

Dr. RAPPOPORT. I would like to develop that, Senator, and I hope you do not leave before I get to it. The problem here is the limitations on our ability to do as much or as many of the things as we would like to do.

We are acquainted with glaucoma. You see the ophthalmologists have glaucoma studies. He can have studies for ocular pressures once a year in many places, or you can have diabetes weeks or cancer detection weeks, you see. We have had these programs and the question as to how—

Senator WILLIAMS. You zero in on single purpose examination. We have had testimony to that effect this morning. If it is a general screening, as with this mobile unit everybody wants it, but if you have a cancer week and go to the cancer clinic, oh, that scares the life out of you.

Dr. RAPPOPORT. This is one of the nice things about it. We have certain ideas on that subject. For instance, in our hospitals where we have a group that we can control, you might say, where we have good correlation between patients; this is millions of people we are talking about we would like to do exactly what you are proposing.

The glaucoma, the auditory, the visual checks, the EKG's. But here we have had the problem of having to compete with that hospital dollar with the critical departments, or with Blue Cross.

They say if you have a disease we will pay for the test to nail down that disease, but we will not let you run a stem-to-stern examination on a screening basis. So there has been a problem there. We thought it best to mobilize the funds you have available, the space you have available, the manpower you have available and the people with the know-how in one place and still be able to do it.

So this is our problem—how best to utilize the facilities we have. That is not to say we have the best, and that is why I think we should explore automated divisions, 1080 computers or 1440, in order to do the job better and more effectively.

We have a great many tests, we have thousands of tests that would be very useful. How shall we perform it? Do we have the people to do it? Well, automation promises to give us some relief but what we gain in the relief of the performance of tests we lose by this flood of information. We literally get overwhelmed by the data that is being produced by these multichannel testings. So we have to come

up with better means of handling that information and I think computers serve a very useful purpose to do so.

Senator WILLIAMS. If you depend on the IBM card you might come up with cancer you don't have.

Dr. RAPPOPORT. If you put garbage in you get garbage out. This is an old cliché in the computer trade, as you know. Instead of making it easier it is going to require more and more critical professional evaluation of the data being produced in such enormous quantities.

I have been proposing this to my hospital for 15 years—automate, compute, but you must secure validity checks. What you put in must be proved to be exact.

I probably read in the newspaper about every kid in a school in Arizona getting seven lunch periods a day—computer failure. We know these things happen. In a health period two lunch periods is one too many. We cannot have that kind of mistake.

Senator WILLIAMS. You heard about that marriage testing computer study which brought together the perfect couple. The only trouble was they were brother and sister.

[Laughter.]

Dr. RAPPOPORT. That is right. And so, above all these transistors and mechanical devices which we know about, there is only one way to prove the truth of the validity of an examination—you have to go back to the patient. You have to go back to the patient and this is an area in which we are very concerned.

Suppose some test reveals an abnormality and we are concerned. Let us take an older gentleman; say, 55 or 60 years. We have a test which suggests you might have a prostate. This would naturally be involved in any screening battery that you created. Well, the work up that you would have to do would be enormous. You would have to get that patient in the hospital, probably have to do a prostatectomy—that is a rather painful procedure. Probably take a couple of days of hospitalization and you would have to do a lot of clinical examination.

You wouldn't know whether there was or was not cancer. You have this fellow worried. He won't believe you when you say, "It looks like you are all right. Come back in 6 months."

You have planted a seed and this is one of the things we are worried about. The fact is that you have to establish the validity of a presumption by going back to doctors and going back to the conventional clinical analysis.

Now this means that on top of the busy, overburdened laboratory, X-ray and doctors, we have this added job of establishing the truth or the lack of truth of an abnormality arrived at by some automated device.

Now, it is true that we make utmost efforts for accuracy and precision, but the only way you can truly examine the validity of a result prepared by an automated device is to say, "Does it make sense in terms of the patient?" So you have to go back to the patient.

This has been a major part of the pathologists problem because with this flood of information that is "X" potential, running thousands of tests an hour and thousands of results that have to be analysed and correlated, you are now forced to take that mass of data and go back to your patient and check to see whether it makes sense. Make sure

it is going back to the right patient. Let us make sure you do not have clerical error and computer error and technician error and technologist error and machine error—

Senator NEUBERGER. Are you not painting the worst possible picture. The human element of mistake is present with us always. Why blame the computer too much for us. You are painting the bleakest picture.

Dr. RAPPOPORT. The thing I am trying to point out is I am brilliant. I have been saying this 15 years ago, back in my own society they thought I was a bit nuts. The point is I am not a bit unaware of the hazards and they have to be balanced off so that we step by step develop a balanced program.

Senator NEUBERGER. But I do not quite know what you are getting at. Is it not better for the patient to go and have to be called to discover that he did not have cancer. I think that is as valuable as discovering that you have it. What would you propose? To not get all this information?

Dr. RAPPOPORT. We are not sure of many of these devices, Senator. The path of automation—I am going to Europe tonight to talk in Rome about this matter—is paved with bones of instruments that were praised to the skies as having the capability to do meticulous examinations without a mistake, and we do not have them.

Senator NEUBERGER. That has not stopped us from going on, Dr. DeBakey tried many artificial hearts before he got one that is successful. That does not mean we should not do it.

Dr. RAPPOPORT. We have to develop it and develop it in a sense of an evolutionary matter. I don't believe the state of art and science at the present time permits wholesale adoption of a technique.

Senator NEUBERGER. Of course, as you know we do not have any legislation before us and this is exactly what we are trying to bring out to see if we think there is some value.

Dr. RAPPOPORT. Yes, they have value. We are going to start off with the assumption, I thought we agreed, that we would find them of value, but I am trying to indicate the critical analysis duties that we have.

Our manpower situation mitigates against a situation here. Now, this seems like a contradiction. One would think that we would be saving manpower, and it is true. But the type of manpower that we would be saving would not be the kind of manpower that we need. We need, once again, critical evaluation, the ability to take the patient and the data, go back and forth in order to establish whether it is right.

Senator NEUBERGER. We might not be saving manpower, but we might be saving lives.

Dr. RAPPOPORT. That is correct. The question is, Where shall we put the lever according to Archimedes? And my point is shall we put the program on a broad base or shall we target it in for certain groups of people, certain age groups of people, or certain types of diseases. This is my point.

Senator NEUBERGER. That is what I want to get at because I know there are many people who think the whole population should not be screened.

Dr. RAPPOPORT. Well, there are certain diseases to which young folks have which older folks do not, and conversely, I think an inclu-

sion, all including battery that would examine everybody for everything, would be a dissipation of our results.

Senator NEUBERGER. We do not have the money to do it.

Dr. RAPPOPORT. We do not have the money, know-how, or the talent.

Senator NEUBERGER. We do not envisualize doing that in this millennium, I don't think.

Dr. RAPPOPORT. That is right. It is necessary therefore that we so tailor our values that 60-year-old people have different examination patterns than 35-year-old people. The frequency of examination is important.

You remember we said we ought to Pap test everyone in this country every 6 months, every year. How do we get these people in? It is true, with utmost exertions in our institution and our area, we have been quite successful in our screening programs. We even get the patients in the hospital and screen them. But the point that we make is it is still difficult to get them in. We do get the hypochondriacs, we get the neurotics and the psychosomatics and they come in over and over. While those who should visit us will have to be educated before they do so.

We have seat belts and yet people will not use them. We have training and we have extension programs, Diabetes Weeks, and we still have difficulty getting them in. So our problem here is education of the public.

Senator NEUBERGER. Dr. James was here this morning and he said the value of the screening test which included the Pap test was more effective than talking to women's clubs and that is exactly what we need if you want a screening test, bring them in. You heard Dr. Peeples just before you tell about what they are doing in Maryland.

Dr. RAPPOPORT. We are acquainted with the Davis procedure. There is another problem. The returns in some areas have been particularly good, the experience in some has been good, and in others not so good. And the ability to diagnose is still a moot question. So it is up for reevaluation and assessment.

The point we would like to make though is that we must determine who will screen the screeners? Who will establish the accuracy of what is being done? Who will screen the data so produced?

This is a very difficult problem. The computer will accept what you put in, but the ability to judge and assess the merit or the value of this material is still a matter of a personal examination.

The trade-off value of one screening versus another. We have diseases that should be examined meticulously or searched for. We have other diseases that we should not waste our time, largely because of the payoff.

Where shall we put the major thrust, the major effort? There is a very, very rare disease of an inborn, inner metabolism, which is far more rare than PKU, and that certainly is a rare disease. How shall we proceed to decide which ones get our major effort with the existing limitations of manpower and people?

These decisions are very important and must be determined before we can do it.



Now, the financial requirements are such as to warrant a great deal of consideration. People have a difficult time getting to see their dentist, getting their Pap smear, and it is in high-powered programs such as the cancer program puts on that we are able to get the advances we have. But many groups have failed miserably to come in. We have not been able to do that because it has been voluntary.

We think there are areas in which this pressure can be made effective. In Permanente, Dr. Collen's group, he has a homogeneous group with reasonable amount of supervision, control, and contact. Dr. Collen—I will not steal his thunder—has done an enormous job. Dr. Thiers, whom you will hear, has done an enormous job in his hospital population, but by and large it is difficult to get people to come into these screening programs as we run them. I have run diabetes year after year. These military services, there is an enormous place there where certain control and supervision can be done.

We would like to propose that a greater effort be spent in the hospital population where, under control conditions, under medical supervision, and under good analytic and accurate study we can really do a fine job in looking for the occult, the hidden, the asymptomatic disease in otherwise normal people, or people who do not complain of a given disease.

Senator NEUBERGER. You referred to the Permanente program, but the results of the screening go to the doctor, not to the patient. So in a screening process is that not what happens? Is it the patient that gets the results?

Dr. RAPPOPORT. We understand that, Senator, but the point is the people at the Permanente Foundation are instructed and are encouraged and they have the instrumentality available for this very wonderful study, but there needs to be a certain amount of supervision or a homogenous group, such as people belonging to the Permanente Foundation.

Senator NEUBERGER. Could that not be expanded through Public Health Service?

Dr. RAPPOPORT. In other words, this is one of the parameters of our problem.

Another problem is how far shall the screening program be? What is the thickness of our mesh? You have a mesh per a certain sized hole. Are we going after the major killers? Are we going after major killers plus moderate killers? Or are we going after anything that could possibly occur due to ill health? I think these are the possibilities or propositions that require reevaluation. I believe before a program is tailored, we must define what are our goals and how fine the mesh shall be.

How many wires shall we put into that mesh? How many tests shall we perform? As I say, we have examined Permanente. Dr. Collen is a brother consultant to IBM in the data-handling capacity; we are familiar with the handling of the data. It is true, it goes to the doctor, but somebody has to put that data all together, you see, and we are very interested in participating in this program in order to establish the weak spots, the strong spots, the areas in which accuracy of position is required, so that we do not go down a false road.

Senator NEUBERGER. I wish you would comment on a passage in your prepared statement. You refer to Blue Shield and that is what made me think of this.

It must not be forgotten that in most instances a well-taken history and physical examination by a physician plus several well-chosen procedures can elaborate the basic disease process, and a complete screening is neither necessary nor warranted.

In other words, you are talking about physical examination or clinical testing instead of health screening. What you say is that it is preferable to screening; is that it?

Dr. RAPPOPORT. Well, I think we have to put it in the proper framework. If we are examining an ostensibly normal population, then obviously we are talking about a screening, we are searching for possible occult hidden disease. In this case, of course, we have to use the most subjective procedures that we can possibly devise in order to clarify whether or not there is an abnormality, a biochemical procedure, immunizing procedure.

The patient says, "I feel well," but the test says something is going wrong before it becomes clinically manifest. Obviously the subtlety of the disease is matched only by the subtleties you use to find it. You must expect to exert more effort to clarify that.

For the person, however, who has a hernia, it requires no great sophistication to find out that a person has a hernia. Should we balance off, you see? Let's take the patient with hernia. Look at the hernia, see the hernia and let it go at that, so that we can utilize some of the subtlety or sophistication or talent for those cases which need that degree of sophistication.

As an attorney you can look at the problem and it is immediately there. You don't have to write a 50-page brief. Maybe you do, I don't know. The point I make is, let's balance the effort for the results we gain, and when it is very difficult to elucidate, then we turn the whole gamut of our diagnostic procedure off. Let's not say "wait"—that same effort, for obviously clearly definable and regularly recognizable situations. There are adjustments as to the expenditures—

Senator NEUBERGER. I am sorry. We will have to curtail this, we are running into the next witness' time. I believe Senator Williams wanted to know this.

I believe the question he wanted to ask you: Where does pathology come in with the hearing test given in the mobile unit—glaucoma, et cetera?

Dr. RAPPOPORT. I think, Senator Neuberger, no hospital pathologist is—and I will not belabor the point. There were lots of diseases here which the laboratory in a conventional sense is already involved, diabetes, anemia, chest X-ray, tuberculosis. We are involved in practically everything there, and if there is something wrong, it will be up to some pathologist to find out why.

I think we will have to agree, at least we have always thought that the pathologist is always the hub of the diagnostician in medicine. That is a balanced diagnostic study, but we are talking about pathology, laboratory, clinical pathology, laboratory techniques, and we are talking of the best way to achieve the mostest of what we have. It is not blue sky and we have to spend our waking hours and know-how and people in the best way possible.

Senator NEUBERGER. Thank you very much. We enjoyed having this discussion. We have had the medical school, sociologists, clergy, and we certainly consider the pathologist an important part of this.

We welcome your appearance here and I do hope I get up to your exhibit. I am counting on going.

Dr. RAPPOPORT. Thank you.

Senator NEUBERGER. I now welcome Mrs. Dorothy P. Rice who will be our last witness in this afternoon's session. She is a medical economist, Acting Chief of the Special Studies Branch in the Division of Health Insurance Studies in the Office of Research and Statistics in the Social Security Administration.

We are glad to have you, Mrs. Rice, and we are looking forward to hearing your statement.

#### STATEMENT OF DOROTHY P. RICE, MEDICAL ECONOMIST, SOCIAL SECURITY ADMINISTRATION

Mrs. RICE. Thank you, Senator.

I am happy to have this opportunity to appear before the Subcommittee on Health of the Elderly to discuss the cost of chronic illness and its impact on the economy. In this statement, I will present data on the annual expenditures for medical care of chronic disorders affecting almost half of our total population and more than 7 out of 10 persons aged 45 years and over. In addition to discussing their annual direct expenditures for medical care, I will cover the indirect costs or the value of the losses in output to the economy resulting from chronic illnesses.

I propose to cover most of the material that I have included in the prepared statement and because it contains quite a few figures, I would like to hold closely to it although I will not necessarily read all of it. Medical advances in the prevention and control of formerly fatally infectious diseases such as pneumonia, typhoid fever, and tuberculosis have made it possible for an increasing number of Americans to reach an age at which they become more vulnerable to arthritis, rheumatism, heart disease, cancer, and other chronic illnesses.

As a result, chronic diseases causing limited or total disability now constitute a major health problem.

An estimated 87 million persons, or almost half of the civilian non-institutional population, reported one or more chronic conditions for the 12-month period ending June 1965.

I have also prepared several tables and they are appended to the statement and you may want to refer to them.

Senator NEUBERGER. They will be included in the record.

(The information referred to follows:)

#### LISTING OF MAJOR DIAGNOSTIC CATEGORIES AND SELECTED SUBCLASSIFICATIONS

##### CHRONIC CONDITIONS

Tuberculosis.

Neoplasms.

Allergic, endocrine, metabolic, and nutritional diseases:

Allergic disorders.

Disease of thyroid gland.

Diabetes mellitus.

Diseases of other endocrine glands.

Avitaminoses and other metabolic diseases.

**Diseases of blood and blood-forming organs :**

- Anemia.
- Hemophilia.
- Diseases of spleen.

**Mental, psychoneurotic, and personality disorders.****Diseases of the nervous system and sense organs :**

- Vascular lesions affecting central nervous system (stroke).
- Inflammatory and other diseases of central nervous system.
- Diseases of nerves and peripheral ganglia.
- Inflammatory and other diseases of eye.
- Diseases of ear and mastoid process.

**Diseases of the circulatory system :**

- Rheumatic fever and rheumatic heart disease.
- Arteriosclerotic and other diseases of the heart.
- Hypertension.
- Diseases of arteries.
- Diseases of veins and other diseases of circulatory system.

**Diseases of the genitourinary system :**

- Nephritis and nephrosis.
- Other diseases of urinary system.
- Diseases of male genital organs.
- Diseases of female genital organs.

**Diseases of bones and organs of movement :**

- Arthritis and rheumatism.
- Osteomyelitis and other diseases of bone and joint.
- Other diseases of musculoskeletal system.

**Congenital malformations :**

- Monstrosity.
- Congenital malformations of circulatory system.
- Cleft palate and harelip.

**Symptoms, senility and ill-defined conditions :**

- Symptoms referable to symptoms or organs.
- Senility and ill-defined conditions.

**ACUTE CONDITIONS****Infective and parasitic diseases :**

- Venereal diseases.
- Diseases attributable to viruses.
- Typhus and other rickettsial diseases.
- Malaria.

**Diseases of the respiratory system :**

- Acute upper respiratory infections.
- Influenza.
- Pneumonia.
- Bronchitis, acute and chronic.
- Other diseases of respiratory system.

**Diseases of the digestive system :**

- Diseases of buccal cavity and esophagus (dental conditions).
- Diseases of stomach and duodenum.
- Appendicitis.
- Hernia of abdominal cavity.
- Diseases of liver, gallbladder and pancreas.

**Pregnancy, childbirth, puerperium (maternity).****Diseases of skin and cellular tissue.****Certain diseases of early infancy :**

- Birth injuries, asphyxia, and infections of newborn.
- Other diseases peculiar to early infancy.

**Injuries and adverse effects of chemical and other external causes.**

TABLE 1.—Number and percent of persons with 1 or more chronic conditions, by sex and age, July 1964–June 1965

Sex and age	Total population (thousands)	Persons with 1 or more chronic conditions	
		Number (thousands)	Percent of population
<b>BOTH SEXES</b>			
All ages.....	188,430	87,301	46.3
Under 17.....	66,343	14,187	21.4
17-24.....	21,299	8,406	39.5
25-44.....	45,299	25,013	55.2
45-64.....	38,196	25,277	66.2
65 and over.....	17,292	14,418	83.4
<b>MALE</b>			
All ages.....	91,311	40,683	44.6
Under 17.....	33,726	7,669	22.7
17-24.....	9,962	3,741	37.6
25-44.....	21,613	11,273	52.2
45-64.....	18,401	11,770	64.0
65 and over.....	7,610	6,230	81.9
<b>FEMALE</b>			
All ages.....	97,119	46,618	48.0
Under 17.....	32,618	6,519	20.0
17-24.....	11,337	4,665	41.1
25-44.....	23,686	13,739	58.0
45-64.....	19,795	13,507	68.2
65 and over.....	9,683	8,188	84.6

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, "Current Estimates From the Health Interview Survey, United States, July 1964–June 1965," Public Health Service Publication No. 100, series 10, No. 25.

TABLE 2.—National health expenditures: Amount and distribution, by object of expenditure, 1963

Object of expenditure	Amount (millions)	Percent distribution
Total.....	\$34,263	100.0
Personal services and supplies.....	29,394	85.5
Hospital care.....	11,579	33.8
Nursing home care.....	825	2.4
Physicians' services.....	6,867	20.0
Dentists' services.....	2,869	6.9
Other professional services.....	890	2.6
Drug and drug sundries.....	4,335	12.7
Eyeglasses and appliances.....	1,439	4.2
School health services.....	150	.4
Industrial implant health services.....	298	.9
Medical activities in Federal units other than hospitals.....	642	1.9
Nonpersonal services.....	4,869	14.2
Medical research.....	1,195	3.5
Construction.....	1,566	4.6
Government public health activities <sup>1</sup> .....	786	2.3
Voluntary health agencies.....	251	.7
Net cost of insurance.....	1,071	3.1

<sup>1</sup> May include some expenditures for personal services, such as immunization programs.

Source: U.S. Department of Health, Education, and Welfare, Social Security Administration, Research and Statistics Note No. 10-1965, "National Expenditures for Health Care Purposes by Object of Expenditures and Source of Funds, 1960-63."

TABLE 3.—National health expenditures—Selected categories: Estimated amount for chronic and acute conditions, by diagnosis and object of expenditure, 1963

Diagnosis	Amount (millions)					Percent distribution				
	Total	Hospital care	Nursing home care	Professional services		Total	Hospital care	Nursing home care	Professional services	
				Physicians	Others <sup>1</sup>				Physicians	Other <sup>1</sup>
Total.....	\$22,530.0	\$11,579.0	\$825.0	\$6,867.0	\$3,259.0	100.0	100.0	100.0	100.0	100.0
Chronic conditions, total.....	12,041.5	7,173.3	674.8	3,509.0	684.4	53.4	62.0	81.8	51.1	21.0
Tuberculosis.....	241.4	230.2	-----	6.9	4.3	1.1	2.0	-----	2.2	.1
Neoplasms.....	1,279.0	1,006.1	27.2	206.0	39.7	5.7	8.7	3.3	3.0	1.2
Allergic, endocrine, metabolic, and nutritional diseases.....	902.9	339.3	28.0	515.0	20.6	4.0	2.9	3.4	7.5	.6
Diseases of blood and blood-forming organs.....	155.9	54.8	-----	96.1	5.0	.7	.5	-----	1.4	.2
Mental, psychoneurotic, and personality disorders.....	2,401.7	2,059.7	29.7	281.5	30.8	10.7	17.8	3.6	4.1	.9
Diseases of nervous system and sense organs.....	1,416.4	684.0	178.2	508.2	46.0	6.3	5.9	21.6	7.4	1.4
Diseases of circulatory system.....	2,267.3	1,272.7	207.1	714.2	73.3	10.1	11.0	25.1	10.4	2.2
Diseases of genitourinary system.....	1,210.2	737.9	12.4	432.6	27.3	5.4	6.4	1.5	6.3	.5
Diseases of bones and organs of movement.....	1,430.0	501.7	52.0	453.2	423.1	6.3	4.3	6.3	6.6	13.0
Congenital malformations.....	113.0	89.3	-----	20.6	3.1	.5	.8	-----	.3	.1
Symptoms, senility, and ill-defined conditions.....	623.7	197.6	140.2	274.7	11.2	2.8	1.7	17.0	4.0	.3
Acute conditions, total.....	10,488.6	4,405.7	150.2	3,358.0	2,574.7	46.6	38.0	18.2	48.9	79.0
Infective and parasitic diseases.....	260.6	109.9	-----	144.2	6.5	1.2	.9	-----	2.1	.2
Diseases of the respiratory system.....	1,581.1	751.0	-----	893.4	26.7	7.0	6.5	-----	11.7	.8
Diseases of the digestive system.....	4,158.7	1,335.5	9.1	398.3	2,415.8	18.5	11.5	1.1	5.8	74.1
Maternity.....	1,391.1	919.8	-----	425.8	45.5	6.2	7.9	-----	6.2	1.4
Diseases of skin and cellular tissue.....	248.1	146.8	-----	96.1	5.2	1.1	1.3	-----	1.4	.2
Certain diseases of early infancy.....	30.3	22.6	-----	6.9	.8	.1	.2	-----	.1	( <sup>3</sup> )
Injuries.....	1,702.8	995.4	72.6	604.3	30.5	7.6	8.6	8.8	8.8	.9
Miscellaneous.....	1,115.9	124.7	68.5	879.0	43.7	5.0	1.1	8.3	12.8	1.3

<sup>1</sup> Includes nursing care and services of dentists, podiatrists, physical therapists, clinical psychologists, chiropractors, naturopaths, and Christian Science practitioners.

<sup>2</sup> Includes dental care.

<sup>3</sup> Less than 0.05 percent.

Source: Rice, Dorothy P., "Estimating the Cost of Illness," Department of Health, Education, and Welfare, Public Health Service Publication No. 947-6, Health Economics Series No. 6, May 1966.

TABLE 4.—Annual mortality and morbidity losses: Indirect costs for chronic and acute conditions, by population group and diagnosis, 1968

Diagnosis	Amount (millions)				Percent distribution			
	Total	Mortality	Morbidity		Total	Mortality	Morbidity	
			Institutional	Noninstitutional			Institutional	Noninstitutional
Total.....	\$23,773.1	\$2,731.0	\$5,104.3	\$15,637.9	100.0	100.0	100.0	100.0
Chronic conditions, total.....	15,146.1	2,207.1	4,903.3	8,035.7	63.7	80.8	96.1	50.4
Tuberculosis.....	403.6	18.3	141.4	243.8	1.7	.7	2.8	1.5
Neoplasms.....	1,334.5	483.8	58.4	792.3	5.6	17.7	1.1	5.0
Allergic, endocrine, metabolic, and nutritional diseases.....	607.2	67.7	56.2	483.4	2.6	2.5	1.1	3.0
Diseases of blood and blood-forming organs.....	48.5	7.3	3.9	37.4	.2	.3	.1	.2
Mental, psychoneurotic, and personality disorders.....	4,634.0	10.0	3,640.7	983.2	19.5	.4	71.3	6.2
Diseases of nervous system and sense organs.....	1,825.3	299.8	307.0	1,218.5	7.7	11.0	6.0	7.6
Diseases of circulatory system.....	4,145.6	1,225.9	328.9	2,590.7	17.4	44.9	6.4	16.3
Diseases of genitourinary system.....	546.1	48.3	16.5	481.3	2.3	1.8	.3	3.0
Diseases of bones and organs of movement.....	1,230.6	5.6	81.3	1,143.7	5.2	.2	1.6	7.2
Congenital malformations.....	48.5	6.7	-----	41.8	.2	.2	-----	.3
Symptoms, senility, and ill-defined conditions.....	322.2	33.7	289.0	19.6	1.4	1.2	5.3	.1
Acute conditions, total.....	8,627.0	523.6	200.9	7,902.2	36.3	19.2	3.9	49.6
Infective and parasitic diseases.....	486.5	13.7	1.5	471.2	2.0	.5	(*)	3.0
Diseases of the respiratory system.....	3,305.7	139.4	8.4	3,157.8	13.9	5.1	.2	19.8
Diseases of the digestive system.....	1,343.6	123.4	20.5	1,199.6	5.7	4.5	.4	7.5
Maternity.....	34.3	2.1	-----	32.2	.1	.1	-----	.8
Diseases of skin and cellular tissue.....	131.7	3.3	.8	127.6	.6	.1	(*)	.7
Certain diseases of early infancy.....	-----	-----	-----	-----	-----	-----	-----	-----
Injuries.....	2,052.4	241.7	105.3	1,705.4	8.6	8.9	2.1	10.7
Miscellaneous.....	1,272.8	-----	64.4	1,208.4	5.4	-----	1.3	7.6

Source: Rice, Dorothy P., "Estimating the Cost of Illness," Department of Health, Education, and Welfare, Public Health Service Publication No. 047-6, Health Economics Series No. 6, May 1966.

TABLE 5.—Annual mortality and morbidity losses: estimated indirect costs for chronic and acute conditions, by diagnosis and age, 1963

Diagnosis	Amount (millions)					Percent distribution				
	All ages	Under 25	25 to 44	45 to 64	65 and over	All ages	Under 25	25 to 44	45 to 64	65 and over
Total.....	\$23,773.1	\$1,113.4	\$7,143.1	\$10,733.5	\$4,783.2	100.0	100.0	100.0	100.0	100.0
Chronic conditions, total.....	15,146.1	504.5	3,844.9	6,882.2	3,914.5	63.7	45.3	53.8	64.1	81.8
Tuberculosis.....	403.6	23.5	154.7	181.7	43.7	1.7	2.1	2.2	1.7	.9
Neoplasms.....	1,334.5	40.5	265.9	678.2	349.9	5.6	3.6	3.7	6.3	7.3
Allergic, endocrine, metabolic, and nutritional diseases.....	607.2	20.5	143.9	311.7	131.2	2.6	1.8	2.0	2.9	2.7
Diseases of blood and blood-forming organs.....	48.5	2.0	15.9	15.3	15.2	.2	.2	.2	.1	.3
Mental, psychoneurotic, and personality disorders.....	4,634.0	244.3	1,821.0	1,898.7	670.0	19.5	21.9	25.5	17.7	14.0
Diseases of nervous system and sense organs.....	1,825.3	69.5	342.0	733.6	680.1	7.7	6.2	4.8	6.8	14.2
Diseases of circulatory system.....	4,145.6	41.3	540.7	2,065.5	1,498.1	17.4	3.7	7.6	19.2	31.3
Diseases of genitourinary system.....	546.1	23.0	190.0	249.2	83.9	2.3	2.1	2.7	2.3	1.8
Diseases of bones and organs of movement.....	1,230.6	31.9	319.4	640.6	238.8	5.2	2.9	4.5	6.0	5.0
Congenital malformations.....	48.5	4.2	21.5	18.8	4.0	.2	.4	.3	.2	.1
Symptoms, senility, and ill-defined conditions.....	322.2	3.8	29.9	88.9	199.6	1.4	.3	.4	.8	4.2
Acute conditions, total.....	8,627.0	608.9	3,298.2	3,851.3	868.8	36.3	54.7	46.2	35.9	18.2
Infective and parasitic diseases.....	486.5	57.3	204.4	206.7	18.2	2.0	5.1	2.9	1.9	.4
Diseases of the respiratory system.....	3,305.7	214.8	1,245.4	1,535.4	310.2	13.9	19.3	17.4	14.3	6.5
Diseases of the digestive system.....	1,343.6	68.9	450.0	669.1	155.5	5.7	6.2	6.3	6.2	3.3
Maternity.....	34.3	15.9	18.4	(1)	.....	.1	1.4	.3	(2)	.....
Diseases of skin and cellular tissue.....	131.7	16.4	34.4	65.5	15.4	.6	1.5	.5	.6	.3
Certain diseases of early infancy.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Injuries.....	2,052.4	166.7	897.7	772.1	216.0	8.6	15.0	12.6	7.2	4.5
Miscellaneous.....	1,272.8	68.9	447.9	602.5	153.5	5.3	6.2	6.3	5.6	3.2

<sup>1</sup> Less than 500,000.

<sup>2</sup> Less than 0.05 percent.

Source: Rice, Dorothy P., "Estimating the Cost of Illness," Department of Health, Education, and Welfare, Public Health Service Publication No. 947-6, Health Economics Series No. 6, May 1966.



TABLE 6.—Annual economic cost: Estimated direct expenditures and indirect costs of morbidity and mortality for chronic and acute conditions, by diagnosis, 1963

Diagnosis	Amount (millions)			Percent distribution		
	Total	Direct expenditures	Indirect costs	Total	Direct expenditures	Indirect costs
Total.....	\$46,303.1	\$22,530.0	\$23,773.1	100.0	100.0	100.0
Chronic conditions, total.....	27,187.6	12,041.5	15,146.1	58.7	53.4	63.7
Tuberculosis.....	645.0	241.4	403.6	1.4	1.1	1.7
Neoplasms.....	2,613.5	1,279.0	1,334.5	5.6	5.7	5.6
Allergic, endocrine, metabolic, and nutritional diseases.....	1,510.1	902.9	607.2	3.3	4.0	2.6
Diseases of blood and blood-forming organs.....	204.4	155.9	48.5	.4	.7	.2
Mental, psychoneurotic, and personality disorders.....	7,035.7	2,401.7	4,634.0	15.2	10.7	19.5
Diseases of nervous system and sense organs.....	3,241.7	1,416.4	1,825.3	7.0	6.3	7.7
Diseases of circulatory system.....	6,412.9	2,267.3	4,145.6	13.8	10.1	17.4
Diseases of genitourinary system.....	1,756.3	1,210.2	546.1	3.8	5.4	2.3
Diseases of bones and organs of movement.....	2,660.6	1,430.0	1,230.6	5.7	6.3	5.2
Congenital malformations.....	161.5	113.0	48.5	.3	.5	.2
Symptoms, senility, and ill-defined conditions.....	945.9	623.7	322.2	2.0	2.8	1.4
Acute conditions, total.....	19,115.6	10,488.6	8,627.0	41.3	46.6	36.3
Infective and parasitic diseases.....	747.1	260.6	486.5	1.6	1.2	2.0
Diseases of the respiratory system.....	4,886.8	1,581.1	3,305.7	10.6	7.0	13.9
Diseases of the digestive system.....	5,502.3	4,158.7	1,343.6	11.9	18.5	5.7
Maternity.....	1,425.4	1,391.1	34.3	3.1	6.2	.1
Diseases of skin and cellular tissue.....	379.8	248.1	131.7	.8	1.1	.6
Certain diseases of early infancy.....	30.3	30.3	.....	.1	.1	.....
Injuries.....	3,755.2	1,702.8	2,052.4	8.1	7.6	8.6
Miscellaneous.....	2,388.7	1,115.9	1,272.8	5.1	5.0	5.3

Source: Rice, Dorothy P., "Estimating the Cost of Illness," Department of Health, Education, and Welfare, Public Health Service Publication No. 947-6, Health Economics Series No. 6, May 1966.

TABLE 7.—Present value of lifetime earnings: Amount discounted at 4 percent by age and sex<sup>1</sup>

Age	Males	Females	Age	Males	Females
Under 1.....	\$59,063	\$34,622	45 to 49.....	\$80,325	\$50,896
1 to 4.....	64,989	37,638	50 to 54.....	63,027	44,371
5 to 9.....	79,333	46,289	55 to 59.....	45,948	37,467
10 to 14.....	96,736	56,422	60 to 64.....	28,387	30,164
15 to 19.....	114,613	64,636	65 to 69.....	15,043	23,579
20 to 24.....	126,688	67,960	70 to 74.....	9,264	18,118
25 to 29.....	128,698	66,826	75 to 79.....	5,544	12,888
30 to 34.....	122,964	64,359	80 to 84.....	2,935	6,916
35 to 39.....	111,956	60,988	85 and over.....	210	1,123
40 to 44.....	97,301	56,603			

<sup>1</sup> Represents present value of expected lifetime earnings for projected fatalities in each year, calculated for each 5-year age and sex group on the basis of 1963 life tables, 1963 labor force participation rates adjusted for full employment (an average 4-percent unemployment rate), 1963 mean earnings, imputed value of housewives' services, 1963 housekeeping rates, and an annual net effective discount rate of 4 percent.

Source: Rice, Dorothy P., "Estimating the Cost of Illness," Department of Health, Education, and Welfare, Public Health Service Publication No. 947-6, Health Economics Series No. 6, May 1966.

TABLE 8.—Total mortality losses: Number of deaths, estimated total years lost, and lifetime earnings for chronic and acute conditions, by diagnosis, 1963

Diagnosis	Amount			Percent distribution		
	Number of deaths	Total years lost (thousands)	Lifetime earnings (millions)	Number of deaths	Total years lost	Lifetime earnings
Total.....	1,812,921	32,533.0	\$49,928.1	100.0	100.0	100.0
Chronic conditions, total.....	1,428,629	19,929.4	32,832.1	78.8	61.3	65.8
Tuberculosis.....	9,306	168.5	341.0	.5	.5	.7
Neoplasms.....	290,208	4,760.1	8,460.2	16.0	14.6	16.9
Allergic, endocrine, metabolic, and nutritional diseases.....	43,414	690.5	1,180.7	2.4	2.1	2.4
Diseases of blood and blood-forming organs.....	5,314	121.5	175.4	.3	.4	.4
Mental, psychoneurotic, and personality disorders.....	4,651	121.5	250.9	.3	.4	.5
Diseases of nervous system and sense organs.....	215,648	2,570.9	3,853.5	11.9	7.9	7.7
Diseases of circulatory system.....	782,098	9,089.2	15,761.4	43.1	27.9	31.6
Diseases of genitourinary system.....	31,046	495.2	851.9	1.7	1.5	1.7
Diseases of bones and organs of movement.....	3,772	76.6	127.7	.2	.2	.3
Congenital malformations.....	20,814	1,319.0	1,087.9	1.1	4.1	2.2
Symptoms, senility, and ill-defined conditions.....	22,358	516.4	741.5	1.2	1.6	1.5
Acute conditions, total.....	384,292	12,603.5	17,095.8	21.2	38.7	34.2
Infective and parasitic diseases.....	10,419	338.4	434.4	.6	1.0	.9
Diseases of the respiratory system.....	105,235	2,174.0	2,665.4	5.8	6.7	5.3
Diseases of the digestive system.....	71,700	1,445.3	2,458.5	4.0	4.4	4.9
Maternity.....	1,466	68.0	93.9	.1	.2	.2
Diseases of skin and cellular tissue.....	2,119	45.5	73.8	.1	.1	.1
Certain diseases of early infancy.....	62,688	4,376.4	3,072.7	3.5	13.5	6.2
Injuries.....	130,665	4,155.9	8,297.1	7.2	12.8	16.6

Source: Rice, Dorothy P., "Estimating the Cost of Illness," Department of Health, Education, and Welfare, Public Health Service Publication No. 947-6, Health Economics Series No. 6, May 1966.

TABLE 9.—Total mortality losses: Estimated present value of lifetime earnings for chronic and acute conditions, by diagnosis and age, 1963

Diagnosis	Amount (millions)					Percent distribution				
	All ages	Under 25	25 to 44	45 to 64	65 and over	All ages	Under 25	25 to 44	45 to 64	65 and over
Total.....	\$49,928.1	\$10,195.6	\$9,753.8	\$19,870.3	\$10,108.4	100.0	100.0	100.0	100.0	100.0
Chronic conditions, total.....	32,832.1	2,548.3	5,369.8	16,001.6	8,912.3	65.8	25.0	55.1	80.5	88.2
Tuberculosis.....	341.0	17.4	107.5	174.6	41.5	.7	.2	1.1	.9	.4
Neoplasms.....	8,460.3	561.3	1,563.6	4,573.2	1,762.1	16.9	5.5	16.0	23.0	17.4
Allergic, endocrine, metabolic, and nutritional diseases.....	1,180.7	94.9	245.2	525.9	314.7	2.4	.9	2.5	2.6	3.1
Diseases of blood and blood-forming organs.....	175.4	60.8	36.5	49.5	28.6	.4	.6	.4	.2	.3
Mental, psychoneurotic, and personality disorders.....	251.0	37.2	103.7	98.3	11.8	.5	.4	1.1	.5	.1
Diseases of nervous system and sense organs.....	3,853.5	318.9	567.8	1,535.8	1,431.0	7.7	3.1	5.8	7.7	14.2
Diseases of circulatory system.....	15,761.3	180.5	2,209.0	8,334.1	5,037.7	31.6	1.8	22.6	41.9	49.8
Diseases of genitourinary system.....	851.9	103.1	243.0	341.5	164.3	1.7	1.0	2.5	1.7	1.6
Diseases of bones and organs of movement.....	127.7	39.0	22.3	44.4	22.0	.3	.4	.2	.2	.2
Congenital malformations.....	1,087.8	934.5	89.2	57.5	6.6	2.2	9.2	.9	.3	.1
Symptoms, senility, and ill-defined conditions.....	741.5	200.7	182.0	266.8	92.0	1.5	2.0	1.9	1.3	.9
Acute conditions, total.....	17,095.9	7,647.44	4,383.8	3,868.7	1,196.0	34.2	75.0	44.9	19.5	11.8
Infective and parasitic diseases.....	434.4	192.3	83.9	121.1	37.1	.9	1.9	.9	.6	.4
Diseases of the respiratory system.....	2,665.4	885.0	370.8	894.9	514.7	5.3	8.7	3.8	4.5	5.1
Diseases of the digestive system.....	2,458.5	325.7	611.6	1,174.1	347.1	4.9	3.2	6.3	5.9	3.4
Maternity.....	93.9	27.5	65.9	.5	-----	.2	.3	-----	(1)	-----
Diseases of skin and cellular tissue.....	73.9	11.7	23.5	28.0	10.7	.1	.1	.2	.1	.1
Certain diseases of early infancy.....	3,072.7	3,072.7	-----	-----	-----	6.2	30.1	-----	-----	-----
Injuries.....	8,297.1	3,132.5	3,228.1	1,650.1	286.4	16.6	30.7	33.1	8.3	2.8

<sup>1</sup> Less than 0.05 percent.

Source: Rice, Dorothy P., "Estimating the Cost of Illness," Department of Health, Education, and Welfare, Public Health Service Publication No. 947-6, Health Economics Series No. 6, May 1966.

TABLE 10.—Total economic cost: Estimated direct expenditures, indirect cost of morbidity, and present value of lifetime earnings discounted at 4 percent, by diagnosis, 1963

Diagnosis	Amount (millions)				Percent distribution			
	Total	Direct expenditures	Morbidity	Total mortality	Total	Direct expenditures	Morbidity	Total mortality
Total.....	\$93,500.3	\$22,530.0	\$21,042.2	\$49,928.1	100.0	100.0	100.0	100.0
Chronic conditions, total.....	57,812.6	12,041.5	12,939.0	32,832.1	61.8	53.4	61.5	65.8
Tuberculosis.....	987.6	241.4	385.2	341.0	1.0	1.1	1.8	.7
Neoplasms.....	10,589.9	1,279.0	850.7	8,460.2	11.3	5.7	4.0	16.9
Allergic, endocrine, metabolic and nutritional diseases.....	2,623.1	902.9	539.5	1,180.7	2.8	4.0	2.6	2.4
Diseases of blood and blood-forming organs.....	372.6	155.9	41.3	175.4	.4	.7	.2	.4
Mental, psychoneurotic and personality disorders.....	7,276.6	2,401.7	4,624.0	250.9	7.8	10.7	22.0	.5
Diseases of nervous system and sense organs.....	6,795.4	1,416.4	1,525.5	3,853.5	7.3	6.3	7.2	7.7
Diseases of circulatory system.....	20,948.4	2,267.3	2,919.7	15,761.4	22.4	10.1	13.9	31.6
Diseases of genitourinary system.....	2,559.9	1,210.2	497.8	851.9	2.7	5.4	2.4	1.7
Diseases of bones and organs of movement.....	2,782.7	1,430.0	1,225.0	127.7	3.0	6.3	5.8	.3
Congenital malformations.....	1,242.7	113.0	41.8	1,087.9	1.3	.5	.2	2.2
Symptoms, senility and ill-defined conditions.....	1,653.7	623.7	288.5	741.5	1.8	2.8	1.4	1.5
Acute conditions, total.....	35,687.7	10,488.6	8,103.3	17,095.8	38.2	46.6	38.5	34.2
Infective and parasitic diseases.....	1,167.8	260.6	472.8	434.4	1.2	1.2	2.2	.9
Diseases of the respiratory system.....	7,412.8	1,581.1	3,166.3	2,665.4	7.9	7.0	15.0	5.3
Diseases of the digestive system.....	7,837.3	4,158.7	1,220.1	2,458.5	8.4	18.5	5.8	4.9
Maternity.....	1,517.2	1,391.1	32.2	93.9	1.6	6.2	.2	.2
Diseases of skin and cellular tissue.....	450.3	248.1	128.4	73.8	.5	1.1	.6	.1
Certain diseases of early infancy.....	3,103.0	30.3	.....	3,072.7	3.3	.1	.....	6.2
Injuries.....	11,810.6	1,702.8	1,810.7	8,297.1	12.6	7.6	8.6	16.6
Miscellaneous.....	2,388.7	1,115.9	1,272.8	.....	2.5	5.0	6.1	.....

Source: Rice, Dorothy P., "Estimating the Cost of Illness," Department of Health, Education, and Welfare, Public Health Service Publication No. 947-6, Health Economics Series No. 6, May 1968.

Mrs. RICE. Although aged people as a group are more prone to suffer chronic illness than those in younger age groups, these illnesses are not limited to the aged population. About one-fourth of persons under age 25 report one or more chronic conditions, compared with 55 percent of those aged 25-44 years, 66 percent in the age group 45-64 years, and 83 percent age 65 years and over.

Not all chronic conditions are necessarily disabling although such conditions often require medical care. Of the 87.3 million persons with 1 or more chronic conditions, 22.6 million, or more than one-fourth, report some degree of activity limitation.

The following statistics serve to underscore the prevalence and incidence of specific chronic conditions:

A total of 14.6 million adults have definite heart disease, and another 13 million have suspected heart disease.

About 13 million Americans report they suffer from some form of arthritis.

There are 2 million known diabetics in this country.

Approximately 1.2 million persons have some visual impairment which results in a limitation of activity.

More than half a million new cancer cases are diagnosed each year.

What do these numbers mean in terms of dollars and cents? What part of our national expenditures for health and medical care is for care and treatment of these and other chronic illnesses? What are the indirect costs associated with chronic illnesses? These questions are answered in my recent study, "Estimating the Cost of Illness," copies of which are available at this meeting.<sup>1</sup>

Senator NEUBERGER. What is the name of that?

Mrs. RICE. "Estimating the Cost of Illness," and this is an outgrowth of the work I had done for the President's Commission on Heart Disease, Cancer, and Stroke on estimating the costs of cardiovascular diseases and cancer.

Total expenditures for health and medical care amounted to \$34.3 billion in 1963, representing 5.8 percent of the GNP, table 2, page 61. The allocation of funds by disease is limited in this discussion to the following expenditure categories: hospital and nursing home care, and services of physicians, dentists, and other health professionals. In 1963, these expenditures amounted to \$22.5 billion or approximately two-thirds of the total outlay for health and medical care. The remaining one-third includes a variety of personal and nonpersonal expenditures, including drugs, eyeglasses and appliances, medical research, construction, Government public health activities, and other miscellaneous expenditures.

This group of nonpersonal expenditures is not allocated according to disease and includes expenditures for a variety of conditions and illnesses not readily identifiable.

The estimated distribution of 1963 expenditures for specified health services is presented for the 18 major diagnostic groups, categorized according to the International Classification of Diseases that is used all over the world. These major diagnostic groups were further classified into "chronic" and "acute" categories. Since most of the major diagnostic groups include a mix of both types of illnesses, the alloca-

<sup>1</sup> Available also from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

tion was made on the basis of each group's predominant characteristics. For example, although diseases of the respiratory system include chronic bronchitis, this category is classified as "acute" because most of the other specific illnesses are, in fact, of the acute type.

On the basis of this admittedly rough classification system, expenditures for medical care and treatment of chronic conditions amounted to the staggering sum of more than \$12 billion in 1963, or more than half of the total personal health care expenditures distributed among the various diseases (table 3, p. 62). Not included here are other direct costs such as amounts spent for drugs and for research in chronic diseases, which would make the total even greater.

There are striking differences among the several expenditure categories in terms of the diagnostic distributions. Expenditures for chronic illnesses account for 62 percent of the hospital care, but only 51 percent of physicians' services. As expected, a major portion of the expenditures for nursing homes—82 percent—is for care and treatment of chronic conditions. Only a small proportion—21 percent—are of payments for the services of other professional personnel. Included in this category are dental services, which amount to over \$2 billion a year.

These statistics point up the fact that a substantial portion of the Nation's annual health expenditures is spent for hospital and medical care of persons with chronic illnesses. However, direct expenditures do not measure the full economic cost imposed upon the Nation by illness, disability, and premature death since they do not include the loss of output to the economy. These losses, labeled "indirect costs," are perhaps even more arresting.

Chronic illnesses causing limitation of activity, institutionalization, and death, result in losses of output to the economy. The vast majority of the 1.5 million persons in institutions are there because of some chronic disability. More than 70 percent of deaths are now due to three chronic illnesses—heart disease, cancer, and stroke. A total of 224 million days was lost from work in 1963 due to chronic conditions.

In addition to persons in the labor force who occasionally do not work because of illness and disability, there is a considerable number of individuals not in institutions who are unable to work. It is true that not all of them would have worked or been productive if illness had not interfered. Some are too old or too young for gainful employment. Others are unwilling to work, and some are unable to find a job. Nevertheless, a reasonable estimate of the value of their losses in output can be made by assuming that if it were not for these illnesses, these stricken persons would have had the same employment experience as persons in the same age and sex group under conditions of full employment. If full employment is not assumed, losses due to death and disability cannot be isolated from losses due to unemployment. The calculation of the annual loss in output is performed by applying prevailing average earnings to the productive time lost by age and sex group for each major cause of death and major type of illness.

An important group usually overlooked in estimating illness costs is the female keeping house. In 1963, a total of 323,000 women were reported unable to keep house because of illness. A value has been imputed to housewives' services equal to the average earnings of a do-

mestic worker, or \$2,670 in 1963. This imputed value is clearly on the low side because it makes no allowance for the housewife's longer workweek and does not take into account the size of the household cared for. And I have been criticized in some quarters for attaching such a low value.

A total of 6.2 million man-years was lost in 1963 due to death and illness. As previously indicated, not all of these years would have been productive. Of this total, three-fourths, 4.6 million man-years, represent productive years lost, valued at \$24 billion.

Using the rough classification system outlined above, the value of losses in output were also classified according to chronic and acute conditions. More than three-fifths of the annual indirect costs, valued at \$15.1 billion, are associated with chronic conditions. The distribution of these indirect costs according to population group reveals some significant differences between acute and chronic conditions.

As expected, losses for persons who died in 1963 from all chronic conditions such as cancer, diseases of the circulatory system, and diseases of the nervous system, represent more than four-fifths of the mortality dollar losses. Because institutionalized persons are largely afflicted with chronic illnesses, their losses in output represent almost all of the institutional losses—96 percent of the total. For the non-institutional population, including the current employed, those unable to work, and women keeping house, chronic conditions account for more than half of the total losses in output.

Although the incidence and severity of chronic diseases increases with age, these chronic conditions and the resulting losses in output are by no means limited to the aged. The distribution by age shows that dollar losses are highest for those aged 45 to 64, accounting for almost \$7 billion, or 45 percent of the \$15.1 billion annual indirect costs of chronic illnesses. These figures are shown on table 5, page 64.

Productivity losses for the 65-and-over age group represent a considerably smaller proportion of the total—26 percent, reflecting the relatively lower productivity of this age group.

To summarize, the total annual economic cost of all illnesses—the sum of the direct expenditures for medical care and the indirect costs of illness, disability, and death—was estimated at \$58 billion in 1963, comprised of the following:

First, \$34.3 billion spent for medical care, services and supplies. Of this total, \$22.5 billion was distributed among the major diagnostic group.

Second, \$23.8 billion lost to the economy in 1963 due to premature death, illness, and disability for all diseases.

Of the \$46.3 billion total economic cost distributed among the major diagnostic groups, \$27.2 billion, or almost three-fifths, represents the annual costs of chronic illnesses—\$27 billion.

Although the annual direct and indirect costs of illnesses are high, from the economist's point of view, single-year cost estimates represent only part of the estimated losses in output resulting from illness, disability, and death. If an individual who dies this year had not succumbed, he would have continued to be productive for a number of years. If he is ill and disabled this year and his disability continues into future years, his future productivity will be affected. It is the present value of these future losses that constitutes the appropriate

measure of the costs of a disease. For mortality, the estimated cost or value to society of death in a particular year is the product of the number of deaths in that year and the expected value of these individuals' future earnings after sex and age have been taken into account. This method of derivation must consider life expectancy for different age and sex groups, the changing pattern of earnings at successive ages, varying labor force participation rates, imputed value of housewives' services, and the appropriate discount rate to convert a stream of costs or benefits into its present worth.

Applying these expected lifetime earnings by age and sex, as shown in table 7, page 65, to the 1.8 million deaths in 1963 results in a loss of nearly \$50 billion to the economy. These deaths represent a loss of 32.5 million man-years. For the 1.4 million persons who died from chronic diseases, an estimated total of almost 20 million man-years was lost, valued at \$33 billion. Thus, almost two-thirds of the estimated lifetime earnings lost from all deaths in 1963 are attributed to chronic disease deaths.

Again, the highest proportion of deaths was naturally among the aged, with those age 65 years and over representing three-fifths of the total. The 45-to-64 age group is also strongly represented among the deaths, comprising nearly a fourth of the total. In terms of lost lifetime earnings, however, the latter age group accounted for two-fifths and the 65-and-over age group accounted for only one-fifth of the total amount. The much higher earnings losses for those who died in the 45-to-64 age group are due to their considerably higher expected earnings.

The age distribution of losses for those who died from chronic diseases shows a similar pattern. Of the 1.4 million who died due to these conditions, one-fourth were age 45 to 64 and 67 percent were age 65 and over. The lifetime earnings losses once again show a reverse relationship: losses are considerably higher for the former group.

Summing up the annual direct expenditures for illnesses, annual morbidity costs, and lifetime earnings losses due to death in 1963, the total economic cost amounts to \$94 billion. The distribution according to chronic and acute conditions shows that losses resulting from the former are considerably greater than the latter. The economic toll associated with illness, disability, and death in 1963 due to chronic diseases amounts to \$57.8 billion, a rather staggering amount by any definition.

Just a few words about the prevention of chronic disease. Precise figures on expenditures for prevention of disease are difficult, if not impossible, to estimate. By stretching the imagination and the figures a bit, and classifying as prevention expenditures all public and private expenditures for medical research, for public health activities, and for physicians' examinations without sickness, the total amounts to less than \$3 billion in 1963, about 8 percent of our total national health expenditures. This is clearly an overestimate of health prevention expenditures because public health activities include many demonstration and treatment programs. In addition, a not insignificant portion of current medical research is also for research in improved treatment methods.

These hearings of the Subcommittee on Health of the Elderly are being held for the purpose of studying modern health screening meth-



ords intended to detect and prevent chronic illness. For many chronic illnesses, early diagnosis and prompt treatment can prevent serious and lengthy periods of disability, high medical bills, and considerable losses in earnings. Considerable savings can be realized by detecting disease in its early stages before symptoms become apparent, before disabling complications have developed and while it is amenable to treatment. If a death is prevented, the potential savings are high, especially if death would have occurred during the productive years. The estimates of earnings losses presents a framework for evaluating screening programs which are designed to detect and diagnose illness at an early stage, thereby reducing or deferring disability and preventing premature death.

Preliminary results of a new study of benefits associated with a 5-year cervical cancer screening program show that the anticipated payoff would be high—\$9 returned for every dollar invested. This study was conducted by an ad hoc committee in the Department of Health, Education, and Welfare as part of the Department's efforts to examine the objectives, benefits, and costs of existing and alternative programs. The report has not yet been released, but the findings are of special interest to this committee.

Costs of a 5-year cervical cancer detection program, involving inpatient and outpatient hospital screening and special screening projects, were developed in considerable detail.

The program anticipates that a total of almost 7 million women would be examined over the 5-year period, more than 80,000 cervical cancer cases would be found, and approximately 34,000 cervical cancer deaths averted. The dollar benefits associated with this program were estimated in terms of savings of high treatment costs for invasive cancer and savings from death reduction. The procedure was laborious and detailed, but the expected payoff illustrates clearly that screening programs are a good investment not only from a health, but also from an economic, viewpoint.

Senator NEUBERGER. Is that study—sometimes you refer to it in the past and sometimes in the present.

Mrs. RICE. This cost-benefit analysis of the 5-year cervical cancer screening program is a new study that has not been released yet. This is part of the Department's recent efforts to examine the objectives and the benefits associated with particular programs.

The previous study on "Estimating the Cost of Illness" had been completed fairly recently and is available in published form.

Senator NEUBERGER. Almost every witness we have had today has referred to the Pap test, screening test. It seems to me if more women would take advantage of it there would be less cervical cancer.

Mrs. RICE. This is clearly true if we institute an expanded cervical cancer screening program and see that all women, especially in the younger age groups, make themselves available for the screening test. The problem is, as I gather, that many women cannot be reached very easily. But if they could be reached the incidence of the disease would decline in the future. There is no question about that.

Senator NEUBERGER. You have a final report on this particular project for our hearing record coming up?

Mrs. RICE. A final report is not now available, but preliminary results can be made available to the committee.

Senator NEUBERGER. I think we ought to have that, because it seems to be a very important part of the study.

Mrs. RICE. I will see that the part of this preliminary study relating to the benefits associated with cervical cancer screening programs will be included in the record.

(Preliminary study referred to follows:)

#### ECONOMIC BENEFITS OF UTERINE CANCER CONTROL

A study was made by the Cancer Control Branch to assess the potential direct benefits of a screening program to demonstrate control of cancer of the uterus.

Programs to demonstrate cancer detection measures generally have two objectives. First they seek to find and cure cases of the disease under controlled conditions. Secondly they seek to stimulate others to utilize the case-finding procedures demonstrated, in an effective manner.

Benefits of the stimulative effects of such programs are not subject to practical means of quantitative appraisal or prediction. While we can observe trends in mortality and other events that follow the programs, we cannot measure the extent to which these events and trends are caused by a specified program. This is because other forces are at work at the same time, helping to improve control of the disease.

We can, however, measure the effects of the program among the people who take part in it. This was the kind of study that was made of the uterine cancer control demonstration plan.

It was found that the life-saving effects of the case-finding activities of the program alone, could return after five years of operation, nine dollars for every dollar invested in the total program.

The program that was analyzed consisted of projects to be conducted by hospitals, clinics, health agencies and professional societies, with grant support. The local objectives of these projects include the following purposes:

(a) Finding and curing early-stage cases of cancer of the uterus (principally in-situ cancer of the uterine cervix);

(b) Installing the cytological examination for this purpose as a routine examination in hospitals and outpatient clinics;

(c) Demonstrating methods of educating women who seldom visit physicians or hospitals to obtain periodic examinations;

(d) Studying and demonstrating improved examination methods, and the epidemiology of the disease; and

(e) Training cytotechnologists so that the work force can grow with the expanding use of cytological examination.

Considered as basic costs in the appraisal of this program were the total anticipated project grant expenditures, including those for training and those applied to improvement of uterine cancer control procedures. Added to these were the costs of hospital and medical care for the women expected to be found with cancer in early stages.

Considered as benefits were the savings in estimated earning power of these same women, and the savings in the medical costs that would have accrued had their cancers been allowed to progress to later stages.

Although such projects customarily find numbers of cases of cancer that already have reached the later invasive stages, these were eliminated from the computation. Because of the nature of cancer of the uterus, most of these cases would have been discovered soon without the program. Therefore the program could not be credited with the lives that are saved in this group.

The economic appraisal of the direct benefits of the program was conducted according to the principles of the Dorothy P. Rice study, "Estimating the Cost of Illness." Both costs and benefits were subjected to discounting procedures in order to express the findings in terms of present values. The case-finding estimates and those of the occurrence and survival of "early" and "late" stages of disease among the cases were based on experience in similar projects that have been conducted by the Cancer Control Branch.

The following tables present some of the most valuable planning information that was developed in this study.

*Undiscounted grant costs related to examinations, case finding, and deaths averted*

5-year grant program costs.....	\$73,750,000
Examinations:	
Number performed .....	6,712,000
Number per case found.....	80.7
Grant cost, per examination.....	\$10.99
Cancer cases found:	
Number .....	83,182
Grant cost, per case found.....	\$887
Cancer deaths averted:	
Number .....	34,206
Grant cost, per death averted.....	\$2,156

*Estimated 1968-72 program costs and benefits, discounted to present values*

Program costs:	
Grant awards .....	\$68,086,000
Treatment of cases found at early stages.....	50,652,000
Total .....	118,738,000
Program benefits:	
Earnings saved .....	\$998,319,000
Treatment costs averted by programs.....	73,045,000
Total .....	1,071,364,000
Benefit-cost ratio.....	9.0

Source: Cancer Control Branch, Division of Chronic Diseases, Public Health Service, U.S. Department of Health, Education, and Welfare, Oct. 11, 1966.

Senator NEUBERGER. We look forward to studying your tables, which seem very complete, but I was thinking of the cost again. If you took the indirect costs of chronic illness, say, to one man, age 50, who becomes disabled, can you tell me what does he lose in terms of income and in terms of average costs for care?

Mrs. RICE. We do not have the direct expenditures for medical care broken down by age group. This is very difficult to estimate.

Senator NEUBERGER. I was trying to get one that might not be elderly as we usually think, that is, 65—more or less middle age. Is there some chart?

Mrs. RICE. Yes; one of the tables that I have, table 7, page 65, presents the present value of expected lifetime earnings at specific age groups. The present value is a procedure used by economists to convert a stream of earnings over a period of time to its present worth. A given amount of money has different values if realized at different times. We convert aggregate lifetime earnings to their present value, so we can examine them in terms of the dollar value today.

In terms of the present value, a male in the age group 50 to 54 would lose about \$63,000, if he were completely disabled and not productive, either by dying or by having a chronic disability totally preventing him from working during the rest of his lifetime. To this indirect loss in output, we must add his medical care costs during his lifetime.

The present value of lifetime earnings for the female in this age group amounts to \$44,000, including the imputed value of housewives' services. These lifetime earnings also take into account labor force participation, life expectancy for different age groups, and changing patterns of earnings at successive ages. So these estimates are realistic, it seems to me.

Senator NEUBERGER. In the foreword to your study I notice on the costs of heart, stroke, and cancer, your division chief commended you for your professional skill and enthusiasm. I think we have seen that evidenced in your testimony here today. It just appalls me, the monumental amount of work you have done here. It is of extreme value to us in settling down to specifics on costs to the economy.

We never can evaluate some of the emotional costs here in just plain dollars and cents.

Mrs. RICE. I should like to point out that there are additional losses that should be considered, including pain, suffering and grief associated with disability and death. These are intangibles to which the economist cannot attach dollar values. The data I presented on the measurable costs of illness, disability and death can be used to evaluate health programs. I am very pleased to have contributed to the measurement of these dollar losses, the costs to which we can attach specific dollars and cents and make the meaningful estimates.

Senator NEUBERGER. Thank you very much.

The committee is going to recess in a moment and reconvene tomorrow morning at 10 o'clock when the first witness will be Dr. Paul Dudley White, followed by Dr. Ralph Thiers, Dr. Warner Slack, and Dr. Caceres, as well as some instruments which will be demonstrated that are utilized in screening programs.

The committee is now in recess.

(Whereupon, at 3:15 p.m. the subcommittee hearing recessed, to reconvene at 10 a.m., the following day, Wednesday, September 21, 1966.)

## DETECTION AND PREVENTION OF CHRONIC DISEASE UTILIZING MULTIPHASIC HEALTH SCREENING TECHNIQUES

WEDNESDAY, SEPTEMBER 21, 1966

U.S. SENATE,  
SUBCOMMITTEE ON HEALTH OF THE ELDERLY  
OF THE SPECIAL COMMITTEE ON AGING,  
*Washington, D.C.*

The Subcommittee on Health of the Elderly met at 10 a.m., pursuant to recess, in room G-308, New Senate Office Building, Senator Maurine B. Neuberger (chairman) presiding.

Present: Senators Neuberger, Smathers, Yarborough, and Williams.

Committee staff members present: Thomas S. Biggs, Jr., counsel to the special committee; William E. Oriol, professional staff member; Patricia G. Slinkard, chief clerk; and Diane LaBakas, minority research assistant.

Senator NEUBERGER. The hearing will come to order.

We are a few minutes late, since we have been observing the beautiful and fascinating equipment we have around here.

This morning we begin the second day of hearings of the Health of the Elderly Subcommittee of the U.S. Senate Special Committee on the Aging.

The chairman of that full committee is with us this morning, and I will call on him in just a moment.

Our topic is the "Detection and Prevention of Chronic Disease, Using Multiphasic Screening Health Techniques."

Yesterday we were fortunate to hear from several very distinguished witnesses, who gave very important testimony on our subject.

Today we have more such witnesses, and we will have a demonstration of several of the instruments which are presently being used in screening programs or are suitable for screening programs.

Before I introduce our first witness, I would like to call on our chairman, Senator Smathers.

The CHAIRMAN. Thank you, Senator Neuberger.

First, I would like to commend you, as the chairman of the subcommittee, and the committee, for initiating what I believe to be a profoundly significant inquiry into the techniques of health screening. It is something that is needed, obviously, very much.

I have a little prepared statement, and I am just going to submit it for the record at this point. I know you have some very distinguished witnesses. I have had the pleasure of meeting Dr. Paul D. White before, and I am most anxious to hear him.

But I again want to congratulate you and your subcommittee and staff for the very splendid work that you are doing. I think you will do much to open up fields for helping detect, particularly in the elderly, illness and disease on a mass basis, which obviously will be effective, but at the same time much less expensive than present methods.

I want to again commend you and thank you for what you have done. (The statement referred to follows:)

STATEMENT OF HON. GEORGE A. SMATHERS, A U.S. SENATOR FROM THE STATE OF FLORIDA, CHAIRMAN, SENATE SPECIAL COMMITTEE ON AGING

Madame Chairman, I commend the Subcommittee on Health, and its distinguished Chairman, for initiating what I believe to be a profoundly significant inquiry into techniques of health screening in our ever more complex society.

As has been pointed out, much has been done by the 89th Congress to provide for the treatment of those who become ill, particularly our senior citizens.

But it has been axiomatic in medicine that the prevention of disease is far better than the cure. We should, therefore, be quite concerned with utilizing more modern techniques to screen our population for medical purposes.

Mass screening techniques may very well prove to be the least expensive and most practical way to detect abnormal conditions before they become symptomatic, therefore giving both patient and doctor a better break in the treatment of the disease.

Madame Chairman, I would like to point out that at least one community in my state of Florida has done pioneer work in this area, implementing a screening program through cooperation by local physicians and county and state health departments.

The city of Monticello, in Jefferson County, Florida, established a continuous community screening program in February 1963. The program was established, with the help of area physicians, and has provided a continuous health profile screening of the inhabitants since inception.

As of July 31, 1966, some 60,131 separate tests have been made on 3,818 persons. Of these, 1,406 persons were referred to their doctors as a result of some 1,865 abnormal screening tests.

The program in Jefferson County, Florida, is supported by funds from the Florida State Board of Health and the County Health Department.

A nurse carries out the screening examinations, under supervision of the county health officer. Clerical service is handled by the county health department and laboratory support provided by the State Board of Health in nearby Jacksonville.

This rural community in north Florida has a small, but stable, population of 9,543—with 10 percent of that number over 65 years of age.

About eight percent of the population receives state welfare and more than 50 percent of those over 65 are receiving old age assistance.

Thus, it is apparent that economic levels in the community are low. In my opinion, continued operation of a screening program in this and other pilot communities may give us much valuable information needed for handling the medical problems of our elderly poor.

While the Jefferson County project is but one variant in the methodology of multiple screening, it is indicative of the kind of effort that can be made to make mass screening an effective instrument in creating a healthier society.

Senator NEUBERGER. Thank you.

We have one of our other committee members present here also this morning, Senator Yarborough, of Texas.

The Senate is going into session at 11, and we hope we don't have too many interruptions during this important hearing.

We are indeed fortunate to have as our first witness, Dr. Paul Dudley White, eminent cardiologist from Boston, Mass.

Dr. White?

**STATEMENT OF PAUL DUDLEY WHITE, M.D., CARDIOLOGIST,  
BOSTON, MASS.**

Dr. WHITE. Madam Chairman and members of the committee; it is a pleasure to be here. I have a statement which I will turn in, some of which I will read; I shall speak also off the cuff. But I would also like to answer questions, if they are such that I can take care of.

The process of aging has interested me very much for many years, for three reasons: As a part of my professional work as a practicing cardiologist involved in a long followup of many patients, and this long followup is about to be presented in the form of a book which should and could appear in 2 or 3 months. This book is called "Hearts, Their Long Followup."

During the completion of that book, and through the years in which we have been seeing patients, sometimes for 30, 35, and 40 years and even longer—and some of these patients I still see every year—we have learned many lessons which we shall present. I hope that this book may be helpful from the standpoint of aging as well as from that of the special diseases which we discuss in the cardiovascular field.

The second reason for my interest is as a scientific problem; that is, the problem of aging in need of extensive and intensive worldwide research—and I emphasize worldwide. The chief diseases of old age are atherosclerosis (a rusting of the arteries), and thromboembolism, a disorder of blood clotting. Epidemiology, the study of these epidemics which have fallen upon mankind, is preeminently needed in all advanced countries.

Atherosclerosis is disease No. 1 in this country today. Epidemiology is a research tool for international use leading to cooperation, medical and lay, throughout the world. In this I have been keenly interested in the last 10 to 15 years. We have established the so-called International Cardiology Foundation, in which in each country there are enlisted—in addition to the doctors, also laymen and industrial experts, and the Government, working together in a three-pronged attack on disease. This cooperative effort is long known here, and has been practiced in the United States, but not in many other parts of the world. We are helping to cultivate it elsewhere. When these national foundations get established, they join the international group, the International Cardiology Foundation, which is more than just a meeting of the doctors. It is they with the laymen and the governments working together.

The third reason for my interest is a personal one, since I have now reached 80 myself. Some of these statements of mine will cover my own experience.

Let me now present pertinent observations derived from these experiences:

First, one doesn't die from old age alone, but always from some complication. When a certain woman died a hundred years ago in the Massachusetts General Hospital at 45, the only diagnosis was "old age." Now we might say old age at 75, but it is not old age alone even at 75. Something else has happened. It is true, however, that the older person is, as a rule, less resistant. The four complications that

are most important are (1) infections, as with pneumonia, once "the old man's friend," no longer quite so friendly because it can be controlled. Perhaps sometimes we shouldn't try so hard to control it. (2) Infarction; that is, destruction of tissue due to clotting of blood in the arteries going to the heart, the brain, the lungs, and the kidneys. That is a common cause of death in old people. (3) Cancer. (4) Accidents. Those are the four common complications.

Now the second point. There has justifiably been much emphasis both on the increasing longevity of the American people during the last generation or two, and also on our natural wish and efforts to promote the health of old people as well as simply their length of life, and not to keep hopeless and helpless invalids alive. But the fact is that with very obvious exceptions, the two—that is, longevity and good health—go together for the chief reason that hopeless invalids are much more likely to die of complications than are relatively healthy old people. But we naturally don't know or realize how many very old people are still healthy; there are a great many but we don't hear so much about them.

A good many old people whom I see are still healthy but are afraid that they are getting sick, simply because they are older. They come and want to know, "Have I got some trouble at last?" When they reach the age of 80, they don't need to worry so much.

The third point is that one can outgrow—and this is probably the most important lesson I have learned, and which we are presenting in this book—one can outgrow one's troubles as one gets older. One can actually get better rather than worse. One can be better at 60 than at 50, better at 70 than at 60. I have had many patients who have outgrown their troubles.

For example, even severe angina pectoris, recurring for months, can completely clear, as can the temporary disability from minor strokes, because of the natural, not manmade, development of a collateral circulation. This is nature's aid.

That is why I gave an address in Memphis, Tenn., in 1932, entitled "Optimism in the Treatment of Heart Disease." And, of course, man, too, can now help with the marvelous new surgical operations and the drugs that can control high blood pressure and infections and prevent thrombosis. This is perfectly true, but we don't realize how many people get better anyway. And then if you happen to do a spectacular operation or give certain drugs, you may give undue credit to those therapeutic measures. But I have nothing against them; they should be developed more.

The next point follows: One can learn to live with one's difficulties. This is for oneself a major accomplishment that we must foster in our patients and in oldsters as well as youngsters throughout the country. Patience, stoicism, and optimism must be cultivated in our American people, who have become soft, and demand, with the submission of the medical profession, tranquilizing and sedative drugs which often do more harm than good. We must stiffen our morale and our spiritual fiber.

It isn't necessary to suffer, but we can often endure more pain than we think we can. It may be good for us once in a while to have some symptoms, rather than to try to avoid all symptoms by drugs all the time.



The next point is that the old adage about the ounce of prevention is still very true, and rather than spend all our time on the middle-aged and elderly in diagnosis, treatment, both medical and surgical—and I have been fascinated with these instruments that you have here—and rehabilitation; rather than spend all our time on those subjects, which of course we must continue to improve, we must teach our teenagers and young adults health habits which they can use throughout life.

Often I think that we are putting the cart before the horse. We must get this health process started early in life.

The health of old age is, to a large extent, dependent on the health habits of middle age, the health of middle age on the health habits of the young adult, and the health habits of the young adult are related to those of the teenager, which have, I believe, become defective during the last generation.

The health habits of the teenagers—this is where we must begin. We have had many difficult experiences with that problem.

We had a fitness institute for a week once at the YMCA camp in the Berkshires, Camp Becket, in which we met with 20-year-olds, husbands and wives. The husbands had previously been YMCA boys at the camp. We had them come back, a hundred of them, 50 couples in their twenties (we had babysitters to take care of their children) to emphasize the need of their continuing through the twenties the health habits they had learned at the camp as teenagers.

And this is the gap, the twenties. Many of them had changed their way of life, often harmfully.

Now, I shall add my own advice about all this, which has come from long experience, as well as from the research of innumerable medical scientists.

In the first place, annual examinations are, I believe, invaluable at all ages. And at least once in the older teenager or young 20-year-old there should be, in addition to routine physical, urine and blood examinations, serum cholesterol, and blood sugar tests, such as can be taken on this instrument, and an electrocardiogram and chest X-ray film for the person himself while perfectly healthy, to keep and preserve in his own files for future comparison.

Often a doctor 25 years later wishes that he could see for comparison the old X-ray film and the old electrocardiogram taken in good health in the early twenties.

Once in a while one uncovers abnormalities in these young people. One may discover hypertension or diabetes, which it is very important to know, even though the person may feel perfectly well. I mean, in the young ages. And, of course, the family is very important. I spend much of my time not just treating the fathers and mothers, but getting after the children who may be perfectly healthy at the time, to try to keep them from having what their parents have had. This demands first priority.

My second advice concerns the diet and the weight. Despite all protestations to the contrary, these are most important and should be controlled sensibly from the age of 12, or even before. We are an overnourished Nation, and we should wake up and regard excessive food intake, as serious as it really is, an intoxication with a slow and

insidious harmful effect, not so dramatic as intoxication by alcohol or drugs, but about as serious.

The middle-aged husband today, having been brought up to eat, and told by his mother and father to clean up his plate, having been taught to eat too much of everything, naturally finds it difficult to understand why he shouldn't continue to eat too much, and he is quite likely to resent the advice of his doctor, and particularly of his wife, who has an especially hard time of it.

I am very sympathetic with the wife. We have to do better, though, than we are doing now in getting the husband instructed earlier. His habit is already fixed at 45 or 50. It is difficult to teach an old dog new tricks. Thus, we must get this point over to pediatricians, parents, schoolteachers, and public health personnel who deal with children.

Thirdly, for optimal function of an alert brain a really good blood supply is needed, and this means not only avoidance of overnutrition, but also physical fitness in the way of firm and active leg muscles. It is said that if you want to know how flabby your brain is, you should feel your leg muscles. Exercise of the large muscles of the body is essential to positive health—positive health is not just the absence of disease. A walk of 4 miles, or a comparable activity, a day is, I believe, the absolute minimum needed for good health—or 28 miles a week.

You may prefer to swim or to play golf without a cart, or to bicycle. It doesn't matter which. Both physiological and psychological benefits are great. Blood-clot prevention and the delaying of serious arteriosclerosis affecting heart, brain and kidneys are clear results of this essential health habit, which needs to be emphasized far and wide in this era of our slavery to machines of all kinds. I do not mean these diagnostic machines here; these are different, but machines such as automobiles, and push button devices of all kinds, and elevators.

This advice is very important: During active use of the legs, their muscles act as pumps and carry out about 30 percent of the circulation of the blood, relieving the heart of that much, 30 percent, as experiments have recently proved. During leg exercise, their big muscles squeeze the veins. Since the veins have valves, the blood is pumped up toward the heart. The valves have been known for nearly 400 years. In fact, William Harvey announced in 1628 his discovery of the circulation of blood through his knowledge of the function of the valves in the veins.

Then comes the fourth point—and I am almost through—the avoidance of smoking and of the use of other toxic substances such as opiates and LSD—I don't classify them all quite the same—and also of excessive alcohol. All of these are to be included in our list of health habits; and now even excessive coffee and tea drinking is beginning to be realized as causing stress. And if you have too much stress, you aren't so healthy. Excessive coffee and tea drinking is excessively stimulating to some people. We are just beginning to work on that.

Finally, excessive emotional stress is to be avoided, but minor stresses are not important. Fatiguing physical exercise and tranquilizing programs are important antidotes. Tranquilizing programs are of many sorts, in art and music and literature, and even in one's work.

One definition of stress is as follows: Stress is life, and you had better enjoy it. You can't live without at least some stress.

All of these desirable health habits are often difficult to start in later life, but they are easily inculcated in the young if we go about it wisely, by example as well as by precept. And of course there are rules also for the prevention of infections and accidents and for the early protection against cancer.

I shall be glad to answer questions. These machines that will be shown should be used equally on the young, to get this information early and not just in the old.

Thank you.

Senator NEUBERGER. Senator Smathers.

The CHAIRMAN. First, Dr. White, I want to commend you for your statement and thank you for it. We know of your eminence, your preeminence in this field and we appreciate your comments.

Do you think that there is anything more, or should there be anything more, that the Federal Government should do in connection with developing better health habits? Or should we in the Federal Government stay out of this field? Or have we done enough? Let's have your views on that.

Dr. WHITE. A few years ago, I came down with others during President Kennedy's tenure of office to discuss the question of these problems in the young. As a result of that conference in which about 60 of us took part, a new institute for the study of child health and human development was started in the Public Health Service. This was very important. This new institute has been working on emphasizing health habits, developing health habits early, but there is much more to be done. We are a little too casual, I think, about preventive medicine for unwarranted fear of its overemphasis. Of course we still have to improve our diagnostic and therapeutic activities in treating disease. But we haven't paid enough attention to the methods of the establishment of positive health. And that, I think, could be taken up more practically by the U.S. Government.

The CHAIRMAN. Do you think that with the development of these new machines, some of which we see here today, you can foresee the time when computers and machines of this character will substantially add to the longevity of people's lives?

Dr. WHITE. Yes, I think, for example, if you could take these two milliliters of blood from all the young people in college and in the schools, in the high schools, the older teenagers and young 20-year-olds, this is probably where these tests will be more useful than later on in life, though they can be used all through. So I think there is good application, now that these tests can be done more easily and regularly.

The CHAIRMAN. We are, as you know, members of the Senate Special Committee on Aging, and our problems are essentially those of the elderly. If you had just one or two words of advice to give to our committee and to the elderly for our assistance to the elderly in this health field, what would they be?

Dr. WHITE. Well, there are two or three points I want to emphasize. One is this, that if we can keep the older people working, we will have taken care of at least half of all the difficulties of old age, I believe, and these include medical, psychological, social, and economic problems, too.

And instead of doing this by mass procedures, we will have to take each individual and fit him into some activity in which he still can be

useful in some way, even though but slightly, which will continue his interest and productivity. And he will be a much happier person then.

The CHAIRMAN. Do you think that the general automatic retirement age of 65, which was set many, many years ago, is a realistic age now, in the light of our development, to have people retire?

Dr. WHITE. No, I think it should be very elastic. We may have to have a figure. But I am sure some people at 75 or 80 are fit to carry on. With rich experience, I think their knowledge is invaluable. They acquire wisdom, I hope, with time and the passing of years, and if they have a good cerebral circulation which can be maintained better if such a person keeps active physically and doesn't get heavy, I think such a person should be allowed to fit into some activity which would be useful in whatever way, maybe in his old job, long after the age of 65.

Senator NEUBERGER. Senator Yarborough?

Senator YARBOROUGH. Dr. White, as a member of the Senate Labor and Public Welfare Health Subcommittee since 1958, we have heard you there and know of your work. We set up recently, for special methods of study, an assimilation of information in connection with stroke and other diseases and also the regional medical centers, by which we hope to get knowledge out to the smaller hospitals and the practitioner, wherever he is.

And there is another subcommittee of that committee that has been studying unemployment manpower and retraining. I think you have put your finger on what we found in that committee to be one of the most serious of all these problems, how to keep these older people employed. You have made a very cogent statement, I think, for the Labor Committee, that keeping them employed is half the problem.

If they had work they could do, that would cure half of their health problem. That is the most difficult problem we face. We can get money to study heart disease, to study cancer and to study stroke. We passed a law and are setting up regional medical centers. Now we want your advice, if you had any wisdom on that—and you have great accumulated wisdom.

In my experience in the Senate, I have never seen more sound health advice compacted into four pages, than this brief four-page statement you have given. I look forward with interest to the publication of your book. There is great wisdom in it, and as you brought out other points, on employment, the changing way of life, I shall study not only this statement but your book, too.

There is one statement you make in here that I would like to comment on. You say that patience, stoicism, and optimism must be cultivated in our American people, who have become soft.

It reminds me of the changing way of life of Americans. Up until 25 or 30 years ago, about half of our people lived on the farms. Farm life teaches patience, stoicism, and optimism. A farmer had one chance a year, and insects and nature often wiped out his crop. He had to be patient and stoical and optimistic. That was inculcated into him as a way of life.

Now with only 20 percent of our people on farms and ranches, do you have any words of wisdom for us on how to inculcate these virtues, when they grew up, as a natural part of man, and that rural

life also took care of the employment of the aged? There was a place for them tending some of the animals and the smaller children. There isn't any place, it seems, in apartment living in an automated, computerized, machine society. Do you have any advice for us as to how we should retain these virtues? How we should train people in patience, stoicism, and optimism from youth on, when the whole way of life is changed in not more than two generations?

Dr. WHITE. I would like to make two answers. One is that we should spend a certain amount of the resources we have for these centers in preventive measures and in changing these bad habits that we now have cultivated, and this is more important, I think, than just diagnosing and treating these old people, because this applies to old age especially. That is the first answer.

And the second is that those of us who are old enough to have learned to walk before automobiles became too easily used, are luckier than we realized. That was true of the farmers. And we have to get the people to use their legs again. That is very, very important.

Most of the old people I see that are a hundred years old or more walk a lot. This is very important, just this process of walking, bicycling or swimming. Using the leg muscles is very essential.

I went to West Point a few months ago. I have gone there for several years to give some advice to the plebes, the first-year cadets. Just last spring, I was there again and told about this disease of atherosclerosis, that is giving their fathers, aged about 50, so much trouble. These boys are about 18 or 19, fine physical specimens and alert, a thousand of them sitting there. And their fathers are having troubles just as we see in many, many middle-aged men, heart attacks, strokes, sudden deaths, and so on.

And I told those boys that 30 years ago we didn't know enough about this disease to give their fathers advice which might have helped them. But we have learned a lot in the last 30 or 40 years, and now I am quite sure that I speak for many of the doctors of the country in telling them that if they do three things, from now on, they will probably escape the illnesses of their fathers, or at least such illness will be cut down to a minimum.

And those three things, which they can do if they want to, are: First, to avoid overweight. That is, to avoid any gain in weight after the age of 22. Most of my patients have gained 20, 25, 30, or 40 pounds. This is very common. Not all of them. Some of them have diabetes and they may be thin. But most of my coronary cases put on a lot of weight, and that is where the trouble comes primarily.

The second advice was to keep physically very active all through life, never stopping. This is very important. Those who are crippled and can't use their legs may get exercise in some other way.

And third, not to smoke.

Then I said that since this seems to be so, "I would like to know how many of you cadets would be interested in following out these three measures during the next 30 or 40 years. We will be able to follow you up, because you will be Army officers and won't be lost from statistical study. At the end of 30 or 40 years we will have some information from you. And I am quite sure that you will be much healthier than most of your fathers have been."

And I said: "Will those of you who are interested raise your hands?" This was a chance I took. About 800 of them put up their hands. At

least we have some of the young people now interested in our efforts to avoid these diseases which we are now trying to treat in older people.

Well, of course, at the age of 80 or 90 or 100, we must expect some changes of old age, but we shouldn't at 50 and 60 and 70. These are ages that we shouldn't have to deal with.

Heart disease and stroke, that is, cerebral vascular disease, and of course the problem of cancer, though it is much less common, are still with us too early in life. So I think these centers that are being established throughout the country should emphasize preventive measures just as much as the current diseases of old age.

Senator YARBOROUGH. I think that is a valuable suggestion, Dr. White. And as a member of that Public Health Subcommittee, we will see that these recommendations get over to them.

If you will pardon this personal note, my own father lived to be more than a hundred years of age, and he walked actively up until 6 weeks before he passed away.

Dr. WHITE. I might just say a word about my own father, who at about the age of 22 was so thin that the insurance companies refused to insure him because of the hazard of tuberculosis. So he was advised by the doctors to go out and put on weight, in other words to get fat, so that "you won't get tuberculosis," which killed his father at the early age of 33. And unfortunately my father took that advice very literally.

The first 10 pounds quite likely did save his life from tuberculosis. That is quite possible. But the next 30 or 40 pounds, which he religiously put on, and was proud to record every year—and I have the figures at home—probably gave him the arteriosclerosis from which he died, to be sure not at an early age, but at 71, going to see a patient. He died suddenly, and he had extensive arteriosclerosis of the coronary arteries due to the fact that we didn't know enough then to advise him against drinking over much milk.

Milk is a fine food, but in great excess it can do harm, like any food.

Senator NEUBERGER. I think you have given us an interesting maxim, when you said, "If you want to know how flabby your brain is, feel your leg muscles." And we should all go home with that very much in mind.

I am glad to see that you gave us an optimistic viewpoint about the problems of the aging. Just because you are approaching what you think are the "later years," you have no reason to be despondent and lay down and die.

Dr. WHITE. You would be surprised to see the number of people I see at 75 and 80 who are so much better than they were 10 years earlier. That can happen. But they have to follow the rules of health in accomplishing this.

Senator NEUBERGER. We have a little criticism. We have been spending a lot of time on the problems of the aging, and if anybody criticizes the work of this committee, it is that "you ought to spend more time on youth."

But I think it is interesting for the public to know that the Congress of the United States does have a part and is interested in the general welfare. And you have helped us to give a great deal of optimism to people in this country.

Thank you very much.

Dr. WHITE. It is never too late to mend; many people get better as they get older.

(Dr. White's prepared statement follows:)

STATEMENT OF DR. PAUL D. WHITE, CARDIOLOGIST, BOSTON, MASS.

Madam Chairman and Members of the Committee:

1. Appreciation of invitation.

2. The process of aging has interested me very much for many years for three reasons:

(a) As a part of my professional work as a practicing cardiologist involved in the long follow up of many patients—my new book on the subject.

(b) As a scientific problem in need of intensive and extensive (world wide) research concerning atherosclerosis and thromboembolism—including epidemiology as a research tool for international use leading to cooperation (medical and lay) between many nations (describe the I.S.C.).

(c) A personal interest now that I have reached 80 myself.

3. Pertinent observations derived from these experiences.

A. One doesn't die from old age alone, but *always* from some complication, although it is true that the older person is as a rule less resistant. The four complications that are most common are: (1) infections, especially pneumonia, once "the old man's friend," (2) thromboembolism with infarction of heart, brain, lungs, or kidneys, (3) cancer, and (4) accidents.

B. There has justifiably been much emphasis both on the increasing longevity of the American people during the last generation or two and also on our natural wish and efforts to promote the health of old people as well as their length of life and not to keep hopeless and helpless invalids alive. The fact is that with very obvious exceptions, the two usually go together for the chief reason that hopeless invalids are much more likely to die of complications than are relatively healthy old people, but we naturally don't know or realize how many very old people are still healthy.

C. *One can outgrow* one's troubles as one gets older. One can actually get better rather than worse. For example, even severe angina pectoris recurring for months can completely clear as can the temporary disability from minor strokes because of the natural (not man made) development of a collateral circulation. That is why I gave an address in Memphis, Tennessee in 1932, entitled: "Optimism in the Treatment of Heart Disease." And of course now man too can help with the marvelous new surgical operations and the drugs that can control hypertension and prevent thrombosis.

D. *Also, one can learn* to live with one's difficulties and this is in itself a major accomplishment that we must foster in our patients and in oldsters as well as youngsters throughout the country. Patience, stoicism, and optimism must be cultivated in our American people who have become soft and demand, with the submission of the medical profession, tranquilizing and sedative drugs which often do more harm than good. We must stiffen our morale and our spiritual fiber.

E. *The old adage* about the ounce of prevention is still very true, and rather than spend all our time on the middle aged and elderly in diagnosis, treatment (both medical and surgical), and rehabilitation, which of course we must continue to improve, we must teach our children, our teenagers, and our young adults health habits which they can and should continue throughout life. The health of old age is to a large extent dependent on the health habits of middle age, the health of middle age on the health habits of the young adult, and the health habits of the young adult on those of the teenager, which have also, I believe, become defective during the last generation. Camp Becket. Fitness Institute.

F. *And now I shall add* my own advice about all this, which has come from long experience as well as from the research of innumerable medical scientists:

(a) Annual examinations, often brief, are, I believe, invaluable at all ages. At least once in the older teenager or young 20-year-old there should be (in addition to the routine physical examination, urine and blood count) *serum cholesterol and blood sugar tests, an electrocardiogram and chest x-ray film for the person himself or herself to preserve most carefully for future comparison, (often needed by some doctor later in life, e.g. 25 years later), as well as not rarely to uncover some existing abnormality.*

(b) The diet and weight, despite all protestations to the contrary are most important and should be controlled sensibly from the age of 12 or even before.

We are an overnourished nation and we should wake up and regard excessive food intake just as serious as it is—an intoxication with a slow and insidious harmful effect, not so acute or dramatic as intoxication by alcohol or drugs, but almost as serious. The middle aged husband today, having been brought up to eat (to clean up) too much of everything on his plate naturally finds it difficult to understand why he shouldn't continue to eat too much, and he is quite likely to resent the advice of his doctor and particularly of his wife who has an especially hard time of it. His habit is already fixed—it is difficult to teach an old dog new tricks. Thus we must get this education over to pediatricians, parents, school teachers, and public health personnel who deal with children.

(c) For optimal function of an alert brain a really good blood supply is needed, and this means not only avoidance of overnutrition but also physical fitness in the way of firm and active muscles. It is said now that if you want to know how flabby your brain is, feel your leg muscles. Regular exercise of the large muscles of the body is essential to positive health—a walk of 4 miles, or a comparable activity, a day, is, I believe, the minimum needed for good health—or 28 miles a week. You may prefer to swim or to play golf without a cart, or to bicycle, it doesn't matter which. Physiological and psychological benefits are great; blood-clot prevention, and the delaying of serious arteriosclerosis affecting heart, brain, and kidneys are clear results of this essential health habit which needs to be emphasized far and wide in this era of our slavery to machines of all kinds. During active use of the legs, their muscles carry out 30 per cent of the circulation of the blood relieving the heart of that extra load.

(d) The avoidance of smoking and of the use of other tonic substances such as opiates and L.S.D. and also of excessive alcohol are all quite clearly to be included in our list of proper health habits, and now even coffee and tea in too large amounts daily can cause stress and this can have harmful results.

(e) Excessive stress is to be avoided but minor stresses are a part of life and are to be met by antidotes like fatiguing exercise and tranquilizing programs of one sort or another in art, in music, in literature, and even in one's work.

All these desirable health habits are often difficult to start in later life but they are easily inculcated in the young if we go about it wisely, by example as well as by precept. And of course there are rules also for the prevention of infections and accidents and for early detection of cancer.

I shall be glad to try to answer questions.

Senator NEUBERGER. The next witnesses are Dr. Ralph Thiers, Dr. Slack, and Dr. Caceres, if they will come forward.

**STATEMENTS OF RALPH E. THIERS, PH. D., PROFESSOR OF BIO-CHEMISTRY AND DIRECTOR OF CLINICAL CHEMISTRY LABORATORIES, DUKE UNIVERSITY MEDICAL CENTER; WARNER V. SLACK, M.D., ASSISTANT PROFESSOR, MEDICINE AND COMPUTER SCIENCES, UNIVERSITY OF WISCONSIN SCHOOL OF MEDICINE; AND CESAR A. CACERES, M.D., INSTRUMENTATION ACTIVITIES CHIEF, HEART DISEASE CONTROL BRANCH, DIVISION OF CHRONIC DISEASES, BUREAU OF STATE SERVICES, PUBLIC HEALTH SERVICE, AND ASSOCIATE PROFESSOR OF MEDICINE, GEORGE WASHINGTON UNIVERSITY**

Dr. THIERS. Senator Neuberger, Dr. Slack is on your right, Dr. Caceres is next, and I am Dr. Thiers.

Senator NEUBERGER. Dr. Thiers, I believe you are professor of bio-chemistry at Duke University Medical Center in North Carolina.

Dr. THIERS. Yes.

Senator NEUBERGER. And Dr. Slack, will you identify yourself?

Dr. SLACK. I am assistant professor of medicine and computer sciences at the University of Wisconsin.

Senator NEUBERGER. And Dr. Caceres.



Dr. CACERES. Chief of the Instrumentation Activities Field Station, Heart Disease Control Branch, Division of Chronic Diseases, U.S. Public Health Service, and associate professor of medicine, George Washington University.

Senator NEUBERGER. We welcome the three of you and look forward to hearing your statements. How are you going to present this? Individually?

Dr. THIERS. Senator Neuberger, I have been asked to say a few words in an introductory fashion.

In order to set a background for the following testimony—when one goes to see a physician with a problem, an orderly sequence of events takes place, which has been written on this flip chart. This is a systematic procedure which is taught to physicians at medical schools.

First, the patient makes his complaint, for example: "Doctor, I have a pain."

The doctor then takes a history of the patient. He then does a physical examination, using his five senses to examine the patient. Then he comes to a tentative diagnosis. On the basis of this tentative diagnosis, he orders certain laboratory examinations to be performed on the patient. For example, "We will get a blood sample, Mr. Smith, for this, that, and the other thing. We will ask you to take an ECG, a spirogram, et cetera."

When he gets the results back from these examinations, he makes his diagnosis. On the basis of that diagnosis he begins treatment of the patient; "Mr. Smith, we are going to have to ask you to do this, that, and et cetera. Treatment is, of course, the goal of the whole process.

First, Dr. Slack is going to talk on one aspect of historytaking, which he has placed on computer. Next, Dr. Caceres is going to talk about two aspects of laboratory examination, the ECG and the spirogram. And then I am going to talk about analytical considerations in general, with respect to laboratory examinations, using clinical chemistry as a specific example.

(A description of the instruments to be demonstrated follows:)

*The Linc (laboratory instrument computer):* A small, versatile digital computer which has been programmed at the University of Wisconsin Medical Center to collect the information of clinical histories directly from patients. Questions are presented to patients on a cathode-ray screen and responses are made by keyboard entries. Question presentation is varied in accordance with patients' responses—for example, a "yes" response to a general question is followed by a series of specific qualifying questions and a "don't understand" response is followed by explanatory statements. All responses are stored on magnetic tape for use in patient care and clinical research. Upon completion of the medical interview, a summary is printed by teletype for immediate clinical use. The computer-based medical history system will be demonstrated using an allergy history program for example.

*Electrocardiogram on line with computer:* The electrocardiogram is recorded on a data acquisition chart consisting of a standard electrocardiograph, a magnetic tape record, and a digital coder. The tape recorder records the electrical signal for playback into the computer, and the coder is used to make identification of the signal, by the computer, possible. The data acquisition chart is manufactured by Computer Instruments Corp., Hempstead, N.Y. The signal is transmitted over standard telephone lines using a DATA-phone set provided by the American Telephone & Telegraph Co.

The computer used (Control Data 160-A) is at the Instrumentation Field Station (IFS) of the U.S. Public Health Service. It is capable of performing 80,000

additions in a second—roughly equivalent to adding all the entries on 200 pages from a telephone direction. The electrocardiogram report is transmitted back to the sender using the conventional teletypewriter.

*Spirometer on line with computer:* A wedge spirometer and an amplifier manufactured by Med-Science Electronics, Inc., St. Louis, to test a subject for lung function, vital capacity and obstructive lung disease. The analysis, return, and printout of the spirogram is available almost instantaneously. The electrical signal from the spirometer is played into the data acquisition unit and transmitted to the computer and returned by the teletypewriter in a manner similar to that for the electrocardiogram.

*Technicon SMA 12 autoanalyzer (blood chemistry):* Multiple analysis—a dozen simultaneous tests from a thimbleful of serum—is possible on this instrument. Samples and standards are analyzed by the machine at the rate of 30 per hour and its 12 findings for each sample are recorded sequentially on a single, calibrated piece of paper. The 12 tests are for uric acid, inorganic phosphate, cholesterol, lactic dehydrogenase, total protein, albumin, urea, glucose, calcium, bilirubin, alkaline phosphatase, and glutamic oxaloacetic transaminase. Its manufacturers say that the SMA (sequential multiple analyzer) 12 can perform 1,200 blood tests per 8-hour day, requiring the full-time attention of only one technician. The SMA 12 weighs 900 pounds.

*Warner-Chilcott robot chemist:* An analytical instrument designed to duplicate automatically, but with greater precision, the manual steps performed in chemical assays such as blood constituent analyses. The robot is capable of automatically performing as many as 120 tests per hour using the principle of discreet sampling. The digital presentation of the results of each analysis can be easily fed into data processing equipment.

The unit consists of—

1. A programmer which controls all working elements by means of an electrical command and response system.
2. A presentation module from which prepared samples to be analyzed are drawn automatically.
3. A pipetter and reagent dispenser which delivers predetermined quantities of samples and reagents to individual process tubes.
4. A processing turntable with thermostatic temperature control which, through rotation, permits performance of all operations sequentially.
5. A spectrophotometer which reads the optical density of each sample by means of photoelectric cells, converts the result to digital form and displays it while relaying it to the data converter or printer (analog to digital converter).
6. The data converter prints the information, with a sample identification number, on a paper tape.

Dr. SLACK. Thank you, Dr. Thiers.

The medical history is that portion of the clinical transaction in which the doctor interviews the patient. There are many questions which in the good medical situation should be asked of all patients at regular intervals, and many physicians consider the medical history to actually be the most important aspect of the clinical process. But in spite of this, there has been relatively little research done on the medical history, and doctors and patients have not been helped much with the problems of medical interviewing.

And there are significant problems with regard to the medical history as it is traditionally taken.

In the first place, it is very time consuming. Medical history is a very time-consuming process, and incomplete or inadequate histories are often the result of time limitations beyond the physician's control. And as a corollary to this, the medical history process is very expensive. Actually, talk is one of the most expensive commodities in clinical medicine.

Furthermore, the use of the data collected from the medical history is rendered very difficult by the methods used to record these data.

First of all, the traditional illegibility of the physician's handwriting is a major problem, and furthermore the lack of standardization of

these records makes retrieval of this information for patient care and clinical research difficult and often impossible.

Now, at the University of Wisconsin Medical Center, using a small digital computer, we have attempted on a research basis to try to overcome some of these problems.

Basically, what we are doing is programing a digital computer as a model of the physician as an interviewer, to take medical history information directly from patients.

We have here an example of the computer in use at the University of Wisconsin. The patient sits in front of the computer and the questions are presented to the patient on the cathode ray screen, which is very much like a television screen. The patient responds by pushing keys on the keyboard in front of the computer. And, basically, this is a conversation between the computer and the patient.

Now, the display on the screen now says: "Before proceeding I need to have your name. Please type this and then press the "Go" bar. The patient proceeds to type her name into the machine. These responses are going directly into the computer memory and being stored on magnetic tape, thus eliminating the need for punchcards or light-sense or mark-sense or other intermediary data handling.

Now Mrs. Rupp is entering today's date, and the computer has already taken her age, and she proceeds to type in the hospital number, presses the "Go" bar and the computer says, "Now if you will press 'Go' we will begin with the medical questions."

This demonstration is one of questions dealing with symptoms of allergies. But at the University of Wisconsin we are extending this project and hope eventually to have the complete medical history in computer-based form. The demonstration this morning will be of symptoms of allergy.

The computer says, "Do you know what chest wheezes are?" If the patient says, "I don't understand," and presses button 4, then the "Go" bar, the computer explains "Wheezes are squeaking sounds in the chest, with breathing. Do you know what I mean?"

If she still doesn't understand, we reword the question and say, "Have you had whistling or squeaking sounds with breathing?" If she still doesn't understand and presses 4 it says, "I don't mean gurgling or other noises in your throat or mouth. Have you ever had wheezing in your chest on breathing?" And if she still doesn't understand, it leaves "wheezing" but the fact that the concept of wheezing was not understood is recorded and printed out for the physician's use.

And now we are on to the hay fever syndrome. And the computer asks, "Have you ever suffered from running or stuffy nose with sneezing and watery, itching eyes?" If she says, "No," to this, pressing button 2, the concept of hay fever is left then.

Excuse me. We don't quite trust her response to this, and the computer asks, "Have you ever suffered from hay fever or allergic nose trouble?" When she says "No" to this, the computer moves on to hives, first of all giving her some words of encouragement, saying, "You have done very well, and you don't have many more questions to answer. Press go to continue."

Now with regard to hives, the computer explains that hives are white blotches on the skin which occur suddenly and usually itch. "Have you ever had hives?" If she says "No," the computer skips the

subject of hives and says, "There aren't many more questions. Shall we continue?"

She says "Yes." We proceed to the problem of drug allergies. "Have you ever received penicillin?" If the answer is "Yes," pressing button 1, the computer says, "Have you ever suffered from chest wheezing, skin rash, swollen face, and a number of symptoms that can result from allergic reaction to penicillin?" If the patient says "Yes," the computer branches out and asks specifically about these symptoms. "Did you have skin rash?" We will say "Yes."

"Did you have joint pains?" We will say "Yes." "Did you have chest wheezing or shortness of breath after taking penicillin?" We will say "No."

"Did you have swollen lymph glands after taking penicillin?" "Yes." "Did you have fever after taking penicillin?" We will say "No."

And "Did you have swelling of your face after taking penicillin?" We can say "Yes."

Then it asks, "Have you had more than one penicillin reaction?" We will say, "No." And then it branches and asks the patient now to type in the year about when you had your penicillin reaction: "1965."

And then pressing "Go," we branch "Have you had a reaction after penicillin injection?" We will say "Yes."

It may be important to differentiate between the allergic reactions to an injection of penicillin or an allergic reaction to the taking of tablets orally.

"Did you have a reaction after taking penicillin tablets?" We will say "No."

"Did your penicillin reaction ever last more than a day?" We will say "No."

"Type in the number of hours of your longest or only penicillin reaction." We might say "10 hours," or whatever, "5 hours." And then "Go."

Now we are on to another drug, which can be an important cause of allergic problems—*aspirin*. "Have you ever taken aspirin?" We say "Yes." The computer again asks, "Well, have you had any of these symptoms: skin rash, swollen joints," and so forth with aspirin? We say "No." The computer, not quite satisfied with that response, asks, "Have you ever had any bad reaction after taking aspirin?" The patient says "No." The computer says, "Good. Shall we continue?" "Yes, continue."

"Have you ever received tetanus or rabies shots?" If the patient says "No," this is an important point, because tetanus or rabies injections are made from horse serum, and this allergy can be life threatening—not being satisfied with one negative response, the computer says, "Think back now and be certain. Have you ever been given rabies or tetanus injections?" If the patient still says "No," it branches out and asks a general question, whether or not there have been allergies to any drugs not yet mentioned. This is a general screening question. We will answer "No" to this question, but if the answer were "Yes," then the patient could type in the name of the drug, and that would become part of the record.

"Have you ever had eczema?" This is associated with allergic disorders. We will say "No."

"Have you in the past year had an unexplained skin rash?" We will say "No."

And this is a general question regarding the family history of allergy which may be of use in determining the significance of a person's allergy history.

It says, "Has any one of your parents, brothers or sisters had asthma, drug allergy, hay fever, and so forth?" And if the patient says "No" to this, the computer says, "This is the end, and thank you very much for your participation."

Now, upon completion of this computer-based history, a printout is generated by means of a teletype machine and the printout is in a traditional form with the exception that it is legible. Our aim is to provide this to the physician for use in patient care.

He will have this complete summary available to him prior to his initial interview with the patient. At the same time, all of the patient's responses have been entered directly into the computer and stored on magnetic tape where they can be used, both for care of his patient in the future and also for purposes of clinical research.

The printing process takes a bit of time. The system has been designed to be economical. This computer is being leased by the University of Wisconsin for approximately \$600 a month, which is about the price of one laboratory technician, and so even on a research basis it is economically feasible to use this as an interviewing machine.

Senator YARBOROUGH. Madam Chairwoman, may I ask a question at this point?

Doctor, since only a relatively small percentage of the people know how to type and most are not in that category, what do you do with the large number of people who don't know what to do with the keys on the typewriter?

Dr. SLACK. Before the patient begins the medical history a teaching machine program comes on instructing this person how to use the computer. And most of the responses are made by just pressing buttons, numbered 1, 2, 3, and 4. The 1 button is pressed for a "yes" answer, the 2 for a "no," the 3 for a "don't know," and the 4 for a "don't understand." We have found that the person with no typing experience takes longer, but as long as they are literate—and this is one of the limitations of this system now. A person has to be able to see, and they have to be literate. But we are working to overcome this. We are planning on the spoken word as a means of presenting questions.

But we found that patients can hunt and peck their name, and they never mistype their name. They never misspell their name. They see it on the screen, and they can change it; whereas to become a patient at the University of Wisconsin, to be admitted to the University Hospital one has to give his name 15 times and it is not uncommon to have the patient discharged with a different name than he came in with. We are working to overcome this.

Before the patient is permitted to go on with the medical history there is a little test, testing to see if they have familiarized themselves with the operation. So by the time they answer the first medical question, we have determined that they are good at operating the computer.

With an eighth-grade education, people have been able to use our system quite well. And I should say that the patient reaction to this

program has been quite gratifying. They have all enjoyed it, practically all have enjoyed it, found it interesting and have not in any way been threatened by being interfaced with a computer. As a matter of fact, the churning tapes and the flashing lights, I think, have added to it.

The CHAIRMAN. Doctor, what is the machine now doing? What are those sounds?

Dr. SLACK. What the machine is doing now is scanning the response tape for positive responses, and then checking to see if there are print-out statements associated with those responses, and if there are, it will print them out on paper by teletype machine.

I will present you with a copy of the printout. But what it does is give the patient's name and age and it reads "Allergy history, computer-based interview." 1. Asthma syndrome: "Wheezing not understood." 2. "Allergic rhinitis—none by history." Allergic rhinitis is the pedantic phrase for hay fever. 3. Urticaria—none by history. 4. Drug allergies—and then it describes the penicillin allergy. "Penicillin therapy—adverse reaction experienced manifested by skin rash, joint pain, lymphadenopathy, facial swelling: one reaction; occurred in 1965"—and so forth, giving a summary of all of the clinically significant responses made by the patient, and this can go directly into the chart. But if it is lost, all of these responses are still on magnetic tape.

(The print-out statement follows:)

PROGRAMMED MEDICINE - UNIV OF WISC MEDICAL CENTER

WB080 00040034

PATIENTS NAME  
RUPP , MARY . . . C  
AGE . 26 YEARS OLD  
DATE SEPTEMBER 21, 1966  
HOSPITAL NUMBER  
123456

ALLERGY HISTORY COMPUTER-BASED INTERVIEW

1. ASTHMA SYNDROME  
WHEEZING NOT UNDERSTOOD

2. ALLERGIC RHINITIS  
NONE BY HISTORY

3. URTICARIA  
NONE EXPERIENCED BY HISTORY

4. DRUG ALLERGY

PENICILLIN  
THERAPY RECEIVED  
ADVERSE REACTION EXPERIENCED MANIFESTED BY  
SKIN RASH  
JOINT PAIN  
LYMPHADENOPATHY  
FACIAL SWELLING  
1 REACTION  
OCCURRED IN 1965  
OCCURRED AFTER PENICILLIN INJECTION  
DURATION ABOUT 52 HOURS-- LONGEST OR ONLY REACTION

ASPIRIN TAKEN  
NO ADVERSE REACTION TO ASPIRIN  
NO ADVERSE REACTION TO ASPIRIN

OTHER DRUGS-- NO ADVERSE REACTIONS

5. ECZEMA  
NONE BY HISTORY

6. UNEXPLAINED SKIN RASH  
NONE IN PAST YEAR

7. FAMILY HISTORY  
NEGATIVE FOR ASTHMA, HAY FEVER, HIVES AND DRUG ALLERGY

END SUMMARY

Senator NEUBERGER. Thank you very much for that demonstration. I should think this would make going to the doctor fun.

Maybe if you had a little coin slot in there, you could help amortize that machine.

(Statement of Dr. Slack follows:)

PREPARED STATEMENT BY WARNER V. SLACK, M.D., ASSISTANT PROFESSOR OF MEDICINE AND COMPUTER SCIENCES, UNIVERSITY OF WISCONSIN

The clinical transaction between doctor and patient involves data obtained from 3 sources—the medical history, the physical examination and the laboratory examination. The medical history consists of information of potential clinical significance collected during the course of interview between doctor and patient. Of the 3 sources of clinical data, relatively little research has been done on the medical history. This is true in spite of the fact that many clinicians consider medical history to be the most important aspect of the patient's examination.

Apart from theoretical interest of research on the medical history, there are practical reasons why such effort is urgently needed. History taking is very time consuming and incompleteness often results from time limitations beyond the physicians control. Further, the lack of standardization from interviewer to interviewer, together with the traditional illegibility of hand-recorded patient records, makes information retrieval for patient care and clinical research difficult and often impossible. Improved methods of collecting and recording detailed medical histories are needed.

A computer-based medical history system is being developed at the University of Wisconsin Medical School in which a small, digital computer collects the information of clinical histories directly from patients, prints out summaries in a form of immediate use to physicians and stores all responses for future use in patient care and clinical research.

The LINC (Laboratory INstrument Computer) has been used in the medical history system because of its low cost, high flexibility and operational ease. The LINC was developed and first constructed at the Massachusetts Institute of Technology in 1962 with the support of The National Institutes of Health.

The patient sits in front of the computer and questions are displayed on a cathode-ray screen. Responses are made by keyboard entries. The responses are stored on magnetic tape for future analysis and significant responses are printed by teletype for immediate use. The teletyped phrases are in a legible but otherwise traditional format.

Thus far, results with the program have been encouraging. Early efforts have dealt primarily with histories of allergy symptoms. In comparison with physician-interviewers the program is most effective when dealing with patients whose presenting or primary problem is not allergy and who might not otherwise have the advantage of a detailed allergy history. In addition to the allergy system a medical history dealing with uterine cancer is now being tried clinically at the University of Wisconsin Hospitals and gastro-enterology, neurology, cardiology, psychiatry and pediatric histories are being developed. The goal is to obtain at least as much detail about potentially significant phenomena occurring in patients' medical histories as would satisfy conscientious clinicians were they to have taken the medical histories themselves.

With proper technological development (using such means as mobile medical history units and regional health centers) low cost, high quality computer-based medical interviewing can be made available to large groups of people who might not otherwise seek medical care as well as to those patients whose physicians need help in their task of medical history taking.

#### SUPPLEMENTAL STATEMENT SUBMITTED BY DR. SLACK

Computer-based medical interviewing is needed to supplement health screening programs. When properly developed, computer interviewing systems will be less expensive, more complete and available to larger populations than are physician interviewers. Complete medical histories taken regularly from all citizens—which should be our goal—cannot be done by physicians. There does not exist enough physician time for such a large scale medical interviewing project. Physicians must spend their time as judiciously as possible and providing physicians with information reliably obtained by computer interview will enable them to better use their time in making diagnostic and therapeutic decisions.



To realize the goal of a good medical history screening project, the following are needed. The complete medical history (including questions relevant to all major disease processes) must be developed, tried clinically and improved on the basis of experience. The system design should be such that abnormalities, when elicited, will be qualified in detail by further questioning. Programmed learning and explanatory sequences should be incorporated into the computer history to increase the validity of the information collected.

To present the medical questions to patients, receive and store patient responses and print out history summaries for physician use, computer hardware must be designed specifically for computer-based interviewing. This will entail the production of computer processing units capable of controlling multiple, individual interviewing terminals—with terminals equipped with large screens for displaying questions (in an easy-to-read manner), audio mechanisms for presentation of questions by spoken voice (as a means of overcoming illiteracy and vision difficulties) and keyboards made for patients' responses. Such computer interviewing equipment should be designed for use in regional, multiphasic screening centers. The cost can be kept low—well below one dollar per interviewing hour.

The computer equipment described should also be suitable for the collection of physical examination and clinical laboratory data. Research on the use of a computer to obtain physical examination information by interviewing examining physicians is currently being conducted at the University of Wisconsin Medical Center. Dr. G. Phillip Hicks and associates at the University of Wisconsin have developed a computer-based clinical laboratory system using a small, inexpensive, general purpose computer (Laboratory INSTRUMENT Computer). Laboratory technologists are in direct communication with the computer—the computer communicates by cathode-ray scope and the technologists enter laboratory data by keyboard. Dr. Hicks has also interfaced laboratory machines such as the autoanalyzer directly with the computer.

By using the computer as an active participant in the process of clinical data collection, laboratory, physical examination and medical history data will be obtained immediately in computer processable form (reliably and economically) and thus made available for purposes of multiphasic screening, individual patient care and clinical research.

Small computers similar to the Laboratory Instrument Computer and capable of interviewing and being interfaced with laboratory machines should be available for use in areas removed from large medical centers and for use in mobile multiphasic screening units.

Senator NEUBERGER. All right. We have next Dr. Caceres, who is the Instrumentation Activities Chief, Heart Disease Control Branch, Division of Chronic Diseases, Bureau of State Services, Public Health Service, Washington, D.C.

Dr. CACERES. Thank you.

A great variety of preventive, diagnostic, and care services are available today, in theory at least, to the elderly, and the battery of services is bound to increase. The resources available for the elderly to pay for existing services are inadequate, and we can't expect that the resources of the elderly will be sufficient pay for the more diverse services of the future. The problem then is: What can we do to so organize the delivery of health and medical services that we can economically provide all of the elderly with the quality service of today as well as with the better quality service that is going to be introduced in the future?

The solution depends on doing three things.

One, we must bring systems analysis to health services for the elderly, just as it has successfully been focused on the military and industrial problems of today. The need, the supply, and the delivery of health services must be viewed broadly as a total system and not as a jumble of unrelated bits and pieces.

Second, in the use of health manpower, every medical and health test should be done by the person with the least formal education,

who can do it well and effectively under adequate supervision. You see the beginning of this when a dental hygienist and not the dentist cleans your teeth, when a technician and not a radiologist X-rays your chest, and when an aid and not a nurse makes up your hospital bed.

But in medicine in general we may not be using quickly trained help as widely and as intelligently as the Armed Forces did nearly a quarter of a century ago, and as they are continuing to do today.

Third, we must use machine systems—and this is vital today—machine systems that utilize computer systems, for any repetitive tests that would be drudgery and an uneconomical use of the time of health personnel, particularly the health personnel that is highly trained or permanently scarce. These categories are registered nurses and physicians. The optimum use of machine systems that utilize computers as an aid and a backup to physicians and nurses, would relieve the shortage of professionals that we have today and would enable the existing ones to serve at their highest level of patient care.

Today we are going to try to illustrate some of those general concepts with a model that was begun at the heart disease control program in the Division of Chronic Diseases in the late fifties. The heart disease control program and the Division of Chronic Diseases have long known of need for integrated health services to the elderly. This has been one of their principal areas for research and development these past few years. As a model for national delivery of health services, we have chosen the electrocardiographic system. However, we are first going to show you another system, which was developed from the model after we were satisfied that the model itself was successful. The subject, Mr. Flaherty, is going to perform a forced expiration. He will blow into a spirometer that has been located at your left-hand side of the auditorium. The spirometer is a device that measures and records the volume of air expelled by the subject in specified units of time.

These changes in the volume that are obtained from the spirometer are being recorded by the data-acquisition device, which Dr. Ridges is presently operating. The device records the data on analog magnetic tape for economical storage and later use, and also allows the signal to be sent to the computer over conventional telephone lines.

The device also records the patient's identification number and information relating to his age, sex, height, and weight. It also will record the signal as a tracing on paper for monitoring by the physician.

The computer system that we currently have at the instrumentation field station located on the campus of George Washington University has now received the signal from the test subject for this particular demonstration, and we will soon get back an analysis.

The computer there takes roughly 30 seconds to do the analysis of the spirogram, and then starts transmitting the data back to us over the teletype. The teletype, as Dr. Slack has shown, is a relatively slow device, but it is economical. The computer system at the field station will have already printed out the answers long before they are available to us here, but the high-speed printer there is relatively expensive. We are now getting back from the teletype a printed page that gives the data in reference to the breath that was exhaled.

(The print-out follows:)

INSTRUMENTATION FIELD STATION: HEART DISEASE CONTROL PROGRAM SENATE OFFICE BUILDING			
=====			
COMPUTER PROCESSED FORCED EXPIRATORY SPIROGRAM			
PROCESSING DATE 09/21/66 CALIBRATION CONSTANT 1,075 ML			
=====			
PATIENT NO. 0000-02 AGE 23 YRS SEX M HEIGHT 75 IN			
PREDICTED VITAL CAPACITY 4,660 ML			
=====			
	TRIAL 1	TRIAL 2	NORMAL
FORCED VITAL CAPACITY (ML)	4,752	4,603	
PERCENTAGE OF PREDICTED VC	101	98	80
TIME OF FVC (SECONDS)	2.06	1.66	
TIME OF MAX. INST. FLOW RATE	0.12	0.13	
=====			
FORCED EXPIRATORY VOLUMES (ML)			
ONE-HALF SECOND	3,326	3,227	
PERCENTAGE OF FVC	69	70	
THREE-FOURTH SECOND	4,217	4,069	
PERCENTAGE OF FVC	88	88	
ONE SECOND	4,405	4,396	
PERCENTAGE OF FVC	92	95	75
TWO SECONDS	4,722	4,603	
PERCENTAGE OF FVC	99	100	94
THREE SECONDS	4,752	4,603	
PERCENTAGE OF FVC	100	100	97
AT MAX. INST. FLOW	841	861	
PERCENTAGE OF FVC	17	18	
=====			
FLOW RATES (ML/SEC)			
200-1200 ML	8,739	8,269	7,000
25%-75% FVC	6,092	6,044	3,400
25%-50% FVC	6,600	6,758	
50%-75% FVC	5,637	5,466	
.5 - 1 SEC	2,158	2,338	
1 - 2 SEC	317	207	
2 - 3 SEC	30	0	
MAX. INSTANTANEOUS	9,687	9,157	
MID-EXHALATION	5,939	6,010	
=====			
INTERPRETATION -			
ABOVE DATA WITHIN NORMAL LIMITS			

Computer report of a spirogram taken on a patient at the Senate Office Building. The numbers are volumes and flow rates of the air expired by the patient and are a useful measure of a patient's pulmonary function.

Senator YARBOROUGH. Doctor, how far away is the instrumentation field station on which this was being recorded?

Dr. CACERES. The instrumentation field station is near Washington Circle.

Senator YARBOROUGH. That is some miles away from here?

Dr. CACERES. Roughly 3 miles. It is near the Virginia boundary of the Federal District. It is about 5 miles away.

The signal leaves the data acquisition set in the auditorium over a conventional telephone line, a standard line with an analog data-phone interface. This type of interface device is now available from telephone companies, so that you can transmit analog signals from a specific recording device at the patient's side to the computer center. In other words, you don't have to have a computer center everywhere you record.

Senator YARBOROUGH. Are some of the processes you have explained here used to implement the Regional Health Centers Act that the last Congress provided for?

Dr. CACERES. In developing these systems we have hoped that they would be utilized in all regional health centers, and in all modern hospitals as well. As a matter of fact, these systems could be utilized by physicians in small clinics. The data-phones are small devices. I am going to ask Dr. Ridges to show the data-phone system that can be used with a conventional telephone.

This is what a private nurse or visiting nurse could take into a patient's home, along with a small, portable electrocardiograph, to transmit the signals to a data center, and get back from the data center the results of the analysis by voice recording. If the signal were sent from a clinic, the results could be returned via a teletype device such as we have here.

Senator YARBOROUGH. Then the nurse by attaching that to the phone could take the electrocardiogram right in the person's home?

Dr. CACERES. Yes, sir.

Senator YARBOROUGH. By attaching this device to the phone?

Dr. CACERES. Yes, sir. With the same device, the spirometric analysis, which would take a physician about 20 minutes to do, can be available to the clinic immediately. Today not 1 person in 1,000 has had a spirometric examination. In this day when we know that emphysema, a disabling lung disease, is highly prevalent, and we know that smoking is a major cause, we can say with certainty that insufficient numbers of people are being tested for their pulmonary problems.

This is so because the spirometric testing requires some degree of additional training for the physician. It also now requires an investment of physician time that might be excessive in view of the numbers of people that require testing, and in view of the large amount of computation time needed to do the analysis by manual methods.

This means, then, that we are not giving the best information that we can for the detection and followup of lung diseases.

The solution to the problem in reference to spirograms is obviously not for the physicians to go back to school to try to learn some very difficult techniques, or to impose upon them the need to do computations that they are not set up to do in their clinics, but to have non-physicians run the tests and a machine system to do the computations.

We have, then, a system that helps us to reject two unacceptable proposals. One is the notion that when our scarce physicians are working full-time caring for the sick, so-called luxury services, like disease prevention, disease detection, and periodic physical examinations, should be cut back or eliminated.

Dr. Slack has shown some of the reasons why we don't have to curtail some of these services, and these demonstrations and those of Dr. Thiers will show others.

The second false notion is that nothing is wrong with today's health practices except that some people can't afford to pay for them. The answer is that even unlimited money would not buy quality services for everyone today, because our present modes of organization and delivery do not take advantage of all the modern concepts of organization and management that have begun to tap the potentials of automation technology.

Now we will begin to receive data sent from a hospital outpatient department in Hartford, Conn., to our computer in Washington. The question that Senator YARBOROUGH posed to us about distance

can now be more properly answered. The electrocardiographic interpretations being printed out on the teletype now are of signals recorded in Hartford Hospital this morning. They were received at the field station a few minutes ago, and you are seeing the answers here. These same interpretations are also being transmitted back to Hartford Hospital. This means that if we have a patient anywhere in the country, with a machine system, we are capable of giving him the types of services that the most experienced cardiologist could give.

By having stored within the computer the cardiologist's available knowledge of the electrocardiogram, we are in effect bringing the services of a cardiologist to the bedside of the patient. This is a demonstration of what can be done by the modern use of computers and other available electronic and communications technology.

To show you what was done in Hartford today, we will now record an electrocardiogram on a subject here and simultaneously transmit it to the computer. Additionally, the data is being recorded on analog magnetic tape, in the data acquisition device that we have shown, and will be available for later use. Each EKG has been interfaced with appropriate codes, so that the signals can be easily identified by the computer system. The computer system will receive the signals from this patient as the signals are being recorded.

It is receiving them over a conventional telephone line. When the recording of the electrocardiogram is completed, a procedure requiring 3 minutes, the computer will start sending back answers with a delay of only 15 seconds. This is done even before the technician can begin to remove the electrodes from the subjects. The answers are now available here, and in another situation could be available for use by physicians in practical circumstances.

In our current screening examinations, as part of the trials of this procedure, we have found that roughly 30 percent of individuals that walk into a screening system will have some type of cardiographic abnormalities. This doesn't necessarily mean clinical abnormalities.

I hope Dr. White will take a look at the electrocardiogram that we have recorded here. We will match his interpretation with the computer's.

We have found that even on individuals in the younger age brackets, we have findings in the electrocardiogram that can be used for later analysis. Dr. White just mentioned that it would be wise to store information from the young for use later on when they are older.

The subject here today, Mr. Flaherty, happens to have some non-significant clinical findings in his electrocardiogram. He is among the 20 percent of 22- to 29-year-old men that happen to have these findings.

These would be good to know now, because if he were later examined for heart disease, the physician would have this background information and would not inappropriately do certain things on the basis of the later data alone. With a preliminary electrocardiogram, he would know that the patient falls within a category in which certain types of data do not indicate heart disease.

The two electrocardiograms from Hartford are here, and the one from the subject will be forthcoming.

(The Hartford print-outs follow:)

INSTRUMENTATION FIELD STATION						HEART DISEASE CONTROL PROGRAM							
COMPUTER PROCESSED ELECTROCARDIOGRAM													
SEPT. 21, 1966						HARTFORD HOSPITAL OUTPATIENT CLINIC						3791	
LEAD	I	II	III	AVR	AVL	AVF	V1	V2	V3	V4	V5	V6	
PR	.15	.00	.00	.15	.00	.00	.14	.13	.13	.17	.14	.18	PR
QRS	.09	.06	.06	.05	.06	.07	.10	.10	.09	.08	.08	.09	QRS
QT	.33	.33	.33	.32	*45	.33	.00	.36	.36	.34	.31	.33	QT
RATE	73	73	73	76	72	74	75	74	74	76	76	77	RATE
CODE	3	2	2	2	3	4	3	R3C	2	3	2	4	

WITHIN NORMAL LIMITS

INSTRUMENTATION FIELD STATION						HEART DISEASE CONTROL PROGRAM							
COMPUTER PROCESSED ELECTROCARDIOGRAM													
SEPT. 21, 1966						HARTFORD HOSPITAL OUTPATIENT CLINIC						3795	
LEAD	I	II	III	AVR	AVL	AVF	V1	V2	V3	V4	V5	V6	
PR	.14	.16	.17	*21	.12	.17	.13	.17	*20	.19	.19	.17	PR
QRS	.11	.11	.09	.07	.10	.11	.09	.08	.09	.09	.09	.11	QRS
QT	.33	.33	.30	.31	.29	.33	.31	.32	.34	.34	.35	.33	QT
RATE	103	104	100	102	96	100	99	97	97	97	102	101	RATE
CODE	3	4	2	3	3	3	4	5	4	5	2	5	

BROAD P WAVES; P MITRALE  
 VENTRICULAR RATE OVER 100 IN 2 OR MORE LEADS; TACHYCARDIA  
 QRS AXIS, -10 TO -59 DEGREES; LEFT AXIS DEVIATION

Two computer processed electrocardiogram reports sent to the Senate Office Building from the Instrumentation Field Station in Washington, D.C. The electrical signal was recorded from a patient in Hartford, Conn., relayed over the telephone to the field station, analyzed by the computer, and sent by teletype to the Senate subcommittee hearing. The total procedure took place during the hearing.

Incidentally, in our tests done at the American Dental Association last year by telephone from Las Vegas to Washington, we were able to screen 1,200 dentists at their national convention. The data that were available the day after the meeting allowed tabulation of abnormalities by age of the subjects—something that cannot be done in current academic or clinical circumstances unless one uses computers.

We found in these screening tests that as one increases in age, abnormalities in electrocardiograms tend to increase. By age 40 to 49 over 30 percent of the subjects will have abnormalities of some type, not necessarily abnormalities that disable, but things that the physician should know.

By the time we are 50 years old, over half of all of us will have certain abnormalities that the physician should know. They could be precursory to disease and should be evaluated, or perhaps are useful in followup of patients.

The electrocardiogram is a basic means of detecting, then, latent heart disease and assessing cardiac status. Roughly 50 million electrocardiograms are done annually in the United States, and a large proportion of these are taken on the elderly, since they of course are the group most susceptible to heart disease.

But, because the analysis of electrocardiograms, spiograms, and other tests is a time-consuming, tedious chore for physicians, and the EKG itself is a significant expense to the patient, it is often omitted from the examination.

For the elderly, in fact for everybody, the electrocardiogram should be routine.

The computer analysis of electrocardiograms has been repeatedly demonstrated in short-distance transmissions and in long-distance transmissions. We saw both here today. We have been using these tests in Washington, D.C., for the last 3 years. We have had demonstrations that show that we can communicate well from Chicago to Washington, San Francisco to Washington—any distance that one would wish.

Electrocardiograms have recorded on a routine basis at Hartford Hospital in the outpatient area for more than a year. They will also be recorded from the emergency room, starting later this year. Our computer system will be interrupted to try to serve the Hartford Hospital emergency room when the need arises and to provide answers immediately after the tracing is received, long before the physicians at the emergency room have been able to obtain the services of a specialist.

The development of automation makes possible the emergence of regional data centers with which small hospitals, nursing homes, and individual practitioners can have direct access by telephone. These centers would provide the integrated analyses of medical and laboratory tests of the wide variety that is needed in the case of chronic disease patients, in the care of the elderly, and in the evaluation of health, status.

We are now only in the infancy of automation in the field of health. We can foresee that widespread use of automation and modern communications media can reduce the total cost of medical tests from dollars to cents. We can see that the diverse battery of medical and laboratory tests now available only on a selective basis can become fully accessible to the entire community.

Senator YARBOROUGH. Madam Chairman, may I interrupt for a moment? I must go to the floor shortly.

I want to inquire: How long has the spiogram been in use?

Dr. CACERES. The spiogram has been in use for about 25 years. It has long been proven as one of the significant tests in the detection of lung diseases. But for the reasons that we mentioned, that it is a difficult test to do, that it is difficult to compute the answers, we are not using it routinely in medical practice.

Senator YARBOROUGH. I am very much interested in seeing it. Frankly, I have never seen one before. I have had some checkups by some pretty big hospitals in the United States, and I am not going to call the names, and I have never heard of this machine. I never saw it being used.

Dr. CACERES. The Division of Chronic Diseases has a branch now that is particularly concerned with trying to increase the availability

of lung-function tests. We hope they can be made available to Senators as well as to the entire community.

Senator YARBOROUGH. Then the spirogram is not in widespread use at this time?

Dr. CACERES. Only in specialty clinics. It is generally used only to confirm that one has a respiratory disease. It should be used for screening. A group in Alabama as well as other groups are beginning to note the interest in the spirogram and to explore the possibilities of using it on a national basis.

Senator YARBOROUGH. You would not normally use it, then, at the present time unless there were some indications?

Dr. CACERES. In the majority of instances that is right. Unfortunately, it is used only to confirm, and we believe it should be used not only for confirmatory reasons, but for prediction and followup, which are the things we most need.

Senator YARBOROUGH. Before I am forced to leave, there are the regional health centers we are setting up under the legislation recently passed, and I believe you were here, Doctor, when we discussed those.

In your work here with the Government, your particular division is very much concerned with that. I want to mention a bill now pending before the full Committee on Labor and Public Welfare, which we reported last week from our Federal subcommittee, on which I served for some years, and that is to integrate the medical knowledge in the veterans community.

The Veterans' Administration operates the biggest system of hospitals in the world operated by any one agency, either Government or private. We have a bill pending that I hope we can pass this year which provides for an exchange of information between the veterans hospitals and other medical units in the community, hospitals and otherwise, and where the veterans hospitals have very extensive operations that require vast numbers of personnel. They might be on exchange and not being used at all times, and those facilities might be made available to other people not in the veterans hospital complex and not entitled to full utilization, but more than that, bringing the training of physicians trained in the veterans hospitals out into the civilian community.

That comes through another branch than the branch that you serve in, but we hope through that bill, if it is passed this year, to help in this integration of medical knowledge and medical services through this great hospital system that the Veterans' Administration operates.

Dr. CACERES. The integrated use in medicine, of all of these tests and equipment, is certainly something that medicine has long wanted.

Senator YARBOROUGH. I congratulate our chairwoman on a most interesting series of hearings. I see by the time these cameramen have finished putting this on the television screens which are going to have a peripheral result, the primary purpose of this committee is to study the problems of the health of the aging. I think you gentlemen have stimulated the interest in medical checkups over this country by this demonstration this morning.

Senator NEUBERGER. Tell them I am here. I am not going to report for the quorum.

I see that Dr. White has joined you. Has he seen the result of your operation? These look like hieroglyphics to us laymen, but I was interested in the interpretation, which said that the data was within normal limits.



Dr. CACERES. Yes; that is the correct interpretation of the respiratory data. We have just given Dr. White the results of the cardiographic analysis.

This one was taken on the subject that we had here, and is a print-out that gives the interpretation plus the numerical values.  
(The print-out follows:)

INSTRUMENTATION FIELD STATION						HEART DISEASE CONTROL PROGRAM							
COMPUTER PROCESSED ELECTROCARDIOGRAM													
SEPT. 21, 1966						SENATE OFFICE BUILDING						6126	
LEAD	I	II	III	AVR	AVL	AVF	V1	V2	V3	V4	V5	V6	
PR	.14	.18	.20	.20	.00	.20	.17	.00	.16	.18	.16	.17	PR
QRS	.13	.08	.09	.08	.08	.09	.11	.11	.11	.11	.10	.11	QRS
QT	.37	.36	.36	.34	.32	.35	.34	.37	.39	.39	.38	.39	QT
RATE	65	66	64	69	65	72	57	61	63	66	67	64	RATE
CODE	A2C	2	3	3	3	2	2	2C	3C	2	2R	2C	

**ST ELEVATION; RULE OUT PERICARDITIS OR EARLY REPOLARIZATION  
VENTRICULAR RATE UNDER 60 IN ONE LEAD**

Computer report of an electrocardiogram taken on a patient at the Senate Office Building and transmitted to the instrumentation field station in Washington, D.C. The numbers are computer measurements of the various wave durations of the EKG determined for each of the 12 leads. At the bottom is the computer interpretation.

Not all the numerical values would be of interest to the practicing physician: some are more for study purposes. The practicing physician would be more interested, as you are, in the interpretation. Perhaps Dr. White would care to comment.

Dr. WHITE. May I come to the microphone?

Some 30-odd years ago we took spiograms to identify symptoms of nervous nature, and this was a very useful record even then in differentiating diseases from processes or breathing that were not dependent upon primary disease of the lungs. And we published such spiograms way back.

But electrocardiography is what has interested me, especially in beginning my work in the field of heart disease. And I still believe that we don't have enough information about the normal human electrocardiogram.

Therefore, we do need to acquire more records of healthy people, because sometimes the normal records with some variation are being interpreted as evidence of disease. I have consulted with Eugene Lepeschkin in Vermont, who is one of the world's authorities on the normal human electrocardiogram, and he is studying some of these odd variations of what we think are normal findings, and these are to be distinguished or differentiated from disease processes.

This has happened just recently. Only 2 weeks ago I was in Vermont and took with me to Eugene Lepeschkin records of a youngster 16 years old with quick striking change in his S.T. & T. waves, which were not dependent, I am sure, on any disease, and were trenchant, depending on various factors. But to look at the electrocardiogram without knowing what the patient was, actually, would have concerned one.

This could be a case of serious coronary heart disease, or a mild cardiac disease of unknown origin; yet this lad was perfectly normal. So we do need many, many more records of perfectly normal individuals and this type of recording will be very helpful, I think.

Thank you for allowing me to say another word or two.

Senator NEUBERGER. Dr. Caceres, I am wondering about the cost of this ECG interpretation using a computer. Do you have a leased line to the hospitals? How do you manage the payments?

Dr. CACERES. The payments are now made as a part of our direct operating costs, and the work is a research and development project. We have been able to make some very preliminary cost studies. Our figures are not those an accountant would come out with and are not based on volume usage. They are based on a system that was designed around 1959, and is what engineers would term a "breadboard" model.

Based on these costs, an electrocardiogram would cost about \$2. The cost to a hospital by conventional means is now about \$5. These again are rough costs.

We can predict that, given the appropriate instrumentation and the right type of volume, the costs of an electrocardiogram can be in the cents category, and today could come down to under a dollar. With appropriate volume they would be in the range of 10 to 25 cents.

We have, then, a system, as Dr. White has said, that can begin to study the whole aging process, initially by recording individuals when they are in good health.

We have seen, in Kaiser-Permanente, in California, which has studied the logistic flow of people through a clinic and through many laboratory tests, that periodic health evaluations are useful, not just to the elderly, but of course to others. I think we must stress what Dr. White has said, that we must get data on normal people as well; and one way of so doing and the only way that we have of so doing today, is by having a machine system obtain this data for us.

We have seen that it is possible, with automation and good logistics planning, to do efficient analysis of the types of tests required by physicians. In short, medical and laboratory tests are the essential backup to the physician today for the economical delivery of health services. It can change the course of American medicine. It is inevitable in the long run. If we wait patiently, it will be here; but should we wait for the long run passively when it is feasible now?

We should accelerate total systems development, including automation, studies in the better use of manpower, with the same degree of support that we provide for basic research. We need to reevaluate the existing methods of delivering health care. We need to support trials and demonstrations to prove out prototype equipment and systems in varied local and regional health arrangements.

Developmental research and extensive field testing are the road that we must take now to make the best of modern health care available to the elderly as well as to the community at large.

The potential benefits to health services are exemplified by the work of the instrumentation field station itself. IFS was set up in 1960 as the first group within the Public Health Service to do research and development of instrumentation and automated systems to improve delivery of health care.

Our short-run goal has been to develop and demonstrate means of improving health and medical care by automating the analysis of

diagnostic information such as the electrocardiogram, spirogram, phonocardiogram, and other physiological data useful in early detection, management, and rehabilitation of persons with cardiovascular and associated disease.

As a model for all medical signals, a digital computer has been programmed at IFS to determine the heart rate, amplitude, and duration of the standard 12-lead electrocardiogram, and to make an English-language interpretation of these measurements. As shown here today, the technique is now acceptable for clinical use, and it is now being used routinely for patient care in several centers. During the past 3 years, over 50,000 electrocardiograms have been measured and interpreted by the computer under the part-time direction of three physicians and four technicians. This demonstrates that medical signals can be acquired, measured, and analyzed by an automated system rapidly and economically with only limited direction from medical personnel.

Plans have been drafted for a nationwide data pool of computer-processed electrocardiograms. Approximately 20 investigative groups will be participating in the data pool the first year, with a combined annual output of over 70,000 electrocardiograms.

Programs are underway to process and display 8-hour résumés of patients in coronary care units. This system will in effect observe the clinical data from each patient (vital signals, EKG, and medications) and produce a physician's interpretation of status and prognosis. Alarms will automatically signal certain types of changes in patient status. On-line, real-time processing techniques can be extended to simultaneous monitoring of up to eight patients.

We are developing competence and facilities for monitoring of continuous electrocardiograms of subjects under stress or undergoing surgery. Signal-averaging techniques, using NASA data particularly, are being used to reduce and possibly eliminate noise during stress or exercise electrocardiography. An exercise EKG lab at the George Washington University Hospital is being planned to provide diagnostic services and be a part of a program for rehabilitating coronary patients. We will study statistical techniques for computer-analyzed, continuously recorded electrocardiograms of patients undergoing surgery.

During 1966, IFS released the specifications used to produce a new generation of improved data-acquisition carts. About 20 of these carts are now being used to obtain EKGs, spirograms, electroencephalograms, plethysmograms, and other body signals. Newer specifications for data-acquisition carts will provide for analog-to-digital conversion at the recording site, digital recording, and a portable, suitcase-size system for telephone transmission.

We propose to automate the interpretation of fetal-maternal EKG parameters at various stages of pregnancy, and to develop a computer program which will extract and print the number of fetuses, fetal position, viability, and abnormalities of fetal heart rate.

An automated system to process spirograms, as demonstrated here today, has been developed as a means to assess respiratory symptomatology of obstructive or restrictive chronic lung disease. A similar program could also be applied to monitoring respiration in an intensive care unit or to developing a computerized pulmonary function laboratory.

A new microphone-recording system has been developed to record phonocardiograms, and a computer program to analyze heart sounds is well advanced. This program will identify systolic and diastolic murmurs, as well as detect abnormal sounds.

IFS is receiving tape-recorded plethysmograms for analysis, and we plan to complete a pattern recognition and diagnostic program for the plethysmogram to encourage its more widespread use in assessing peripheral blood pressure and vascular disease. Programing now measures 11 critical points on the periodic plethysmogram curve.

We have constructed an optical system to record cuff blood pressure, and we are developing a computer program that will permit this system to be used in community screening projects.

A program has been written which classified the electroencephalogram into amplitude and frequency measurements as is done visually by a human electroencephalographer. Attempts will be made to utilize measurements of blood flow to the brain as a function of cardiac output.

An immunochemical system for detection of group A streptococci by fluorometry, designed to be amenable to complete automation, has been developed and validated. Such a system would allow any community to handle the large workload of a throat-culture program. We propose to develop other systems to automate the output of medical laboratory tests.

A program has been written to determine cardiac output from dye-dilution curves in conjunction with electrocardiograms and will be tested clinically. Computer analyses of electrophoresis will be developed to permit analysis of large numbers of EPG's within seconds. Dye-dilution curve analysis for on-line use in operating rooms and intensive care units will also be developed.

We are assisting nutritionists in the writing of a nutrition computer program to be utilized in hospitals.

As these typical components of health-care systems are fully developed and validated, we plan to combine them into integrated, rational systems for the delivery of health services. Our actual work on such integration is at an early stage, but it is already evident that it is the key to better health care and to substantial cost reductions. The kind of systems analysis and technology that have effected economies, bettered products, and increased output in industry has scarcely been applied at all to hospital, clinical, and preventive health services. It challenges all of us, and presents the opportunity, to improve services for the elderly, and in fact for the entire population.

At this time I would like to thank the several organizations that have worked with us to develop better systems of medical care. The analysis of electrocardiograms and spiograms by computer requires special-purpose equipment which is all commercially available. The electrocardiogram is recorded on a data-acquisition cart, consisting of a standard electrocardiograph, a magnetic tape recorder, and a digital coder, manufactured by Computer Instruments Corp., Hempstead, N.Y. Transmission of the signal is accomplished over standard telephone lines using a data-phone set provided by the American Telephone & Telegraph Co. The phone set couples the data-acquisition cart to the telephone lines. The computer used is a Control Data Corp. 160-A general purpose digital computer. Electrocardiogram

reports are transmitted back to the sender by conventional teletypewriter. In analysis of the spirogram, a wedge spirometer and an amplifier—Med-Science Electronics, Inc., St. Louis, Mo.—are added to the above system.

Thank you.

(Dr. Caceres' prepared statement follows:)

PREPARED STATEMENT BY CESAR A. CACERES, M.D., CHIEF, INSTRUMENTATION FIELD STATION, HEART DISEASE CONTROL PROGRAM, DIVISION OF CHRONIC DISEASES, PUBLIC HEALTH SERVICE, U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, WASHINGTON, D.C.; ASSISTANT PROFESSOR OF MEDICINE, GEORGE WASHINGTON UNIVERSITY HOSPITAL, WASHINGTON, D.C.

#### ORGANIZATION AND DELIVERY OF HEALTH SERVICES FOR THE ELDERLY

A great variety of preventive, diagnostic, and care services are available—in theory at least—to the elderly today, and the battery of services is bound to increase.

The resources available to the elderly are inadequate to obtain the services on hand today, let alone the more diverse services that will be developed tomorrow.

The problem is, what can we do to so organize the delivery of health and medical services that we can economically provide the elderly not only with the quality service of today but with the best that will be available in the future?

The solution depends on doing three things:

1. We must bring systems analysis to health services for the elderly, just as it has successfully been focused on military and industrial problems. The need, the supply, and the delivery of health services must be viewed broadly as a total system, not as series of unrelated bits and pieces.

2. In the use of health manpower, every medical and health task should be done by the person with the least formal education who can do it well and effectively under adequate supervision. You see the beginning of this when a hygienist not a dentist cleans your teeth, a technician not a radiologist x-rays your chest, and an aide not a nurse makes up your hospital bed. But in medicine in general, we may not be using quickly trained help as widely and intelligently as the Armed Forces did nearly a quarter of a century ago in World War II and are doing today.

3. We should use a machine—such as a computer—for any repetitive task that would be drudgery or an uneconomical use of the time of health personnel, particularly the highly trained and permanently scarce categories such as physicians and registered nurses. Optimum use of auxiliary nonprofessionals and machine systems as an aid and a backup to physicians and nurses would relieve the shortage of professionals and enable them to serve at their highest level of patient care.

The demonstrations today will help us reject two unacceptable proposals. One is the notion that when our scarce physicians are working full-time caring for the sick, so-called luxury services like disease prevention and detection and even the periodic physical examination should be cut back or eliminated. Dr. Slack has shown some of the reasons why curtailment of service is unnecessary, and Dr. Thiers and I hope to demonstrate some of the others.

The second false notion is that nothing is wrong with today's health practices except that some people can't afford to pay for them. The answer is that even unlimited money would not buy quality health services for everyone today, because our present modes of organization and delivery do not take advantage of modern concepts of organization and management, and have only begun to tap the potentials of automation technology.

I will try to illustrate some of these general concepts with a model that was developed over the past 5 years in the Public Health Service. We chose the electrocardiogram as the model for automated pattern-recognition and interpretation because physicians are familiar with it, and have 50 years of experience in relating its waveforms to specific clinical meanings. But we could have begun with almost any other physiological signal—brain waves, vital capacity, heart sounds, and others. As a matter of fact, we have since demonstrated that each of these signals is subject to automated measurement and interpretation. Automation not only can lower the cost of these tests, but also save the scarce time of physicians. The measurements are highly accurate, and the interpretations agree with those of clinicians as frequently as clinicians agree with each other.

Today we intend to demonstrate the use of a computer for on-line analysis of electrocardiograms and spiograms. An electrocardiogram will be taken from a subject at this hearing. It will be transmitted directly from the subject to the computer at the Instrumentation Field Station by telephone over a line kindly provided by the Chesapeake and Potomac Telephone Company. The computer will analyze the signal almost instantaneously, and the results will be relayed back to the auditorium and displayed on the teletype printout. If time permits, to demonstrate the use of this program in a community hospital, an EKG taken from a patient at Hartford Hospital in Connecticut will be computer-analyzed and relayed from the computer to the teletype printout.

A subject will also be tested for lung function, his vital capacity, and possible obstructive lung disease. The analysis, return, and printout of the spiogram will also be available almost instantaneously.

The electrocardiogram is a basic means of detecting latent heart disease and assessing cardiac status. Roughly 50 million EKG's are done annually in the United States; a large proportion is taken on the elderly, since they are the age group most subject to heart ailments. But because the analysis of large numbers of electrocardiograms is a time-consuming, tedious chore for physicians, and the EKG itself is a significant expense to the patient, it is often omitted from the examination. For the elderly—in fact for everyone—its use should be routine.

Computer analysis of EKG's has been demonstrated repeatedly in a variety of studies and field trials. Telephone transmission of EKG's over short distances on a daily basis, for example, has been in operation for 3 years in Washington, D.C. Long-distance transmission has been successfully demonstrated between Washington and San Francisco, as well as with Las Vegas, Chicago, and other locations.

For some time we have been taking EKG data from Hartford Hospital, as a playback from tape, and returning the measurements and an English-language interpretation by teletype. This year, to serve the Hartford Hospital emergency room, and for several other places, we plan an interrupt-feature that will allow our computer to receive on-line data and return immediate analyses without interfering with scheduled operations. This means that the computer in Washington will receive the signals from the patient's heart almost simultaneously as they occur in Connecticut, and will return a printout by telephone in 15 seconds after the last lead of the EKG is transmitted.

Automated analysis of spiograms has been demonstrated in a cooperative project with George Washington University Hospital and in a study conducted with the U.S. Naval Aviation Medical Center, Pensacola, Florida.

Analysis of the spiogram by a physician may require 15 minutes for a minimum number of computations. The enumeration of the same and even additional information from the spiogram takes the computer about 30 seconds. This information is valuable in screening and follow-up for bronchitis and emphysema or aiding the physician in his diagnosis.

Despite its clinical value, the spiogram is little used in medical practice. Probably not one person in a thousand has had a test of vital capacity, although bronchopulmonary disease is among the most prevalent causes of disability.

The developments in automation will make possible the emergence of regional medical data centers with which small hospitals, nursing homes, and individual practitioners have direct access by telephone.

These centers will make integrated analyses of medical and laboratory tests of a wide variety, and will provide a valuable backup service to institutions and physicians concerned, for example, with chronic disease in the elderly.

We are currently in the infancy of automation in the field of health, but we can already foresee that widespread use of automation and modern communications media can reduce the unit cost of many medical tests, such as the electrocardiogram, to perhaps 5 or 10 cents. Thus the diverse battery of medical and laboratory tests now available on a selective basis can become fully accessible to the entire community.

Kaiser-Permanente in California has studied and developed the logistic flow of people through many components of the physical examination, medical history, and laboratory tests. It has demonstrated that periodic health evaluation, which the elderly need on a frequent basis, can be done efficiently and economically. The addition of automated analysis and interpretation, as demonstrated here today, would provide even higher quality and effect further significant cost reductions and economies in physician and laboratory time.

In short, automation of medical and laboratory tests is the essential backup to the physician for the economical delivery of health services. It is feasible now and, in the long run, inevitable. But we should not want passively for the "long run"—we should accelerate total systems development, including automation, with the same degree of support that we provide for basic research. We need to re-evaluate existing methods of delivering health care; we need to support trials and demonstrations to prove out prototype equipment and systems in varied local and regional health arrangements. Developmental research, with extensive field testing, is the road we must take to make the best of modern health care available to the elderly and the population as a whole.

Senator NEUBERGER. We will move right on to you, then, Dr. Thiers.  
Dr. THIERS. Thank you, Senator Neuberger.

I have submitted testimony, and I would like at this time to summarize as briefly as I can bring myself to, after hearing these stimulating comments, what I have to say in the written testimony.

Senator NEUBERGER. This will all be in the record.  
(Dr. Thiers' prepared statement follows:)

PREPARED STATEMENT BY RALPH E. THIERS, M.A. PH. D., PROFESSOR OF BIO-CHEMISTRY, AND DIRECTOR, CLINICAL CHEMISTRY LABORATORY, DUKE UNIVERSITY MEDICAL CENTER

#### INTRODUCTION

The information available to clinicians for diagnosis and for treatment comes principally from five sources; the patient himself, the doctors "physical examination" of the patient, X-ray, combined surgical-pathological "biopsy", and the laboratory examination. Of these the laboratory examination has, in recent years, outstripped all of the others in increasing its value to medicine.<sup>1</sup> There are many reasons for this, not the least being the impact and support of basic research.

Because I believe that the clinical laboratory holds today's most exciting promise for advancing medicine, and because multiphasic screening represents the widest possible application of the laboratory, I am indeed grateful for the opportunity to testify before this committee.

#### GOALS OF MULTIPHASIC SCREENING

When a patient comes to a physician a definite sequence of procedures usually occurs, illustrated by the following outline.

1. Complaint—Dr. I have a pain in the—
2. History—Mr. D. when did you first notice—
3. Physical—Let me listen to your chest and—
4. Tentative Diagnosis—The most likely problem is—
5. Laboratory Examination—We'll get a blood sample for—a urine sample for—an ECG, etc.
6. Diagnosis—After considering lab information etc. I judge that Mr. D. has—
7. Treatment—Mr. D. we'll have to—

The goal of multiphasic screening is to take as much as possible of the laboratory examination and move it from the fifth event in sequence to a position along with the first and second. Real advantages result. In fifth position the physician must carefully choose which laboratory examinations are to be done. Instead, with multiphasic screening the philosophy of the "history" and "physical" can hold—"Do a systematic complete study without regard for what findings are predicted." A very complete body of information will then reach the physician early, making his job easier and more effective.

<sup>1</sup> "Program for Rehabilitation of Laboratory Medicine" Report to Diagnostic Research Panel, National Cancer Institute, NIH, Nov. 1, 1961, W. B. Wartman, Chairman.

## DEFINITION OF MULTIPHASIC SCREENING

One must define multiphasic screening carefully if it is to be really valuable in practice. I suggest, "All parts of the laboratory examination, history and physical examination which are quantitative in nature (or can be expressed in numbers suitable for computer processing), which involve either the patient or samples taken from him, which save physician-time by not requiring the actual presence of a physician for their performance, which do not involve clinical judgment or the practice of medicine in their performance, and the results of which may be reported directly to the physician for his use in observing the patient and diagnosing and treating the disease."

Thus the overall purpose of multiphasic screening is to provide maximal assistance to patient, physician, and medical practice. This can be done by decreasing that part of the physician's load which is "analytical" in nature, as defined by the following diagram.

History, Physical Exam., Laboratory Exam.	Diagnosis, Treatment
ANALYTICAL	SYNTHETIC
<ul style="list-style-type: none"> <li>—collective</li> <li>—increasingly quantitative</li> <li>—scientific</li> </ul>	<ul style="list-style-type: none"> <li>—constructive</li> <li>—creative</li> <li>—the medical art</li> </ul>

This diagram has one added value. It emphasizes that multiphasic screening alone is valueless, until it is combined with the creative practice of the physician's art, for which there is no replacement.

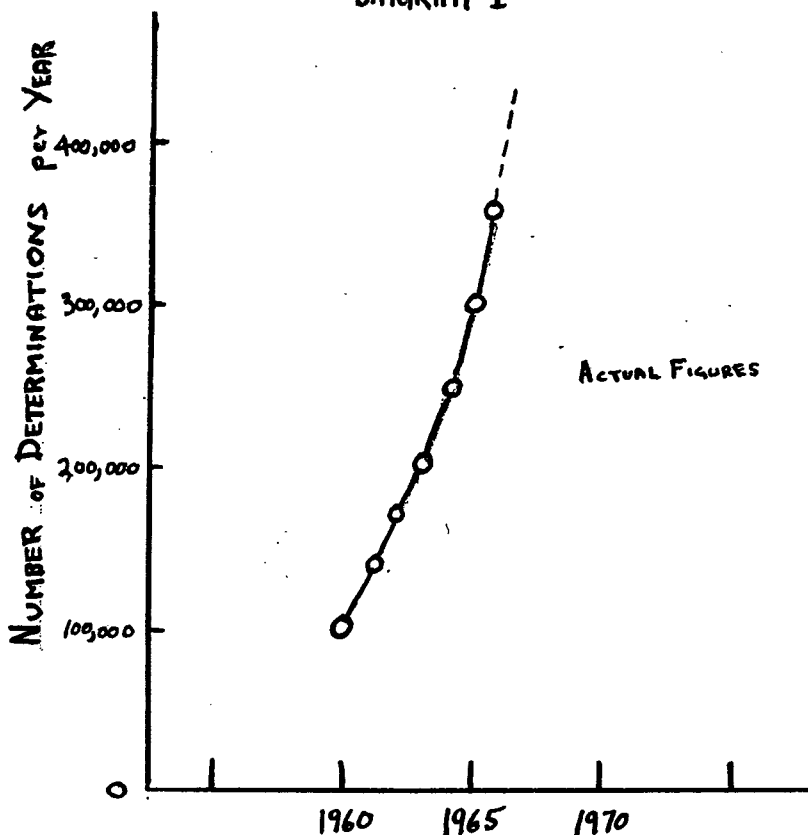
## CLINICAL CHEMISTRY—A KEY EXAMPLE OF QUANTITATIVE LABORATORY EXAMINATIONS

"Mr D. weighs 270 lbs. and is 5 feet 2 inches tall."

The physician takes this information and compares it with a table showing the "Normal Range" of weights for men of that height, before making the judgment that Mr. D's weight is abnormal. He makes similar judgments about the concentration of the nutrient "sugar" in the blood, the concentration of the waste product "urea" in the blood, the amount of the waste product "acid" in the urine, spinal fluid, sweat, and almost any other material which can be obtained as a clinical "sample." The results give invaluable medical information. The task of analyzing such samples to obtain numerical values of amount or concentration is called "Clinical Chemistry."



DIAGRAM 1



Such information is of increasing value to the field of medicine, judging by the rate at which requests to Clinical Chemistry Laboratories, have risen in the last two decades, principally for the analysis of blood and urine. Diagram 1 shows the trend in my own laboratory since 1960. The increase, observed all over the country, shows no sign of abating. It is a crucial part of the trend in modern medicine toward becoming more scientific. This statement is certainly borne out by the widely accepted definition of Lord Kelvin, "A science is that which describes its subject matter quantitatively—that is, in numbers."

It would have been wholly impossible for the clinical laboratory to keep up with this trend, and we would not be here today discussing multiphasic screening except for the vision and genius of the chemist in one of these overloaded laboratories, Leonard Skeggs. Professor Skeggs, to solve the overwhelming problem he saw, invented a new form of analytical chemistry. This was an awesome feat—in my opinion, of Nobel Prize proportions. His invention, continuous flow automatic analysis, after years of developmental work by the Technicon Corporation, forms one of the most dramatic stories of the modern scientific industry. To quote Dr. Skeggs,<sup>2</sup>

"As a biochemist in an overburdened clinical laboratory, I was acutely aware of this problem and conceived of a completely automatic method of continuous analysis. The idea was quickly put to the test. A fully functional model was constructed which determined urea and glucose in blood accurately and automatically. Several discouraging, unsuccessful attempts were then made to interest companies in manufacturing the equipment.

<sup>2</sup> Preface to: *Automation in Analytical Chemistry*, L. T. Skeggs, Jr., ed., Mediad, N.Y., 1966.

"Finally, in 1954, the Technicon Instruments Corporation undertook the project. After three years of difficult research and development work, the AutoAnalyzer was introduced. It has, of course, been very successful.

"The success of the method is not due solely to the fact that it is an easier, quicker, and more economical way to conduct an analysis—. The automatic, continuous flow method of analysis has certain inherent advantages which permit results to be obtained and experiments to be conducted that are either very difficult or simply cannot be performed by other methods."

In continuous flow analysis, samples of blood from different patients flow one after the other down a conduit tube, and are treated by any or all of the standard techniques of chemistry while passing by. One great advantage of the method comes from the ability to divide the flowing stream into two or more new streams and to perform separate chemical measurements on the original sample in each part. Thus we see today an instrument which takes a teaspoonful of blood and quite automatically performs twelve complicated chemical analyses on it, recording the results on graph paper in directly usable form. To quote Dr. Skeggs again.

"The chemical graph" of the serum thus produced is much more informative and descriptive than the usual group of blood tests for one, two, or three constituents which are usually performed by the older manifold methods, and is sure to be of great assistance to the physician in the diagnosis and treatment of his patient."

The tremendous practical success enjoyed by continuous flow automatic analysis has stimulated others to automate standard methods of analysis (generally termed batch processes) in which the samples are treated discretely in separate containers rather than continuously. The Robot Chemist is such an instrument, now in early production stages, the Hycel Mark X is promised as another. If these instruments prove successful as has the Technicon AutoAnalyzer they will be extremely valuable additions to the field.

(Plans for the hearing include demonstration to the committee of a Technicon SMA-12 instrument performing simultaneously twelve different determinations, thus producing 12 numbers per patient which have clinical significance and a Warner Chilcott Robot Chemist, performing a determination of enzyme activity the numerical results of which are valuable in the diagnosis of certain heart conditions. Printed descriptions of the Hycel Mark X are also available.)

The changes in clinical chemistry produced by automation in the last decade can best be expressed as diagrams. These show in rough but meaningful figures not only the trends of the last 10 years but the probabilities for the next ten, because unlike the stock market the lines tend to keep going, up or down.

DIAGRAM 2

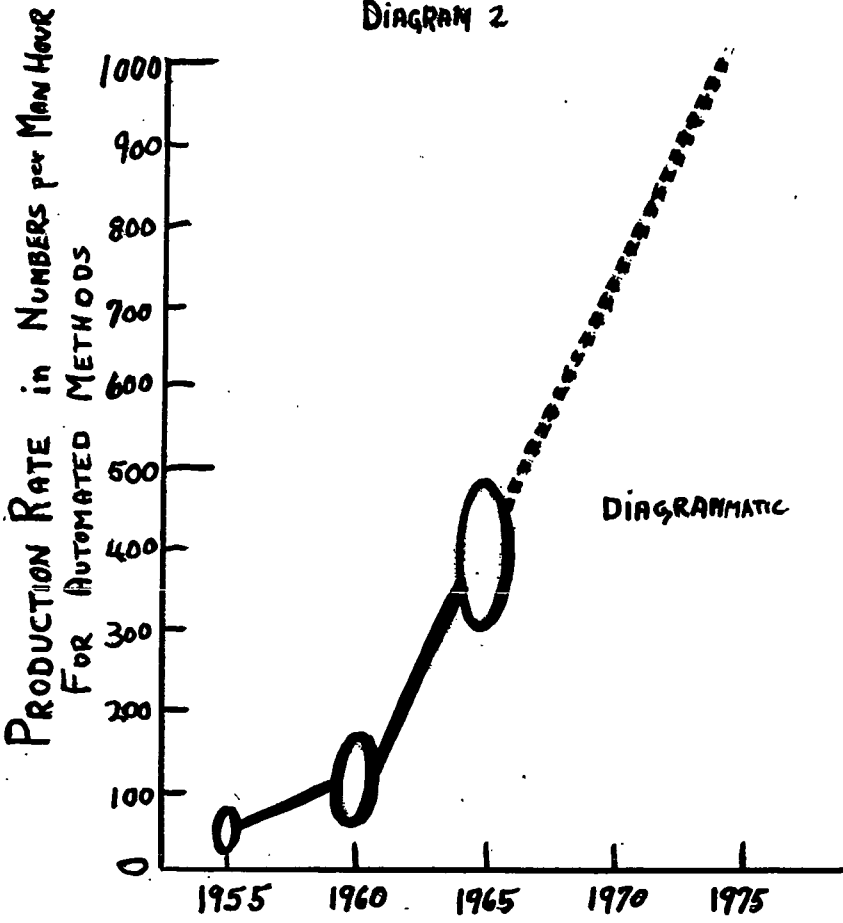
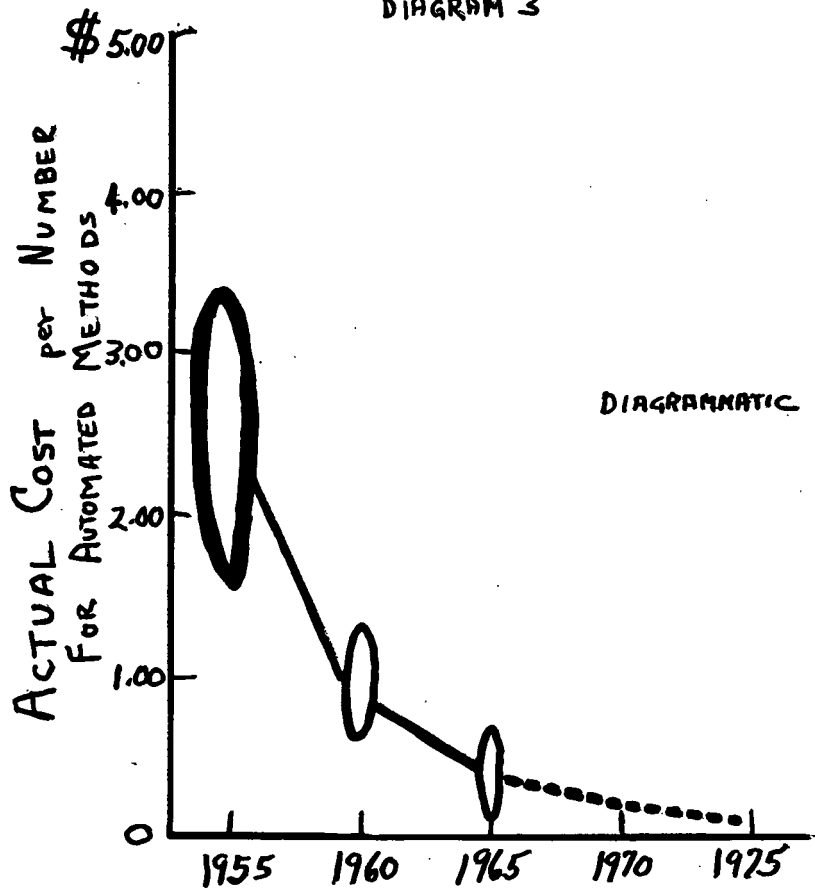


DIAGRAM 3



DIAGRAMMATIC

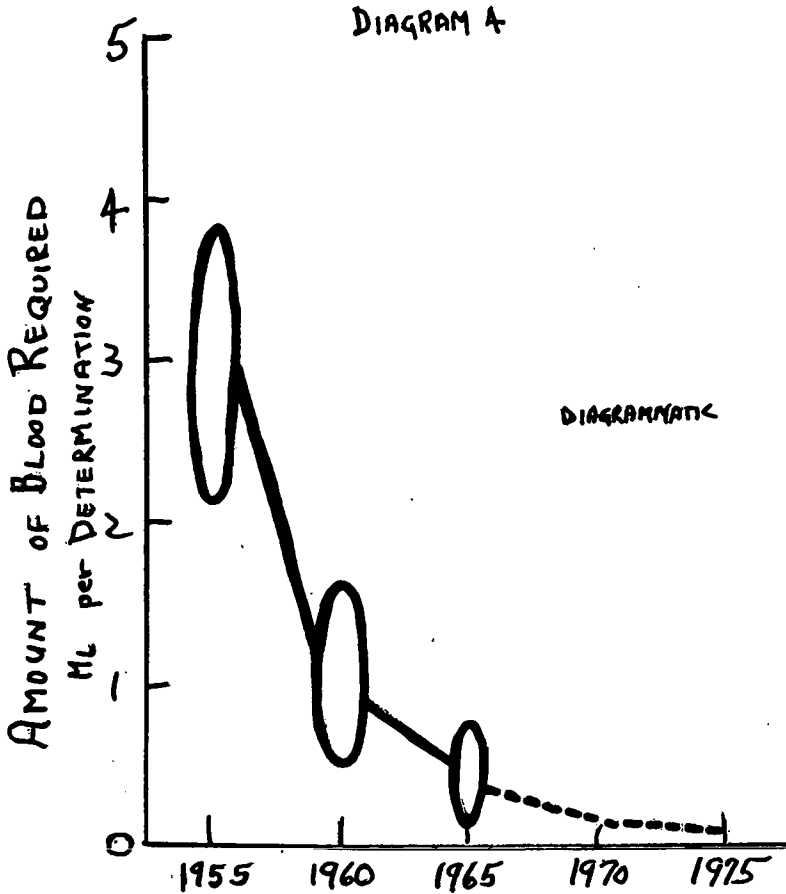


Diagram 2 shows the increasing amount of information one chemistry technician can provide per hour, using the automatic method. The number is very large and will increase farther. Today we have instruments that turn out 300 to 500 useful numbers per hour. Tomorrow or next year it may be 1,000 or 2,000. Computers of one sort or another are essential in handling the data.

Diagram 3 shows the drop in the actual cost of the information as automation improves. Man hours are the big expense. So a determination that cost several dollars to perform 10 years ago, today or tomorrow might cost as little as a cup of coffee, or a telephone call. It will decrease further.

Diagram 4 shows the amount of blood needed for this type of work. Getting enough blood used to be a problem. It is no longer a limiting factor in all but special cases, such as children. It will continue to decrease.

The vexing problem of automatically identifying the sample belonging to each patient and keeping the many samples straight has been recently solved in two different ways. The IBM company has just announced a new "1080" system which accomplishes this feat while reading and monitoring AutoAnalyzers, by special punch cards and hardware. The Kings County Research Laboratory, a pioneer in the field of providing low cost automated computerized determinations to physicians has also succeeded but by a slightly different approach. This independent laboratory appears to be by far the most advanced in the application of online computers to automated quantitative analytical equipment, and in offering screening services at minimal charges. They have demonstrated how computers can detect and even correct certain types of instrumental errors. Just as the

Internal Revenue computers make cross checks to catch tax evaders so also can computers be used to guarantee close to perfect analytical accuracy.

Sample stability has been a difficult problem. Blood is notoriously unstable. Immediately after it is drawn the cells begin to react with the fluid part, the plasma, and change it. Separation of cells and plasma prevents this, but exposure to air and airborne bacteria causes other stability problems. The Kings County Research Laboratory, has recently developed a sealed-system procedure for collecting stabilized plasma samples. (A demonstration is planned.) Preliminary data show negligible change of very sensitive constituents, even upon sending such samples through the mail.

Therefore, with respect at least to Clinical Chemistry, one can state that *multiphasic mass screening is a present possibility, not a future dream*. In fact it has been performed in a number of places for several years—the Academy of General Practitioners Exhibit at the American Medical Association annual meetings, the Permanente Foundation of California, the Kings County Research Laboratory, the Swedish province of Varmland, and others I am sure.

At least five separate studies have demonstrated that multiphasic screening is medically valuable. In a controlled study at Duke University Medical Center a battery of 11 common chemical determinations provided unexpected information which proved of significant value to the doctor in diagnosing or treating one patient in every 20. The unexpected abnormalities observed were roughly equal in number to those expected.<sup>3</sup>

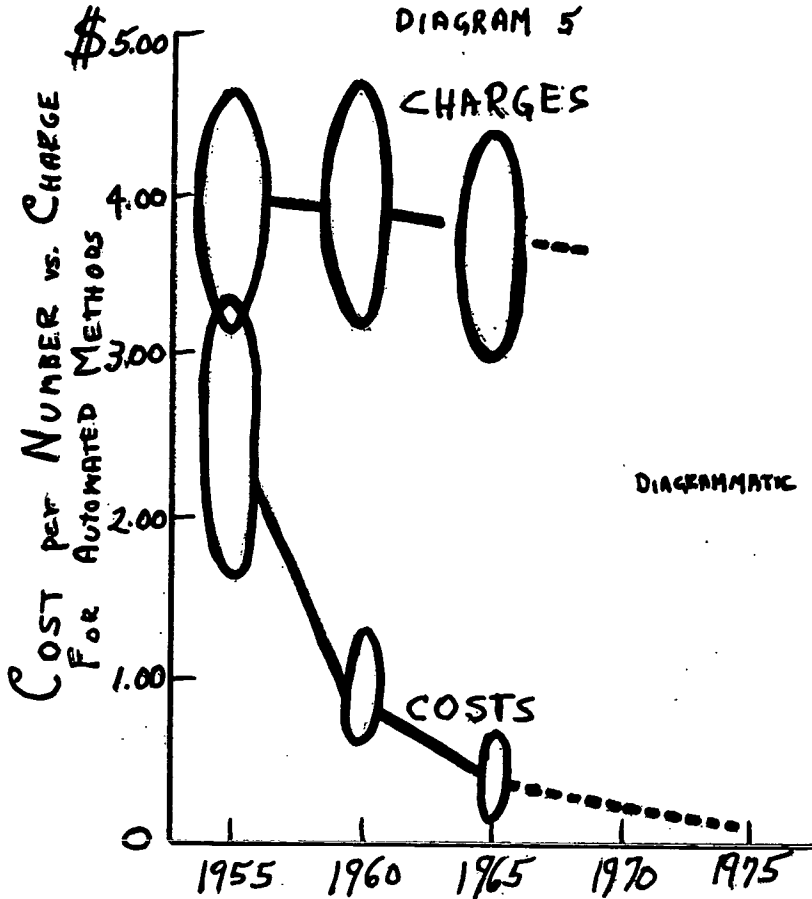
There is said to be strong opposition in some quarters to the idea of multiphasic screening. I have never heard such opposition from anyone who has been associated with a screening project or its service. In evaluating multichannel screening one must compare the value of the information to the physician with the cost of obtaining the information. The cost per number obtained has dropped far and fast, and I believe it will continue to do so, until no practical excuse can be found for not screening.

However, it must be emphasized that the increasing utilization of quantitative laboratory service will rise, not fall, as will the technical manpower to carry it out. One must therefore understand that a desire to advance medicine and serve the patient better is the sole supportable motivation for mass screening. Service will be greatly increased, unit costs will be greatly decreased, overall costs may be expected to rise. But this will rise slowly compared to the very rapidly increasing services provided.

#### PROBLEMS FACING MULTIPHASIC SCREENING

If multiphasic screening is "here today", why must there be a hearing on screening? Why is it not in full flower, offered by medical centers and hospitals, across the country? Four factors stand directly in the path of the advances described above—they are serious problems which must be faced squarely.

<sup>3</sup> "Profile of Admission Chemical Data by Multichannel Automation: An Evaluative Experiment," *Clinical Chemistry*, March 1966.



I. Multiphasic screening threatens the current charge structure of medicine. All diagrams above referred to true costs per determination. Diagram 5 shows the relationship of true costs and charges-to-patients in rough average form, also on a "per determination" basis. A patient may today pay five dollars or more for a determination that now costs fifty cents or less to perform.

The public cannot afford multiphasic screening at present charge rates. But there is understandable reluctance in some areas to changing the cost-charge relationship. This is a serious problem. For example administrators of non-profit medical centers point out that the money lost by lowering laboratory charges would have to come from some other source.

However, there are even deeper and more serious aspects of this problem. When charges are so far in excess of costs that improved service cannot justify increased charges, then there is no motivation for improvement, except the dedication of those right on the "firing line" in the laboratory. Since the excess over costs is almost invariably used for purposes other than laboratory support such dedication rapidly wears very thin. Laboratory budgets remain wholly inadequate as needs increase. As a result, the American patient today gets, in the main, mediocre-to-poor quantitative laboratory services. The committee of physicians referred to above expressed it as follows: " \* \* \* many serious analytical errors are made. For economic reasons, duplicate determinations usually are not feasible, and mistakes sometimes can be very serious for the physician and the patient. \* \* \* There are almost never enough laboratory services to fill all needs. If the laboratory seems to have enough time for its work, this may well be an illusion. First of all, most clinical chemical laboratories have not had time

for many years now to perform analyses in duplicate and to include knowns or controls, so that these ideals have almost been forgotten.

"\* \* \* Also, present financial arrangements in hospitals are frequently inherently incompatible with good results. Probably because clinical laboratories for many years made mostly the less demanding qualitative observations and few of the present quantitative chemical analyses, the support of both technical and supervisory personnel has always lagged far behind \* \* \*"

II. Multiphasic screening threatens to cut across present disciplinary lines and administrative arrangements. The "fire power" of the instruments we have today is tremendous. Tomorrow's will be greater. These instruments do, for example, a hemoglobin measurement on blood without regard to the particular specialty which happens to be responsible for hemoglobin analyses in any particular hospital.

To date multiphasic instruments have not been able to break these barriers. One sad result is gross underutilization of the 12 channel instruments now in use. They are most accurate when fully employed. The installation I know best, capable of about 300 determinations per hour, has averaged 64 per hour. I know of three specific cases where offers of service and cooperation to other institutions or groups, at or below cost, has met with flat refusal. The other body desired the prestige of owning the equipment, or had too inflexible a charge structure, or both. This I am sure, is a widespread pattern.

III. Multiphasic screening threatens precedent. It is easy to point out that the performance of quantitative laboratory measurements is *not* the practice of medicine and therefore need not take up the time of physicians. However, certain groups maintain that the conduct of all laboratory examinations *is* properly a part of the physician's practice and the American Medical Association has passed a resolution supporting this stand.<sup>4</sup>

The confusion may be dispelled by distinguishing between qualitative judgments and quantitative (numerical) statements. "That man is overweight", is a qualitative statement which is in fact a clinical judgment and which would be taken very seriously only if made by a physician. The statement "That man weighs 270 lbs. and is 5 feet 2 inches tall", is a quantitative statement. It is not a clinical judgment. The person who made the weighing is best qualified to make the statement. The physician who hears the statement can make a clinical judgment, but it is a waste of his time to make the weighing. Although he could, of course, make the weighing accurately, one must face the obvious fact that the physician is at best poorly trained to operate complex chemical equipment such as multiphasic analyzers, or even to judge and supervise their operation. If he insists on operating them he wastes his training. If he insists on supervising them he cannot obtain top grade chemists—they will not work under such a supervisor.

Quantitative measurements can be made with complete objectivity. Clinical judgments cannot. Any physician who believes that his subjective clinical judgment is the best monitor of the accuracy of a laboratory which makes quantitative measurements has a sick laboratory. The illness is probably due to scientific and financial undernourishment. Most hospital laboratories in this country today suffer from this malady (in spite of the large income they bring in), and do make serious mistakes. My own is no exception. The malady is aided and abetted by the willingness of the physicians to ignore errors, relying on their clinical judgment. But sick laboratories, monitored by clinical judgment, fail the physician worst when he most needs them—when he is wrong.

Top grade analytical chemists are being trained by modern universities. But they and their teachers have kept away from the clinical field for so long (largely because of the above attitudes) that they are unaware of its importance. In general, chemists and other scientists are asleep to their responsibilities in this field. If multiphasic screening is to succeed they must be awakened. Special training programs for chemists are in order. There are now fewer than 1,500 trained clinical chemists in the whole country.

Scientists must be provided with the tools necessary to perform with complete reliability. They must learn to accept full responsibility as assistants to the medical profession. The physician must allow the scientists to accept responsibility and must not insist upon retaining responsibility which they are not trained to discharge. (Scientists are defined here as those who describe what they do in numbers.)

<sup>4</sup> Bulletin of the College of American Pathologists 15, 136-7, Oct. 1961.



IV. Multiphasic screening requires a body of highly accurate data on normal ranges, standards, quality control methods and other chemical considerations which simply does not exist today. Unless expert chemists pick up the challenge in large numbers these basic gaps will remain to diminish the effectiveness of multiphasic screening.

#### CONCLUSION

As stated earlier, multiphasic analysis is not a futuristic dream. It is here today. In spite of the four stumbling blocks discussed above, I believe multiphasic screening will progress rapidly, break down the barriers, and lead to a new era in medicine. I envision the quantitative clinical laboratory of the future as a tightly integrated group of non-physicians, operating highly technical, automated, multiphasic computerized equipment to produce completely objective data of the highest possible quality (and therefore value). I see the need for a group of collaborating medical specialists, not supervising as experts in clinical chemistry or any other number-producing science but as true experts in what these numbers mean to the doctors with whom they consult and to the patients whom they observe. This will be scientific use of scientists and medical use of physicians. When this new era comes the laboratories will no longer be mediocre but excellent, and the physician, relieved of the wearisome routine burden of the analytical part of medicine, can concentrate on the rewarding synthetic part—early diagnosis and effective treatment.

Dr. THIERS. I feel very strongly about this subject. I think that the laboratory is the doorway to the exciting eras of medicine of the future, and I think that mass screening is the key to that door. But I think that if multiphasic screening is going to be effective, we are going to have to define it carefully and define its purposes, because there is opposition, and there are problems.

It can be defined very simply. If I may refer to this chart again, the first five items on this chart form what I call the analytical part of the medical procedure—the complaint, history, physical examination, tentative diagnosis, and laboratory examination. The last two, final diagnosis and treatment, are the synthetic part.

I think that multiphasic screening has as its goal, performance of those examinations and procedures of the analytical part which can be done quantitatively, which can put into numbers for computers, which can be done by nonphysicians in order to save physicians' time, which is after all the goal of this, and in order that the results can be presented directly to the physician for the synthetic part, the diagnosis and treatment.

Medicine is becoming far more quantitative and scientific as time passes by, and both the results and the cause of it is shown in the next chart, which illustrates the workload of my own laboratory since going to Duke University Medical Center in 1960.

We pass around in the field numbers like, "The laboratory's work is doubling every 5 years." My figures don't agree. In my laboratory the workload has tripled in the last 5 years. Because of this rapid increase I don't think we would be here today talking about multiphasic screening, I think laboratories would have gone out of business long ago, except for the work of Leonard Skeggs. He is a chemist who, in 1954 or thereabouts, was supervising an overworked laboratory, suffering from this same growth phenomenon, in the Veterans' Administration system in Cleveland, Ohio. And seeing this trend very clearly, much more clearly than most of us saw it at that time, he took the action of simply inventing a new form of analytical chemistry. This was quite a feat.

Ordinarily analytical chemistry is performed in what I call batches. You have a series of test tubes. You put a sample into each test tube,

put a reagent into each one, heat the lot of them, put more reagents into each, filter and so on. It is a slow painstaking process and, for example, 1 person might take an hour to find the concentration of sugar in blood samples from 20 patients.

The instrument invented by Dr. Skeggs does continuous flow analysis. It places the samples into a tubular conduit, one after the other, Indian file, and does the performance of all the techniques of chemistry as they pass by, inside the tube. On the flip chart here we show heating, reagent addition and color measurement.

Let's say this yellow color shows the proportion of sugar in the patient's bloodstream. The light here looks at that color and measures it on a photocell, which makes recordings on a chart, and the heights of these peaks (the distance to the left) indicates the concentration of sugar in the blood of successive patients. As the samples pass by, the recording is made, and so this is patient No. 1, No. 2, No. 3, and so on.

Now, one tremendous bonus of the continuous flow analytical system is that one can split the stream. And this is where the toughest nut of all in laboratory medicine, namely clinical chemistry, got cracked. Because when the stream could be split, you could do a sugar analysis on one of the tributaries by treating it by one technique, but you can treat another tributary by a different technique, and do an analysis for urea, for example. And you can treat a third tributary by a third technique.

As shown here, the sample in that tributary is being sprayed into a flame. By that I recognize that this is a determination of sodium or potassium. Again, the results can be put on a strip chart.

The instrument shown here today splits the stream 12 ways. And from one sample of blood serum about the size of a teaspoonful it does 12 different determinations simultaneously.

This has meant a tremendous amount to clinical chemistry and in the long run to multiphasic screening. As shown in the next chart, it has taken the output of one technical person which in 1955 was between 10 and 100 determinations per hour (these blobs indicate how rough the data are), and raised it rapidly.

In 1960 it was up to between 100 and 200. Today one technician can turn out 300 to 500 numbers per hour. And it doesn't take a crystal ball to see that in another 5 years or a decade these machines will be turning out a thousand or 2,000 numbers per hour.

These numbers are used directly by physicians. For example, if I say Mr. Smith weighs 270 lbs. and is 5'2" tall, this is a number. But a physician takes that and compares it with the normal range of weights for men of Mr. Smith's height and comes up with the clinical conclusion that Mr. Smith is overweight. In this case the conclusion is fairly obvious. But the clinical judgment that Mr. Smith is overweight should be taken seriously by Mr. Smith only if made by a physician.

The production of such medically valuable numbers has increased tremendously. And equally significant, since personnel costs are the highest costs in production work—and this is number-production work—the cost of these determinations, as Dr. Caceres pointed out, has decreased tremendously, from the \$2 to \$5 range in 1955 until today or tomorrow each of these numbers is going to cost about the same as a cup of coffee or a telephone call.

So, multiphasic screening, in my opinion, is not a futuristic dream. It is here now.

There are two other technical problems, which have recently been solved, which make it feasible. One is sample identification. When you start doing a thousand determinations, an hour or 2,000, it is awfully hard to keep the patients straight.

As Dr. Slack pointed out, the patients sometimes even come into the hospital under one name and go out under another. In fact, we have on one occasion had two patients in the same room with the unusual name of Heatherborough and the same first initial. So, patient identification is a difficult problem. But computers have solved this, in two different fashions. The IBM Co. has just put out a new "1080" system, in which by redesign of the punchcard and the development of some special hardware, the blood sample is identified as soon as it comes out of the patient's arm and that identity is maintained automatically until the results are printed. It is important, in my opinion, to realize that in the most elegant way of handling multiphasic screening, the results for ECG, spirogram, history, and everything, could come out ready for the doctor in integrated form on the same sheet, all with automatic identification and collation.

Another problem is sample stability. Both the identification of samples and the sample stability problem have been solved by the King County's Research Laboratory of New York City in a rather different fashion. This laboratory is one of the pioneers in providing low-cost, automated data to physicians in that area. The problem with blood stability is that the minute you take blood from an arm; the cells and the plasma begin to react together to change the composition. You can separate the two by centrifugation, as shown here, and pouring off the upper layer, which is the part we are always interested in analyzing. But the minute you open the tube, you get problems with the fact that there is loss of some parts of the sample to the open air. Bacterial contamination is also a risk. So that stability is a problem.

A technique has been developed, which uses a sealed system. By using a vacuum tube, which has a preservative in it, and a double-ended needle, one can take the clear plasma off the top of the cells. (It is not as clear as it should be, because I carried it up here in my pocket and it got slightly mixed again.) But you see the principle.

Everything is disposable except what you want—a sealed sample of stabilized plasma. Tests have shown that this can be shipped through the mail, and 7 or 9 days later the most sensitive constituents are still there, in the original concentration. So that the geographical problem has been solved. Blood can be kept stable for clinical chemical analysis.

There is no other "fundamental technical problem" that I can see. We should be using multiphasic screening far more than we are today. Multiphasic screening is at its best when it is most widely used. I think multiphasic screening centers, such as we have been talking about, should apply not only to the elderly, but to hospital in-patients, out-patients, and to the normal person, young or old. If so, why then do we find it in places like King's County Research Laboratory (an independent laboratory which is not in the best reputation among certain physicians, although among those I have met, who have checked its

accuracy, it has a very high reputation), Permanente Foundation, another independent institution, Technicon Corp., the Swedish Government—why are American hospitals and medical centers not leading the way?

There are a number of problems, two of them most serious. These are subtle problems, and in my opinion they stand squarely across the path of success in multiphasic screening.

The costs I was talking about in the previous flip chart were the real costs. Unlike them the charges to patients have not fallen dramatically with time.

This is a pattern which has had serious effects on the laboratory for many years and now stands in the way of multiphasic screening. Think of it a moment. If someone is being charged \$5 for a laboratory determination that really costs 50 cents, and if the difference is not going to the support of the laboratory, then there is no motivation for improving the services of the laboratory. Why? Because if you improve the services; there is no reason, and no excuse for increasing charges; they are already too high. Then there is no motivation for improving the services in the laboratory except the dedication of those right on the firing line in the laboratory. What effect has this on the laboratory? Well, the technicians and people right on the firing line, who have a great deal of dedication, find that that dedication wears very thin after the hospital has added 10 percent more beds without changing the size of the laboratory, or its budget—for about the fifth time.

The net result of this—and I can't state this too strongly—is that, at least with respect to clinical chemistry which I know best, the laboratory work done for patients today is mediocre to poor, in a country where the technology can provide excellent services. This statement may not apply to any service except chemistry; I don't know. Application of the "Rule of 13" makes one suspect that it does apply in other services. You know the rule, "If a clock strikes 13 times, the 13th chime is not only incorrect; it casts doubt on the other 12. So it may be a wider pattern than just chemistry."

A second thing standing in the way of multiphasic screening is the confusion on the part of many people, including the medical profession, between quantitative data and qualitative data. I say Mr. Smith weighs 270 pounds and is 5 feet 2 inches tall. That is a quantitative statement. It is expressed in numbers. If I say Mr. Smith is overweight, that is a qualitative statement. The latter statement is a clinical judgment. It can properly be made only by a physician.

The former statement, "the man weighs 270 pounds and is 5 feet 2 inches tall," is a quantitative statement. It can be made best by the person who did the weighing. Of course, the physician is perfectly capable of making an accurate weighing, but in all honesty physicians are not trained and are not interested in operating equipment like the complex gear we see here today.

If the physician does operate this equipment, he is wasting his training. But the American Medical Association has passed a resolution, saying that the conduct of laboratory examinations is the proper responsibility of physicians, and implying strongly that it is the practice of medicine.

Physicians are not trained in medical school to perform careful quantitative determinations. This is the area of chemists, physicists,

engineers, et cetera. If a physician insists on operating these instruments, he is wasting his training. If he insists on supervising that operation, he will not get top-flight chemists, engineers, or physicists to work under him. They won't work under that kind of supervisor. The result is that the excellent chemists, physicists, et cetera, being produced by our universities of today, have for many years kept away from the clinical service field and by now have forgotten it. They are asleep to their responsibilities in this area.

Unless they are made to understand these responsibilities, and unless the confusion between quantitative and qualitative which has produced this unreasonable attitude is changed, they will remain asleep. I think training programs are in order for chemists, physicists, engineers, to wake them up to their responsibilities in this area and to teach them best how to discharge them.

In spite of these and other serious problems, which explain the reasons that multiphasic screening is seen in independent laboratories, et cetera, instead of where one would expect to see it, in large medical centers—in spite of these difficulties—I think multiphasic screening will go ahead and break down these barriers. It must. It is logical.

But we must understand that the real motivation for multiphasic screening is not that it is less expensive, because it will not cost less. It will just increase the service. The manpower required will not decrease. The service will increase tremendously. But the goal, I think, will be reached and reached very shortly; namely, the goal of providing to the physician, by the most competent people to do it, all of the information that can possibly be obtained for him in the analytical part of the procedure. I believe this will lead us to a new era in medicine where the physicians can concentrate on those parts of the field that are most rewarding to them and best fit their training—diagnosis, and treatment—which is the goal of it all.

I would like to discuss the two instruments on the right-hand side of the room, and if the member of the committee who is here would like to come down closer to it, we can do it far more easily.

Senator NEUBERGER. I keep worrying that a bell will ring any moment and we don't want to interrupt.

Now, what are all of these (pointing to lights on the control board)?

Dr. THIERS. This indicates which of the steps is in process at any given time. All systems are "go," as they say, as indicated by the bottom series of lights. This shows how quickly an analysis can be made. In this case it is 30 seconds.

This is the machine I have spoken about, which is today's ultimate in multichannel, continuous-flow analysis. You are pointing to the heart of the system now. Under your hand is a pump which moves the liquids through the various tubes. The samples are actually being picked behind you, here. Each of these is from a different patient. The sample moves through this tube, and then divides into different streams at this point. There are more than a dozen reagents involved in these 12 tests, and a wide variety of different procedures is being carried out. For example, this device removes interfering substances from the samples, things that make the tests impossible. And all of these streams then converge on the measuring device, a colorimeter, after having been treated, and passing through coils which time the reaction. Each of these different colors is a different reagent producing a color which can be measured later on and which indicates the concentration.

Senator NEUBERGER. How much blood serum does it use? Dr. Thiers. The amount of blood used can be seen by the amount, a little less than a teaspoonful.

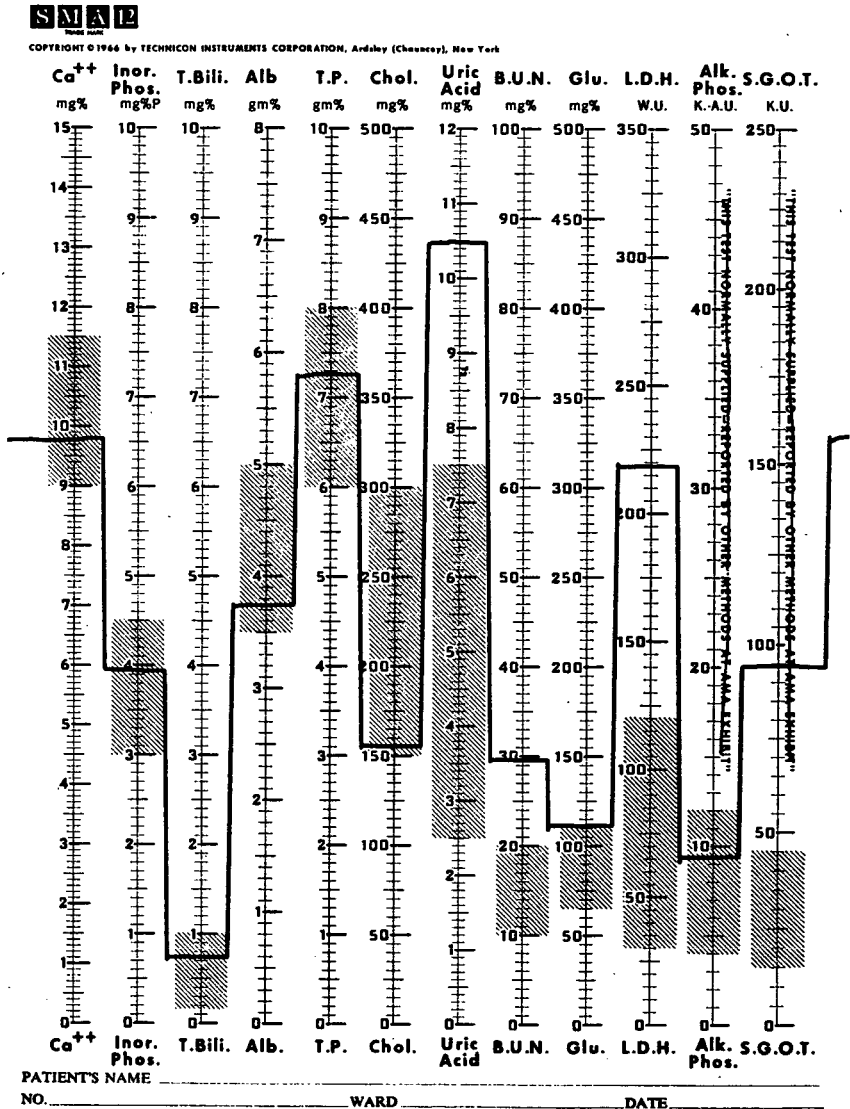
All of these then pass into that device, which measures the results of the reaction.

Senator NEUBERGER. Like telephone wires in a dial system.

Dr. THIERS. There are real analogies to what you see here and the wires of telephone exchanges.

The results are printed up as a line, here, across a chart. Here is an example of this chart.

The chart is as follows:



This can be sent directly to a physician, and the horizontal position at which a line crosses the calcium scale, for example, tells the physician that the calcium value in the blood of this patient is 9.8. The gray area indicates the normal range, so that, as you can see, this calcium is in normal range.

The inorganic phosphorus is also in normal range, but uric acid is not, and is quite high, as you can see. There are 12 different important chemical determinations being made here. All 12 come out on this one sheet.

They are then printed out here in a form suitable for putting into a computer.

Thank you, Senator Neuberger.

Senator NEUBERGER. We have certainly appreciated the wonderful demonstrations we have just seen.

We are trying to keep the program on schedule, and we have a number of witnesses yet.

I believe Dr. Lester Goodman is here and will be our next witness.

Dr. Goodman is Chief of the Biomedical Engineering and Instrumentation Branch, Division of Research Services, National Institutes of Health, here in Bethesda, Md.

Dr. Goodman will be the last witness before we recess for lunch, and I would like to resume the committee as early as possible after just an hour's recess, and plan to come back about 1 o'clock, because the Senate will be having a number of votes this afternoon, and it may be necessary for us to interrupt.

So, after Dr. Goodman we will take a brief recess until 1 o'clock and we can pick up with the scheduled witnesses.

**STATEMENT OF LESTER GOODMAN, PH. D., CHIEF, BIOMEDICAL ENGINEERING AND INSTRUMENTATION BRANCH, DIVISION OF RESEARCH SERVICES, NATIONAL INSTITUTES OF HEALTH, BETHESDA, MD.**

Dr. GOODMAN. Madam Chairman, the testimony presented this morning and yesterday has discussed the problems of medical diagnosis and prevention. The needs of multiphasic screening and early detection of disease have been well stated. Certainly the need has been justified and estimates of the ultimate benefits have been made. It has been reiterated in the comments and vividly displayed by demonstrations that technology has a very important key role to play, not only in multiphasic screening and diagnosis, but in the entire practice of medicine.

What I would like to attempt here is a brief description and characterization of technology, in some basic, somewhat abstract terms, and to examine its interrelationships with the field of medicine. Comments pertinent to fields of medicine, such as surgery, therapy, and diagnosis, certainly have great bearing on our immediate focus on multiphasic screening.

The format that I have adopted is illustrated by table 1 of my prepared statement.

The purpose of technology in medicine is to provide tools to perform medical tasks. For sake of brief perspective, I have arbitrarily parti-

tioned the domain of "technology" into five mutually intersecting categories: measurement, analysis, control, energy, and structures.

Medical tasks, similarly, is divided into three parts: diagnosis, surgery, and therapy.

Measurement is interpreted as the observation and interpretation of the state of a system, for example, size, color, temperature, and so on.

Measurement includes quantification, conditioning, transduction, transmission, recording, and display.

Analysis, here, is interpreted as the search for interpretation of relationships among the phenomena that constitute a system and its behavior.

The tools for analysis include fundamental physical principles, formal mathematics, statistics, logic, simulation, computation, and so on.

I point out that analysis usually follows measurement.

Control, in this context, is interpreted as a deliberate course of action to influence a system such that its behavior is restricted within prescribed bounds.

Measurement necessarily precedes control. Control usually follows analysis.

Energy appears to be an entity that enables change among the elements of the universe. The energy state of a system is transformed whenever a change in relationship among its elements, that is, activity, occurs.

In a sense, the fundamental concern of all technology is the appropriate conversion and application of energy to suit the purpose of men.

Structures are the physical entities, natural or derived, via which energy is stored or transformed. The term used here incorporates both the physical and chemical properties of materials and the design and construction of devices.

Medicine: Diagnosis is concerned with detecting incipient or manifest disorder in the individual or the community and recommending a course of action that will tend to prevent, alleviate, or correct the disorder.

Instruments are now available for nearly all diagnostic indexes presently specified as useful by the medical profession. Pertinent data can be acquired, quantified, and treated almost anywhere reliably and conveniently.

We have seen a dramatic demonstration of that this very morning.

It has also been mentioned, and I will iterate, that there is a need to enhance the speed, accuracy, precision, and economy of treating these measures, and extend their application to a community-wide basis.

I would point out that technical feasibility for large-scale diagnostic instrumentation systems is established. The major question remaining is concerned with the allocation of resources to accelerate development.

In short, almost any specified measurement can be made, and there seems to be no practical technical limit to what can be measured.

The situation regarding analysis cannot be spoken of with as much confidence: Analysis of medical measurements and their significance is an area where our abilities are severely constrained.

One basic reason is that medical science and physiology have not yet established a set of pertinent physical principles analogous to, or expressible within, the fundamental principles of the physical sciences. Indeed, it is not clear when or if such can be accomplished.



Further, the most advanced available formal mathematics and logic are far from adequate in treating the enormous complexity of the living system.

Nevertheless, there is great promise for the future, and the search for more efficient methods certainly deserves encouragement.

Analysis is one area where technology has considerable potential for contribution to medicine.

With due respect for the great store of knowledge and skill of the medical diagnostician, it must be said that his training and methodology are fundamentally based on empiricism. Interpretations and conclusions regarding physiological phenomena are almost exclusively descriptive and comparative in terms of a literal or figurative "handbook."

Engineering analysis, as developed over the past score or more of years, has made great strides in transforming the "handbook" engineering of a few years ago; and the enlightened exploitation of the engineer's experience can, I believe, help provide the same for the practice of medicine.

Control in the terms suggested above cannot now be effectively performed, since its precursor, analysis, is as yet inadequate.

To say that no control is being practiced would obviously be a gross error. However, that which is currently applied is almost exclusively empirical and quite primitive.

A great deal of research and development in both medicine and technology is required before analysis and the subsequent control that we seek can approach the sophistication of their counterparts in the practice of modern engineering.

Energy in diagnosis is subject to no apparent insurmountable technical limitations. The current state of the art in the generation and conversion of energy appears completely adequate to handle practically all foreseeable problems.

Structures for diagnostic instrumentation, in terms of state of the art, are being primarily motivated by two major needs. One is the demand for miniaturization of devices.

The popular literature of the day is replete with examples of breakthroughs in extremely small but highly complex integrated electronic circuits. These developments are rapidly being incorporated into a variety of devices, especially those intended for implantation where they may detect and transmit diagnostic information, often by wireless telemetry.

The second is the search for special materials such as specific selective membranes for use in chemical analysis and for materials to encapsulate implants that are compatible with body fluids and tissues.

Diagnosis, usually, is associated with the single individual and his doctor. In this era of burgeoning social consciousness, as manifested, for example, by medicare and regional medical centers, there is a massive and pointed demand to extend the benefits of improved diagnosis and subsequent treatment to the entire community.

The mechanism might be technically expressed in terms of control, as interpreted above; namely, to plan and carry out a deliberate course of action to influence the behavior of the community and its environment, such that disease and its debilitating effects are prevented or minimized.

I iterate that control must be preceded by measurement and usually follows analysis.

This sequence has been acknowledged, and the beginning steps taken. The first task is to demonstrate that diagnostic indices can be obtained quickly, reliably, and economically on a community-wide basis.

The second step is to obtain the truly enormous number of measurements required to enable rational analysis.

The obvious route to effective control lies in the enhancement and extended use of automation and the electronic computer.

In addition, a sizable cadre of well-trained teams of professionals and subprofessionals from a variety of disciplines is needed.

A sound beginning has been made. Technical feasibility has been established. The decision to allocate necessary resources remains to be made. Surgery is concerned with the material alteration of the living structure to correct or alleviate a physiological disorder. The surgical arena probably provides for the most challenging effort in technology today for the tools and techniques it might supply, and it is there that can be found a number of its most dramatic contributions.

Measurement in surgery can be exemplified by the medical instrumentation found in the surgical wing of the Clinical Center at the NIH in Bethesda.

There, any one of four complex physiological monitoring and display systems can detect, condition, quantify, transmit, record and display up to 24 critical variables in a format useful to the surgical team.

It is pertinent to note that the engineers and surgeons who designed the system, which has been in operation for 3 years, acknowledge that it is still in a development phase. They are constantly involved with updating and improving its efficacy as the state of the art evolves. The effort to miniaturize sensing elements, increase accuracy, and enhance reliability is expected never to end. Research is underway to seek methods for measuring certain variables without breaking through the skin. The clutter of service paraphernalia, wires, tubes, et cetera, must be minimized. Wireless telemetry of many important physiological indices is fast approaching the stage where it can be reliably utilized. As stated above with reference to diagnosis, there seems to be no practical technical limit to what can be measured in the operating room.

Analysis in surgery is almost completely absent. The rationale for this statement follows almost identically that offered for analysis in diagnosis.

There is little need for repetition here. For emphasis, however: although it seems important that scores of measures be obtained, the question of justifying why particular sets are considered can only be answered by stating that these are the best to choose on the basis of the empirical evidence available.

Further, it is hoped that the data provided will aid the search for analytical explications of physiological behavior which might improve control of surgical procedures.

As implied immediately above, the type of control exercised in the operating room is, conceptually, quite crude with respect to what can be expected after reliable analyses become available.

It is important to recognize, however, that although control in surgery may be primitive in concept, its practice must be quick, de-

cisive, and accurate. That it is often taken for granted by the casual observer is a tribute to the knowledge and skill of the surgical team.

The state of the art vis-a-vis supplying and controlling energy for surgical tasks is completely adequate for the medical tasks commonly undertaken. There are, however, some rather difficult problems associated with the effect of power in terms of potential danger to the patient and its interference with measurement.

One case in point is a severe lack of quantitative knowledge of the body's reaction to power in terms of shock and lethality.

Also, there is no certainty regarding trauma, obvious and subtle, that may result from the effect of electrical fields.

The dangers of radiation are often present.

To date the best that can be done is based on empirical evidence. There is a definite need to seek more information to improve the safety of surgical operations.

There is also a continuous need to seek improved procedural and equipment standards for safety.

The use of powered tools in surgery is rapidly growing. In addition, the number of measurements requested by the surgical team is increasing, as are demands for more accuracy and precision.

Senator NEUBERGER. I am sorry, Doctor. We have just had word from the floor that we have a vote coming up soon, and I am going to have to interrupt your testimony.

Is it possible for you to come back later?

Dr. GOODMAN. It is, at your pleasure.

Senator NEUBERGER. I have got the other people scheduled. We are going to have to vote this afternoon, but these are things we never can anticipate.

Why don't we, then, come back as soon as this vote is over, and you can continue then, if you would like.

Dr. GOODMAN. Thank you.

Senator NEUBERGER. That will be about 1 o'clock, and then the other witnesses will follow right after that.

I am sorry to have to recess the committee at this time, but I think we will all need a little break and some lunch, and we can then pick up again.

So we stand in recess.

(Whereupon, at 12:20 p.m., the subcommittee recessed, to reconvene at 1 p.m., the same day.)

#### AFTERNOON SESSION

Senator NEUBERGER. Dr. Goodman, let us continue with you, because I am going to have to go to the floor again pretty soon.

Dr. Goodman will be followed immediately by Dr. Wagner and Dr. Swartz and others on the list.

#### STATEMENT OF LESTER GOODMAN, PH. D.—Resumed

Dr. GOODMAN. I am trying to tie together the fundamental involvement of technology in medicine. Many people are concerned with enormous, complex, and important medical systems for the future. If these people do not have a clear perspective of what the interrelationships, the virtues, and the limitations are, I fear there is going to be a good deal of waste, inefficiency, and frustration.

This is the motivation for my trying to put together this story.

We reached part way into it before the recess, and we were speaking about the role of energy in surgery. We spoke of the safety problem and also the problem of interference with measurement caused by power fields.

We can get excellent measurements through electronics. However, we are now measuring in thousandths of a volt, or even millionths of a volt. Television, radio, and powered tools can distort these measures tremendously.

The prevention of electrical interference is not yet reduced to a straightforward regimen. It is one area that demands the utmost skill of the electronic engineer.

Some day, perhaps, it may be possible to accomplish many of the procedures and goals we now seek in surgery without breaking through the skin.

Structures involved in surgery are readily apparent. The specially constructed room itself, tables, monitoring equipment, syringes, scalpels, forceps, sutures, et cetera, are familiar items.

A closer examination reveals a tremendous variety of special purpose devices that attest to the remarkable skill and art of the design engineer and instrument maker. There seems to be practically no limit to what can be designed and constructed short of physical realizability and available materials.

The state of the art in this context might be exemplified by some of the tools used in neurosurgery, such as single cell stimulating and recording electrodes with diameters of fractions of a micron. (A micron is approximately one forty-millionth of an inch.) These can be positioned in the brain in 1-micron increments.

Materials used in surgery represent an area of significant importance where new knowledge is urgently needed. Devices that come in contact with tissue or body fluids must have no damaging physical or chemical effects.

The search for suitable materials remains, essentially, in the empirical domain. However, progress in such fields as solid state physics, polymers, and surface chemistry is very encouraging.

One area of crucial importance that is often overlooked is equipment reliability and maintenance.

For example, during open-heart surgery, a heart-lung bypass machine is used. Only one is provided. Should the system fail during operation, there is not sufficient time to replace it with another unit.

Thus, backup machines are not feasible. It is noted, however, that backup surgical teams are feasible.

The ability of technology to build reliable instruments and the skill of its maintenance technicians is well demonstrated by the observation that open-heart surgery is becoming almost commonplace.

Moving on to therapy.

Therapy, quickly, is involved with corrective measures taken to remedy or improve dysfunction. Rehabilitation might be included in this domain.

Therapy is always preceded by diagnosis and may follow surgery.

Measurement in therapy plays an important role in the deterministic assessment of changes in physiological performance resulting from treatment.

Comprehensive physiological monitoring systems certainly can serve an important function for intensive patient care in postsurgical and therapeutic situations.

In almost every case, the measuring instruments used for surgery are the same as used for diagnosis and surgery.

Analysis in therapy, again, we cannot feel too confident about. Continued research soon may provide more precise predictors for the effects of a particular course of treatment, and furnish a reliable rationale for their specification.

It follows that control in therapy must be somewhat unsatisfactory, because we do not yet have efficient analysis. The recent emphasis on artificial organs, for example, has placed great stress on the need for more complete understanding of normal control processes.

Until such time as an analytical understanding of the workings of the healthy system becomes available, the best efforts to restore normal function by means of physical constructs must be far from adequate.

The present state of the art in control technology far exceeds the requirements for controlling the prosthetic devices that are specified and built today. As knowledge improves and demands become more sophisticated, the challenge will sharpen, and we in the technical community feel we are prepared to meet the task.

Energy conversion and control for most of the tasks in therapy involve conventional applications. Technology is well equipped to handle these in a straightforward manner.

The real problem lies in the specification of requirements.

Structures, here, deserve special attention. It is stated above that technology can design and build practically any specified device within the limits of physical realizability and availability of suitable materials.

The state of the art in materials is probably the chief current stumbling block to progress in medical instrumentation, especially in the field of prosthetics.

Technology is woefully inadequate in its knowledge of the physical and chemical properties of inert materials for long-term implantation within the body.

Technology and medicine together suffer from a profound lack of information on the properties of living materials, such as bone, tissue, and body fluids.

It is generally agreed that satisfactory devices for renal or cardiovascular replacements cannot be delivered until the short- and long-term deleterious interactions of inert and living media can be controlled.

Pertinent issues that remain to be resolved include corrosion, infection, thrombogenesis, protein denaturation, toxicology, and a host of others.

All of these are being studied vigorously and, though the present situation is somewhat dismal, the needed breakthroughs and subsequent positive developments can be anticipated with confidence.

There is strong justification for a concentrated program of research, development, and testing in the area of materials. This must be performed via collaboration of the best talents from the fields of the physical and life sciences together with their peers from medicine and engineering. To do less would be a disservice to the community.

## SUMMARY

Each of the regions in the technology-medical tasks grid has been considered. The attempt has been made to characterize the coordinates of the "space" and, for each intersection, assess the current state of the art, identify trends, and imply some barriers to advancement.

The approach has been, deliberately, conceptual, summary, and suggestive. Any attempt at exhaustive citation in so comprehensive a field would be presumptuous. Hopefully, it has been illuminating and provocative.

There remain several general observations and allied issues that deserve mention.

The life science researcher or clinical practitioner daily faces problems that are characterized by a degree of complexity and subtlety far in excess of those encountered in typical engineering and engineered systems.

He recognizes the rapid development of new techniques and devices recently developed by the engineer. He senses that these should be of great help to him, but he is often mystified, even baffled, as to how to take advantage of these new resources.

He resents, justifiably, the intrusion and criticism of the glib engineer with his "exact" physical laws, "exact" mathematics, and "exact" electronic computers.

The engineer, on the other hand, senses that he has much to offer the life science researcher. He resents, justifiably, the tradition and empiricism of much of life science research and its reluctance to accept what modern technology can provide.

Too often in the past has the artificial boundary that exists between the life and the physical sciences developed into a formidable barrier because of naive dilettantism and arrogance on both sides.

It has been demonstrated repeatedly, however, that impasse to cooperation and communication fades rapidly when workers identify mutual goals and become problem-solution oriented rather than pragmatic in their approach.

At present, examples of such collaborative and productive relationships are too few, but the trend is definitely for improvement, and there are no insurmountable barriers to advancement.

Recent popular literature has painted impressive pictures of some remarkable accomplishments achieved via technology and medicine. Special attention has been given to artificial organs, automation, and medical applications of exotic forms of energy.

It is suggested above, and reemphasized here, that serious workers in the field acknowledge the relatively crude nature of what has been accomplished. The very best of the new devices must be considered as temporary, stopgap measures, to be viewed with caution, skepticism, and suppressed enthusiasm.

Once more, the current position on the ladder of evolution is primitive, but the trend is highly encouraging, and the future appears limitless.

Also, one must be sobered by the realization that the full exploitation of the wondrous systems that medicine and technology can produce must be awaited with patience because of the difficulty of the problems encountered and the massive resources required.

These resources include material, money, and manpower. At present there exists a severe shortage of well-trained people at all professional and subprofessional levels to meet even the needs of today. One cannot be optimistic about the immediate future.

Little more can be said about intermediate prospects and the long-range situation except that enlightenment and decisive steps are called for now if we are to be prepared to meet the needs of the community.

A serious manpower problem now is acknowledged throughout the Nation in industry, academic, and public service where it is especially critical.

The need to seek an optimum mix of industrial, academic, and government participation is clearly established. The recipe for such a mix remains to be defined.

In conclusion, these are most exciting times in which to be a member of the scientific community. To be actively involved with the care and well-being of one's fellow is challenging, fulfilling, and rewarding. The author is grateful for the privilege.

Senator NEUBERGER. Thank you.

You refer to these screening devices which we have been seeing here today as crude devices. You mean that we are just beginning? Is that it? You don't mean to disparage their use or their possibility for the present?

Dr. GOODMAN. Certainly not. They are samples of the best available today. However, one must recognize that the systems we have seen demonstrated represent little more than straightforward mechanization of conventional techniques. Their obvious virtues justify widespread utilization today, especially in communitywide diagnosis and multiple screening. Further, these machines have helped to establish definitely the technical feasibility of what we hope to accomplish in the future. However, with regard to the level of sophistication of what might be achieved, as exemplified perhaps by the space program, these are relatively crude machines.

There is work now underway in many parts of the Nation, some of it in our own laboratories, to improve these machines, to enhance their accuracy, efficiency, and reliability, and also to reduce the volume of blood or serum required to perform these tests. And again I will point out, if I may, that the kinds of tests that these machines perform are those specified, upon the basis of empirical evidence, by the diagnostician. We, one day perhaps, will understand what these measures mean in an analytical way. And I say that one day the entire set of diagnostic measures cited as authoritative may look considerably different from what it now does.

Senator NEUBERGER. But you don't mean to say that these themselves are not a step forward from where we were 10 years ago?

Dr. GOODMAN. A crucial step of great significance.

Senator NEUBERGER. What you are saying, then, is that we should not just rest at this level, that there will be developing more and more. Is that it?

Dr. GOODMAN. We must, indeed, develop. We cannot rest.

Senator NEUBERGER. Thank you for a very comprehensive paper, Doctor. Glad to have you here.

We will now call on Dr. Wagner, who is Chief of the Bureau of Medical Services of the Public Health Service.

Do you have a paper?

**STATEMENT OF DR. CARRUTH J. WAGNER, CHIEF, BUREAU OF MEDICAL SERVICES, U.S. PUBLIC HEALTH SERVICE, BETHESDA, MD.**

Dr. WAGNER. I submit for the record, Madam Chairman, the statement, and with your permission I will summarize it.

Senator NEUBERGER. That would be very much appreciated, on account of the interferences we are having today.

Dr. WAGNER. Yes, ma'am.

I think, Madam Chairman, that the subject that you are considering is extremely timely and provocative, and much suffering and premature death could be avoided in our adult population if a way were to be found of insuring the early detection of chronic diseases.

As has been demonstrated, we have at our disposal a battery of sensitive, proven tests to accomplish this task, and our challenge that is before us now is to devise an effective means whereby the test can be applied to the adult population in such a way that the information is used, and it is provided at a reasonable cost.

The concept of preventive medicine in the field of chronic disease has been soundly endorsed not only by the medical profession but also to a limited extent by the people themselves.

For example, it is common now for every adult to urge the use of preventive medicine as it relates to a child, but the adult does not apply the same requirements to himself.

Studies have been made in various disease categories to determine the extent of undiagnosed conditions which exist today. Here are a few of the important facts:

Use of the Papanicolaou smear to detect cancer of the cervix would prevent thousands of deaths. In fact, it is predicted that if all cervical cancers could be discovered in this way before they become invasive, cancer of this site would be 100-percent curable. Yet, the fact remains that more than 8,000 women die each year of cancer of the cervix.

Glaucoma, a serious eye disease causing 14 percent of all blindness occurring among adults, can be identified in its early stages by a relatively simple screening measure utilizing the tonometer. Yet, the fact is that there are approximately 1,300,000 cases of glaucoma among the population over age 40.

Another example, diabetes, can be very easily detected, and its complications controlled, if it is detected early, and yet of this very progressive disease it is estimated that some 2 million undetected cases are in the population, and, moreover, that we are making very slow headway in uncovering these 2 million cases.

For example, last year some 700,000 people were screened, with only 7,000 new cases diagnosed.

Ideally, the best way to insure the early discovery and control of many of these chronic diseases is for every person to have a thorough medical examination at periodic intervals and be under continuous medical management.

From a practical standpoint, however, even if we were to overlook and be able to handle the overwhelming costs that would be involved, such a solution is unworkable, because there are not enough physicians and not enough of the resources that would go into such a program.



Some practical alternative must therefore be found.

This was recognized 15 years ago, when a major attempt was made to determine a practical alternative.

The National Conference on Chronic Disease, in relationship to the preventive aspects, was sponsored by the Commission on Chronic Illness. A body of experts was brought together, and they concluded that the solution to the problem lay in the development of simple, inexpensive procedures for the early detection of chronic disease and the subsequent development of a community screening program.

This conference helped to focus national attention upon the fact that there was a large undetected reservoir of disease, and that the role of screening, mass screening, was a very essential tool if something were to be done about it.

In the years that followed, the Public Health Service intensified its efforts to test many of the screening techniques and to develop new and better screening procedures, including the use of the health questionnaire, laboratory tests, and more recently electronic devices and computers.

Screening demonstrations were supported as the means of creating prototypes that could be used in communities throughout the Nation, and these screening programs included tests for single as well as multiple diseases.

At the present time, the Division of Chronic Disease in the Public Health Service is spending approximately \$86 million to attack the problems of chronic disease. About \$53 million of this is directly or indirectly related to the early detection of disease, and \$13 million is specifically being spent in the area of development and testing of screening methods, support of community demonstration projects, and through the formula grant mechanism, support of State and community screening services and programs.

A giant step forward was taken a few years ago, when the Public Health Service provided some assistance in research and development support to the periodic health appraisal program being conducted by the Kaiser Permanente Health Foundation in California.

You will be hearing about this program in detail tomorrow morning, when Dr. Collen, who is program director, appears.

Essentially, this provides a mechanism whereby a multitest laboratory completes in about 2 hours clinical tests, with health history, that would take very much longer time by conventional methods.

In June of this year the Public Health Service negotiated contracts for the establishment of two health protection centers for the aged adult, based on the techniques developed in the Kaiser Permanente program.

One of these will be in Milwaukee, and will be conducted by the Milwaukee City Health Department. The other will be in New Orleans, and conducted by the Department of Tropical Medicine, Public Health, Tulane University.

The aim of these health maintenance projects is to keep the apparently well people well, and it is hoped that this health protection program will stimulate such individuals to think in terms of taking positive action toward health maintenance.

Finally, negotiations are currently in progress for the creation of two similar demonstration projects in other communities.

The automation and computers lead to sharply reduced costs in the long run. In other words, the per-unit cost of achievement of health detection applied to large groups of people lowers the cost as compared to the cost for a single examination taken out of context by conventional methods.

However, the high cost of the equipment initially is a very serious factor to consider in applying this technique to the country as a whole.

The extent to which these demonstrations can be expanded and new approaches investigated depends upon the availability of funds for the initial application and the maintenance of the equipment during the period that it is being used.

If, at some future date, disease-detection services are available on a national scale, I think we can visualize some very substantial benefits to the public's health beyond just the health itself.

In other words, we are in the process of studying what the long-range effects would be from a cost-effectiveness standpoint and from a cost-benefits standpoint, and I think that the outline provided to you by Mrs. Rice is a good example that the investment in good health pays off not only in the social and psychological aspects, but also in the economic aspects, as well.

Second, the multiple screening programs could make it possible to establish a register of individuals who suffer from certain chronic diseases for which at the present time only palliative treatment is available, so that when the research and the health sciences area provide answers to these chronic diseases and provide a tool for their control, we would be able to very rapidly identify where these people are, and apply the research findings as quickly and effectively as possible.

And finally, from a long-range viewpoint, I think it is reasonable to presume that early diagnosis will permit better control of degenerative diseases and prevent or minimize the crippling conditions that would otherwise occur, and this results in a much healthier aging population.

We should see a very substantial contribution to the country as a whole, because if these people are maintained in a healthy state, and if we accompany them with a socioeconomic kind of program, these can be extremely productive people, and make a major contribution to the country.

I think, in conclusion, Madam Chairman, it is my firm conviction that we have an obligation to utilize the powerful disease-detecting techniques and the automated equipment which is available right now to the maximum extent possible, and thus provide for the utmost in health maintenance of people.

I would be very happy to respond to questions.

Senator NEUBERGER. Yes. I was interested in your report, because it does come from our own U.S. Public Health Service, and we know the interest and attitude of the Public Health Service.

I was especially interested in your statement where you said that the Public Health Service has two health centers, health-detection centers underway. Is that right, now?

Dr. WAGNER. We have made grants, Madam Chairman, to two places, one to the Milwaukee City Health Department, the other to the Tulane Medical School.

Senator NEUBERGER. When will those be functioning?

Dr. WAGNER. They are in the process now, in planning and developing their projects, and we hope they will be in operation this year.

Senator NEUBERGER. Tell me what they will encompass. Will they use some of the material that we saw illustrated here today?

Dr. WAGNER. Yes. They will base it upon a similar process of developing the types of tests and combinations of tests that would be applied to specific population groups, and at the same time try to demonstrate methods of motivation and relate the findings on the base of motivation and getting these people under care for the provision of preventive as well as curative services for the diseases detected.

Senator NEUBERGER. Who will be screened?

Dr. WAGNER. I will have to refer that to Dr. Chinn, who will follow me. I think he has some better information about the population groups.

Senator NEUBERGER. It is interesting to me that our Government, as I said, is looking ahead and moving forward with such programs. Probably we can only expect the Government to be as cognizant of the costs to the economy and the loss of working days. We can't expect a private doctor, after all, to be as aware of that, although I know his humanitarian instincts.

So it looks to me as if we had a good combination, here, of the Government working with the profession.

Do you feel that is true?

Dr. WAGNER. Oh, very definitely. I think that the plurality of health services, as to methods and procedures, varies from community to community and county to county, but I think the profession as a whole wants information when they need it, in order to plan and implement the best possible program for the people that they are serving.

Senator NEUBERGER. And you think this leaves the doctor time to do the things for which he was really trained? Is that right?

Dr. WAGNER. Very definitely. I think the physician today has a good percent of his time, possibly 40 percent of his time, involved with the repetitive types of things that are logistically oriented, such as paperwork and clerical activities that can be taken off his hands.

Secondly, the delay in the traditional methods of examining the patient and sending him for his laboratory work and getting him back is a poor utilization of a physician's time. He should have information immediately available when he confronts the patient.

Senator NEUBERGER. Therefore I was somewhat shocked and startled by the statement that Dr. Thiers, the biochemist, made this morning, when he said that the AMA is taking the stand that all of this is still in the province of the doctor, rather than of the chemist.

I wanted to question him on it more, but we got so busy with the quitting time, that it seemed to me that we were regressing, if that was the attitude of the organization that represents the doctors of this country, because our testimony so far has not indicated that at all from individual doctors, but rather that they welcomed it.

So I think we will have to look at the record and see what he really did say about their opposition.

Thank you very much.

(Dr. Wagner's prepared statement follows:)

STATEMENT BY C. J. WAGNER, M.D., ASSISTANT SURGEON GENERAL, CHIEF, BUREAU OF MEDICAL SERVICES, U.S. PUBLIC HEALTH SERVICE

Thank you for giving me the opportunity to appear before you today. The subject we have to consider is timely, provocative, and urgent of solution. Much suffering and premature death could be avoided in our adult population if a way were found to insure the early detection of chronic diseases. We have at our disposal a battery of sensitive proven tests to accomplish this task. Our challenge is to find the most effective means of making these tests available to the adult population.

The concept of preventive medicine in the field of chronic illness has been soundly endorsed by the medical profession at large—but too little practiced by the busy physician who must give the bulk of his attention to those already ill.

The public has also endorsed the theory of preventive medicine—but practices it primarily for the younger generation. Preventive check-ups are considered a "must" for the children, but all too often the adult resists going to the physician while he is in apparent good health. When pain and discomfort prod him into action the disease may already have progressed significantly.

Studies have been made in various disease categories to determine the extent of undiagnosed conditions which exist today. Here are a few of the important facts:

Use of the Papanicolaou smear to detect cancer of the cervix would prevent thousands of deaths. In fact, it is predicted that if all cervical cancers could be discovered in this way before they become invasive, cancer of this site would be 100 percent curable. Yet, the fact remains that more than 8,000 women die each year of cancer of the cervix.

Glaucoma, a serious eye disease causing 14 percent of all blindness occurring among adults, can be identified in its early stages by a relatively simple screening measure utilizing the tonometer. Yet, the fact is that there are approximately 1,300,000 cases of glaucoma among the population over age 40.

Diabetes can be easily detected and its complications controlled—if found in the early stages. Undetected diabetes is a progressive disease which can lead to disabling complications. Yet estimates indicate that there are approximately 2 million cases of undetected diabetes in our population. Moreover, we're making slow headway in uncovering these 2 million cases; last year some 700,000 persons were screened, with 7,000 new cases diagnosed.

Ideally, the best way to insure early discovery and control of many of the chronic diseases is for every person to have a thorough medical evaluation at periodic intervals, and to be under continuous medical management. From a practical standpoint—even if we were to overlook the overwhelming costs involved—such a solution would be unworkable. There simply are not enough doctors now to provide this service for all adults and also take care of the sick. A practical alternative must therefore be found.

Fifteen years ago, a major attempt was made to determine what would be a practical alternative. A "National Conference on Chronic Diseases: Preventive Aspects" was sponsored by the Commission on Chronic Illness. Co-sponsors were the U.S. Public Health Service and the National Health Council. Forty-three other organizations participated, pooling a wide range of private and public agencies concerned with chronic diseases. The delegates included physicians, dentists, nurses, social workers, health educators, and statisticians. This body of experts concluded that the solution to the problem lay in the development of simple, inexpensive procedures for the early detection of chronic diseases, and subsequent development of community screening programs.

Perhaps at this point, explanations of terms to be used would be in order, particularly the terms *screening*, *multiple screening*, and *early detection*.

Screening has been defined by the Commission on Chronic Illness as "the presumptive identification of unrecognized disease or defect by the application of tests, examinations, or other procedures which can be applied rapidly."

*Screening tests* applied on apparently well persons sort out those who probably have a disease from those who probably do not. The screening test is not meant to be diagnostic. Persons with positive or suspicious findings on the screening examination are referred to their physicians for diagnosis and necessary treatment.

A *screening program* consists of a single testing procedure provided to a large mass of persons considered highly susceptible to the disease for which they are tested.

*Multiple screening* has been defined by the Council on Medical Service of the American Medical Association as the "use of two or more simple laboratory tests, examinations, or procedures, applied rapidly and on a mass basis to determine presumptive evidence of unrecognized or incipient disease or defect."

The kind of tests usually preferred for multiple screening are those that require a minimum of direct professional involvement, and which can be applied to large numbers of people at reasonable cost. Later in these hearings, you will undoubtedly receive much detailed information about the kinds of tests that are being incorporated in various multiple screening programs throughout the nation.

As in screening for a single disease, positive findings are referred to the individual's regular physicians for definitive diagnoses; negative findings are usually not reported.

*Early detection*, often called *preclinical detection*, has been defined as the identification of disease prior to the onset of clinical symptoms, by the application of screening tests and diagnostic procedures.

Let me give some examples. An individual can have glaucoma or coronary heart disease and have absolutely no symptoms of the disease. Similarly, cervical cancer is completely asymptomatic in its early stages. Screening tests such as tonometry, electrocardiography, and cervical smear can greatly aid in the identification of the pathological evidence of these diseases.

Screening of apparently well persons, particularly among the aged, can also lead to detection of advanced, but unrecognized, diseases, often symptomatic and even disabling, but sometimes attributed by the individual to "old age." While recognition of previously unknown advanced disease does not provide the opportunity for early intervention in the disease process, it can still be beneficial if, for example, a diabetic's leg or a glaucoma patient's sight can be saved even for a few years. Detection of previously unknown disease, even at an advanced stage, often provides an opportunity to halt further progression of the disease, to extend the useful years of life, and to rehabilitate the patient.

The conference called fifteen years ago by the Commission on Chronic Illness helped to focus national attention on the need for early detection of hidden disease, and on the role of screening programs in preventive health activities. The conference also served as a catalyst to stimulate action on many fronts.

In the years that followed, the Public Health Service steadily intensified its efforts to test many of the existing screening techniques and to develop new and better screening procedures including questionnaires, laboratory tests, and more recently, electronic devices and computers. Screening demonstrations were supported to create prototypes as models for communities throughout the Nation. These included both single disease and multiple disease detection programs. They have ranged in scope from five-year programs to demonstrate high quality diabetes screening procedures and exhaustive work in the instrumentation of electrocardiogram reading, through relatively large multiple screening programs for urban areas, to a limited multiple testing program for a Spanish speaking poor population in New Mexico.

During Fiscal Year 1966 approximately \$81,000,000 was available to the Division of Chronic Diseases of the Public Health Service to attack the problems of chronic illness. Approximately \$13,000,000 was spent on the development and testing of screening methods, support of community demonstration projects and, through the formula grant mechanism, support of State and community screening services and programs.

A significant step forward was taken a few years ago when the Public Health Service provided research and development support to the periodic health appraisal program being conducted by the Kaiser Permanente Health Foundation in California. You will be hearing much more about this imaginative, pioneering venture tomorrow from the program's director, Dr. Morris Collen. In essence, however, it offers an up-dated version of the traditional disease detection tests—streamlined and coordinated—and with many special features. Using a battery of automated procedures with built-in computer analysis and read-out results, the multitest laboratory completes in about two hours clinical tests and health history that would require very much more time by conventional methods. Thoroughness, speed, accuracy, and economy of money and personnel time, particularly physician time, are special features of this approach.

In June, the Public Health Service negotiated contracts for the establishment of two health protection centers for the aging adult based on the techniques developed in the Kaiser Permanente program. One program in Milwaukee will be conducted by the Milwaukee City Health Department; the other in New Orleans will be directed by the Department of Tropical Medicine and Public Health of Tulane University School of Medicine.

The aim of these health maintenance projects is to keep the apparently well people well, and it is hoped that this health protection program will stimulate such individuals to think in terms of taking positive action for health maintenance. With counseling and referral activities as a basic part of the total program, these demonstrations are designed to encourage participants to undergo periodic health appraisal and to assist the physician in carrying out the appraisal by providing him with an extensive documentation of all findings—positive and negative—of the health testing program in advance of the medical examination.

Negotiations are currently in progress for the creation of two similar demonstrations in other communities.

Thought is currently being given to the establishment of a smaller unit which would be, in effect, a satellite of a larger program. In this instance, it is planned for the satellite unit to use the computers which will be located in the main unit. The use of mobile units in a similar satellite-type manner to serve rural areas is also under consideration.

Automation and computers lead to sharply reduced costs in the long run—but during the initial phases of equipping a demonstration program, the high cost of such equipment is a serious factor with which to contend. The extent to which these demonstrations can be expanded and new approaches investigated depends on the availability of funds.

If at some future date disease detection services are available on a national scale, I can visualize benefits to the public's health which extend beyond the immediate identification of disease in the individual. In this connection we plan to continue study of direct and indirect economic benefits which may result from early disease detection.

The findings derived from multiple screening programs will provide a more complete picture of the hidden reservoir of disease in our Nation. A more complete knowledge of the prevalence of various chronic diseases will give us valuable clues for the establishment of hypotheses relating to the cause of these diseases. Detailed information on the prevalence of diseases would also help in the establishment of a more accurate priority list to guide us in our research and development efforts.

Moreover, multiple screening programs could make it possible to identify individuals who suffer from certain chronic diseases for which, at present, only palliative treatment can be provided. In the event of a breakthrough in the treatment of any of these diseases, curative therapy could be applied promptly to those identified. In addition, detailed information on the prevalence of diseases in various geographical areas should help us in determining the type and extent of care resources which should be applied in those areas.

A comprehensive preventive health program could help to alleviate the pressures placed on physicians for medical services as a result of our expanding economy and our growing population of aging persons. Health screening could provide the physician with an important tool to make diagnoses more rapidly and efficiently. And, from a long range point of view, it is realistic to expect that early diagnosis will permit better control of degenerative diseases, and prevent or minimize the crippling conditions that would otherwise occur. This would result in a healthier aged population, and ultimately should decrease substantially the amount of therapeutic care required.

The kind of multiple screening programs now being developed are practical, in step with the most recent advances in biomedical engineering, and can be of valuable assistance to the medical profession. It is my firm conviction that we have an obligation to utilize the powerful disease detecting techniques to the maximum extent possible and thus provide the utmost in health maintenance for our people.

Senator NEUBERGER. Dr. Swartz?

Dr. Swartz is chairman of the American Medical Association Committee on the Aging. He is from Lansing, Mich.

You may proceed, Dr. Swartz.

**STATEMENT OF DR. FREDERICK C. SWARTZ, CHAIRMAN, AMERICAN MEDICAL ASSOCIATION COMMITTEE ON AGING, LANSING, MICH.**

Dr. SWARTZ. Thank you.

I am Dr. Frederick C. Swartz, of Lansing, Mich., in the active practice of internal medicine, and chairman of the Committee on Aging of the Council on Medical Service of the American Medical Association. With me is Mr. Bernard Harrison, director of the AMA's Department of Legislation.

I am here today, and at the subcommittee's invitation, to present my own personal views, as well as those of the Committee on Aging, on certain phases of the prevention of chronic illness.

For the sake of completeness, this paper includes some definitions and explanations, and with the subcommittee's permission, I will merely present the mainstream of thought embodied in this paper as it pertains to the subject matter under immediate consideration.

Senator NEUBERGER. We will appreciate that.

Dr. SWARTZ. I submit that a definition of terms is mandatory before we can discuss intelligently the prevention and detection of chronic illness. The Association's Committee on Aging has developed some tentative definitions which may help in this and future considerations of this subject. Chronic condition includes the other terms which we hear so often, chronic disease, chronic illness, long-term illness.

The proposed definition of "chronic condition" is as follows:

"Any condition that (a) is outside the pale of normal variance and that is abnormal in a recognizable, functional or structural way, either before or after a complete history, physical and laboratory examination, and (b) has been present for or can reasonably be expected to persist for some period of time."

If we accept this type of definition, then we can divide individuals who have one or more chronic conditions into three categories, from the standpoint of the health and other professional services that they may need:

(a) The asymptomatic and nondisabled group: These individuals have neither symptoms nor disability resulting from their chronic condition(s), and require no more medical attention than their group as a whole, but may benefit from suggestions in the area of public health maintenance, such as good nutrition, physical and mental activity, and the shedding of unphysiologic habits.

(b) The intermediate group: These individuals present some degree of disability and/or symptoms resulting from a chronic condition(s), but are able, either with or without medical attention and guidance, to administer to their own needs, and to carry on their own vocation or avocation in essentially the fashion to which they are accustomed. They, too, could benefit from some suggestions in the area of positive health maintenance.

(c) The long-term care patient group: These individuals are disabled and/or symptomatic as a result of a chronic condition, and need—in addition to a physician's attention and care—the services of one or more additional types of personnel and/or facilities: for example, the visiting nurse, the social service worker, physical or occupational therapist, homemaker—home health aid, nursing home, foster

home, rehabilitation centers, and at times the general hospital. In a limited fashion, this group as well could benefit from suggestions from the area of positive health.

In medicine, we frequently have been accused of being disease oriented. This vantage point is admittedly a good one when you are dealing solely with the sick. When there is an absence of organic or psychosomatic or psychiatric disease, however, the practitioner may be at a loss to make contributions to the health of the people from a positive, nondisease point of view. It is important, therefore, within this discussion of chronic disease, that we do not limit our approach to this subject to one of disease detection alone. Much can be learned, and much more can be accomplished, if we include in this discussion not only those who have a chronic condition, but also those who do not have. In this way, we can apply to the latter group what we have learned from studying the former.

The Committee on Aging has, during the years since its creation, developed a six-point health program for older citizens, which is spelled out in a booklet entitled "Medicine's Blueprint for the New Era of Aging." This "positive health approach" has important implications for the subject under discussion today.

The basic premise of this program was based on an early recognition by the committee that there are no diseases specifically attributable to the aging process, and that those of the older group who are sick present the same many sided problems as the sick of any age group. The chronic disease and long-term illness which constitute the major problems of medicine today are the end product of the recurring and irritating effects of environment on protoplasm over long periods of time. They result from these irritants, and not from the passage of time.

For this reason, medicine has the responsibility and the opportunity to ameliorate or dilute these environmental insults by emphasizing a positive health maintenance program with those individuals who are apparently well.

The responsibility of the physician in this program is to institute a program of periodic health appraisals and to coordinate the contributions of other disciplines for the benefit of the patient.

The first objective of the health appraisal would be to detect and treat organic disease. This is the chief concern of the patient, and most frequently the real reason for his seeking medical aid. Careful, routine medical history and physical examination will discover most overt ailments or provide clues for further investigation. If organic disease is found, the proper treatment is begun. If no disease is found, the patient is so informed, but the responsibility of the examiner does not end here. What for the future?

At this point we usually discuss with the patient the possibility of potential disease in the future, the effects of unnecessary emotional strain at home or at work, the real benefit to be obtained from good posture, physical exercise, mental activity, and good nutrition.

Finally, we have learned from our efforts at rehabilitation the importance of motivation on the part of the patient. We have learned from civil defense programs the importance of adequate, thoughtful, planning for catastrophe.

Putting these two ideas together, we concluded that it would be good medicine to try to pre motivate persons to be prepared to fight back at catastrophes that might befall them in later life.



The American Medical Association has for some years been concerned with the area of multiphasic screening. The AMA Council on Medical Services published a study on multiphasic screening, giving a description of data on 33 screening programs. We are currently working in a consultant capacity to the United Health Foundation in their project to develop basic criteria for evaluating multiphasic screening programs in the community.

Along with many other groups, we are continuing to study developments in this field, and to identify more precisely both potentials and problems inherent in multiphasic screening.

Some of these problems are:

"Periodic examinations—and I am referring to multiscreening tests at the moment—when accompanied by positive action on the part of the patient, may be very helpful. However, when not accompanied by intelligent action, it may have the following disadvantages: (1) If the report is negative, the person acquires a false sense of security; while disease may not be evident at the time of the survey, it can develop a few weeks or months later, but the person is inclined to pay little heed to symptoms and delays going to his physician, because 'he was well at the time of the survey'; (2) it may and does cause undue apprehension in persons with 'false positive' diagnoses; (3) it can result in considerable expense to those who are reported as having findings suggestive of disease, but in whom disease is not confirmed in subsequent examinations; (4) those who have no opportunity for appraisal of the 'negative' group by a physician, yet in this group will be found persons who need medical attention."

The great difficulty in multiphasic screening is that the interpretation of diagnostic tests is of little value without a history of the patient, and understanding of his personality and familiarity with his whole family background \* \* \*. Some 960 of the 1,000 persons who passed through the multiple-screening tests came up with negative results. This group do not know that the negative test has little value. The tests are not intended, of course, to give the individual a rapid, clean-cut, and precise series of competent diagnoses. But that is exactly what the average man thinks they do; otherwise, he would not go through the procedure.

And now, with the permission of the committee, I will leave the work of the American Medical Association for the moment and speak entirely from the viewpoint of one who is in the private practice of medicine.

I have, since returning from the Armed Forces in 1946, retained the practice of internal medicine along the lines suggested above.

My files have people that have come in for periodic examinations ever since we have been in practice. Obviously, there have been some changes in the group for various reasons from time to time, but others who have become acquainted with the advantages of periodic health appraisals have kept this an ever-growing group.

We do a complete history and physical examination on every patient. At the same time, we are subjected to a screening type of program that is dictated by the history and physical examination, which includes using an X-ray of the chest and certain laboratory procedures, including the use of blood count, certainly procedures which are found to have value when repeated on a yearly appraisal basis.

We are therefore utilizing what one may call a screening type program of our own.

In our office we recognize and subscribe to the definition of the National Commission on Chronic Illness of screening as "the presumptive identification of unrecognized disease or defect by the application of tests, examinations, or other procedures that can be applied rapidly."

It is generally agreed that the tests used in the multiple-screening program should be simple of administration, should be easy to interpret, should be relatively inexpensive, should require little time to perform, and should meet the five criteria suggested by the Commission on Chronic Illness. These are: reliability, validity, yield, cost, and acceptance.

In my opinion, there is little doubt that multiphasic screening programs, when wisely selected, can contribute some help to the detection of disease. However, transmission and interpretation of results to the patient must be entirely through the hands, eyes, experience, and judgment of the physician. After all, these tests are done by man-made machines, under man's direction, and human error is still a factor.

People get enough education from odd sources these days that if certain findings are borderline or slightly abnormal, they can become extremely disturbed. If interpretations are not handled by physicians, the possibility of iatrogenic disease may well overbalance the good intended by the screening programs.

The character of multiphasic screening programs has changed somewhat over the years. In this day of computerized processing of medical data, it would seem to me that the positive aspects of multiphasic screening, properly conducted, and under favorable circumstances, may outweigh the negative ones. This will be true only if the agencies responsible for the screening see to it that all findings go directly to the physician, and that it be only through him that the patient receives interpretations of results.

Up to this point, I have limited our discussion largely to the people who have a chronic condition, and special emphasis has been placed on those who have some symptoms or disability resulting. This group includes only a few million people in this country. What of the many others who do not have a chronic condition? This may be the biggest field in the medical practice in the future. It is from this reservoir that the chronically diseased come. What do we know about them? How near are the members of this group to becoming members of the group with a chronic condition? If they do not have a chronic condition, are they really well? Are they all in the same degree of "wellness"? Are those who have chronic conditions without major disability resulting any less capable of doing and enjoying living than those who do not have a chronic condition? Is there any way to measure degrees of wellness?

Suppose, as you tell a patient who has just passed a complete history and physical examination, that so far as you know he does not have any medical disease; that he is within the pale of normal variance, and considered well. The patient, quite happy, but in a thoughtful mood, asks, "OK, Doctor, but how well am I? Could I run a block? Could I run a mile? Could I ride with the astronauts?" These sound like timely and intriguing questions, to me. We must find an answer

to them. The patient of the future will be asking questions regarding the future. He not only wants to know whether he is well now, but whether he has the possibility of being well for 5 more years, or 10 more years, of whether he can expect a coronary in the next 3, or whether he can take a job with added responsibilities, and many other things.

I firmly believe that this is going to be a major field in the future. It is a major challenge to medicine today. Medicine needs to develop for patients who do not have a chronic condition, and for those who have chronic conditions without major disability, ways to test the functional capacity of the cardiovascular system, the pulmonary system, the musculature and nervous system, and the liver. Collections of data of this sort, under resting and stressful conditions, would form a body of knowledge so that the physician could tell the patient with a fair degree of reliability just how well he was. With this kind of information, the patient could better plan his future, and if we could do a better selling job, we might well improve the health of the race and ultimately reduce the size of the group who have chronic conditions.

For the information of the committee, I have taken the liberty of attaching to my statement, in addition to the previously named exhibit, some other pertinent pamphlets prepared by the AMA Committee on Aging. These include: "Health Promotion for Adults," "Needs of the Long-Term Patient," and "Retirement, a Medical Philosophy."<sup>1</sup>

Madam Chairman, I thank you for the opportunity of presenting the views of the American Medical Association Committee on Aging and my own personal thoughts. I will be glad to answer questions if I could.

Senator NEUBERGER. Yes. Thank you, Dr. Swartz. We are very interested in having your views as they represent you and the AMA, both.

I was wondering, when you were talking about the screening process, if you were at all familiar with Dr. Collen's work at the Kaiser Foundation?

Dr. SWARTZ. Yes; in a limited fashion. I have attended meetings where these programs have been presented. I don't know much about it in detail, but in general.

Senator NEUBERGER. Well, the reason I ask was that you seem to question, or you seem to have some questions, about how the result of the test would be used, and I think, as I know it, there, they certainly give all the tests to the physician.

I don't know that any screening that any of us could anticipate, where that would be the final step. I think it just automatically would have to be putting the results in the hands of the patient's physician.

Is that one of the fears you have?

Dr. SWARTZ. Oh, I don't really have any fears, particularly. I think that men of good intention can work out a solution to the problem.

But in the practice of medicine, as I do it out at the front, where I am treating patients every day, it is surprising the number of questions that arise from little details that come from laboratory tests that are done here and there, and they are not related. People get quite excited over these things, and raise their blood pressure up. It is a problem.

<sup>1</sup> Exhibits referred to will be found in committee files.

Senator NEUBERGER. But you haven't sent them to those laboratories. They have gone of their own accord. Is that it?

Dr. SWARTZ. Well, no. I don't have any place like this to send them. The screening techniques we use are ones we devise for an individual after we see them, to get some judgment. One patient may have quite a concentration of screening tests regarding the respiratory system, like sputum, and somebody else may have it with blood. Somebody else may have it with stool or intestinal content. The type of screening is one that is applied by the individual physician, where he uses these multiphasic things that come from analyzing in the laboratory, et cetera, but the physician does this judgment selecting.

Senator NEUBERGER. I don't think any of the committee members who have been listening to the testimony ever visualized that it would be an end unto itself, that it would be only as a service to the doctor.

Well, you did not see some of the computers here this morning, but I am sure you are familiar with them.

Would you yourself find it would give you more free time, as a practicing internist, to have a computerized history, have it on a tape, or be able to look at it, and not have to take it yourself?

Dr. SWARTZ. I don't think this is quite a possibility. We are working in this area. With the papers that we submitted, there is an outline for a physical examination and periodic health appraisal. We are now working with the idea in mind of streamlining this down to the point that just the positive items of this examination could be computerized, so that when you used the button and get it all back on the oscilloscope, you won't get three typewritten pages, but two or three lines, summarized. Of course, the big problem here is programing, but I think we can do this.

Senator NEUBERGER. Working in the field of preventive medicine, is it not possible for individual physicians like you to do your own screening? It would be just a relative few numbers in the population, would it not, that you can see?

Dr. SWARTZ. Well, we are making a little effort in this regard, too. We start off with the assumption that there are not enough medical men to go around. And I mean women, of course, too. In my experience in medicine, there have been a lot of jobs the doctor used to do that he does not do any more.

In the hospital, for instance, we have a team of nurses; the doctor practically never puts a needle in a vein any more. The doctors have been pushed out of this area.

We now have coronary care units where the girls trained there will do their own defibrillation of the heart, and so forth; before the time limit is up, she presses the button and starts the heart going again.

The whole practice of medicine is changing a great deal, and we realize this.

In this particular field, at the moment, we are trying to train in our own office individuals of the middle-aged group; that is, women 35 to 60, who have raised their children and can give maybe 6, 8, 10, or 40 hours a week. We are going to train these women to take the initial identification phase, do the history by and large, and bring the patient up to the physical examination.

This will save about 50 percent of our time, you see. Then we will merely check the report that she has already completed, do the physical examination, and draw conclusions. We figure that we can probably

double, if not triple, our medical contribution to the community by employing individuals of this type, that we train ourselves.

Senator NEUBERGER. I don't know whether you heard the previous witness or not, Dr. Wagner, tell about the two units for multiphasic screening, that Public Health Service is preparing to open soon in Milwaukee and New Orleans.

We hope that we can look upon them as pilot programs and experimental programs, and have people from the AMA, doctors, evaluate, revise, criticize, and so on, and see if we can help to screen a larger number of people.

You quoted some editorials. I notice the dates were 1954 and 1951, which would seem, in the light of testimony we have had here for a day and a half now, to be quite out of date.

Is this true, that the last AMA statement was made in 1959? Or would you consider your statement today to bring that up to date?

Dr. SWARTZ. This gets you into a situation I find hard to explain, because these things are gone over and over again. These fellows get to be so sophisticated that they forget they have said things, and they feel since they have talked it over for a number of years that this must be it. The same thing is true of many of these concepts; they don't get down in a corner of an official document, but most of the people who do any talking about it have an understanding that this is the case, you see.

Senator NEUBERGER. I guess I took the gist of your paper, not entirely, but a lot of it, to be on that page 15, where you were most critical, or most worried or concerned, about the screening, and you said, "However, transmission and interpretation of results to the patient must be entirely through the hands, eyes, experience, and judgment of a physician."

And that is I think exactly what we anticipate. The interpretation will be put in the hands of a physician.

So I don't know whether that was a warning statement that you gave.

But then I did in the next sentence read: "After all, these tests are made by manmade machines under man's direction, and human error is still a factor to be recognized," which made me wonder if you can overlook human error in a doctor's eyes, hands, judgment.

There still is a factor of error there, is there not?

Dr. SWARTZ. This is true. I don't think we do much better than the good baseball batter, percentagewise.

Senator NEUBERGER. I think we do much better than that, because a lot of us would not be here today if it had not been for skill, and so on.

But this is not to eliminate that just because the machine did it there could be error, when a doctor did it there would not be error.

Dr. SWARTZ. No, this is not intended. The only thing is that these have to be interpreted. I included in the paper, but I did not read it, that recently we received three blood sugars running anywhere from 150 to 250. The normal top is 210. We would normally accept this as the best testimony by the best people in the dietetic text book. But we gave them, for 3 days, a heavy carbohydrate diet, and took their blood sugars for a period of 5 hours, and all three were perfectly normal.

As we approach all laboratory procedures—you have to have some real knowledge of the laboratory.

Some of these techniques are a little out of my knowledge, but I do know that in some of the clinics, where some very touchy procedures, like the blood calciums, are done—when a laboratory clue is there, you get consistent results right across the board.

There is a variation even within the margin of error; so these all have to be taken into account. Someone with a little experience and judgment takes, you know, the possibilities.

Senator NEUBERGER. Just one problem that bothers me: Some of the witnesses have indicated that when a patient comes to the doctor, the doctor is looking for something specific. That is, the patient comes because of a complaint, and when you mentioned diabetes, I was reminded that a patient could come in and have an examination, see the doctor, and go, and yet have diabetes undetected, while the screening process, the multiphasic screening process, might begin to detect it.

Dr. SWARTZ. I don't think your statement would be true with someone who had substantial training in the area of diabetes. At one time, all diabetes detection was clustered around diabetic coma, and so on. They all died that way. Now it would be a crime if somebody died of this. They all live long enough to die of some other disease.

In the meantime, we have gained enough information that the whole interest in diabetes of the sophisticated group is in those groups that don't show any indications of diabetes, some even by blood sugars. If you have a substantial background of diabetes in the family, you don't have to do much else. You are in the driver's seat.

A lot depends on the complete experience of the individual physician, and there are a lot of people who just don't have that much interest in diabetes.

Senator NEUBERGER. I see.

Thank you very much.

(Dr. Swartz' prepared statement follows:)

STATEMENT OF THE AMERICAN MEDICAL ASSOCIATION BY FREDERICK C. SWARTZ, M.D.

Madam Chairman and Members of the Subcommittee:

I am Frederick C. Swartz, a physician in the active practice of Internal Medicine in Lansing, Michigan, and Chairman of the Committee on Aging of the Council on Medical Service of the American Medical Association. I am here today in response to the Subcommittee's invitation to present my own personal views, as well as those of the Committee on Aging, on certain phases of the prevention of chronic illness.

For the sake of completeness, this paper includes some definitions and explanations. With the Subcommittee's permission, I will merely present the mainstream of thought embodied in this paper as it pertains to the subject matter under immediate discussion.

In recent years, there has been a considerable increase in the attention devoted to long-term disease and disability. The medical, social and economic problems posed by the individual who—whether because of acute or chronic disease, accident or genetic defect—is impaired over a long period of time are tremendous. For these reasons, the AMA Committee on Aging is developing plans to implement among constituent and component societies and other groups an overall program to improve prevention, care and rehabilitation of long-term illness.

The focus in such a program will not be on any particular disease entity, age group or type of impairment, but on long-term impairment *per se*, as a medical, psychological, social and economic catastrophe in the life of the individual affected. Emphasis will be placed on the basic needs which apply across all types of activities and programs on behalf of this group. As such, we are concerned

with the child with a birth defect as well as the older person with arthritis, the individual paralyzed by an automobile accident, as well as the person suffering from cancer.

The AMA Committee on Aging has studied much of the material available in this field, with particular attention to the report of the National Commission on Chronic Illness which operated between June 1949 and June 1956.

It became apparent that before any further progress could be made, there would have to be some understanding of the basic meaning of the terms used. An all-inclusive all-exclusive type definition for chronic conditions, including the viewpoints of everyone who had some interest in this definition, would be almost impossible. It was apparent from the first that all disciplines who had anything to do with the subject matter would have some phases or facets that would need emphasis from their standpoint that would not and should not be a part of the definition of some other approach. As these ideas were developed, however, it seemed evident that someone would have to make an effort toward the formulation of definitions with the idea in mind that after having developed the basic concepts, they might have to be tempered by the thinking of other disciplines.

In our presentation, we tried to follow the principles of Aristotle, and that the definition would insofar as possible, be all-inclusive and all-exclusive.

The following is a quotation from an article in "Hospitals," June 16, 1957, which gives rather nicely the reasons that form the background for the need for usable definitions.

"Our discussions in the hospital field, our studies and formal reports on the many problems facing us, often sorely lack the clarity necessary for general comprehension of our thoughts. Confusion of wide scope with respect to definitions prevails to such an extent as to bedevil our language to others. It is not sufficient that the words of our dissertations be familiar words—their meanings in the context in which we use them must admit of no doubt. Examine the following statements pertaining to chronic disease, currently a familiar topic of serious consideration, and note how conflict must breed meaninglessness, how these definitions when paraphrased and placed side by side become, in effect, jargon." "Although 'a disease is an illness,' a 'person can have a disease and not be ill.' A 'chronic disease—lasts for thirty days or more'; a 'chronic illness lasts for sixty days or more'; or even lasts 'for 180 days or more.' 'A chronic disease is a lengthy disease reverse of acute,' but nevertheless it is a 'disease of long duration with or without chronic phases.' Again, 'chronic illnesses are those that leave residual disability,' but the term does not require that the illness be associated with gross or detectable disability or even awareness of the existence of a disorder."

"Depending on the definitions used, and the studies cited, we find that between 4,000,000 and 23,000,000 people are chronically ill (these were the statistics of 1957 and they have changed markedly since that time). Who can sensibly discuss the amount of facilities and services for chronic disease when the group of people falling into this category supposedly range all the way from one number to seven times that number, depending on the definitions of chronic disease?"

I submit that a definition of terms is mandatory before we can discuss intelligently the prevention and detection of chronic illness. The Committee on Aging has developed some tentative definitions which may help in this and future considerations of this subject. The proposed definition of "chronic condition" is as follows:

"Any condition that (a) is outside the pale of normal variance and that is abnormal in a recognizable, functional or structural way either before or after a complete history, physical and laboratory examination; and (b) has been present for or can reasonably be expected to persist for some period of time."

Persons having one or more of these abnormal variations will be considered as belonging to the group who have a chronic condition.

All other individuals whose variations are within the normal pale will be considered outside the field of the present discussion.

In the book, "The Story Behind the Word," by Harry Wain, the term "chronic" is defined as follows:

"This term refers directly to due time and is derived from the Greek word 'chronos' or 'time.'"

Hence, as applied to disease, the term refers to diseases that continue a long time. The use of the term in this sense is very ancient and dates back to Hippocrates.

The Britannica World Language Dictionary, edition of Funk & Wagnalls Standard, defines "condition" as (1) a state or mode in which a person or thing exists; (2) a state of health; and (3) a modifying circumstance.

From the same source, the word "pale" is defined as a fence enclosing a piece of ground, hence, any boundary or limits; and, that which is enclosed with bounds; as the social pale.

If we can accept these definitions, then we can divide individuals who have one or more chronic conditions into three categories, from the standpoint of health and other professional services required:

(a) *The asymptomatic and non-disabled group*: these individuals have neither symptoms nor disability resulting from their chronic condition(s), and require no more medical attention than their age group as a whole, but may benefit from suggestions in the area of public health maintenance, such as good nutrition, physical and mental activity, and shedding of unphysiologic habits.

(b) *The intermediate group*: these individuals present some degree of disability and/or symptoms resulting from a chronic condition(s), but are able, either with or without medical attention and guidance, to administer to their own needs, and to carry on their own vocation or avocation in essentially the fashion to which they are accustomed. They, too, could benefit from suggestions in the area of positive health maintenance.

(c) *The long-term-care patient group*: these individuals are disabled and/or symptomatic as the result of a chronic condition, and need friend or relative and—in addition to a physician's attention and care—the services of one or more additional types of personnel and/or facilities; for example, the visiting nurse, social service worker, physical or occupational therapist, homemaker—home health aide, nursing home, foster home, rehabilitation center and at times the general hospital. In a limited fashion this group as well could benefit from suggestions in the area of positive health maintenance.

Other definitions that I believe will guide consideration of this subject are given in Volume I of the report of the National Commission on Chronic Illness, entitled, "Prevention of Chronic Illness" published for the Commonwealth Fund by the Harvard University Press in 1957. I quote:

"Prevention, in its narrowest sense, means averting the development of a pathologic state; more broadly, to include also all measures which halt progression of disease to disability or death. Under the broader definition, all definitive treatment of disease may be considered preventive, hence some discussion of treatment is pertinent to any consideration of prevention.

"Primary prevention means averting the occurrence of disease.

"Secondary prevention means halting the progression of a disease from its early unrecognized stage to a more severe one.

"Screening is the presumptive identification of unrecognized disease or defect by the application of tests, examinations, or other procedures which can be applied rapidly. Screening tests sort out apparently well persons who probably have a disease from those who probably do not. A screening test is not intended to be diagnostic. Persons with positive or suspicious findings must be referred to their physician for diagnosis and early treatment.

"Detection is the identification of ordinarily unrecognized disease or defects by the application of screening tests, examinations and diagnostic procedures.

"Case finding is the active search for and pursuit of cases of chronic disease and disability in both asymptomatic and more advanced stages—in order to provide, for the patient's concern, available techniques of secondary prevention appropriate to the stage of the disease, and thus stop further progression of the disease or disability to a more severe, complicated, or disabling stage."

In medicine we frequently have been accused of being disease-oriented. This vantage point is admittedly a good one when you are dealing solely with the sick. When there is an absence of organic or psychosomatic or psychiatric disease however, the practitioner may be at a loss to make contributions to the health of the people from a positive, non-disease point of view. It is important, therefore, within this discussion of chronic conditions, that we do not limit our approach to this subject to one of disease-detection alone. Much can be learned and much more can be accomplished if we include in this discussion not only those who have a chronic condition, but also those who do not. In this way we can apply to the latter group what we have learned from studying the former.

The Committee on Aging of the American Medical Association's Council on Medical Service has during the years since its creation developed a six-point health program for older citizens, which is spelled out in a booklet (Exhibit A)<sup>1</sup> titled "Medicines Blueprint for the New Era of Aging." This "positive health" approach has important implications for the subject under discussion today.

<sup>1</sup> Exhibits referred to will be found in committee files.



The basic premise of this program was based on an early recognition by the Committee that there are no diseases specifically attributable to the aging process, and that those of the older group who are sick present the same many-sided problems as the sick of any age group. The chronic diseases and long-term illnesses which constitute the major problems in medicine today are the end product of the recurring and irritating effects of environment on protoplasm over long periods of time; they result from these irritants and not from the passage of time itself.

For this reason, medicine has the responsibility and the opportunity to ameliorate or dilute these environmental insults by emphasizing a positive health maintenance program with those individuals who are apparently well.

Accordingly, a program of positive health maintenance and improvement became a major objective of the AMA Committee on Aging and a basic part of its six-point program.

The responsibility of the physician in this program is to institute a program of periodic health appraisals and to coordinate the contribution of other disciplines for the benefit of his patient.

The term "periodic" is used to indicate the need for repeated examinations. The interval at which these will be performed will be dictated by the needs of the patient.

The term "health appraisal" is really the old term "physical examination" with broader implications. Added are such items as mental and emotional evaluation, nutritional history, history of physical exercise and recreation, history of radiation exposure, sensitivities and allergies, expanded laboratory and x-ray investigations, and a socio-psychomatic section as a parallel to the present illness. This gives the physician a chance to match recurring symptomatology with psychological trauma.

The Committee strongly supports the concept that a periodic health appraisal is a basis for positive health programs. It believes further that the earlier in life such a program is instituted, the greater will be its accomplishments.

As a guide for the individual physician in furtherance of the periodic health appraisal as a part of his practice, the Committee has prepared a personal history form (Exhibit B) including what might be referred to as the glossary explaining various items.

The form itself is not a rigid recommendation. It attempts, rather, to suggest a logical thinking pattern that a physician might use in making a record of the health appraisal. It is not a blank paper which allows extreme latitude for the wordy, nor a checklist which leaves no place for space for elaboration. Its headings are designed to remind the examiner of all things that might be important in the appraisal, and in general to provide adequate space for necessary recording.

As envisioned by the Committee, this form is bounded by the history-taking ability of the examiner on one hand and the use of the special senses, the stethoscope, the sphygmomanometer, tongue blade, the percussion hammer, the otoscope, the pin and the finger cot on the other. The physician with a minimum amount of equipment is all that is necessary to accomplish the appraisal. The procedures that require special training equipment other than the above and those where "payoff" in findings are small have been omitted. Any special type examination may be added at the physician's discretion.

What can the practitioner hope to achieve with this type of evaluation?

The first objective of the health appraisal should be to detect and treat organic disease. This is the chief concern of the patient and most frequently the real reason for seeking medical aid. Careful routine medical history and physical examination will discover most overt ailments or provide clues for further investigation. If organic disease is found, the proper treatment is begun. If no disease is found, the patient is so informed, but the responsibility of the examiner does not end here. What of the future?

At this point we usually discuss with the patient that while we were looking for outright disease, we were not unmindful of the possibility of potential ailments. The diastolic pressure that persistently stays in the high normal or low hypertensive level particularly in a patient whose family presents a history of vascular vulnerability—cannot and should not be dismissed without mapping out a course for future living that will best postpone the expected difficulties.

The periodic health appraisal frequently exposes a patient who is hard pressed with harmful and unnecessary emotional strains and traumas. The emotionally disturbed may be as handicapped as the organically diseased. Recognition of

these forces as the etiologic factors in the production of symptoms is necessary to the solution of a great number of patients' problems. Tact, sympathy, understanding and direction is good preventive psychiatry in the physician's office.

Even the patient who has no evidence of real or potential organic disease is rarely so perfect that he can't be improved by a discussion of posture and physical exercise as it pertains to him and his future health. Daily exercise that improves muscle tone and circulation should be recommended. This activity is almost always over and above the activity involved in making a living.

The doctor is also in the unique position of being able to advise about *mental* activity without hurting the ego of the patient. It is important to advise a patient to venture into stimulating intellectual levels that prevent limitation of horizons and too much attention to self.

Nutrition is an important part of the periodic health appraisal. Those who are unmistakably and unquestionably overweight become a major problem in weight reduction. Those who are not actually overweight must be surveyed carefully for the possibility of being undermuscled and overfatted. A gross review of usual food intake frequently indicates areas that need correction.

The periodic health appraisal would certainly be incomplete without its preventive phase. Shots and inoculations that have merit should be discussed and used. Safety measures for young and old at home, in traffic, in school and office need to be mentioned with the authority of the medical profession. A mention of the importance of mood as a background for accidents is important.

Finally, we have learned from our efforts at rehabilitation the importance of motivation on the part of the patient. We have learned from Civil Defense Programs the importance of adequate, thoughtful planning for catastrophe. Putting these two ideas together, we have concluded that it is good medicine to try to premotivate patients in advance to fight back at some of the catastrophes that might befall them in later life.

The American Medical Association has for some time been concerned with the area of multiphasic screening. In 1955, the AMA Council on Medical Service published a study of multiple screening giving descriptive data on 33 screening programs. We are currently working in a consultant capacity to the United Health Foundations in their project to develop basic criteria for evaluating multiphasic screening programs in the community.

Along with many other groups, we are continuing to study developments in this field and to identify more precisely both the potentials and problems inherent in multiphasic screening.

Some of these problems have been identified in the 1955 AMA study I referred to earlier. They are:

"Periodic examinations (referring to multiple screening), when accompanied by positive action on the part of the patient, may be very helpful. However, when not accompanied by intelligent action, it may have the following disadvantages: 1. If the report is negative, the person acquires a false sense of security; while disease may not be evident at the time of survey, it can develop a few weeks or months later, but the person is inclined to pay little heed to symptoms and delays going to his physician because 'he was well at the survey.' 2. It may and does cause undue apprehension in persons with 'false positive' diagnosis . . . 3. It can result in considerable expense to those who are reported as having findings suggestive of disease, but in whom disease is not confirmed on regular examination. 4. Most multiphasic screening techniques leave no opportunity for appraisal of the 'negative' group by a physician; yet in this group will be persons who need medical attention." (Editorial appearing in *California Medicine*, September, 1954)

"The great difficulty in multiphasic screening is that the interpretation of diagnostic tests is of little value without a knowledge of the history of the patient, an understanding of his personality and a familiarity with his whole family background . . . Some 960 of the 1000 persons who pass through the multiple screening tests emerge with negative results. This group is treated most unfairly. They have a false sense of security. They do not know that negative tests have little value . . . The tests are not intended, of course, to give the individual a rapid, clean-cut and concise series of comprehensive diagnoses. But that is exactly what the average man thinks they do; otherwise he would not go through with the procedure." (Simillie, *Journal of the American Medical Association*, April 21, 1951)

The most recent AMA statement on this subject was made by the Association's House of Delegates in 1959. Speaking to the use of multiphasic screening in industry, the House of Delegates adopted these conclusions:

"In industry, multiphasic screening, in selected instances, appears worthy of further trial if carefully conducted and confined to relatively few, simple and significant tests according to the needs of a particular situation. If multiphasic screening is to be considered as a part of an occupational health program, it should be directed to occupational groups, be related to the job and its environment, and should come within the scope, objectives and functions of occupational health programs. . . . Multiphasic screening should include provisions for a 'follow-up' program and referral of the reports of the tests to the personal physicians of persons examined."

And now with the permission of the Committee I will leave the work of the American Medical Association for a moment and speak entirely from the viewpoint of one who is in the private practice of medicine.

I have since returning from the Armed Services in 1946 maintained a practice of internal medicine essentially along the lines discussed above.

My associate and I have a card index file of about 1,000 people who have come in for a periodic health appraisal every year or two and have done so ever since we have been in practice. Obviously, there have been some changes in the group for various reasons from time to time, but others who have become acquainted with the advantages of periodic health appraisal have kept this an ever growing number.

We do a complete history and physical examination on every patient, and at the same time they are subjected to a screening type of program which includes an x-ray of the chest and certain routine laboratory procedures which include the usual blood count and certain blood chemistries that have been found to have significant predictive value when repeated on the yearly appraisal basis. We are, therefore, utilizing what one may call a "screening type program" of our own.

In our office, we recognize and subscribe to the definition of the National Commission on Chronic Illness of "screening" as "the presumptive identification of unrecognized disease or defect by the application of tests, examinations, or other procedures that can be applied rapidly."

It is generally agreed that the tests used in the multiple screening program should be simple to administer, should be easy to interpret, should be relatively inexpensive, should require little time to perform, and should meet the five criteria suggested by the Commission on Chronic Illness. These are:

The test must be reliable in that information be available concerning the reproductibility of results as limited by the technical procedure.

The validity of a test is measured by the frequency with which the result of the test is confirmed by acceptable diagnostic procedure.

The yield of a screening program can be measured by the number of the previously unknown verified cases of disease among the total population surveyed, the number of persons with previously unknown verified disease benefited by referral to medical care, the number of previously known cases not under medical care benefited by return to it, the number of individuals who believe they have a disease, have a positive screening test, but are not found to have the disease at subsequent diagnostic examination, and the number of cases of communicable diseases who are prevented from spreading their disease to the family or the community.

The size of the yield of the screening program must be balanced against the cost—measured in monetary terms and in the relative amounts of time of professional and non-professional personnel.

Reliability, validity, yield and cost are essential criteria for evaluation of screening tests and programs. The measurement of acceptance of the program by physicians, individual laymen and the community is a useful additional criteria of the effectiveness of the screening program. *The goal of multiple screening is to find those conditions which require early attention from the physician and to obtain the correction of the conditions in the physician's office.* It is this latter part, the referral of the patient to the physician's office for early care, that is the prime objective of multiple screening.

In my opinion there is little doubt that multiphasic screening programs, when wisely selected, can contribute some help to the detection of disease. However, transmission and interpretation of results to the patient must be entirely through the hands, eyes, experience and judgment of a physician. After all, these tests are done by man-made machines under man's direction, and human error is still a factor to be recognized. Within the last month on our office screening program, we have had three fasting blood sugar tests returned that definitely placed the patients test in the classification of diabetes mellitus. After three days of high

carbohydrate diet, a glucose tolerance test was run on each one of these patients and every one of them turned out to be perfectly normal.

As mentioned previously, the patient and even the physician can be lulled into a sense of false security by a battery of negative tests. The doctor knows that the only test that says what it means is the positive test, that is, if it is not a false positive test. The negative test today may become the positive test of tomorrow. In my internship, I remember very well a patient suspected of having tuberculosis who had negative sputum tests on every morning for 29 days, but on the 30th day she had a generous supply of tubercle bacillus. This type of experience makes one wonder about the value of negative tests.

As experience continues to accumulate, it becomes evident that perhaps the greatest promise lies in the field of primary and secondary prevention.

Primary prevention implies the development of a body of knowledge that will indicate what agents might, on coming in contact with the patient, produce chronic conditions and communication of this information to the patient. It must be recognized, however, that even when evidence is overwhelming, it is hard to make the human individual change his habits. The success of any health effort, whether it be primary or secondary prevention or the treatment of existing disease and disability, depends largely upon the motivation of the patient. The physician and all his helpers can only point the way—the patient alone makes the journey. In my opinion, we will probably make very little progress against cancer of the lung so long as the nation continues to consume cigarettes in prodigious numbers. We will make very little progress against obesity and all its consequences so long as feasting is such an important part of the American way of living. Not much can be expected from treatment when patients lose contact with their physicians or, logic based on faulty premises, stop taking indicated medication.

Up to this point, we have limited our discussion largely to people who have a chronic condition, and special emphasis has been placed on those who have some symptoms or disability resulting. This group numbers only a few million people in this country. What of the many others who do not have a chronic condition? This may be the biggest field in the medical practice of the future. It is from this reservoir that the chronically diseased come. What do we know about them? How near are the members of this group to becoming members of the group with a chronic condition? If they do not have a chronic condition, are they really well? Are they all of the same degree of "wellness"? Are those who have chronic conditions without major disability resulting any less capable of doing and enjoying living than those who do not have chronic conditions? Is there any way to measure degrees of wellness?

Suppose you tell a patient who has just passed a complete history and physical examination that so far as you know he does not have any medical diseases; that he is within the "pale of normal variation" and considered well. The patient, quite happy but in a thoughtful mood, asks, "O.K. doctor, but *how* well am I? Could I run a block? Could I run a mile? Could I ride with the astronauts?" These all sound like timely, intriguing questions to me. We must find an answer to them. The patient of the future will be asking questions regarding the future. He not only wants to know whether he is well now, but whether he has the possibility of being well for five more years, or ten more years, or whether he can expect a coronary in three years, or whether he can take a job with added responsibility, and many other things.

I firmly believe that this is going to be a major field in medicine of the future. It is a major challenge to medicine today. Medicine needs to develop for patients who do not have a chronic condition and for those who have chronic conditions without major disability ways to test the functional capacity of the cardiovascular system, the pulmonary system, the musculature and nervous system, and the liver. Collection of data of this sort under resting and stressful conditions would formulate a body of knowledge with predictive value so that the physician could tell the patient with a fair degree of reliability just *how* well he was. With this kind of information, the patient could better plan his future, and if we could do a better selling job we might well improve the health of the race and ultimately reduce the size of the group who have chronic conditions.

For the information of the Committee, I have taken the liberty of attaching to my statement, in addition to the previously named exhibits, some other pertinent pamphlets prepared by the AMA Committee on Aging. These include:

Health Promotion for Adults (Exhibit C).

Needs of the Long Term Patient (Exhibit D).

Retirement, A Medical Philosophy & Approach (Exhibit E).

Madam Chairman, thank you for the opportunity of presenting the views of the American Medical Association and my own personal thoughts. I will be glad to attempt to answer any questions the Subcommittee may have.

Senator NEUBERGER. Next we will hear from Drs. Cowan, Borhani, and Petrie.

Dr. Cowan is president of the Association of State and Territorial Chronic Disease Program Directors, and director of the Division of Adult Health of Lansing, Mich.

How do you want to handle your presentation, here? Each one individually?

Dr. COWAN. Yes. If you don't mind, Madam Chairman, I will start out with the statement from the association, and then that will be followed up by Dr. Borhani, who is secretary-treasurer of that organization, and then by Dr. Petrie.

Senator NEUBERGER. All right. Suppose you begin, Dr. Cowan.

**STATEMENT OF DR. JOHN A. COWAN, PRESIDENT, ASSOCIATION OF STATE AND TERRITORIAL CHRONIC DISEASE PROGRAM DIRECTORS; DIRECTOR, DIVISION OF ADULT HEALTH, MICHIGAN DEPARTMENT OF HEALTH, LANSING, MICH.**

Dr. COWAN. Needless to say, I am delighted to be able to make the statement today.

I am representing, as you stated, the Association of State and Territorial Chronic Disease Program Directors.

That is a group of physicians who are extremely motivated to the conservation of health, and in this association there is one representative from each of the States who have as their whole career planned to conserve the health of the individual and the group. Their business is primarily in diagnosing and treating the community, rather than the individual.

I asked Dr. Borhani, the secretary-treasurer, to poll our organization, to get their information and their opinions about screening, and the benefit of their experiences in the States that they represent.

Dr. Borhani has informed me that not only has this been done, but it is on file in the records and proceedings for this committee.

So on that basis, we will not go into the details of that.

I would like to point out, though, that the consensus resulted in three recommendations to this committee:

1. That multiple screening should be comprehensive, rather than single-disease oriented.
2. That there should be no age limit.
3. That State and local health departments be responsible for planning and administration.

State and local health departments have been doing this for years, as you will note from the formal statement put in the record. They have had a great deal of experience in all community planning, community organization, and they can feel the pulse of the people in their communities and design a screening program that will particularly fit their area. This not only may vary from State to State, but may vary considerably within a State, depending on the type of population, rural, urban, distribution, and so on.

With that, and I repeat that the other information is in the record, I would like to go on with some personal comments.

The health of our aging population has been a subject of serious concern to medicine, to public health, to social welfare, and to Government in general, for many years.

Great strides have been made in certain directions, examples of which are the recent amendments to the Social Security Act, commonly called medicare, and the Regional Medical Programs Act as related to heart disease, cancer, and stroke.

Unfortunately, there is one big gap. We have medicare. We have "kiddie" care. But for the great productive group of our population, from 21 to 64, the ones who work and produce, very little is being done or has been done.

The greatest contribution that can be made to health, in my opinion, is in the area of prevention. This must begin in infancy, or even pre-natally, and continue on through life.

However, it is particularly important to have available health protection services in the middle years of life, when chronic disease becomes so apparent and so devastating.

The proposed legislation for multiphasic screening as a component of adult health maintenance provides an opportunity for public health to fill the vacuum that has existed in preventive medicine.

The medical world has demonstrated many achievements in curative medicine and control of communicable diseases. The rising tide of biomedical research has doubled and redoubled our store of knowledge about the chronic conditions.

We need to develop and support a creative partnership among all our health resources. This partnership in health will be the true path to the conquest of crippling and chronic diseases.

Senator NEUBERGER. Will you excuse me for interrupting?

We have two of our top staff members here who handle a lot of this that I would like to have receive some of the testimony until I can get back, if you would like to do it that way, because I have had the papers, and I have gone over them, but I do want to be here, but I don't know whether I am going to have to stay for two votes or not, and it would be a convenience to you people if we didn't have to keep you too late.

So why don't you kind of take charge for a little while, and I will be right back. I hope I can bring some of the other members who have been delayed.

Mr. BIGGS. The buzzer you heard was for a vote. Senator Neuberger has to go over to the floor for that, so you may continue with your statement.

Dr. COWAN. As you know, the Nation's well-being derives from the health of its people, and any investment in health, particularly in preventive medicine, will have a long and positive effect on this well-being.

The establishment and support of preventive medicine in our medical world will present quite a contrast to the crisis-to-crisis medicine with which we have continued to live.

It has been clearly established that early detection of chronic diseases, when combined with proper medical management, greatly reduces the crippling effects of the condition and adds many productive and healthy years to the individual's life.

Every available fact points to the same conclusion, that the toll of heart disease, arthritis, cancer, stroke, diabetes, and other chronic diseases can be sharply reduced now, in this Nation, and in this time.

Most of the diseases which cause great difficulty for both the middle-aged population and the elderly are the chronic diseases and disabilities.

As you know, it has already been stated by several people that the basic approach to chronic disease must be preventive. Otherwise, the problem will get progressively larger, and any hope for a substantial decline in the incidence and the severity will be postponed for many years.

There have been several references today to the Commission on Chronic Illness. In 1966, they pointed out that with the existing or limited knowledge of etiologic agents and causative factors associated with chronic disease, we can prevent occurrence of a significant number of cases of some of these diseases.

We can prevent an appreciable amount of disability and can postpone, if not prevent, death from certain of these diseases at their onset—cancer, cardiovascular disease, neuromuscular, and other chronic diseases.

Much can be done to prevent illness and disability through early diagnosis and adequate treatment, including intensive rehabilitation.

Now, the two common methods of early-case finding, and that is what we are talking about, include first the so-called physical examination, or health inventory, and second, multiphasic screening for presumptive evidence of certain diseases.

The health inventory is considered an ideal. This is impractical, for the following reasons:

First, the number of practicing physicians is insufficient.

Second, the physician is oriented both in his medical school training and later in his practice toward the treatment of disease, rather than prevention.

Third, the layman ordinarily seeks medical attention only after the development of symptoms or disability.

And fourth, the cost is enormous, whether it is borne by the individual or by society.

Multiphasic screening has been defined for you before, and I will not repeat that.

Public health has already played an important role in the prevention of both communicable and chronic diseases. The impact of this can be measured by the decline of thyrotoxic heart disease by prevention of goiter, diphtheritic myocarditis by prevention and treatment of diphtheria, syphilitic aortitis, gonococcal arthritis and endocarditis, rheumatic heart disease, and many others.

So we have two areas of prevention, primary prevention, and secondary prevention.

Primary means the avoidance of disease, and in these instances I would mention to you some of this has been done, but our greatest contribution can be in what is called secondary prevention of disease, disability, and premature death.

A chronic disease assumes public health significance whenever it has the following three characteristics:

First, it is widely prevalent in the community.

Second, it is a significant cause of death or disability.

And third, it can be dealt with on a community basis with a reasonable assurance of success.

Chronic diseases in general fulfill these criteria.

From among the chronic diseases which are unequivocally benefited by early detection and treatment, the following partial list can be made: Diabetes, glaucoma, tuberculosis, syphilis, certain types of cancer, and anemia.

A good example of what we are getting at is in the field of diabetes control. After decades of experience in treating diabetics, the Joslin Clinic reports that those diabetics who receive treatment shortly after the onset of their disease live longer than diabetic patients in general. This is true at any age level.

An example, though, is the group from 45 to 49 years of age. Here, Joslin reports that 43 percent of those treated early were alive 20 years later, as opposed to 29 percent of all diabetic patients.

This is just one example of the many reports available to justify early detection and treatment.

This pattern has been clearly established in many, although by no means all, areas of chronic disease. Early detection and treatment mean a longer productive and healthy life, and are a sound investment in the public health of this Nation.

I was going to talk about some of the multiphasic screening programs that we have had in Michigan, but the statistics on those are in the record. I will not take your time for that, except to mention the highlights of one or two.

One of these—

We have done both multiphasic screening and single-disease type screening.

One of these, of course, is in diabetes, and since early 1957, to the present date, we have screened more than one-half million persons, 588,710, to be exact.

With followup completed on the first 348,113 tests, we have already discovered, and brought to treatment by their personal physicians, 2,385 new cases of diabetes, previously unknown, and in addition brought 1,574 previously known cases back under medical management.

I mentioned to you before the report of the Joslin Clinic, as to the advantages of finding diabetes early.

We have done cervical cancer screening, glaucoma screening, and so on. I will not go into the details of those. We have lots of numbers.

I want to point out, though, that these are not numbers. These are people. And these people require further diagnosis from their physician, and in most instances treatment.

In the screening procedure, local and State health departments have become quite used to the techniques, and it requires a lot more than having the instrumentation to do screening in the community.

One of the biggest things is to get public acceptance. This is not always easy to do. And we also need acceptance by the practicing medical profession, and their cooperation is needed if we are going to get any followup and results.

On our screening programs in Michigan, we work cooperatively with the voluntary health associations involved, such as the Michigan Tuberc-



culosis & Respiratory Disease Association, the Michigan Diabetes Association, and so on.

There has been very good cooperation between the Michigan Department of Public Health and the Michigan Commission on Aging in screening endeavors.

Now, we realize we have just scratched the surface. I have submitted to you some estimates on the persons 45 years and over with specific chronic conditions. That is in the record, and also some statistics on the number of persons with one or more chronic conditions, by age group.

When I reflect on the magnitude of the problem, I am always reminded of Leavell's comment:

We still need to remind ourselves constantly that the increase in man's life span by 18 years in half a century has more profound medical, economic, and social implications than such developments as atomic energy, air transportation, space exploration and modern communication.

Screening has been acceptable. In fact, many times we have been unable to meet the demands of the people, and that is not only true in our particular State. I am sure we would find it so in the others that you will hear.

But if resources are not made available, and the problem enlarges as our population ages, as we have seen it do over the past several decades, I submit to you there is a question that we are going to have to ask ourselves: Will we be faced with an economy that will depend upon the ability of a chronically diseased population to produce the labor force required to sustain it?

In discussing multiphasic screening, we must keep in focus impact of the positive screening on an already overburdened physician. I would say overtaxed, but somebody might think that was a pun.

With screening, we will have people consulting with physicians who previously never consulted with a doctor, except for some acute or terminating illness.

Hopefully, the solution as outlined in an earlier recommendation of the President's Commission on Heart, Cancer, and Stroke, will lie in providing enough medical personnel to take care of these new patients, and also provide new centers of medical excellence for the application of these skills.

In spite of the demand for a physician's time, many of the problems we experienced in coordinating our early multiphasic screening programs in Michigan with the medical profession no longer exist. This is reflected in the development of close working relationships with the various professional groups in the State.

As an example, we participate with voluntary health organizations in the screening of members of the Michigan State Medical Society at their annual meeting.

Further evidence of the rising interest and awareness of the medical profession is their continued support and participation in the multiphasic screening programs conducted at the annual meeting of the American Medical Association, in their most recent program in Chicago in June of this year.

Programs like this, and the cooperative one we have in Michigan, can further bridge the gap between public health and private medicine. In any cooperative effort, there is no substitute for understand-

ing and close communication. After being properly involved and informed, we believe that physicians recognize that screening can be an important part of medical management.

Let me point out, however, though, that screening will not relieve, but will rather add to their overflow, although it will alter the type of patients that they see, because they will be seeing patients who otherwise would not be going to a physician.

Then, in conclusion, in my opinion, the time has come for us to prevent sickness, rather than spending all of our time in patching up those who are already sick or disabled.

The greatest thing that can be done for the older population is to find, treat, and counsel those in the great middle years, when they are incubating the diseases which will later cause them to require prolonged care and hospitalization.

Mr. BIGGS. Dr. Cowan, you mentioned screening of the program by physicians and by public health. What suggestions do you have that can possibly be done to insure that physicians do accept a screening program?

Dr. COWAN. I think it can be done in a number of different ways, and there is no one pathway that would succeed or fail.

Ordinarily, the program should be discussed with the medical community in advance.

Second, they should participate in the planning of the program. They perhaps will participate in recommending to the local health department what the screening levels should be, so that at any given level a patient will be referred to his physician or not referred.

Much of the difficulty, from a practical standpoint, in connection with screenings, comes from a misunderstanding of this. Physicians do not like to be flooded, in their office, with people who have nothing wrong with them. On the other hand, they do not like either false positives or false negatives. They like to see those patients who probably have an abnormality at a time when they can use their diagnostic and treatment skills to the greatest advantage.

They have in general some reluctance, and the reluctance used to be vocal, in terms of, "Well, this is mass medicine, machine medicine, at its worst."

However, some of them later openly admitted that one of their fears of screening is that the screening operation may find something out about the patient that they might have discovered themselves.

This does not happen very often, but it does happen occasionally, and I don't see why it should bother the physician.

But now, if the physicians are brought in on the planning, if you will ask them to cosponsor the planning, and ask them to appoint a technical advisory committee, we have found in those conditions we have very little difficulty with the medical community.

Mr. BIGGS. You talk about the community, but if it were, for example, a statewide program, then you would say preplanning with the State Medical Association, or if nationwide, with the American Medical Association. Is that correct?

Dr. COWAN. That is right.

Mr. ORIOL. Associated with that, you have this very wide acceptance from the public. Was that on tuberculosis screening alone?

Dr. COWAN. And diabetes.

Mr. ORIOL. How do you go about educating the public to this? How do you get such wide acceptance?

Dr. COWAN. We do a great deal of community organization and promotion, through use of our health educators.

We usually, in any particular community where we are going to screen, have discussions with the press, both the working press and the management of the newspaper. Very often we try to get editorials in the newspaper, as well as articles.

We publicize it through television, through radio, through consistent spot announcements throughout the day.

We get the cooperation, for example, of the electric light company, putting a notice in the light bills that go to everyone, things of that type.

And then sometimes we match one type of screening against another. When one is relatively unpopular, we try to combine it with one that is popular.

Since the early years, since the 1940's, we have been doing tuberculosis screening by mass X-ray. That has become an accepted and integral part of the community life in most areas of Michigan.

Now, we only do this type of mobile X-ray screening when we combine it with diabetes screening.

Mr. ORIOL. That raises a point here. How many different kinds of mobile units have you used in Michigan for differing kinds of screening?

And would you like to see something like we had outside this building, a mobile health unit that could do several kinds of tests at once?

Dr. COWAN. Yes, we certainly would, to answer your last question first.

We have used two different things. Whenever possible, if we are doing screening—much of our early screening was done in small industry, on industrial workers. Then we set up, right within the plant, the industrial plant itself.

Otherwise, we have gone with our X-ray trailers. We have used six of those to go around the State, and we have had them custom made. They have an area in there where we obtain blood specimens, do blood pressure determinations and so on.

Mr. ORIOL. You think at this stage, where you have had so much cooperation over the years, the various associations with whom you worked would be willing to pool their interests into one giant mobile unit, with a little help?

Dr. COWAN. That is a little difficult to answer, sir.

The voluntary health organizations in the past have done a considerable amount of screening. Most of them have now gone out of the screening business.

In our particular State, I think the only ones still in it are the Heart and Diabetes Associations which do screening. They are considering buying a screening bus and trailer, as you go around the State, to do certain types of cardiovascular screening.

The voluntary associations might get together, particularly if they had a good reason to.

Mr. ORIOL. Why do these things fluctuate? I notice in the summary provided by Dr. Borhani, across the Nation there is such a wide variety of different kinds of screening programs which are very popular for a while, and then we see no more of them.

In one State a project was ended because the public health funds suddenly ran out, and so forth.

Are there fads in screening in the field? Would one overall screening effort sort of sustain this and make it a habit?

Dr. COWAN. Well, we have again, as I mentioned before, public acceptance. In some instances the public no longer accepts too graciously certain types of screening, but screening is not an end to itself. It is a means to an end, as brought out earlier, to final diagnosis and treatment, if indicated, or else a clean bill of health.

But to do screening, you want to be able to screen for a disease that you can do something about after you find it. That is one of the criteria which was used. And with some diseases, we can screen for them, but there is not much more we can do about them afterward. In other diseases, we don't have an acceptable screening test. If we could find them, really we could do something.

But I think you will find throughout the States that the patterns vary, and the amount and type of screening varies with the knowledge that we have of that particular disease at that time, and how successful we were without previous screening activities for that. That may lead you to drop one that was apparently very popular before, and pick up one that was not used before.

Mr. ORIOL. You said that, with screening, doctors would see patients who otherwise would not see a physician. You have touched upon that. I just wonder if you would elaborate on that a little more.

Dr. COWAN. I read a good many different articles about how screening is going to help the overburdened physician. I can't see how it will help, except to change the type of patient that he sees.

He will be seeing patients who apparently have an abnormality, rather than be spending most of his time on persons who are apparently well, and come in for just a periodic physical or come up because they are psychoneurotic.

The patients that are screened and have abnormalities will be going to a physician. These people felt apparently well before they were screened. They would not have been going to a physician, except for this screening incident.

That was the point I was trying to make.

Mr. BIGGS. Dr. Cowan, I think it is very important that you did make the point that we are not dealing with numbers, but we are dealing with individuals. I think we should keep that in mind at all times.

Thank you very much.

(Dr. Cowan's prepared statement follows:)

STATEMENT PREPARED BY JOHN A. COWAN, M.D., CHIEF, DIVISION OF ADULT HEALTH, MICHIGAN DEPARTMENT OF PUBLIC HEALTH, AND PRESIDENT OF THE ASSOCIATION OF STATE AND TERRITORIAL CHRONIC DISEASE PROGRAM DIRECTORS

I am very pleased to be able to testify before this committee today on the role of health screening as a component in the management of chronic disease.

The health of our aging population has been a subject of serious concern to medicine, to public health, to social welfare and to government in general for many years. Great strides have been made in certain directions, examples of which are the recent so-called Medicare legislation and the Regional Medical Programs Act as related to heart disease, cancer and stroke. Nevertheless, in my opinion, the greatest contribution that can be made to health is in the area of prevention. This must begin in infancy or even prenatally and continue on through life. However, it is particularly important to have available health pro-

tection services in the middle years of life when chronic disease becomes so apparent and devastating.

The pending legislation promoting multiphasic screening as a component of adult health maintenance, provides an opportunity for public health to fill the vacuum that has existed in preventive medicine.

The medical world has demonstrated many achievements in curative medicine and the control of communicable disease. The rising tide of biomedical research has doubled and redoubled our store of knowledge about the chronic conditions.

We need to develop and support a creative partnership among all our health resources. This partnership in health will be the true path to the conquest of the crippling and chronic diseases. As you know, the nation's well being derives from the health of its people and any investment in health, and particularly in preventive medicine, will have a long and positive effect on this well being.

The establishment and support of preventive medicine in our medical world will present quite a contrast to the crisis to crisis medicine we have continued to live with.

This area of preventive medicine, or adult health maintenance, is one of the broadest and most challenging imaginable since it will encompass all those measures which promote the continued health of the individual.

It has been clearly established that early detection of chronic diseases, when combined with proper medical management, greatly reduces the crippling effects of the condition and adds many productive and healthy years to the individual's life. Every available fact points to the same conclusion—that the toll of heart disease, cancer, stroke and other chronic diseases can be sharply reduced now, in this nation, in this time.

Most of the diseases which cause the great difficulty for both the middle aged population and the elderly, are the chronic diseases and disabilities. "The basic approach to chronic disease must be preventive. Otherwise, the problems created by chronic diseases will grow larger with time and the hope of any substantial decline in their incidence and severity will be postponed for many years."<sup>1</sup>

As was pointed out by the Commission on Chronic Illness in 1956, with the existing though limited knowledge of etiologic agents and causative factors associated with chronic disease, we can prevent occurrence of a significant number of cases of some of these diseases. We can prevent an appreciable amount of disability and can postpone, if not prevent, death from certain of these diseases at their onset—in cancer, cardiovascular disease, neuromuscular and other chronic diseases. Much can be done to prevent illness and disability through early diagnosis and adequate treatment including intensive rehabilitation.

Two common methods of early casefinding include (1) the so-called periodic physical examination or health inventory and (2) multiphasic screening for presumptive evidence of certain diseases.

*The Health Inventory* is considered an ideal. This is impractical for the following reasons:

1. The number of practicing physicians is insufficient.
2. The physician is oriented, both in his medical school training and later in his practice, toward the treatment of disease rather than prevention.
3. The layman seeks medical attention only after the development of symptoms.
4. The cost is enormous, whether it is borne by the individual or society.

*Multiphasic Screening* is the presumptive identification of unrecognized disease or defects by the application of a test, examination and other procedures which can be applied rapidly.

Public health has already played an important role in prevention in both communicable and chronic diseases. The impact of this role can be measured by the decline of Thyrotoxic heart disease by prevention of goiter; diphtheretic myocarditis by prevention and treatment of diphtheria, syphilitic aortitis, gonococcal arthritis and endocarditis, rheumatic heart disease and many others.

A chronic disease assumes public health significance whenever it has the following three characteristics:

1. It is widely prevalent in the community;
2. It is a significant cause of death or disability;
3. It can be dealt with on a community basis with a reasonable assurance of success.

<sup>1</sup> *Planning for the Chronically Ill*, a Joint Statement of Recommendations by the American Hospital Association, the American Medical Association, the American Public Health Association, and the American Public Welfare Association. *Journal of the American Medical Association* 135: 343, October 11, 1947.

From among the chronic diseases which are unequivocally benefitted by early detection and treatment, the following partial list can be made: diabetes, glaucoma, tuberculosis, syphilis, certain types of cancer, and anemia.

A good example is in the field of diabetes control. After decades of experience in treating diabetics, the Joslin Clinic reports that those who receive treatment shortly after the onset of their disease live longer than diabetic patients in general. This is true at any age level and an example is the group from 45-49 years of age. Here, Joslin reports that 43.4 per cent of those treated early were alive twenty years later, as opposed to 29.2 per cent of all diabetic patients. This is just one example of the many reports available to justify early detection and treatment. The pattern has been clearly established in many, although by no means all, areas of chronic disease. Early detection and treatment mean a longer productive and healthy life, and are a sound investment in the public health of this nation.

#### MICHIGAN PROGRAMS

Multiphasic screening, as well as individual disease screening, has long been an important part of our disease prevention program and has been demonstrated successfully in Michigan since 1954. We have experienced very good reception on the part of the public and in many instances the demand for the screening programs by individuals has exceeded the capacity of the clinics. Before 1954, most of our screening was pointed primarily at the detection of single disease entities, such as, tuberculosis, chronic lung disease, lung cancer and certain types of heart abnormalities. Since 1954, we have conducted thirty-three (33) multiphasic clinics and have screened 31,279 persons. In addition to the multiphasic screening, we have also continued to screen large numbers of Michigan residents for individual diseases, such as, diabetes, glaucoma and cervical cancer.

Between 1954 and 1965, cervical cancer screening projects have been demonstrated in about forty (40) counties in Michigan, with 42,183 women screened and 156 previously unknown cases discovered and brought to treatment by their personal physician. The impact on these 156 individuals, their families and society, extends far beyond the limitations of this discussion. We now have developed techniques in making screening more selective and through improved community organization and promotion the yield has been increased from 3.7 per thousand screened to a high of 17.2.

Another example in Michigan is in our diabetes screening activities. Since early 1957 to the present date, we have screened more than one-half million persons (588,710 to be exact). With follow-up completed on the first 348,113 tests, we have already discovered and brought to treatment by their personal physicians, 2,385 new cases of diabetes that were previously unknown, and in addition brought 1,574 previously known cases back under medical management.

Our efforts in glaucoma screening have also been effective. Since 1959 we have screened 24,704 persons for glaucoma and have discovered and brought to treatment by their personal physician 279 cases of previously unknown disease. It should be noted that if these cases were not discovered early and adequately treated, many of them would progress to blindness.

Our mobile 70 mm. chest x-ray screening program has also been very active and in 1963 we screened 247,736 persons. In addition to the tuberculosis and heart disease suspects found, there were 474 lung cancer suspects that were referred to their private physicians for diagnostic follow-up. As a direct result of this program, 79 new cases of lung cancer were diagnosed and treated (27 cases of lung cancer were detected as result of some other abnormality such as suspect tuberculosis or cardiac involvement).

As discussed earlier, we have also been active in multiphasic screening and since 1954, 31,279 persons have participated in this program. In screening this population, we found 16,716 abnormalities of which 2,378 were confirmed by the screenees' physicians as previously unknown, and 3,450 as previously known but returned to medical management. In total, 12,313 of the original persons screened were found to have one or more suspected chronic conditions.

In general, our screening procedures include the following steps:

1. Community organization and promotion.
2. Registration, including the name of the patient's physician to whom the report is to be sent, and a screening history.
3. The screening procedure.
4. Laboratory testing, where indicated, and x-ray interpretation.
5. Reports are then sent to the patient's designated physician for his information in making a diagnostic disposition and treatment, if indicated.

It should be emphasized that the patient is *not* informed of the results of the test but told only that he has an abnormality and that he will need to report to his doctor for further examination.

6. The final procedure is the follow-up by letter, or if necessary, a visit to encourage the patient to report to his physician, and to obtain from the physician the report of the results of his examination.

In our screening programs we work cooperatively with the voluntary health associations involved, such as, the Michigan Tuberculosis and Respiratory Disease Association, the Michigan Diabetes Association, the Michigan Heart Association and the cancer societies. There has been very good cooperation between the Michigan Department of Public Health and the Michigan Commission on Aging in screening endeavors.

When we reflect our screening programs here in Michigan on our current estimates of specific chronic conditions in Michigan, we realize that we have barely scratched the surface of the problem. Information on the magnitude of chronic diseases in Michigan is currently estimated by utilizing the prevalence estimates for specific conditions from the U.S. National Health Survey<sup>2</sup> and the Michigan population projections through 1970.

*Number of persons 45 years and over in Michigan with specific chronic conditions*

	1965			1970		
	45 to 54	55 to 64	65-plus	45 to 54	55 to 64	65-plus
Heart condition.....	33,416	51,511	102,672	35,612	55,321	110,707
High blood pressure.....	46,107	59,556	89,079	49,137	63,961	96,050
Diabetes.....	11,321	19,198	27,876	12,065	20,618	30,058
Arthritis and rheumatism.....	103,717	125,398	183,402	110,533	134,673	197,755
Chronic bronchitis.....	11,595	11,289	13,041	12,357	12,124	14,062
Visual impairments.....	17,347	20,956	71,208	18,457	22,506	76,781
Deafness and other hearing impairments..	34,785	45,022	118,542	37,071	48,285	127,647

Information on the general magnitude of the number of persons in Michigan with one or more chronic conditions can be provided by utilizing the current estimates from the National Health Interview Survey<sup>3</sup> and the Michigan population projections.

*Number of persons with 1 or more chronic conditions in Michigan*

Age	1965	1970
25 to 44.....	1,090,168	1,070,542
45 to 64.....	1,051,874	1,124,596
65 and over.....	575,543	620,385

When I reflect on the magnitude of the problem, I am always reminded of Leavell's comment, "We still need to remind ourselves constantly that the increase in man's life span by 18 years in half a century, has more profound medical, economic, and social implications than such developments as atomic energy, air transportation, space exploration and modern communication."<sup>4</sup>

When we further reflect on these screening activities in Michigan and other areas as they are presented, I suggest to you that the numbers, or new cases previously unknown and now diagnosed and brought to treatment, are not numbers, but individuals. These individuals come from all of the various social and economic strata. Chronic disease, like other disease problems, does not respect the artificial barriers in our society. Chronic disease reaches into and takes away from all of us the individual right to a healthy and productive life. We should all realize the rewards of utilizing our economic and human resources in combat-

<sup>2</sup> Health Statistics from the U.S. National Health Survey, "Older Persons Selected Health Characteristics." United States, July 1957-June 1959, Series C-No. 4, page 35.

<sup>3</sup> Current Estimates from the Health Interview Survey, United States, July 1961-June 1965, Series 10, No. 25, page 12, table 9.

<sup>4</sup> Leavell, Hugh, *New Occasions Teach New Duties*. Public Health Reports. 68 : 687-692, July 1953.

ing the devastating effects of chronic diseases, and hopefully we will be able to meet the demands when new resources are made available.

If resources are not made available and the problem enlarges as our population ages, as we have seen over the past several decades, will we be faced with an economy that will depend upon the ability of a chronically diseased population to produce the labor force required to sustain it?

In discussing multiphasic screening we must also keep in focus the impact of the positive screen on an already overburdened physician. With screening, we will have people consulting with physicians who previously never consulted with a doctor except for some acute or terminating illness.

Hopefully, the solution as outlined in earlier recommendations of the President's Commission on Heart Disease, Cancer and Stroke, will lie in training enough paramedical and medical personnel to care for these new patients and also provide new centers of medical excellence for the application of these skills.

In spite of the demand for a physician's time, many of the problems we experienced in coordinating our multiphasic screening programs, in Michigan with the medical profession, no longer exist. This is reflected in the development of close working relationships with the various professional medical groups in the state. As an example, we participate with voluntary health organizations in the screening of members of the Michigan State Medical Society at their annual meeting. Further evidence of the rising interest and awareness of the medical profession is their continued support and participation in the multiphasic screening program conducted at the annual meeting of the American Medical Association with their most recent program in Chicago in June of this year. Programs like this, and the cooperative one we have in Michigan, can further bridge the gap between public health and private medicine. In any cooperative effort there is no substitute for understanding and close communication. After being properly involved and informed, it is believed that physicians will recognize that screening can be an important part of medical management. While screening will not relieve, but rather will add to their work load, it will alter the type of patient they see.

In my opinion, the time has come for us to prevent sickness rather than spending all of our time in patching up those who are already sick or disabled. The greatest thing that could be done for the older population is to find, treat and counsel those in the great middle years when they are incubating the diseases which will later cause them to require prolonged care and hospitalization.

Mr. Biggs. We will now hear from Dr. Borhani.

**STATEMENT OF DR. NEMAT O. BORHANI, SECRETARY-TREASURER,  
ASSOCIATION OF STATE AND TERRITORIAL CHRONIC DISEASE  
PROGRAM DIRECTORS; CHIEF, BUREAU OF CHRONIC DIS-  
EASES, CALIFORNIA STATE DEPARTMENT OF PUBLIC HEALTH,  
BERKELEY**

Dr. BORHANI. First of all, if I may, I would like to reiterate what Dr. Cowan mentioned and request that the summary document that I prepared and submitted to you last week be inserted in the record.

We did send a telegram to all States and territories, and the response received was summarized into that document, which represents the entire picture of this program in the United States. Thank you.

(The document referred to follows:)

**SUMMARY OF HEALTH SCREENING PROGRAMS IN SELECTED STATES<sup>1</sup>**

**PROGRAM**

**Arkansas**

1. Chest clinics for tuberculosis in some counties; diabetes screening in a few counties; plans to start cervical cytology in a few counties.

<sup>1</sup> Replies received as of September 8, 1966. Four other states also replied but did not describe any screening programs.



*Colorado*

1. Planning a regional medical program on heart-cancer-stroke, if grant approved.
2. Had a diabetes screening program which lapsed with withdrawal of USPHS personnel.
3. Presently some screening for tuberculosis and respiratory diseases, and for cervix cancer in six areas of state.
4. Some community diabetes screening by Diabetes Association.
5. A few (4-6) glaucoma screening clinics per year by Society for prevention of Blindness with State Department of Public Health's assistance.

*Connecticut*

1. Screening for tuberculosis, diabetes, glaucoma and visual defects and for visual and hearing defects in school-age populations.

*Florida*

1. Four permanent glaucoma screening centers screened 86,800 persons and identified 1,360 that were diagnosed as glaucoma (rate of 15.1 per 1,000 examined).
2. Recently screened 10,174 Aid to Dependent Children recipients for cervix cancer by Pap smear; 205 confirmed as cervical cancer by biopsy for yield of 19 cases per 1,000 examined. County Health Departments are continuing this program.
3. Have long had screening programs for tuberculosis and venereal disease. In tuberculosis screening, program also finds 1 in 800 suspicious for lung tumor and 1 in 300 suspicious of cardiac pathology.

*Georgia*

1. Combined testing for syphilis and tuberculosis was started in 1942. In 1949, anthropometry and diabetes tests and cardiological review of X-rays were added. The program was discontinued after several years due to lack of funds and inadequate follow-up. Now have separate screening program for syphilis, tuberculosis, diabetes, arthritis, pulmonary and cardiovascular diseases. Plan to start cervical cytology program for medically indigent females. Have specially trained health educator-administrator men assigned to work with local screening programs and promote public acceptance.

*Hawaii*

1. Screening for diabetes, glaucoma, tuberculosis.
2. Two instances of multiple screening exams, one among plantation employees and one in an isolated, predominantly Hawaiian neighborhood.

*Illinois*

1. Screening for diabetes, glaucoma, rheumatic fever, cervical cytology and tuberculosis.
2. Health activities below age 60 include pre-school and school exams, prenatal and postnatal exams and multiphasic screening examinations in housing centers, particularly in metropolitan areas.

*Indiana*

1. Fluoroscopic surveys for tuberculosis.

*Massachusetts*

1. Trial program in 1952 demonstrated potential of multiphasic screening examinations for disclosing unsuspected disease. No program now.

*Mississippi*

1. Screening for diabetes; recently began a multiple screening program for glaucoma, visual acuity, diabetes and hypertension.

*Missouri*

1. Did a multiple screening program in Jefferson County several years ago on 5,000 persons. Physicians did not seem to appreciate the results sent to them and patients frequently did not return to their physician.
2. St. Louis City Health Department is doing a screening program as a pilot study at a housing project:

*Montana*

1. No programs except a few small ones such as heart sounds screening in children.

*Nevada*

1. Screening for tuberculosis and an annual glaucoma screening. No support for multiphasic screening examinations or other screening programs.

*New Hampshire*

1. Screening for pulmonary diseases, diabetes and glaucoma.

*New Jersey*

1. Screening for diabetes, syphilis, tuberculosis.

*New Mexico*

1. Some programs in oral cytology, venereal disease, tuberculosis and cervical cancer screening.

2. Conducted a diabetic screening program in 1959-1960.

3. Conducted a multiphasic screening examination in June 1966 for 268 women at an agricultural extension service course. Tests were height, weight, blood pressure, urine sugar, urine protein, blood sugar.

4. An Adult Health Maintenance Program is being developed for a low income rural area of four counties. Will include nutritional and medical history, laboratory tests, and limited physical examination with physician referral and follow-up planned.

*New York*

1. State employees in Albany area receive battery of screening tests, primarily for cardiovascular and respiratory disease. Screened 6,000 in past year. Plan to expand group and offer repeat exams at three-year intervals. Plan to add further tests.

2. A Well Aging Conference by Erie County Health Department in Buffalo has been in operation as demonstration past three years. Expect it to be absorbed in the department on continuing basis.

3. New York City Health Department operates continuing screening programs in glaucoma and diabetes.

4. Numerous glaucoma and diabetes programs throughout State, some continuous, some periodic.

*North Carolina*

1. Screening for diabetes, cancer and heart, and other chronic diseases on a limited basis.

*North Dakota*

1. Screening for glaucoma and cervical cancer.

2. Conducted one multiphasic screening examination at Fort Berthold Indian Reservation in 1958.

*Oklahoma*

1. Has operated a mobile multiphasic screening trailer since 1960. Tests are height, weight, blood pressure, oblique lead EKG, vital capacity, hematocrit, blood sugar and cervical cytology. By the end of 1965, 295,379 people had been screened and 21 percent had been referred to their physicians for further examination.

*Pennsylvania*

1. Screening for diabetes, glaucoma and tuberculosis routinely. Special screenings for anthro-silicosis and similar conditions.

*Tennessee*

1. Screening for diabetes, tuberculosis, oral cytology, P.K.U., heart disease. Also multiphasic screening examinations for eligible patients in Family Planning Clinics. Multiphasic screening examinations in Shelby County.

*Texas*

1. State has been involved in selective screening programs involving tuberculosis, diabetes and cancer. Some glaucoma screening conducted by voluntary agencies.

2. Houston City Health Department is developing a multiphasic screening program to become operational soon.

*Utah*

1. Screening for diabetes, tuberculosis, glaucoma.
2. Screening of pre-school children for amblyopia and other visual defects.
3. A cervical cytology screening was done between 1962 and 1965. Cervical cancer was diagnosed in 16 of 4,498 women.
4. The U.S. Public Health Service Occupational Health Field Station examines and screens past and present uranium miners by sputum sample for lung cancer. Lung cancer has developed in 54 men.
5. State Health Department is cooperating with the Salt Lake County Medical Society in developing a screening program for the Kennecott Copper Corporation. It may be modeled somewhat after the Kaiser program in California.
6. Now being planned are development of a Chronic Disease Screening Program for faculty of the University of Utah, a multiphasic screening program for about 300 persons age 62 and over who will be living in a housing development, a screening program for elderly Navajo Indians, and screening programs in Senior Citizens Centers in principal cities and in some industries.

*Virginia*

1. Limited multiphasic screening examinations for migrant workers by mobile trailer; hope to use in other parts of state after migrant season ends.
2. Screening for tuberculosis, diabetes, syphilis.

*Washington*

1. Various screening programs are conducted in the state.

SUMMARY OF OPINIONS AND RECOMMENDATIONS OF STATE CHRONIC DISEASE DIRECTORS<sup>2</sup>

1. There was almost unanimous agreement that there is a need for the development of multiphasic screening programs. Only one State Chronic Disease Director expressed the opinion that national legislation is neither necessary nor desirable for such a program.
2. Almost all replies stressed one or more of the following points regarding proposed legislation and development of multiphasic screening programs:
  - a. The legislation should clearly name state and local health departments as the responsible agencies. There was much objection to the regional concept. It was suggested that funds be channeled through the usual machinery of Federal aid to States, and State plus Federal aid to local health departments.
  - b. Funds must be adequate to provide for a total program of:
    1. lay and medical education to promote acceptance and utilization of multiphasic screening,
    2. development and application of the best screening procedures,
    3. comprehensive follow-up of individuals with positive findings, and
    4. development of adequate resources for diagnosis and treatment.
  - c. Any legislation should be highly flexible so programs can be developed at the local level and tailored to the health needs of the population and medical resources available. For example, multiphasic screening programs in largely rural areas probably need to be organized quite differently from those in urban areas.
  - d. Funds should not be earmarked for any one type of screening or chronic condition.
  - e. No age limits should be imposed for eligibility for multiphasic screening, although specific tests used vary according to age.
  - f. Provision must be made for the evaluation of any multiphasic screening program. One State Chronic Disease Director suggests Federal legislation with an adequate appropriation to encourage development of a nationwide network of multiphasic screening examination programs aimed at defining the productivity of varying approaches under differing field conditions.
3. A number of states reported improved physician cooperation in recent years; however, several states reported difficulty in getting the medical community to accept and cooperate with screening programs. Attention must be given to early solicitation of physician cooperation in the program, with em-

<sup>2</sup> Includes replies received as of September 8, 1966.

phasis on the concept that the purpose of screening is to bring patients to their family physician early in the development of the disease process.

4. It was emphasized that the purpose of multiphasic screening examinations must be made clear to the public, particularly that these are screening programs, not diagnostic clinics, and that a visit to their personal physician is essential for completion of the examination.

5. Several states emphasized the shortage of medical and related personnel essential to carry out screening programs and follow-up to insure that treatment is given where indicated.

Dr. BORHANI. Now, with that, my responsibility of representing the Association of Chronic Disease Program Directors is finished; however, I do have another task, if I may be permitted to proceed, that is to represent the State of California Department of Public Health.

As you recall, Dr. Lester Breslow, director of the department, was invited, but unfortunately could not attend this hearing because of other pressures of work back home.

It is a pleasure for me, and an honor, to appear before this committee, and to represent the California State Department of Public Health.

First, I would like to mention that last night I had the privilege of being instructed by the Governor of the State of California, the Honorable Edmund G. Brown, who sent a telegram through Dr. Lester Breslow. He asked me to present his views to the committee.

I would like to request that the Governor's message to the chairman be entered in the record.

Mr. BIGGS. This may be done.

Dr. BORHANI. The Governor's message reads:

DEAR SENATOR NEUBERGER: As Governor of the State of California, I wish to add to this hearing my earnest endorsement for the establishment of a health screening program.

I am well aware that chronic diseases account for three-fourths of the deaths which occur each year in California. I know, too, that these diseases strike down thousands of Californians who might otherwise continue normal and productive lives for many years. Such deaths not only bring untimely and needless tragedy to thousands of families, but they also do harm to our productivity and to our economy.

You will be interested to know that I have proposed that multiple screening examinations be made available to one million people of my State that are in our MediCal (Title XIX of the Public Law 89-97) program, and that another one million residents be reached through a joint State-Federal program.

I congratulate you upon your interest in this extremely important phase of public health. I hope that the Congress will support you in the development and realization of such a vital program.

This is the end of the Governor's message to the chairman of the committee.

I also, if I may, would like to introduce in the record a letter which was sent directly to the chairman of the committee by Dr. Lester Breslow, director of the California Department of Public Health; I trust that you have received that letter. If not, I have a copy I can furnish for the record.

Dr. Breslow did send me a copy of his letter, which arrived last night; in his letter he indicates again his regret at being unable to appear before this distinguished committee, and very clearly points out our position in regard to the subject under discussion.

I have also submitted, as you know, a document which summarizes our activities in the State of California on multiphasic screening ex-

aminations, and I would like to request that that document, which is called "Multiphasic Screening Examinations in California," be entered in the record as our views on the subject.

(Letter and document referred to follow :)

STATE OF CALIFORNIA,  
DEPARTMENT OF PUBLIC HEALTH,  
Berkeley, Calif., September 19, 1966.

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*United States Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: I am pleased to respond to your recent letter concerning health screening programs. Unfortunately, other commitments here in California preclude my personal appearance before your Subcommittee on Health of the Elderly. However, I am glad to present my views for the record.

Dr. Nemat Borhani, chief of the Bureau of Chronic Diseases of the California State Department of Public Health, will present a detailed report on our activities in the health screening field, and he will represent the Association of State and Territorial Chronic Disease Program Directors on the same subject.

The various chronic diseases now account for three-quarters of the annual deaths in California. One-third of these occur among persons less than 65 years of age. Thousands of Californians who might otherwise continue normal and productive lives die needlessly or become disabled from chronic diseases each year.

While the trend has been toward a higher proportion of deaths and disability from the chronic diseases, we now have many indications that this trend can be checked. For example, the cancer death rate, particularly among women, is already declining. This is especially true of the common form of the cancer of the uterus in which there has been a spectacular drop in the death rate during recent years. In California, at least, the death rate from the common forms of heart disease, that is heart disease associated with high blood pressure and coronary artery disease, has started to decline. Such facts have been insufficiently emphasized. Together with the well-known accomplishments in the field of diabetes control, tuberculosis control and the control of other important diseases, these recent indications of success with respect to cancer and heart disease suggest what we may anticipate in the future.

The most important element in the situation is that these favorable trends could be greatly accelerated through organized programs of health screening. What has been achieved in the case of tuberculosis, diabetes, cancer of the uterus and other forms of cancer, hypertensive heart disease and many other chronic diseases is due to a relatively simple form of attack on the problems. That attack consists of early detection of the disease process and prompt treatment with modern methods. The technical basis for a successful attack on many important chronic diseases is well established. All that is needed is organization in the full-scale application of available tools.

This should take the form of health screening programs such as those now being considered by the Congress.

In your letter, you refer to my advocacy of the establishment of 5 to 10 more health screening projects such as that undertaken by Dr. Morris Collen at the Kaiser Foundation Hospitals. I believe that at least 5 to 10 more projects of similar magnitude should be undertaken promptly. Such endeavors would advance our understanding of the potential accomplishment through health screening, would aid in the refinement of present tests and lead to the discovery of new tests, would popularize the concept of health screening among physicians, other health personnel and the general public, and would permit exploration of how health screening should be conducted in different parts of the country and in different kinds of institutions. Since Dr. Collen will be presenting testimony to your Committee, I believe that it would be better for him to give estimates of the costs of such centers. In this connection, however, I would like to emphasize that a considerable proportion of the cost of the Kaiser project is attributable to research and development. The actual provision of service on a large scale utilizing presently established means of detection would be in the order of magnitude of \$15-20. This would include the cost of multiphasic screening embracing tests for more than a dozen important chronic conditions.

This does not include the cost that would be necessary for the follow-up medical care of individuals found to have the chronic conditions.

A brief history of health screening programs in California, which you requested, will be presented by Dr. Borhani.

The development of automated and semi-automated techniques for health screening have vastly increased the potential and reduced the cost of such programs. Proper organization is needed if we are to make the best use of such technological improvements. I believe that we are on the verge of even greater developments. We should be organized to apply promptly the new developments as well as what is already known concerning the early detection of chronic diseases.

You inquire also about differing screening tests for differing age groups. It is true that various chronic diseases affect the various segments of the population in differing degree. Screening programs should be designed to take this fact into account. I believe that the final responsibility for such matters should be left in the hands of the physician responsible for the individual projects. Only in this way will we favor the development of new understanding through actual experience based on different points of view. For example, we now realize that the Papanicolaou smear, the cytologic test for cancer of the uterus, should be applied to women in their 20's or even younger, rather than waiting until women reach the so-called "cancer age". Some years ago many physicians believed that the Papanicolaou smear should be limited to women over the age of 35 years. Further experience, based upon the ideas of a relatively few physicians, has shown the fallacy of the older prevailing viewpoint.

In closing, I should like to emphasize one aspect of the current situation in respect to the development of health screening programs. You have asked about the desirability of establishing several more projects along the lines of that at the Kaiser Foundation Hospitals, and I have indicated above my opinion on that question. However, much more can and should be undertaken through Congressional action. A great deal could be accomplished with Federal support of health screening programs, organized on a somewhat less extensive basis than that at the Kaiser facilities. We need programs like that of Dr. Collen to test the limits of what can be accomplished and demonstrate what should be available to all persons five years from now. In the meantime, a large network of health screening programs should be organized throughout the country, utilizing health departments, clinics, hospitals and other health agencies.

I hope that you and your Committee will give favorable consideration to proposals for Federal support to health screening programs utilizing what is now known, as well as to programs for research and development in this field.

Sincerely yours,

LESTER BRESLOW, M.D.,  
Director of Public Health.

## MULTIPHASIC SCREENING EXAMINATIONS IN CALIFORNIA

### BACKGROUND

Over 40 years ago the American Medical Association first endorsed periodic health examinations as a means of preventive medicine.<sup>1</sup> With advances in laboratory techniques, various tests were developed to aid physicians in diagnosing patients' diseases. These tests were designed to be administered mainly by technicians, with results interpreted by physicians.

Persons concerned with the advancement of preventive medicine then saw the possibility of screening large groups of people to identify persons needing physicians' attention for diagnosis and medical management.<sup>2</sup> As a first step, mass screening programs for the detection of selected diseases were undertaken during World War II, mostly for the detection of tuberculosis and venereal diseases. As tests for the detection of other diseases were developed and proved satisfactory, the idea of combining a number of these tests into *multiphasic screening* evolved. Over the years multiphasic screening examinations have

<sup>1</sup> American Medical Association, *Periodic Health Examination: A Manual for Physicians* (3d rev.), Chicago, Ill., AMA 1947, p. 7.

<sup>2</sup> Breslow, Lester, "Prevention and Control of Chronic Diseases: V. Periodic Health Examinations and Multiple Screening," *A.J.P.H.*, vol. 49, No. 9, September 1959, pp. 1148-1156.

developed to the point at which many tests are now automated and in some instances results of screening tests are processed electronically.

The goals of multiphasic screening examinations are the same as those for periodic health examinations, namely:

1. "to detect early abnormalities so that early diagnosis and treatment may prevent disability and premature death,
2. to improve patient understanding of health and disease,
3. to establish patient-physician rapport as a basis for continuing health supervision, and
4. to provide an opportunity for such specific preventive action as immunizations, and for advice concerning habits affecting health. . . ."<sup>2</sup>

The ideal way to detect most chronic diseases is for every person to have thorough, periodic health examinations. With the present shortage of medical manpower, this is obviously impossible. A practical alternative therefore is multiphasic screening examinations which can be easily administered by technicians. Screening examinations provide a means by which apparently well persons with undiagnosed disease are separated for more definitive diagnosis.

It must be emphasized, however, that multiphasic screening examinations are not complete health examinations and do not provide medical diagnoses. They are the application of two or more simple laboratory tests, examinations or procedures on a mass basis to determine presumptive evidence of undetected or incipient disease. Persons with positive screening results must be referred for thorough clinical and laboratory examinations to arrive at definitive diagnoses.

To be effective, multiphasic screening tests must follow certain criteria. In 1955, the American Medical Association outlined some basic principles involved in the selection of tests to be included in multiphasic screening examinations,<sup>3</sup> namely, that the tests should: 1) be easily administered, 2) be easily interpreted, 3) be relatively inexpensive, 4) require little time to perform, and 5) meet the five criteria established by the National Conference on Chronic Illness. These are: reliability, validity, yield, cost and acceptance by the community.

*Reliability*—The test must be reliable in that information must be available concerning reproducibility of results as limited by the technical procedure.

*Validity*—The validity of a test is measured by the frequency with which the result of the test is confirmed by an acceptable diagnostic procedure.

*Yield*—The yield of a screening program can be measured by the number of previously unknown verified cases of disease among the total population surveyed, the number of persons with previously unknown verified diseases benefited by referral to medical care, and the number of previously known cases not under medical care benefited by return to it. . . . , and the number of cases of communicable diseases who are prevented from spreading their disease to the family or to the community.

*Cost*—The size of the yield of the screening program must be balanced against the cost . . . measured in monetary terms and in the relative amounts of time of professional nonprofessional personnel.

*Acceptance*—Reliability, validity, yield, and cost are essential criteria for evaluation of screening tests and programs. The measurement of acceptance of the program by the physicians, individual laymen, and the community is a useful additional criterion of the effectiveness of a screening program."<sup>4</sup>

A basic aspect of medicine is the concept of prevention and early detection. At present, a number of chronic diseases can be controlled if detected early enough. The thousands of deaths each year from the common cancer of the uterus are truly unnecessary. The highly accurate "Pap" test can detect this form of cancer before it becomes destructive and at a time when treatment can and does save lives. Changes in vision or in the pressure of the eye, if detected early, can lead to action that will prevent blindness. A few drops of blood, analyzed in detail with modern automated techniques, can give clues to diabetes, heart disease, diseases of the liver and kidney, as well as disorders of the blood, itself. These automated laboratory techniques are highly accurate and economical. We now have means for the early detection of many common chronic diseases as well as for some of the less common. Also, automated techniques keep the time and cost per test, and per person tested, at a minimum. "Recognizing the limitations imposed by time, cost and personnel shortages on current

<sup>3</sup> Council on Medical Service, American Medical Association, a Study of Multiple Screening, revised 1955, p. 7.

<sup>4</sup> Preventive Aspects of Chronic Disease, Conference Proceedings, National Conference on Chronic Diseases, Mar. 12-14, 1951, Chicago, p. 63.

opportunities for health examinations, the Commission on Chronic Illness accordingly endorsed screening as a practical supplement and alternative to comprehensive periodic health examinations. . . . ."<sup>6</sup>

#### MULTIPHASIC SCREENING PROGRAMS IN CALIFORNIA

In California, multiphasic screening examinations for the early detection of chronic disease have received considerable attention, beginning with the first project in 1948.<sup>6</sup> Between 1948 and 1954, with assistance from the State Department of Public Health, sixteen multiphasic screening projects were undertaken,<sup>7</sup> Table 1.

In 1948, the first multiphasic screening program was conducted as a demonstration project in San Jose, California. In the interest of economy and of better service to persons examined, the project combined screening tests usually done separately and applied them in a single procedure to 945 employees in four industrial establishments. Included were: miniature X-ray films of the chest, blood specimens and urine samples from which the suspected presence of pulmonary disease, heart disease, syphilis, kidney disease or diabetes could be detected. Personal and medical histories of each examinee were also obtained. The results in case-finding were considerably greater than those of the then-customary single disease screening.<sup>8</sup>

In 1951, a multiphasic screening examination was conducted among the members of the International Longshoremen's and Warehousemen's Union in the San Francisco Bay Area (I.L.W.U.). Several organizations cooperated in this survey, including the Union-Management Welfare Fund, the Kaiser Foundation Health Plan and the California State Department of Public Health. By 1951 large-scale projects had demonstrated the feasibility of multiphasic screening examinations as a public health measure. Not previously investigated, however, was the potential of such procedures in medical care programs providing comprehensive services (i.e., Permanente Medical Group and Kaiser Foundation Hospitals).<sup>9</sup>

The 1951 project afforded a unique opportunity to study:

1. The results of medical follow-up of multiphasic screening when there was no additional charge to the individual participant for diagnostic and treatment services, and when all records were available through one medical care organization, and

2. The cost of screening tests and of follow-up services.

Three features characterized the San Francisco longshoremen program:

1. A well-organized consumer group, the Union, which took the initiative in instituting the project,

2. The existence of a prepaid medical care program for the group. Thus, no financial barrier existed for completion of follow-up, and

3. A wide array of public and voluntary health agencies in San Francisco actively participated in the program.

In 1956 a five-year mortality follow-up of the I.L.W.U. was made.<sup>9</sup> A ten-year follow-up was undertaken in 1960.<sup>10, 11</sup> This study had four phases:

1. Mortality follow-up of examined population, 1951-1960,

2. Morbidity follow-up of examined population, 1951-1960,

3. A repeat multiphasic screening examination in 1961, and

4. A study of "health value patterns" among persons screened and persons not screened in 1951.

In both the 1951 and 1961 screening examinations approximately two-thirds of the "eligible" I.L.W.U. members participated. It should be emphasized that participation in either program was entirely voluntary and offered to all eligible members of the Union.

<sup>6</sup> American Public Health Association, *Chronic Disease and Rehabilitation: A Program for State and Local Health Agencies*, 1960, p. 51.

<sup>7</sup> Canelo, C. K.; Bissell, D. M.; Abrams, H.; Breslow, L., "A Multiphasic Screening Survey in San Jose," *California Medicine*, vol. 71, No. 6, December 1949.

<sup>8</sup> Breslow, Lester, "Multiphasic Screening in California," *J. Chron. Dis.*, vol. 2, No. 4, October 1955, pp. 375-383.

<sup>9</sup> Weisnerman, E. R.; Breslow, L.; Belloc, N. B.; Waybur, A.; and Milmore, B. K., "Multiphasic Screening of Longshoremen With Organized Medical Follow-up," *A.J.P.H.*, vol. 42, No. 12, December 1952, pp. 1552-67.

<sup>10</sup> Buechley, R. W.; Drake, R. M.; and Breslow, L., "Height, Weight, and Mortality in a Population of Longshoremen," *J. Chron. Dis.*, vol. 7, No. 5, May 1958, pp. 363-378.

<sup>11</sup> San Francisco Longshoremen: 1951-60 Mortality and Morbidity and 1961 Multiphasic Screening Examination. Dec. 31, 1961—Final report.

<sup>12</sup> Borhani, N. O.; Hechter, H. H.; Breslow, L., "Report of a Ten-Year Follow-up Study of the San Francisco Longshoremen," *J. Chron. Dis.*, vol. 16, 1963, pp. 1251-1266.



From the ten-year mortality study a number of facts emerged.<sup>11</sup> For example, "Throughout the age range 45-64, the mortality among 'hypertensive smokers' was approximately 9-10 times as high as that of 'nonhypertensive non-smokers.' . . . The men who had abnormal electrocardiograms in 1951 had a death rate approximately three times as high as those who did not have abnormal electrocardiograms."

Early in 1953, the late Doctor Russell S. Ferguson, Health Officer of Santa Cruz County, became concerned over the availability of medical care to aged persons living in Santa Cruz County. He sought the assistance of the Director of the County Department of Welfare in evaluating this problem. Together they concluded that an amount of money equal to that being spent for medicine and drugs for a small number of old age security recipients (O.A.S.) could provide financial support for a screening program and thus a preventive medical program for all O.A.S. recipients in the county. The Bureau of Chronic Diseases in the California State Department of Public Health was then requested to make a broader study and to prepare recommendations.<sup>12</sup>

In September 1955, the Santa Cruz County Health Department initiated a geriatric screening program to implement the recommendations. This program was a means to promote the early detection of disease and to assure prompt treatment for O.A.S. recipients. Persons in need of medical care were referred to their physicians and/or clinics for further diagnosis and treatment. In June 1956, the County Board of Supervisors appropriated funds to provide: professional services, drugs, a public health nurse and an X-ray technician. A few months later, the County Welfare Department began to reimburse the County Health Department for the cost of screening examinations. Funds were from the Welfare Department's administrative budget, half of which were available as Federal matching funds. During the first three years, \$27,250 were made available to the geriatric program for medical, dental and ancillary services for which no other funds were available at that time.

The State Public Assistance Medical Care Program became effective October 1, 1957. One provision of this program was that O.A.S. recipients could receive physician, X-ray and laboratory services privately; it also paid for certain drugs. Thus it became possible to shift some of the costs of the Santa Cruz Geriatric Screening Program to the State Medical Care Program.<sup>13</sup>

In 1959, a special study of the Santa Cruz Geriatric Screening Program was initiated to collect information on medical, social and economic characteristics of O.A.S. recipients. The purpose was to measure the degree of utilization, costs and sources of payment for medical and health services and to identify measurable items which could be used in evaluating the impact of this program on medical and related services.<sup>14</sup>

Over the years, the Department has encouraged multiphasic screening programs in the State. It has funded a number of such programs as well as projects concerned with the development and/or refinement of screening tests. Tables 2-4 summarize some current activities.

Another form of activity has been consultation services to local groups involved in screening programs. An example of this activity was the Department's close cooperation with Dr. Morris Collen and the group at the Kaiser Foundation Hospital during the development of its current multiphasic screening program.

In 1960, the Glaucoma Screening Project sponsored by the Sight Conservation Research Center of San Jose started operation on a twice weekly basis in the city health department clinic. The San Jose City Health Department in 1962 augmented this program by providing its Chronic Illness and Aging allotment funds to include tests for diabetes. Over 8,000 persons have been screened for diabetes since April, 1962. Of the total cases screened, 4.3 percent were diagnosed as diabetics and 2.8 percent were borderline cases.<sup>15</sup>

In spite of the reliability of many long-used screening tests, problems still arise. In analyzing the results of the San Jose diabetes screening tests, it is apparent that the referral of patients from evening clinics was 54 percent higher than for morning clinics. Further, when private physicians' reports on

<sup>11</sup> State of California, Department of Public Health, *The Health Status of Old-Age Security Recipients in Santa Cruz County*, Berkeley, 1956.

<sup>12</sup> Harris, O. S., "A County Health Department Geriatric Program," *Patterns for Progress in Aging*, case study No. 8, U.S. Department of Health, Education, and Welfare, Washington, D.C., June 1961.

<sup>13</sup> State of California, Department of Public Health, *Health Care of Old-Age Security Recipients in Santa Cruz County, January 1958-June 1961*, Berkeley, 1965.

<sup>15</sup> Williams, M. T., "Diabetes Screening by a City Health Department," *J. Occ. Med.*, vol. 18, No. 8, August 1966, pp. 422-424.

follow-up were received, a larger proportion of the evening referrals were considered negative. All possible points of error were checked; no differences in methods of testing or types of persons tested could be found. The clinic, backed by the Sight Conservation Research Center, undertook a study funded by the State Department of Public Health to investigate the problem. (Table 4). The importance of refining tests now in use cannot be underrated. It is a necessary part of a multiphasic screening program to assure that no cases of disease are missed and that the false positives are minimized.

#### OTHER SCREENING PROGRAMS IN THE STATE

In California, counties with less than 40,000 residents may obtain selected health service through contractual arrangements with the State Health Department. Recently, physicians in these contract counties were offered a diabetes screening program through which they may send blood specimens to the State Department of Public Health laboratory for free glucose determination.

In addition, the State, in cooperation with these rural counties, has initiated multiphasic screening programs called "Health Fairs".<sup>16</sup> In the spring of 1967, such fairs will be held in Mono and Alpine Counties. These are isolated counties in the Sierra Mountains and have respective populations of approximately 5,000 and 400 residents.

A number of hospitals in the State operate screening clinics for glaucoma detection. St. Luke's Hospital in Pasadena and St. John's Hospital in Santa Monica operate clinics which are open to the general public. White Memorial Hospital in Los Angeles operates such a clinic for out-patients. There are many other glaucoma screening programs in the State; however, they are one-time screenings on an announced basis.

Amblyopia screening is often included as a part of preschool examinations. In San Jose, the multiphasic screening for preschool children include: urine analysis, hemoglobin, height, weight, amblyopia and hearing examinations as well as interviews with parents. In other areas, amblyopia screening is part of the Well Child Conference Program; San Bernardino and Long Beach use this method. In other areas, such as Orange and Riverside Counties, the local Elk's Club and health department screen preschool children at announced clinics.

The Department has assigned personnel to cooperate with large local school systems to establish screening programs for hearing deficiencies. Consultation and training are provided.

In 1965, the Department sponsored a screening program for children entered in the "Head Start Program". It was carried out in six different areas; dental problems were in greatest evidence.

In addition, State legislation has played a part in increasing the use of screening techniques throughout the State. In January, 1966, it became mandatory to test newborn infants for P.K.U. (phenylketonuria) a condition which can cause mental retardation in later life. The last legislature passed a bill which requires preschool children attending Day Care Centers to undergo a health screening examination. The Department has worked closely with the Department of Education to develop standards for this program.

#### PLANS FOR FUTURE MULTIPHASIC SCREENING PROGRAMS IN CALIFORNIA

Chronic diseases are the leading causes of mortality, morbidity and disability in California. They impose a multimillion dollar burden on the State's economy each year—not to mention hardship to the individual, his family and the community (Table 5).

Present knowledge limits the scope of primary prevention of chronic diseases, i.e. the avoidance of the disease entirely (as in vaccination against smallpox). As a result, early detection is the most effective means now available for their control. A comprehensive program of early detection has three major components: Professional and Public Education, Development of Local Detection Programs, and Demonstration Projects.

Health education activities are another important element in the control of morbidity and mortality from chronic diseases. Such programs must allow for adaptation to the specific needs of any community. Included are: seminars, workshops, conferences, programs for television and radio, news releases, press conferences, and exhibits for local functions such as fairs, etc.

<sup>16</sup> Brown, W. R.; McKay, C. A., "Multiphasic Screening Demonstrations in Two Mountain Counties," *California's Health*, vol. 19, No. 4, Aug. 15, 1961, pp. 25-26.

We hope to develop early detection programs in at least five additional geographic areas of the State. Included in the program will be provisions for screening procedures, analysis of results, referral and follow-up, and evaluation. The basic program will detect diabetes, glaucoma and hypertension. In addition, specific screening programs for the early detection of cervical cancer will be continued.

Demonstration projects should also be sponsored to test the feasibility of using new techniques or approaches in the early detection of chronic diseases. Examples are:

1. Cervical Cytology Programs in Planned Parenthood Clinics. It is good medical practice to obtain a cervical tissue specimen before a woman starts routine usage of contraceptives because many of these women are in, or are just entering the age groups in which the prevalence of carcinoma in situ of the cervix is highest. Several planned parenthoods clinics have these programs in operation and they will be continued (Table 4).

2. Mammography. Evidence now shows that mammography can detect malignant breast tumors undiscovered by clinical examination. The method appears feasible for routine screening on a large scale only if technicians do the initial readings and radiologists make final decisions on suspicious or doubtful cases. It is essential to test further the feasibility of this technique for the early detection of breast cancer. In 1967-1968, at least two such projects will be developed in California.

#### COMPREHENSIVE PROGRAMS

Comprehensive multiphasic screening programs require a great deal of effort and coordination. Much time and effort must be spent in surveying: existing programs, past histories of different programs, existing services in communities, community needs, resources available and the medical climate of the communities. Only after this basic survey is completed can an effective program be tailored for the specific communities in question.

Education begins when an advisory committee starts planning and will properly radiate out as the committee gains greater understanding of the problem and program. Considerable time must also be spent in educating the medical community. Education begins prior to actual screening and must be continued throughout the entire process of the screening program. The public must be informed of the reasons and goals, what is to be gained, the limitations of screening, and the importance of medical follow-up.

Actual screening programs should vary with location, population studied and equipment available. An ideal screening program includes all tests presently available. The tests must have proven value and meet criteria previously described. In this way, many diseases may be tested for at one time, saving time and money, and increasing yield.

The best current example of an ideal program is that offered by the Kaiser Multiphasic Screening Project which includes the following tests:

1. Electrocardiogram (6 leads)
2. Phonocardiogram (at apex and base)
3. Table tilt cardiovascular test (80° tilt in 35 sec.)
4. Height, weight, and anthropometry
5. Chest X-ray (70 mm. minifilm)
6. Breast X-ray (women)
7. Timed vital capacity (1 sec. and total)
8. Visual acuity (modified Sloan chart) and pupillary escape test
9. Ocular tension (Schiotz tonometer)
10. Retinal photograph (left eye)
11. Hearing test (for 6 frequencies)
12. Pain reaction test (modified Libman test)
13. Health questionnaire (present and past history)
14. Personality appraisal questionnaire (modified MMPI)
15. Urine pH, glucose, protein, and blood (paper strip) tests
16. Urine bacteria count (tetrazolium chloride culture)
17. Serum glucose (1 hour after 100 gms. glucose)
18. Serum creatinine
19. Serum albumin
20. Serum total protein
21. Serum cholesterol

22. Serum uric acid
23. Serum calcium
24. Serum transaminase
25. Blood hemoglobin
26. White cell count
27. Blood group (AB)
28. V.D.R.L. test
29. Blood rheumatoid factor (latex test)
30. Blood trace elements (start 1965)
31. Frozen serum specimen

Follow-up must be an integral part of any screening program. Plans should be made for immediate referral if abnormal results are obtained during screening. Included in follow-up plans should be procedures for ascertaining whether each individual saw a physician and the results of his definitive examination. There should be established means for adequate referral for persons who do not have a physician and for the medically indigent.

Constant evaluation is necessary to detect any errors occurring in test procedures and to make the necessary changes. Standards that can be duplicated must be developed and results must be assessed.

Following is a list of major chronic diseases for which screening tests have been developed:

DISEASE	SCREENING TEST
Cardiovascular	Blood pressure
Hypertension Heart Disease	Chest X-ray
Arteriosclerotic Heart Disease	Retinal photograph
	History
	Chest X-ray
	ECG
Diabetes	History
	1-2 hour post glucose
	Ingestion blood sugar
Chronic Genital Urinary Disease	Urine for bacteria ; albumin
	BUN
Chronic Pulmonary Disease	Chest X-ray
	Spirometry
Neoplastic Disease	Cervical Cytology
	Mammograph
	Skin and oral inspection
	Chest X-ray
	Sigmoidoscope
	Breast Palpation
	Gastric analysis stool for occult blood
Arthritis and Rheumatism	History
	Uric acid, blood
	Inspection
Mental Illnesses	Minnesota Personality Inventory
Obesity	Height, weight, skin fold
Glaucoma	Tonometry
Hearing Loss	Audiometry
Vision Loss	Visual acuity
Hematological Disorders	Hemoglobin, Hematocrit, white blood count

Several of these tests may be simplified with the development of automated procedures. At present, most blood chemistry determinations can be done quickly, accurately and inexpensively. It appears the EKG reports may soon be completely computerized. Results of other tests may be punched on computer cards for immediate analysis and storage and answers to health questions can be placed on computers programmed to analyze answers in specific ways.

In the future it will undoubtedly be possible to conduct screening programs more rapidly and economically for larger portions of our population.

TABLE 1.—*Multiphasic screening projects in California, 1948-1954*

Location	Date	Administration	Number persons tested	Description of persons tested	Tests employed										
					Height and weight	Vision	Hearing	Chest X-ray	Electrocardiogram	Blood pressure	Serologic test for syphilis	Hemoglobin	Blood sugar	Urine sugar	Urine albumin
San Jose.....	May 24 to June 4, 1948.	City and State health departments, County medical society.	945	Industrial workers from 4 plants.				X		X		X	X	X	X
San Mateo.....	October 1948 to June 1949.	County health department.....	577	Persons over 50 years of age volunteering for a nutrition study.	X			X		X	X	X	X	X	X
Los Angeles.....	November 1949 to June 1951.	City health department.....	2,250	Random sample of Los Angeles city civil service employees.	X			X	X	X		X	X		X
do.....	Aug. 31 to Sept. 16, 1950.	University student health service.	3,132	Entering university students.								X	X		X
do.....	Mar. 27 to June 30, 1950.	Los Angeles County X-Ray Survey Foundation: City health department for limited S.T.S. program.	13,597	Persons in downtown district responding to chest X-ray program.				X		X					
Contra Costa County....	Feb. 15 to Apr. 14, 1951.	Contra Costa Chest X-Ray Survey, Inc.	14,863	Persons appearing at 2 X-ray stations in communitywide chest X-ray program.				X				X			
San Francisco.....	June 18 to Aug. 7, 1951.	Prepayment health plan and union welfare fund.	3,994	Longshoremens.....	X	X	X	X	X	X	X	X	X	X	X
Bakersfield.....	Sept. 24 to 30, 1951.	County health department and county medical society.	2,162	Persons attending county fair.	X			X				X			
Contra Costa County....	Nov. 28 to 29, 1951.	Medical department of corporation.	209	Industrial workers in 1 plant.	X			X	X			X	X	X	X
Orange County.....	Feb. 2 to 16, 1952.	County health department, tuberculosis association and medical society.	4,167	Persons responding to community program.				X				X			
Vernon.....	Feb. 19 to 21, 1952.	Medical department of industry, city and State health departments.	572	Industrial workers.....	X		X	X				X	X		
Los Angeles (Northeast Health District).	Feb. 25 to Mar. 22, 1952.	City health department, tuberculosis and health association.	3,203	Persons responding to community program.	X			X				X	X		
Yolo County.....	March to April 1953.	County health department.....	17,000	Persons responding to community program.				X				X			
do.....	January 1954.....	Student health service and State health department.	472	Veterinarians and veterinary students attending a State convention.	X			X				X	X		X
Imperial County.....	Jan. 11, 1953, to Mar. 6, 1954.	County health department.....	32,475	Persons responding to community program.				X		X					
Los Angeles.....	Feb. 16 to 19, 1954.	Tuberculosis and health association and labor-management committee.	862	Industrial workers in 2 plants.	X	X		X	X	X		X	X		X

<sup>1</sup> 20,047 received chest X-rays.

<sup>2</sup> 124,118 received chest X-rays.

TABLE 2.—Chronic illness and aging allotments used in screening program activity, fiscal years 1962-63—1966-67

Area	Periods of contract	Amount	Type of screening	Description
Alameda County.	1962-63—1966-67.	Amount varies and is part of ChD program.	Present tests include: height; weight; vision; chest; tonometry; urinalysis; blood pressure; blood tests for: hemoglobin, blood sugar, urea nitrogen, cholesterol, uric acid, SCOT; EKG-3 lead; puffmeter; audiometry, range of motion; skinfold caliper.	The first project was a geriatric screening program including only some of the tests currently being conducted and only at one place in Oakland. Present program has two screening centers, Central and Eden districts, serves persons over 40 years and screens about 50 persons per week.
Contra Costa County.	1962-63 and 1963-64.	\$2,200 total.	Glaucoma, special method.	A glaucoma case finding by familial screening project using corticosteroid eye drops over 8-week period. Potential glaucoma shows rise in pressure.
Long Beach City.	1962-63—1965-66.	\$10,855 per year.	Diabetes-----	Clinics held twice a month for persons: over 40, relatives of known diabetics, persons overweight, family history of diabetes, patients coming to department for other service.
San Jose City.	1962-63—1966-67.	\$8,765 per year.	Glaucoma, diabetes, chest.	Clinics are twice weekly for persons over 35. A start has been made to screen employees in selected companies.
San Francisco City.	1963-64-----	Partly ChD program.	Glaucoma-----	Screened population at Laguna Honda Home using nursing staff.
Santa Cruz County.	1962-63—1966-67.	\$5,135 per year.	Diabetes, glaucoma, chest.	At first screening for diabetes only. At present in Santa Cruz, clinics are held once a week and all three tests performed; in Watsonville, twice monthly, diabetes only.
Sonoma County.	1965-66-----	\$7,120-----	Cytology-----	For developmental work on a self-administered cytological screening technique; women 35-45 in Sonoma are eligible, they must be asymptomatic, nonpregnant, premenopausal.

TABLE 3.—Chronic illness and aging supplemental and contract funds used in screening program activities

Institution	Contract period	Funds	Description
Pacific Hospital, Long Beach...	1963-64—1966-67.	\$5,597	A glaucoma screening clinic testing hospital clinic patients; recently services extended to city employees.
Canon Kip Community House, San Francisco.	1962-63—1965-66.	1,760	Glaucoma detection screening for persons 35 years and over.
Hebrew Home for the Aged, San Francisco.	1964-65-----	2,920	To prepare a protocol for a study to develop an economical, valid, and reliable method for screening institutionalized older persons.
University of California-----	1965-December 1966.	6,000	To correlate chest X-rays taken at known points in respiration under specific conditions, and, using a special device developed for this purpose with selected pulmonary function studies, in order to determine whether or not this technique is a useful screening method for chest diseases not diagnosable by standard X-ray procedures.
San Bernardino County Health Department.	1965-66-----	625	Develop and demonstrate screening procedure for senile muscular degeneration and the possible relationship between it and infections with toxoplasma. 25-50 patients with muscular degeneration will be tested by laboratory techniques for evidence of preexisting toxoplasmosis.

<sup>1</sup> Per year approximately.

TABLE 4.—Other contract funds used in screening program activities

Institution	Type funds	Contract period	Funds	Description
Palo Alto Research Foundation.	Cancer..	October 1964-65-1966-67.	<sup>1</sup> \$14,000	Perform mammographic examinations (\$7.15 per exam).
Ventura County Health Department.	...do....	November 1965-June 1966, 1966-67.	<sup>1</sup> 3,000	Obtain smears of all women attending family planning clinics (cytology)(\$2 per slide).
Herrick Memorial Hospital, Berkeley.	...do....	October 1964-65-1966-67.	<sup>2</sup> 1,700	Cytology examinations (\$2 each).
San Diego Health Department.	...do....	November 1964-June 1965.	4,800	Cytological exams on women attending prenatal, VD clinics and women prisoners (\$2 per exam, sputum \$3).
Attending staff associated with Los Angeles County Hospital.	...do....	July 1964-March 1967.	20,000	Examine cervical smears collected in prenatal clinic (\$1.50 per exam).
Tulare County Health Department	...do....	May 1, 1962-June 30, 1967	3,000	Perform cytological exams on women attending prenatal, family planning, and VD clinics (\$3 per smear).
Yolo County Health Department.	...do....	1962 through 1966-67.	2,300	Cervical cancer screening (\$2 per slide).
San Francisco City and County Health Department.	...do....	Mar. 15, 1966-Nov. 30, 1966	10,000	Cervical cytology exams performed in planned parenthood and VD clinics (1st 150 exams per week \$3, over 150 exams per week \$2).
Children's Hospital, Los Angeles.	Heart disease.	Mar. 1966-Aug. 31, 1966.	20,253	Heart sound screening program among a parochial school population utilizing a direct interpreting analog-digital circuitry (Phono Cardio Scan) in order to define its sensitivity and specificity when used in a large population.
Sight Conservation Research Center, San Jose.	...do....	May 15, 1966-May 14, 1967.	22,675	To establish an optimum blood glucose level useful as a referral criterion for diabetes screening clinic held in the evening; 300 persons 35 and over will be examined.

<sup>1</sup> Total.<sup>2</sup> Per year.

TABLE 5.—Chronic conditions per 1,000 persons per year by age and diagnosis California Health Survey, January–December, 1958

Diagnosis	International classification disease code	Age group						
		Total	0 to 4	5 to 14	15 to 24	25 to 44	45 to 64	65 and over
Total persons.....		24,163	2,950	4,876	2,721	7,016	4,579	2,021
Total conditions.....		825.3	214.2	338.6	502.7	939.6	1,230.4	2,008.4
Infective and parasitic diseases.....	001-138.....	8.5	1.7	3.5	4.4	14.3	12.0	8.4
Neoplasms.....	140-239.....	17.5	3.4	2.3	6.6	27.4	27.7	32.2
Malignant.....	140-205.....	4.3	.3	.2		4.1	7.9	17.8
Benign and unspecified.....	210-239.....	13.3	3.0	2.0	6.6	23.2	19.9	14.3
Allergic, endocrine, metabolic and nutritional diseases.....	240-289.....	138.2	92.2	129.4	131.9	163.2	151.6	120.7
Hay fever.....	240.....	47.4	15.9	48.6	53.3	68.4	40.8	24.2
Asthma.....	241.....	28.1	21.7	34.7	28.7	23.9	29.7	32.2
Other.....	242-246.....	35.3	51.9	39.6	27.6	33.6	33.8	20.3
Diseases of thyroid gland.....	250-254.....	16.5		4.3	17.6	26.9	23.6	15.8
Diabetes mellitus.....	260.....	5.9		.6	3.3	3.4	12.0	25.2
Endocrine glands, avitaminoses other metabolic diseases.....	270-289.....	5.0	2.7	1.6	1.5	6.8	11.6	3.0
Diseases of blood and blood forming organs.....	290-299.....	7.9	3.4	3.9	9.6	10.1	9.0	11.4
Mental, psychoneurotic and personality disorders.....	300-327.....	36.0	2.0	9.8	26.8	54.6	50.2	64.3
Diseases of nervous system and sense organs.....	330-398.....	34.9	13.9	18.0	15.8	32.1	42.8	123.7
Central nervous system, nerves and peripheral ganglia.....	330-369.....	13.7	3.4	2.3	3.7	16.8	20.5	44.0
Eye.....	370-389.....	15.9	7.1	9.2	8.4	9.7	17.5	73.2
Ear and mastoid process.....	390-398.....	5.2	3.4	6.6	3.7	5.6	4.8	6.4
Diseases of the circulatory system.....	400-468.....	134.8	5.4	14.3	57.3	144.4	228.0	472.5
Rheumatic fever and chronic rheumatic heart.....	400-416.....	3.6	.7	4.5	5.5	3.4	3.7	3.0
Arteriosclerosis and degenerative heart.....	420-422.....	9.2		.4		2.8	20.7	52.4
Other heart.....	430-435.....	14.4	2.4	8.0	4.0	6.8	22.7	68.8
Hypertensive heart disease.....	440-443.....	3.8				.6	4.8	32.2
Other hypertensive disease.....	444-447.....	28.3	.3	.4	9.6	19.2	55.7	131.6
Diseases of the arteries.....	450-456.....	3.6				.7	4.4	30.2
Varicose veins.....	460.....	26.9	1.4	.4	11.4	37.8	47.0	66.3
Hemorrhoids.....	461.....	38.1	.7	.4	23.5	67.0	56.3	61.4
Other circulatory.....	462-468.....	6.8		.2	3.3	6.0	12.7	26.7
Diseases of respiratory system.....	470-527.....	86.0	35.6	50.0	61.4	115.9	113.8	111.3
URI, influenza and pneumonia.....	470-493.....	5	1.7	.6	.4		.4	
Chronic bronchitis.....	502.....	13.4	17.6	12.1	7.0	11.0	16.4	20.8
Chronic sinusitis.....	513.....	60.4	2.4	17.8	48.1	96.3	86.7	79.7
Other.....	510-512, 514-527.....	11.7	13.9	19.5	5.9	8.6	10.3	10.9
Diseases of digestive system.....	530-587.....	61.6	13.9	6.1	18.7	67.8	115.5	177.6
Buccal cavity and esophagus.....	530-539.....	2.5	2.0	.6	2.2	4.1	2.8	2.0
Stomach ulcer.....	540.....	10.8		1.0	3.3	15.8	23.8	13.4
Ulcer of the duodenum.....	541.....	4.3		.2	.7	6.3	11.1	3.5
Other diseases of stomach and duodenum.....	542-545.....	7.9	.7	.6	3.3	9.5	14.0	22.8
Appendicitis and other appendix diseases.....	550-553.....	.2			.7	.6		
Hernia.....	560-561.....	15.2	8.1	3.3	3.7	12.5	24.2	58.9



Other intestinal and peritoneal diseases.....	570-578.....	9.1	3.0	.2	1.8	7.6	15.3	40.6	
Liver, gallbladder and pancreas.....	580-587.....	11.4		.2	2.9	11.4	24.2	36.6	
Diseases of genitourinary system.....	590-637.....	32.9	1.7	.9	27.6	47.0	53.1	51.0	
Nephritis and nephrosis.....	590-594.....	.6		.4	1.5	.6	.7	1.0	
Kidney infections.....	600.....	2.5	1.0	1.0	3.7	4.3	1.5	2.5	
Kidney and urethral stones.....	602.....	2.0			3.3	2.7	3.3	2.5	
Cystitis.....	605.....	2.2		.4	1.5	4.1	2.6	3.0	
Other.....	601, 603-604, 606-609.....	5.4	.3	1.8	4.4	5.8	8.1	14.8	
Male genital diseases <sup>1</sup> .....	610-617.....	9.7	.7	.8		7.3	14.5	59.5	
Female genital diseases <sup>2</sup> .....	620-626.....	2.5			3.5	6.4	.4		
Menstrual disorders <sup>2</sup> .....	634.....	8.0		3.7	18.0	16.9	.8		
Menopausal symptoms <sup>2</sup> .....	635.....	14.1				14.8	40.2	.9	
Other <sup>2</sup> .....	630-633, 636-637.....	5.4			3.5	9.9	6.3		
Diseases of skin and cellular tissue.....	690-716.....	17.4	5.8	10.7	25.7	21.5	21.6	14.8	
Diseases of bones and organs of movement.....	720-749.....	74.9	.7	3.5	14.3	66.1	166.0	260.8	
Arthritis and rheumatism.....	720-727.....	61.5	.7	1.8	7.3	44.7	140.0	247.4	
Slipped disc.....	735.....	6.6		.4	3.3	12.5	12.2	2.5	
Other bone and joint diseases.....	730-734, 736-738.....	2.0		1.2	2.6	2.4	2.6	3.0	
Other diseases of musculoskeletal system.....	740-749.....	4.8			1.1	6.4	11.1	7.9	
Congenital malformations.....	750-759.....	2.4	5.4	4.5	1.5	1.1	1.3	.5	
Symptoms referable to systems or organs.....	760-789.....	14.4	5.8	7.6	9.2	11.7	21.2	44.0	
Nervous system and senses.....	760-781.....	3.1	.3		1.8	2.6	6.6	10.4	
Cardiovascular and lymphatic.....	782.....	1.4	.7	1.0	1.1	.6	1.1	7.9	
Respiratory.....	783.....	3.1	1.7	3.1	2.2	2.7	3.9	6.4	
Gastrointestinal.....	784-785.....	1.9	.3	.4	1.8	1.8	2.6	6.4	
Genitourinary.....	786.....	2.3	.3	2.7	.7	1.0	2.8	9.9	
Other.....	787-789.....	2.4	2.4	.4	1.5	3.0	4.1	3.0	
Senility and ill-defined diseases.....	790-797.....	10.5	.3	3.7	10.3	15.7	11.1	22.3	
Other.....	760-777, 800-899.....	2.2	1.4	.2	1.1	3.6	2.8	7.4	
NATIONAL HEALTH SURVEY IMPAIRMENT CODE									
Hearing.....	X06-X09.....	38.2	1.0	14.5	12.5	25.5	53.9	192.0	
Vision.....	X00-X05.....	16.1	1.4	2.9	4.8	8.1	20.7	101.4	
Other.....	X10-X89.....	91.2	19.3	47.6	63.2	109.5	128.0	192.0	
Total male.....		11,647	1,507	2,464	1,279	3,288	2,201	90	
Total conditions.....		728.6	206.4	364.4	414.4	791.1	1,118.1	1,855.7	
Infective and parasitic diseases.....	001-138.....	9.5	2.6	3.6	2.3	17.3	11.8	13.2	
Neoplasms.....	140-239.....	11.3	4.6	2.4	3.9	13.4	19.5	29.7	
Malignant.....	140-205.....	3.6	.7	.4		2.1	5.0	24.2	
Benign and unspecified.....	210-239.....	7.7	4.0	2.0	3.9	11.3	14.5	5.5	
Allergic, endocrine, metabolic and nutritional diseases.....	240-289.....	115.5	93.6	142.9	105.6	112.2	113.6	107.9	
Hay fever.....	240.....	43.6	17.2	57.2	56.3	53.2	33.6	22.0	
Asthma.....	241.....	30.7	23.2	41.8	27.4	22.2	34.1	39.6	
Other.....	242-246.....	27.0	48.4	37.3	13.3	21.9	22.3	13.2	
Diseases of thyroid gland.....	250-254.....	5.5		4.9	4.7	7.6	6.4	7.7	
Diabetes mellitus.....	260.....	5.0		.4	3.1	5.2	7.7	20.9	
Endocrine glands, avitaminoses and other metabolic diseases.....	270-289.....	3.7	4.6	1.2	.8	2.1	9.5	4.4	

TABLE 5.—Chronic conditions per 1,000 persons per year by age and diagnosis California Health Survey, January–December, 1958—Continued

Diagnosis	International classification disease code	Age group						
		Total	0 to 4	5 to 14	15 to 24	25 to 44	45 to 64	65 and over
Diseases of blood and blood forming organs.....	290-299	2.7	3.3	4.9		2.4	2.3	1.1
Mental, psychoneurotic and personality disorders.....	300-327	25.1	1.3	11.0	14.9	35.3	40.0	44.0
Diseases of nervous system and sense organs.....	330-388	32.5	11.3	18.3	19.5	81.9	35.4	120.0
Central nervous system, nerves and peripheral ganglia.....	330-389	11.6	.7	3.6	3.9	12.2	17.3	46.3
Eye.....	370-389	15.8	8.6	8.1	10.2	13.4	16.0	67.2
Ear and mastoid process.....	390-398	5.2	2.0	6.5	5.5	6.4	3.2	6.6
Diseases of the circulatory system.....	400-468	101.1	5.3	16.6	35.2	101.0	197.6	349.1
Rheumatic fever and chronic rheumatic heart.....	400-416	3.1	.7	4.9	5.5	2.7	2.3	2.2
Arteriosclerosis and degenerative heart.....	420-422	11.9				3.3	29.1	70.5
Other heart.....	430-435	14.9	2.6	9.3	3.9	4.3	29.1	69.4
Hypertensive heart disease.....	440-443	2.2				.6	5.0	14.3
Other hypertensive disease.....	444-447	17.2		.8	8.6	14.0	38.2	62.8
Diseases of the arteries.....	450-456	2.9				.9	5.0	22.0
Varicose veins.....	460	11.5	2.0	.4	.8	13.1	23.6	37.4
Hemorrhoids.....	461	33.1		.8	15.6	58.4	56.3	52.9
Other circulatory.....	462-468	4.3		.4	.8	3.6	9.1	17.6
Diseases of respiratory system.....	470-527	77.5	30.5	50.3	46.1	104.0	109.0	101.3
URI, influenza and pneumonia.....	470-493	.5	.7	.8	.8		.9	
Chronic bronchitis.....	502	12.3	16.6	15.0	5.5	7.6	12.3	24.2
Chronic sinusitis.....	513	52.4	.1	18.3	35.2	84.2	63.1	65.0
Other.....	510-512, 514-527	12.4	12.6	16.2	4.7	12.2	12.7	12.1
Diseases of digestive system.....	530-587	65.7	14.6	6.9	24.2	75.4	128.3	186.1
Buccal cavity and esophagus.....	530-539	2.3	1.3		3.1	4.0	2.7	2.2
Stomach ulcer.....	540	15.1		1.2	6.2	22.5	34.5	16.5
Ulcer of the duodenum.....	541	6.4			1.6	9.4	16.3	5.5
Other diseases of stomach and duodenum.....	542-545	9.2		.8	6.2	14.0	15.4	18.7
Appendicitis and other appendix diseases.....	550-553	.1			.8			
Hernia.....	560-561	22.5	10.0	4.9	4.7	17.3	35.0	104.6
Other intestinal and peritoneal diseases.....	570-578	5.2	3.3		.8	4.6	8.2	24.2
Liver, gallbladder and pancreas.....	580-587	4.9			.8	3.6	14.1	14.3
Diseases of genitourinary system.....	590-637	18.8	.7	3.2	7.0	18.8	28.6	83.7
Nephritis and nephrosis.....	590-594	.5		.4	.8	.3	.4	2.2
Kidney infections.....	600	1.4		.4	.8	2.7	1.8	1.1
Kidney and urethral stones.....	602	2.7			4.7	3.0	5.4	3.3
Cystitis.....	605	.7				1.2	.9	2.2
Other.....	601, 603-604, 606-609	3.5		1.6	.8	3.6	4.5	15.4
Male genital diseases.....	610-617	9.7	.7	.8		7.3	14.5	59.5
Female genital diseases.....	620-626							
Menstrual disorders.....	634							
Menopausal symptoms.....	635							
Other.....	630-633, 636-637	.4				.6	.9	

Diseases of skin and cellular tissue.....	690-716.....	14.9	5.3	8.1	23.5	19.5	20.4	7.7	
Diseases of bones and organs of movement.....	720-749.....	58.5	.....	3.2	12.5	55.6	137.7	188.3	
Arthritis and rheumatism.....	720-727.....	43.4	.....	.8	3.9	31.3	109.9	169.6	
Slipped disc.....	735.....	8.1	.....	.4	2.3	14.9	17.7	3.3	
Other bone and joint diseases.....	730-734, 736-738.....	2.9	.....	2.0	4.7	4.6	2.3	3.3	
Other diseases of musculoskeletal system.....	740-749.....	3.9	.....	.....	1.6	4.9	7.7	12.1	
Congenital malformations.....	750-759.....	2.1	6.0	4.5	2.3	.3	.....	.....	
Symptoms referable to systems or organs.....	780-789.....	15.6	4.6	7.3	13.3	12.5	24.5	49.6	
Nervous system and senses.....	780-781.....	3.4	.....	.....	3.1	3.0	7.7	9.9	
Cardiovascular and lymphatic.....	782.....	1.2	.7	.....	.8	.3	.9	9.9	
Respiratory.....	783.....	3.6	2.6	2.0	3.1	2.7	6.4	6.6	
Gastrointestinal.....	784-785.....	1.6	.....	.8	2.3	2.4	1.4	3.3	
Genitourinary.....	786.....	2.9	.....	4.0	1.6	.6	2.7	15.4	
Other.....	787-789.....	2.8	1.3	.4	2.3	3.3	5.4	4.4	
Senility and ill-defined diseases.....	790-797.....	8.5	.7	3.6	7.0	12.2	9.5	20.9	
Other.....	760-777, 800-999.....	3.6	2.0	.4	1.6	5.2	4.5	9.9	
NATIONAL HEALTH SURVEY IMPAIRMENT CODE									
Hearing.....	X06-X09.....	43.4	1.3	15.4	16.4	30.1	65.4	222.5	
Vision.....	X00-X05.....	16.9	.7	2.8	4.7	13.4	24.5	93.6	
Other.....	X10-X99.....	105.3	17.9	68.8	74.3	130.5	147.2	226.9	
<b>Total female.....</b>		<b>12,516</b>	<b>1,443</b>	<b>2,412</b>	<b>1,442</b>	<b>3,728</b>	<b>2,378</b>	<b>1,113</b>	
<b>Total conditions.....</b>		<b>915.2</b>	<b>222.5</b>	<b>312.2</b>	<b>581.1</b>	<b>1,070.5</b>	<b>1,334.3</b>	<b>2,133.0</b>	
Infective and parasitic diseases.....	001-138.....	7.6	.7	3.3	6.2	11.5	12.2	4.5	
Neoplasms.....	140-239.....	23.2	2.1	2.1	9.0	39.7	35.3	34.1	
Malignant.....	140-205.....	4.9	.....	.....	.....	5.9	10.5	12.6	
Benign and unspecified.....	210-239.....	18.4	2.1	2.1	9.0	33.8	24.8	21.6	
Allergic, endocrine, metabolic and nutritional diseases.....	240-289.....	159.8	90.8	115.7	155.3	208.1	186.7	131.2	
Hayfever.....	240.....	50.9	14.6	39.8	50.6	81.8	47.5	26.1	
Asthma.....	241.....	25.8	20.1	27.4	29.8	25.5	25.7	26.1	
Other.....	242-246.....	43.0	55.4	41.9	40.2	44.0	44.6	26.1	
Diseases of thyroid gland.....	250-254.....	26.7	.....	3.7	29.1	44.0	39.5	22.5	
Diabetes mellitus.....	260.....	6.7	.....	.8	3.5	1.9	16.0	23.8	
Endocrine glands, avitaminoses and other metabolic diseases.....	270-289.....	6.7	.7	2.1	2.1	11.0	13.4	1.8	
Diseases of blood and blood forming organs.....	290-299.....	12.7	3.5	2.9	18.0	16.9	15.1	19.8	
Mental, psychoneurotic and personality disorders.....	300-327.....	46.2	2.8	8.7	37.4	71.6	69.7	80.9	
Diseases of nervous system and sense organs.....	330-398.....	37.1	16.6	17.8	12.5	32.2	49.6	126.7	
Central nervous system, nerves and peripheral ganglia.....	330-369.....	15.7	6.2	.8	3.5	20.9	23.5	42.2	
Eye.....	370-389.....	16.1	5.5	10.4	6.9	6.4	19.8	78.2	
Ear and mastoid process.....	390-398.....	5.3	4.9	6.6	2.1	4.8	6.3	6.3	

See footnote at end of table.

TABLE 5.—Chronic conditions per 1,000 persons per year by age and diagnosis California Health Survey, January–December, 1958—Continued

Diagnosis	International classification disease code	Age group						
		Total	0 to 4	5 to 14	15 to 24	25 to 44	45 to 64	65 and over
Diseases of the circulatory system	400-468	165.9	5.5	12.0	77.0	182.7	256.1	573.2
Rheumatic fever and chronic rheumatic heart	400-416	4.0	.7	4.1	5.5	4.0	5.0	3.6
Arteriosclerosis and degenerative heart	420-422	6.7		.8		2.4	13.0	37.7
Other heart	430-435	14.0	2.1	6.6	4.2	9.1	16.8	68.3
Hypertensive heart disease	440-443	5.2				.5	4.6	46.7
Other hypertensive disease	444-447	38.7	.7		10.4	23.9	71.9	187.8
Diseases of the arteries	450-456	4.1				.5	3.8	36.8
Varicose veins	460	41.3	.7	.4	20.8	59.5	68.5	89.8
Hemorrhoids	461	42.7	1.4		30.5	74.6	56.3	68.3
Other circulatory	462-468	9.1			5.5	8.0	16.0	34.1
Diseases of respiratory system	470-527	93.6	40.9	49.8	74.9	126.3	118.2	119.5
URI, influenza and pneumonia	470-493	.4	2.8	.4				
Chronic bronchitis	502	14.5	18.7	9.1	8.3	13.9	20.2	18.0
Chronic sinusitis	513	67.8	4.1	17.4	59.6	107.0	90.0	91.6
Other	510-512, 514, 527	10.9	15.2	22.8	6.9	5.4	8.0	9.9
Diseases of digestive system	530-587	57.6	13.2	5.4	13.9	61.1	105.5	170.7
Buccal cavity and esophagus	530-539	2.7	2.8	1.2	1.4	4.3	2.9	1.8
Stomach ulcer	540	6.8		.8	.7	9.9	13.9	10.8
Ulcer of the duodenum	541	2.5		.4		3.5	6.3	1.8
Other diseases of stomach and duodenum	542-545	6.7	1.4	.4	.7	5.6	12.6	26.1
Appendicitis and other appendix diseases	550-553	.4			.7	1.1		
Hernia	560-561	8.5	6.2	1.6	2.8	8.3	14.3	21.6
Other intestinal and peritoneal diseases	570-578	12.7	2.8	.4	2.8	10.2	21.9	53.9
Liver, gallbladder, and pancreas	580-587	17.3		.4	4.8	18.2	35.6	54.8
Diseases of genitourinary system	590-637	45.2	2.8	8.7	45.8	71.9	75.7	24.2
Nephritis and nephrosis	590-594	.7		.4	2.1	.8	.8	
Kidney infections	600	3.5	2.1	1.6	6.2	5.6	1.3	3.6
Kidney and urethral stones	602	1.4			2.1	2.4	1.3	1.8

Cystitis	605	3.6		.8	2.8	6.7	4.2	3.6	
Other	601, 603-604, 606-609	7.1	.7	2.1	7.6	7.8	11.3	14.4	
Male genital diseases	610-617								
Female genital diseases	620-626	2.4			3.5	6.4	.4		
Menstrual disorders	634	8.0		3.7	18.0	16.9	.8		
Menopausal symptoms	635	13.8				14.8	49.2	.9	
Other	630-633, 636-637	4.8			3.5	10.4	6.3		
Diseases of skin and cellular tissue	690-716	19.6	6.2	13.3	27.7	23.3	22.7	20.7	
Diseases of bones and organs of movement	720-749	90.1	1.4	3.7	15.9	75.4	192.2	319.8	
Arthritis and rheumatism	720-727	78.3	1.4	2.9	10.4	66.6	167.8	310.9	
Slipped disc	735	5.2		.4	4.2	10.5	7.1	1.8	
Other bone and joint diseases	730-734, 736-738	1.1		.4	.7	.5	2.9	20.7	
Other diseases of musculoskeletal system	740-749	5.5			.7	7.8	14.3	4.5	
Congenital malformations	750-759	2.6	4.9	4.6	.7	1.9	2.5	.9	
Symptoms referable to systems or organs	780-789	13.2	6.9	7.9	5.5	11.0	18.1	39.5	
Nervous system and senses	780-781	2.8	.7		.7	2.1	5.5	10.8	
Cardiovascular and lymphatic	782	1.7	.7	2.1	1.4	.8	1.3	6.3	
Respiratory	783	2.7	.7	4.1	1.4	2.7	1.7	6.3	
Gastrointestinal	784-785	2.2	.7		1.4	1.3	3.8	9.0	
Genitourinary	786	1.8	.7	1.2		1.3	2.9	5.4	
Other	787-789	2.1	3.5	.4	.7	2.7	2.9	1.8	
Senility and ill-defined diseases	790-797	12.3		3.7	13.2	18.8	12.6	23.4	
Other	760-777, 800-999	1.9	.7		.7	2.1	1.3	5.4	
NATIONAL HEALTH SURVEY IMPAIRMENT CODE									
Hearing	X06-X09	33.2	.7	13.7	9.0	21.5	43.3	167.1	
Vision	X00-X05	15.3	2.1	2.9	4.8	3.5	17.2	107.8	
Other	X10-X99	78.1	20.8	36.1	53.4	90.9	110.2	163.5	

1 Rates based on male population.  
 2 Rates based on female population.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases.

Dr. BORHANI. Now, if I may just take your time for a few minutes, I would like to mention that the State of California has been concerned about multiphasic screening examinations for many years. We believe that the multiphasic screening is one of the best methods of early detection, and thus prevention of both mortality and morbidity from chronic diseases.

We started multiphasic screening examinations in California in 1948; table I in the document summarizes our activities since then.

We also have utilized this method for epidemiological investigations of chronic diseases. I would like to mention a very good example in which we used the multiphasic screening examination for epidemiology of chronic diseases; that is, the study of San Francisco longshoremen.

In 1951, this San Francisco labor force group joined the Kaiser Foundation health plan. The department of public health in California saw an opportunity to do a well planned, organized, multiphasic screening examination among this group of workers.

The examination was repeated in 1960. I will not take time to describe this study because I have briefly referred to it in our prepared statement, but I would like to say a few words to emphasize the point I want to make in this presentation.

The San Francisco longshoremen were tested in 1951. The tests were very simple and crude indeed. In 1951, we did not have all the new electronic equipment you saw today. The tests performed were very simple; casual readings of blood pressure, three lead electrocardiogram, test for diabetes, serology, and other simple tests of that kind, and a very crude question on cigarette smoking habits: Do you or do you not smoke more than a pack of cigarettes a day?

Ten years later, the results of these tests performed by technicians and by nurses and recorded as such, were related to mortality and morbidity experience in this population.

For example, we found that throughout the age range 45 to 64, the 10-year mortality among those who in 1951 had abnormal blood pressure and who were reported to be cigarette smokers was 10 times as high as among those who in 1951 had normal blood pressure, and who said they did not smoke cigarettes. In other words, the results of multiphasic screening examinations are being utilized in delineation of risk factors associated with mortality and also with morbidity. Our findings in the longshoremen study correlate very well with other epidemiological investigations in this field.

Since 1951, the State of California has conducted many demonstration programs on multiphasic screening examinations. These are described in detail in the document submitted for the record.

Chronic diseases are the leading cause of death and the leading cause of morbidity and disability in California, and the picture for the entire Nation is the same.

They also impose a multimillion-dollar burden on California's economy each year, and the figure for the United States is something like

\$39 billion each year, only for heart, cancer, and stroke, not to mention the rest of them.

Over and above these figures, I think we should never lose sight of the hardship to the individual, his family, and his community, when a patient suffers disabilities resulting from chronic diseases.

We continue to develop early detection programs in the State of California, and feel that demonstration projects in this area should be sponsored to test the feasibility of using new techniques or approaches in the early detection of chronic diseases.

For instance, we are encouraging cervical cytology programs in planned parenthood clinics throughout the State of California. We feel that this is a very important area of public health activity, because most of these are young women who seek advice for new contraceptive measures, and it is, we feel, a good medical practice to start taking the smear, examining it regularly, and putting them under medical surveillance.

Another program we are encouraging is mammography. This is a new X-ray technique that assists us to screen young female patients and detect carcinoma of the breast; in some cases we have found that small nodules can be detected by the use of mammography before a clinical examination by a physician can detect carcinoma of the breast. So we are trying to demonstrate the feasibility of this technique, and hopefully make it universal throughout the State.

Another example is the use of new electronic machines and equipment in early detection of chronic diseases.

Specifically, for instance, we just finished a demonstration program to test the feasibility of new electronic devices for the detection of heart sound abnormalities; if feasible, we plan to screen general populations for cardiovascular diseases. This equipment, incidentally, was evolved as a result of our experience and know-how in space technology.

I would like to emphasize, as I mentioned earlier, that a letter very clearly stating our position was sent to the committee by Dr. Breslow, director of the department of public health. (See letter, p. 173.)

Dr. Breslow makes a few points in his letter upon which I would like to elaborate; I have his permission to do so. He says, and I quote:

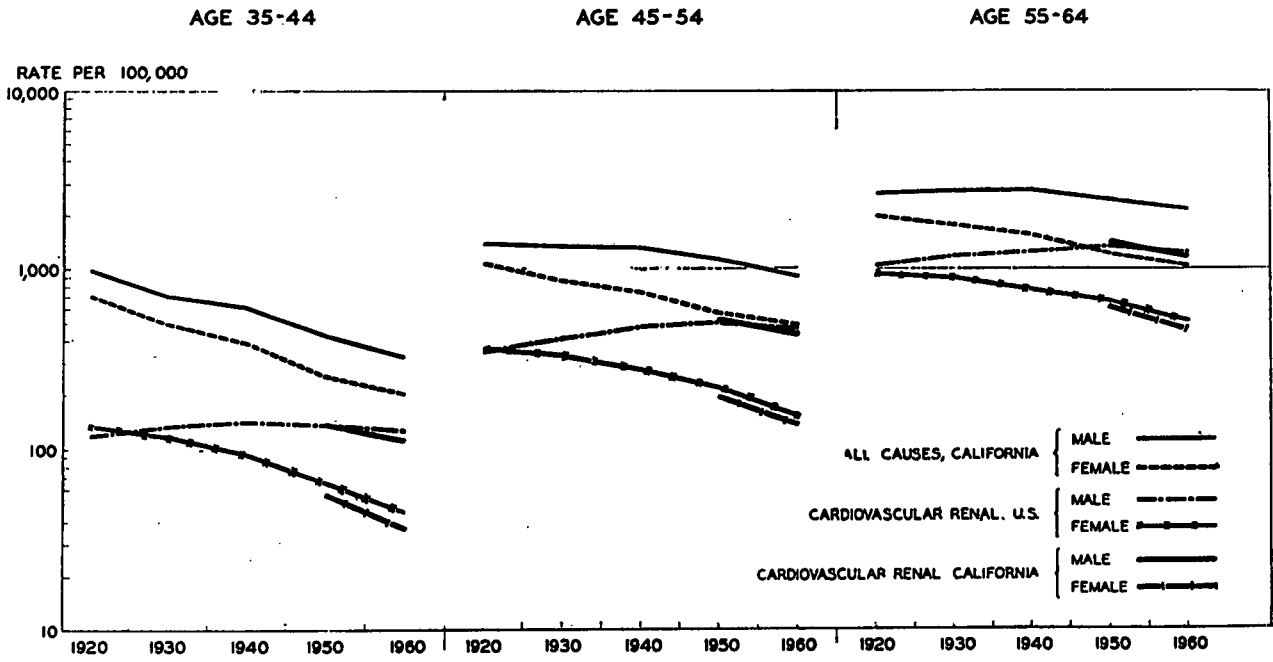
While the trend has been toward a higher proportion of deaths and disability from chronic diseases, we now have many indications that this trend can be checked. For example, the cancer death rate, particularly among women, is already declining. This is especially true of the common form of cancer of the uterus in which there has been a spectacular drop in the death rate during recent years.

Also, in California at least, the death rate for the most common cardiovascular diseases, hypertension, coronary heart disease, and stroke, has started to decline.

I have a chart which shows this decline in the age group between 49 and 64, between the years 1949 and 1960.

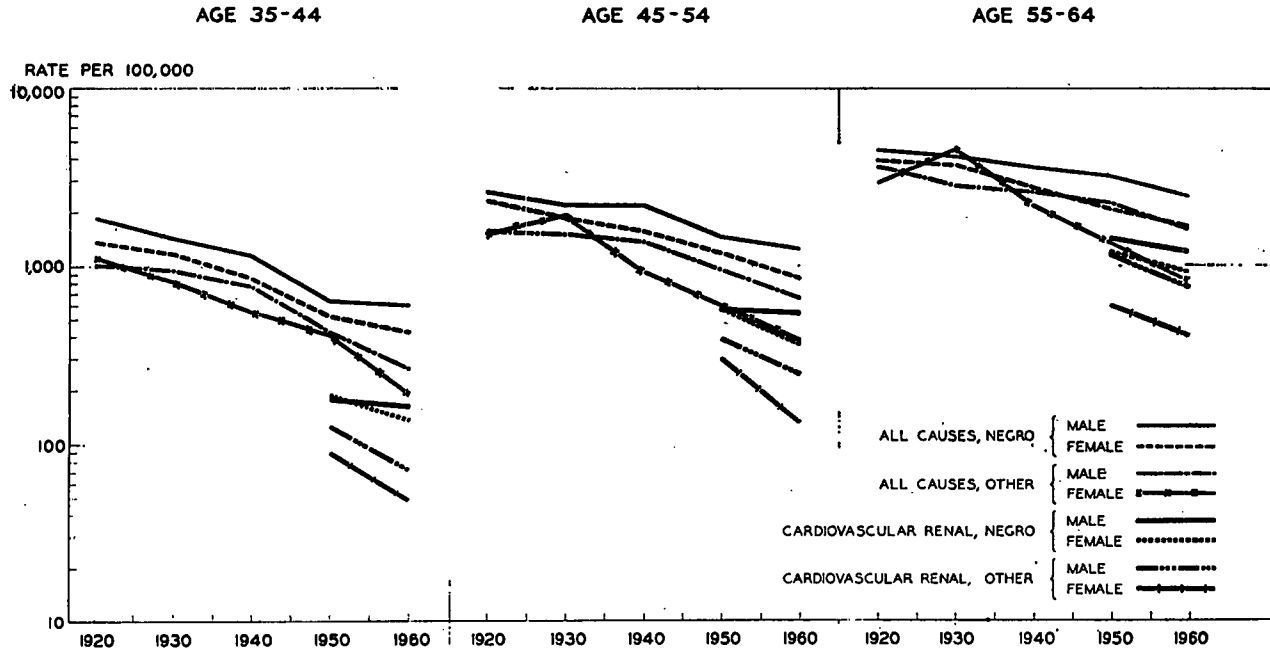
(Figs. 1 to 4 will follow here:)

DEATH RATES FROM ALL CAUSES AND CARDIOVASCULAR RENAL DISEASES  
(WHITE POPULATION)  
1920-1960



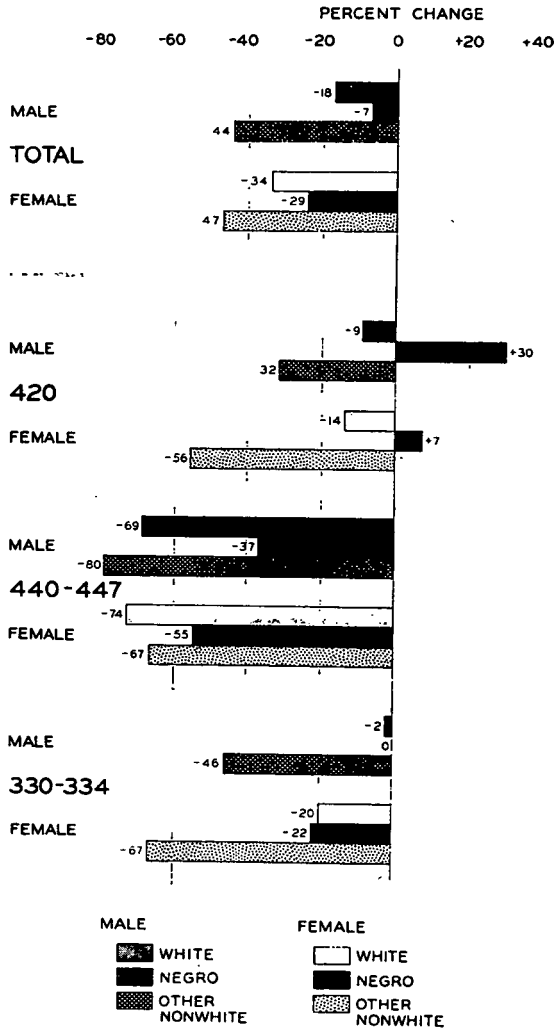


DEATH RATES FROM ALL CAUSES AND CARDIOVASCULAR RENAL DISEASES  
 (NONWHITE POPULATION)  
 CALIFORNIA, 1920-1960



**PERCENT CHANGE IN DEATH RATES  
FROM 1949-1951 TO 1959-1961  
FOR SELECTED CARDIOVASCULAR DISEASES  
IN CALIFORNIA**

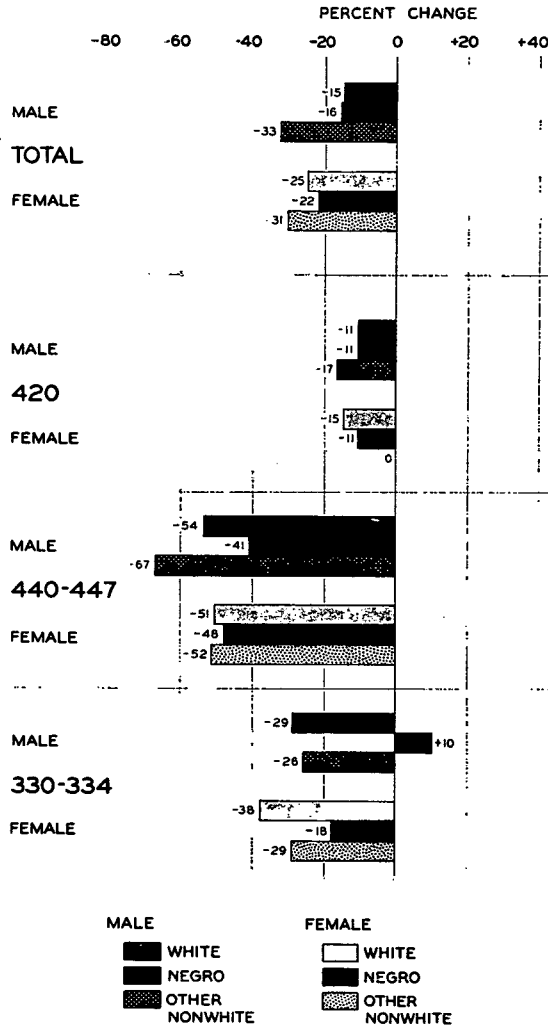
AGE 35-44





**PERCENT CHANGE IN DEATH RATES  
FROM 1949-1951 TO 1959-1961  
FOR SELECTED CARDIOVASCULAR DISEASES  
IN CALIFORNIA**

AGE 55-64



Dr. BORHANI. Now, the most important element—and I am still quoting from Dr. Breslow's letter—he says:

The most important element in the situation is that these favorable trends could be greatly accelerated through organized programs of health screening.

What has been achieved,

he continues,

in the case of tuberculosis, diabetes, cancer of the uterus, and other forms of cancer, hypertensive heart disease, and many other chronic diseases, is due to a relatively simple form of attack on the problems.

That attack consists of early detection of the disease process and prompt treatment with modern methods. The technical basis for a successful attack on many important chronic diseases is well established. All that is needed is organization in the full-scale application of available tools.

This should take the form of health screening programs such as those now being considered by the Congress.

I would like to thank you once again for giving me the privilege of appearing before you.

I would like to add one word about some calculations we have made in California that are interesting to me, and I hope will be interesting to you.

For instance, based on the 1950 and 1960 death rates from lung cancer in California, we can expect 7,500 deaths from lung cancer in 1970. We believe that 3,750 of these deaths can be prevented, by just developing a good, wholesome public health program of early detection, and control programs against one factor; namely, cigarette smoking.

Taking, for instance, breast cancer: The projection we make for 1970 is 2,700 deaths. By applied public health programs, we believe we can definitely eliminate 600 of these deaths.

Really the figures are astonishing to look at, and, as Dr. Cowan mentioned before, these are not just figures—these are people.

We are charged with the responsibility of doing whatever our profession dictates to take care of the health of people, and I think if we do not discharge our professional responsibilities we have done something wrong.

So, I urge you, Madam Chairman, as the Chief of the Bureau of Chronic Diseases for the State of California Department of Public Health, and as the Secretary-Treasurer of the Association of State and Territorial Chronic Disease Program Directors, and as a citizen, to continue this good work, because we need your attention for the need of early detection.

As I mentioned during your brief absence, it was my privilege to present for the record the telegram received from the Governor of the State of California.

Senator NEUBERGER. I appreciate that very much. The staff has told me about that telegram. That is very heart-warming.

In fact, your whole report is optimistic, and that incidence of lung cancer deaths is especially heart-warming to me.

The documents submitted by you will be of great value in the subcommittee's work, I can assure you.

You announced a program for screening 2 million people in California. This is a big project. Now, what are your plans for carrying that out?

Dr. BORHANI. Well, you might know, Senator, that in California we went into program budgeting for the next fiscal year. In our program budget, we have two objectives in this particular area.

One is to make available in the next fiscal year, over and above our present activities, five comprehensive centers for early detection of chronic diseases in five geographic areas of the State.

The second objective we have is the two points mentioned in the Governor's message to you.

Under title XIX of Public Law 89-97, we have what is called the Medi-Cal program. With the assistance of local health departments, local medical societies, and local societies and clinics, we are developing comprehensive multiphasic examinations in local communities for recipients of this program.

And I might add that we also are developing a very comprehensive program in the Watts area in cooperation with the University of Southern California. In the Fresno area, there is a program directed toward a special segment of our population.

Senator NEUBERGER. A very wonderful report. Thank you very much.

We will now hear from Dr. Lester Petrie, who is director of the Branch of Preventable Diseases of the State of Georgia.

**STATEMENT OF DR. LESTER M. PETRIE, DIRECTOR, BRANCH OF PREVENTABLE DISEASES, DEPARTMENT OF PUBLIC HEALTH, STATE OF GEORGIA, ATLANTA, GA.**

Dr. PETRIE. Senator Neuberger, I, too, want to congratulate you and your subcommittee, and thank you for the privilege of presenting my particular thoughts to you.

Before I summarize my paper, there is one observation on one comment that was made by Dr. Swartz, a short time ago, that recalls something to my mind that I would like to put in the record.

That was his comment that the findings, the screen test findings, should be reported only through the physician to the patient.

There is no disagreement between me and Dr. Swartz, I think, on the fact that tests are meaningless unless interpreted by a physician. That is certainly a fact.

But there is a difficulty here introduced by the fact that in our screening of a million and a half persons, and in the samples that we have collected since then, we have quite consistently observed that approximately 75 percent of the people who consult a physician after going through this screening line do not go to the physician whose name they gave us as they went down the line, but do go to someone else. I mean the ones that go to a physician go to a different physician from the one whose name they gave us.

Now, I think it is entirely in order that a patient should have the privilege of changing his choice of physician, and I think that it is irritating to a physician to get a report of a battery of screening tests for a patient that never comes to him.

And it is also rather valueless for the battery of screening tests not to go to the physician to whom it should go.

In summarizing my paper, I have called attention to the fact that 21 years ago the Georgia Department of Public Health pioneered in

multiple-test health screening, and for nearly 7 consecutive years, beginning in October 1945, an average of 17,500 persons per month went through our screening tests for 80 consecutive months, a total of 1.4 million people.

And this was at an average cost of \$1.03 per person tested.

On the other side of the coin, it was a million and a half dollars.

This measure of success was possible only because of the close harmony existing between the Public Health Department and the medical profession, and mutual support by both the State and local medical profession and health departments.

In my paper, of course, I have summarized some of our findings, and also some of the conclusions we drew from those findings, and in addition, some of the consequences of certain chronic illnesses, and some of the costs.

These matters have all been quite thoroughly covered by other people, and I am going to skip over, even in my summary of the paper, here, to the thing that I really came up here to say to you folks.

We discontinued large-scale, communitywide, multiphasic health service in Georgia in 1953.

The major reason that we discontinued at that time was the very sharp reduction in appropriations.

But we have not yet reinstated large-scale multiphasic screening on a communitywide basis for another equally, or even more basic, reason.

And that reason is that our communities have not yet developed the resources to assure the availability of adequate medical diagnosis and care to all of the suspects that we find by the surveys, nor to identify and control all of the other key factors which interrelate to affect the course and progress of disease in the community.

Senator Neuberger, I learned something this morning which has caused me to make a small but significant change in the wording of my written report, on page 205, and I call your attention to this:

"I can now see little reason for the Government to underwrite all the expense of health screening for industries and businesses and the professions and the labor force, and the members of their households whom they support with their dividends and their salaries and wages."

All of us who work for a living are members of the labor force.

Industrial and medical leaders, as with the Kaiser industries and the Permanente group, have demonstrated that with a little help they can organize themselves and do the job, and pay for most of it out of earned income.

This is as it should be in the free American tradition.

We cannot afford to ignore this occupational health approach.

That is what I really came to tell you folks. For the occupational health approach deals with those who produce the wealth which we need, and who represent the population and support the population which we serve.

You know, we are all the same people. I am a member of the labor force, and I am a professional person, and I am the same guy.

And I would like to call your attention, on page 205, to the box which shows the general population and the labor force and the households in the United States and in Georgia, in the 1960 census.

Now, what that teaches us is that in Georgia, our one and a half million labor force, which includes all of us who work for a living, sup-

port the one and a tenth million households in which our 4 million citizens live.

"Take Home Health" learned on the job could be of universal value; if the entire population at risk is our ultimate target, the labor force is the bull's-eye.

If big business or big industry or big government perfects a health center for its own employees, why cannot it contract with its neighbors to include members of small establishments, where 90 percent of the labor force works?

This occupational health maintenance know-how would be a wonderful fringe benefit, not only for all of us who work for a living, but for everyone we support.

I can visualize regional health protection centers being operated by either private enterprise or government or conjointly, but why cannot group contracts be worked out at very reasonable per-person cost to business, industry, occupational or professional groups, as a fringe benefit to be paid for out of earned income?

It seems to me it is better for the recipients to pay directly at the source, rather than indirectly and more expensively out of taxes.

We would find a substantial profit from this investment to be increased production, increased productive capacity, for all of us.

A government can team up with free enterprise, and vice versa. The Public Health Service and the Kaiser Foundation Research Institute have opened a gate. I plead that any new health protection center do as they have done, learn the techniques by servicing their own.

They who cast out first mistakes they learn on themselves can see more clearly to prevent more costly mistakes in their services to others.

Then I recommend for consideration an initial screening schedule, which it is no use in my reporting here, because it is in the paper.

And I will leave you with this comment: that perhaps, just perhaps, if this Nation learns how to provide health maintenance for its labor force, paid for out of earned income, perhaps it then can see more clearly how to make it available for the rest of the population.

Senator Neuberger, I have seen sick call for the few crowd out health service for the many. At any one time in these United States, about 3 percent of our population are under medical care or other professional care for sickness or injury.

That leaves 97 percent of our population as of today that are not under any kind of professional care for sickness or injury, as of today, right now.

And I have seen so often this sick call for the relatively few, the 3 percent, crowd out health service for the many.

Almost everyone gives lipservice to prevention, but unfortunately, most shift the responsibility to anyone other than themselves.

The matters we are considering here today have the potential for overcoming some of the apathy—that is, both professional apathy and public apathy—but only if the essential, cardinal principles such as I outlined in my paper are adhered to.

Now, since I submitted my original paper, the following additional pertinent information has become available, and I have appended it to an amended copy of the paper. I think perhaps it is in the one you have. I don't know.



One; a letter from the President of the Fulton County Medical Society—that is in Atlanta, Ga.

And two; certain estimations of indirect costs in Georgia, which we adapted from the national estimates that you heard about yesterday from Dorothy Rice. Startling figures in Georgia calculated for diseases of the circulatory system, arthritis, and rheumatism, diseases of the respiratory system, cancer, and tuberculosis, total indirect costs for only these five groups, in just one State, of \$206,480,000.

The computation of these costs rests on two assumptions, (1), that chronic illness is distributed in Georgia as it is in the coterminous United States, and (2), that the cost of illness is the same in Georgia as it is in the coterminous United States. So these costs should be regarded as a thesis subject to test, rather than as a fact.

I want to thank you again for the privilege of presenting these thoughts. I take full responsibility for them. They do not necessarily reflect in their entirety established policies of the Georgia Department of Public Health.

However, they have been reviewed by professional members of my own department. They have also been reviewed by the chairman of the Georgia Commission on Aging, and by the president and president-elect of the Medical Association of Georgia, without dissent.

Thank you.

(Dr. Petrie's prepared statement follows:)

PREPARED STATEMENT BY LESTER M. PETRIE, M.D., M.P.H., F.A.C.P.

Senator Neuberger, Members of the Subcommittee, and Guests:

My discussion today will be devoted largely to costs and consequences of chronic disease in Georgia and the effect of a modern health screening program on its consequences and upon the workload of the medical profession.

We have had some success and some disillusionment with multi-test health screening in Georgia. From 1945 to 1953 1.4 million citizens of our State voluntarily submitted to the prick of the needle and the radiation of X-ray so that they could "know for sure" about their health. I now think our propaganda "know for sure" was some of the worst we ever put out. It sure did bring the people to the examining stations—but on a false premise—for neither we nor they could "know for sure" just by a laboratory test. *There is no easy short cut to correct medical diagnosis of disease.*

However, an ancillary benefit of the survey technique proved to be its effectiveness as a health education tool if correctly used. It motivated nearly 70% of our population age 15 and over (eighty to ninety percent of them not otherwise under medical supervision) to voluntarily do something to protect their own health. And, it did find and bring to treatment 130,000 cases of syphilis; and many cases of other diseases, previously hidden and unknown, were referred to private physicians for diagnosis and treatment.

The most important factor which assured success in spite of mistakes was the priceless inheritance of close harmony between the Health Department on the one hand and the Medical Societies and private practitioners on the other. They worked together guiding our affairs. They fixed the pattern of cooperation without which real success in such a venture would be impossible.

May I first discuss certain costs and consequences of chronic disease. Thirty years ago, public health in Georgia was not too concerned about diabetes, glaucoma, hypertension, or arthritis because we were too overwhelmed with malaria and typhoid fever and pellagra, etc. Six hundred and six (606) deaths from malaria were reported in 1936. It is estimated that there were over 120,000 cases. In that same year there were 195 reported deaths and 926 reported cases of typhoid fever, and probably hundreds of unreported cases. There were 391 deaths from pellagra and unnumbered cases. Sickness was one of the basic reasons that President Roosevelt could categorize the South as "the economic problem number one". Sickness transmitted by a malaria infected mosquito, or

a human typhoid carrier, or an inadequate diet or otherwise, was a major reason why industry in Georgia could not prosper in those days.

Many millions of public health dollars were spent in malaria control work. Epidemiological investigations to identify and control the factors and their interrelationships which affected the occurrence and course of disease in our population did not come cheap. Laboratories identified malaria parasites in human blood and in anopheles mosquitos. Breeding places of mosquito larvae were found and treated or eradicated. Swamps were drained. Houses were screened. Public education was fostered. With the advent of D.D.T. houses and outbuildings were sprayed. By 1950 the job was done except for relatively inexpensive surveillance which still continues. No confirmed malaria transmission has occurred in Georgia since 1950 except for one case acquired at Fort Benning in 1964 and one more in 1965. Similar epidemiological investigations provided the framework for the control of typhoid and pellagra and other diseases. As a result industry was and is able to prosper in Georgia. Our multi-billion-dollar economy today justifies the public health investment which helped make it possible. Elsewhere the 2 billion people living in less fortunate countries where disease rates are high, life expectancy is low, and production of wealth is insufficient, should be a constant reminder to us that to have either health or wealth a nation must have both.

The above dramatizes benefits from the control of certain diseases within our lifetime. Other examples could be cited such as smallpox. There are still other diseases which are partially controlled, including:

1. *Syphilis*.—A serologic test for syphilis was included in our community-wide multiphasic screening surveys in Georgia. There were 130,000 cases of syphilis brought or returned to treatment, of which 33,033 were previously unknown and untreated; 1,017 of the previously unknown and untreated cases were primary or secondary syphilis. The majority of the primary and secondary cases were found by epidemiological investigation of contacts of infectious cases rather than directly by the screening. Contact investigation of all infectious cases of syphilis is a continuing program. Prior to this program, 20 percent of the inmates in our State mental hospital were there because of central nervous system syphilis. Today, new admissions for psychoses attributable to syphilis are negligible. Secondary prevention of chronic tertiary syphilis has been accomplished. Last year, 2,516 cases of syphilis, of which 1,004 were primary or secondary, were found and brought to treatment. (See Table I appended.)

2. *Tuberculosis*.—Primary prevention, and even eradication of tuberculosis is possible, yet there were 117 deaths in Georgia in 1964 (2.8 per 100,000). A more realistic measure of the persons now directly affected by tuberculosis in Georgia is the sum of the 2,531 active cases on our register, the 6,000 cases where disease was active less than five years ago, and the 10,000 to 11,000 contacts to newly reported cases; a total of approximately 20,000 persons. The annual cost is well over 5.5 million dollars. The average annual cost for maintaining a citizen in the State Tuberculosis Hospital is \$6,333. On the other hand, the average annual buying power of a citizen of metropolitan Atlanta today is \$2,520 after taxes. How much better it is for a citizen to annually contribute \$2,520 to our economy over and above his taxes rather than to contribute nothing but extract 2½ times that amount from the taxpayers.

During multiphasic screening years 7,000 cases of tuberculosis were found (6.4 cases per 1,000) and an additional 6,000 suspects (5.8 cases per 1,000). Unfortunately, we did not do intensive epidemiologically oriented follow up. In later years we resurveyed some of the same communities and found the same old cases over again less the ones who had died and plus a few new ones. In far too many instances we found very little evidence of adequate curative treatment for the cases, or of adequate contact investigations to find the source cases or to prevent spread to new cases. This experience convinced us that screening is not an objective in itself. *Multiphasic screening is useless unless provision has been made for the necessary epidemiological follow up and control of all the key factors which interrelate to affect the occurrence and course of the diseases, and to assure availability of adequate medical diagnosis and care to the patients.* Multiphasic screening is capable of swamping the medical and health facilities of any community which has not been prepared to diagnose the suspects and care for the cases found.

Many more chronic diseases remain partially or completely uncontrolled. Their prevalence has always been very difficult to determine since deaths only are reportable. Estimates of prevalence of some of them based on published findings of the National Health Survey have been calculated by our Epidemiologic

Investigations Branch. The Georgia population from which case prevalence figures were calculated is that estimated by age for 1964.

3. *Heart disease, the first cause of death.*—There is no question that this is the major public health problem confronting us today. It causes more deaths than all other diseases combined and even under age 65 is the leading killer. There are about 110,000 known cases in Georgia today according to the National Health Survey (Tables II and III).

4. *Hypertension.*—Studies in Georgia have indicated that 13% of our population over 17 years of age have significant hypertension. More than 3/4 of these have never known prior to the survey that they had this condition. Hypertension represents one of the most successfully treated of the cardiovascular conditions today, with the mortality during the last 10 years decreasing by 42%. Therefore, it is very important to identify in our population those who have the condition so that the proven successful methods of therapy may be applied before irreversible damage is done to the brain, kidneys, or heart.

5. *Cancer, the third cause of death.*—Delay in securing professional guidance precludes successful therapy in many cases; in some the delay may be attributable to professional oversight. The problem is greatest among those in the low income groups. There are over 14,000 known cases in Georgia today according to National Health Survey.

6. *Nontuberculous chronic respiratory diseases.*—In recent years the decline in deaths from tuberculosis has been offset by an increasing death rate from obstructive lung diseases (chronic bronchitis, asthma, pulmonary emphysema). Examinations under various governmental pension programs indicate that these illnesses frequently cause disability serious enough to prevent gainful employment. The prevalence is greatest in the 45-64 year age group. Because this disease develops slowly its earliest stages often go unrecognized and progression is insidious for a period of years. Eventually undue shortness of breath becomes apparent, at first only during exertion, later with less and less exertion, and ultimately even the simple acts of talking, eating or dressing cannot be accomplished without it. Such persons are permanent respiratory cripples. There are 552,000 known cases in Georgia according to National Health Survey (tables II and III).

7. *Diabetes.*—Diabetes may be present for years, unknown to the individual until definite symptoms cause him to seek medical care. In most diabetics symptoms do not become apparent until after age 40 or older. By this time irreversible permanent damage may have been done. Diabetes is the seventh cause of death in the United States and the third cause of blindness. Early death from diabetes is estimated to cause an annual loss of 415,000 life years. The prevalence of diabetes will become greater as the population over forty increases. Symptomatic diabetes and its complications (blindness, kidney disease, cardio-vascular lesions, gangrene, etc.) cannot be prevented without early detection and proper treatment. Overall prevalence of symptomatic diabetes is estimated to be 17 per 1,000 population, but one-half unknown. (This national estimate approximates nicely the actual findings of our multiphasic surveys in Georgia. An analysis of 241,457 persons tested showed 4,524 or 18.7 per 1,000 classified as abnormal, borderline, or previously known diabetic). (Reference: Mass Screening for Lowered Glucose Tolerance—Petrie, McLoughlin, and Hodgins. Presented at the Thirty-fourth annual session of the American College of Physicians. April 15, 1953. Published in Annals of Internal Medicine, May 1954). On this basis we estimate about 80,000 cases in Georgia, over one-half unknown. This also approximates nicely the 34,257 known cases according to the National Health Survey (tables II and III).

8. *Glaucoma.*—Simple chronic glaucoma is an insidious condition occurring most frequently in people over 40 years of age. It affects approximately 21 per 1,000 of the population. Increased intraocular tension gradually destroys the function of the eye. By the time changes are noticed most useful vision is lost. Fourteen percent of all blindness is traceable to this cause. It is the second greatest cause of blindness in the U.S. Early detection through adequate screening with referral for proper medical care could preserve the sight of thousands. There are 4,373 known cases in Georgia according to the National Health Survey (tables II and III).

9. *Arthritis and rheumatism.*—There are more than 12 million cases in the U.S. according to a recent survey. More than \$250,000,000 is spent by victims on misrepresented drugs and useless treatment. Each year it forces more than 3,000,000 persons to restrict their activities, another 1,500,000 become partially

disabled, another 250,000 become completely disabled. There is no laboratory screening test for arthritis, but with early case finding, education and proper medical care much of the suffering and disability can be materially reduced. There are 244,000 known cases in Georgia according to the National Health Survey. (Table II and III).

Is a multiphasic health-screening program feasible? The answer is a qualified yes.<sup>1</sup> There are basic cardinal principles which must be worked out with all parties concerned—understood—agreed to—and followed. In Georgia the principle of multiple-test health screening is approved only if it is correctly understood and only if it is performed in a professionally ethical manner under medical supervision, and only in those geographical areas where the procedure has the endorsement of the local health department and the local medical society.

Some cardinal principles mutually agreed to are listed below for your consideration. These principles are adhered to in the screening program of the Georgia State Employees' Health Service and in public screening surveys.

1. Laboratory tests are to augment a complete physical examination by the private physician, and not to supplant an annual examination of this type. Such tests, however, may be performed by qualified technicians under medical supervision.

2. No individual can secure maximum benefits from the screening services without a medical interpretation which can be secured from the personal physician of his choice.

3. No employer can secure maximum benefits from the screening services without medical judgments as to suitability of employment, matching the physical capacities of the worker to the physical demands of the job, which can be secured from the medical consultant or medical director.

4. Test findings identifying individuals shall be treated confidentially and shall not be reported by the screening service except to the individual concerned, or personal physician of his choice, and the medical director or medical consultant of his employer. The screening service may withhold confidential information even from the physician if he fails to protect the ethical rights of either the employer or the employee.

5. The principal public health reason for health test screening is health education aimed toward prevention. Each individual should learn: 1) his own inescapable responsibility for his own health; 2) the limitations of his own resources; 3) where to turn for help.

All persons screened are taught that health tests are not in themselves a physical examination. Failure to pass a test is not a diagnosis of disease, nor is passing all a complete bill of health. . . . they require medical interpretation which an individual can secure from the personal physician of his choice. The physician must make his own examination and conduct his own tests to evaluate more completely what has been revealed by the health tests.

As a follow up each employee screened should be issued a personal report indicating which tests he had passed and which he had failed. This report can re-emphasize and further develop understanding of the real meaning of the tests. He should also be issued a personal pocket health record identification card including record of his immunizations and sensitivities, blood type, and special conditions which should be kept up to date.

The results of tests, with the permission of the employee, should be forwarded to the personal physician of his choice. The more a physician knows of an individual's normal health, the better he is prepared to accurately diagnose and properly treat the sickness or injury.

We wish to acknowledge very valuable assistance from the Council on Occupational Health of the American Medical Association in working out the above cardinal principles, and their assurance that they would support a program based on similar principles in any community where the program is supported by the local medical society.

An overwhelming vote of confidence was given our community-wide-multiple-test health surveys in Georgia in 1945-1953 under the above principles. We accepted a commitment to survey a community only upon written confirmation from both the health department and the medical society. The service was so popular that in 1953 we had commitments for a full schedule eighteen months in advance. These were for repeat surveys in communities which had been

<sup>1</sup> Costs are reasonable. 1945-53 Georgia surveys averaged \$1.03 per person tested.

surveyed several years before. But we discontinued the surveys for two major reasons:

1. Sharp reductions in appropriations.
2. Follow up was inadequate to identify and control the key factors which interrelate to affect the occurrence and course of the diseases, and to assure availability of adequate medical diagnosis and care to the patients. Merely finding persons suspected of having a disease is useless if nothing is done about it.

Another good question is "What tests should be included in a multiphasic screening battery?" We have guidelines here. Ideally the decision regarding baseline tests to be used should be separately made for each community and for each age and sex group. Tests to be considered must be economically feasible, scientifically sound as to reliability, validity, sensitivity, specificity, and yield, and the prevalence of the disease in the sex and age group in the community should be verified. No physical examination should be considered complete unless it includes the health tests designed to discover otherwise hidden cases of diseases which are prevalent in the sex and age group in the community. Probably no more effective battery of tests than that offered by the Permanent Medical Group has been developed. Also, the Section on Pathology and Physiology of the American Medical Association has released an excellent brochure recommending selected clinical pathology tests in health evaluation.

I can see little reason for the government to assume all of the expense of health screening for industries and businesses and the professions and the labor force, and the members of their households whom they support with their dividends and their salaries and wages. All of us who work for a living are members of the labor force. Industrial leaders, as at the Kaiser Industries and the Permanent group, have demonstrated that they can organize themselves to do the job, and pay for most of it out of earned income by teaming up with government. This is as it should be in the American tradition of freedom. We can no longer afford to ignore the occupational health approach for it deals with those who produce the wealth we need and at the same time represent and support the population we serve. The following statistics verify this:

*Take-home health potential*

	United States	Percent	Georgia	Percent
General population (1960 census).....	179,325,671	100	3,943,116	100
Labor force <sup>1</sup> .....	69,877,481	39	1,449,944	37
Households.....	53,021,061	-----	1,040,325	-----

<sup>1</sup> In any State a sizable segment of the labor force is employed in the educational system of State and local governments. In Georgia the university system employs approximately 15,000 of 40,000 State employees and local schools employ 63,000 of over 100,000 local government employees.

NOTE.—Health and safety must be practiced where the people are, and they are most abundantly at work. In Georgia our 1.5 million labor force supports the 1.1 million households where our 4 million citizens live. "Take Home Health" learned on the job could be of universal value.

If big business, or big industry, perfects a health screening center for its own employees, why cannot it offer contracts to all its neighbors in the area including the employees of smaller establishments (private enterprise or government)? Ninety percent of our labor force work in smaller establishments. This occupational health "know-how" would be a wonderful fringe benefit not only for all of us who work for a living but for everyone we support. Conversely, why cannot big government, if it perfects a health screening center, contract with its neighbors to make its services available to all smaller establishments in the area (business, industry, professions or government)?

I can visualize regional health protection centers being operated either by private enterprise or by government or conjointly. Group contracts could be worked out at very reasonable cost to business, industry, professional groups or labor unions as a fringe benefit to be paid for out of earned income. It is better for the recipients to pay directly at the source rather than indirectly and more expensively out of taxes. We would find the principal profit from this investment to be the increased productive capacity of our labor force.

Government can team up with free enterprise as the U.S. Public Health Service and the Kaiser Foundation Research Institute have demonstrated through the Permanent Medical Group. They have opened the gate. No one has dem-

onstrated a better method to get the show on the road. I plead that any new health protection center do as they have done—learn the techniques by servicing their own personnel. They who cast out first the mistakes they learn on themselves will then see more clearly to prevent more costly mistakes in their service to others.

A recommended initial screening schedule, subject to modification according to local experience, could be—

1. An initial screening of all employees at time of employment and schedule rescreening if findings so indicate.

2. Rescreening of all employees at age 40 and periodic rescreening as frequently as findings may indicate but at least every three years until age 50.

3. Periodic rescreening after age 50 as frequently as indicated but at least every two years until age 60 and every year thereafter.

Ladies and gentlemen, I have devoted my life to health service. I have seen sick call for the few too frequently crowd out health service for the many. Almost everyone gives lip service to prevention. Unfortunately most shift the responsibility to some one or anyone other than themselves. The matters we are considering have the potential for overcoming some of the public apathy but the essential cardinal principles must be adhered to.

Thank you for the privilege of presenting these thoughts. I take full responsibility for them. They do not necessarily reflect in their entirety established policies of the Georgia Department of Public Health; however, they have been reviewed by professional members of my own department and the Georgia Commission on Aging and the Medical Association of Georgia without any dissent in principle.

P.S. The following additional supporting information has become available and is appended: (1) A letter from the president of the Fulton County Medical Society; (2) Estimations of indirect costs in Georgia adapted from national estimates by Dorothy Rice.

Diseases of the circulatory system.....	\$68,930,000
Arthritis and rheumatism.....	26,800,000
Diseases of the respiratory system.....	74,680,000
Cancer (neoplasms).....	28,690,000
Tuberculosis.....	7,380,000

The computation of these costs rests on two assumptions and should be regarded as an hypothesis subject to test rather than as a fact:

1. Chronic illness is distributed in Georgia as it is in the coterminous U.S. as a whole.

2. The cost of illness is the same in Georgia as it is in the coterminous U.S. as a whole.

TABLE I.—*Syphilis morbidity by age group, fiscal year 1966*

Age group	Primary and secondary syphilis		Total syphilis	
	Cases	Percent	Cases	Percent
9 and under.....	2	0.2	11	0.4
10 to 14.....	18	1.8	23	.9
15 to 19.....	246	24.5	382	15.2
20 to 24.....	304	30.3	488	19.4
25 to 29.....	180	17.9	309	11.9
30 to 34.....	111	11.1	229	9.1
35 to 39.....	59	5.9	198	7.9
40 to 44.....	42	4.2	153	6.1
45 to 49.....	18	1.8	128	5.1
50 to 54.....	12	1.2	114	4.5
55 to 59.....	6	.6	99	3.9
60 to 64.....	0	-----	75	3.0
65 and over.....	2	.2	71	2.8
Unknown.....	4	.4	236	9.4
Totals.....	1,004	100	2,516	100

TABLE II.—Estimated prevalence rate per 1,000 of various chronic diseases by age<sup>1</sup>

Age group	Diabetes	Cancer	Heart disease	Chronic respiratory disease except TB	Arthritis and rheumatism	Glaucoma
All ages.....	8.1	3.4	26.0	130.6	57.7	1.0
Under 45.....	2.2	.8	7.6	118.3	16.0	.6
45 to 64.....	19.3	7.8	51.8	171.2	144.5	
65 and over.....	40.4	18.6	148.7	154.9	265.8	

<sup>1</sup> Age specific rates were taken from National Health Survey data or Cancer Illness Among Residents in Atlanta, Ga., Cancer Morbidity Series 1-1950, Federal Security Agency, Public Health Service. Rates for all ages are the age adjusted rates obtained by applying national age specific rates to the Georgia population, 1964.

TABLE III.—Estimated annual case prevalence of various chronic diseases by age, Georgia, 1964 population

Age group	Diabetes	Cancer	Heart disease	Chronic respiratory disease except TB	Arthritis and rheumatism	Glaucoma
All ages.....	34,257	14,271	109,835	551,592	243,581	4,373
Under 45.....	6,928	2,519	23,935	372,562	50,389	2,348
45 to 64.....	14,741	5,957	39,565	130,763	110,369	
65 and over.....	12,588	5,795	46,335	48,267	82,823	

JOHN T. GODWIN, M.D., F.C.A.P.,  
Atlanta, Ga., September 14, 1966.

Dr. LESTER M. PETRIE,  
Director, Branch of Preventable Diseases,  
Department of Public Health,  
Atlanta, Ga.

DEAR DR. PETRIE: Thanks for your letter concerning multiphasic health screening programs. It appears that the programs of multiphasic screening are worthwhile based on the percentage of positive findings which otherwise would not be detected.

I believe that this type of screening should be done by all physicians within the next few years in view of the development of multichannel auto-analyzers for chemical determinations. Within the near future, there should be an adequate number of twelve channel auto-analyzers in addition to other multichannel auto-analyzers, which would make it possible for all patients to be screened by multiple chemical examinations at a very low cost. These procedures should be available in the vicinity of the practice of most physicians. It is well known that it is not practical to ship such specimens because of altered results of the chemical components.

I am well aware of the Preventicare Bill and hope that it will not be necessary to embark upon this type of program in view of the fact that this can be done as a part of the private practice of medicine.

I would certainly encourage multiphasic screening by private practitioners in initial and annual examinations of all patients.

I believe Mrs. Neuberger has made some comment concerning mandatory Cytological screening reflecting a statement made by Dr. Leopold Koss. It is my belief that we do not need mandatory type regulations in health matters generally. The State of Georgia at the present time examines twenty-nine per cent or more of all eligible women cytologically, annually. This is the highest examination rate of any of the Continental States. I hope you would encourage continued local efforts toward expanding cytological studies and that this not be discussed as a mandatory procedure.

I believe that this expresses my interest and concern about screening and hope that you might express this opinion at the hearing.

Thanks very much, and with best regards, I am

Yours very truly,

JOHN T. GODWIN, M.D.

Data used in computing the following cost estimates were obtained from the following sources:

Population and case rates:

1. National Health Survey, Series B, No. 12, Chronic Respiratory Conditions Reported in Interviews United States, July 1957-June 1958.
2. National Health Survey, Series B, No. 13, Heart Conditions and High Blood Pressure Reported Interviews, United States, July 1957-June 1958.
3. National Health Survey, Series B, No. 20, Arthritis and Rheumatism Reported in Interviews, United States, July 1957-June 1958.
4. National Health Survey, Series B, No. 31, Duration of Limitations of Activity Due to Chronic Conditions, United States, July 1959-June 1960.
5. Georgia Vital and Morbidity Statistics, Georgia Department of Public Health, 1964.
6. 1960 Census of Population, PC (1)-ID, Table 157.

Indirect costs:

Tabular Data for Estimating the Cost of Illness, presented at the 93rd Annual Meeting of the American Public Health Association, Chicago, Illinois, Epidemiology Section meeting on "Economic Factors in Epidemiology", October 18, 1965 by Dorothy P. Rice, Medical Economist, Division of Medical Case Administration, Public Health Service, U.S. Department of Health, Education, and Welfare.

NOTE.—In the absence of specific data, it has been necessary to estimate case totals and costs for Georgia. The result should be regarded as an hypothesis subject to test rather than as fact.



The computation rests on two assumptions:

1. Chronic illness is distributed in Georgia as it is in the coterminous U.S. as a whole.
2. The cost of illness is the same in Georgia as it is in the coterminous U.S. as a whole.

Disease or condition and age group	Percent in age group	Total U.S. population (millions)	Population in age group (millions)	U.S. cases per million population	Number U.S. cases (millions)
<b>1. Circulatory system:</b>					
Under 45.....	70.6	178.5	126.1	16,600	2.09
45 to 64.....	20.3	178.5	36.2	118,000	4.27
65 and over.....	9.1	178.5	16.2	279,000	4.52
<b>2. Arthritis and rheumatism:</b>					
Under 45.....	70.6	178.5	126.1	16,000	2.02
45 to 64.....	20.3	178.5	36.2	144,500	5.23
65 and over.....	9.1	178.5	16.2	265,800	4.31
<b>3. Respiratory system:</b>					
Under 45.....	70.6	178.5	126.1	118,300	14.92
45 to 64.....	20.3	178.5	36.2	171,200	6.20
65 and over.....	9.1	178.5	16.2	164,900	2.51
<b>4. Cancer (neoplasms):</b>					
Under 45.....	70.6	178.5	126.1	800	.10
45 to 64.....	20.3	178.5	126.1	7,800	.28
65 and over.....	9.1	178.5	16.2	18,600	.30

Disease or condition and age group	Indirect cost (millions)	Number cases in age group (millions)	Cost per case	Number cases in Georgia	Cost in Georgia age group (millions)
<b>1. Circulatory system:</b>					
Under 45.....	582.0	2.09	\$278	52,278	\$14.53
45 to 64.....	2,065.5	4.27	484	90,123	43.62
65 and over.....	1,498.1	4.52	331	85,936	28.78
Total Georgia indirect cost in millions of dollars.....					86.93
<b>2. Arthritis and rheumatism:</b>					
Under 45.....	351.3	2.02	174	50,889	8.77
45 to 64.....	640.6	5.23	122	110,869	13.47
65 and over.....	239.8	4.31	55	82,823	4.56
Total Georgia indirect cost in millions of dollars.....					26.80
<b>3. Respiratory system:</b>					
Under 45.....	1,460.2	14.92	98	372,562	36.51
45 to 64.....	1,535.4	6.20	248	130,763	32.45
65 and over.....	310.2	2.51	124	46,267	5.75
Total Georgia indirect cost in millions of dollars.....					74.68
<b>4. Cancer (neoplasms):</b>					
Under 45.....	306.4	.10	3,037	2,519	7.65
45 to 64.....	678.2	.28	2,402	5,957	14.31
65 and over.....	349.9	.30	1,161	5,795	6.73
Total Georgia indirect cost in millions of dollars.....					28.69

Disease or condition and age group	Number Georgia deaths from TB	Total Georgia deaths	Percent Georgia deaths from TB	Percent U.S. population having chronic disease	Percent Georgia population having TB	Total Georgia population	Cases TB in Georgia
5. Tuberculosis:							
Under 45.....	51	8,141	.63	31.0	0.20	3,149,300	6,299
45 to 64.....	80	10,368	.77	60.7	.47	763,800	3,590
65 and over...	78	16,810	.46	77.5	.36	311,600	1,122

Disease or condition and age group	Number U.S. deaths from TB	Total U.S. deaths	Percent U.S. deaths from TB	Percent U.S. population having chronic disease	Percent U.S. population having TB	Total U.S. population (millions)	Cases TB in United States
5. Tuberculosis:							
Under 45.....	2,115	276,142	0.77	31.0	0.24	126.0	302,400
45 to 64.....	4,329	425,073	1.02	60.7	.62	36.2	224,440
65 and over...	4,429	1,010,047	.44	77.5	.34	16.2	55,080

Disease or condition and age group	Indirect cost (millions)	Number of U.S. cases	Cost per case	Number of cases in Georgia	Georgia cost (millions)
5. Tuberculosis:					
Under 45.....	\$178.2	302,400	\$569	6,299	\$3.58
45 to 64.....	181.7	224,440	810	3,590	2.91
65 and over.....	43.7	55,080	793	1,122	.89
Total Georgia indirect cost in millions of dollars.....					7.38

NOTE.—Data on disability caused by tuberculosis could not be found and the estimates shown were made by—

1. Assuming that disability from tuberculosis bears the same relationship to disability from all causes as death from tuberculosis bears to death from all causes. Georgia death rates were used in computing Georgia cases, U.S. rates for U.S. cases.
2. Assuming that disability data for the United States as a whole are applicable to Georgia.
3. Assuming that the indirect costs per case of tuberculosis are the same for Georgia as for the United States.

It bears repeating that these computations represent only a hypothesis subject to test rather than a presumption based on applicable measurements.

Senator NEUBERGER. Thank you very much, Dr. Petrie.

When you say that there is this large area, 97 percent, that do not get any medical supervision, what is the way, though, to bring some of those in under some coverage?

Dr. PETRIE. I think that the way is really health education. People need to learn the values. They need to learn the kinds of facts that we have been learning here today. However, I did not intend to imply that 97 percent of the population do not get medical supervision but rather that on any given day they are not under professional care for sickness or injury. It is estimated that 90 percent of our population never visit a physician except for sickness or injury.

And I think that perhaps the major or a major ancillary benefit from the multiple screening that we did in Georgia was the fact that it motivated 70 percent of this previously apathetic group to do something about their health.

I think that the educational feature of some of this performance probably outweighs to some extent some of the scientific findings, the fact that screen tests motivate people to take responsibility for their own health.

Senator NEUBERGER. You discontinued that screening. Do you now propose to go back to it? Do you find that it paid off?

Dr. PETRIE. Yes, ma'am. It paid off. But the reason we have not gone back to it as yet, or the reason that I personally have not gone all-out to try to go back to it, is because of what we found in our more recent screening surveys.

When we would go back into a community that we had screened a couple of years before, we would just find the same old cases of tuberculosis all over again, less the ones that had died and plus some new ones.

That was not true of syphilis, because in syphilis we had a real good contact investigation followup program. Syphilis we found was new, but TB was the same old stuff over again, and the same in regard to other chronic illnesses.

To me, screening is no objective in itself, and just finding cases and dropping them has no value. So we have been waiting until our communities are organized, so that we can find the cases, and the community will do something about it.

I am certain that multiphasic screening as we did it in Georgia 20 years ago is capable still today of literally swamping the medical profession with more cases than they can handle.

And I am not being critical of the medical profession, here. I have practiced. I will say I am not in any sense critical of any physician who gives preference to his sick patients, and when he is working 18 or 20 hours a day, as I have done, with crises of sick patients, you cannot blame him for refusing to see patients who have no complaints.

Senator NEUBERGER. Shortage of doctors, again?

Dr. PETRIE. Yes.

It is more than that, too. It is beyond that. It goes to this business of specialization. We need doctors who are trained just especially—we need specially trained doctors in the public health aspects of community health, the folks that can handle the community health business, teamed up with the folks that can handle sick calls.

We need specialists in sick call, and we need specialists in health call.

Senator NEUBERGER. You cannot expect that to be paid for through the labor force, then. Don't you have to call in State government and Federal Government? Because otherwise this proposal that you have, that they would appreciate it more if they paid for it—I don't think you could reach some of them.

Dr. PETRIE. Well, I think if you look into the record of what big industry has really done, big industry like Lockheed and General Motors and Ford, and so forth, and Eastman Kodak, particularly, and many others, they have been leading the field, I think.

I think they have really been leading us in the public health profession, in some of this business of health maintenance. They have learned how, and are applying sound principles of health maintenance to keep their labor force healthy.

They have a legitimate interest in this. They cannot help but do it, because they are dependent upon the productivity of the workers, and a healthy worker can outproduce a sick worker.

Senator NEUBERGER. That is true of those big ones, but in Oregon we don't have any of those you name. We don't have any big industry. And in the farming areas in Iowa and the Central States, I don't know how they take care of a lot of their health programs.

Dr. PETRIE. All right. Now you are down to another thing.

You do have some big employed groups in Oregon. In the State of Georgia the State itself employs 40,000 people, and local governments over a hundred thousand people.

If you organize an employee health service, you could reach not only the 160,000 employees of local and State government as is possible in my State, but through them your health education program would be indirectly reaching two times as many more people that are members of their households. We use health screening tests as "bait" to attract employees to the screening center—to open their minds to health education teaching. We try to teach each one three things; (1) his own inescapable responsibility for his own health; (2) the limitations of his own resources; and (3) where he can find help—especially by choosing and consulting with his own personal physician. We hope that not only the employee learns these things and acts upon them but also that he helps other members of his household to do likewise.

If we reach them directly, as we learn how to teach these organized groups directly, then we will understand better how to extend the service to reach the balance of the population.

Now, this concept is not worked out to perfection as yet, but it is a dream in my mind.

Senator NEUBERGER. One of the great virtues of the Permanente Foundation, when it came into Oregon, was that it was able to give some health service to people who have not been able to afford it.

Thank you all very much for staying through with us during the trying circumstances.

The committee will adjourn until 10 o'clock tomorrow morning.

(Whereupon, at 3:30 p.m., the subcommittee recessed, to reconvene at 10 a.m., Thursday, September 22, 1966.)

# DETECTION AND PREVENTION OF CHRONIC DISEASE UTILIZING MULTIPHASIC HEALTH SCREENING TECHNIQUES

THURSDAY, SEPTEMBER 22, 1966

U.S. SENATE,  
SUBCOMMITTEE ON HEALTH OF THE ELDERLY  
OF THE SPECIAL COMMITTEE ON AGING,  
*Washington, D.C.*

The Subcommittee on Health of the Elderly met at 10 a.m., pursuant to recess, in room G-308, New Senate Office Building, Senator Maurine B. Neuberger (chairman), presiding.

Present: Senator Neuberger.

Committee staff members present: Thomas S. Biggs, Jr., counsel to the special committee; William E. Oriol, professional staff member; Patricia G. Slinkard, chief clerk; and Diane LaBakas, minority research assistant.

Senator NEUBERGER. The hearings will come to order.

This is the third and last day of our hearings on the subject of detection and prevention of chronic disease utilizing multiphasic health screening techniques.

During these interesting 2 days previous to now we have heard expert testimony on our subjects from a number of eminent witnesses, and have enjoyed the demonstration of some of the screening instrumentation programs.

Today we will have witnesses who will deal primarily with existing screening programs.

Before I introduce our first witness, I would like to submit for the record a telegram from Dr. Dacso, president of the American Academy of Physical Medicine and Rehabilitation.

(Telegram follows:)

NEW YORK, N.Y., *September 20, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate Special Committee on Aging, Washington, D.C.:*

The last national heart survey revealed the existence of millions of people whose disabilities severely impaired their physical and mental performance. In spite of the anticipated complications in connection with a multiphasic screening program mentioned in your recent letter, our organization is in favor of exploring the possibilities of such a program. The academy as an organization and its individual members will always be available to offer their experience in planning such activities.

AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION,  
MICHAEL M. DACSO, M.D., *President.*

Senator NEUBERGER. Our first witness is a pioneer in modern multiphasic health screening techniques. He is Dr. Collen, director of the Permanente Foundation Multiphasic Health Screening Clinic in Oakland, Calif.

Dr. Collen, I don't know whether you are a pioneer in setting up the kind of a screening program we have been reading about and hearing about in connection with your hospital, but as one of the existing modern ones, yours is the only one we can find to refer to. Is that true?

**STATEMENT OF MORRIS COLLEN, M.D., DIRECTOR, PERMANENTE FOUNDATION MULTIPHASIC HEALTH SCREENING CLINIC, OAKLAND, CALIF.**

Dr. COLLEN. Thank you, Senator Neuberger.

There are many programs existing at the present time that utilize the various phases of multiphasic screening. I think what we have done is to put together the largest-coordinated program that functions on line with a computer. Perhaps that is our contribution to develop a larger package, so to speak.

Senator NEUBERGER. Several of the witnesses have referred to you as being quite a leader in this area; so we have looked forward to your appearance today.

Dr. COLLEN. Thank you. The Kaiser Foundation Health Plan is a prepaid comprehensive medical care and health program which provides hospital and medical services to 1½ million people on the west coast and Hawaii. The Kaiser Foundation Health Plan contracts with Kaiser Foundation hospitals to provide hospital facilities and services to its members. Kaiser Foundation Health Plan and hospitals are both nonprofit, tax-exempt corporations, with a board of directors consisting of Mr. Henry Kaiser, Mr. Edgar Kaiser, Dr. Sidney Garfield, the founder of our program, and several of their associates.

The Kaiser Foundation Health Plan also contracts with partnerships of physicians to provide the professional medical services to its members. I am a physician in the Permanente Medical Group, which provides the medical services to the 685,000 health plan members in the San Francisco Bay area.

When our health plan was established in Oakland in 1942, one of the earliest principles formulated by Dr. Garfield was that of preventive medicine. Accordingly, periodic health examinations have always been one of the prepaid services provided by our health plan.

Traditionally in the annual health evaluation, the physician conducts a routine historical review and physical examination. He then arranges for the patient to receive a series of routine laboratory, electrocardiographic and X-ray examinations, and then subsequently the patient returns for report, diagnosis, treatment, and followup procedures.

In our program, the patient receiving this periodic health examination, first obtains a battery of tests and procedures, conducted by paramedical personnel in an automated, multitest laboratory. Subsequently an internist reviews the multitest laboratory report, conducts a physical examination, and then proceeds in a traditional manner to diagnose, treat, and arrange followup procedures.

This method of applying multiple screening techniques to periodic health examinations has been used by this program since 1950.

Automated multitest laboratories are presently operating in the Kaiser-Permanente Medical Centers in Oakland and San Francisco, Calif., where each is processing 2,000 cases monthly within a 40-hour-week schedule. The patient proceeds through a series of 20 stations in a period of 2 to 3 hours and receives a battery of tests and procedures.

At the first station, a patient registers at the reception desk approximately every 3 minutes from 1 p.m. to 8 p.m. daily. Here he receives a clipboard which contains a medical questionnaire form and a deck of cards which are prepunched with his medical record number for computer input.

This is an actual deck of cards as they are prepared by the computer for the patient before his appointment.

The patient at station 2, removes the outer body garments in a dressing booth and puts on a disposable paper gown. The patient then proceeds to station 3, where the six-lead electrocardiogram is recorded. These are subsequently read by the cardiologist, who records his interpretation on a card, using pencil marks which can be sensed directly by a card-reading machine for input into the computer. Automatic analysis of the electrocardiograms by the computer is being tested.

The patient drinks a solution of 75 grams of glucose in carbonated water, and the time of glucose ingestion is recorded by a time stamp on the back of the card, and the patient at that time is assigned a sequencing number from 1 to 24 for control purposes.

The patient then proceeds to receive a chest X-ray, which is subsequently read by the radiologist, who records his interpretation on the mark-sense card. X-rays of the breast are performed on all women over age 45, and these are also read by the radiologists.

Weight and skin thickness are measured and then by means of an automated anthropometer, a dozen height and transverse body measurements are recorded directly onto the patient's punchcard in 3 minutes. At the next station, the pulse rate and blood pressure are measured and recorded.

The patient then returns to his dressing booth and redresses. Visual acuity is then tested by reading a wall chart, and ocular tension is measured by a nurse with a tonometer, and the reading is recorded on a card. A drop is then placed in one eye to dilate the pupil for later retinal photography.

The vital capacity is measured with a spirometer. The hearing is tested with an automated audiometer, and the readings are recorded on a marked sense card.

At station 14, a self-administered medical questionnaire form, which the patient received at the first station, and which was completed while waiting between stations—this questionnaire is now audited by the nurse. The patient is then assigned to one of 24 questionnaire booths in accordance with the sequencing number which was assigned to the patient at station 4.

Here the patient receives a box which contains a deck of 207 punched cards, each having a separate question printed on a card. The questions have been selected which are adjudged medically to be of value in discriminating patients with specific diseases from nondiseased persons. The patient responds to each question by taking the card from the top section of the divided letterbox and dropping the card into the middle section if his answer is "Yes," or into the bottom section if the

answer is "No." This procedure automatically sorts yes responses for direct input into the computer by means of a card-reading machine.

As a part of the preventive medical program, the patient receives a booster dose of tetanus toxoid, and when an hour has elapsed since the ingestion dose, the patient is called from the questionnaire booth and sent to the laboratory, where blood samples are drawn for hemoglobin, blood count, test for syphilis, and rheumatoid factor; these test factors are recorded on the marked-sense cards.

Also, eight blood chemistry determinations, glucose, albumin, total protein, cholesterol, creatinine, uric acid, calcium, and transaminase are simultaneously done within 12 minutes by the multichannel automated chemical analyzer, with the test results directly punched in the cards. A urine specimen is collected, and tests are done for bacteria, for the urine pH, glucose, blood, and protein, and the results are marked into the patient's test cards.

The patient then returns to his questionnaire booth, and when he has completed all of his questions, he then goes to the next station, where a photograph is taken of the right retina, with a camera. These retinal photographs are subsequently read by an ophthalmologist, who records his interpretation on a mark-sense card.

The patient now returns to station 20, the last station, where he turns in his clipboard containing the marked and punched cards, and the questionnaire form, and there exchanges the box which contains assorted medical questionnaire cards for a second box of cards by which a psychological test is evaluated. By the time the patient turns in this last questionnaire, the on-line computer processing has been completed and supplemental tests and appointments are advised by the programmed rules of the computer, and these are arranged for the patient. Routinely advised are a sigmoidoscopy for all patients aged 40 or more and for all women a gynecological examination with cervical smear for cancer detection. A majority of the data is recorded on prepunched or mark-sense cards, so as to permit its immediate introduction into the data-processing system. Thus as an on-line procedure, while the patient waits at station 20, the computer processes the information from the punched cards, from the prepunched sorted cards, and from the reproduced mark-sense cards; in the central facility these punched cards are entered directly into the computer.

In the San Francisco facility the punched cards are read into a data communicating system and transmitted via telephone line to the central computer in Oakland, 15 miles away. The processor now goes through a program routine containing various test limits and decision rules and prints out a report constituting "advice" as to any additional procedures which should be done prior to the patient's next visit.

These advice rules have been previously established by the internists, and the receptionist is instructed to arrange certain additional tests and appointments for the patient before his physical examination visit with the physician.

For example, if the 1-hour serum glucose is greater than a predetermined normal limit for the patient's age and sex and hours since last food intake, the computer prints out instructions to the receptionist to return the patient to station 16 for a 2-hour serum glucose. If a serious abnormality is detected, an earlier appointment with the physician is advised. As an off-line procedure, the computer collates and



stores on the random access disk pack the physician interpretations that arrive 2 days later. These are the mark-sense reports from the X-rays, electrocardiograms, and the remaining laboratory tests.

When all the information has been received and stored, the computer then produces a printed summary of all the test reports and the questions answered "Yes" by the patient.

When he sees the patient, the internist reviews the summary report at the time of the patient's first office visit. The physician directs his attention toward elaborating on the questions to which the patient has answered "Yes" and to the test abnormalities reported from the automated multitest laboratory. He completes his physical examination and then proceeds to arrange whatever medical care is necessary for his patient in a customary manner.

Now, in order to evaluate this program, we study its effectiveness for disease detection and its effectiveness in preventing or postponing disease and disability.

To give you some concept as to its effectiveness in disease detection, we have abstracted a few statistics from an analysis we performed last year, when we processed 39,524 patients. Forty percent of the patients were aged 50 years and over. Fifty-five percent of the patients were women and forty-five percent were men. Hypertension and hypertensive heart disease was diagnosed in 9 percent of all patients. The electrocardiogram had some abnormality reported in 20 percent of all patients. Over the age of 50, 25 percent of women and 31 percent of men had some abnormality reported. In men ages 50 to 59, 25 percent; men ages 60 to 69, 35 percent; and men aged 70 years or more, in 52 percent of their electrocardiograms, some abnormality was reported. Similarly, the chest X-ray had some abnormality reported in 24 percent of all patients over age 50, in 33 percent of women and 43 percent of men. In men ages 50 to 59, in 30 percent; 60 to 69, 48 percent; and in men 70 years or more, 68 percent had some abnormality reported in the chest X-ray. Pulmonary emphysema was diagnosed in 0.5 percent of our women and 2.5 percent of our men. Mammography X-ray examination of the breasts, for cancer detection showed that cancer of the breast in women aged 50 years or more, proven by surgery, was found in 1 out of every 500 women.

Visual acuity of 20/20 or 20/30 is considered as within normal limits. Visual acuity of 20/40 or less indicates need for refraction; 7.5 percent of all people had a visual acuity of 20/40 or less. For aged 60 to 69, it was 12 percent, and for age 70 or more, 26 percent of all people had a visual acuity of 20/40 or less. Glaucoma was diagnosed in 1 percent of our patients, and deafness in 2.5 percent. The retinal photograph of the fundus of the eye had some abnormality reported in 9 percent of all patients.

The urine contained sugar in significant amounts in 11.5 percent of all patients; urine protein in 1.2 percent; urine bacteria in significant amounts in 1 percent of men and 3 percent in all women. Diabetes was diagnosed in 3 percent of all patients; anemia was diagnosed in 1 percent of men, and 7.5 percent of all women. Gout was diagnosed in 1 percent of men, osteoarthritis in 3 percent of men and 7.5 percent of women. Our most common diagnosis is obesity, which was diagnosed in 12 percent of men and 20 percent of women.

It is difficult to evaluate the effectiveness of this program in preventing and postponing disease and disability. In a long-term research study which is supported by a grant from the Chronic Disease Division of the Public Health Service, we have randomly selected a group of 5,000 people whom we invite to receive this examination every year. We compare them to a large control group, who do not choose to avail themselves of this periodic health examination. We are presently in our third year of the study, and after another 5 to 7 years we hope we shall be able to show if there are significant differences in morbidity, mortality, utilization of hospitals and doctors, for people who have an annual checkup as compared to those who do not. We further evaluate the effectiveness of this program by long-term epidemiological studies directed to investigating the treatment of early asymptomatic disease.

Does the treatment of early asymptomatic diabetes prevent or postpone the complications of diabetes? Does the continuous treatment of women with bacteria in the urine prevent or postpone pyelonephritis and fatal kidney disease? We "spin off" patients with early asymptomatic disease into these various research studies to see if we can prevent or postpone the disabling disease by attempting to normalize the abnormal measurement.

To briefly give you some concept of the costs involved, our last analysis showed that the total unit cost of an examination for a patient to go through the 20 stations, including amortization of equipment and facilities, including the costs associated with reading the X-ray and electrocardiogram reports, but excluding any supplemental physician examinations, the total cost for the multitest laboratory test examination, was \$22.48 per patient.

Now, \$9.84, or 44 percent of this, is supported by the grant from the Public Health Service and \$12.64, or 56 percent, is borne by the Kaiser-Permanente organization. Health plan members, of course, prepaid for this examination, but the examination is available to non-plan members in the community, who pay \$50 for such an examination, of which 44 percent is returned to the Public Health Service.

The supplemental physicians' examinations cost the Permanente Medical Group \$19, on the average, so that the total examination, including the physicians' examinations and their communicating back the diagnoses for our studies, cost \$41.48. The contribution by the Public Health Service for its research aspects, then, is 24 percent of the total, and the Kaiser-Permanente organization provides 76 percent of the total costs. Our costs for equipment in each of the laboratories was approximately \$150,000 per clinic, plus the leased computer, and the facility space, running 6,000 to 10,000 square feet.

It is our conclusion that if a decision is made to provide health examinations to large groups of people, one cannot afford to do this by means other than by utilizing automated multitest laboratories, because of the improved service to patients and doctors, and improved quality and improved economy.

It is our hypothesis that by early detection of an important clinical abnormality, if one can normalize this abnormality, one can significantly prevent or at least postpone disabling disease.

It is our belief that the advent of computers and automation to medical care inaugurates a new, exciting, and rewarding area of preventive medicine.

Thank you.

Senator NEUBERGER. It has been a fascinating account of your experience in your own clinic. Yesterday we had some witnesses who were not wholehearted in their support of automated screening tests. Have you discovered such opposition, from any unit or organization? This all sounds so good. What is the other side of it?

Dr. COLLEN. Well, we have had considerable experience in being involved in the development of new methods and procedures for providing medical care, and we expect opposition as being normal to any new development. I think in the practice of medicine this is not necessarily improper, because a new procedure needs to be proven.

When one is taking care of patients, before a physician should give up tried and traditional procedures, new methods should be proven as being better than old methods.

Therefore, I think that is proper that if we are developing a new method of examining and evaluating people, it should be proven that it is better than traditional methods.

Some of the problems with multiphasic screening in the past, in my opinion, have been because they were not directly related and integrated into the patient care by the patient's physician. It creates difficulties to go into a community, as the Public Health Service has often done in the past, perform a battery of screening procedures, and report to the patient that "you have some abnormality; go back and see your doctor."

The physician who has been taking care of that patient for many years often is aware of a borderline abnormality, and perhaps considered it not serious enough to concern the patient. The patient informs the doctor that he has learned there is an abnormality, and asks why didn't the doctor tell him before? The doctor has a problem of explaining one of two alternatives. Either the patient had it before the doctor knew about it and felt it wasn't serious enough to concern the patient, or it is a new condition that has developed since the last exam. In either case, we see how the patient may lose confidence in the doctor.

We function only as a referral laboratory in that a patient is referred by the physician or can only be examined by giving us the name of the physician. Reports are not given to the patient, only to the doctor. In this way, the physician utilizes the laboratory as he does any other referral laboratory.

We believe also that the physicians should be responsible for setting the standards for the quality and the type of the tests which are performed, so that it functions as a service laboratory to the doctor.

Senator NEUBERGER. You are aware of the criticism that we heard, and that was this might be intruding upon the work of the physician, whose training in his eyes and ears and specialization are necessary. But actually it isn't so much a criticism of the screening process as the way it might be used incorrectly, is that it?

Dr. COLLEN. Yes; I think that is true. In our organization, of course, the multitest laboratories are an integral part of the medical care program. They are directed and supervised by the physicians.

I think that the physicians cannot possibly criticize the fact that automated equipment usually performs tests more accurately than people. Automated equipment not only improves the quantity, but also improves the quality of tests. The utilization of automated equipment and computers also permits us to produce more information on more people and more information on each individual. Whereas before the usual direction of treatment was based on norms which, perhaps, were generated outside the community, perhaps by small studies in medical schools, in our program and any program utilizing these procedures one can generate norms from one's own population. We provide our physicians with normal values based upon our own patients, by age and sex.

Furthermore, after a patient has had three or four examinations, the computer can generate the patient's own normal values so that we can begin to detect a trend away from his own normal before he perhaps may exceed the population normal.

So there is no question but that the installation of automated and computer equipment will provide a more individualized service for the patient which was not previously possible.

One additional comment which I would like to make is that because the automated, multitest laboratory is able to perform a certain amount of the routine repetitive procedures which the physician has had to do before, it frees up the time of the doctor, so that he can use his time better for the unique contributions he can make in the decision process of diagnosis, and in advice and counseling.

The physician takes considerable time for "data acquisition," for the collection of information, which often can be performed, by machines or paramedical personnel. There are many routine procedures for which the physician should not be bothered.

When all of the data are collected and are preprocessed, we even provide on the summary report an asterisk if a test is outside the normal limits. The physician can then conserve his time for decision-making, diagnosis-making, deciding on treatment, and advising and counseling the patient, so that in fact there is more individualized and personalized service as a result.

If I may make just one more comment: When patients go through the laboratory itself, they are accustomed in a laboratory with being faced with machines and receiving series of tests, and so that causes no problem. But when they see the physician in his office, this they want personalized. Now that many of the routine procedures have been performed, the physician now has more time to spend with the patient on treatment matters.

Senator NEUBERGER. And the patient reacts how to this. Do they like it?

Dr. COLLEN. The patients like it very much indeed. Presently one of our main problems is that there is a waiting period of over a month. The great majority of patients, once they have had the multiphasic checkup will come back and have it again and again. The satisfaction by patients is very high.

Senator NEUBERGER. You have an unusually large or well-equipped center. Can you visualize a mobile unit that is equipped sufficiently to be able to be used effectively?

Dr. COLLEN. We have explored this with one of the union groups, who has its members spread through the west coast, and who are not able to avail themselves of our large centers. We have been trying to advise them on a mobile unit to attempt to do something along these lines.

We believe that a considerable proportion of the tests we do could be performed on a mobile unit connected by telephone lines with a central computer.

Senator NEUBERGER. One of the criticisms that has stuck in my mind since yesterday was this sort of automated screening increases the workload of the doctor.

Dr. COLLEN. We have not found that this is true. In the traditional health evaluation, when the physician sees a patient, he takes a history and physical—physicians will spend usually from 30 to 60 minutes on that part of the exam. When the patient returns a few weeks later he will spend 15 or 30 minutes giving the patient a followup report.

It is our experience that if the patient goes through this procedure, where he receives the automated laboratory examinations first and then sees the doctor, 50 percent of all the patients—this has been our experience for many years—50 percent of all the patients are taken care of by the one visit to the doctor.

Senator NEUBERGER. Now, has it been so that a patient comes in because he is complaining of something else, and through this screening process are you likely to find that he is suffering from diabetes or something he didn't know he had?

Dr. COLLEN. Yes. Actually the majority of people have some complaints. When they come in for the periodic health exam, about 98 percent answer "Yes" to at least one question. It is rare for the important medical questions we ask, that they answer "No" to every one of the 207 questions.

Senator NEUBERGER. But for some reason diabetes kept coming up yesterday, and I presume that is because we have the equipment here, and evidently that is discovered through the blood tests. Would you say that you have found diabetes—and I think you mentioned it—in enough cases that you could say you could use some preventive drug? You can't prevent diabetes.

Dr. COLLEN. Diabetes tends to be primarily an inherited, family condition. But what we hope—and one of our epidemiological spin-off research studies is directed exactly to this: If we can detect early diabetes before it has developed symptoms in the patient, some of the newer drugs hopefully will prevent or postpone the clinical diabetes, and the complications of diabetes.

A patient really doesn't care if he has the tendency to diabetes, as long as it doesn't disable him or cause him to suffer or to shorten his life. Three percent of our patients going through have a diagnosis of diabetes. There is another 3 to 5 percent who have some disturbances in their blood sugar, which we call chemical diabetes, or prediabetes. Everyone now is concerned with studying these patients to see how many of them will actually get diabetes.

Senator NEUBERGER. You mentioned a lot of percentages by age groups. Would that be discovered in the blood sugar of an older group usually?

Dr. COLLEN. Yes; the frequency of abnormalities of the blood sugar increases with age. Actually, our normal values show that the value of the sugar in the blood increases linearly with age. In other words, it is about 30 points higher in a 60-year-old person than in a 30-year-old person.

As a result, when we get into the sixties and seventies, we find that a majority of people have such a high blood sugar that the present question today, to which physicians are addressing themselves is: Is this normal, or is this abnormal?

Senator NEUBERGER. I was interested that you have a control group.

Dr. COLLEN. Yes.

Senator NEUBERGER. This, of course, is the only way over a long period to determine some of the values of your screening, I presume. You mentioned grants from the Public Health Service.

Dr. COLLEN. Yes.

Senator NEUBERGER. Would you be prepared to say in round numbers how much of a grant you get from the Public Health Service?

Dr. COLLEN. In the multiphasic screening program?

Senator NEUBERGER. I was sort of thinking all over. No, what is a general figure?

Dr. COLLEN. The Kaiser Foundation Research Institute has several grants from different divisions of the Public Health Service, and I am sorry I can't give you the total figure.

Senator NEUBERGER. Well, would you know more specifically?

Dr. COLLEN. Our present grant from the Chronic Disease Division is \$720,000 a year, and this supports the multiphasic evaluation study and the automated multitest laboratories.

Our organization is fortunate in that it has some unique attributes, and in order to do epidemiological research studies of this nature, to answer these questions, one needs large population groups followed for long periods of times, and studies conducted by coordinated and co-operating groups of physicians. And these, of course, are very difficult studies and very expensive studies.

Senator NEUBERGER. As we progress in these hearings I take greater and greater pride in the work of our Public Health Service. We have had wonderful testimony from people, both State public health and Federal Public Health Service. And I think that the case of detecting disease would be 50 years behind if we didn't have this wonderful help through the Public Health Service.

Dr. COLLEN. I would like to agree with this and point out that although much of the research in the past has been directed to symptomatic, therapeutic and restorative medicine, only now, because of the advent of automated equipment and computers, is epidemiological research in chronic disease involving large numbers possible.

The costs of such programs cannot be borne by private groups, only by Government support.

Senator NEUBERGER. We had one machine here yesterday—\$17,000. And when private groups say, "Let us do the screening" or "we are leary of this," I always think if we depended on the private groups to the extent you just said, we would make no progress. It seems to me that we have got to have cooperation here between private medicine and public health medicine and research engineers, and so on, or we wouldn't get anywhere.

I wish you would remain on the witness stand, because I understand the next witness is familiar with your department.

Mr. Leonard Stevens, will you come forward please?

Mr. Stevens is a science writer, and he has had some experience with this center we have just heard about. We would like to hear from you, Mr. Stevens.

**STATEMENT OF LEONARD A. STEVENS, SCIENCE WRITER, NEW MILFORD, CONN.**

Mr. STEVENS. Madam Chairman, I have a statement that I wrote, but perhaps it would be better if I just reviewed it for you briefly.

Senator NEUBERGER. Fine.

Mr. STEVENS. I pointed out that I became interested in this problem 2 years ago, when I wrote a book for the President's Council on Aging, which was published by the Government Printing Office. It is called, "On Growing Older."

And in going over the subject with a great many authorities, some of whom have already appeared before these hearings, Dr. White being one, I became impressed with the need for preventive medicine, especially in the field of aging.

Last winter I had the opportunity to do an article, under assignment, on the Kaiser Foundation Center, and I was allowed to go through the automated physical that Dr. Collen has been telling you about. I have been invited to come here, as you know, to comment on my feelings about it—whether it was an impersonal experience, whether it had qualities of the assembly line, or what.

I have to admit that when I first heard about the center, I didn't know much about it, and some of the terms that go with it—"automated," "computerized," "multitest," and so forth—stirred some rather interesting images.

But actually, in the experience itself, I don't think it is emphasized enough that you are really dealing with people. And these people give you the tests. You are not connected into machines any more than you ever would be in a physical examination. They use equipment, and it is equipment that almost anyone may have experienced if he has had a number of physical examinations.

The computer is something that the typical patient going through the center never sees, and I don't think he is even aware that the data is being processed as it is taken from him.

The people giving the examinations do a commendable job. They are obviously selected for their personality, for being able to deal nicely with people. I remember in particular a lady giving the tonometer tests for glaucoma. She was very willing to discuss what she was doing. She would not discuss anything in a diagnostic sense; I don't mean that. But people are interested in this center and in the equipment, and it makes a difference if those administering the tests are willing to talk to you.

I might mention that the person right behind me of the some 150 going through that afternoon, a young man, was found to have glaucoma, and he knew nothing about it.

I think Dr. Collen and his colleagues really should be commended for the organizational job they have done at the center. And this is

very, very important. I think any such center that is established has to be very carefully organized, and the personnel very carefully selected.

One important fact about this, and especially for older people, is that you are not rushed as you go through. You are not put in a line, No. 1, No. 2, No. 3, and made to follow that order. It is relaxed. If you cannot keep up, the person behind you is allowed to move on. And there are plenty of seats throughout the center, so that you can sit down and rest and you can take your time to answer the some 600 questions given at that time.

I think this was revealed, in that, after my going through the center, the following day I interviewed a number of the patients to talk about some of the things that you have been asking about. And I found nobody who considered this an impersonal experience. In fact, I don't think they had even thought about it. They were more concerned that this was a very reassuring experience.

Let me just tell you about what happened with my family doctor at home in the small town of New Milford, Conn., where I live. When I went out to Oakland, I asked him if he would confer with me on the results of this examination which would be mailed directly to him. He was extremely negative about it. He immediately misunderstood what the center was about, and I was not in any way able to help him out of that misunderstanding at that point. He felt that anything automated and computerized would certainly lack the personal, intuitive, human qualities that are so important to a doctor in such examinations.

However, when the results were sent to him on a computer read-out sheet, a large sheet of paper, I went back to him, and he reviewed them with me and completely changed his mind. He decided that he was wrong. He had really misunderstood it. He saw this more, as I think it really is, as a laboratory, that could relieve him of time that he would be spending asking questions and doing such tests. And he needs it, I know, because the previous physical to the one I took in Oakland, was given by him.

Let me just tell you very briefly about it, but first let me say that this doctor is a wonderful doctor. He is our family doctor, and we depend upon him, and we have a great deal of faith in him, and I will continue to go to him as long as I can. However, to get an appointment for a physical examination is a trying experience and he knows it.

My physical that I had there was scheduled one evening for 8:30. When I went into his waiting room it was packed with people, and he told me I would have to be the last patient there to be attended to. He came out at 10:30, and the man was so tired that I felt that I needed to treat him instead of his treating me.

However, he insisted on going through a physical examination in his office, which was completed at 10 of 12 that evening. Then, after that, I had to go to the local hospital and complete the tests, some of the same ones I later was to receive in around 2 hours in Oakland. In fact, in Oakland I received many more tests than I would have at the hospital, in New Milford. But now I have to confess I never got to the New Milford hospital, because of procrastination, and the fact that nobody was pushing me.



Anyway, I would like to conclude by saying that I am very much in favor of such automated laboratories, and I would like to see them widely available to the citizens of the country. I know the examinations could be especially valuable to the good health and long life of our millions of older people, but I also would like to see some centers available to people of all ages.

I believe that preventive measures so important to the later years should be started as early in life as possible.

I brought along the article that I wrote. It was condensed in the Reader's Digest and Dr. Collen has told me it has created almost too much interest; he has had so many people there to see his center. And the USIA has, I will now tell him, picked up the article and is going to publish it in their Russian and Polish editions of America.

Senator NEUBERGER. It is very interesting to have your personal experience.

I realize that your situation, in being in the screening center, was unique in that you had not been referred there.

Mr. STEVENS. Yes; but I made a point to see that I was not treated specially. I asked that I not be identified as a writer. And I don't think any of the technicians or nurses knew who I was.

Senator NEUBERGER. I see that in your statement. What I was thinking of, though, was the end result.

Mr. STEVENS. Right.

Senator NEUBERGER. You were given personally the results of the screening tests?

Mr. STEVENS. No. They were returned to my doctor in New Milford, Conn.

Senator NEUBERGER. That is what I wanted to know, because this is where the great criticism seems to come from, from the ignorant and uninformed. The patient will get the screening tests and it will be discovered that he has some chronic disease or some latent malignancy that he didn't know about, and thus bring on trauma and psychiatric troubles and worries and scares.

Mr. STEVENS. I think there was concern out at Oakland that this might happen to me, and I might be treated specially, because I had come there to do a story. But they were very careful not to do that. They informed me that all the information would have to be sent back to my personal physician.

Senator NEUBERGER. If, over the years, with the kind of work going on at Permanente, it is discovered that there is value to a large area of the population through this kind of screening, what are we going to do to allay the fears—and you are not the only witness who said this about doctors—of those distrustful of this kind of thing? What can we do to allay the fears?

Now, you had a doctor who was converted or saw the value, by study and seeing the evidence.

Mr. STEVENS. He became involved in it.

I am giving only my opinion on this, but I think you would have to inform the doctors. But how you do that, I don't know.

Senator NEUBERGER. What about going back to the medical schools? And shouldn't our graduates in 1966 and so on be made aware that they can make use of automated equipment and computers, so that they

wouldn't even question it? Do you know if that is being done, Dr. Collen?

Dr. COLLEN. Yes, many medical schools are doing just that, and more are adding them every year. The present graduates of many of the medical schools are very sophisticated in computer programming and utilize the equipment right in their physiology laboratories.

Senator NEUBERGER. You are close to a bilingual school. The one I am closest to is Stanford. Will the doctors coming out of there know they can be relieved of history taking? Will they want this?

Dr. COLLEN. Answering the first question, most of the students know about it. I have described our program to graduate students on the Berkeley campus, and to medical students at Cal and at Stanford.

To come back to the previous problem, it is our experience that the physician goes through three stages, like all people when something new is introduced. The first one is skepticism and distrust. Later when the physician has an opportunity to participate, to receive patients who have received these reports, they become openminded. Then after it becomes evident that it provides more and better service to their patients, they demand it. I think it is only a matter of time before patients and physicians will both demand it.

Senator NEUBERGER. It seems to me they would be ready to accept it. For years they have been accepting the reports of laboratories. The dentist doesn't make inlays any more. I suppose when you go to dental school now, you still learn how to do it, but you don't really plan to do it and it is given to a technician.

Mr. STEVENS. Might I add something that I don't think was brought out? I remember that Dr. Collen told me when I was at Oakland these centers—he can correct me if I don't remember correctly—might have commercial possibilities if they could be located in areas—I think you said—of 200,000 population. I think that, in this vein of educating doctors, if the centers could be proven and started on a commercial basis, you might make considerable headway with them.

Senator NEUBERGER. This committee has no legislation before it, but we are exploring all these ideas, and you have had experience and it is a part of the record, and maybe some of these things will come to pass. I have kept you a long time, but yesterday we had a demonstration by Dr. Slack. Are you familiar with his computer method of taking history, and is that different from yours?

Dr. COLLEN. Yes, I have visited Dr. Slack. We have had several meetings together, and I have a very high regard for his work. His work on the matter of history taking is more advanced than ours, and we have been following his work with great interest.

In our self-administered questionnaires, the patient either checks a form, or sorts the prepunched cards. The latter adds one step, in that the response of the patient can be read directly into the computer.

Dr. Slack has gone one step further, in that not only can the patient communicate with the computer, but he can go on through branching questions. In our program if a patient answers "yes," we present that "yes" to the doctor and the doctor goes through the branching process of: If yes, so what? and so forth.

Dr. Slack's program permits the computer to ask: "If yes, so what?" And it can pursue the history taking all the way to the ultimate, the same as the doctor.

Now, the reason we have not yet installed a program like his, is the matter, again, of economics.

The boxes we have made with the cards are very cheap. They only cost us \$1.17 to make, and cards are only \$1 per 1,000. In order for us to install cathode-ray tubes for our 24 stations open at San Francisco and do what he is doing would, of course, involve \$100,000 or more.

Senator NEUBERGER. Thank you both very much. It has been a very enjoyable hour we have spent with you.

(Prepared statement of Dr. Stevens follows:)

STATEMENT BY LEONARD A. STEVENS, SCIENCE WRITER, NEW MILFORD, CONN.

Two years ago, while retained by the President's Council on Aging to research and write the Council's book, "On Growing Older," I interviewed many authorities concerned with the medical problems of aging. They impressed me with the increasing need for preventive health measures as a person grows older. A chapter in the book is devoted to the subject.

At the same time I learned that preventive medicine has not developed with the same remarkable progress found in symptomatic medicine. While we talk a good case for taking preventive measures the practice of it leaves a lot to be desired. This point interested me as a writer; therefore it was a welcomed assignment when last winter a national magazine asked me to fly to Oakland, California, to do an article on the Kaiser Foundation's automated health examination.

I suggested to the Kaiser people that my initial reporting consist of taking an automated physical. They kindly agreed and one afternoon I joined about 150 people who went through the center. To those working there I was just another patient, for I had asked that my identity as a writer not be revealed. I wanted no special treatment.

I have been invited to comment before this subcommittee on what the examination was like. In particular, was it impersonal? Was it reassuring?

Before going to Oakland I had some images come to mind about the forthcoming experience—thoughts that must arise when most anyone first hears of the center. An automated physical? Given in a multitest or multiphasic laboratory? A medical examination by computer? It was easy to come up with some unusual mental pictures of being inspected by machine—perhaps being personally wired into a computer.

After my trip to the Coast I kept a 4:30 p.m. appointment at the Kaiser Center where I was immediately guided through the center's 20 stations. In each I received one or more tests from a lady technician. Between the stations I was kept busy answering some 600 questions about my medical history. By 6:45 I was through with the tests and assured that nothing had been found of an emergency nature.

While the words "automated" and "computerized" had initially produced images of a mechanically oriented examination, the experience was anything but that. It was an examination by people. They used technical equipment—but so has every doctor or technician in every examination I have ever experienced. The test data was processed by computer, but I wasn't at all involved. My confrontation was with human beings, all of whom were pleasant, relaxed and willing to discuss what they were doing.

I particularly remember the technician who gave me a tonometer test for glaucoma. She said she had applied the test thousands of times, but hadn't become bored because the work's importance held her interest. She felt that glaucoma was unfortunately being discovered more and more in young people. Incidentally, I learned later that a young man who followed me through the tests was found to be a glaucoma victim, though he had no idea of the problem.

While Dr. Morris Collen and his colleagues are to be commended for a magnificent technological job in creating this exciting center, it may not be well enough recognized that they have also done an equally outstanding job at organizing and operating the center in terms of personnel. All the technicians and nurses were obviously chosen for personal qualities as well as technical competence. This kind of attention, in my opinion, is an essential foundation stone for any such center.

The good organization job has also created a center where patients are not pressured or rushed along—which is an important point for older people. While it is possible to take all the tests in a little over two hours, there is no reason why a person can not spend much longer. Patients are not required to proceed in any order. Should an individual be slower than others the speedier patients can move ahead.

There are ample seats outside each station where patients may sit to answer their written examinations in a relaxed fashion. Should a person require help with the questions, there are plenty of center personnel to give assistance.

The results of the center's personal qualities, I believe, were revealed by brief interviews that I conducted with a number of patients on a day following my tests. No one was concerned about his examination being cold and impersonal. Frankly, I found no one who had given it serious thought—which in itself is indicative of how well the patients are treated. On the other hand, nearly everyone said something to reveal how much faith he had in the center's work. The patients recognized that, compared to previous physicals, here was the most careful and thorough one they had ever experienced.

In conclusion, please let me tell briefly of my family doctor's reactions to my visit to the center. Before I went to Oakland, he agreed to review the results of my examination, which would be forwarded directly to him by the Kaiser people. But his immediate reaction was negative. He feared that the center's designers might be deceiving themselves into thinking that a computer could match the subtleties which often reveal to a doctor that a patient in apparent good health may have some hidden problems. But when the results were returned to him, my physician changed his mind. He recognized that the center was in no way trying to compete with a good doctor's intuitive, common-sense qualities. Instead he realized that the automation, which at first worried him, could handle the time-consuming, routine testing jobs that make it difficult for him to conduct very many physical examinations—though he believes in them devotedly. Then he was all in favor of such centers and wondered how one might be established near our hometown.

I too would like to see such automated laboratories widely available to the citizens of this country. I know the examinations could be especially valuable to the good health and long life of our millions of older people, but I also would like to see such centers available to people of all ages. I believe that preventive measures so important to the later years should be started as early in life as possible.

#### BETTER HEALTH THROUGH AUTOMATION

[By Leonard A. Stevens]

In 30 years I have had many physical checkups, but none more thorough than the examination I received in Oakland, California, recently. It was comparable to one that might require two days in a hospital with a bill of \$300 or more, however, it lasted just over two hours and cost under \$30. Oddly enough I didn't see a doctor that day. The examination was conducted by female technicians and nurses assisted by automated testing devices and a large electronic computer. The checkup was administered on the same day to nearly 300 people. About half were examined in San Francisco with the results continually transmitted by wire for analysis by the Oakland computer.

My unusual physical took place in the world's first and only "automated multi-test laboratory" which has caught the interest of medical people all over the world. It is operated by the Permanente Medical Group, an organization of doctors that works with the Kaiser Foundation Health Plan. Some 40,000 members of the plan are receiving the examination each year.

Through such automated centers millions of people may soon enjoy longer, healthier, more comfortable lives because of regular, thorough examinations. In the past some difficult problems have limited this kind of preventive health care, but the automated examination appears to hold the solutions.

Over countless decades doctors have told their patients not to wait for aches and pains before making appointments, but to come in good health for regular physical checkups. However, doctors have seldom pressed the advice. Regular routine physical exams, if all patients subscribed, would be so time consuming that appointment books would hardly have space for the sick. Moreover, physicians would understandably find the repetitious life of routine questions and tests dulling their senses and reducing efficiency.

At the same time patient attitudes have been lackadaisical. It's difficult to remember to call the doctor when you're feeling fine. Also, good physicals are both time consuming and expensive. So we let them slide and slide—though frequently warned of the dangers.

Thus preventive medicine in America is crowded aside by "symptomatic" or "crisis" medicine. All too often it takes a crisis to, force most of us to the doctor where we find the waiting room lined by worried faces with pained bodies.

I confess that my last physical checkup prior to the Oakland experience illustrates how crisis medicine dominates preventive practice. I had long delayed calling my doctor for a checkup, but I finally made an appointment for eight o'clock one evening. Arriving on time I was dismayed to see the waiting room packed with distressed looking people who, of course, were all ahead of me. At 10:30, I heard the doctor, one of the town's most popular practitioners, announce that I was next. The poor man, ashen from fatigue, valiantly insisted on giving the checkup which lasted until nearly midnight. Even then I still had special tests to take at a hospital. A tangle of my own appointment problems, plus procrastination kept the tests from being completed.

The Permanente center was in sharp contrast to this experience. I was quickly signed in and given an instruction pamphlet explaining that I would visit 19 test stations. At the end an appointment would be made for me to see my doctor on another day when he would have all the test results to review with me. If necessary, he would recommend further tests or steps to remedy any problem.

In spare moments at the center I was to answer nearly 600 written questions. The first set was handed to me on a metal clipboard and they required checking mostly yes-and-no boxes with a special pencil that would enable the computer to process the answers.

An important part of the ordinary physical occurs as the doctor questions the patient about his medical history, including recent aches, pains and odd feelings. The first signals of serious problems often come from the patient's recollections of such discomforts. But the doctor must weigh the answers in light of human differences. Is the patient, for instance, a chronic complainer or a stoic who admits nothing? But all this requires that the doctor remain alert through hundreds of routine questions. It is more than we should expect of even the most diligent doctor, and we should not be surprised that historicals do not always get the attention they deserve.

The Permanente questions have been scientifically devised to turn the job over to the patient and the center's computer. The patient answers a lot of very specific questions which are designed for a layman yet cover many medical possibilities point by point. "Have you often, at any time in the past year, had attacks or episodes of pain or pressure or tight feeling in your chest that awakened you from sleep?" asks one question. Another queries: "Have you coughed up an ounce (about 2 tablespoonsful) of sputum daily for more than two weeks in the past year?"

There are also questions aimed at determining what kind of an individual is taking the test. A question that may help separate chronic complainers from stoics asks what a person should do when he has a cold. Should he see a doctor right away? Treat himself unless it gets worse? Or let nature take its course?

With the clipboard I sat down among several men (women come on alternate days) and began, as they were doing, to answer questions, but I had barely got underway when I was sent into the testing laboratory. The first stop was in one of many dressing cubicles where instructions told me to undress to the waist and put on a disposable paper gown found in a pile on a shelf. Leaving the cubicle I was ready for the tests.

The automated multitest center is architecturally designed to administer many physical checkups with speed and efficiency. The stations, rooms of various designs and sizes, are found on both sides of a central hallway that essentially makes a large circle. In each room a patient undergoes one or more phases of the examination. People move steadily through the center so the average test is administered about every minute and a quarter.

From the dressing cubicle I was directed to see an aide who stood by a colorfully decorated soft-drink vending machine. "Do you know if you have diabetes?" she asked. "Or have you had surgery removing part of your stomach?" I said "no" and she served me a cool, sweet, carbonated drink drawn from the vending machine.

"Drink it all," said the lady. "It prepares you for the diabetes tests that you will receive in about an hour. It is a small amount of glucose mixed with cold carbonated water."

She stamped the time on the first of 16 data processing cards in a special holder on my clipboard. Each card was to be collected and then punched or marked with test results as I went through the center, thereby gathering medical data in a form the computer at the front of the building could process.

In the next 15 minutes I encountered about five major tests, as I moved along with a small group of men whose appointments coincided with mine. In one of the early stations, two of us, each lying on a table separated by a partition, were given electrocardiograms through a single machine. Mine was administered by an attractive young lady who pleasantly discussed the test as she applied six electrical contacts to pick up the rhythms of my heart beat.

"Ever have an electrocardiogram before?" she asked. I had, so she explained how the bodily contacts for this equipment had been adapted for easier and quicker application to the patient.

Today the center's electrocardiograms are inscribed by an electronically driven pen that writes on moving paper which is then sent to an expert for visual analysis of each patient's results. In the near future, however, the heart signals may be fed directly into a device that will allow the Permanente center's computer to analyze the complex waves quickly and efficiently. This has already proven feasible elsewhere but the necessary equipment is not ready for use in the automated center. Today completed electrocardiograms are delayed a few days because of the manual analysis.

In the next station I was weighed and measured in more than a dozen ways in about two minutes. I was weighed on a typical scale, but most measurements were made with an "automated anthropometer" specially built by the Permanente center's designers under the direction of Dr. Morris F. Collen.

"Please stand on the red footprints," said the anthropometer technician pointing to the base as I approached it. This caused me to step directly under a large steel arch and locate myself between the opposing ends of two movable rods projecting from each side of the metal framework. The girl operated the machine by sliding the rods up and down the frames and telescoping them in and out to touch different points on my head and body.

For instance, she slid both rods to the height of my hairline, then drew them together until each touched opposite sides of my head. At that instant her foot tapped a switch on the floor and the width of my skull was simultaneously punched into one of my data cards that had been placed in an electronic device nearby. Her instructions that I should shift to some plaid footprints caused me to turn for different measurements. When completed, my card carried 12 anthropometer measurements, such as my height, length of my arms, chest thickness and hip widths.

Most often in a physical exam only two bodily measurements, weight and height, guide the doctor toward conclusions regarding the individual's bodily condition, especially whether he is obese. But weight problems are also related to a person's bodily framework. Thus the automated tests provide a much more comprehensive record from which to draw the important comparisons.

In a third station I received a typical chest X-ray and rendered another data processing card for use by a radiologist to record his interpretation of the picture of my lungs. Had this been the next day and had I been a woman over age 40, I would have stopped at station seven, but on days for men it is closed. The room is equipped for "mammography" in which two X-ray views are made of the female patient's breasts. Mammography is extremely important for the early detection of breast cancer.

By now I was well on the way through my first couple of hundred questions, which I was answering a dozen or two at a time between stations. Most were factual and comparatively easy. One section, for instance, contained a long list of diseases each with eight possible blocks to check to show which if any affected my blood relatives.

At the next three stops I encountered examinations common to regular physical checkups and eye examinations. At number eight my pulse and blood pressure were recorded. Number nine was a room with black walls, where first I read the well known eye chart and then, under some special lighting arrangements, received the fairly conventional "pupillary escape" test which checks the response of the eye's pupil under rapidly changing intensities of light.

At station 10 I receive a quick, simple and painless test for glaucoma, one of the nation's leading causes of blindness, even though it can be controlled if detected early enough.

"How many of these tests have you given?" I asked the nurse as she recorded the results.

"Oh, I have lost count—thousands and thousands," she said. "But I never get bored. It's extremely important. We used to think of glaucoma as something afflicting only older people. But I am now aware of finding it more and more in younger folks."

Before I left her station, the nurse administered an eye drop that began to dilate my left pupil. She explained that it would allow a special camera a few stations ahead to photograph the retina.

A minute later in the next room I was standing in front of a "spirometer," a device with a large flexible hose. The lady operator placed a clean cardboard mouthpiece in the hose as she explained that I was to blow into it three times as hard as I could, exhaling all the air possible. The girl then recorded the highest figure of the three that registered on the machine's dial.

The spirometer measures what doctors call ventilation, i.e., the rate at which air can flow in and out of a person's lungs. This rate is an index to the elasticity of the lungs and the volume of air they can handle. In turn ventilation problems are indications of lung diseases such as asthma and emphysema.

In all the stations to this point the nurse or technician had been notably communicative about the tests. This attitude has been encouraged by Dr. Collen and his staff to make sure patients do not feel that here is a cold, mechanical medical mill lacking the important human qualities found in a good doctor. A minor exception seemed evident in station 12 where the woman technician was pleasant but not as communicative.

Here I was instructed to remove my right shoe and sit in a chair in front of a waist-high pedestal on which is mounted a pressure gauge and a valve handle. It was attached by tubes to a device on the floor into which I was told to place my foot so the heel tendon fitted between the ends of two opposing rods.

"This is a tendon reflex test," said the lady pointing to the rods. "They will press in on your tendon. Now, if it hurts, tell me and I will stop."

She turned the valve and the rods pressed slowly together on the tendon. For several seconds I felt only the increasing pressure, but soon it hurt slightly. I didn't say anything for the pain wasn't insufferable—except the rods were continuing to press together—and then I decided to speak up. The pressure was released instantly.

Later I learned that this test is actually aimed at ascertaining how a patient reacts to pain. Eventually the Permanente doctors hope the data will make the test useful in overall efforts to determine a person's degree of stoicism. The knowledge may become another guide as to how examiners should weigh an individual's responses when asked about physical discomforts.

In station 13, a soundproof room, four of us were given earphones and told to listen carefully for a sequence of six different tones that would rise slowly in volume one at a time. The instant a tone was heard each person was to press a pushbutton and hold it until the sound disappeared. As the test proceeded, our hearing abilities were automatically evaluated and the results recorded.

Now, well into the second hour, we were directed to a large circular room that included stations 14 and 15. Attendants at a central counter collected my complete questionnaire. In return I received a tray containing three compartments. The top one held a stack of 207 punch cards, each bearing a printed question. Every question was to be answered by dropping its card into either of the two lower compartments, one of which was labeled "Yes-True," the other, "No-False."

"Please work in a booth, until your name is called," said an attendant pointing to cubicles with chairs and counters that lined the circular walls.

To receive the remaining physical tests, I left my booth on call and visited three nearby stations. In station 16 a technician drew blood from my arm and passed the vial with one of my cards through a window to a laboratory with a most ingenious machine.

I was later shown the device. It is waist high and several feet long. A complex of plastic tubes, wires and mechanical equipment, the machine well earns its technical title as a "multi-channel automated chemical analyzer." It can split a small blood sample into eight parts and test it that many ways in 12 minutes. The blood is analyzed for glucose, creatinine, albumin, protein, cholesterol, uric acid, calcium and transaminase. Moreover, the auto-analyzer

can receive a new sample every two minutes, which means it can simultaneously process six persons' blood. Spot checks are continually made to ensure that samples are not mixed. The eight test results, which provide data for detection of many serious problems, are automatically punched into the proper data cards for use in the computer.

From the blood sample room I stepped into an adjacent station where I provided a urine sample in a specially marked container that I handed through a slot in the wall to a laboratory. It was immediately analyzed and recorded.

Back in the circular room, before completing all the question cards, I was given a tetanus booster injection and then called for a final test. In a darkened room a nurse instructed me to look into the end of a cylinder with my left eye in which the pupil was dilated. She adjusted the equipment and then came a blinding flash, as a color photo was made of the eye's retina. The nurse then administered an eye drop that returned the pupil to normal. The photograph was soon developed and observed by an ophthalmologist. It was then filed with his analysis in my records at the center. This kind of inspection may reveal more than just eye problems; it may (by revealing changes in blood vessels) catch early signs of other health problems, such as diabetes, kidney trouble and high-blood pressure.

With all questions answered and turned in, I was instructed to wait at the final station outside the computer room where the initial processing of my medical data was in progress. Should the findings of my checkup reveal anything of an emergency nature, the computer would immediately say so to the attendants by printing out some special coded numbers.

Emergencies requiring immediate attention do not occur too often, though one by chance did show up while I waited at the final station. A young man was taken aside by a nurse and quietly informed that signs of glaucoma had been found. She told the man not to be alarmed, but advised him to go immediately to the ophthalmologist in the adjacent hospital.

Just before my visit, Rhode Island's Congressman John E. Fogarty was inspecting the center and at one point he asked about emergencies. Coincidentally he was looking at a patient's data sheet which it turned out indicated the person might have leukemia. In a more dramatic incident, a technician was alarmed by an unusual electrocardiogram being taken from a woman patient. A doctor summoned from the hospital found she was actually having a heart attack.

I was soon called by a nurse who announced: "You will be happy to know that nothing of an emergency nature was found in your examination." She then made an appointment for me to visit my doctor subsequent to his receiving a final summarized report of the physical. A second future appointment was made for me to take a rectal examination which was not mandatory, but was strongly recommended for detection of cancer. Likewise gynecological tests are recommended for women examinees.

In the automated center's short history it is showing that such periodic examinations can uncover what Dr. Collen refers to as "a large hidden reservoir of asymptomatic disease [the stage before symptoms appear]." For instance, among all the center's patients, hypertension is found in some nine percent, diabetes in four percent and glaucoma in one percent. These discoveries, says Dr. Collen, "permit early institution of medical care and often help to prevent or postpone serious and even permanent disability."

Some of our most serious diseases can't be "cured," but if they are detected early enough their symptoms may be prevented or at least held back. "A person couldn't care less," explains Dr. Collen, "if he has the genes for diabetes and lives to 100 without suffering from it." The same applies in varying degrees to other serious chronic diseases, such as cancer and heart problems.

Another good feature of the new center is that it instills confidence in patients. This benefit is then inherited by the doctors involved, for patients feel the physicians are offering the best, most advanced techniques for maintaining good health. And this is more than intuition, for automated procedures have proven to offer greater precision and sensitivity than conventional tests.

Of course, the automated center and others like it are certain to improve—not only because of new equipment and methods, but because the seeds for even more precise, sensitive testing are found in the data now piling up about thousands of patients every month. This medical data, stored on magnetic tape, is the basis of research to find exactly what is notable in people as diseases first begin. Thus the center's work may lead to ways of detecting problems at earlier and earlier stages for increasing effectiveness in fighting disease.



But how can other communities enjoy similar centers? Dr. Collen, who has been with the Permanente project from its infancy, has cost figures indicating that a population of 200,000 or more people can support a commercially operated automated laboratory, if physicians would use it. Several widely spread communities, in fact, might share a central computer through telephone wires connecting it to small centers where the actual examinations would be conducted.

Meanwhile, such centers may be forced into existence by rugged demands that Medicare will soon press on doctors and hospitals. For them, automated laboratories can save time and energy by taking over routine physicals, but most important, automation's widespread possibilities for preventive medicine can mean that fewer people will suffer the diseases that are now the heaviest burdens for physicians and their facilities.

With all this in mind, Senator Harrison A. Williams of New Jersey and Congressman Fogarty recently introduced Federal legislation to foster establishment of community health examination centers for people over 50. Nicknamed "Preventicare," the legislation would provide grants to medical schools, community hospitals and other nonprofit agencies to help them establish and operate such centers. The legislation was written after careful study of the Kaiser Foundation and the Permanente Center.

The U.S. Surgeon General Dr. William H. Stewart, who would distribute Preventicare funds, believes such a program is essential to the Nation's health. "Many lives can be prolonged," he stated recently, "and many disabilities prevented, postponed or minimized, through early detection and prompt treatment of many chronic diseases. Projects which apply the great potential of automation to health maintenance are especially promising. We in the Public Health Service are keenly interested in helping to make the best in preventive services available to people across the nation."

When I saw my doctor to discuss the final results of my automated examination, the session required less than a quarter of an hour. He had already read the summarized medical data condensed by the computer to a letter-sized sheet of paper. One of the blood tests left a question in the doctor's mind, so he had a sample of blood drawn from my arm and sent to a local laboratory for double checking. When the results came back he phoned to say I had a clean bill of health.

During my visit I reminded the doctor of my last abortive checkup conducted close to midnight. If automated health care could prevent such sessions, agreed the physician, he was all for being replaced—in that role—by a computer.

Senator NEUBERGER. I will now call on Dr. Murray Grant, who is Director of Public Health for the District of Columbia Department of Public Health, and who some of us have met on the mobile unit.

Dr. Grant, we welcome you.

**STATEMENT OF MURRAY GRANT, M.D., D.P.H., DIRECTOR OF PUBLIC HEALTH, DISTRICT OF COLUMBIA DEPARTMENT OF PUBLIC HEALTH, WASHINGTON, D.C.**

Dr. GRANT. Thank you, Madam Chairman.

I would like to say that I am very pleased to be here to speak on a subject that is of some interest to us in the field of public health. In fact, I would say very considerable interest, Madam Chairman.

I have already submitted a written statement, but what I would like to do this morning, if I may, is to speak extemporaneously about this subject, and perhaps, if I may, tell you a little about a program that we started in a county adjoining Washington, because of the fact that this county has both urban and rural portions, and because I think that it may be of interest to you to know how this disease prevention program can be carried out in rural areas as well as in urban areas.

And then after that I would like to speak a little bit about our program in the District of Columbia and some of the results of this program as we visualize it thus far.

Senator NEUBERGER. Please proceed.

Dr. GRANT. In 1959, when I was health officer of Prince Georges County, Md., we approached the medical society to see if they would have an interest in supporting us in the development of a diabetes-detection program.

They did support us. And shortly afterward we contacted some of the ophthalmologists in the county to see if we could secure their support in relationship to the development of a glaucoma-detection program. And again, they were very supportive of this program and helped us considerably.

We took a person who had previously been employed as a sanitarian. We gave him some special training in glaucoma detection and in blood testing. And we began a program just as simply as that, Madam Chairman, with this one individual, assisted by a member of our health education staff.

Prince Georges County, I should tell you, had a population of some 400,000 back in those days, consisting, as I have indicated, of both urban, semiurban, and rural portions, and it was our intent to try to develop this program for the county as a whole, for people primarily over the age of 40 who wished to take advantage of this program of their own volition.

We preceded the program with a substantial educational drive. We enlisted the support of the Lions Club in the case of the glaucoma program, and of local church groups and other groups in connection with the diabetes program. We stationed this individual that I have referred to in shopping centers, in churches, in just about any kind of facility we could locate throughout the county. We preceded his arrival there by about 2 months of education in an effort to insure that the people at large in the area knew of his arrival and would be willing to participate, and we then scheduled the program.

And I would say, Madam Chairman, that this program was a very successful one, and I think I would like to cite one figure that I have never quite forgotten, because in all of my experience in the field of public health I have never known a program to be as successfully accepted as the glaucoma-detection program.

In a period of 2 months we made 750 appointments for people over the age of 40 who wished to avail themselves of this program. And in that period 749 of those people turned up for the appointment, and the 1 person that didn't was a lady who called us to tell us why she couldn't. I have never had an experience similar to that anywhere since I have been in the field of public health.

So this program, then, I mentioned specifically because of the fact that it was started in a very small way, using really one individual that we especially trained for this purpose. And because I think it was really a successful program, carried out in a population I should say that is relatively wealthy, Prince Georges County, one of the wealthiest counties of Maryland, and a program that was carried out with support of the medical profession and carried out in both rural and urban areas.

I assume, Madam Chairman, that you have already heard testimony relating to the problems of chronic disease, its extent and its cost; and because of this assumption on my part, I don't propose to speak to this point.

I therefore propose to move into the District of Columbia program, which was started in April of 1963, utilizing a large mobile trailer that we acquired on loan from the U.S. Public Health Service.

We equipped this trailer with a staff that we acquired as a result of some Federal funds we had in another program that I diverted to this program and, as I indicated, we began the program in April of 1963. At that time the total funds that we had available were some \$70,000. And it was with this that we began to employ some staff and began the program.

If I had one concern at that time, my major worry was that people would not accept it. We have had long, hard experience, Madam Chairman, in running programs in the field of public health that we felt were needed and desired, only to find that people weren't motivated to take advantage of them, particularly people in the lower socioeconomic groups. And this was where we were planning this unit, at least in its initial phases.

So that we launched this program with a rather carefully developed educational program. We employed at that time two individuals, community health workers. We launched them into the neighborhood. We worked with churches and with civic groups in the area to stimulate the populace in the area to the desirability of taking advantage of the program.

In this effort I may say we were very substantially assisted by the news media, and I must say, Madam Chairman, that they have been tremendously helpful in helping us inform the populace at large of the desirability of this type of program.

I needn't have worried, however, because, as it turned out, within a very short time the unit was oversubscribed.

We had first planned to place the unit in a location and let anyone that wished come in and go through it. It came very rapidly to pass that we couldn't continue this program in this manner, because we had long waiting lines, and so we began to set up the program on an appointment basis. And very rapidly the appointments were scheduled about a month or so in advance.

We saw approximately 40 persons per day at the unit and we still see about 40 persons per day, on an appointment basis, and we are as a rule scheduled approximately a month in advance. We stationed a unit at this location and retained it there at, the first location, as I recollect, for about 3 months. Then we moved it to another location, and we subsequently moved it, of course, several times in the approximately  $3\frac{1}{2}$  years in which it has been in operation.

We have seen during that  $3\frac{1}{2}$  years at our mobile health center program, a program which, I believe, Madam Chairman, you had an opportunity to see for yourself—we have seen some 30,000 people go through this unit in the  $3\frac{1}{2}$  years in which it has been in operation.

About 18 months ago, we established a second program, at what we call our Southwest Health Center. This is not a mobile unit. This is a stationary health center located not too far from the Capitol, where we located an additional program using some funds emanating from the MAA or Kerr-Mills program. And this program, too, Madam Chairman, has been very successful. It is seeing about 10,000 persons a year.

This program is open to any person in the District of Columbia over the age of 40, and we have had a very great deal of success in enlisting the assistance of news media again in developing this program. And as I say, we have again found ourselves in a situation where we are making appointments 3 to 4 weeks in advance.

In connection with this program at the Southwest Health Center, I should make the point that we are also transporting certain persons to that unit, persons that we feel would have some difficulty in getting there themselves. I refer specifically to persons, old age individuals, in public housing projects and in nursing homes. We are arranging for their transportation to this unit in order for them to take advantage of the program.

But the vast majority of individuals who come to that center come under their own steam.

In terms of the results of the program, I can briefly indicate that some 75 percent of the individuals who have gone through the program, we have found, have one or more finding. As you know, Madam Chairman, the kinds of screening we carried out in this program take approximately a half an hour for each person to go through. It includes height and weight measurements, visual screening, testing for glaucoma, blood testing for diabetes, syphilis, and anemia and an electrocardiographic reading for a possible heart condition, a physical inspection by a physician who staffs the unit and a blood pressure examination and a chest X-ray for possible lesions of the chest, including cancer, tuberculosis, and so on.

We have found, then, that some 75 percent of the individuals who have come through have some kind of problem.

However, of this number we find a considerable number of these individuals, actually about 20 percent of this 75 percent number, previously have been under care and currently are under care for their problem. And so, Madam Chairman, I would say that of the total number of individuals that have come to the unit, 54 percent have actually been referred to a physician for care. This 54 percent includes those persons who have defects that were found anew; in other words, the individual didn't know he had any problem whatsoever, and it also includes the individuals who knew they had a problem, were previously under the care of a physician, but lapsed from such care. We think that both of these referrals are of value.

We found that approximately 90 percent of the individuals that we have referred in the District of Columbia find their way into the offices of private physicians for continuing care, and we have found during a 6-month followup of these individuals that some 86 percent follow through to see the physician and are under care by that time.

This then very briefly explains the program, Madam Chairman; in terms of its costs, I should indicate to you that it is costing us approximately \$12 a person to go through the total screening examination, and this includes the health education program that precedes it and the followup program that succeeds it. I shall add, too, Madam Chairman, that to my way of thinking, these two programs—these two aspects of the program are perhaps among the most important. Getting the patient to the unit, in other words, the health education program, to sell the people on the idea of going there; and most important, the followup.

There is no point whatsoever, of course, in developing a screening program of any kind unless you follow these individuals up and try to insure that they receive care. We are devoting approximately 25 per cent of our total budget to this latter part of the program.

I think, Madam Chairman, that this perhaps might explain enough about the program to permit you to ask questions, to which I will be glad to try to respond if I can.

Senator NEUBERGER. Now, yours differs from some of the other screening that you have heard about in that it does not require a referral by a physician.

Dr. GRANT. No, it does not require a referral by a physician. That is correct, Madam Chairman.

Senator NEUBERGER. Therefore, would most of your participants come because they want to find out, or because they have a pain, or what would be your estimate of why they come?

Curiosity?

Dr. GRANT. Well, I think there are many reasons, Madam Chairman.

I want to make this point before I respond to your specific question. Most of us in the public health field have felt for a long time that these kinds of detection programs that I have mentioned to you belong in the offices of private physicians. We think that if private physicians could do this, and if patients would go, this would be an ideal arrangement to have these programs carried out in their offices.

Be this as it may, and in spite of the fact that we in the field of public health have been endeavoring for many years to sell people on this idea, from a practical point of view we recognize the fact that this is not going to happen except in a certain number of people. It is not going to happen for a number of reasons.

One is the fact that people are not motivated, and the second reason is because it costs money, and sometimes it costs a great deal of money. So it is because of these reasons that we have moved ahead to develop these kinds of publicly organized and publicly financed disease detection programs along the lines that we have developed in the District.

In response to your specific question, in terms of why people go to the unit, obviously there are many reasons. One of them is that a neighbor went. They heard the neighbor went through. It took her only a half an hour. She went through a battery of tests. It didn't cost anything. And "why shouldn't we go and get the same kind of service?"

We have tried to motivate these people by having our workers go out into the field. We have had pastors speak from the pulpit. We have had all kinds of educational material available, so that people could be motivated to want to take this kind of service, which is free to them, in view of the fact that it doesn't cost them anything out of their own pocket.

Some of them obviously have a pain or ache that they worry about, and come to the unit to find out what it is all about. Some of them have been referred specifically by physicians for this service.

So there are many reasons, Madam Chairman. The extent of these reasons in terms of the percentage, for one reason or another—I don't know the answer to this question at all—but I am sure there are many reasons, including some of the ones I have mentioned.

Senator NEUBERGER. Do you find those mostly in need of screening don't come?

Dr. GRANT. Well, I had thought that would be so. And this was my first concern when we first located the unit in one of the areas of the District of Columbia that has a very low socioeconomic level. But I must admit that many of the poorer people availed themselves of the services of this unit. This, I must say, surprised me, Madam Chairman. I didn't expect it. I thought this was where we would have some problems.

But we have found a considerable number of people in the lower socioeconomic group taking advantage of it. I am perfectly certain, at the same time, that many have not. But we have located the unit in each of these locations for from 1 to 3 months. It has been busily occupied. And in almost every case we have been successful in getting people to come to the unit.

Senator NEUBERGER. What would be the effect of the attendance and the results if you charge a small fee for screening?

Dr. GRANT. Madam Chairman, I think that is a very good question, because I have often thought about it.

I don't know what the effect would be in the District of Columbia. My guess would be that it would have an effect on reducing the number of people that came. I am not certain, however, that that would be so. I have established programs in the past, and I can give you a specific example where I thought this would happen.

For example, when I was in Prince Georges County, we established a dental clinic entirely for low-income groups. And when we first began it, we charged no fee and we had lots of people come. I decided that we would charge a nominal fee. And it did not reduce in any way, shape, or form the number of people that came. And, as a matter of fact, I thought many times, Madam Chairman, that a program similar to the one we established here could conceivably be established elsewhere and a reasonable fee charged, and I am not at all certain that this would interfere measurably with the total numbers of people that would come.

I think it would with some, but I think you could still have a successful program even though you charged a nominal fee. That is my opinion. I am not sure it is validated by any particular experience, but I honestly think that this would happen.

Senator NEUBERGER. Thinking back to the early sort of program that is comparable to yours, in the tuberculosis detection center, did they charge a fee?

Dr. GRANT. In general, no, Madam Chairman. In almost all of the detection programs that exist in this country for tuberculosis, no fee is charged.

Senator NEUBERGER. There we were out to eradicate a disease, too. But wouldn't you think—or I seem to think—that some of the success of that program was based on the fact that there came an acceptance from the public? As you say, an education program went on.

Dr. GRANT. I think the education program was a very important component part of that. I think there were many factors one could cite as being responsible for such success as we have had in the tuberculosis control program. But I think one of them certainly is that.

Senator NEUBERGER. Then in your cost that you figure, \$12, you include the cost for education?

Dr. GRANT. Yes; this includes the total cost of the program including the educational program, the screening, and that portion of the followup that we carry out within the Department. In other words, prior to the time that the individual gets into the physician's office.

Senator NEUBERGER. Well, we are all fascinated with the work your agency has been able to accomplish and your very good report on it, and I do appreciate your bringing the mobile screening unit here. It has helped to dramatize our hearings as well as advance the people's concern for their health.

Dr. GRANT. Thank you, Madam Chairman.  
(The prepared statement of Dr. Grant follows:)

STATEMENT BY MURRAY GRANT, M.D., D.P.H., DIRECTOR, THE DISTRICT OF COLUMBIA DEPARTMENT OF PUBLIC HEALTH, WASHINGTON, D.C.

It is with a great deal of pleasure that I appear before this Subcommittee to speak on a subject close to many of us in the public health profession.

The D.C. Department of Health operates two full time multiphasic screening programs for adults aged 40 years and over, regardless of income. The program on the mobile unit—a specially designed, fully equipped trailer on loan from the Public Health Service—has been in use here since April 1, 1963, and screens approximately 10,000 persons yearly. The stationary screening program opened in April, 1965, at the Southwest Health Center, operates under the same policies and procedures as the mobile unit, and screens a like number of persons yearly.

Systematic screening of all persons 40 years of age and older to detect incipient chronic disease and disability and to bring these persons under medical supervision is advantageous to the community and to the individual.

I believe that every individual over 40 should have access to facilities which enable them to receive screening tests for a variety of diseases. In the case of some of these diseases, such as diabetes, testing at an earlier age even than 40 is desirable. The point, of course, is that the earlier one finds a disease entity in an individual, the more likely is that individual to be able to receive effective treatment. It is clear, for example, that an individual who develops glaucoma and has some degree of blindness as a result can receive treatment aimed at retarding further development of blindness; this treatment, however, cannot turn back the events that have occurred. In other words, the degree of blindness already contracted by the patient will remain. This same basic principle is true of other disease entities. While we must admit that our current knowledge of some of these diseases makes efficient treatment difficult, this should not preclude us from doing everything possible to detect the disease at an early date and doing everything within our power to provide medical and ancillary services aimed at preventing the disease from marching on its irrevocable course to disability and even early death. Further than this, early detection of disease may also serve to initiate steps aimed at rehabilitation. Again, the earlier this is undertaken, the better for the patient and for society.

We do not now have prevalence data on chronic diseases in various age groupings for the population of Washington, D.C., but we do utilize the information gained from the National Health Survey data. However, we have requested funds to enable us to initiate a continuous health survey in this City, which we expect will yield data useful in planning and evaluating health programs in disease detection as well as in providing health care.

The National Health Survey data for 1960-1962,<sup>1</sup> reveal that approximately 2 million persons in the United States have definite evidence of diabetes and know they have it. The number of persons with what is generally considered evidence of "unknown diabetes" is substantially greater than the number of known diabetics.

There are 0.9 cases of known diabetes in every hundred persons aged 35-44 years, 2.0 cases in every hundred persons aged 45-54 years, 3.3 cases in every hundred persons aged 55-64 years, and 4.8 and 4.7 cases in every one hundred persons aged 67-74 years and 75-79 years, respectively. We don't know what

<sup>1</sup> National Center for Health Statistics, Series 11, No. 2, *Glucose Tolerance for Adults*.

the age breakdown of the unknown diabetics is in Washington, D.C., but we do know that diabetes exists in younger age groups and that early detection leads to a better opportunity for preventing later disability.

Similar National Health Survey data<sup>2</sup> for heart disease reveal that 15.5% of persons aged 35-44 years already have definite or suspect heart disease. The younger age groups, as would be expected, have far less (from 5.2% for 18-25 year olds to 7.3% for 25-34 year olds) while the older age groups have more (28.5% for 45-54 year olds up to 67.5% for 75-79 year olds).

Similarly,<sup>3</sup> 22.4% of 35-44 year olds have definite or borderline hypertension and the percentage increases with each age group.

Comparable prevalence data for other chronic diseases would also tend to re-enforce our feeling that screening programs directed at persons over age 50 or 55 would leave undetected a large number of chronic diseases that should be under medical management for prevention of long-term disability. There is considerable evidence, in fact, to justify multiphasic screening beginning at age 35.

The savings to be derived from the early detection and treatment of chronic diseases will be reflected in the continued productivity of the wage earner and family, in the forestalling of costly hospitalization, and in the attendant social and economic gains of a family that can remain together and be financially independent. Benefits will accrue in the reduction of premature deaths and in the relief and rehabilitation of those for whom the progression of disability is halted.

Our screening procedure takes about one half hour of the screenee's time and includes tests for certain heart and pulmonary abnormalities, anemia, hypertension, diabetes, glaucoma, syphilis, visual impairment, hearing impairment and abnormalities of height and weight.

The entire procedure is similar in both the clinics. Our Mobile Unit is presently stationed near here for your inspection—as well as for your participation as a screenee if you should happen to be forty years of age or over.

Upon registration, identifying information is obtained from the screenee by the receptionist and a record is opened. The screenee is asked a few brief questions about previous visits to the screening program, source of referral, and history of previous known conditions as well as previous treatment.

Height and weight is determined on the standard office scale with height attachment. Using the Dublin height-weight tables, those screenees who are greater than 20% overweight or 10% underweight are referred for further evaluation, especially in view of the possible relationship of overweight to hypertension and diabetes.

The next several tests are performed by specially trained screening technicians. Visual acuity is tested using the A. O. Sight Screener, an instrument that the screenee looks into, to read various charts. Those whose acuity is 20/40 or less in either eye (with or without glasses) are referred for more thorough eye examination.

Hearing acuity is determined with the sweep test on the audiometer, using 3000 up to 8000 cps (cycles per second) at 40 db (decibels) on both ears, then 3000 down to 500 cps at 20 db. Screenees are referred for further evaluation of hearing loss, diagnosis and treatment for a 20 db loss at the lower frequencies (250 up to 300 cps) and for a 40 db loss at higher frequencies (4000 up to 6000 cps) in either ear.

The blood pressure is determined using the standard blood pressure cuff, with referrals for those persons with a reading of 160 and over systolic pressure or 95 and over diastolic pressure or both.

The blood pressure reading is subsequently checked again by the physician, who also inspects the oral cavity and the neck for gross abnormalities suggestive of cancer of the head and neck or other diseases. A cytological smear is made of suspicious oral lesions. The physician listens to the heart for murmurs or arrhythmias suggestive of heart disease. He also reviews the brief history given by the screenee, obtaining expansion or verification where necessary, and he answers screenees' questions.

A blood specimen is drawn by a screening technician. At the clinic site, the hemoglobin is determined, utilizing the Klett colorimeter method. Screenees with a hemoglobin below 12 or above 17 Gms for males or below 11 and above 16

<sup>2</sup> National Center for Health Statistics, Series 11, No. 6, *Heart Disease in Adults*.

<sup>3</sup> National Center for Health Statistics, Series 11, No. 13, *Hypertension and Hypertensive Heart Disease*.



Gms for females are referred for further evaluation for anemia and other diseases.

The remainder of the blood specimen is transported to the central laboratory of the Health Department for testing for syphilis and diabetes.

Utilizing the VDRL, any positive results are followed in the usual manner by our venereal disease control program staff as syphilis suspects until the diagnosis is established, treatment provided if indicated, and contacts investigated if the case is an infectious one.

The blood sugar testing has been automated since early this year on the auto-analyzer, which is located in the central laboratory. The autoanalyzer, using one technician, can perform hundreds of blood sugars daily, giving an exact determination. Previously, blood sugars were done at the clinic site on the clinitron, a compact but semi-automated piece of equipment that gave only probable normal or probable abnormal readings. Referrals for further evaluation are made for those persons whose blood sugar is 130 mg. % or above (160 mg. % if they have eaten within 1-½ hours of the test).

With the screenee lying down, a six lead electrocardiogram (i.e., three standard leads plus AVR, AVL, AVF) is recorded by a technician and later scanned for abnormalities by the physician. Referral is made for further evaluation of any abnormal conditions noted.

While the screenee is still lying down, the intraocular tension is determined by the screening technician with the use of the Schiøtz tonometer following anesthetization of the eye. Screenees with a reading of over 21.9 mm Hg in one eye or more than 4 mm Hg difference between both eyes are referred for evaluation for possible glaucoma.

Finally, a chest x-ray is taken—a 70 mm machine is used on the mobile unit and a 14 x 17 machine at the Southwest Health Center. The films are developed and transported for interpretation by the radiologist at our Northwest Central Clinic. They are read for evidence of tuberculosis, lung cancer and other pulmonary diseases, as well as cardiovascular abnormalities. Any abnormal chest finding is referred for further evaluation and diagnosis.

Our latest data show that 54% of all those screened are referred for further evaluation. This rate is 74% for those screenees aged 65 or over and 51% for those under 65 years. About 89% of those referred go to private sources for evaluation, and care if indicated.

Perhaps the most vital part of our screening programs is not the screening operation itself but rather the follow-up, whose purpose it is to insure that persons who need further evaluation of abnormal screening test results, obtain such evaluation, as expeditiously as possible, and are placed under care if indicated.

Follow-up is completed—that is, a final disposition is reached—within six months on 86% of those referred. In a recent period during which some 4550 persons were screened, 2320 referred for abnormal test results, and 2204 follow-ups completed, we detected—

(a) One hundred ninety-one previously unknown cases of *hypertension* placed under medical care, plus 229 cases returned for further care. The yield of previously unknown cases of hypertension was 4.2% among the persons screened (i.e., 191 out of 4,559).

(b) Seventy-four previously unknown cases of *glaucoma* placed under medical care, plus 4 cases returned for further care. This represents a yield of 2.0% of previously unknown glaucoma (79 out of 3,889 actual tonometries performed).

(c) Sixty-nine cases of *anemia* previously unknown to the evaluating physician and placed under medical care, plus 31 cases of anemia previously known to the evaluating physician and returned to medical care.

(d) Twenty-three cases of *diabetes* previously unknown and placed under medical care, plus thirteen diabetics returned to care.

(e) Five *neoplasms* previously unknown and placed under medical care, plus three patients with neoplasm returned to care.

(f) Twenty-three cases of hypertensive *heart disease* and fifty-three of arteriosclerotic and degenerative heart disease previously unknown and placed under medical care, as well as twenty cases of each previously known and returned for further care, and many others.

In fact, among these 4,559 screenees, of whom 2,310 were referred for follow-up, there were a total of 868 conditions or diagnoses reported which were previously unknown to the physician referred to and for which the screenee was placed under care. Further, there were an additional 482 previously known conditions or diagnoses for which the screenee was returned to treatment.

A frequently heard question in relation to multiphasic screening applied to a supposedly healthy population concerns the costs encountered. There are many ways to evaluate cost—per person screened, per screening test, per disease or condition tested for, per person placed under care, per newly detected disease or condition placed under care, per person returned to care for previously known conditions, or per previously known condition returned to medical care.

Our most recent cost estimates are for the mobile unit for calendar year 1964. During that year, 9,138 persons were screened and 6,453 persons were referred for further evaluation. The total cost of the program on the Mobile Unit that year (exclusive of capital outlay for the unit and the equipment, which are owned by the Public Health Service) was \$111,965.

The following specific costs were estimated :

Cost per screenee.....	\$12. 25
Cost per screening test performed.....	. 94
Cost per abnormality found on screening.....	8. 81
Cost per diagnosis (previously unknown and previously known and returned to treatment).....	31. 64

As stated earlier, perhaps the most important part of a multiphasic screening program is the follow-up and a considerable proportion of our budget is devoted to that service, amounting to \$28,010 for calendar year 1964 or 25% of the total cost. Prorated over the number of persons screened, the follow-up cost amounted to \$3.06 per screenee. The follow-up cost per person referred for further evaluation was \$4.34.

I would point out what, I am sure, is quite obvious to you; namely, that the development of this type of program creates increasing demand for health manpower, not merely to staff the units but, more important, to arrive at a final diagnosis and provide appropriate treatment. It is this latter phase of the operation that can produce considerable problems. There is, of course, no use whatsoever in developing a disease detection program unless it is subsequently followed, and at an early date, by expeditious handling of the patient with a view to providing the necessary treatment and rehabilitation.

It is essential to have sufficient and well trained follow-up workers to assure that all persons with findings suggestive of chronic disease are followed through to definitive diagnosis and treatment by their own physicians or by public health facilities. These workers locate persons who do not obtain a confirmation diagnostic test, who fail to report to their private physician, or who do not show up for diagnosis and treatment, and assist them in carrying out plans for the indicated medical procedure.

Furthermore, thorough and complete follow-up to final disposition for each case within a set time interval is essential for the production of reliable biostatistical and performance data with which to continuously evaluate the program. For example, analysis of the data we have collected has enabled us to revise our referral procedure and records to eliminate unnecessary over-referral, resulting in our current relatively low referral rate of 54.3%. Also, we know that over 86% of those referred are followed through to final disposition, that about 90% go to private physicians, hospitals, or medical centers for diagnosis and care.

In the District of Columbia, chronic illness is a critical factor contributing to the ever widening group of dependent families. Not only is illness most frequent in families of low income, but it is this group which is driven, by economic necessity, to postpone seeking medical service until a condition is acute. Extensive medical care and hospitalization are only a part of the resulting costs, since assistance is generally required to maintain the family as well.

In our several years of experience, we have learned the following things about effective programming :

(1) A movable unit is very useful in that it makes the program more readily accessible to residents of lower socio-economic areas. It is best located in a semi-residential neighborhood with accessible public transportation, ample parking, and abundant local foot traffic. In order to screen the maximum number of persons the mobile unit is moved periodically from one location to another. Systematic neighborhood screening and follow-up is given priority in those sections of the city where the lowest incomes are reported.

(2) The appointment system is essential to insure a continuous, even workload and to avoid loss of time on the part of the screenees.

(3) Basic to the entire operation is the willingness of people to take the screening examination. Continuous public education and information efforts are

essential to promote the programs. Two community health workers persuade area residents of the advantages of a health screening examination and organize the neighborhood for optimum scheduling of appointments.

(4) It is essential to reiterate, to the public and to medical practitioners, that this program provides screening only and does not substitute for a complete medical examination. There is little question in my mind that the best place for these screening tests to be carried out is the office of the family physician; however, it seems unlikely that this procedure will take place, at least for a high percentage of our citizens.

The obvious question then arises as to whether there exists in many communities the health manpower readily available to meet this increased demand. This question is not easy to answer, but I am sure you will find that there are many in the health field who do not believe that an adequate supply of manpower currently exists for this purpose and who would furthermore state that the number that do exist might preferably devote their time to handling the acute medical problems that need immediate treatment.

(5) Safe and efficient operation of the program depends on adequate trained personnel and detailed planning for staff shortages since any absence of community health workers, screening technicians, clerks, or follow-up staff severely hampers the daily operation.

(6) It is essential to provide periodic evaluation of the types of tests done and the criteria for referral in order to avoid needless and non-productive over-referral for diagnosis.

(7) Screening tests employed should be simple, rapid, acceptable to the screened, relatively inexpensive, and should yield results readily categorized as referable or non-referable. In this respect, automation wherever possible is a boon.

(8) Periodic evaluation of data collection and tabulations, and also policies and procedures is necessary to insure valid and meaningful statistics.

(9) Even though the yield in numbers of cases found is greater in older age groups, our data indicate that there is a significant amount of chronic disease detected in the fourth and fifth decades to warrant their inclusion in screening programs. However, we will obtain additional information on this subject when we begin to collect prevalence data. In addition, we need to know, by detailed prospective studies, the long-range benefit to individuals in whom certain chronic diseases are detected at an early age.

The problem still remains of the lower income persons referred for further evaluation, who are not eligible for public services but who cannot finance private care. These persons, though perhaps few in number, require hard work on the part of our follow-up staff to insure that diagnostic and care services are received.

A third, similar multiphasic screening program is being planned for the outpatient department at D.C. General Hospital, to provide on an annual basis a battery of screening tests for those patients cared for in various clinics. Such a program will be closely coordinated with the two existing ones to avoid duplication of effort and to provide comparable data.

Since our program began, we have been able to automate at least one procedure with the acquisition of an autoanalyzer. Blood sugars are now done more efficiently than with the former equipment. With the arrival of additional attachments for the autoanalyzer, we will be able to automate the hemoglobin determination and possibly add additional tests not now done, such as cholesterol, blood urea-nitrogen for renal disease and cytological smear for cervical cancer. Furthermore, we are exploring the possibility of automating the interpretation of the electrocardiogram and possibly of spirometry testing for breathing capacity, by a cooperative arrangement with the Instrumentation Field Station, Public Health Service, to utilize their computers for rapid automatic interpretation and reporting.

Finally, we are conducting one methodological research project into the feasibility of using the self-administered, irrigation type cervical smear for the detection of cancer and a second project is evaluating the use of a simple urine test to detect infection which may be indicative of chronic kidney disease.

As a result of our experience with multiphasic screening, we feel that such a program is successful in detecting previously unknown diseases at an early enough stage so that future disability may be prevented, as well as in finding persons who need to return to medical supervision for previously unknown conditions. The program has been well received by the public and the health professions.

It is my belief that the multiphasic screening program, including the educational and follow-up components, is an essential part of a comprehensive community health program. It should be readily available, along with other adult health services in the community where people live and work.

Senator NEUBERGER. The next witness is Dr. Forrest Brown. Dr. Brown is the chief of the Community Health Service of the Oklahoma Department of Health, in Oklahoma City, Okla.

We are glad to have your testimony. I have looked at your statement and look forward to hearing your comments.

**STATEMENT OF FORREST BROWN, M.D., CHIEF, COMMUNITY HEALTH SERVICE, OKLAHOMA DEPARTMENT OF HEALTH, OKLAHOMA CITY, OKLA.**

Dr. BROWN. Madam Chairman, I appreciate the opportunity to do this. And since we do have our formal statement, I, too, would like to talk extemporaneously.

I have enjoyed hearing the speakers before and seeing the direction in which your interest has grown in the problems as you see them in this area.

We are perhaps fortunate in Oklahoma—this is a mobile unit operation of a multiphasic screening program—in that with an existing tuberculosis survey program, in which Oklahoma was a pioneer, each and every county had had chest X-ray surveys for tuberculosis.

At that time we began to look at our returns on this and the cost of discovering the cases of tuberculosis seemed rather exorbitant by this method. Easily grafted onto this were other screening programs, which could be done.

Therefore, we had an advantage, speaking from the public health standpoint, on the question of the acceptance of other screening programs by the private practicing physicians. Since this was a program grafted onto the one which had been long accepted by them, it is true, perhaps, the only reason being that tuberculosis was a contagious disease and, therefore, had been accepted for a long time as being a public health problem.

It has been our policy from the beginning to try to face these known problems of acceptance by the public and by the physicians and to try to devise these screening programs in such a way as to get involvement of the public and the physicians.

Our procedure that has been developed with experience over a time requires that we must have some organization, a voluntary organization, in each community that is willing to take care of appointment-making and publicity relevant to the program. In order to assure followup in this program we must also have an invitation from the local health department.

And I think Dr. Grant made a very important point here. There is no use of doing screening unless you are going to insure that these people are going to get care afterward. An invitation from the medical society in the county in which the program is to operate is also a required essential.

Now I think this is a most important phase of the program, and the adaptation of screening levels and so forth is talked over with the physicians, this is an opportunity to call to their attention what the

program is and how it will operate. There is the old adage "seeing is believing." But once these problems have been discussed we get rather reluctant acceptance in some instances—we have not run into an instance where once a physician has had an experience with a screening program and its referral system, he has any reservations afterward. And in many instances they have been high in their praise.

Because of limited resources we have primarily used screening as a health education tool. One of the most important educational aspects, we think, is the more or less—I don't like to use the word "forcing" of the individual to be screened to choose a physician who will care for him if there is anything found that needs care.

We think this reflects in education to that individual who is not found to have anything, in that we made him go through the process of choosing. And it is surprising, particularly in some of our rural communities in Oklahoma, that we will run as high as 50 percent of the people who cannot offhand tell you who their family physician is. They can be rather quickly taken through a series of questions which will cause them to choose one.

One of the most important things that we can think of to keep a screening program going and to have acceptance is to tailor make it to the particular community in which you are operating. By this I mean the general educational level, both of the general public to be screened and the physicians in the community. We think that one of the most deadly things that can happen to a screening program, that will almost surely kill it, is to have overreferral. In other words, people referred to physicians for suspected conditions, which upon the examinations performed by that physician leads him to the opinion that they do not have that disease.

Senator NEUBERGER. Say that again.

Dr. BROWN. Maybe I can make this statement a little bit clearer by making this reference by definition of diagnosis. A diagnosis is an opinion arrived at by a physician upon the basis of the evidence that he has at hand, a little evidence or a lot of evidence, good or bad evidence.

So this is what results in diagnosis. This is what happens when the screenee is referred to the physician. He either receives a diagnosis of the disease or a negative diagnosis of absence of disease.

There are two factors involved. One is the sensitivity or the accuracy of your testing procedures, and the other is the diagnostic ability of the physician to whom they are referred.

Senator NEUBERGER. His interpretations of the results.

Dr. BROWN. Right.

Senator NEUBERGER. Well, they cannot be so—

Dr. BROWN. Well, it goes a little further, Madam Chairman, than just the interpretation of the results. This is said in the sense that there is no such thing as a diagnostic test. This can be universally agreed upon. But it does fit into what I have given as the definition of a diagnosis.

I realize I am getting rather involved here.

Senator NEUBERGER. I am not quite clear on the overreferral.

Dr. BROWN. Overreferral: If a particular procedure is used as screening for diabetes, and you refer all who have a blood level, positive 100 milligram percent of sugar in their blood, and in this partic-

ular community the physicians these people are going to are not getting diagnosed unless they have a level of 120 or 160; if you refer at levels of 110, they do not get diagnosed for diabetes.

Now, your technical and your human error element also, you need to protect in this.

In a case of diabetes, again, that is referred, it will not be uncommon for a physician who really does a good workup on the patient to have a bill of \$80 to \$110 for diagnosing the absence of diabetes, while if it is a clear-cut case of diabetes he may make the diagnosis of diabetes for much less than that.

Senator NEUBERGER. Is it valuable though if the blood sugar doesn't reach that line; 120 or whatever you said? It is valuable to know what the blood count is anyhow?

Dr. BROWN. Oh, yes. In the medical sense it is.

Senator NEUBERGER. Well, what is the point you are making? That the patient may be alarmed that he has potential diabetes? I still am not clear on the point you are making.

Dr. BROWN. My point is this, Madam Chairman: There are communities in which—and we have had this happen—the patient has accused both the physician to whom they were referred and the State health department as being in collusion, by trying to make the doctor "business."

Senator NEUBERGER. But how does the patient come to the screening thing first? It was through his own volition? He wasn't referred.

Dr. BROWN. Right.

Senator NEUBERGER. This patient didn't want to know? Is that it? That he had potential diabetes?

Dr. BROWN. I don't know what the motivation behind it was. The instances that we have had to this—all you know is what you are accused of, but the accusation came to the physician to whom they were referred.

Senator NEUBERGER. But now, that isn't very general, is it? Isn't that some kind of a neurotic sort of person?

Dr. BROWN. This is an unusual sort of person.

Senator NEUBERGER. That is like when the doctor tells you you have appendicitis, pulling out a gun and shooting the doctor. It seems to me that it will be a rare person who had of his own volition climbed the steps and went into the unit, who didn't then want to discuss it with the doctor. Of course, if he were that neurotic, that he didn't want to know about some terrible disease he had, he wouldn't want to go in there in the first place. He wouldn't even want to go near the place, because he might find out.

Dr. BROWN. I don't know whether I have made this at all clear to you. These patients did not have the disease for which they were referred.

Senator NEUBERGER. I would rather pay \$5 to find I didn't have something than \$105 to find out I did, it seems to me.

Dr. BROWN. Most people do feel this way about it, but you do have those who do not.

Senator NEUBERGER. But you go to the dentist, you pay for an examination, and you are so thankful when you don't have a cavity. You take your car to the garage, and it comes out that it doesn't need to be repaired. I still think that is a quirk.

But what we obviously need here is some education going on, on how to follow this. All right, you many continue.

Dr. BROWN. Along this same line, just to relate some experiences—and again the explanation of all of these; I do not have all the answers by any means—the question of overweight, which from the medical standpoint is a real important factor in many diseases. We started out with a policy of referring individuals only when they were 20 percent overweight, according to average weight and height tables for the age. And this, as related this morning, is the highest percentage-wise of the abnormalities found.

After doing this for a while and after talking with the physician to whom they have been referred, we quit referring the patient on the basis of overweight only, if this was the only abnormal finding that we had.

It was simply reported to his physician.

Our procedure is to report the findings to the physician, and merely to notify the patient that he needs to contact his physician relative to some positive finding. This does not state even what it is.

But most physicians have had so little success in the situation of the person who is only overweight, to persuade them to go through a weight-reducing regime, that they consider this almost impossible. In practically every instance the physician said, "The patient already knew it; I already knew it; and we have talked this over many times, but apparently it does no good."

And so an office call would not be particularly indicated. I will just call her up and remind her of it over again, that she is overweight, or he, as the case may be.

I believe, other than that, Madam Chairman, I might be able to answer some specific questions.

Senator NEUBERGER. Well, you have given me a very interesting picture of your own experience, and all of this is very valuable to us in adding to regional reports in this area.

I believe it was Dr. Collen who said that in the obesity thing you just discussed, 12 percent of the men tested and 20 percent of the women are involved. This startled me and I didn't question about it at the time, because we think the women because of vanity and fashion are worrying about it. But you were talking about not just being plump, but being obese.

Dr. BROWN. Right.

Senator NEUBERGER. Then do you advise this obese person of the effect on her health?

Dr. BROWN. Oh, yes. We try to, during the entire stay of the individual in the trailer from the time they walk in the door, to educate them relative to this. An obese woman going through the trailer, when she gets to the diabetes station, is going to be specifically talked to about the possibilities of overweight predisposing to diabetes. When she goes by the heart station, it is going to be called to her attention again. It is going to be called forcibly to her attention several times.

Senator NEUBERGER. And yet she has come voluntarily to this unit, hasn't she?

Dr. BROWN. Yes.

Senator NEUBERGER. Something must have been stirring in her mind that she ought to go. Those aisles are awfully narrow. She might have trouble going down there. But is there any psychiatric connection in some of these?

Dr. BROWN. Oh, I would hesitate to say psychiatric, Senator. Certainly there are many psychological factors involved in overweight. In fact, this may be the most important factor. It seems that group dynamics work as well as or better than anything else. An organization called "Tops" takes off pounds sensibly. It seems to be about as effective as anything.

Senator NEUBERGER. I think the statistics, though, show there is a great deal of back-sliding. Women's magazines very often will carry a story: I lost 60 pounds, 70 pounds, 80 pounds. Then 10 years later they go back and interview some of these people. They carry stories on them.

There has been a high mortality, which shows unfortunately there must be some psychological or environmental factor.

We have got to hurry on, but I just want to ask you one more question about cost figures. Now, you are continuing this program right now in Oklahoma?

Dr. BROWN. Yes.

Senator NEUBERGER. And what about the per capita cost?

Dr. BROWN. The per capita cost on the basis of the people screening?

Senator NEUBERGER. Yes.

Dr. BROWN. With just the screening procedures themselves involved, and the mailing and notification costs, but this does not include followup.

Senator NEUBERGER. Does not include what?

Dr. BROWN. Does not include the cost of following up of the screening by the local nurses and the public health department. It has no administrative costs figured into it. To put an individual through this screening unit, it will vary according to the number of tests. But in general running five or six different procedures, we have been able to, on simply the operation and notification costs, do this for about \$4 per person.

Senator NEUBERGER. That is of interest to us, too.

Dr. BROWN. Thank you.

(Dr. Brown's complete statement follows:)

PREPARED STATEMENT BY FOREST R. BROWN, M.D., M.P.H., OKLAHOMA STATE  
DEPARTMENT OF HEALTH

We, in Oklahoma, recognize the need for and are most definitely in favor of this proposed legislation. Certainly the prevention of disabilities from chronic illness is one of the most significant public health problems today. The population trend, with more people every year being added to the older age groups, makes it more important than ever that we begin in the early years to take steps toward prevention of the ill health and disabilities associated with chronic illness, which actually, for some, render the so-called "golden" years only years of physical, mental, and economic distress. With the advances in medical science, we are adding each year many more chronically ill aged and aging people to the vast reservoir of folks in our long-term care facilities, as well as to our general hospital admissions. Hence, early detection of chronic illness, adequate followup, and early treatment are essential unless we want to continue building more long-term care facilities and spending larger sums of private and public funds for health care of these individuals.



## NEED

The best source of information known relative to need is from the National Health Surveys but insofar as Oklahoma is concerned this information cannot be obtained specifically since the National Health Survey data are on a regional basis rather than a specific state basis. We, of course, do have mortality data but these are of little help in reflecting the need for care of the chronically ill and aged.

The specific data we have concerns the number of individuals found positive on various screening procedures (see Attachment No. 1). In addition to this information, persons presenting themselves for screening procedures gave a history of having previously known disease, as shown below:

*Prevalence of certain diseases known prior to screening among screenees in 10 Oklahoma counties<sup>1</sup>*

	Number	Percent
Total persons screened.....	26,957	100.0
Total with certain known diseases.....	4,572	17.0
Hypertension (only).....	2,303	8.5
Heart disease (only).....	905	3.4
Tuberculosis (only).....	271	1.0
Diabetes (only).....	231	0.9
Anemia (only).....	4	-----
Heart disease and hypertension.....	632	2.3
Heart disease and diabetes.....	28	0.1
Hypertension and diabetes.....	107	0.4
Hypertension and tuberculosis.....	34	0.1
Hypertension, heart disease and diabetes.....	32	0.1
Hypertension, heart disease and tuberculosis.....	25	0.09

<sup>1</sup> Screenees are not screened for known disease, hence, there is no duplication between data on attachment 1 and the above figures.

## METHOD

Multiphasic screening began in Oklahoma in 1958 and has been well accepted by both the public and the medical profession almost since its inception.

It is our feeling that screening program design and operation are determined by factors of population size, distribution, and sophistication. Availability of medical practitioners and facilities, and incidence of disabling conditions are also very important. The desired results to be achieved and resources available influence whether the screening program is primarily case finding, public education, or professional stimulation and education, or a combination of all. Although any good screening program must contain all of these elements, our program in Oklahoma has always placed primary emphasis upon public education; i.e., to educate people to recognize disease in themselves and others and to know the best channels for securing diagnosis and treatment.

One of the most important of these educational procedures takes place the moment the screenee steps into the multiphasic screening unit. As soon as identifying information is obtained the screenee is asked to name the physician to whom he wishes positive screening results reported, with the understanding that this is the physician to whom he will go if he has positive findings. Upon asking this question, we have found a high percentage of people who very definitely have not given this question any previous thought, particularly those people who have not recognized a need for, or used, a physician in their family within the past three years.

As the screenee goes through the unit, the technicians and nurses at each station explain what disease he is being screened for and the implications of the disease. The nurses particularly take note of any previously known disease recorded on the screening record (which is the registration card that the screenee carries with him through the unit) and inquire as to his knowledge of this disease and the care he is presently receiving. This results in many of these people returning to medical care for these known conditions.

In Oklahoma, because we can reach only a fraction of those persons needing it, our screening program has been aimed to reach persons whom we feel are most receptive to health educational programs. Usually this means the civic leaders,

Farm Women's Clubs, P.T.A. groups, various fraternal organizations, etc. In general, this means the middle and upper economic income groups. After we demonstrate to these groups the need for screening programs and increased activities in chronic disease detection and care, they are able to carry the message to other segments of society in their communities.

During the years 1960 through 1965, as shown in Attachment No. 3, 295,379 people were screened with 728,550 different procedures.

Data processing equipment and automated analysis equipment have been used to a limited degree in Oklahoma. This limited use has been due to the fact that we did not have the financial resources to do a large-volume case finding program. Should resources be made available for this, we would be able to increase our volume of work and at the same time improve our educational efforts.

At the present time, in Oklahoma, we believe that mobile unit operation is preferable insofar as the obtaining of tests and initiating of programs are concerned because it takes the service to the people. Another way of expressing this is: the mobile unit becomes a part of the Neighborhood Health Center. The main use for highly sophisticated computer processes, we feel, will be in two centers in Oklahoma; namely, Tulsa and Oklahoma City. Although these centers would operate as screening units in themselves, along the lines of the Kaiser Foundation program, their main purpose would be for processing specimens submitted from mobile units and outlying neighborhood health centers throughout the state.

Although we see nothing in S. 3921 which indicates a prescribed method of screening or health assessment, I would like to urge that inflexible guidelines not be allowed to occur in this bill, and further, in the administration of this bill, should it become law, I would urge that the Public Health Service not set up stereotyped selections of programs that would preclude their adaptation to meet the needs of a particular state or other political subdivision, or community.

Reference is made to a previous statement about determining factors which influence the aims and objectives of a screening program. If programs are stereotyped it becomes impossible to operate within these frameworks and philosophies.

#### COOPERATION OF PHYSICIANS

From the beginning, we were concerned about the acceptance of this screening program by the medical profession. We realized that without the understanding and participation of the medical profession it would be impossible to attain our goal; i.e., patient care in the earliest possible stage of the disease condition. Admittedly, two county medical societies in Oklahoma have declined to invite this program into their county. It is also true that in some counties where it has been accepted some physicians have accepted it on a doubting note—"you say this is how it will work but I won't believe it until I see it". To date, with possible 1,000 physicians in Oklahoma having had contact with this screening program, we have not received a single objection. In fact, once the program was conducted, the physicians were usually generous in their praise of the program.

#### RECOMMENDATIONS

We hesitate to bring up the question of the age limit (50) as it now exists in the bill for fear it will appear that we are against the bill, which we most definitely are not; however, I feel impelled to call to your attention once again that this age limitation will cause us to miss a wonderful opportunity to detect chronic diseases earlier in their course, thereby greatly increasing economic losses and human suffering.

In Oklahoma, for the degenerative chronic diseases, we have had a minimum age limit of 35 years in most instances. In cytological screening for cervical cancer this has been reduced even further.

It will be noted from the following data that the first large increase in screening returns occurs in the 35-44 age group. If screening were to be limited to persons over 50 years of age, we would miss a great majority of the diseases for which we are screening. Any reduction that can be made in the age limits down to 35 years of age can well be supported, both in terms of number of diseases discovered and in the benefits to be derived from detection at an earlier age.

*Percent of persons screened who were referred to physicians for followup, by certain age groups (based on 26,957 persons screened)*

Age group :	Percent referred
0 to 4.....	0.4
5 to 14.....	3.5
15 to 24.....	8.2
25 to 34.....	12.7
35 to 44.....	18.0
45 to 54.....	22.2
55 to 64.....	30.4
65 to 74.....	35.0
75 to 84.....	41.4
85 and over.....	52.3

Admittedly, in Oklahoma, popular demand will force our continuance of our screening program, with our present age limits or even lower, inadequate as it is.

In closing, I would like to reiterate that we urge the Congress of the United States to make this much needed legislation law. Time will reveal it as an historic investment in the conservation of human resources.

ATTACHMENT No. 1

*Results of multiphasic screening in 12 Oklahoma Counties, 1960-62*

	Total	Percent		Total	Percent
Number persons screened.....	32,963	100.0	Hemoglobin, age 12 and over:		
Referred to physician			Number screened.....	22,390	100.0
(questionnaire sent).....	6,698	20.3	Referred.....	1,026	4.6
Questionnaires returned.....	4,659	69.5	Questionnaires returned.....	663	64.6
Heart disease, age 35 and over:			Confirmed.....	392	59.1
Number screened.....	23,299	100.0	Tuberculosis, age 35 and over:		
Referred.....	814	3.5	Number screened.....	23,328	100.0
Questionnaires returned.....	567	69.7	Referred.....	97	0.4
Disease confirmed.....	354	62.4	Questionnaires returned.....	57	58.7
Blood pressure, age 21 and over:			Disease confirmed.....	23	40.4
Number screened.....	21,844	100.0	Tuberculin test, ages 1 through		
Referred.....	1,950	8.9	34:		
Questionnaires returned <sup>1</sup> .....	1,858	165.2	Number screened.....	10,510	100.0
Disease confirmed <sup>1</sup> .....	1,335	139.0	Positive.....	785	7.5
Diabetes, age 30 and over:			Negative.....	7,379	70.2
Number screened.....	22,369	100.0	Not read.....	2,346	22.3
Referred.....	758	3.4	Obesity, <sup>2</sup> age 15 and over:		
Questionnaires returned.....	515	67.9	Number screened.....	32,579	100.0
Disease confirmed.....	252	48.9	Males.....	12,745	39.1
Cervical cytology, age 21 and			Females.....	19,834	60.9
over:					
Number screened <sup>2</sup> .....	5,840	100.0	Males overweight.....	497	3.9
Referred, classes III and			Females overweight.....	2,118	10.6
IV.....	96	1.6	Total overweight.....	2,615	8.0
Questionnaires returned.....	90	93.7			
Cancer confirmed.....	37	41.1			
Confirmed for other					
than cancer.....	20	22.2			
Referred, classes I and II.....	491	8.4			
Questionnaires returned.....	303	61.7			
Confirmed (not CA).....	141	46.5			

<sup>1</sup> Based on 9 counties only.  
<sup>2</sup> Based on 6 counties only.  
<sup>3</sup> More than 25 percent overweight.

## SCREENING RECORD

Date \_\_\_\_\_ Project No. \_\_\_\_\_ X-ray No. \_\_\_\_\_  
 Name \_\_\_\_\_ Age \_\_\_\_\_ Sex \_\_\_\_\_ Race \_\_\_\_\_  
 Address \_\_\_\_\_ Phone \_\_\_\_\_  
 Known: High Blood Pressure \_\_\_\_\_ Ht. Disease \_\_\_\_\_ Diabetes \_\_\_\_\_ TB \_\_\_\_\_ Asthma/bronchitis \_\_\_\_\_ Anemia \_\_\_\_\_  
 Last food or soft drink intake: Hrs. \_\_\_\_\_ Mins. \_\_\_\_\_ Ht. \_\_\_\_\_ Wt. \_\_\_\_\_ Occupation \_\_\_\_\_  
 Any blood relatives living or dead having diabetes? \_\_\_\_\_ Heart Disease? \_\_\_\_\_ High B.P.? \_\_\_\_\_  
 Name of family physician \_\_\_\_\_ Town \_\_\_\_\_

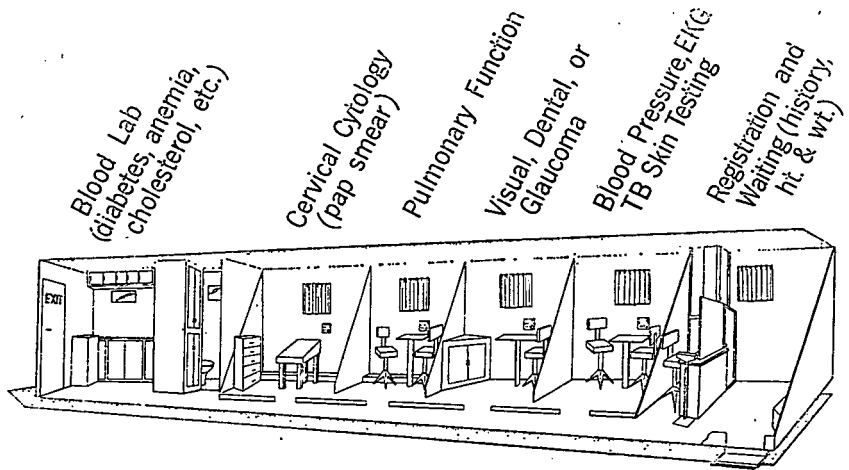
Cervical Cytology: No. \_\_\_\_\_ Class 1 2 3 4 5 Other Abnormalities \_\_\_\_\_  
 70mm X-ray: Tuberculosis Neg \_\_\_\_\_ Pos \_\_\_\_\_  
 70mm X-ray: Heart Disease Neg \_\_\_\_\_ Pos \_\_\_\_\_  
 70mm X-ray: Other Neg \_\_\_\_\_ Pos \_\_\_\_\_  
 Diabetes Neg \_\_\_\_\_ Pos \_\_\_\_\_  
 TBC Test: PPD \_\_\_\_\_ Tine \_\_\_\_\_ Date given \_\_\_\_\_ Date read \_\_\_\_\_ Neg \_\_\_\_\_ Pos \_\_\_\_\_ mm, Not read \_\_\_\_\_  
 ECG Neg \_\_\_\_\_ Pos \_\_\_\_\_  
 Hemoglobin Neg \_\_\_\_\_ Pos \_\_\_\_\_ Vital Capacity, total \_\_\_\_\_ L \_\_\_\_\_ % of predicted  
 Hematocrit Neg \_\_\_\_\_ Pos \_\_\_\_\_ % Vital Capacity, 1 sec. \_\_\_\_\_ L \_\_\_\_\_ % of total  
 Blood Pressure \_\_\_\_\_

ATTACHMENT NO. 3

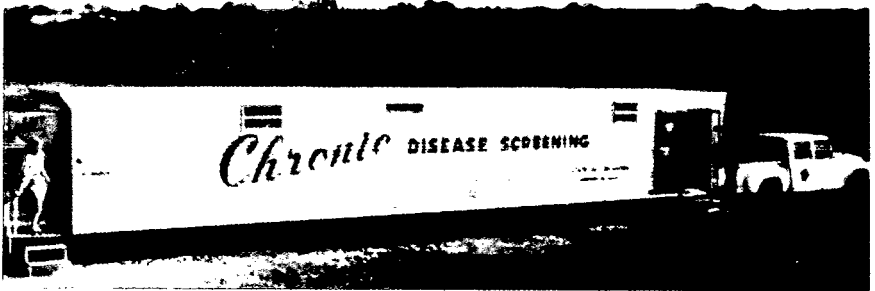
Results of multiphasic screening, 1960-66

Procedures and diseases screened for	1960		1961		1962		1963		1964		1965		Total	
	Number screened	Number positive	Number screened	Number positive	Number screened	Number positive	Number screened	Number positive	Number screened	Number positive	Number screened	Number positive	Number screened	Number positive
Total number of tests made....	69,803	16,888	85,631	3,967	86,004	4,790	93,537	5,201	185,281	2,635	208,294	5,427	728,550	28,908
Total number persons screened.	31,858	6,888	16,966	3,967	14,539	3,198	15,198	3,458	86,498	2,566	150,350	5,205	295,379	25,282
Total number referred to physician						3,198		3,458		1,694		3,377		11,727
70mm chest X-ray.....	21,174	1,155	12,681	822	11,215	672	10,660	660	67,174	959	55,217	655	178,121	4,923
Heart.....		724		545		488		469		459		326		3,011
TB.....		143		61		56		42		134		96		652
Other.....		288		216		168		149		366		233		1,420
Blood sugar—Diabetes.....	6,344	222	9,058	546	9,043	397	9,123	310	12,377	559	27,845	1,930	82,110	4,126
Tuberculin test—TB.....	17,750	3,935	7,820	1,244	4,034	342	4,446	347	8,320	162			146,536	5,868
EKG—Heart disease.....	122	20	1,901	583	1,053	317	2,556	(*)	2,699	119	2,744	(*)	11,080	1,208
Blood pressure—Hypertension.	6,437	891	9,773	1,856	9,093	1,091	9,499	1,253	7,204	204	6,929	337	48,940	5,632
Copper sulphate drop test—Anemia <sup>1</sup>			11,680	499	12,019	480	13,661	655	9,645	80	8,945	109	35,950	1,823
Cervical cytology—Ca.....			19	0	4,834	72	6,601	79	5,214	49	5,684	55	22,352	255
Cervical cytology—Other.....						421		567		224		489		
Height.....	8,988		12,585		12,799		15,119		10,038		9,185		59,726	
Weight.....	8,988	665	12,585	918	12,799	998	15,119	1,330	10,038	359	9,185	808	59,726	5,078
Audiometer—Hearing defects.			33	0							2,810	203	36,350	203
Urnalysis.....			65	9										
Vital capacity.....	7,426	(*)	7,426	(*)	9,110	(*)	6,753	(*)	2,825					
Dental exams.....									160				160	
Cholesterol.....									178	8	521	42	699	50
Glaucoma.....									79	4	982	19	1,061	22
Visual acuity.....									131				131	

<sup>1</sup> Positive tuberculin tests in mental hospitals account for high positive results.  
<sup>2</sup> Number tests positive and number persons positive (total) not distinguishable for some years.  
<sup>3</sup> 2,104 screened at Central State Hospital not included; 409 also.  
<sup>4</sup> Diabetes only unit.  
<sup>5</sup> Not available.  
<sup>6</sup> EKG made only when blood pressure elevated.  
<sup>7</sup> Screening procedures changed from specific gravity to volume (hematocrit) in 1962.  
<sup>8</sup> Positive determinations not made, these tests done for study purposes only.



CHRONIC DISEASE SCREENING UNIT  
 COURTESY OF THE MEMPHIS-SHELBY COUNTY HEALTH DEPARTMENT



Senator NEUBERGER. The next witness is Dr. Henry Packer.

Dr. Packer is the director of chronic disease screening of the Memphis-Shelby County Health Department screening program. I believe you are also chairman of the Department of Preventive Medicine at the College of Medicine, University of Tennessee.

Dr. PACKER. That is correct, Madam Chairman.

Senator NEUBERGER. All right, Dr. Packer.

**STATEMENT OF HENRY PACKER, M.D., DIRECTOR OF CHRONIC DISEASE SCREENING, MEMPHIS-SHELBY COUNTY HEALTH DEPARTMENT SCREENING PROGRAM, MEMPHIS, TENN.**

Dr. PACKER. I am afraid I am at somewhat of a disadvantage in being so late on the program. The other speakers have stolen all of my thunder.

Senator NEUBERGER. Well, there is beginning to be some repetition, but you would be surprised at the variance. But we like it to come regionally, too. It all adds to the record.

Dr. PACKER. I have prepared a brief statement of our program in Memphis, and with your permission, I would like to go over it and elaborate on it a little bit.

Senator NEUBERGER. Fine.

Dr. PACKER. And then answer any questions about aspects that you have some question about.

Senator NEUBERGER. All right.

Dr. PACKER. Screening for chronic diseases of one kind or another has been carried out in Memphis for over 25 years. During the early years, the main emphasis was upon infectious chronic diseases, such as syphilis and tuberculosis. In recent years, the emphasis has changed to detection of noninfectious chronic diseases, such as cervical cancer, diabetes, and glaucoma.

At the present time, tests for these five diseases are provided by a chronic disease detection unit based in the city of Memphis hospitals, which is the teaching hospital of the University of Tennessee College of Medicine. This unit works in close cooperation with the local health department, each supplementing the other in reaching as many groups in the community as possible.

Our screening program in Memphis has developed in a step-by-step manner, rather than by launching a broad program at a single point in time. We have been opportunists in initiating various aspects of our detection program, taking advantage of favorable circumstances as they presented themselves from time to time.

Our program first began before World War II with mass blood testing for syphilis, when this procedure was considered an effective case-finding method in the control of this disease. The health department and the city hospital collaborated in a community-wide blood-testing program, using both mobile units and stationary clinics to reach as many people as possible.

I might say that this program served as a pattern for later programs in relation to other chronic diseases.

A few years later, the local Tuberculosis Society began to promote mass screening for tuberculosis by means of chest X-rays and provided mobile units for this purpose, and also a stationary unit for the city hospital. The chest X-ray was added to the blood test for syphilis in our screening program at that time. Last year our hospital X-ray unit screened about 40,000 persons and picked up over 80 cases of new active tuberculosis which were previously unknown.

In 1952 Memphis became the site of the Nation's largest community-wide screening program for cervical cancer, using the Pap smear. This was a cooperative project between the University of Tennessee and the National Cancer Institute to evaluate this method of detecting cervical cancer. Since the beginning of this project, about 75 percent of the women in Memphis and Shelby County have had one or more Pap smears. The rate of cervical cancer has been reduced by almost 50 percent since this project started. This test is routinely used in our screening program now.

In 1955 the Public Health Service loaned us an instrument known as a Hewson Clinotron for automated testing of blood specimens for diabetes. This enabled us to add diabetes to the list of diseases for which we carried out screening. About 2 years ago the local health

department purchased an AutoAnalyzer for doing automated testing for diabetes, and this replaced the Clinitron.

Our hospital screening program is served by this equipment, which is stationed in the health department laboratory. Last year 17,695 persons in the community were tested for diabetes by this instrument, and 361 new diabetics were discovered. This represents over 2 percent of those tested.

In 1956, about 10 years ago, we added screening for glaucoma to our chronic disease screening program. We were impelled to do this because of the increasing number of partially blind persons who were coming to the eye clinic of our hospital. Little could be done for these people in this stage of the disease. We knew that blindness could have been prevented if this condition had been discovered early, and that there was a simple test, using a tonometer, for doing this.

We began to use this test in our screening program, after getting some financial assistance from the National Society for the Prevention of Blindness to do a pilot study. This pilot study proved beyond doubt the value of this procedure.

In our program, this testing was first done by nurses who had been trained in this procedure by eye specialists in our clinic. More recently, due to the shortage of nurses, we have been training technical assistants to do this procedure. They are doing an excellent job, and this is in line with the philosophy of using paramedical personnel whenever possible in screening programs, in order to reduce costs and save the time of physicians.

During the past 10 years, we have screened over 40,000 persons for glaucoma, and have discovered over 800 persons who had this disease and were not aware of it. We feel that this should have an impact upon reducing disabling blindness from this disease in this community.

Not only this, but by having a glaucoma detection program based in our teaching hospital, our medical students, interns and residents have become familiar with this procedure, and we hope they will use it in their practice later on.

I would like to digress at this point, with reference to the matter of acceptance by physicians. I think one reason physicians do not accept, or are reluctant to accept, some of the newer screening procedures, is because they were not taught these things in medical school. I think it is important that we do teach our medical students, who are going through school today, how to interpret these tests and their value. This is what we are doing in our program. It is an advantage, I think, to base a chronic disease screening program in a teaching hospital, for this reason.

We have also used our glaucoma detection program for research purposes. We had a 3-year contract with the Public Health Service to evaluate the use of various screening levels in glaucoma detection programs. One of the decisions which has to be made in any screening program is what screening level to use in referring patients for further evaluation.

This has reference, Senator, to your question about overreferral, and I hope this may explain a little bit about that. It is a very complex situation, which even physicians often do not fully understand.

In glaucoma screening, for example, there is no sharp dividing line between normal and abnormal values of eye pressure, yet a single



screening level must be chosen. This means that if too low a level is chosen, there will be many false positives, that is, many persons will be referred for costly and time-consuming examinations, only to be told that nothing is the matter with them, and this always arouses a great deal of resentment.

I have known patients to get very angry when told that nothing was the matter with them after a positive screening test caused them to incur the expense of a thorough examination. Also, physicians often lose confidence in a screening procedure when they find many false positives.

In other words, many patients are referred to them for evaluation, and after a thorough examination they are forced to tell some patients there is nothing the matter with them, that they do not have the disease even though the screening test was positive. This often causes them to question the value of the procedure.

On the other hand, if the screening level is set too high, many persons who have the disease will be missed. These problems are inherent in all screening programs, and must be understood by both the public and the physician, if such programs are to meet with acceptance.

I think this is one of the major reasons why physicians sometimes are critical of these programs. This is because so often patients are referred to them with borderline values, by screening programs.

In clinical medicine usually the levels are pretty definitely normal or abnormal, but in screening programs many borderline values are referred to the physician, and oftentimes he has difficulty in interpreting them. This is a fundamental difference between screening and clinical diagnosis, as seen by the physician.

The part of our screening program which is based in the city hospital serves a number of groups at the present time. These groups are as follows:

1. Patients admitted to the outpatient department, who routinely receive screening tests. About 40,000 persons are admitted each year to our outpatient department. We are trying to provide as many as possible of these people with these screening tests.

2. Applicants for city government employment, who receive these tests as part of their preemployment examination.

3. Food handlers, who are required by law to have tests for syphilis and tuberculosis in our State. We also include tests for cancer, diabetes, and glaucoma, and we issue a "health card" with the five diseases listed and the dates they received the test. People soon become familiar with this report and they call it a "health card." They carry it around in their wallet, and it gives them something tangible to show that they have had these tests, and when they need to have them done again.

4. Employees of the city of Memphis hospitals, who are given screening tests annually as part of an employee health program.

In conclusion, I would like to say that while we believe that multiphasic screening programs such as ours have uncovered a great deal of disease in the early stages, and that such programs have great potential for reducing disability and the costs of medical care, the latter does not automatically result from such a program.

Detection of chronic disease is not an end in itself, but should be part of a total plan. There must be a followthrough, as other speakers

have pointed out, of cases found to see that they receive some benefit from treatment. It has been our experience that early cases of diabetes and glaucoma found by our screening program frequently do not stay under treatment as well as persons in the later stages with symptoms. They become "dropouts" after a short period of treatment. In other words, they are not convinced, due to the fact that they have no symptoms, of the importance of remaining under treatment. This is a problem to which we are now giving our attention.

I am afraid we have fallen down on this part of the program up to now, and we hope to give it more attention and to remedy it in the future.

I will be glad to answer any questions, if I can, at this time.

Senator NEUBERGER. Your programs have been discussed so thoroughly that I don't think of any additional questions. You put a great deal of emphasis on the glaucoma detection program. Isn't there a glaucoma institute in New York—I happen to know of the one there—doing some research in this area, in which they have developed a little instrument that is a throwaway thing and very cheap to produce, and that can be given in schools, trying to get the general population acquainted with the possibility of detection?

What do you do if you detect glaucoma?

Dr. PACKER. Talking about instruments, I don't know whether you have seen the instrument that we use for detecting glaucoma. It is a very simple instrument. We teach all our medical students how to use it. You simply put this on the eye, after putting a drop of an anesthetic on the eye, and you simply read off the pressure on the scale. It is a very simple instrument, and almost anybody can be taught to use it.

It has been standardized and has been used for over 60 years. Until they find a much better instrument than this, I think we are going to stick to it.

I think it is a good idea to study new instruments, but this is a very simple instrument. It is called a Schitz tonometer.

Senator NEUBERGER. Does that have to be given by a physician or can it be done by a paramedical person or technician?

Dr. PACKER. In our program now, this procedure is done by paramedical personnel. We started out by having nurses do this, but due to the shortage of nurses we decided to try to see if we could train other people to do this, and they are doing extremely well. Many ophthalmologists have people in their offices who are not nurses, who carry out this procedure for them. With a little bit of practice it can be done very readily.

Senator NEUBERGER. Would you say that your program in Memphis has concentrated on a few of these diseases that you indicate that are on the health card? You haven't gone out of your way to make it general to include other things?

What is on that little health card?

Dr. PACKER. The tests on the health card include the blood tests for syphilis and diabetes, the X-ray of the chest for tuberculosis, the PAP smear for cervical cancer in the females, and the test for glaucoma. Those are the only tests we are now using. We feel these are tests that are well recognized as being of value. I don't think anybody questions the value to the individual of discovering these diseases early.

Senator NEUBERGER. What about cardiograms?

Dr. PACKER. We are not doing this routinely, since we have had limited resources, and we have had to operate within the limits of our resources in developing this program.

Senator NEUBERGER. We appreciate your testimony very much. Thank you.

Dr. PACKER. I am glad to be here.

Senator NEUBERGER. We still have a little time. We have done well by noon, and Mr. Norman Sobol of the City of Hope is here. I think we can take you at this time, since the afternoon session is scheduled.

#### STATEMENT OF NORMAN L. SOBOL, DIRECTOR, CITY OF HOPE, CALIF.

Senator NEUBERGER. The City of Hope is in California?

Mr. SOBOL. That is right, although I am associated with our National Labor Council office in Philadelphia.

Senator NEUBERGER. All right. We haven't seen your statement beforehand.

Mr. SOBOL. I have filed the statement.

Senator NEUBERGER. I see.

Mr. SOBOL. I would direct myself to some of the basic concepts in our approach, particularly the socioeconomic setting in which we are undertaking a pilot industrial screening program.

Senator NEUBERGER. That would be of interest to us, I think, Mr. Sobol.

Mr. SOBOL. What we have undertaken is to initiate a comprehensive program in association with some 16 trade unions affiliated with 6 international unions. These include the International Union of Electrical Workers, the Machinists, the Automobile Workers, the Communications Workers and the Oil & Chemical Workers. Also, several more may be added.

Our approach is based on the medical premise that the techniques of preventive medicine are badly needed, especially in this particular socioeconomic area. This has been demonstrated by ample data.

Our method is to take a multiunit mobile screening clinic into the industrial setting, to deliver medical services where large populations may be reached in organized fashion.

Our plan is to make arrangements with the unions and with management, so that definite schedules can be met. On that basis we look forward to screening perhaps 60 to 72 people a day, administering some 23 tests for a fairly comprehensive multiphasic screening program. The program will include mammography and the Pap smear for women workers, who often don't have the time or opportunity to have tests made, since they work during the day and perform their household duties at night.

All will have detailed self-histories and chest X-rays that include both an AP and a lateral, and an evaluation by a certified internist.

On a systematic, scheduled basis we will deal with adequate populations to justify use of the new technology, so that we plan to use machine data processing, computer analysis and the AutoAnalyzer to bring costs down substantially, below programs of this kind.

Our thinking, I may say, is integral. The City of Hope has articulated a humanitarian philosophy of medicine since its founding in 1913. In this particular program, we hope to make our contribution

by utilizing some of the already available, tested technology for multiphasic screening of large groups of people. Finally, that we think of this as operating initially within the socio-economic setting of collective bargaining, to provide regularized funding.

It is fairly well known that the trade union movement has been a powerful force for improving the health care benefits made available to their members through negotiations, and that these new standards often serve to stimulate comparable developments in other areas of the work force and society. We hope to convey to the labor movement generally, and to management people, the fact that multiphasic screening, integrated acceptably into the industrial environment, can make an important medical contribution in preventing premature death and unnecessary suffering, disability, and expense. We think this can be done at minimal costs, using a maximum number of paramedical personnel, preventing a great deal of disease for which, as it happens, the employer may sometimes have to pay.

The employer is often paying for utilization of health plans. He is paying for workmen's compensation. He is paying for various kinds of disability, for decreased population, and costs of that kind.

I believe that this kind of mobile approach, particularly, can bridge the gap between the in-hospital screening program, which is being done so well in the Kaiser-Permanente program, and to make more comprehensive and systematic the mobile screening done so valuably in so many cases by departments of public health.

Thank you, Madam Chairman.

Senator NEUBERGER. Who comes to the City of Hope? Just people from affiliations that you mention here?

Mr. SOBOL. No; by no means.

Our patients have come from virtually all sections of American life, from every State in the Union. They are people of modest means who cannot assume the catastrophic costs of the treatment of the catastrophic diseases which we treat, such as cancer, leukemia, and diseases of the heart, chest, and blood.

We have, since our founding, treated patients without charge, without demanding any means tests and maintaining a specific and emphatic concern for the dignity and privacy of the patient.

The screening program is one of our new horizon programs with which we, as a pilot medical and research center, are concerned. We are much concerned with opening paths in fields of medicine.

Senator NEUBERGER. Did you hear Dr. Grant, the previous speaker, discuss the mobile unit?

Mr. SOBOL. Yes; I heard some of that discussion.

Senator NEUBERGER. Have you anything to add that yours is different? Have you a cost ratio on yours?

Mr. SOBOL. Well, in terms of adding, I would say that despite the general shortage of physicians, the City of Hope has been able to assemble for this proposed program in the Philadelphia-Camden area a fine team of doctors. These include respected clinicians, several medical school professors, physicians certified in their fields, and some younger physicians, too.

One notable authority in the field of mammography is contributing his services.

While some physicians may talk of health maintenance as not being interesting work, and certainly not remunerative, some very fine people have joined the City of Hope in this challenge to extend techniques of preventive medicine to large populations of adults.

Senator NEUBERGER. So you do not have a cost figure?

Mr. SOBOL. On costs, we are projecting figures rather than based on experience. Our guess is, as we in this particular program phrase it, that for a penny an hour in the union contract package—when labor and management get together and negotiate and work out a new contract—for roughly \$20 to \$25 a year a mobile comprehensive screening program can be developed which will meet our objectives.

Senator NEUBERGER. Now, did you propose that as a fringe benefit, or as an employee's self-deduction?

Mr. SOBOL. Well, it is up to the particular group to decide how it wants to finance multiple screening. I happen to know, from personal experience, how valuable and important the work of the labor movement has been—and this is beginning to get adequate recognition.

One aspect is to address this information, as we obtain hard data, to every American union. One American union, the International Union of Electrical Workers, I may say, has already approved, at its international executive board meeting, a resolution endorsing multiphasic screening as a collective bargaining objective.

To my knowledge this is the first time a major American union has adopted multiple screening as an objective, although here and there some unions have set up very limited programs.

Senator NEUBERGER. I can visualize some of those workers, not knowing enough about it, saying, "What is that to us? We would rather have the money."

Mr. SOBOL. This is built into the system of collective bargaining. The older men may think of pensions and the younger men may want more take-home pay to buy clothes for their children in school. An educational program on the value of multiple screening among people who effectuate improvements in health care is necessary.

I would like finally to address myself to the question of followup.

Programming to insure treatment of discovered abnormalities seems to us to be of the very essence of doing a good job. It is our hope that the trade unions themselves can serve as effective instrumentalities in the followup program. Not only will project personnel report the medical results to the personal physician, and follow up with letters and telephone calls, but union committees can follow up in the workplace, on a personal contact basis. Of course, the privacy of the patient will be scrupulously observed. In these ways, we can have a double check-triple check system to insure that abnormalities receive proper attention.

Senator NEUBERGER. It certainly behooves industry, it seems to me, to keep its workers well. I would think a good electrical worker had quite a bit of money put into his training at his apprenticeship, and to keep him on the job is of importance not only to him personally but to industry.

We had a report which I haven't had time to digest yet, from a medical statistician and economist about the cost. Thank you very much, Mr. Sobol, we are glad to have you.

(Statement follows:)

## STATEMENT BY NORMAN L. SOBOL, DIRECTOR, CITY OF HOPE INDUSTRIAL HEALTH SCREENING PLANNING PROGRAM

## STATEMENT ON INDUSTRIAL MULTIPLE SCREENING

When the City of Hope was founded in California in 1913, it consisted of two tents pitched in the middle of five desert acres. One tent was for victims of tuberculosis; the other housed the nurses who would care for them. The City of Hope of those days was built upon voluntary contributions of \$136.05—and the faith and humanity of a small number of working people who had come to Los Angeles from New York and other parts of the nation.

Today, the City of Hope is known in many places as a pilot National Medical Center. It has articulated a humanitarian philosophy of high-quality, free patient care. In the past decade, a multiplicity of our physicians and scientists, using the latest technology when appropriate, has reported nearly 600 original findings in the medical sciences.

This brief history is stated for the lesson it conveys about the changes in the last half-century of American medicine, and in meeting medical needs. Involved are, in part, the mobility of the American population, the extraordinary achievements and complexity of modern medicine, the problems of reaching people who need medical care, the anticipation and prevention of disease viewed as health maintenance, the revolution in financing of medical care and research, the necessary evolution of new programs by both medical and socio-economic groups, and the abiding concern for the welfare of the whole person. The fulfillment of that concern—as a matter of right, not charity—is an ultimate test of our science and our society.

It is precisely the steadfastness of the underlying City of Hope philosophy which has led us continually to devise new methods as new knowledge and techniques were developed to combat such diseases as cancer, leukemia, chronic chest diseases and blood and hereditary diseases.

During the past year our National Medical Center initiated a New Horizons program, including a program of preventive medicine centered upon comprehensive, multiple screening of large numbers of industrial workers, and some supervisors and executives, at or near their places of work.

From epidemiological research conducted by the Public Health Service and various institutions and private agencies, it is clear that untold millions of Americans are dying prematurely, suffering needless pain, economic deprivation and disability, with all the consequent results for family and nation—*needlessly*. Needless, that is, in terms of the potential genius of our medicine, of our technology, of that unique American social inventiveness which is manifest when the nation's citizens are cognizant of the needs and goals.

What is badly needed is the development of new *systems* to deliver necessary preventive medical services where large numbers of adults can be examined expeditiously and economically. Such medical services are especially significant to people in the lower socio-economic groups.

The City of Hope has outlined one important system in its proposed Industrial Health Screening Program. Our governing philosophy is to take mobile clinics into the industrial setting; to provide high-quality, multi-phasic screening of patients on a definite schedule; to use labor-saving, automated equipment with maximum use of paramedical personnel; to employ efficient processing of the patient while respecting his dignity—all to detect asymptomatic diseases on the most economic basis. Systematic follow-up will be stressed to ensure treatment.

In association with unions affiliated with the International Union of Electrical Workers (IUE), Automobile Workers (UAW), Machinists (IAM), Oil and Chemical Workers (OCAW), Communications Workers (CWA), and others, the City of Hope plans to take a multi-unit mobile clinic directly into factory parking lots, and upon adjacent streets. We will take sophisticated medical techniques out of crowded hospitals into the workplaces where the people are, in large groups. Many people will be screened who simply will not visit hospitals for such procedures, or wait in busy doctors' offices, or visit the half-dozen specialists whose combined knowledge may be applicable.

The medical program will consist of a detailed self-history, some 23 tests, plus a physical examination and evaluation. The new automated laboratory equipment will be used. Modern data processing and computerization will expedite our findings.

Medical results will be referred to the individual worker's personal physician and to himself. At all times, the individual's dignity and privacy will be respected. Thus, our mobile units will be physically attractive units, like mobile homes. Private dressing rooms will, of course, be provided. Assiduous efforts will be made to ensure the follow-up and treatment of all discovered abnormalities by means of union committees as well as program personnel.

Despite the real shortages in medical personnel generally, the City of Hope has been able to attract outstanding clinicians, professors at notable medical colleges and researchers to a challenging new program of this kind.

Our expectation is that, for a penny or a penny-and-a-quarter an hour in the labor-management "contract package," a comprehensive screening program can be performed in the industrial setting. As techniques improve, the cost may well become less.

We believe that the economic mechanism of collective bargaining can, and will, establish new patterns for progress in multiple screening. Indeed, we believe the time is appropriate now. Many labor-management contracts have gone beyond hospital and surgical coverage to include "diagnostic" clauses of \$50 to \$100. Increasingly, labor and management leaders are reviewing the content of their health plans, in terms of actual medical services provided, guarding the lives of their people.

This Spring, the International Union of Electrical, Radio and Machine Workers formally adopted comprehensive multiple screening as a collective bargaining objective, the first time by any major American labor organization, to my knowledge. In the resolution, the City of Hope was designated as the proposed screening agency. One reason for this is the existing availability of City of Hope medical and administrative personnel on a regional basis, commensurate with the multi-plant, multi-state collective bargaining which is frequently prevalent.

Moreover, the City of Hope has maintained a close relationship with organized labor which has existed since our founding in 1913. We have ministered to many thousands of working people, including members of unions, to whom we offered no means tests, no bills, no demands upon their privacy or dignity. I make bold to say that today we conduct the most extensive health education program among American trade unionists.

Comprehensive screening in the industrial setting has a number of important implications, we believe, for occupational medicine. These might include cooperative labor-management programs of preventive medicine, immunization, occupational health audits for air contaminants, metal poisoning, dermatitis, etc. and prophylactic programs to avoid low-back pain, to prevent disability, etc. Certainly, the smaller and middle-size plant might welcome the competent medical resources which can be made available.

In addition, the proposed mobile screening system may aid preventive medicine among high risk populations, in low income neighborhoods, among older citizens with their decreased mobility, and in large membership groups, generally. A number of important, worthwhile programs have been developed in this area of service, including the neighborhood health center. What remains is to develop large-scale, flexible and economical systems to deliver the best in preventive medicine at the lowest cost.

Through the mobile system, we hope to bridge the gap between the hospital facility and large populations.

Relatively inexpensive mobile units will diminish the load on existing hospital facilities.

Existing social organizations (trade unions) will help recruit screenees, and provide appropriate voluntary manpower, rendering a vital service to their members and communities. While the privacy of the patient will be entirely respected, referral and follow-up procedures can be made more effective than heretofore through daily work contacts and/or home visits.

We frankly believe that the busy leaders of labor and management, and their concerned associates, should be kept informed of developments in preventive medicine which they, through their funds and instrumentalities, can extend to all their members, employees and, in time, to families and retirees.

Indeed, at the management level, it will become clear that preventive medicine can save very substantial costs for Workmen's Compensation, health plan utilization, disability, lost time and production, etc. We believe the time will come when screening programs, including our own, will have a substantial impact on the utilization of existing hospital facilities, premium costs for hospital care, increased availability of medical and paramedical manpower, as well as the simple saving of lives and unnecessary suffering.

Anticipating the future, each tri-unit Mobile Screening Clinic can be expected to screen comprehensively 15,000 to 16,000 individuals per year at full utilization, about 44 weeks a year. A fleet of 65 such clinics, with adequate staffing and modern administrative techniques, could screen 1,000,000 people a year, at minimal cost.

The City of Hope believes that comprehensive industrial screening may help initiate a major "breakthrough" in the progress of preventive medicine in this nation.

Some 2,400 years ago, Sophocles wrote a great paean of praise of the wonders of Man, his voyages of discovery, his dominion over nature.

The ancient Greek wrote, "He (Man) hath resource for all . . . ; only against Death shall he call for aid in vain; but from baffling maladies he hath devised escapes."

In our biological, physical and social sciences, we have devised ever-new escapes from maladies beyond the utmost imagination of all the generations which have preceded us.

This is our challenge and opportunity.

Senator NEUBERGER. We are going to recess now until 1:30 when the leadoff witness will be Dr. Leo Gitman, of the Brookdale Hospital Center in Brooklyn, N. Y.

(Whereupon, at 12:02 p.m., the subcommittee recessed, to reconvene at 1:30 p.m., the same day.)

#### AFTERNOON SESSION

Senator NEUBERGER. The meeting will come to order.

Dr. Leo Gitman will be the first witness. Dr. Gitman is the director of the Department of Community Health of the Brookdale Hospital Center, in Brooklyn, N. Y.

You may proceed as you see fit, Dr. Gitman.

#### STATEMENT OF LEO GITMAN, M.D., DIRECTOR, DEPARTMENT OF COMMUNITY HEALTH, BROOKDALE HOSPITAL CENTER, BROOKLYN, N. Y.

Dr. GITMAN. As has become customary at this hearing, I will begin by saying that I will abstract my written statement, but I would like to take this opportunity to amplify some points of special significance.

Senator NEUBERGER. Very good.

Dr. GITMAN. I am quite certain that there has been detailed testimony offered on the dollar costs of chronic illness.

Senator NEUBERGER. Mrs. Rice, who is a medical economist, gave us that, which we have not had time to digest, but which looks very important. It is one of the phases I am particularly interested in, because it is the way you sell the program to Congress.

Dr. GITMAN. This is why I thought I might present just one or two statistics, merely to indicate the enormity of the problem, and I might use arthritis as the model.

It has been estimated that the cost of arthritis amounts to almost \$2 billion annually. Each year, it causes 186 million days of restricted activity, 57 million days of bed disability, 12 million days of work lost, 1½ million days of hospitalization, and 30 million visits to a physician.

Not only are the costs enormous, but what is more disturbing, there is a definite relationship to economic status. The highest rates for arthritis are at the lower income levels.

Senator NEUBERGER. Why is that, now? What do you know about the diseases that would make a corollary?



Dr. GITMAN. This does not permit an easy answer. The factors of poor physical environment, poor nutrition are important. I would not like to be placed in a position of trying to prove this now, but I suspect that this relates very much to the individual's attitude toward health, his concept of health and disease, and this is one of the things I am going to develop in my presentation.

Senator NEUBERGER. Good.

Dr. GITMAN. As I was saying, on the incidence of arthritis, for the under \$2,000 income individual, the overall rate is three times that at the \$4,000 level or over. That is a 300-percent differential. Not only is the incidence higher in the poor, but the impact of the disease is greater. For instance, low-income families report more activity restriction, and more average disability days, than higher income groups. At the risk of appearing presumptuous, may I suggest that there are really three basic questions before this committee:

1. Is the periodic health examination a valid approach to the problem of preventing chronic illness?
2. Is an effective, economically feasible method presently available?
3. Will the population, especially the poor, accept this method?

My presentation will attempt to suggest answers to these questions, hopefully, with a minimum of platitudes and professorial pronouncements.

The statistics I have quoted, being aggregate entities, fail to convey the consequences in terms of people—individual people. It is in the microcosm of clinical practice that they become meaningful.

The 60-year-old man, a diabetic, with gangrene of a foot, who refuses to permit amputation despite his constant pain, drags his wife, his children, and their families all into his own orbit of despondency, bickering, and emotional turmoil. Or again, the 55-year-old widow crippled by arthritis, living with an unmarried daughter, who is living her life out in quiet desperation. The 75-year-old man who prided himself on the fact that he had never seen a physician, until a chronic sore on his face began enlarging, and now is a hideous, foul-smelling disfigurement. We can go on, literally ad nauseam.

The point that I wish to make is that we can estimate dollar costs, but how do we assess human costs?

In the present state of knowledge, one must accept the premise that periodic health examinations are an effective approach to the problem of chronic illness. It is logical to assume that detection of disease in its earliest stages will provide the opportunity to alter the natural history of that disease. This approach has already made significant contributions in conditions like diabetes, glaucoma, arthritis, and cancer.

The potential for prevention has been demonstrated by many studies, and I present two citations as illustrations.

One authority estimates that at least one significant abnormality that could be benefited by medical advice would be encountered in 80 percent of so-called normal individuals, age 40 or over, who are carefully examined.

In another report, based on an analysis of periodic health examinations of business executives, 40 percent of the group were found to have some previously unrecognized abnormal condition. And what is of even greater significance, approximately half of these abnormalities, if untreated, have the potential for disability or death.

Accepting the magnitude and the urgency of the problem of chronic illness, and the validity of periodic health examinations as a preventive mechanism, our next consideration is the requirements of such a program.

I believe a practical program is one which utilizes modern diagnostic tests and techniques, requires minimal professional involvement in the screening procedure, evaluates medical and psychosocial function—I would underscore “psychosocial”—is economically feasible, permits examination of large numbers of individuals in a comparatively short period of time, and provides a summary for the physician to use in his evaluation of the patient, in conjunction with his physical examination.

It is my considered judgment that the program of the Kaiser-Permanente group is a prototype fulfilling these requirements.

These are general statements. Let us reconsider them in the context of a very specific program, the program we are developing at the Brookdale Hospital Center in Brooklyn, N. Y.

The population in this hospital service area is 500,000. About one-third of the geographical area contains a high-density, low-income, multiethnic population. In some of the subdivisions, designated as health areas, the combined percentage of Negroes and Puerto Ricans is well over 80 percent, 30 to 40 percent of families have annual incomes under \$3,000; 50 to 70 percent under \$4,000, and the unemployment rate is 8 percent to somewhat more than 11 percent.

The Brookdale Hospital Center's commitment to community health consists of two large areas of responsibility. First, treating the patient who is ill, and, secondly, providing preventive medicine. It is the second component which is the concern of this committee, to which I address myself.

Until several years ago, I was extremely pessimistic over the solution of the problem of preventive medicine, especially in our community. The large numbers of people to be evaluated, the poor health orientation of the poor, the lack of adequate numbers of professionals to handle the problem, the enormous expense of a sophisticated examination, all these were difficulties which appeared overwhelming, and the problem actually insoluble. The publications of the Kaiser-Permanente group caused tremendous excitement for those of us who were struggling with this problem. It, indeed, appeared to provide a solution. The Gerontology Branch, Division of Chronic Diseases, U.S. Public Health Service, stimulated much interest in the multiphasic health evaluation mechanism, and it is with its encouragement and support that we, at Brookdale, are developing a similar program. We are no longer pessimistic. We are now confident that the preventive medicine component of our hospital's responsibility for community health can be discharged satisfactorily.

The projected program at the Brookdale Hospital Center consists of three operational segments: health education and motivation; multiphasic screening, and referral and followup.

I would like to spend a few minutes dealing with these ad seriatim. With regard to the health education and motivation, the population of our community differs significantly from that serviced by the Kaiser-Permanente program, insofar as it is a low-income, high-density, multiethnic group involved in no organized medical care program. We are, therefore, immediately faced with the problem of motivation

of this population. This is in turn dependent on the poor person's concept of health. As one consequence of poverty, the poor are tragically ignorant of the causes, treatment, and curability of disease. Dental decay and loss of teeth, a hacking morning cough, joint pains, low back pains, urinary difficulty, these are among the many conditions believed to be inevitable and, therefore, it would be useless to try to do anything about them.

In a family existing on bare essentials, top priority is given to improving the things like living space, household equipment, clothes for the children, a secondhand car, and so on. If symptoms like joint pain occur, self-medication, generally patent medicine, is resorted to. It is estimated that arthritics spend \$435 million annually for non-prescription drugs and devices for relief of pain. And it is distressing to learn that, of this amount, \$250 million is spent annually for remedies of questionable benefit.

If patent medicine fails, the individual generally consults his neighbors or other members of the family. With continued discomfort, he turns to the druggist. Only when the individual is incapacitated does he seek medical care. That is to say, only then does he consider himself sick. It is therefore not surprising that the sophisticated concept of preventive medicine based on periodic health examinations is foreign to much of this segment of society.

In our program, we first identified the characteristics of the community by analysis of demographic data and consultation with experts familiar with this population. Educational approaches, specifically tailored for each major group, are being formulated.

This question of educational approach requires amplification. There has been much talk about education, going into a community to provide facts. And I might point out that scores of published studies have clearly established several facts pertinent to our discussion. First, the presentation of knowledge per se is rarely an effective stimulus to action.

Second, successful health programing requires consideration of the community's organization and mores.

Third, individual action is largely determined by the immediacy of the threat. That is to say, an individual will be likely to report for smallpox vaccination only if a member of his family, or someone in the immediate neighborhood, has contracted the disease.

Fourthly, the person of marginal economic status is more likely to look for an immediate concrete reward for his actions.

Fifthly, the use of intermediaries, who are respected and trusted members of the community, is generally a very effective technique. And, finally, involvement of a group has a much better chance of success and an attempt to focus on individuals. So the phrase "educational approach" is therefore used in the sense of influencing attitudes by techniques which take into account the culture of the people we are concerned with, and not by abstractions, or philosophical statements.

We have planned with these considerations in mind. We have approached the several broad-based action groups in the community with suggestions that each form a strong health committee, and that each of these send representatives to a joint committee representing the community to meet with our department on a regularly scheduled

basis at the hospital. These organizations represent the most effective propaganda mechanism for achieving communitywide coverage through its membership and influence. The appeal will be not on the basis of good health per se, but on the basis that good health is a social right. It should, therefore, become a component of the social action program of the community organizations. The individual is thereby pressured by the group to conform. He will therefore become involved initially, not because of health considerations, but because it is what his peers expect him to do.

And to strengthen our identification with the community, we have provided concrete benefits amongst which are setting up and staffing a first aid unit at a fair organized by one of the community organizations, establishing a modest scholarship fund for needy high school students, providing material and guidance for career development programs conducted by these organizations.

Our community health educator, who is a respected member of the community, will work with the health committees of these organizations, and guide and coordinate the activity of our community health aides. These aides will be selected from the community, and trained to be our representatives and educators in specific assigned geographical areas. The aides will work with the blockworkers of these organizations.

Hopefully, this kind of community involvement will recruit registrants for the periodic health examinations. In the process, good health concepts will be disseminated, and eventually have an impact on a significant portion of this population, and once the individual becomes involved in this project, we have the opportunity to bring him into the mainstream of medical care, and keep him there.

More importantly, this will have been accomplished by the members of the community and not by outsiders. This should bring a sense of pride and accomplishment which is so sorely lacking in underprivileged communities, and perhaps it will to some degree counteract the characteristic alienation and apathy which we see.

The second operational segment, I will say little about, except that it will be an adaptation of the Kaiser-Permanente model.

With respect to the referral and followup segment, the impressive computer read out of the results of the multiphasic test process is of value only if it is used as an aid to the physician in arriving at a diagnosis. I will pursue this no longer, because this has been pointed out by a number of other witnesses.

The difficulties cited in discussion of the first operational segment exist here as well. This is the question of motivation. It is our responsibility to insure that the patient visit the private physician or other provider of medical care, and the community mechanisms designed to get the patient registered in the program will be just those utilized to get him to a physician. Here, however, we have an additional factor to be considered. The involvement of the practicing physician. The current changing medical scene may very well present difficulties. We have had discussions with local organizations of physicians, and hope to have them appoint representatives to the liaison committee of our program. In addition, we are completing a survey of physicians and dentists practicing in our hospital area. We will meet with them to discuss their role in the program, and expect to make referrals of all

patients financially able to pay physicians' fees. Those unable to do so will be referred to the ambulatory care services of the Brookdale Hospital Center.

Now may I return to the three questions posed earlier in my remarks.

First. Is the periodic health examination a valid approach to the problem of preventing chronic illness? For the reasons I have outlined, I believe the answer is in the affirmative.

Second. Is an effective economically feasible process available? There is no question in my mind that the prototype exists.

Third. Will the population, especially the poor, accept the periodic health examination? I believe we can achieve acceptability, providing we shed our preconceived ideas and stereotypes, and are cognizant of the results of research of social scientists working in this area, and are willing to face up to these situations. At the very least, we have the opportunity to study in depth the phenomenon of the resistance to health care innovations. I firmly believe this becomes the crucial consideration in our efforts to bring the fruits of medical research to the consumer.

The experience gained in our program will most certainly have more than local significance. The problems confronting us in Brooklyn exist in almost every large urban area in this country. The guidelines which we will formulate and the experience gained should have applicability in every large city in the United States.

Finally, legislation supporting the development of modern multi-phasic health examination programs throughout this country will close the gap between medicare benefits and the socially desirable goal of true comprehensive health care. This kind of legislation will constitute a historic milestone in the development of medical care in this country. Without it, we shirk our social responsibilities, and court disaster.

Thank you.

(Dr. Gitman's prepared statement follows:)

PREPARED STATEMENT BY LEO GITMAN, M.D., DIRECTOR, DEPARTMENT OF COMMUNITY HEALTH, THE BROOKDALE HOSPITAL CENTER, BROOKLYN, N.Y.

Senator Neuberger and Members of the Subcommittee on Health of the Elderly, I am here because of a deep concern for what is probably the most important problem facing the medical profession and society today—the prevention of chronic illness. I speak as a physician who has been in clinical investigation, and now is devoting his entire professional activity to community medical care programming. I speak as a human being dismayed by the anguish and social wastage of chronic illness, especially in the poor and the aged. I squirm on hearing the euphemism "golden years" for old age. For thousands of people these are "black years"—years of chronic pain, disability, horrible loneliness, dependency, and mental and physical deterioration.

Undoubtedly, statements by economists and statisticians will present to this Committee detailed discussion of the dollar costs of chronic illness. I will cite a few facts, using arthritis as the model, merely to indicate the enormity of the problem.

It has been estimated that the cost of arthritis amounts to almost 2 billion dollars annually. Each year it causes 186,000,000 days of restricted activity; 57,000,000 days of bed disability; 12,000,000 days of work loss; 1,500,000 days of hospitalization; and 30,000,000 visits to a doctor. There is a clear cut relationship between the incidence of arthritis and economic status. The highest rates for arthritis are found at lower income levels. Under \$2,000. annual in-

come, the overall rate is three times that at the \$4,000. or over level; i.e. 138.7 per 1,000 as compared to 45.6.<sup>1</sup>

Not only is the incidence higher in the poor, but the impact of the disease is greater. Low income families (which include more older persons than higher income families do) :

- (1) Report relatively more activity limitation due to arthritis;
- (2) Report more average disability days due to arthritis; and
- (3) Report relatively fewer who seek medical care for arthritis.

As a footnote, I have a statistic furnished by Dr. Paul Densen, Deputy Administrator, Health Services Administration, New York City.

In comparing Flushing, a middle class area, 97.6 percent white with Bedford District of Brooklyn which is a poor section, roughly two-thirds Negro and Puerto Rican, the death rate from diabetes is 200 percent greater in the depressed Bedford area.

Paranthetically, it may be noted that the infant mortality rate (infant deaths per 1,000 live births) is almost 300 percent greater in the Bedford District.

These data, as aggregate entities, fail to convey the consequences in terms of individual people. It is in the microcosm of clinical practice that they become meaningful.

The 60 year old man, a diabetic, with gangrene of the foot, who refuses to permit amputation despite constant pain, drags his wife, his children and their families into his orbit of despondency, bickering and emotional turmoil.

The 55 year old widow, crippled by arthritis, living with an unmarried daughter who is living in quiet desperation.

The 75 year old man who had prided himself on the fact that he has never been to a doctor—until a chronic sore of the face began enlarging and is now a hideous foul-smelling disfigurement.

One could go on, literally, ad nauseum.

One can estimate the dollar costs of chronic illness. How does one assess human costs?

In the present state of knowledge, one must accept the premise that periodic health examinations are an effective approach to the problem of chronic illness. It is logical to assume that detection of disease in its earliest stages will provide the opportunity to alter the natural history of that disease. This approach has already made significant contributions in diabetes, glaucoma, arthritis, and cancer.

The potential for prevention has been demonstrated by a number of studies. I present two citations as illustrations.

One authority estimates that at least one significant abnormality that could be benefitted by medical advice would be encountered in 80 percent of "normal" persons over 40 years of age who were examined carefully.<sup>2</sup>

In another report based on an analysis of periodic health examinations of business executives, 40 percent of the group were found to have some previously unrecognized abnormal condition. Forty-six percent of the abnormalities, if untreated, were potential causes of disability or death.<sup>3</sup>

The traditional periodic health examination has several serious disadvantages. Too often, it is a superficial perfunctory procedure which often recognizes disease only after it has already progressed too far to permit meaningful intervention.

I believe the following would be accepted as constituting a high quality periodic health examination for adults: careful, detailed history and physical examination; examination of the urine; blood count; determination of the blood sugar, urea nitrogen, cholesterol, sedimentation rate; sigmoidoscopy in patients over age 40; cervical ("Pap") smear and mamography in females; x-ray of the chest; testing of hearing, visual acuity and ocular tension.

How many patients can afford the costs of these procedures as a recurrent medical expense? I would state, without fear of contradiction, that this kind of examination is infrequently done even if the patient is able to pay the sizable costs. In the case of the low middle class and poor, the percentage is infinitesimal.

It is generally recognized that the number of available health professionals, e.g.: physician, nurse, social worker, etc., to provide adequate care in the United States, is inadequate. This estimate relates to the treatment of people who are

<sup>1</sup> Arthritis Source Book. P.H.S., U.S. Dept. H.E.W., PHS publication No. 1431, April 1966.

<sup>2</sup> Smille, W. G., and Kilbourne, E. D., Preventive Medicine and Public Health 3rd Ed. The MacMillan Co., New York, 1963, page 373.

<sup>3</sup> Elson, K. A. J.A.M.A. 172: 55, 1960.

ill. Periodic health examinations are aimed at the asymptomatic individuals. How are we to take care of this additional patient load? The answer is that up till a few years ago, it was not possible. There are two few professionals to implement this kind of programming. Even if the current intensive efforts to build the necessary schools, recruit and train health professionals are successful, it will be years before we reap the benefits. It seems to me that we must utilize the resources of modern technology to relieve the professional of functions which could be performed by non-professional personnel.

Accepting the magnitude and urgency of the problem of chronic illness and the validity of periodic health examinations as a preventive procedure, our next consideration is the requirements of such a program.

A practical program is one which: 1) utilizes modern diagnostic tests and techniques, 2) requires minimal professional involvement in the screening procedure, 3) evaluates medical and psychosocial function, 4) is economically feasible, 5) permits examination of large numbers of individuals in a comparatively short period of time, and 6) provides a summary for the use of the physician in his evaluation of the patient in conjunction with his physical examination.

It is my considered judgment that the program of the Kaiser-Permanente Group is a prototype fulfilling these requirements.

These are general statements. Let us reconsider them in the context of a specific program—the program we are developing at the Brookdale Hospital Center in the Borough of Brooklyn in New York City.

The Brookdale Hospital Center is a voluntary general hospital whose 340 bed complement will be increased to 500 beds by 1969. As Director of the Department of Community Health at this Institution, I am responsible for the initiation, coordination and facilitation of all hospital-based programs relating to community health programming and servicing. I might add that it is probably the only voluntary hospital in the country with a Department of Community Health with status equal to that of the traditional departments such as: Medicine, Surgery, Obstetrics and Gynecology, Pediatrics, etc.

The population in the Hospital's service area is 500,000. About one-third of the geographical area contains a high density, low income, multi-ethnic population. In some of the subdivisions, designated as health areas, the combined percentage of Negroes and Puerto Ricans is over 80 percent; 30-40 percent of families have annual incomes under \$3,000 and 50-70 percent under \$4,000; the unemployment rate is 8-11 percent.<sup>4</sup>

The Brookdale Hospital Center's commitment to community health consists of two large areas of responsibility: 1) treating the person who is ill, and 2) preventive medicine. It is the second component, which is the concern of this Subcommittee, to which I address myself.

Until several years ago, I was extremely pessimistic over the solution of the problem of preventive medicine, especially in our high-density, low income, multi-ethnic population. The large numbers of people to be evaluated, the poor health orientation of the poor, the lack of adequate numbers of health professionals to handle the problem, the enormous expense of a sophisticated examination—all these were difficulties which appeared overwhelming and the problem insoluble.

Should we spread our professional manpower to such an extent as to court the possibility of harassed, overworked doctors, nurses and others forced to render superficial, and perhaps, careless service? Should we restrict the numbers of individuals examined so that the professional could perform adequately? But then, whom do we select for preventive medical care? This becomes a decision with moral overtones—a decision we should not be compelled to make. This approach would also run the risk of inducing communal expectations which could not be fulfilled.

The publications of the Kaiser-Permanente Group caused tremendous excitement for those of us struggling with this problem. It appeared to provide a solution. The Gerontology Branch, Division of Chronic Diseases, U.S. Public Health Service, stimulated much interest in the multiphasic health evaluation mechanism, and it is with its encouragement and support that we, at Brookdale, are developing a similar program. We are no longer pessimistic. The multiphasic procedure furnishes a method which can screen large numbers of

<sup>4</sup>The Brookdale Hospital Center: Core Area Preliminary Survey of Selected Demographic and Epidemiologic Characteristics, January 1966. Prepared by Anna C. Gelman, MPH, Asst. Professor of Epidemiology, Columbia University School of Public Health and Administrative Medicine, New York City.

individuals, requires few highly trained health professionals, and is economically feasible. We are now confident that the preventive medicine component of our Hospital's responsibility for community health can be discharged satisfactorily.

The projected program at the Brookdale Hospital Center consists of three operational segments:

1. Health education and motivation.
2. Multiphasic screening.
3. Referral and follow-up.

#### HEALTH EDUCATION AND MOTIVATION

The population of our community differs significantly from that serviced by the Kaiser-Permanente Program insofar as it is a low income, high-density, multi-ethnic group involved in no organized medical care program. We are, therefore, immediately faced with the problem of motivation of this population. This is, in turn, dependent on the poor person's concept of health. As one consequence of poverty, the poor are tragically ignorant of the causes, treatment, and curability of disease. Dental decay and loss of teeth, hacking morning cough, joint pains, low back pain, urinary difficulty, are among the many conditions believed to be inevitable, and therefore it would be useless trying to do anything about them.

In a family existing on bare essentials, top priority is given to improvement of living space, household equipment, clothes for the children, a second-hand car, radio, etc. If symptoms like joint pain and stiffness occur, self-medication, generally patent medicine, is resorted to. It is estimated that arthritics spend \$435,000,000 annually for non-prescription drugs and devices for relief of pain, which includes \$250,000,000 for questionable remedies.<sup>5</sup> If this fails to bring relief, neighbors are consulted. With continued discomfort, the pharmacist's advice is sought. Only when the individual is incapacitated does he seek medical care, i.e.: only then does he consider himself "sick". It is, therefore, not surprising that the sophisticated concept of preventive medicine, based on periodic health examinations, is foreign to much of this segment of society.

The factors of ethnic background, foreign birth, age and educational level, also play an important role in determining the individual's attitude toward health.

In our program, we first identified the characteristics of the community by analysis of demographic data and consultation with experts familiar with this population. Educational approaches, specifically tailored for each major group, are being formulated.

We have approached the several broad based action groups in the community with the suggestion that each form a strong health committee, and each of these send representatives to a joint committee which would represent the community at regular frequently held meetings with the Department of Community Health, the Brookdale Hospital Center. These organizations represent the most effective propaganda mechanism for achieving communitywide coverage through its membership and influence.

Our community health educator, who is a respected member of the community, will work with the health committees of these organizations and guide and coordinate the activity of our community health aides. These aides will be selected from the community and trained to be our representatives and educators in specific assigned geographic areas. The aides will work with the block workers of the community organizations.

These efforts will be supplemented by the standard techniques of radio announcements, newspaper stories and notices, church announcements, posters at strategic locations, etc.

Hopefully, this kind of community involvement will recruit registrants for the periodic health examinations. In the process, good health concepts will be disseminated, and eventually have an impact on a significant portion of the population.

Once the individual becomes involved in this project, we have the opportunity to bring him into the mainstream of modern health care and keep him there. Most importantly, this will have been accomplished by the members of the com-

<sup>5</sup> Arthritis Source Book. P.H.S., U.S. Dept. H.E.W., PHS publication No. 1431, April 1966.



munity and not by outsiders. This should bring a sense of pride and accomplishment which is sorely lacking in underprivileged communities. Perhaps, it will, to some degree, counteract the characteristic alienation and apathy.

#### MULTIPHASIC SCREENING

The second operational segment of the program is basically a technical one. Our procedure will be an adaptation of the Kaiser-Permanente model.

#### REFERRAL AND FOLLOW UP

The impressive computer print-out of the results of the multiphasic test process is of value only if it is used by a physician as an aid in arriving at a diagnosis. It should be clearly understood that the procedure does not produce a diagnosis. The print-out is a sophisticated compilation of significant data. The physician uses this along with the findings of the physical examination to formulate further diagnostic procedures or prescribe therapy, as indicated.

The difficulties cited in the discussion of the first operational segment exist here as well. It is our responsibility to insure that the patient visits a private physician or other provider of medical care. The community mechanisms designed to get the patient registered in the program will be utilized to get him to a physician.

Here, however, we have an additional factor to be considered—the involvement of the physician. The current changing medical scene may very well present difficulties. We have had discussions with the local organization of physicians, and hope to have them appoint representatives to the Liaison Committee of our program.

In addition, we are completing a survey of physicians and dentists practicing in the Hospital's core area. We will meet with them to discuss their role in the program. We expect to make referrals of all patients financially able to pay physicians' fees. Those unable to do so, will be referred to the Ambulatory Care Services of the Brookdale Hospital Center. Reports from the physicians will be requested and will be incorporated in the patient's screening record. And, finally, we will have the patient return for repeat examinations at intervals to be determined.

At this point, I would like to underscore one of our convictions—the community hospital must assume the responsibility of leadership in health care programming and services, especially in low income areas. This, of necessity, implies intense educational efforts directed at the poor health orientation characterizing low income groups. This would not be an artificial situation in view of the central role the hospital customarily occupies in the medical way of life of the poor.

The experience gained in our program will most certainly have more than local significance. The problems confronting us in Brooklyn exist in almost every large urban area in the country. The guidelines which we will formulate and the experience gained should have applicability in every large city in the United States.

Finally, legislation supporting the development of modern multiphasic health examination programs throughout the country will close the gap between Medicare benefits and the socially desirable goal of true comprehensive health care. This kind of legislation will constitute another historic milestone in the development of medical care in this country. Without it, we shirk our social responsibilities and court disaster.

Senator NEUBERGER. I enjoyed your paper, and your remarks very much, Dr. Gitman. It struck me as great sociological comments, and your recognition of the sociological problems along with the medical problems.

I was glad of your emphasis on what we mean by education in this area. I have had a little experience with that since I have done a lot of work in studying the harmful effects of cigarette smoking, and we have had a number of Surgeon General's reports, and all sorts of things, and yet people continue to bring disease upon themselves, because they are not educated, I presume, to the dangers.

But one thing I have learned in a somewhat long political career is that one never knows when the educational process is going on, and each day, something is going on, and you look back, you see how far you have come, so it is encouraging.

I also thought when you were talking about the poor and the difficulty of getting them to accept this treatment, that there is an analogy to a saying that politicians have that one of the hardest things is to get a voter, a constituent, to vote in his own self-interest. You have that same thing.

Dr. GITMAN. That is right.

Senator NEUBERGER. I was glad to see in your paper the reference to the involvement of the physician, which I think we recognize is a very key part of it. Your hospital center is supported how?

Dr. GITMAN. Voluntary funds. It is a voluntary general hospital. Senator NEUBERGER. Well, then, what does that mean? City, county, State?

Dr. GITMAN. No, private. That is, it is supported by funds raised by private citizens. It has no official governmental support, other than the welfare and other medical programs.

Senator NEUBERGER. But then your fees are adjusted on ability to pay?

Dr. GITMAN. Oh, yes.

Senator NEUBERGER. I appreciate your testimony. Thank you.

And I call on the next witnesses, who are billed here together, Dr. Vernon Martens and Dr. I. E. Buff.

**STATEMENTS OF VERNON MARTENS, M.D., DIRECTOR, DEPARTMENT OF PATHOLOGY, WASHINGTON HOSPITAL CENTER, WASHINGTON, D.C.; AND I. E. BUFF, M.D., CARDIOLOGIST, CHARLESTON, W. VA.**

Senator NEUBERGER. Let us see, now. Who is Dr. Buff?

You are Dr. Buff, a cardiologist from West Virginia—Charleston.

Dr. BUFF. Yes.

Senator NEUBERGER. And Dr. Martens, Department of Pathology, Washington Hospital Center, Washington, D.C. You are the first representative of your particular specialty we have had, so we look forward to your remarks. How are you going to handle this?

Dr. BUFF. I will start off.

Senator NEUBERGER. All right.

Dr. BUFF. Madam Chairman, the object of the screening examination at the American Medical Association convention was to interest physicians in their own health. "Every M.D. should have an annual physical examination, start yours today," was the slogan at the American Medical Association convention. Rather than just talking about the virtues of a medical checkup for physicians, this exhibit offered each physician what was hoped to be the first step in securing a comprehensive medical checkup.

The screening examination for physicians was initiated in 1953, exactly 13 years ago, because we felt that physicians themselves were not being examined. We felt there were a great many physicians dying, because they didn't have an examination previously and these deaths might have been prevented. So at the American Medical Asso-

ciation convention, every year, we set up a procedure in which a history was taken on the physicians.

Now, when we started, the history was given in a form for the physician to fill out. But we found it was much better if we had a plain clerk ask the physician the questions. We got a much better history.

From there, we proceeded to take the height and weight of the physician, take the blood pressure, test the eyes for glaucoma, take an X-ray of the lungs, listen to the heart at the beginning—and as the time went on, we dropped this from the program, for various reasons—and we did electrocardiograms.

Well, at first, this was not so accepted by the doctors, and we had to do a selling job, the same as the people talk here about multiphasic screening of the lay population. But after a while, we increased the number of physicians who took the examination, from 500 in 1953 to somewhere near 3,000 in 1966. That it was accepted then was a foregone conclusion, because we had the same people come back, year after year.

At our present status of these examinations, we added a timed vital capacity for the function of the lungs, because emphysema, today, is a disease that is well recognized by most of the medical profession, and 13 years ago, was not, and maybe since most doctors have stopped smoking, we will have less emphysema in the physicians.

In 1966, we found that physicians had 7.7-percent abnormal timed vital capacities. We had a percent who had been found with abnormal lung findings. Approximately 15 percent with abnormal cardiograms, and 5 percent with borderline. Of these physicians who had abnormal cardiograms and borderline, I might add that 80 percent were not aware that they had any heart disease whatsoever. Of the lung disease, approximately 80 to 90 percent were not aware of this. And of the glaucoma, which we had 1.2 percent of positives, practically none were aware of this.

These, Madam Chairman, are physicians—who know symptoms, who know how to interpret them, but cannot interpret them on themselves.

I know that you have been told about the electrocardiogram and the computer. I don't know how much you were told about how good or bad it was, but at the American Medical Association meeting we ran a little experiment. Of those who had abnormal electrocardiograms, as interpreted by some of the leading cardiologists in this country, the abnormal—the physicians who had abnormal cardiograms—were sent to the computer, and this was compared with the physician's diagnosis. I might add that the computer was just a little better than the physicians.

There are many obvious reasons for this. Of course, the computer is objective and not subjective, and they do not know anything about symptoms or patients or anyone telling them they have pain going down their arm, or pain in the center of the chest.

The computer takes the cardiogram itself. It is easy to read things into cardiograms when you have a history.

I feel this way about screening as far as physicians are concerned. Since the physicians themselves cannot interpret their own symptoms, and know when to go to another physician for medical care, how would you expect the lay public and the general population to do so?

Multiphasic screening is the answer to a health need in this country, but only if it is free. It will find abnormal cases. It will find diseases in individuals long before they have symptoms, and long before they have any knowledge that anything is wrong. Prevention is much better than treatment, and early diagnosis is the answer to a cure, if such can be found.

As far as the elderly are concerned, and these, as you know, are individuals who are over 65, such a procedure should at least be set up for them, so the conditions arising in them, without symptoms, can be treated, long before they have knowledge of anything wrong, so these people can end their years in comparative health and happiness.

Madam Chairman, in the State of West Virginia, we have now automatic analyzers. This is free. They are owned by the State, bought by the community health services of the U.S. Government. We are setting up a free analysis for the people of the State of West Virginia. There will be no charge. We are the first State in the Union to do this. Thank goodness, West Virginia is first in something.

We have been depleted for so long. We are also contemplating at this time the possibility of screening rural counties. After all, we have 1 county, Pocahontas, which has only 3 physicians, and a population of approximately 12,000 people. That is 1 for 4,000 people. It is physically impossible for one physician to serve such a population. If we had multiphasic screening for these people, in the entire county, those that were well would not have to go to a physician, or bother him, because of trying to find out from an X-ray or electrocardiogram that something is wrong, because it will be done.

We hope that this, with giving these figures to a physician, will enable us to get young physicians to go into rural areas, because this has been the stumbling block of getting young people, young physicians, to go to rural areas. It is not only the hospital that they want, but they would like to have the data that they can get in a first-class hospital, and if we set this up, in our own State, so they can send all their samples to the center at Charleston, and get their results within 24 hours, they will have information, the same as a patient who lives in New York or Chicago can have.

We will elevate the standard of practice in our own State.

Dr. Martens has been associated with our exhibit for years. He has been a great help to us. He has run the clinical laboratory at the American Medical Association.

(Dr. Buff's statement follows:)

STATEMENT BY I. E. BUFF, M.D., CARDIOLOGIST, CHARLESTON, W. VA.

The object of the screening examination at the American Medical Association Convention was to interest physicians in their own health. "Every M.D. should have an annual physical examination, start yours today!" was the slogan at the American Medical Association Convention. Rather than just talking about the virtues of a medical check-up for physicians, this exhibit offered each physician what was hoped to be the first step in securing a comprehensive medical check-up.

The screening examination for physicians was initiated in 1953, exactly thirteen years ago. The reason for initiating this was the fact that the doctors themselves had not been taking advantage of getting an annual physical examination. There have been many physicians who had known their colleagues to die suddenly and they felt that had they been examined previously and been treated, the chances of this occurring would not have been as great. With the hope of

saving medical manpower and lives, this program was initiated. At the onset, it is very true, that this was not generally accepted by all the physicians and there was a certain degree of resistance by a great many of them. As a matter of fact, in the initial year of 1953, there were only 500 physicians who took part in the examinations. In the beginning a history was taken on the physician. The blood pressure, height and weight were taken. The heart was examined by a physician and an electrocardiogram was taken. An X-ray of the chest was also taken. As the years passed, there were many additions to this examination. Some were added and then later, some were dropped because they did not give the information that was expected. The popularity of the exhibit and the screening examinations became greater. In 1966 there were approximately 3,000 physicians examined. A history was taken on each physician, the blood pressure was taken, the height and weight recorded, the vision was examined and a tonometer test for glaucoma was performed. An X-ray of the lungs was done and a timed vital capacity measuring the output of the lungs, in hopes of diagnosing early pulmonary disease.

It is interesting to note, that with these procedures and the laboratory examination of blood, that a great many conditions were brought to light that the physicians, themselves, did not know existed. There were about 5% who had abnormal X-ray findings of the lungs. There were a little over 1% who had a positive test for glaucoma. In these people, it is possible by early diagnosis to actually prevent blindness. The electrocardiogram and heart examination revealed, on the average, 15% that were definitely abnormal and 5% that were borderline. Of these, approximately 80% did not know of the existence of a heart condition before the examination. The early findings of arteriosclerotic heart disease, hypertensive heart disease and coronary artery disease is very necessary if one is to expect any favorable results in the treatment. It may, also, possibly prevent many heart attacks.

You may well ask, why does a physician need to have an annual physical examination at a convention when he has these facilities at home. This is due to the fact that he probably does not take the time to do it and he thinks in his own mind that nothing is wrong with him. I well remember one physician who was an assistant professor in one of the Medical Schools who actually had a heart attack, a myocardial infarction, about one year ago but had done nothing about it. He was asked why he did not go across the street from his office to the hospital and get an electrocardiogram. He stated that he did not want his colleagues to know that he had heart trouble, that it might prevent him from getting a promotion in his position at the Medical School. There was the sad experience of one of the physicians working in the exhibit, in the early days, not taking an examination himself and to die suddenly of a heart attack, one week after the convention. Since that time, it has become a definite rule that every physician that takes part in the examining of other physicians, must have an examination themselves.

I know that the reading of electrocardiograms by computer has been described by Dr. Caceres but I do want to say that at the American Medical Association, we definitely gave the computer a good test as to whether it was accurate in the interpretations of electrocardiograms. This was done by having all the electrocardiograms read by a cardiologist and those physicians who had an abnormal electrocardiogram had their electrocardiogram retaken on the computer and the results were compared, that of the computer diagnosis with the diagnosis of the physician. We examined approximately 800 in this way and we can definitely state that the computer was just a little better than the individual physicians were in the interpretation of the electrocardiograms. There are many obvious reasons for this. One of the examining cardiologists did not want to have his interpretation compared with the computer and, at first, refused to do this. When we explained to him that we were trying to test the computer as to its efficiency and not his ability to read electrocardiograms, he agreed to take part in the procedure and test. At the end of his two hour tour of duty, he stated that he would like to come back the next day and read electrocardiograms again with the computer. He was asked why he had a change of heart as far as the computer was concerned and he stated that he had learned more electrocardiography in that two hours than he had learned in many days previously.

Members of the Committee, the physicians cannot interpret their own symptoms and know when to go to another physician to have medical care. How would you expect lay people, in the general population, to do so? Multiphasic screening is the answer to a health need in this country. It will find abnormal cases, it will find diseases in individuals long before they have symptoms and long before they

have any knowledge that anything is going wrong. Prevention is much better than treatment and early diagnosis is the answer to a great many cures. As far as the elderly are concerned and these are the individuals, as you know, over the age 65, need a procedure set up for them so that conditions that arise in them can be treated and alleviated long before they become manifest by symptoms.

This, gentlemen, will allow these people to end their years in comparative health and happiness.

Senator NEUBERGER. Dr. Martens.

Dr. MARTENS. After Dr. Buff's remarks, I am not so sure we are not all going to be replaced by the computers.

Very simply, what I have to say can be summed up very readily by the fact that automation in the laboratory is here to stay. I think it is an excellent idea. My only concern is that when it is used, it is used properly and well controlled. My experience has been primarily in laboratory medicine, and I am located in an 800-bed general hospital, and we do approximately 800,000 to 900,000 laboratory tests a year. It, of course, is quite obvious that we have had to automate many of our procedures to do this. To do it accurately requires a constant surveillance of the techniques that are being used. Automation does not apply only to chemistry. Automation can be used in hematology and other disciplines in the laboratory.

At present, I think we are just scratching the surface. We have used, as Dr. Buff has indicated, at the AMA exhibit laboratory, a variety of tests, actually, approximately 23 different tests, and some of these, many physicians would dispute as being of value in the so-called screening procedure. Actually, I think that we don't know what these things mean at the present time, and it is only by experience of this type of examining a large number of people we may be able to come up with some accurate data which will be of some use.

We use a variety of automatic procedures in our exhibit laboratory. Overall, we did something like 50,000 tests. Of this group, approximately 1,500 had to be discarded because the results were in error. We had a very accurate quality control problem. We had Dr. Michael Lubran from the University of Chicago, who ran a continuous quality control on all our procedures.

By this means, we were very quickly able to pick up errors that had occurred. If we had enough serum left, we could repeat the analysis. In some cases, we didn't, and they had to be completely discarded.

This is the plea I make. So often, these machines sound like such marvels that they don't have to have the controls that people think they need and in this way, a lot of erroneous data can be accumulated, which would be of more harm than good. I will be glad to answer any questions or go off into anything that you would desire.

(Dr. Martens' statement follows:)

STATEMENT BY VERNON E. MARTENS, M.D., WASHINGTON HOSPITAL CENTER,  
WASHINGTON, D.C.

I speak for the American Society of Clinical Pathologists and as a practicing pathologist in the District of Columbia, Director of Laboratories and Chairman of the Pathology Department of the Washington Hospital Center. I am certified by the American Board of Pathology in both Clinical Pathology and Anatomical Pathology. Before this I was Director of Laboratories at the Naval Medical School, Bethesda, Maryland, for 7 years. My particular interest for many years has been in Clinical Pathology and particularly in clinical chemistry. We have highly automated many of our procedures in the Laboratories to provide more rapid recording to the physician on the condition of his patient.

The American Society of Clinical Pathology is represented by 5000 members all specialists in laboratory medicine. This Society is particularly interested in automation as it applies to the clinical laboratory. At present they are developing an institute in pathology which will be located in Chicago, Illinois. At present plans are underway to study and further develop automated techniques in all phases of laboratory procedures. In addition they have developed programs of workshops and symposia for both physicians and technologists to further their training in this particular area.

I have also had considerable experience in the past several years in running an automated Exhibit Laboratory at the Annual AMA Convention. Here a screening type of procedure was done in which a battery of 21 laboratory tests were done on each physician who came to the Laboratory; this included a variety of tests on serum and urine. This type of health examination for physicians has been done for the past six years and each year a number of abnormalities are picked up that have been totally unsuspected by the practicing physician. You can well understand that I am an enthusiast as far as this type of examination is concerned. I would prefer limiting my remarks to Laboratory medicine because this is my particular field of endeavor. The physical examination is also extremely important and a very necessary part of health evaluation but my experience in this field is limited.

Each year newer and better instrumentation becomes available to the physician interested in laboratory medicine. I am sure you have heard of the marvelous results that can be achieved with new automated equipment that can report 12 different serum components on a very small sample of blood. There is no question about it, the instruments that are becoming available today are engineering triumphs, but I would like to voice a word of caution. While this type of instrumentation has tremendous advantages, it can be worse than useless if not properly controlled.

In our own program at the AMA we had extreme difficulty in keeping the instruments in proper quality control. Unfortunately some users of this type of instrumentation feel that controls are not really necessary; but if this is not done and if each batch is not very carefully controlled, all the values can be in error without it becoming readily apparent. This type of problem is not contributed to any one instrument or manufacturer but we have found that any of the various types of equipment available can very easily go out of control. Our own practice is to standardize the instrument very carefully with known standard solutions and then in a blind control phase insert serum controls which are unknown to the operator of the instrument.

In summary I would like to say that I am quite an enthusiast about automation in the laboratory and I think it will be a big boom in health screening and health evaluation. However, my biggest concern is that this type of program be very carefully planned and directed under well-trained medical personnel.

**Senator NEUBERGER.** I ask you as a pathologist in a private hospital, is a patient billed separately for any pathology that is done, or is it part of—

**Dr. MARTENS.** Yes. In the institution I am in, the patient is billed separately, except for certain categories. We have categories of city patients, indigent patients, and so on.

**Senator NEUBERGER.** Yes, but the normal hospital patient who goes there for an operation, then the tests, are some of them automatic, or are they ordered by the doctor?

**Dr. MARTENS.** There are certain tests that are required by the medical staff, when the patient is admitted to the hospital. Blood counts, urinalysis, in our particular institution, we don't require serology. Some institutions do. However, it has become a practice of practically all the physicians that ordered serology as routine anyway, so these are the things we do as routine.

Then, in addition to this, all other tests are ordered by the physician. We do the tests that he requests. Now, what happens in the labora-

tory, of course, as we are doing certain procedures, for instance, in surgery, it is routine to have electrolytes, blood typing, coagulation studies. These are not required by the institution, but the surgical staff themselves have more or less put this on as necessary for patient care.

In doing these tests, a lot of times, we will pick up abnormalities in serum, call it to the physician's attention, and actually can go ahead and do further tests which were indicated.

Senator NEUBERGER. Well, I suppose, actually, this would be an ideal place; if you had a good screening system, every hospital patient should be screened. You have got them there, and just for this sort of thing.

Dr. MARTENS. Well, in a hospital population, I think screening is excellent, where you are doing examination for a routine physical. I am not so sure that for a hospitalized patient, this would be a good idea. What I am trying to get at, I think you should establish a baseline metabolic pattern for people. A person comes in who is sick. This person's baseline is not going to be of too much value to you, except to following that patient's illness. In this particular illness, you possibly would not want all the things you might do in a screening procedure.

Senator NEUBERGER. The patient could be in the hospital for one thing, and then go home, and the next day, find that he did have diabetes, or something that had never been discovered, couldn't he?

Dr. MARTENS. Well, a person has overt diabetes, this should be picked up in the urinalysis.

Senator NEUBERGER. Well, what I was really getting at is how much does this pathology that you would say would be pretty much average add to the cost of the hospital bill?

Dr. MARTENS. You mean, adding all the automatic—

Senator NEUBERGER. Well, what would be considered average that would be generally, let us say, a surgical patient coming in, for surgery that does not—say, an appendectomy. How much is the pathology connected with that case?

Dr. MARTENS. Approximately, surgical specimens would run about \$15. The laboratory work would run another \$15. It would be about \$30.

Now, if you were going to add all the other screening tests, I think that your suggestions, such as blood glucose, uric acid, b.m., and so forth, that would add approximately another \$30 to the patient's bill.

Senator NEUBERGER. But if the patient had been through something like the Permanente center, and had a screening test, and went to the doctor, and was going to have his appendix out, would this history that he had with him save him some of that pathology, or would they do it all over again?

Dr. MARTENS. It would be done all over again. For the very reason that a patient's condition can change rather rapidly. It would depend upon—if it was done this morning, or yesterday, this would not be necessary, of course, to do another urinalysis, or a complete blood study, but if it was done a week ago, it certainly should be done.



Senator NEUBERGER. I see. I must not delay too long, because we have to get on. I was interested while you were talking, Dr. Buff, that I wished some representative of the American Tobacco Institute had been in this room with us during this last 3 days, because I sat through hearings with them, and they brought witnesses from the American Thoracic Society, cardiologists, who said there was no evidence that there was a connection between cigarette smoking and emphysema and heart conditions.

Dr. BUFF. Well, there are lots of doctors. There are lots of opinions. There is a lot of p.b.p., which is pocketbook persuasion. There are many physicians, many interests, who are connected with a tobacco group, but that is like saying that the fireman, and that the instance of emphysema in a fireman, in a man who fights fires, is very, very high, and that is like saying that the smoke has nothing to do with it. And I live in an area, Senator, that has one of the highest rates of emphysema in the United States. We have not only the effects of tobacco, but we have air pollution. We are the second most polluted area in the country, and this makes another problem.

Now, whether you want to say do cigarettes cause the emphysema or does air pollution cause the emphysema, I think you are in a little difficult situation, but living in an area with air pollution, you really should not smoke, because you will certainly get it.

Senator NEUBERGER. Yes. We have some controlled studies on this that were done in the Los Angeles area, which show that it is true that, occasionally, emphysema is found among people who do not smoke, but when you took the incidence of the nonsmoker out in the Imperial Valley, with the nonsmoker in Los Angeles, and the smoker in the Imperial Valley with the smoker in Los Angeles, there seemed to be a pretty close connection, of course, as you say.

Well, anyhow, there is a saying that seems to be valid, that Sloan Kettering Institutes, that they have discovered very little lung cancer among nonsmokers. And from this in the cancer area, they have drawn some conclusions.

Dr. BUFF. Well, I don't know if you know of the other axiom, and that is, when a physician has a patient in back of the fluoroscope, and there is a spot on the lung, and he asks that patient, "Do you smoke?" and the patient says, "I never smoke," the chances of cancer of the lung are very, very small.

Senator NEUBERGER. Very interesting.

Dr. BUFF. There are less doctors smoking today than have at any time previously, and they are learning quite rapidly that they should not smoke.

Senator NEUBERGER. This is where an educational process has really been going on. They know how to read the evidence.

Thank you both, very much.

The next witnesses are Dr. Thomas Weber and Dr. Cheraskin.

STATEMENT OF THOMAS B. WEBER, PH. D., MANAGEMENT CONSULTANT, PREDICTIVE MEDICINE PROGRAM OF RETAIL CLERKS UNION LOCAL NO. 770, AND FOOD, DRUG, AND GENERAL SALES EMPLOYERS BENEFIT FUNDS; MANAGER, ADVANCED RESEARCH FOR MEDICAL DEVELOPMENT, BECKMAN INSTRUMENTS, INC., FULLERTON, CALIF.; AND EMANUEL CHERASKIN, M.D., CONSULTANT AND MEDICAL DIRECTOR, PREDICTIVE MEDICINE PROGRAM OF THE RETAIL CLERKS UNION, LOCAL NO. 770, AND FOOD, DRUG, AND GENERAL SALES EMPLOYERS BENEFIT FUNDS; CHIEF, DEPARTMENT OF ORAL MEDICINE, UNIVERSITY OF ALABAMA, BIRMINGHAM, ALA.

Senator NEUBERGER. Dr. Weber is a Ph. D., is that right?  
Dr. WEBER. That is right.

Senator NEUBERGER. Management consultant, predictive medicine program of the Retail Clerks Union, Local 770, food, drug, and general sales employers benefit funds, and he is also manager of the advanced research for medical development of Beckman Instruments, in Fullerton, Calif.

Are you a dentist, Dr. Cheraskin?

Dr. CHERASKIN. I am both a physician and a dentist.

Senator NEUBERGER. We will introduce you now, as consultant and medical director of the predictive medicine program, and of the same group, and chief of the department of oral medicine at the University of Alabama, in Birmingham, Ala.

How are you going to handle who is speaking first, Dr. Weber?

Dr. WEBER. I shall start with a brief review of the predictive medicine concept from the measurement standpoint and Dr. Cheraskin will elaborate on the concept and discuss the program he is directing. You can question either or both of us as you prefer.

Senator NEUBERGER. Thank you.

Dr. WEBER. I am here as a member of a team concerned with the development of predictive medicine programs. The team consists of medical scientists versed in the application of the life sciences to the healing arts, and measurement scientists versed in the application of the physical sciences to precision measuring instruments and techniques. Since predictive medicine depends in great part on precise measurements and their interpretation, its progress requires the combined efforts and experience of both medical and measurement scientists.

Senator NEUBERGER. I notice you use the term "predictive medicine."

Dr. WEBER. That is correct, and we want to define that term. Predictive medicine means maintenance of health through very early detection and measurement of tendencies toward disease and initiation of appropriate countermeasures to forestall or minimize clinical illness. You could say that predictive medicine means, in a sense, the detection and arresting of disease tendencies before they become serious. By aiming at the detection of changes very early in the development of a disease process, predictive medicine is actually an extension of and a supplement to preventive medicine.

Predictive medicine employs multiphasic screening techniques, both to determine the true measures or standards of health for individual persons, and to detect significant deviations from these standards at the earliest possible time. Dr. Cheraskin will expand on this definition when he discusses his predictive medicine program.

In our work as measurement specialists, we also use the term "predictive health" to focus our attention on the ultimate goal of these efforts. We find it useful to think in terms of measuring health and deviations from it, rather than in terms of disease and the extent or seriousness of it. In the context that we use the terms, "predictive health" and "predictive medicine" complement each other.

Predictive medicine and predictive health are based on the concept that measurable changes—biochemical and physiological—occur in the body's metabolism before the onset of overt disease. Multiphasic screening for a variety of parameters makes it possible to detect and chart these changes which may occur months, or even years, before the appearance of many presently accepted clinical indicators of disease. Thus, it is possible to measure and evaluate the transitional state between health and disease. Given this information, in most cases it is possible to initiate appropriate corrective measures. In his remarks, Dr. Cheraskin will discuss this phase of the predictive medicine program, as well as the use of health education programs designed to maintain optimum health.

The concept of detecting disease in its early stages has been known to medical science for many years. However, it is only recently that measurement science has begun to provide the physician with highly sensitive and selective means for detecting and measuring the physical signs of potential difficulty. In the measurement phase of predictive medicine, we are concerned with some extremely subtle biochemical and physiological phenomena. For example, instruments and measurement techniques are now available which make it possible to measure certain biochemical materials in concentrations of a few parts per hundred billion or a few parts per trillion. These advanced techniques, and others now being developed, will play an increasingly important role in the tracking of metabolic trends that presage illness.

In addition to advanced analytical techniques, predictive medicine also involves the use of computation and data processing equipment. Large numbers of individuals must be monitored at regular intervals for a variety of parameters. Information from these periodic tests must be updated and correlated with background data already available to establish meaningful health criteria for each individual. The objective is an accurate health profile for each individual which will serve as the standard against which his continuing health, or deviation from it, is measured. With such large volumes of data to be processed, the computer plays a significant role in predictive medicine.

In consulting with Dr. Cheraskin on the Los Angeles predictive medicine program, we have employed the modern planning technique of systems engineering. This technique, developed to implement large-scale aerospace and industrial programs, has proven to be readily applicable to complex medical programs. It involves four basic phases: analysis of requirements, program definition and design, initial implementation, and, finally, operations implementation. These

four phases are charted in detail in the material which has been submitted to the subcommittee.

The Los Angeles predictive medicine program has reached the operations implementation phase. Dr. Cheraskin, the medical director, will now discuss the program for you.

(Dr. Weber's statement follows:)

THOMAS B. WEBER, PH. D., CURTIS E. MILLER, M.D., BECKMAN INSTRUMENTS, INC., FULLERTON, CALIF., IN COOPERATION WITH EMANUEL CHERASKIN, M.D., D.M.D., MEDICAL DIRECTOR OF THE PREDICTIVE MEDICINE PROGRAM OF THE RETAIL CLERKS LOCAL 770 AND FOOD, DRUG AND GENERAL SALES EMPLOYERS BENEFIT FUNDS

#### THE PREDICTIVE HEALTH PROGRAM

As a representative of measurement science, we appreciate the opportunity to review the concept of Predictive Health and the progress now being made to implement the concept.

We shall begin by defining Predictive Health and showing how it fits into the multiphasic screening concept. Multiphasic screening is applicable to the transition from health to sickness. One aspect of Preventive Medicine is concerned with the early detection of disease by multiphasic screening and has as its function the treatment of subclinical disease to avoid serious sickness. Predictive Health is concerned with the measurement of health by detecting the very early changes in the body that could lead to diseases. Therefore, Predictive Health and Preventive Medicine complement each other.

Impetus has developed in the medical community for the prevention of metabolic and systemic disease by screening individuals prior to the deterioration of their health and the onset of subclinical disease. But, it is only recently that measurement technology has enabled the clinician and public health scientist to measure precisely the early and latent stages of degenerative diseases. As a result of new and improved techniques for the measurement of subtle changes in the body, we may now talk about the Prediction of Impending Disease.

To make Predictive Health a practical part of multiphasic screening, a rational and effective program must be developed. As measurement scientists working with the medical community, we are able to apply to Predictive Health programs the sophisticated program planning technique—systems engineering. Systems engineering has been refined by industry and government technical and management organizations as a tool for achieving control over the complex problems associated with national defense and the space program.

Predictive Health is based on the concept that, prior to the onset of overt disease, minute changes occur in the biochemistry and physiology of the body. There is a transitional state which separates health from disease. The beginning of this transitional state, which is the true beginning of disease, is the result of the inability of the body's defenses to react properly to an external or internal threat or challenge.

We must then look seriously at the state of man in terms of his basic adaptive and defensive mechanisms and, through precise health measurements, determine meaningful changes that could lead to disease. This forms the basis for developing the actual monitoring programs and determines the procedures and the instrumentation which will be required.

A successful Predictive Health program depends on multiple monitoring phases. Each monitoring establishes historical, behavioral, physiological, and biochemical parameters. This means that a large number of parameters are monitored and, after periodic testing, predictive trends begin to appear. These predictive trends are useful to the physician in taking steps when significant changes are observed. This leads to the health education phase of the program. In addition to early preventive measures which can be provided through changes in diet, activity, etc., the public must be made aware of the importance—and the ways—of *maintaining* health. We consider thorough health education to be equal in importance to any other aspect of the program.

## SYSTEMS ENGINEERING APPROACH

Basically, systems engineering is a scientific discipline for designing, developing, and operating complex programs. The elements of this approach are analytical in nature and make ideal tools for the solution of complex medical problems.

The systems engineering approach makes it possible to plan programs with proper emphasis on individual phases and their interrelationships *prior* to actual implementation of the total effort. A principal objective in systems engineering is the attainment of optimum program operation with minimum trial-and-error evaluation after implementation. There are four basic phases to such a program:

- I. An Analysis of the Requirements
- II. Program Definition and Design
- III. The Initial Implementation
- IV. Operations Implementation

With the realization of all four phases, the program will become fully operational.

## PROGRAM IMPLEMENTATION

*Phase I—Requirements Analysis*

The two most important questions to be asked are: 1) What objectives are to be accomplished? 2) In what order must they be accomplished? Figure 1 shows the first of four general flow diagrams used to chart and maintain program growth. Each major objective in this first phase is laid out and specific tasks are assigned to the individual program team members.

This procedure establishes all requirements of the program necessary to accomplish the stated objectives. It is valuable, too, because the analytical approach clearly defines realistic objectives and determines whether or not they are consistent with program goals, operational constraints, and program economics.

*Phase II—Program Definition and Design*

This phase translates the program requirements obtained during Phase I into designs and specifications for facilities, equipment, material, and operations as shown in Figure 2. Additionally, over-all program trade-offs are performed so that a final, optimized program design can be established. Phase II provides the final program definition.

*Phase III—Initial Implementation*

During this phase the program must be brought to operational status. Figure 3 shows four main flow lines: personnel requirements, logistic requirements, acquisition bid proposals, and final program management parameters.

*Phase IV—Operations Implementation*

When Phase IV is completed, the program will be fully operational. As can be seen at the beginning of Figure 4, facilities, personnel and equipment have been brought to operational status. The staffing requirements are now completed and a final checkout is made. In the final checkout, volunteer subjects are tested and the results are used to verify the operational procedures, or modify them as necessary. When this is completed, the program becomes fully operational.

## SUMMARY STATEMENT

Up to this point, we have discussed the concept of Predictive Health and the approach used to establish an operating program. We have placed major emphasis on *concept*. At the present time, the concept of Predictive Health is being translated into reality in Los Angeles where the Retail Clerks Local 770 and the Food, Drug and General Sales Employers Benefit Funds have established a Predictive Medicine Program. Beckman Instruments, Inc., has served as management and technical consultant in the design and implementation of the program.

The medical director of the program is Emanuel Cheraskin, M.D., D.M.D. In his statement, he will describe the program for you.

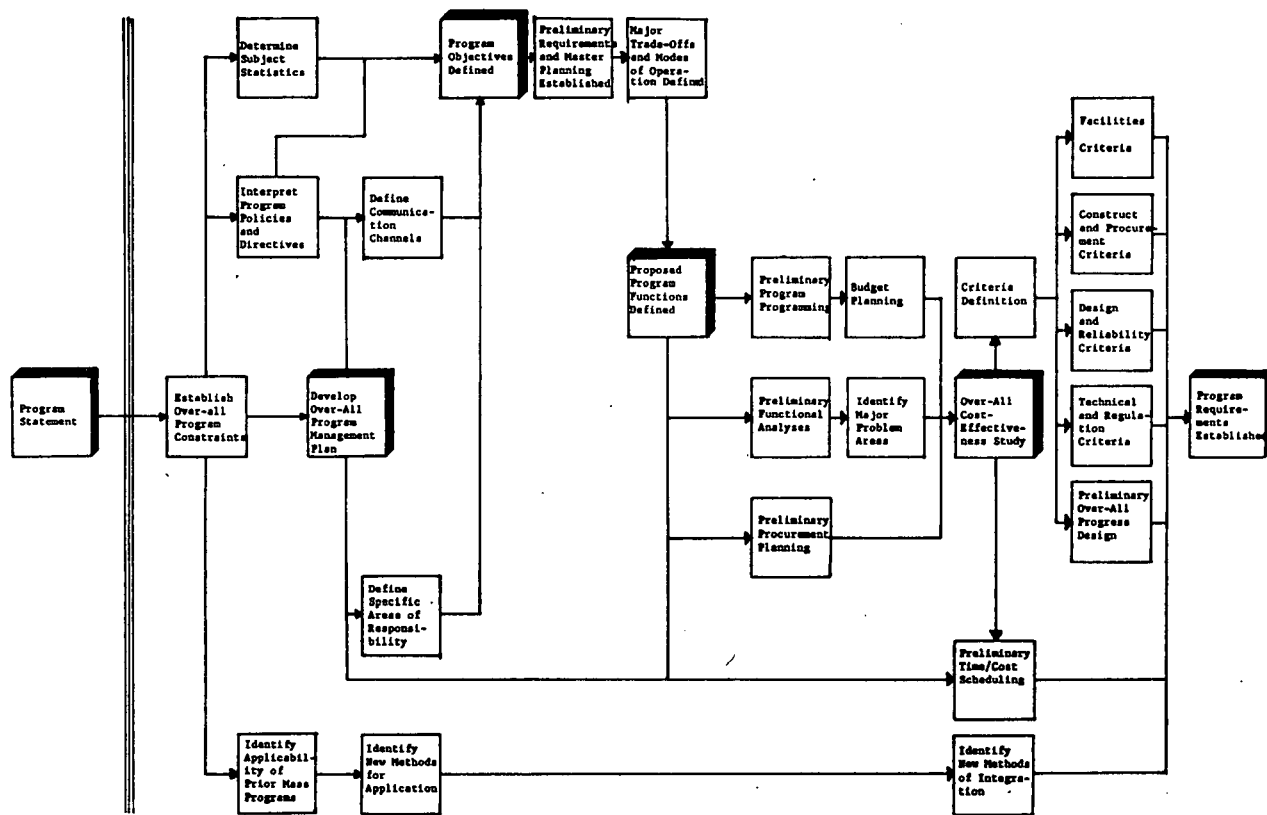


FIGURE 1

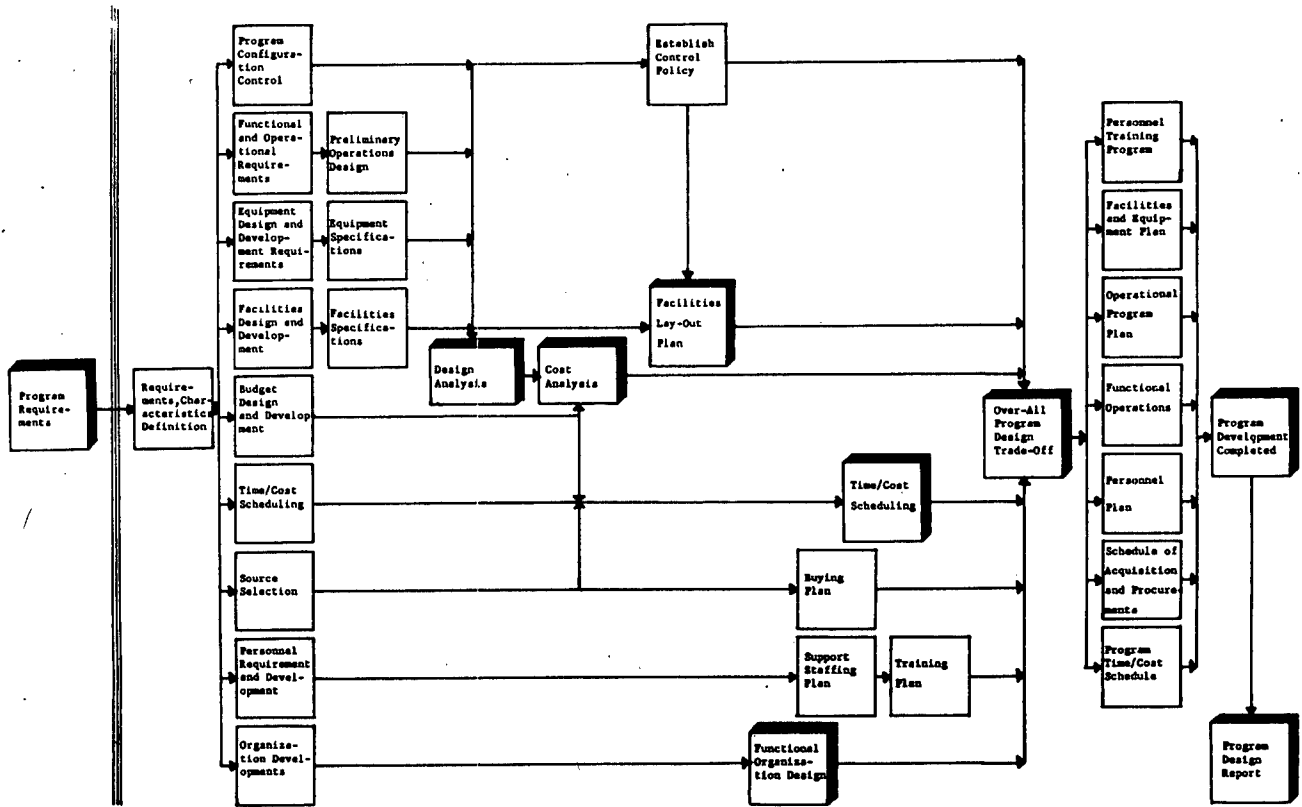


FIGURE 2

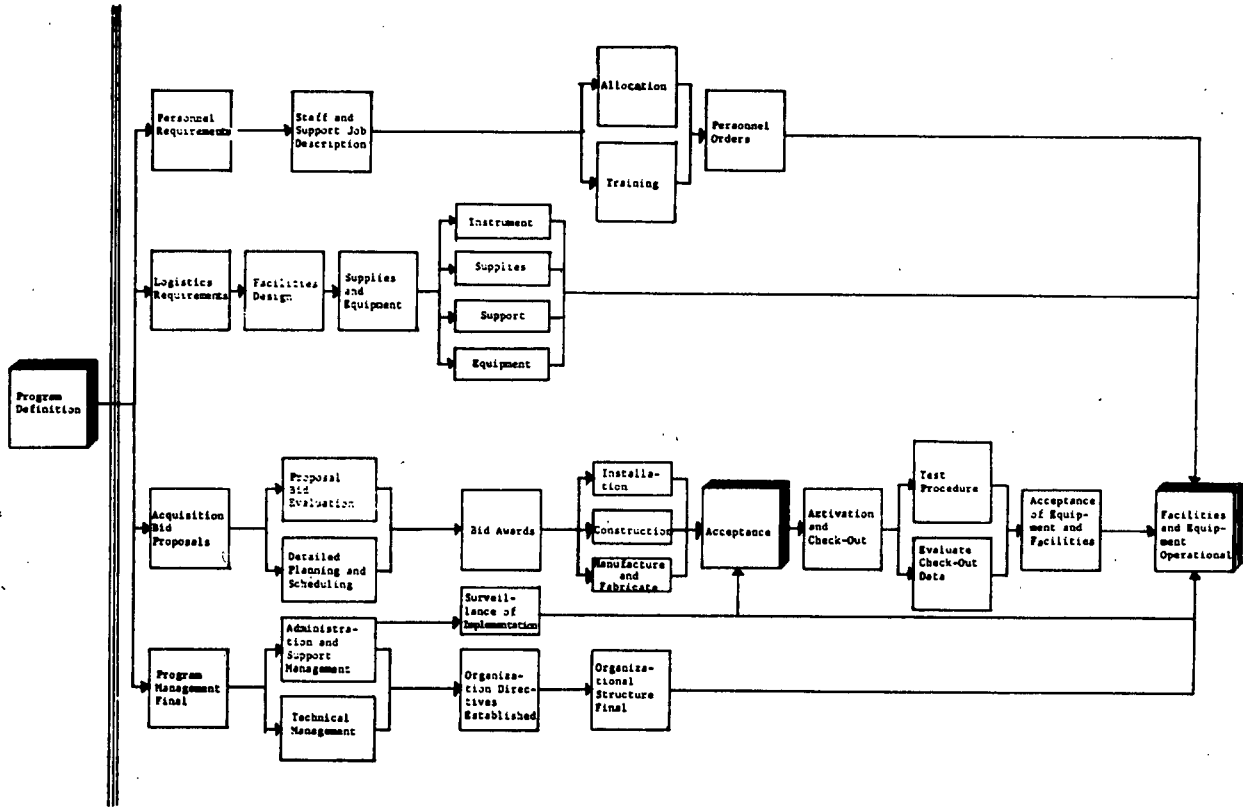


FIGURE 3



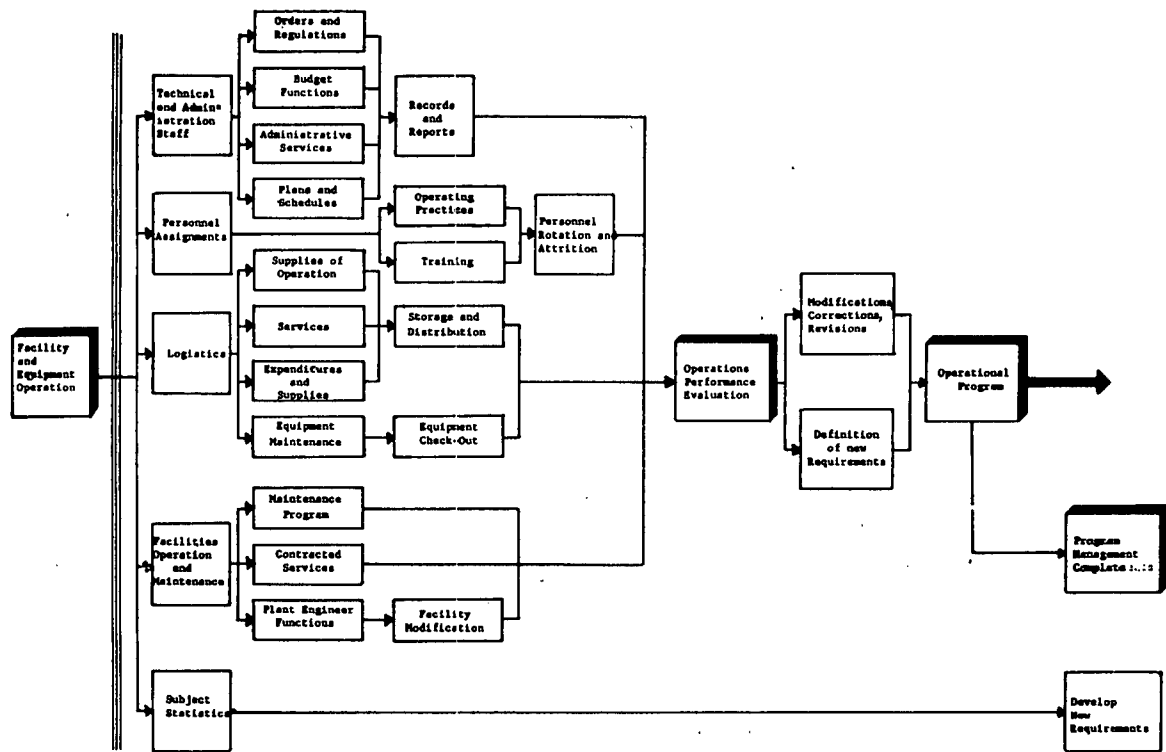


FIGURE 4

Senator NEUBERGER. We will move right on to you, Dr. Cheraskin.

Dr. CHERASKIN. I, too, have prepared a statement which has been submitted. In the interest of expedition, and with the hope that this will allow more time for questions, I shall simply summarize, if I may, that report.

PREPARED STATEMENT BY EMANUEL CHERASKIN, M.D., D.M.D., ON THE PREDICTIVE MEDICINE PROGRAM, HOLLYWOOD, CALIF., SPONSORED BY THE RETAIL CLERKS LOCAL 770 AND FOOD, DRUG AND GENERAL SALES EMPLOYERS BENEFIT FUNDS

Gentlemen: It is my understanding that the agenda for these hearings included an initial session relegated to philosophies of health and disease, a second period devoted to advances in automated instrumentation, and these hours, assigned to a discussion of existing multiphasic screening projects. I have been asked to outline the Predictive Medicine Program sponsored by the Retail Clerks Local 770 and Food, Drug and General Sales Employers Benefit Funds.

There are unquestionably many denominators common to all of the present projects. In the interest of expedition, I shall confine my remarks to *how* the Predictive Medicine Program differs from other current plans. In general terms, its singularity stems from its: (1) *philosophy*, (2) *mode of operation*, and (3) *quality control*.

#### PHILOSOPHY OF THE PROGRAM

Much has been written about the nature of health and disease. Very likely, some of this material has been recited during these hearings. The thesis which dominates the Predictive Medicine Program has been described by many but most eloquently by Doctor Jacques M. May of the American Geographical Society when he wrote:

"It is as though I had on a table three dolls, one of glass, another of celluloid, and a third of steel, and I chose to hit the three dolls with a hammer, using equal strength. The first doll would break, the second would scar and the third would emit a pleasant sound."

This lyrical and no less scientific pronouncement underlines the point that whether man remains healthy or succumbs to disease depends largely upon his metabolic machinery which, for want of a better word, may be termed *host resistance and susceptibility*. Simply, whether man develops tuberculosis, to select one example, is not just a question of inhaling a particular microbe. If the latter were the case, then all of us should be suffering with this malady because all of us have been exposed to the microbial challenge. The big question is why some individuals can withstand the bacterial invasion. Or, apropos to Doctor May's statement, why is the metabolic fabric of steel in one person and glass in another? *Herein lay the first of the unique features of the Predictive Medicine Program for it is most concerned with the ingredients which influence host resistance and susceptibility.*

To enlarge upon this hypothesis, man may be likened to a sphere built from a series of concentric layers. The outer lamella, the obviously visible one, bares the clearcut ravages of disease (e.g. the atrophic arm and the cancerous canker). This mantle over the sphere is the purview of present-day *curative* medicine. Its dramatic successes are a matter of record. The need for these committee proceedings is proof of its shortcomings. Beneath the peripheral rim is a second, less visible, layer. This is the zone of man's performance. For, in fact, before there is obvious evidence of disease, particularly the common killing and crippling chronic syndromes (which is in fact the principal issue), there is a disturbance in productivity. This can take many and diverse forms from difficult-to-measure fatigue to quantifiable expressions such as absenteeism. But even more important is the central core of the sphere. Here it is that disease first begins. It is here that biochemical testing is most meaningful. *Therefore, it is quite comprehensible that the Predictive Medicine Program is largely concerned with the central core which signals impending trouble in advance of reflections in the outer lamellae.*

#### MODE OF OPERATION

The operation of the Predictive Medicine Program has much in common with other multitesting systems. It departs from other programs in two major areas: (1) *the type of parameters studied*, and (2) *the criteria for health*.

We are mindful, in the Predictive Medicine Program, that the term *diet* is inflammatory and the subject of *nutrition* highly controversial. It would indeed be a serious mistake to regard diet and nutrition as a panacea. On the other hand, it is no less in error to ignore diet and nutrition as is the case in other multiple testing projects. Doctor Willard A. Krehl of the University Hospitals in Iowa City, Iowa, puts the subject into proper perspective with the following statement:

"Greater realization is needed in medicine and in public health that good nutrition along with good hygiene are the best weapons available in the prevention of disease. If one were bold enough to make a prediction, it would be that the *most important measure* [italics added] that could be taken to prevent the development of many chronic diseases would be the provision of consistently good individual nutrition, supervised by physicians with a strong assistance from the housewife, from conception to the grave."

*For these and other reasons too cumbersome to enlarge upon here, the Predictive Medicine Program recognizes the place of nutrition by the inclusion of dietary analysis, biochemical testing and, as we shall see later, health education measures.*

Mention was made earlier that performance (residing in the middle layer of the sphere) suffers before there is overt evidence of disease in the periphery. The developing Predictive Medicine Program recognizes this fact and has programmed into it available records of absenteeism, sick leave, disability benefits, and other reflections of productivity. *Hence, in a fourth way, the Predictive Medicine Program differs in that it has the capacity to relate the outer rim (classical expressions of disease) to performance (housed in the middle) to the central core (wherein resides the predictive biochemical data).*

All of the existing multiple testing programs employ biochemical tools. However, the interpretation is no more meaningful than the criteria which have been set to delineate health from disease. Practically all health standards are based upon averages and so-called standard deviations of *presumably* healthy persons. The common statistical tools utilize 95 per cent of the tested population. In other words, the presumption prevails that an individual is healthy if his profile agrees with 95 per cent of the tested population. The illogic of this approach is amply demonstrated by the fact that 95 per cent of the population suffers with dental caries and pyorrhea which cannot be regarded as desirable!

There is increasing concern, in recent times, with criteria for health and disease. Doctor Leo P. Krall of the Joslin Clinic in Boston employs a fascinating analogy to underscore the need for a fresh approach:

"The detection of diabetes can be compared to fishing with a small mesh net that increases the catch of fish but also seines some nonfish or the wrong variety of fish, as opposed to using a larger mesh which would be more specific for the size and type of fish sought but bring a smaller yield."

The point in his story extends far beyond diabetes and fish. I presume that these hearings are concerned with learning the best methods of eliminating disease and maintaining health. This could be likened to the task of removing all of the fish from a lake. If one employs a coarse mesh, then all of the big fish will be caught. This is not unlike identifying the major diseases in their classical and obvious forms at the periphery of the sphere. But sooner or later, the little fish will grow to become big fish. Repeated dredging with the coarse mesh net will never accomplish the prime mission of removing all of the fish. And so in man, the mildly ill will eventually become obviously ill. The solution to the lake problem is to employ a fine mesh net which will trap *all* of the fish and even the eggs! Hence, what is needed is more sensitive tools (and for this we call upon the measurement scientists) and more restricted health standards. *It is here that the Predictive Medicine Program is different in that it employs more rigid health criteria so that disease can be anticipated rather than identified.*

#### QUALITY CONTROL

The Predictive Medicine Program is structured so that the eligible membership will be provided with an initial multiphasic screening evaluation. By this technique, three groups of individuals will be identified including: (1) the obviously ill, (2) the optimally well, and (3) the large gray area of incipient, marginal, subclinical sickness. The participants will then be offered the opportunity of sharing in the programmed series of health education lectures, film clips, motion pictures, literature, and demonstrations. *As far as we can determine, there is no other multiphasic screening program which incorporates an organized health education plan.*

More importantly, after the health education series is concluded, the participants will be reevaluated in the multiple testing system. If the health education series is fruitful, there should be measurable beneficial changes observed in the clinical (outer layer), performance (middle rim), and biochemical (inner zone) areas. *Hence, we regard this unique opportunity to evaluate our successes and failures as a form of quality evaluation which is a distinct departure from existing programs.*

The Board of Trustees of the Retail Clerks Local 770 and Food, Drug and General Sales Employers Benefit Funds cordially invites the members of this committee to visit the Predictive Medicine Program and observe first-hand its philosophy, modus operandi, and quality evaluation. Finally, I should like to applaud personally the Board of Trustees for their comprehension of this health concept and their courage and conviction in charting its course. It is indeed a great honor to be invited into their family for this voyage which, I believe, will open new and profitable vistas in the health sciences.

Dr. CHERASKIN. Obviously, as a multiphasic screening program, we have much in common with others. And this has been discussed many times during these hearings. Again, in the interest of moving along quickly, I should like to point out its differences. Basically, there are five major differences. There are others, and we would be pleased to discuss those, if you wish, later.

These five major departures can be grouped into three categories. First, our philosophy is at variance with most of the existing multiphasic screening programs.

Secondly, our mode of operation has built into it some very sharp departures.

And, lastly, there is a quality control, or quality evaluation which I think makes our program somewhat singular.

Perhaps the best way of describing the philosophy of the program is to illustrate it with, I trust, not an oversimplified illustration. Man may be likened to a sphere, made up of a series of layers. The outer layer is what one sees; the very obvious, the ravages of disease. This is the purview of curative medicine, and I need not go beyond that, I trust.

If one peels off that layer, there is less obvious lamella which may be described as one's performance. I believe it is a well-established fact that before one falls apart, in terms of the typical measures of disease, performance diminishes. One becomes forgetful, and tired, and inefficient and sleepless. We shall have some additional remarks to make concerning performance.

And lastly, to fill the picture, there is a core to this sphere, a chemical core. It is in this area where matters go wrong first. Our program is predicated on the principle that if we must deny something, we shall deny the outer layers, and do something about the inner core; namely, the metabolic machinery. This, for practical purposes, is measured by biochemical instrumentation, and this is where we join forces with measurement scientists.

The man who probably best and most eloquently described our philosophy is Dr. Jacques M. May, right here in Washington with the American Geographical Society, when he once wrote very, very beautifully—

I have three dolls; one made of glass, one of celluloid, and one of steel, and I choose to hit them with a hammer with equal strength. The first breaks, the second scars, and the third emits a pleasant sound.

Our whole concept is based on why is it, two people can breathe the same germ, like a tubercle bacillus, and one individual—somehow

made of steel—comes out unscathed, and the other shatters like glass.

So much for philosophy.

Secondly, we differ in our mode of operation. In this regard, there are a number of departures. I have chosen two, to illustrate the point. Coming from a California area, I am most keenly aware of how inflammatory is the word "diet." And I am mindful of how controversial is nutrition. We recognize that this is not a panacea. But we are also aware that to ignore it is just as wrong. As far as I know, according to the published record of every multiphasic screening program, no provisions are made for nutrition. This is one of our major departures. We have built into our program dietary analyses, and biochemical testing for diet and nutrition.

Our second great departure in terms of our *modus operandi* deals with our criteria for health. It may, Madam Chairman, come as somewhat of a surprise to you to learn how standards for health are created. The simple fact is that almost without exception, our standards for health and disease are designed by testing a presumably healthy sample, obtaining an average, and a so-called statistical standard deviation or deviations which embraces 95 percent of the population around that average, and it is then assumed that what lies within that 95-percent range is healthy.

The illogic of that is abundantly evident. If that is health, then dental caries and pyorrhea are healthy, since 95 percent of the people have it. Accordingly, one of the most critical ingredients in the health program is to have realistic standards, not standards so broad that one is obviously sick when one is outside of its limits. Regretfully, in most multiphasic screening programs, the standards are that broad, and this is our second point of departure.

I made mention before that when one strips the outer layer off the sphere there is a layer of performance. This usually is disturbed before there are the usual ravages of disease, like an atrophic arm or a cancerous canker. As Dr. Weber has pointed out, we are fortunate in having a great amount of material on performance in the industry, based on disability, pensions, sickness, and absenteeism. This information has been programed in, so that we have the opportunity of relating the outer core, obvious disease, to the center, to the middle layer, performance, to the central core, the chemistry. If we do the job that we hope to do, there should be changes at all of these levels.

And, finally, we are at variance with most of the programs, if not all of them, according to the published record, in that we recognize that any such program will delineate three groups of people—those who are obviously sick, those who are optimally well, and those in the large gray area that receive little attention. The man, for example, with a little bit of arthritis. We have tooled up, as it were, so that these individuals—particularly the middle group, especially—will be provided with the opportunity of attending a health education course. We now have a Ph. D. in health education, who has been doing this kind of work for years, and who will make available to the membership lectures and demonstrations and pamphlets, and motion pictures and film clips. After a set period, we shall recall these people, and run them through our program again so that we can check on our quality control.

If these health education experiences have been fruitful, then there should be benefits in the program. This, broadly speaking, I believe, are our major departures from most of the multiphasic screening programs. We have kept our remarks very brief, with the hope that we would have time for whatever questions you wish to ask.

Senator NEUBERGER. Yes, a lot of questions come to my mind. I can just start in on some, one of which is, How do you get people involved in this program?

Dr. CHERASKIN. How do we get people involved in this program? We are fortunate in that we are with a group who have as a leadership health-minded people. And it just takes a powerful leader to move people. Usually great things are accomplished by small groups.

I think we have just been lucky. Our experience so far has indicated that there will be no problem getting people.

Senator NEUBERGER. Well, now, you get people to come, and do they take instruction or nutrition, diet, health? Just physically, how is this carried out?

Dr. CHERASKIN. We have not mentioned that for obvious reasons, but I would be pleased to tell you about it. An individual writes in or calls in requesting permission to join the program.

Senator NEUBERGER. Now, this individual is a member of the union?

Dr. CHERASKIN. Or a dependent.

Senator NEUBERGER. Yes.

Dr. CHERASKIN. Of the Retail Clerks Local 770. These applications have been made available in their newspaper, and through a number of other sources; in the stores where they work. It is hard to miss them; and at their meetings this is discussed, and there are other kinds of propaganda distributed. Be that as it may, they have the opportunity for writing in or calling in, and they are sent forms to complete with vital statistics which we must know, and what day they can best come in. They are sent a booklet explaining what the program will be like.

At some point, they come in and are registered and then, complete a questionnaire which is somewhat more automated than Dr. Collins', and less automated than the Linc system. We, too, would like to have the Linc system. I should remind you, this is a private venture with no Government funds. The program is accomplished with 1 penny per working hour derived from approximately 24,000 or 25,000 people.

Senator NEUBERGER. Well, what percentage of response then do you have from your membership?

Dr. CHERASKIN. This cannot be answered completely at the moment, because we are just getting off the ground. There is no shortage of people to be operational at this point. If we could just keep going that way, we shall have all the response we need.

Senator NEUBERGER. All right then. We have the diet, nutrition.

Dr. CHERASKIN. The participants answer a questionnaire, have their height and weight and ankle jerk tested along with blood pressure and pulse and temperature. A series of parotid—salivary—studies are done, a number of breath analyses are taken. Urinalysis for sugar, protein, and so forth is accomplished. The rest of the tests include the usual automated chemistries that are available by the SMA-12, plus a

series dealing with fat metabolism, because of its relation to heart disease.

On that basis, and through programing, these people are identified as being sick or well or in between. They are categorized, and, of course, the very sick must be sent to their physicians. We are developing a feedback system from them. Now the rest are invited to join the health education program, if they wish. This is made available to them. We do not expect a hundred-percent response. But we will be satisfied with something much less than that. And after that health education experience, they will be requested to come through the program again, reevaluated. If our program is successful, then we shall have the answers, in house.

Senator NEUBERGER. But in this screening test, then you have something that is comparable to the ones we have been hearing about.

Dr. CHERASKIN. Oh, indeed.

Dr. WEBER. Plus some very important new tests related to new measurement concepts.

Dr. CHERASKIN. Breath.

Dr. WEBER. For example, we do a breath analysis on every subject that comes through. We are looking at nine components in the breath. These components occur in very small concentrations, but they do give us possible indication of several diseases. By the same token, we are also doing salivary analyses in order to develop new predictive indices.

Senator NEUBERGER. There comes to mind one thing right now, because there is a great deal of to-do in the country over the issuance of warnings by Dr. Goddard about the value of food additives—I mean, those that are sold for nutritional value; I don't mean preservatives—and the questioning of whether vitamins or synthetic vitamins, purchased vitamins, are doing the job. Now, where do you stand for source material, in teaching nutrition and diet?

Dr. CHERASKIN. Well, of course, this has nothing fundamentally to do with the program, but I certainly have a view, and I trust it is based on facts. I am not aware of where Dr. Goddard received all of his facts, and I understand he is under some fire from other people, who also have some information. I do not know the basis for his statement, frankly. I would appreciate hearing it.

Senator NEUBERGER. I think it would be easy to get.

Dr. CHERASKIN. The facts?

Senator NEUBERGER. The question is, Well, who do you go to? Whom do you call for facts?

Dr. CHERASKIN. Well, I think the only way that people like myself as clinical investigators can operate is to have a hypothesis. All of us live by hypotheses. We walk across the street with the green light, because the presumption is that it is somewhat safer, though it is not 100 percent. In our business, we have a hypothesis, and we test it. We take people, we give them supplements. If people are not eating well, then they should fare better with the supplements. We have done such studies, reported some 200 of them, which are in my curriculum vitae attached to my statement. I would simply like to see Dr. Goddard's facts.

Senator NEUBERGER. Well, it is not too far down there. I am sure while you are here in Washington, you should go down and talk to him. He probably would be glad to talk to you about it, because, as

you say, he is under fire. The fire seems to come, if my office is any indication, from people who have been sent cards to mail to their Congressmen, or who send me pages out of health fact books, and diet supplement material.

Dr. CHERASKIN. I do not believe that is true. The Food and Nutrition Board, which is a very respectable organization, has challenged some of Dr. Goddard's statements.

Senator NEUBERGER. That might be, but I mean the ones that are flooding us.

Dr. CHERASKIN. That is very possible. I am not aware of that, of course.

Senator NEUBERGER. I think a real close investigation of some of these statements from FDA, what they are really trying to do is to instruct people that requirements for a good, well-balanced diet with vitamins and nutrients can be found in a well-balanced diet, and that some of these things that people think they need to be healthy don't do them any harm, but they just cost them a lot of money.

Dr. WEBER. This is not in any way a food fad or a fadist program. It is run by a nutritionist with a doctor's degree, and with several years' experience. I am sure—

Senator NEUBERGER. But all the stuff that comes to me—and there is a flood of propaganda coming in that is inspired by the groups—it is all form cards that are given to people at health food stores, or things like that, and they say they cannot live without it; the vitamin, or the added nutrient, or peanut oil, or whatever it is.

Dr. CHERASKIN. Well, as I indicated, this is highly inflammatory. I am keenly mindful of that. To ignore it because it is inflammatory, would be, I think, negligence on our part. We are trying to put it in its proper perspective. In the statement which I prepared there, there is a quote from Dr. Willard Krehl, a very respected man at the University of Iowa, pointing out that today, if there were one item that could be introduced to do more for chronic disease than any other, it would be in hygiene and nutrition.

That statement is in my report. I do not know of anybody who questions Dr. Willard Krehl's qualifications.

Senator NEUBERGER. Do you advocate to these people who take predictive medicine that they can arrange their own nutritious diet without the purchase of synthetics, or ever eating saffron oil, or whatever it is?

Dr. CHERASKIN. Yes; there are lectures and even on how to cook.

Senator NEUBERGER. So they don't have to go and buy a lot of fancy foods, or—

Dr. CHERASKIN. Some do, some do not. There are people who need them in spite of diet. For example, all other things being equal, one who smokes has vitamin C levels half as high as one who does not smoke.

Senator NEUBERGER. Do you advise him to quit smoking?

Dr. CHERASKIN. Well, naturally. If not, at least to take more vitamin C.

Senator NEUBERGER. It is very interesting. You have presented us with a new approach that we haven't had before, and I am glad to have this in the record. I have one more witness that I have to get to in the next few minutes.



So thank you very much, and I now call on Dr. Chinn, who is the Chief of the Gerontology Branch, Division of Chronic Diseases of the U.S. Public Health Service.

**STATEMENT OF AUSTIN B. CHINN, M.D., CHIEF, GERONTOLOGY BRANCH, DIVISION OF CHRONIC DISEASES, U.S. PUBLIC HEALTH SERVICE**

Dr. CHINN. Madam Chairman. I am delighted to be here, and consider this a real honor, to be the final witness in these important 3-day hearings.

At the same time, I recognize that this is a very considerable responsibility, since inherent in this finality, I suppose is that of doing something toward bringing the 3-day hearing proceedings into focus. I have already submitted a statement, which you have, I presume, and I would like the privilege of digressing from this, if I may.

I would like to talk from two points of view, in the few remarks that I am going to make; that as a member of the staff of the Gerontology Branch in the Division of Chronic Diseases, as well as an ex-practitioner of medicine.

I think it important, particularly at this time, that we bring together these two elements in our health programs, which are so inherently important to the country.

I think that all has been said that can be said, about the detection of disease in its early phases; by a wide variety of very competent people. We have had educators, medical practitioners, public health people, electronic experts, mathematicians, economists, and so forth, to testify relative to these various facts.

And so what I am going to say are rather general remarks which are the result of the influence, you might say, of these hearings on the thinking of a person who is both concerned with public health, and the clinical practice of medicine.

It seems to me that the hearings have clearly demonstrated that the country in its health efforts is at a very definite point in the road at which it must select new approaches. I say that for the very reason that at this point in the road, or at this point in time, there seems to be the necessity to reexamine what we now have, what has been done in the past, and what we might hope to do in the future.

Up to this time, we have seen an enormous effort in research, much of it research in the basic mechanisms of disease, the cure of illness, and which, one would not hesitate to say, has been enormously profitable.

For the service point of view, we have seen tremendous advances made toward the management of sickness. These advances have been in the direction of the building of better institutions, of more institutional beds, better techniques in management of sickness, and, of course, the education of great numbers of health professionals, directed toward the management of sickness.

So the focus has been, from a service point of view, entirely on sickness.

Now are we to continue with this? Is it that we are to be content with the problem of sickness alone?

Let us suppose that we are. Let us suppose that we continue to do as we are doing today. About 5 percent of the people in the United

States over 65 years of age are in institutional beds. If we accept the projected figures that in 1985, there will be 25 million elderly people in the United States, or 7 more million than we have today, and assume that we do, then we have to anticipate the building of 350,000 more institutional beds by that time, to take care of this 5 percent which we assume will be then as it is now. Can we afford this, either from a humanitarian point of view, or can we afford it from an economic point of view?

Can we do something better than this? It seems to me that the only approach of a different character must be toward the prevention of sickness and disability.

Few scientists would believe that we, at our present state of knowledge, know how to prevent most chronic disease. At this point, I would like to make it very clear that the word "disease" is quite different from the word "illness." We use these terms interchangeably very frequently, and erroneously. Disease is a process; sickness is a series of symptoms emanating from that process. As I said a moment ago, there are very few people who believe that most chronic diseases are subject to primary preventive measures. We don't have the scientific basis to do such things. But we believe, and I think these hearings have clearly demonstrated, that the early detection of disease may be influential and importantly influential in the retardation and, indeed, in the prevention of sickness and disability from disease.

So it seems within that context that we have to think about a course of action which would lead to some retarding influence upon the prevalence of sickness, the prevalence of disability, the need to construct more beds, more hospitals, more rehabilitation institutes, more nursing homes, and the need to produce more doctors, more nurses, more technicians, and other personnel.

If we accept the thesis that we need to do something different, and that this should be done in the sickness-prevention arena, do our present systems lend themselves to this? I think the testimony that has been enunciated here, time after time, would refute that emphatically. We do not have the present systems in our medical care activities which lend themselves to large scale searching out and identifying early disease.

Traditionally, this is done by a physician, in his office, on a one-to-one basis—one-doctor, one-patient basis.

I think no one would challenge the fact that from the point of view of physician time, the point of view of patient time, and the point of view of money, this is utterly unthinkable, when applied to any large-scale basis.

We all recognize the fact that every doctor does this to a degree with a limited number of people under his care, but on any large-scale basis, this is utterly impossible.

As an illustration, I think we might take a physician who has under his care a thousand people. This is about the national average, maybe a little more, maybe a little less. Let us suppose that this doctor did indeed attempt to survey every one of those individuals on an average every 2 years. It is impossible to imagine how he could devote less time than 1 hour per survey. Otherwise, he is not doing a proper job. That is 500 hours a year, that he would have to devote to this. A 50-hour week, which most doctors work, perhaps more than that,

would mean, automatically, that he would need to devote 10 weeks, full time, out of his busy practice, to such an activity, withdrawing that much time from taking care of ill people, toward this end. This, it seems to me, is out of the question, and I think that by and large, this would be supported by most people. What, then, is the answer to this? The answer must be something like the subjects about which these hearings have been concerned during the past 3 days.

Some mechanism, Kaiser-Permanente-like if you wish, has to be found in order to meet this enormous problem. What must a mechanism like this involve?

First, it must be noncompetitive with medical practice. It must be economical, in terms of time, and money, and its purposes and limitations must be clearly understood by the public, and the health professions.

Its results must be delivered rapidly, and accurately, into the hands of responsible medical people. I think if we can accept those four rather superficial criteria for such a mechanism, then we are beginning, at least, on safe ground.

What does this give the practicing doctor? It gives him a set of data which would give to him one or more of three things. First of all, it might provide him with evidence that a given individual person has changes suggesting the early onset of a disease, from which that individual might easily become ill in the future.

This previously unknown disease would then require, for further clarification, appropriate physical examinations and appropriate other laboratory studies. It would also give the doctor a set of data which would be to him invaluable in the future, against which he could compare future determinations.

Dr. White alluded to this very clearly yesterday, in which he talked about baseline electrocardiograms being invaluable. There are instances in which a shadow on a chest X-ray film or nonspecific changes in an electrocardiogram can be of invaluable assistance in the future management of an individual, and with which future determinations may be compared.

And thirdly, it would give the doctor sets of data which, when periodically collected, would indicate changes of a very minor character, but still of importance, such as gradually elevating blood sugar levels, or gradually increasing intraocular tension. It seems to me that those three things alone would give to the practicing doctor resources which would enable him to better manage and better care for the people under his charge.

I would like here to digress just one moment, and say a little something about what the Public Health Service is doing in this direction.

Dr. Wagner mentioned this yesterday, with respect to two projects which have come into existence in the past month or two. The mechanisms in these projects are patterned after the Kaiser-Permanente operation in California, in that the same sort of hardware, the same sort of testing is to be used as a part of the project. But I would like to say that they are more than this. They are more than this, because we are hoping to develop these projects in what we choose to call an open-ended community, which is quite a different order of things when one considers that the Kaiser-Permanente effort is in a population of people over which there is a great deal of medical control. Develop-

ing this in an open-ended community poses problems of a very different nature. It poses the problem of motivating people to move into it, of alerting the medical profession and the other health professions into what it is all about, and getting their support, and finally, it involves the utilization of the data by putting them into the hands of proper medical people.

Therefore, we have to think in terms of achieving community and professional acceptance, getting people into the system, and getting the information out to responsible persons.

We have made these projects available to all persons 50 years old in the community, and the 50-year-old figure is accepted because of the fact that there are serious financial limitations to this, and we have felt that for the moment, at least, some restriction had to be placed on the number of people that this would be available to.

These are being developed in a variety of environments, and I would like to say at this point that there are two other projects besides the two mentioned by Dr. Wagner which are in a state of negotiations and development. When we get through, we expect to have four projects: one based in the municipal health department, one based in a university medical school, and its department of public health, and two based in large community hospitals.

Dr. Ebert yesterday referred to the fact that a hospital might be most appropriately a place to base such a thing, because there persons would be readily available. This we subscribe to, but we also subscribe to the fact, that basically, we are looking for the person who does not believe that he has a disease. We are looking for disease in those people, in order to steer them into systems of medical care which will prevent their becoming sick. One sickness, of course, does not exclude the existence of another disease and doubtlessly true, there are a great many people in hospitals today who have more than the sickness for which they are in the hospital. But at the same time, we are also thinking of the millions of people in this country who do not believe themselves to have a disease and in whom disease may be found early.

We believe that these projects are no substitute for traditional periodic health examination, and I would like to emphasize that. We do not believe that they are any substitute for traditional screening. We think that they are more than that. We believe that they represent a new entity, in which physical, psychological, and social information is assembled around a given individual, moved into the hands of responsible people, and thereby, the health of that individual better protected.

Finally, I would like to say in behalf of the Public Health Service, that I would like to commend Mr. Thomas Biggs, and the staff of this subcommittee for the splendid organization of these hearings.

I would also like to express the gratitude of the Public Health Service to you, Madam Chairman, for assembling this important collection of information on the prevention of illness. These hearings will undoubtedly be a landmark in the history of preventive medical care in America, and generations of our citizens, old and young, will benefit by the work of this subcommittee.

Thank you very much.

(The statement by Dr. Chinn follows:)

STATEMENT BY AUSTIN B. CHINN, M.D., CHIEF, GERONTOLOGY BRANCH, DIVISION OF CHRONIC DISEASES, U.S. PUBLIC HEALTH SERVICE

The issues with which the discussions during the past three days have been concerned are highlighted in the following questions: (1) Should positive action to prevent illness resulting from chronic diseases be considered as an important component of the national effort to protect the health of our people? (2) Do the chronic diseases lend themselves to preventive health techniques? (3) Can our present systems of preventive health services be implemented or adapted for wide scale application? (4) What new approaches appear to be emerging that might be utilized in resolving some of the problems posed in the first three questions?

The high prevalence of illness and disability resulting from chronic diseases is certainly one of the most difficult health problems we face today. Reasons for the shift in emphasis from acute to chronic ailments in the health profile of our nation have been cited repeatedly, so I will just mention them briefly. These include: more effective control of acute infectious diseases through sanitation, immunization, and powerful therapeutic agents; increased urbanization, with close and often inadequate living conditions leading to physical, mental, and social stresses; the relatively high prevalence of both overnutrition and under-nutrition—but particularly overnutrition; and a significant increase in the number and proportion of older persons in the population.

These, along with other influencing factors, have brought to the foreground and into sharpened focus the nature and the extent of the growing problem of chronic illnesses and the need to give serious consideration to preventive measures which can be taken. The chronic diseases to which our attention is drawn are those which affect the heart and blood vessels, the nervous system, the organs of special sense, the locomotor system, and certain of the endocrine glands—as well as malignant new growths, tuberculosis and syphilis.

The heightened interest in chronic diseases has resulted in action—in certain facets of the problem. A gigantic research effort supported by public and private sources has been undertaken in an effort to find the cause and cure of many of these diseases. Concurrently, great advances have been made in the construction of better health institutions—acute hospitals, chronic hospitals, rehabilitation institutes, nursing homes, and various combinations of these facilities. Physical plants and equipment have been constantly improved to keep pace with the research effort and to insure the best possible therapeutic care for the sick and the disabled. For some time, vocational rehabilitation assistance has been available for the disabled; and, more recently, economic assistance has been provided for those who are old and for those who are unable to afford proper treatment for their sickness. Supplementing these activities and services has been an intensive program to improve the education and training of physicians, nurses, dentists, and a wide variety of technical experts. All of these efforts have substantially improved the chances given an individual with chronic sickness and disability to live more effectively with his problem.

We can be proud of our progress, but the crucial question is whether we have progressed on a broad enough front. From a humanitarian viewpoint can we be content to continue with this limited focus—concentrating our attention primarily on those who are already sick and disabled? From an economic viewpoint, can our nation afford to provide the constantly increasing requirements for institutional care? It stands to reason that unless there is a reversal of the existing trend, as the population of older persons expands, there will be a corresponding increase in the need for institutional beds, along with the need for more doctors, nurses, dentists, and technical experts.

Consider these facts: Currently, approximately 5 percent of persons over 65 are occupying institutional beds. In 1985, estimates indicate that the aged population will increase to 25 million persons. Based on the existing rate, we would need to have by that time an additional 350,000 institutional beds to take care of just this segment of the population. This statistic alone underscores the need to explore other approaches with all practical speed.

What do we mean by other approaches? Fundamentally, this means the prevention, amelioration, or modification of illness and disability arising from the chronic diseases.

For a preponderance of the chronic diseases, the scientific cause is not yet well enough understood to permit us to initiate large-scale efforts for the primary

prevention of the disease process itself. The onset of these diseases is generally insidious—that is, a long, pathological, preclinical period generally precedes the acute painful, disabling phase of diagnosed illness. Halting or retarding progression of the process before it causes symptoms and disability is a very tangible form of prevention, and a great many of the chronic diseases lend themselves to such an approach.

The concept of prevention is therefore based on the assumption that the progression of a disease from its early to its more severe stages may be retarded and even prevented through early detection of an abnormality, hopefully prior to clinical symptoms, supplemented by appropriate guidance and care. Controlling a chronic disease in this manner can serve to eliminate a measurable degree of sickness and disability that would otherwise occur, and can prolong the productive lives of the affected individuals.

How do we identify the presence of early and preclinical disease? Traditionally, this is done by a physician. With the aid of a carefully taken history (usually built around a physical or mental complaint), a physical examination, and suitably indicated laboratory determinations, the physician establishes the presence or absence of disease. From the point of view of physician time, this is a costly procedure. It is prohibitively costly when applied to the individual who has no given set of symptoms, for there is less likelihood of finding disease in such an individual than there is for one who has specific complaints.

Even eliminating the economic aspects, it is unthinkable to suppose that such disease detection measures could be carried out on any substantial portion of the population by the traditional physician-patient, one-to-one relationship. There is far too little physician time available for any major activity of this sort.

As an example, consider the average practicing physician who, at any point in time, is responsible for the health of a thousand people. If we take the minimum figure of one hour of physician time per preventive examination and provide such an examination once every two years for each person, we have to conclude that this doctor would need to devote the equivalent of 10 weeks of full time each year in order to accomplish the objective. There are few who believe that this amount of physician time can or should be withdrawn from an overloaded schedule devoted to the diagnosis and treatment of sickness which is already evident or strongly suspected.

If we are to accept the thesis, therefore, that early chronic disease detection is a rational approach to reducing or holding in check the increasing magnitude of sickness in this country, it is clearly apparent that something needs to be added to the physician's armanentarium to assist him in undertaking this task.

It might be useful at this point to consider the problem solely from the viewpoint of the practicing physician. We begin with the fact that great pressures already exist on the physician's time to diagnose and treat illnesses as they arise in the course of a routine day. But early physical and chemical changes of a degree that fail to cause symptoms are also at work within a substantial proportion of persons. How is the doctor to know about these changes in the non-symptomatic population so that he can introduce as early as possible measures designed for their control? I believe that the answer must be through the development and use of some mechanism which requires a minimum of physician time and at the same time provides the doctor with a set of observations from which he can rapidly judge future courses of action.

Such a mechanism must be non-competitive with any phase of medical practice. It must be economical in terms of money and time spent by the individual. Its purpose and limitations must be clearly understood by the public and the professional community. Results of the observations must be delivered with rapidity into the hands of the personal physician responsible for the individual screened. We believe that the automated laboratory described during the course of these discussions meets the primary requirements here outlined.

Observations from one laboratory of this type would contain certain important elements coming from a series of laboratories composed of clinical pathology, chemistry, serology, electrocardiography, X-ray, audiometry, pulmonary function, vision and exfoliative cytology as well as certain physical measurements such as height, weight, and levels of blood pressure.

These data would provide an immense amount of information to the practicing physician. First, they could indicate the probability of the presence of one or more chronic disease conditions which the physician would want to clarify by more definitive diagnostic procedures. Second, they would provide a reservoir of background information which would be invaluable in the differential diag-

nosis of symptoms as they arise in the future. Third, the recording of such observations on a periodic basis would make it possible to identify the beginning of small pathological changes in the individual and lead to early diagnosis and preventive management.

Let's consider some of the possible uses of the data in a little more detail. When data indicates the probability of disease, the physician would more than likely want to perform a physical examination and appropriate laboratory procedures to arrive at a final diagnosis. In this way, the individual with a detected, previously unknown disease condition would promptly be moved into a system of care and guidance leading to a lessing of impact from his disease.

With respect to the data providing background information on the health of a given patient, the intrinsic value is more long-range than immediate. Accurate interpretation of any laboratory determination that may be made on an individual is often aided greatly by the results of a similar determination made previously. Classic examples are the chest X-ray with a suspicious shadow or the electrocardiogram with non-specific changes. A record of previous determinations that can be checked for comparison purposes is a resource of enormous value.

Moreover, when procedures are done periodically, the physician can observe changes taking place over a period of time. For example, he is able to observe a gradually increasing blood sugar level or increases in intraocular pressure. These may be most important leads in following the development of diseases. Indeed it may well be true that such changes as these may be the very earliest manifestations of incipient pathological processes.

By taking these three items in perspective, both individually and collectively, the practicing physician cannot help but be in an immeasurably stronger position to deal with the health of his patient. And no one can deny the thesis that the more a physician knows about his patient, the better guidance and care he can give the patient. To my knowledge, there is no other mechanism than the automated laboratory which in an economical and rapid fashion can assemble such information.

To demonstrate the application of this approach within the community, the Gerontology Branch of the Division of Chronic Diseases has plans underway for the creation of four model Adult Health Maintenance Centers which will utilize the automated equipment and computer techniques for health testing developed at Kaiser Permanente. Because of financial limitations, these will not be full-scale demonstrations, but will contain many of the essential features; the extent to which these programs can be expanded and new approaches investigated will depend on the future availability of funds.

The critical problem to be resolved in these activities is not whether the "technology" or "machinery" for such services is feasible—the Kaiser Permanente program and others have demonstrated and are demonstrating this—but the main effort will be to determine how such a program can be most effectively integrated into a community's complex medical care structure.

In each program, emphasis is given to the development of techniques and methods to be employed in motivating and recruiting participants for the health appraisal service, as well as other behavioral and educational factors.

A second major area of concern is the development of appropriate followup techniques and counseling and referral methodology to assure the fact that significant findings are brought under appropriate medical care. Since the crux of health maintenance in this program is the early detection of suspected disease and effective management or treatment of the condition by a physician, regardless of the setting in which he practices, this assurance of effective follow-up is a most vital component of the total program.

An underlying concept which should be made clear here, and which we have stressed throughout the development of our projects, is that health assessment as rendered in a health protection center is not proposed as a substitute for traditional periodic physical examinations or any other traditional medical care or preventive health service; rather it is proposed as a new entity in the complex of health services—an entity which is not presently available.

It differs from a traditional physical examination in that the health assessment involves only limited physician participation and consists of a broad series of health status evaluative measurements which do not necessarily result in a definitive diagnosis.

It also differs from the usual multiple disease detection activity. Historically, multiple disease detection programs have used prescribed criteria for each labora-

tory test to determine whether a person is likely to have or not have a *specific disease process*. The health assessment involves not only such tests and criteria, but also through the use of automated equipment and computers makes feasible the collection from each participant of a broad scope of physiologic measurements and pertinent psychological and sociological information which will be of greater assistance in ascertaining the presence or absence of a number of disease processes. The health assessment, therefore, provides the physician with more complete, meaningful information which will be utilized as a step toward final diagnosis. The comprehensiveness of information derived in the health assessment process should be far more revealing of health status than any preventive program promoted heretofore.

Hopefully, the new technology employed in these demonstrations will conserve medical manpower and will provide physicians with a valuable tool in diagnosis and management. Equally important is the fact that this kind of an approach will provide disease detection services for a vast segment of the population that would never seek, or could never afford, or could not otherwise obtain such a comprehensive health assessment by any other mechanism.

We are confident that these four modest demonstrations will provide us with many answers, and will identify many problem areas to be resolved in our efforts to develop effective health maintenance programs for the adult and aging population.

Senator NEUBERGER. Thank you for those very kind words, too, Dr. Chinn. We appreciate it. I think all of us feel that we have certainly learned a lot, and I know I have. It has opened up entirely new vistas.

I really believe that you have given such a wonderful summary of our 3 days of hearings that it behooves me to leave it at this point, because you pulled it together so well, with some of your comments.

One question might be: Do you have some followup plans built into these projects that we have been discussing?

Dr. CHINN. Well, nothing more than the fact that two of them are just getting underway, and the other two are in a final stage of negotiation. We hope that by this time next year, perhaps we will have some information from them.

Senator NEUBERGER. Good. We will be interested. Thank you, Dr. Chinn.

As these hearings end, several immediate conclusions occur to me.

One is that the hearings could not have come at a better time.

For one thing, it is obvious that Congress should soon give increasing attention to nagging and worrisome deficiencies in present medical services.

After all, we were told at this hearing that we pay out roughly \$57 billion a year for direct and indirect costs of death, disability, and illness caused by chronic disease. This is well more than half of all such costs for all diseases.

What can we do to decrease such costs? The hearings have given substantial evidence that both medical men and the general public still think primarily in terms of dealing with the damage caused by disease, rather than prevention of disease.

And yet, we have it on authority from witnesses at these hearings that prevention of disease will yield far greater returns than treatment ever will or can.

We were further told that we already have vast experience and sophistication in the use of mass screening for disease, even though quite often such screening is sporadic or limited to specific diseases.



And finally, we were told that our technology is quite capable—here and now—of providing efficient, accurate, and convenient screening to large numbers of our citizens. It is true that improvements can be made, but it is believed that widespread screening will accelerate those improvements.

It is quite clear, therefore, that Congress has an obligation to make multiphasic screening a fundamental consideration in future actions for improvement of our health resources. That is my own individual view at this moment; this subcommittee will issue a report giving a more detailed analysis and definitive recommendations.

Once again, I would like to thank our many distinguished witnesses for giving us their time and their thinking. They have performed an important service to Congress and the Nation.

The committee meeting is adjourned.

(Whereupon, at 3:20 p.m., the hearing was adjourned.)

## APPENDIX

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The subcommittee in its investigation and preparation for the hearings held on September 20-22, 1966, corresponded with many people and organizations interested in the health of our Nation. Letters received by the subcommittee are included in the appendix.

### A. MEDICAL SCHOOLS AND COLLEGES

The following form letter was mailed to the deans of many medical schools and colleges:

U.S. SENATE,  
SPECIAL COMMITTEE ON AGING,  
*August 23, 1966.*

DEAR \_\_\_\_\_: The Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging is beginning a study of modern health screening methods intended to detect and thus help prevent chronic illness.

I would like to have your viewpoints on the subject.

As has been found with limited screening programs to identify such diseases as glaucoma, diabetes, tuberculosis, et cetera, the subcommittee believes that substantial benefits would result from more comprehensive screening programs reaching greater numbers of people.

One example is the multiphasic screening program conducted for members of the Kaiser Foundation in California. Participants receive a battery of tests within two and a half hours, with the help of latest equipment and computer evaluation of data. Final diagnosis is made by a physician after he studies all records.

We are also interested in the mobile health testing effort in Washington, D.C., and will give attention to automated or semiautomated device systems that may be capable of speeding large-scale screening.

Our hearings—now scheduled for September 20, 21, and 22—will not deal with any single legislative proposal or any one method of health screening. We want to receive objective, informed, and widespread opinion on the cost of chronic disease today and the potential helpfulness of screening to prevent such affliction. The advent of medicare adds a weighty argument for greater emphasis on prevention.

We will be especially interested in responses to the following:

1. Is there a place for multiphasic health screening in health care in our country? Are there any particular problems that may be anticipated in the acceptance of multiphasic screening programs by the public or by the medical profession?

2. Have any members of the faculty or staff of your college participated in the organization or operation of a multiphasic health screening program?

3. Do you have any suggestions for effective screening or other health maintenance programs for persons below age 60? Above age 60?

4. May we have names and addresses of any individuals who may have special knowledge of, or interest in, our subject?

We would like to have your response for study before the hearings. Thank you for your courtesy and help.

Sincerely,

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly.*

The responses from the medical schools and colleges follow:

BOSTON UNIVERSITY,  
SCHOOL OF MEDICINE,  
*Boston, Mass., August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Special Committee on Aging,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: There is no question that the medical profession is now in the position, due to advanced laboratory technology, to mount economically, screening programs measuring a wide variety of blood chemistry tests almost automatically. Probably the first place where concentrated efforts should be made is, in fact, on hospitalized patients. Since even though they are in for a specific illness, much in a preventive nature could be done by finding other possibly unsuspected abnormalities at the time they are in the hospital. It is also likely that the rate of finding abnormalities in this population would be greater than in an ostensibly healthy population.

The second step would be to make it possible to mount carefully controlled screening processes in selected populations. I think it would be far better to have a rigidly controlled, carefully conducted project, with a limited population rather than to attempt to move too far and too fast with screening too large a population. It is likely that if this were done, the data derived and the good ultimately obtained would not be as valuable as a very carefully conceived and conducted screening project on a defined population which would be capable of long term followup. As a start, of course, one probably would want to pick the disadvantaged populations in the central core of our large cities, even though followup would be more difficult on the population, the amount of good that could be done would probably be greater.

To answer your questions specifically: There certainly is a place for multiphasic health screening in health care in this country. I do not believe there would be any problem of acceptance of multiphasic screening programs by the public or by the medical profession. Rather, the danger I see, is in moving ahead with the program, due to public demand, more rapidly than one can do in an optimal fashion.

As far as I know, no one on our faculty here has participated in a very tightly controlled multiphasic health screening program worth mentioning to you. In answer to your third question, it is probably so that far more benefit would be derived by intensive campaigns for

weight reduction than any other single preventive measure that one could take at this juncture with large scale population in terms of health prevention. I would suggest the name of Dr. Henry Bakst, our professor of preventive medicine here at Boston University Medical School, as an individual who would have a special knowledge and interest in this subject. Also, Dr. Thomas Dawber, who has in fact, participated in a long term limited health prevention screening project with respect to coronary occlusions, in Framingham, Mass., which has been supported for a number of years by the Public Health Service. Dr. Dawber is currently on our staff.

Please let me know if I can answer any further questions on this subject or be of further assistance.

Sincerely,

FRANKLIN G. EBAUGH, JR., M.D.,  
*Dean.*

THE CHICAGO MEDICAL SCHOOL,  
DEPARTMENT OF PREVENTIVE MEDICINE & COMMUNITY HEALTH,  
*Chicago, Ill., August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Your letter of August 23 addressed to our former dean, Dr. Kushner, concerning health screening methods has been forwarded to me for reply. I am familiar with the multiphasic screening program being conducted at the Kaiser Foundation Hospitals in northern California. I believe this a very valuable method of obtaining a great deal of information about the health status of people and at the same time saving the time of the physician.

Because of the shortage of physicians we must seek methods of saving their time through the use of nonprofessional personnel and the employment of automated methods wherever appropriate. The multiphasic screening program is one approach. It yields to the physician a great deal of information he could not easily obtain by himself.

The multiphasic screening program is a case-finding device and it becomes more effective as we develop more techniques for finding out about disease through testing methods. However, casefinding, as you will appreciate, is not effective unless we have the services available for followup of the findings. Therefore it is especially appropriate as a part of comprehensive health programs such as that of the Kaiser Foundation.

I am currently setting up a comprehensive neighborhood health center for a poverty area in Chicago. The program is being jointly financed by the Office of Economic Opportunity and the Children's Bureau. We are planning to install a multiple-screening program similar to that of Kaiser's.

From your letter I assume that you are already in touch with Dr. Morris Collen who is responsible for the development of this program at the Kaiser Foundation Hospitals in Oakland, Calif., and also with the Public Health Service which has financed much of this experiment.

I also recommend that you consult Dr. Julius B. Richmond, Deputy Director for Health Affairs, Office of Economic Opportunity, Washington, D.C. The OEO today is responsible for the most exciting innovations in medical care.

Sincerely yours,

HERBERT K. ABRAMS, M.D.,  
*Professor.*

CORNELL UNIVERSITY MEDICAL COLLEGE,  
*New York, N.Y., September 16, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In response to your questions:

1. There is definitely a place for multiphasic screening in health care. The major defect in most programs is the lack of followup by a physician who will take responsibility for the patient. The public usually accepts multiphasic screening eagerly but without discrimination, and many who need it most do not take advantage of it. High-risk groups such as patients attending ambulatory clinics and welfare recipients may provide a suitable yield, better than a random sample of the population.

2. In the general clinic of the New York Hospital each new patient receives a battery of examinations, and in that sense can be said to have a multiphasic screen. Dr. George G. Reader has been in charge of this activity and may be reached at 525 East 68th Street, New York, N.Y. 10021.

Dr. Emerson Day has been director of the Strang Clinic, a cancer detection clinic, for many years and has had long experience with screening examinations. He may be reached at 55 East 34th Street, New York, N.Y.

3. Ideally each patient over 60 should have a program of evaluation and reevaluation worked out in terms of particular diagnoses and needs. Patients under 60 may also need such a program but the group from 35 to 60 are those who might benefit most from a recurrent multiphasic program.

4. The names and addresses of individuals who may be interested in the subject are:

Dr. Robert Watson, 525 East 68th Street, New York, N.Y. 10021.

Dr. Clinton Weiman 449 East 68th Street, New York, N.Y. 10021.

Dr. Raymond Houde, 444 East 68th Street, New York, N.Y. 10021.

I hope that this information will be helpful to you.

Sincerely,

JOHN E. DETTRICK, M.D., *Dean.*

DUKE UNIVERSITY MEDICAL CENTER,  
SCHOOL OF MEDICINE,  
*Durham, N.C., September 1, 1966.*

HON. MAURINE B. NEUBERGER,  
*Congress of the United States, U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of August 23. I was immensely interested in its contents, since we have been thinking along the same line. In fact, in the last few months, after a year's planning and deliberations, we established a new department—namely, the department of community health sciences—which would have two principal obligations and responsibilities. One, to develop the science of health in contrast to the science of disease, which is currently prevalent in most university medical centers; and two, to develop the interface between our university medical center and the practicing physician in the community hospital.

Dr. E. Harvey Estes has just been selected the chairman of this new department. I am asking him to look over your letter and to provide you with as much objective data as he can gather on these questions.

I might also point out that the Dr. Ralph Thiers mentioned in Mr. Williams' presentation in the Congressional Record, is one of our key faculty members who has set up an automated screening procedure in our clinical chemistry laboratory, which would be especially useful in the type of program that you are interested in. In addition we have attracted Dr. Max Woodbury to our staff; he is a bio-mathematician, who is one of the leaders in the field of computers in the health sciences. He and Dr. Estes have proposed in our regional medical program for heart, cancer, and stroke, a model for the computerization of our health care, which would facilitate health screening.

Undoubtedly you will be hearing shortly from Dr. Estes. If we can collaborate with you in any other way, please let us know.

With best wishes.

Sincerely yours,

WILLIAM G. ANLYAN.

DUKE UNIVERSITY MEDICAL CENTER,  
DEPARTMENT OF MEDICINE,  
*Durham, N.C., September 7, 1966.*

HON. MAURINE B. NEUBERGER,  
*Congress of the United States, U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Dean Anlyan has forwarded to me your letter of August 23 regarding your study of modern health screening methods. As he indicated in his reply, we have great interest in this problem. We see these techniques, plus the computer technology which accompanies them, as a means for conserving the physician's time and spreading his efforts to a larger population as well as a part of a preventive medical program. We have submitted a grant proposal which includes this as a part of a regional medical computer facility.

At the same time there are some cautions which must be considered. First, there must be a program which develops the manpower to organize and supervise such screening units. One can foresee a new specialty which concerns itself with the operation of such units, the interpretation and validation of results, and the development of new screening techniques. Second, there must be some developed experience in the impact of such a program on the conventional medical manpower in an area. If all the hypertension, coronary artery disease, diabetes, and gout were detected, could they all be seen and managed by the physicians now or projected to be in existence? Third, there must be some consideration of the impact of detection of a disease on the future course of that disease and the patient. While some diseases can be effectively treated, there are others which cannot be controlled or in any way altered by early detection. What are the negative effects of such a discovery?

These and other questions can, and will, be answered by further experience, and do not constitute a reason for not initiating such a program. They do raise the question of whether or not such a program should be tried in a few well-organized pilot projects, including a careful evaluation of such problems, followed by large-scale screening as a second phase. I am sure you are interested in exploring such questions in your hearings.

I do not see any major problem in acceptance of such programs by the public. Some of the medical profession may object initially, but I feel that this will disappear as they realize that such programs enable them to start their work with the patient with much more objective data than would have otherwise been possible.

We do not have such a program in operation at present, but we would like to include experience in operation and utilization of such facilities in our training of future community physicians. For this reason, we have proposed the creation of such a unit, which would operate in conjunction with the community practice of medicine, and with our preventive medicine program. I will follow your hearings with great interest, and would appreciate transcripts when available.

Dr. Ralph Thiers, the director of the clinical laboratories at Duke, is spending some time with your staff this week, and will review some of the problems with them. If I can help in any way, please let me know.

Very truly yours,

E. HARVEY ESTES, JR., M.D.,  
*Chairman, Department of Community Health Sciences.*

EMORY UNIVERSITY,  
SCHOOL OF MEDICINE,  
*Atlanta, Ga., August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in answer to your letter of August 23d in which you seek opinions on a number of questions dealing with comprehensive screening programs.

I am sure you will find that one of the difficulties in collecting information on this comes from the fact that we are just approaching

that phase of technological development where screening may be considered.

1. I firmly believe that we are approaching the time when multiphasic health screening may become feasible and desirable. To accomplish this we probably will require additional research of a technological nature and studies on the ways in which we may effectively reach a large portion of the public. There are many indications on the horizon which suggest to me that we are on the verge of developing effective and productive screening programs. I have no doubt that there will be complete acceptance both by the public and by the medical profession, providing it can be shown to be effective.

It has always seemed to me that the major problem (aside from our technological developments) has been to determine whether the benefit gain is worth the expense. If cost is of no importance whatsoever, then one can say that any benefits derived from screening are desirable. I do think, however, there is a philosophical point in which we need to ask ourselves whether money spent in this way is more beneficial to the public at large than it would be if spent in supporting some of our lagging patient care programs. I am afraid I am not enough of a wise man to solve this problem, especially at our present state of knowledge.

2. As is the case in medical schools in this country, the Department of Preventive Medicine and Community Health is perhaps most interested in the problem of multiphasic health screening programs. Dr. Thomas Sellers, Jr., is chairman of this department at Emory. Due to a lack of resources, he has not been able to do as much as he would like, but he has very great interest in the field. Certainly, he is the one I would look to for advice in this field and I consider him very knowledgeable.

3. I do not like to have to distinguish between health care programs for those below the age of 60 and those above. It seems to me problems are somewhat similar in both age groups and I dislike to separate those who are older from those who are younger. Such a differentiation is unfair. With this in mind, I have the personal feeling that our greatest lack of medical care in this country concerns the use of facilities other than hospitals. For too long we have equated treatment of disease solely with the hospital. My own feeling is that in the years immediately ahead we must learn to use outpatient facilities much more effectively. This can be in the form of outpatient clinics, doctors offices, etc. I think I see a changing pattern of medical care which may actually go a long way toward conserving precious hospital beds which are so short at the moment.

4. Aside from Dr. Sellers, who is chairman of our department of preventive medicine and community health, I should like to suggest the name of Dr. Mieczyslaw Peszczyński, chairman of the department of physical medicine and director of our physical medicine and rehabilitation research and training center. Dr. Peszczyński has devoted, and continues to devote, a considerable amount of time to the care of such illnesses as strokes and other physically disabling diseases. He is a key person in our school in the development of a good many programs particularly in relation to the aging patient. I believe you would find his advice helpful.

Very sincerely yours,

ARTHUR P. RICHARDSON, M.D., *Dean.*



THE GEORGE WASHINGTON UNIVERSITY,  
SCHOOL OF MEDICINE,  
*Washington, D.C., September 1, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Dr. John Parks, dean of our school of medicine, indicated in his recent reply to your letter of August 23 that I had some experience in multiphasic screening programs.

My work has been largely in the laboratory phase of such programs, i.e., the development and organization of a clinical laboratory to do large numbers of tests specifically selected for use in the evaluation of the health of aging persons. The laboratory which I organized was highly automated, and was first presented as a working demonstration for the 1961 meeting of the American Medical Association in New York City. At that meeting we performed 14 tests on each of more than 2,000 physicians, a total of some 28,000 tests, in a 5-day period. Subsequently the laboratory, under my direction, was feature of the 1962 (Chicago), 1963 (Atlantic City), and 1964 (San Francisco) meetings of the AMA. For the last 2 years Dr. Vernon Martens of the Washington Hospital Center, this city, has continued this project which has from the beginning been presented jointly by several national pathology societies, with financial support from the Division of Chronic Diseases of the U.S. Public Health Service.

Enclosed is a brochure, prepared for distribution at the 1964 exhibit laboratory. In it I have outlined the concept and operation of such a laboratory.

Feel free to call on me if you think I can be of any help.

Sincerely yours,

THOMAS M. PERRY, M.D.,  
*Chairman, Department of Pathology.*

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THE HAHNEMANN MEDICAL COLLEGE  
HOSPITAL OF PHILADELPHIA,  
*Philadelphia, Pa., August 29, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I wish to respond to your letter of August 23 regarding the study which the Subcommittee on Health of the Elderly is making of modern health screening methods. I will address myself to the specific questions which you ask.

1. I believe that the value of health screening methods has been established during the past 20 years by such programs as the chest X-ray survey conducted by the National Tuberculosis Association, the Pap smear technique for the detection of uterine cancer, the blood sugar program of the National Diabetic Association, and the annual physical examination program conducted by so many industrial corporations for groups of their employees. New automated devices for laboratory tests and computer analysis of EKG's will make multi-

phasic screening programs much simpler and applicable to larger groups of the public.

2. The Department of Pathology of the Hahnemann Hospital has been interested in the automation of laboratory procedures, and Dr. Joseph Imbriglia, professor of pathology and director of the clinical laboratory of the Hahnemann Hospital, would be happy to furnish you with any additional information on this matter. In addition, the Department of Medicine of the Hahnemann Medical College recently has undertaken a multiphasic health screening program with the Carpenters' Union of Philadelphia, and Dr. John Moyer, professor of medicine, would be in a position to advise you about this matter.

3. I would feel that for persons under age 60 we should confine our screening according to certain groupings: extend the school health programs through high school and college and professional schools, study means of requiring more extensive employee health surveys with emphasis on aspects of health conditions which are related to the type of employment, and developing more efficient means of following up familial illnesses in all members of a family when such illnesses are detected. Such selected programs, however, will not be adequate for the group over age 60, and I believe that more effective mass screening of the entire population needs to be developed for the elderly category.

4. See No. 2.

I appreciate your writing to me on this occasion and I hope these comments will be helpful to the members of your committee.

Sincerely yours,

WILLIAM F. KELLOW, M.D., *Dean.*

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HOWARD UNIVERSITY,  
COLLEGE OF MEDICINE,  
*Washington, D.C., August 31, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate.*

DEAR SENATOR NEUBERGER: In response to your letter of August 23, 1966, I am assuming that it was addressed to Dr. Robert S. Jason as dean of the college of medicine. Dr. Jason is no longer dean of the Howard University College of Medicine and has been given a new assignment by the university. I am now dean of the college of medicine and hence am taking the liberty of answering your letter.

In response to the first question regarding the role and acceptance of a multiphasic screening program, I would say that this type of program has a definite role and would fill a definite need in the modern practice of medicine. There would have to be a strongly supportive educational program to develop acceptance on the part of the public. Inasmuch as results would be made available to the individual's private physician, I would not anticipate large-scale resistance from the medical profession. However, some resistance to change would have to be anticipated as is true with many new health programs.

Our hospital as a whole, with its many specialty clinics, does a job of screening but obviously does not compare in terms of timesaving and in serving apparently normal segments of the population. We get,

primarily, those with illness due to disease rather than those with disease without illness. Our faculty and staff have not participated in a multiphasic screening program, but many of them have received reports on their patients from the District of Columbia Health Department's project.

In the initial establishment of such a program, I think that the involvement should be with the age group among whom chronic disease is more prevalent; to wit, those over 50 or 60. In subsequent years it might be feasible to involve younger age groups.

In the District of Columbia we can only cite the District of Columbia Health Department, of which you are already cognizant, which has developed, we believe, an excellent prototype for multiphasic screening.

Sincerely yours,

K. ALBERT HARDEN, M.D., *Dean.*

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INDIANA UNIVERSITY,  
SCHOOL OF MEDICINE,  
*Indianapolis, Ind., September 19, 1966.*

HON. MAURINE B. NEUBERGER,  
*Special Committee on Aging,*  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: I asked Dr. Edwin W. Brown, Jr., associate professor of preventive medicine at our school of medicine, to review your letter of August 23, 1966, concerning your Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging. I am enclosing the notes of Dr. Brown, which I hope will be of some assistance to you. Since Dr. Brown has just recently joined our faculty, he has not been able to answer your questions in detail.

If in the future you wish to consult our school concerning this subject, please contact Dr. Edwin W. Brown, Jr., here at our school of medicine.

Sincerely,

GLENN W. IRWIN, JR., M.D.,  
*Dean, School of Medicine.*

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INDIANA UNIVERSITY MEDICAL CENTER

INTERDEPARTMENTAL COMMUNICATION

To: Dean Glenn W. Irwin, Jr.  
From: Edwin W. Brown, Jr.  
Subject: Senator Neuberger's letter.

Although I have had no personal experience with multiphasic screening programs, I am not aware of any as sophisticated as that of Collen in Oakland, to which Senator Neuberger refers in her letter. Except for several papers of Collen's, there is not much in the medical literature on such programs, reflecting, I suspect, a real lack of sound evaluation of most screening procedures, other than a few, such as mass chest X-ray, which have been widely employed.

It seems obvious that the greatest defect of a multiphasic screening program (and doubtless one which has characterized many of those that have been carried out) is the problem of following up the cases which have been detected, for without such followup there is no way of judging the effectiveness of the program, both in terms of the validity of the screening procedures employed and the value of the program in preventing the ultimate effects of the diseases for which patients have been screened.

I would therefore think that unless the proposed screening centers outlined in Senator Williams' Adult Health Protection Act were very carefully planned so as to include an effective mechanism for followup, one might question their value, in view of the large expenditure of funds that would be required to provide the elaborate screening that Collen has employed.

Since the hearings to be conducted by Senator Neuberger's subcommittee are only a few days away, and since I have not had an opportunity to meet with Mr. DeFrance at Flanner House to learn something of their screening program (having only just learned of that activity's existence), I hesitate to suggest that a telephone call be made to the subcommittee to determine whether they would be interested in having Mr. DeFrance (or other persons connected with the Flanner House program) attend the hearings. However, perhaps you would wish to consider that possibility in the light of your own knowledge of the Flanner House program.

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THE JEFFERSON MEDICAL COLLEGE AND MEDICAL CENTER,  
Philadelphia, Pa., September 12, 1966.

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Special Committee on Aging, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of August 23 regarding modern health screening methods in prevention of chronic disease. I am sorry I have not been able to answer previously. I have been out of the country.

I am very familiar with the multiphasic screening program conducted at the Kaiser Foundation in California and with other similar techniques as well. You asked four questions. I shall answer them according to your numbers.

1. There is a very significant place for multiphasic health screening in health care in our country. Such methods do not go into the details of historical analysis and other items which might evoke the presence of disease or tendencies toward disease. In other words, these methods have their limitations. However, within the framework of the understanding of this fact, they are important.

2. I have participated in the organization and operation of multiphasic health programs in the past.

3. The answer to this question concerning effective screening or other health maintenance programs for persons above and below the age of 60 would be a long discussion. Suffice it to say that as individuals get older, these examinations become more and more important.

4. Within our institution the most knowledgeable individual in this area would be Dr. Harold Hinman, Department of Preventive Medicine, Jefferson Medical College.

With kindest regards, I am,  
Sincerely,

WILLIAM A. SODEMAN, M.D.,  
*Dean and Vice President for Medical Affairs.*

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THE JOHNS HOPKINS UNIVERSITY,  
SCHOOL OF MEDICINE,  
*Baltimore, Md., September 16, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Your letter concerning modern health screening methods arrived while I was in England and I regret the delay in replying.

First, let me say that your exploration of the value of these methods is timely and a genuine contribution to the problem of better health care for the American people.

We are fortunate in having on our faculty Dr. Joseph Sadusk, professor of medicine and associate dean for community medicine, who is experienced in this field and has a deep interest in it, and I have asked him to write you directly on the questions raised in your letter to me. You may recall that Dr. Sadusk served for a while as medical director of the U.S. Food and Drug Administration, but he came to that post after a long experience in California where he had firsthand knowledge of the Kaiser-Permanente multiphasic screening program. He is now engaged in directing for Johns Hopkins a feasibility study of the problem of complete prevention and medical care for a new city, Columbia, to be developed between Baltimore and Washington, a project incidentally which might lend itself as an important trial area for any new methods developed in respect of screening techniques. I suggest, therefore, that you and your committee may wish to consult further with Dr. Sadusk in these matters.

To answer somewhat more specifically the questions posed in your letter:

1. On the basis of present knowledge I would say that there is a place for multiphasic health screening in American medicine. Acceptance by the public and the medical profession will depend more upon administrative arrangements than upon any defect in basic philosophy.

2. I have already referred to Dr. Sadusk's activities in this connection.

3. I have no specific suggestions at this time, but I believe multiphasic screening has just as much applicability to those under 60 as to those over that age.

4. Again, I refer you to Dr. Sadusk.

Thank you for your courtesy in advising me of your most interesting plans.

Sincerely,

THOMAS B. TURNER, M.D.,  
*Dean of the Medical Faculty.*

THE JOHNS HOPKINS HOSPITAL,  
*September 22, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: I have returned to my office to find Dr. Turner's response to your letter of August 23. This letter deals with the subject of screening methods for disease and the scheduled hearings of the Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging for September 20-22. Dr. Turner has asked me to comment on your letter in my positions as professor of medicine and associate dean for community medicine. I concur in his statements on multiphasic screening procedures.

The continuing development of screening methods for the detection of disease if of great importance in increasing life expectancy since our modern programs of preventive medicine are based on the early discovery of disease. But to simply increase life expectancy by prolonging miserable years of life is not enough. It is imperative that such programs be developed with the concept and philosophy of increasing useful life expectancy. Consequently, these programs must be planned not only for the elderly but must include studies encompassing those of middle and young age before the ravage of disease has taken its toll. We must detect disease in its potential and incipient stages rather than wait for overt manifestations of disease.

Prominent among such screening efforts is the Kaiser-Permanente multiphasic screening program which, in my opinion, has advanced to a considerable degree of sophistication and application in health maintenance. It makes excellent use of paramedical personnel, leaving the physician that part of health care for which he has been specifically trained—the physical examination and final judgmental decisions in diagnosis, therapy, and prevention of disease.

But it must also be stressed that since such programs are relatively new, further investigations into the scope and methodology of these projects is needed before final decisions on applicability can be made. Here the Government can play a substantial role in encouraging and supporting such investigations on methods of health screening since there is not yet universal acceptance of the types of tests which should be included. There yet have to be specifically defined those procedures which will give our public the best investment for its medical dollar.

With regard to the concept of increasing useful life expectancy, I would suggest that you contact Dr. Lewis C. Robbins. He is a special consultant to the Health Hazard Appraisal Study, Division of Health Services, Bureau of States Services, U.S. Public Health Service, 4040 North Fairfax Drive, Arlington, Va. His telephone is 521-5600, Ex. 7314.

In 1963 and 1964, while professor and chairman of the department of preventive medicine and community health at the George Washington University, I was associated with Dr. Robbins under a U.S. Public Health Service contract in the development of methodology for a programmed health examination, utilizing health hazard ratios with which every person is faced by virtue of age, sex, and race and which change as the years go along. These ratios were necessarily based on mortality statistics since accurate data did and still does not exist for the morbidity of disease, with the possible exception of the reportable

diseases. Dr. Robbins is carrying this work forward in his present connection with the U.S. Public Health Service and I believe much will come of it since the goal is to use the patient's health care dollar in a manner where it will yield the greatest return in promoting useful life expectancy for that patient.

I should like also to suggest that you contact Dr. Kerr L. White of our Johns Hopkins faculty, an individual who is highly qualified in the field of application of medical and hospital care to large groups. Dr. White is a professor in the Johns Hopkins School of Hygiene and Public Health and is chairman of the division of medical care and hospitals of that school. I believe he can make valuable contributions to your knowledge on the subject in which you and your subcommittee are interested.

And, finally, I should like to tell you of the potential interest of Johns Hopkins in promoting studies on methods of application of health care in a new community.

The Rouse Co. of Baltimore, Md., is acting as the developer of Columbia City, which is to be carved out of the rolling farmlands in the Baltimore-Washington corridor, straddling route 29. This city will reach a population of 110,000 by 1980. It is not an ordinary real estate development—rather, it will be a unique city in many aspects and self-sufficient in cultural, educational, industrial, and family-society aspects. The Johns Hopkins Medical Institutions have been invited to provide comprehensive medical care to this community and my task at present is to perform a feasibility study to this end. The potential for studying methods of application of medical care and health maintenance for the young and old, utilizing all methods of discovery of disease in its potential and incipient stages, and the application of preventive measures is great. Needless to say, multiphasic screening will play a prominent role in this report. It is my intent to submit this feasibility study to the Johns Hopkins Medical Institutions by January 1, 1967. Shortly thereafter, the institutions should be in a position to arrive at a decision as to whether or not to engage in this project.

It is my hope that your Subcommittee on Health of the Elderly will see fit to recommend the support of intensive studies into the methodology of multiphasic screening programs. I should be most pleased to come to Washington at your convenience and tell you about Columbia City and our current thoughts in the application of comprehensive medical care. For telephone contact, my number is 955-6553 (area code 301).

Cordially yours,

JOSEPH F. SADUSK, Jr., M.D.,  
*Associate Dean for Community Medicine.*

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THE JOHNS HOPKINS UNIVERSITY,  
SCHOOL OF HYGIENE & PUBLIC HEALTH,  
*Baltimore, Md., October 24, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senaté, Washington, D.C.*

DEAR SENATOR NEUBERGER: I apologize for not replying sooner to your letter of August 31, 1966, but I was away both when it arrived

and at the time of your hearings and was unable to write you. I don't know whether these comments will be helpful at this juncture but you may wish to have them for the record. I have previously commented on Senator Harrison A. Williams' bill and will not repeat myself.

With respect to the specific questions you ask, I have the following comments:

1. I believe there is a place for multiphasic health screening in our country. I base this judgment less on the potential contribution of such screening programs to early diagnosis and prevention than I do on their contribution to changing the attitudes of the public and the profession. As yet, we do not have conclusive evidence with respect to the sensitivity, specificity, and yields of a variety of screening procedures. This is because the screening procedures have yet to be carried out on large general populations. The Kaiser Foundation Clinic is a step in this direction but it still has not screened a general population. By a general population I mean one that is not selected by any form of enrollment or payment and which is broadly representative of all groups in the community. Any introduction of multiphasic health screening should be accompanied by a strong program of research and evaluation.

I believe that the programs would receive wide acceptance on the part of the public. The health examination survey conducted by the National Center for Health Statistics has had an unusually high response rate; the same is true of the Kaiser program also, I believe. There undoubtedly will be social class differentials in the acceptance of such programs; there have been in the past and there will continue to be in the future.

I believe there will be major problems with the medical profession. As you know, the orientation of medical education in this country is toward acute, episodic illness treated in hospital beds. Unlike some other countries, we do not orient our physicians toward community medicine, preventive medicine, early diagnosis, and medical care. Unlike the other social service systems in our country, medicine is unequipped and largely unacquainted to deal with the modern methods of handling information and the variety of processes and procedures.

Medicine has been described as a "cottage industry." The introduction of automated screening procedures, a rapid delivery of print-outs, and the possibilities for automatic followup from a multiphasic screening program would be a powerful force for encouraging physicians to improve their own operations. The computer encourages where it does not require forms of cooperation with which most mortals are unfamiliar. There may be some resistance on the part of the medical profession because of the possible provision of a "free service." Clearly the service will not be free but must be paid for by taxes, fees, or charges of some kind. A multiphasic screening program should make the work of the physician much more efficient and effective. At least this has been the experience of the Kaiser program.

I believe that in formulating the health screening program, it should be done on a modest basis initially. I would suggest that screening programs be associated with medical centers and health departments initially, possibly in connection with the regional medical programs. The program should serve a well-defined community so that the findings of the program can be related to a definite population base. The



program should not be organized along categorical lines but should be available to general patients with or without symptoms. In suggesting that the multiphasic health screening program be related to the regional medical programs, my interest would be in developing information about the distribution of a variety of diseases and conditions in the community. In time, I believe, the folly of attempting to organize health services along categorical lines as proposed in the regional medical programs currently might be demonstrated.

I would also urge in the formulation of these screening programs that careful attention be given to the information system designed to report the findings back to the physicians in the community and for following up the outcome of the screening program. Again I emphasize the need for research and evaluation with these centers.

2. There are a number of possible screening procedures for children particularly with respect to vision, hearing, posture, behavioral problems, congenital malformations, and dental care which are believed to be effective. Similarly there are a number of screening determinations, particularly those represented by the Kaiser battery, which are believed to be effective for those over 50. Again, it is difficult to generalize on the effectiveness of individual tests because few have been subjected to application and scrutiny in a general population. I believe this needs to be done. There is a substantial body of literature on screening procedures not only in the United States but also in Great Britain and in Scandinavia. I would assume that your staff is familiar with this literature.

3. I have visited the Kaiser multiphasic screening program. I have commented previously on its benefits in my letter to Senator Williams.

Again my apologies for not replying sooner. Please let me know if I can be of any further help to you.

Yours sincerely,

KERR L. WHITE, M.D.,  
*Professor and Director,  
 Division of Medical Care and Hospitals.*

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LOMA LINDA UNIVERSITY,  
 SCHOOL OF MEDICINE,  
*Loma Linda, Calif., September 6, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
 Washington, D.C.*

DEAR SENATOR NEUBERGER: I am writing in reply to your inquiry regarding the possible value of modern health screening methods directed toward chronic illness. In reply to your questions I would say that there is a place for multiphasic health screening in this country though obvious screening techniques would have a much higher yield of disease in many other parts of the world. It is my impression that appropriate screening programs could be well accepted if they were tied to some regional medical center or the patient's personal physician for followup.

There is no one on this school's faculty or staff who is operating a multiphasic screening program at this time although there is interest

on the part of several persons in the department of internal medicine. I am sure the clinical faculty and the medical center would be happy to participate both on a study and service basis in a multiphasic health screening program.

I will be interested in the results of your study.

Sincerely yours,

DAVID B. HINSHAW, M.D., *Dean.*

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LOUISIANA STATE UNIVERSITY MEDICAL CENTER,  
SCHOOL OF MEDICINE,  
*New Orleans, La., September 14, 1966.*

MAURINE B. NUEBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of August 23, 1966, concerning multiphasic screening for early detection and prevention of disability from chronic illness. Although we have not been fortunate enough to have a member of our staff specifically interested in this program we do feel that further research in this area, both basic and operational, is desirable. This is especially true in light of the increasing shortage of medical personnel, the increasing costs of medical care and the relative importance of chronic diseases in causing discomfort, loss of productivity and death in our population. We do have members of our staff who would be interested and involved if a multiphasic screening program were organized here.

Although convincing evidence of the value of using certain screening tests does exist and although several centers are investigating the value and cost of multiphasic screening, we do not believe the evidence thus far warrants the organization of numerous centers of this type for service purposes. Some of the questions yet to be answered include:

1. What screening tests should be used? These tests should be limited to those whose evaluation show low measurement error, simplicity of performance, few false negatives, a manageable number of false positives and whose results have meaning to the physician. (See letter from Dr. Shapiro to Senator Williams re breast cancer.)

2. Are there enough screening tests of merit available to select from the general population a large enough number of people with a poor prognosis (whose prognosis can be sufficiently improved with presently known therapy) to make multiphasic screening of practical value? (See Dr. White's and Dr. Kandle's letters to Senator Williams.)

3. If this is not true for the general population would it be true for any given high-risk group? These groups could be defined by age, economic status, et cetera. Many disease problems would require screening at different age levels to obtain optimum results. (See letter from Dr. Breslow re the lazy eye.)

4. What type or types of service mechanism would function best for different population groups? We certainly don't want multiphasic screening centers that are used only by the people who need them the least. How do we reach the people who have no manifestations of illness and therefore are not in a hospital or under the care of a physician?

These remarks should be interpreted as justification for further investigation in the practical application of a mechanism which potentially holds much merit.

Faculty members at the Louisiana State University School of Medicine who are interested in this subject are Robert W. Sappenfield, M.D., professor and head of the department of public health and preventive medicine; and C. A. McMahan, Ph. D., professor and head of the department of biometry.

We have specific plans for implementing certain phases of these health screening programs in the State of Louisiana as a part of the regional center program for heart disease, cancer, and stroke. We recognize the need for identification of those persons with chronic diseases which can be corrected or alleviated and assure you of our support.

Sincerely yours,

JOHN C. FINERTY, Ph. D., *Dean.*

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LOYOLA UNIVERSITY,  
STRICTH SCHOOL OF MEDICINE,  
*Chicago, Ill., September 28, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: My apologies for not responding earlier to your request for information on multiphasic health screening. I do not believe that I can contribute much at the present time, since our new Loyola University Hospital will not be in operation until 1968. Until such time, the school must follow the policies already in effect in the predominantly public hospitals in which the medical students currently receive instruction.

I believe that there is a place for multiphasic health screening. I would prefer to have the screening performed in established hospitals rather than in separate centers with or without a close relationship to an established hospital. No member of the faculty of this school, to my knowledge, has participated in the organization or operation of a multiphasic health screening program nor do I know of anyone who has a special interest in this subject.

A very complicated computerized system has been devised for the new Loyola University Hospital. It is our hope that the system will relieve the nurses of many of the chores and repetitive functions of a nonprofessional nature which have previously impeded the effective functioning of this professional group. Laboratory procedures will also be scheduled and recorded through the 360 IBM system to be installed in our new facilities. If the faculty of the medical school and the staff of the hospital ultimately decide on a multiphasic health screening program, this computer system will facilitate its operation.

Sincerely yours,

JOHN F. SHERMAN, M.D.,  
*Vice President for the Medical Center and Dean, Loyola University.*

MARQUETTE UNIVERSITY SCHOOL OF MEDICINE,  
MILWAUKEE COUNTY GENERAL HOSPITAL,  
Milwaukee, Wis., September 2, 1966.

GERALD A. KERRIGAN, M.D.,  
Dean, Marquette University School of Medicine,  
Milwaukee, Wis.

DEAR DR. KERRIGAN: I have reviewed the letter from Senator Neuberger regarding "more comprehensive screening programs" and have a few comments. The Senators should keep in mind the following:

1. It would be very expensive. Some years ago I was involved in a screening program for the USPHS for detection of diabetics in Milwaukee. I estimated that it cost about \$10,000 to find one new diabetic. And, since it is very difficult to show that good control of diabetes prevents vascular complications, the results were not encouraging. Also, the few that were found had to be referred to their physician. I have no way of knowing how well they were managed. Thus, the quality of the physicians in this country is a critical issue.

2. It is well known that in the detection of disease, a carefully obtained history is by far more important than even the physical examination and the physical exam, in turn, is superior to random laboratory tests (without history or examination). A "multiphasic" battery of tests could only clue-in the physician that something might be amiss in some area; the results would have to be finally reviewed by a physician and would only provide him with an additional tool whereby he arrives at a diagnosis. Even now he uses laboratory tests to help him, but these are selected discriminately; "batteries" of tests would be indiscriminate. Again, what he does with a diagnosis is critical. Well trained physicians are essential.

3. You ask if this type of screening would be accepted "by the public or by the medical profession." While the public might accept spending 3 to 4 hours periodically for such a checkup, if it is not accepted or rather if physicians are untrained in using this supplementary tool, all is lost.

4. The above points lead to this. All physicians must have gone through medical school and medical school affiliated training programs for interns and residents are large and the most successful. Furthermore, the faculties of the medical schools are always the ones who are called upon to conduct postgraduate courses for physicians (they might be called upon to demonstrate multiphasic screening). They struggle mightily to do all that is asked of them. They are not laggards in research or teaching, but we have never been given a real chance to show what we could do. I can get a "project" research grant from the NIH, but I cannot hire one person to teach (unless we tie it to "research"); I cannot train a young physician to practice good medicine (unless it is tied to "research"); I cannot even buy an X-ray view box to help teach because the NIH says that is not "research" and the hospital says it is not directly concerned with patient care. This lack of support of and lack of faith in the good people in our training institutions underlies all health problems we might have. Give us the tools and we'll do the job; if not us, who will do it? The number and the quality of the physicians and the facilities they have, is the fundamental problem. Give us an opportunity and we'll find

out if multiphasic health screening is really worthwhile and can be taught to be used.

But, what we do not need is a new agency and more forms to fill out.

5. The Senators should keep in mind that no one on earth will get out of here alive. Ideally, however, we should live a long fruitful life and then suddenly go to pieces like the one-hoss shay.

6. Mathematics have displaced

The Clinicians  
By using the 407  
But biometrics  
Cannot do obstetrics  
Until we're reprogramed  
From Heaven.

Sincerely yours,

WILLIAM W. ENGSTROM, M.D.,  
*Professor and Chairman, Department of Medicine.*

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MEDICAL COLLEGE OF GEORGIA,  
OFFICE OF THE DEAN,  
*Augusta, Ga., September 9, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: The attached memorandum provides the most informed response to the questions in your letter of August 23, 1966, that can be provided from the Medical College of Georgia. The answers were provided by Dr. Glen E. Garrison, professor and chairman of the department of community medicine.

The only additional comment that I can provide concerns a planning program for new clinical facilities. In developing these plans, we propose to work closely with industrial and communications engineers. One of the points that has come for discussion concerns the management of regular physical examinations and the means for making these more efficient. Automated systems are to be investigated. We are in the process of organizing and funding this extensive planning project and relevant results will be available within about 18 months.

Thank you for your interest.

Yours sincerely,

W. G. RICE, M.D., *Dean.*

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MEDICAL COLLEGE OF GEORGIA

DEPARTMENT OF CONTINUING EDUCATION

Memorandum to: Dr. Walter G. Rice.

From: Dr. Glen E. Garrison.

Subject: Letter from Senator Neuberger.

I am submitting my opinions relative to each of the four questions which Senator Maurine Neuberger asked in her letter of August 23d to you.

*Question 1.* I feel that there is a place for multiphasic screening programs in health surveillance. The precise role of the activities will have to be determined by performing operational research in multiple locations to determine the sensitivity, specificity, acceptability, and cost effectiveness of various types of screening programs. It is fully conceivable that semiautomated systems could be developed to provide regular (annual or otherwise) health care surveillance more comprehensively and more economically than is currently done by the conventional method in which a physician spends approximately an hour and a half per patient. Effective multiphasic screening programs, if developed, would have the additional great advantage of relieving physicians of a large part of their routine activities and undoubtedly lead to more effective utilization of the physicians in our country.

*Question 2.* To my knowledge, no member of our faculty has participated in a true multiphasic screening program. However, I was one of the principal investigators in the total population survey of cardiovascular disease in Evans County, Ga., between 1960 and 1962; and in this study we performed a standardized examination which included many principles of multiphasic screening.

*Question 3.* The newly created department of community medicine at our institution desires to establish a division of health care administration and research to develop instruction and research in specific types of instrumentation, multiphasic screening programs, cost effectiveness, role of various professional groups, and distribution of health care personnel. The development of the necessary sound research programs in multiphasic screening will require large amounts of financial support and reasonably flexible guidelines for its utilization.

*Question 4.* Qualified professional guidance and direction can be obtained from the Division of Chronic Diseases and perhaps from the Division of Hospital and Medical Facilities of the Public Health Service.

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MEDICAL COLLEGE OF VIRGINIA,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Richmond, Va., September 15, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: I am replying to letter of August 24, 1966. Dr. Frederick J. Spencer, chairman of our department of preventive medicine, and I have been over this in detail.

In 1949 the Richmond City Health Department put on a multi-screening program in which I participated (this was before Dr. Spencer came here). We thought this was a very useful procedure, but were concerned because we did not think the followup was adequate.

Since then, of course, there have been many additions to the possibility of multitest screening, particularly in the laboratory.

We believe that there is a place for such screening programs which would have to be worked out for individual groups of the population. We consider the most important single item in such a program is the

necessity for providing for adequate followup for whatever abnormalities may be uncovered.

Should you desire it, Dr. Spencer would be happy to help out with this problem in any way he can.

Sincerely yours,

KINLOCH NELSON, M.D., *Dean.*

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MICHIGAN STATE UNIVERSITY,  
COLLEGE OF HUMAN MEDICINE,  
OFFICE OF THE DEAN,  
*East Lansing, Mich., September 13, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I was much pleased to receive your letter of August 24 and appropriate enclosures concerning the issue of multiphasic health screening in delivering health care to our citizens.

I am certainly not expert in this particular field of public health, and I am certain that far more valid information concerning the significance of this approach to early diagnosis is available to you.

I would, however, like to develop a suggestion which emanates from a recent experience in the Upper Peninsula of Michigan. This section of the State, as you know, is exceedingly rural, underprivileged, and economically deprived. The population is characterized by an exceedingly high percentage of elderly persons and the number of physicians is very small. It was told to me that there are many communities where people live and die never having had the benefits of a physician's care.

While visiting with the director of the laboratory of one of the hospitals in an Upper Peninsula community, I was informed of the frequency with which diagnoses are made in the laboratory; diagnoses which, with a higher ratio of physicians to population, would be made by the physician through appropriate specialist consultation. For example, it was pointed out to me that it is not uncommon in this hospital for the diagnosis of diabetic coma to be made by the discovery of a high sugar value in the child's spinal fluid. An alert pediatrician would not need to resort to the spinal fluid examination of a child in diabetic coma. A physician less experienced in the diseases of childhood, however, would do the normal thing for a child in coma; namely, do a spinal tap. The laboratory would then give him the correct diagnosis.

In other words, in this setting the laboratory is assuming a more front-line role in diagnosis than is usually the case in American communities today.

It is apparent, therefore, that the laboratory can assume a more "firstline" role in medical care than has traditionally been the case. Furthermore, it would seem that, properly applied, a more routine use of the multiphasic screening techniques could be an important factor in more effective application of medical care in rural areas where physician manpower is scarce. In other words, for the child just described, a routine urine or blood sugar test several months prior to

her sinking into coma would have diagnosed the diabetes before her life was threatened.

This university, with its land-grant tradition, is particularly sensitive to the problems of rural medical care, and I am certain that multiphasic screening imaginatively applied could be a most important feature of medical care of the future in thinly populated areas.

I once participated in a multiphasic screening program in a rural community at Hunterdon Medical Center, Flemington, N.J. This program was set up in 1953 under the directorship of Dr. Ray E. Trussell, currently in the department of hospital administration at the Columbia University School of Public Health. This program was well received by the community, and physicians accepted it well, since each patient gave the name of his physician and the reports were sent directly to him. This was, indeed, a case-finding mechanism which could do nothing but help the physician. If you do not have his name already, Dr. Robert Henderson, medical director of the Hunterdon Medical Center, could give you a followup on this program, and its history from the standpoint of acceptance.

Our medical school is new, currently limited to the preclinical, first 2 years of medical education, and taking its first class this month. Therefore, we do not have any faculty at the present who have been involved in the initiating of such a program.

I feel this to be the limit to which it would be fair for me to go in answering the questions contained in your letter. Like every other modality in health maintenance, multiphasic screening is no panacea, and cannot completely replace those ministrations of the physician or other helping person which have to do with personal observation and examination of, and interaction with the individual. I do feel that new laboratory technology applied according to the principles of multiphasic screening can be much more utilized than is presently the case, to the great benefit of many of our citizens.

If there is anything more that I can do to help, do not hesitate to let me know.

Sincerely,

ANDREW D. HUNT, Jr., M.D., *Dean.*

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NEW YORK MEDICAL COLLEGE,  
DEPARTMENT OF PREVENTIVE MEDICINE,  
*New York, N.Y., September 9, 1966.*

Senator MAURINE B. NEUBERGER,  
*U.S. Senate,  
Special Committee on Aging,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in reply to your letter of August 29, 1966, asking for additional comments on several points raised in the paper I presented at the University of Michigan School of Public Health.

Therapeutic measures in heart disease are clearly limited in value because they cannot alter the pathological changes which have already occurred and which continue to occur in a diseased heart. The most important approach, therefore, is to prevent the occurrence of the disease processes which result in damage to the hear.



Fortunately, research in the epidemiology of coronary heart disease indicates that we may be on the threshold of a major breakthrough in the prevention of this most important cause of heart disease. It has been firmly established by observational studies that the incidence of coronary heart disease is directly associated with the serum cholesterol level. It has also been demonstrated that the serum cholesterol level can be lowered significantly by dietary changes, that is, by switching to a diet such as the "prudent diet" used by the Anticoronary Club of the New York City Department of Health. What has not yet been accomplished is the experimental demonstration that lowering the serum cholesterol level by dietary means will in fact reduce the incidence of coronary heart disease. The data obtained to date by the New York City Department of Health suggests that this may well be the case; however, their series is still too small to warrant firm conclusions. The national diet-heart study which is now being developed under the auspices of the Public Health Service may provide the answer to this question.

If the answer is positive namely, that an altered diet will cause a significant reduction in the incidence of coronary heart disease, then screening methods can play an important role in heart disease prevention. It will be possible to screen the population to discover individuals with high serum cholesterol levels for referral to physicians and clinics for dietary counseling and supervision.

As I indicated in my paper, we have rather good evidence on the value of early diagnosis in cancer. We know, for example, that currently available screening methods are effective in finding cancer of the cervix in the early, curable stages. We also know that this is not true for cancer of the lung; by the time lung cancer has progressed to the point where it can be detected by X-ray, it is usually too late.

We need to know more about the effectiveness of screening programs for other chronic diseases. Diagnosis of asymptomatic disease by screening methods is clearly useful in some diseases where treatment applied in the early stages can halt or retard the disease process. In other diseases, however, treatment in the early stages may have little or no effect, either because the disease cannot be detected early enough, as in lung cancer, or because the available therapy is inadequate. There is a need for well designed followup studies to determine the value of specific screening procedures from this point of view. Such studies could be done effectively by the Permanente program in California because of the availability of medical care to the screened population. They could also be done by medical schools which establish multiphasic screening centers. Investigation also needs to be carried out to discover new and better screening methods.

One other point needs to be emphasized. Screening can be effective in the Permanente program because all those screened have complete medical care available to them. The objectives of a screening program will not be achieved unless there is adequate provision for the followup and treatment of all individuals with positive tests.

The great need at the present time is, I believe, the establishment of regional multiphasic screening centers by medical schools and health departments. These centers would have an important educational function in relation both to the medical profession and to medical stu-

dents. The centers would carry on research to determine the value of various types of screening procedures, to develop new screening tests, and to ascertain the most effective methods of guaranteeing adequate followup and treatment of persons with positive tests. Such centers would, finally, provide the base for further development of screening programs in their respective regions.

Sincerely yours,

MILTON TERRIS, MD.,  
*Professor of Preventive Medicine.*

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THE PENNSYLVANIA STATE UNIVERSITY,  
THE MILTON S. HERSHEY MEDICAL CENTER,  
OFFICE OF THE DEAN,  
*Hershey, Pa., August 29, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your inquiry of August 24. The Milton S. Hershey Medical Center of the Pennsylvania State University is just in the process of organization. We do not anticipate opening our teaching hospital before the summer of 1969, so that we are several years away from actively implementing any clinical care programs. We have not, up to this moment, made any decision on whether we will implement multiphasic screening programs or not. We have decided to organize a department of family and community medicine, and it would be possible for us to implement such a program through that department. Up to the present, none of our faculty or staff have actually participated in the organization or operation of a multiphasic health screening program. I feel that such a program, to be effective, must begin below the age of 60. The chronic diseases that might be detected are often lifelong. If the effects of the disease are to be reduced in extent or prevented, measures must be started as far back in the life of the individual as possible.

I believe there is a place for multiphasic health screening in health care. In many of the clinical problems, the actual history of the illness, as obtained by talking with the patient, is one of the most important diagnostic tools. The self-administered history, which can be evaluated by computer, may have some value; but they cannot, in my opinion, substitute for a personal history taken by a physician. Whether or not a history is taken and a physical examination done, the interpretation of the laboratory findings usually done in the screening techniques must be done by a physician in the light of the other aspects of the patient's health.

I have reviewed the tear sheets you sent me from the Congressional Record of February 25, 1966. You have the names of some of the most knowledgeable people in this field. I recall very pleasantly the invitation of Senator Harrison Williams last year to comment, which I did. I hope these remarks have been helpful. If there are other points on which you wish specific comment, please feel free to write me.

Sincerely,

GEORGE T. HARRELL, M.D., *Dean.*

STANFORD UNIVERSITY SCHOOL OF MEDICINE,  
 STANFORD MEDICAL CENTER,  
*Palo Alto, Calif., September 19, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of September 14. I certainly have no objection to your including my letter in your hearing record. I'd like to suggest in the fourth paragraph of my letter, if you use this portion, that there be inserted in line 4, before the word "involvement" the phrase "continued, close." In other words, the second sentence of that paragraph would then read, "Obviously there must be, and in the very significant number of instances where psychological and emotional problems represent the major issue, continued, close involvement by the physician and other members of the health-care team is mandatory."

At the risk of belaboring a point, let me again suggest the possibility of your contacting Dr. Leland Blanchard of San Jose, to whom I referred in my letter. When last I talked to Dr. Blanchard a week or so ago, he had not heard from you. I simply want to reiterate my views that he has a unique record in terms of thinking about these problems, and I am sure his comments would be of interest.

I much appreciate your willingness to send me a copy of the transcript of hearings when the transcript is printed. I will look forward to seeing it.

With kindest regards, I remain,  
 Very sincerely yours,

ROBERT J. GLASER, M.D.

STANFORD UNIVERSITY SCHOOL OF MEDICINE,  
 STANFORD MEDICAL CENTER,  
*Palo Alto, Calif., August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: I read with interest your letter of August 23, dealing with the study that your subcommittee is about to undertake. I was particularly interested to learn of your emphasis on health screening methods. I have also reviewed the material from the Congressional Record that you included with your letter.

I am not sure how helpful I can be but I am delighted to have an opportunity to respond to the four questions that you have raised. I might say that I am reasonably familiar with the Kaiser programs; some of my associates and I have been to Oakland to see first hand Dr. Collen's operation, and I must say we were all tremendously impressed by it. Recognizing that it is still in the study phase, I will nonetheless be surprised if the ultimate results do not indicate the value of this sort of approach.

This brings me into your first question, relative to the place for multiphasic health screening programs. As I have implied above, I certainly believe there is a place for this kind of approach. The incredible advances in medical science, and the opportunities to apply

automated techniques to health care make it mandatory for us to seek new and more efficient methods for doing the job. Whereas most of us who are now in middle life or older remember the days when the doctor-patient relationship tended to be a very personal thing, with distinct advantages, at least in the psychological sphere, I personally do not believe that it is realistic to assume that this kind of arrangement can be maintained in these times. Further, even though, as I have indicated, the doctor-patient relationship had very positive values often, utilization of the advances that have come to medical science will in many instances outweigh the disadvantages of employing, at least in part, a less personal form of health care.

I am not suggesting that there should be no contact between physicians and patients. Obviously there must, and in the very significant number of instances where psychological and emotional problems represent the major issue, involvement by the physician and other members of the health care team is mandatory. Nonetheless, we are going to have to use newer technology if we are to give patients the kinds of benefits that are potentially available, particularly in terms of screening them for certain diseases, early diagnosis of which will promise longer life and better health.

In terms of your second question, I regret to say that none of us has been actively involved in the organization or operation of a multiphasic health screening program. I would add, however, that as we look at the long term development of our patient care programs at Stanford, both in terms of patient care per se and in terms of the education of tomorrow's physicians, we hope very much to get into this kind of activity. We are now beginning to program a new ambulatory care center, and we visualize one of the features of the center will be the creation of some kind of screening program that will enable us to serve a good many people in the most efficient manner possible.

In terms of developing the most effective screening programs for patients both below age 60 and above age 60, I think that the kind of thing that Dr. Collen is doing is very valuable. Over a period of time, it will be possible to determine what screening procedures produce results that can in fact lead to the prevention or at least the amelioration of disease. We have a number of examples from times past where screening procedures have not been shown to be valuable. For example, I think it is quite clear that to do routine gastrointestinal X-ray examinations in asymptomatic individuals does not turn up enough unsuspected lesions of significance to justify the expense and effort involved. It may be that some day we will have better techniques, and the situation will be altered but certainly I believe the foregoing statement is a valid one at this point. On the other hand, chest X-rays, in all adult groups, on an annual basis have been shown to be very valuable preventive and diagnostic tools. What I am suggesting is that we will have to carry out careful experimental studies, on large numbers of patients, evaluating the importance of any one of many diagnostic aids, and on the basis of the results, we can then determine whether the procedures are justifiable.

I can't suggest anyone who has special knowledge of this field, above and beyond those whose names you already know. I would like to make one suggestion, however, that might be helpful. Dr. Leland Blanchard of San Jose, a distinguished family physician who is an

active participant in our teaching program, and who has thought long and hard about the problems of medical care, would be an excellent individual for you to contact. Dr. Blanchard is in my experience a rare person: he is aware of what is happening in medicine, and understands the needs for change; on the other hand, he has had a long and distinguished record as a fine physician, and he also, therefore, can bring to consideration of new approaches the perspective of a long experience and a sound understanding of patient attitudes. Dr. Blanchard can be addressed at 678 East Santa Clara, San Jose, Calif., and I hope that you give him the opportunity to comment on this subject.

Thank you again for writing me. Please let me know if I can be of further help.

Very sincerely yours,

ROBERT J. GLASER, M.D.

STATE UNIVERSITY OF NEW YORK AT BUFFALO,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Buffalo, N.Y., September 14, 1966.*

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in response to your letter of August 23, 1966, concerning the work of the Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging.

I am happy to provide you with the following viewpoints which are based on discussions with members of the medical school faculty.

(1a) *"Is there a place for multiphasic health screening in health care in our country?"*

There is a place for multiphasic health screening in health care. Early detection of certain pathological processes might well result in complete prevention, or at least, in an effective control of the conditions. For instance, if detected early, uterine cancer can be cured, and phenylketonuria discovered soon after birth will not cause mental retardation if an appropriate dietary regimen is instituted. Current knowledge in various fields of medicine will permit the initiation of a scientifically sound effective screening program based on an appropriately designed battery of laboratory tests. The suspicious and definitely abnormal cases then be followed up by full medical examination. Existing screening programs however have suffered from at least two shortcomings. The extent to which the programs are followed up by the individual screened is not clearly known, neither is the integration of the screening procedure with a definitive medical work-up by a physician.

(1b) *"Are there any particular problems that may be anticipated in the acceptance of multiphasic programs by the public or by the medical profession?"*

Yes, there are several problems to be solved before a full-scale nationwide program can be launched. Among the problems are the following:

Past experience with "health check-up" was not altogether satisfactory. Too many false negatives (i.e., rather advanced disease missed by the check-up routine) aroused distrust among physicians and gave a false sense of security of "proven health" to the patients. Recent progress in laboratory medicine will increase considerably the reliability of health screening programs. The evidence produced by pilot screening programs should convince the medical authorities about its value, and education of the public should place such a screening in proper perspective.

Mass screening is undoubtedly expensive. The advent of medicare, however, makes us all aware of our collective liability as to the health of our aged. A hospital bed is \$40 to \$50 a day. The cost of preventive screening should be weighed against the expenses of a long hospitalization. We are strongly convinced that investment in disease prevention is economically sound.

Critical shortage of skilled personnel may be another problem. Fortunately, rapid progress in automation is a powerful answer to this difficulty. An automated regional screening center could serially test 2 to 3 million people with a remarkably small number of highly trained personnel, if supported by electronic data processing and computer techniques. Automation drastically reduces the cost per test, and at the same time, improves the quality of the test. The remarkable accuracy of automated equipment will enhance the confidence of the physician in the test reports.

Only 2 to 3 years ago, a nationwide screening program would have been branded by the medical profession as an unrealistic utopia. Automation combined with computer handling of the results brings such a program within the realm of reality. If properly organized and conducted, such a program could well alter the pattern of the entire Nation's health needs by leading to better utilization of physicians and health facilities. Obviously, a screening program will not replace a physician's judgment or reduce the importance of medical interpretation of the results. It will only sort out the potentially abnormal cases. This alone, should justify the cost and effort of operation.

A national network of computers would offer an unprecedented possibility of storing all pertinent health data of individuals from birth to death, along with all screening data and illness records. Such a monumental "health memory bank" will give the necessary scientifically firm ground upon which can be built the national health of tomorrow.

(2) *"Have any members of the faculty participated in the organization or operation of a multiphasic health screening program?"*

At the E. J. Meyer Memorial Hospital, one of our teaching hospitals, a pilot project was started in 1963. Supported by a research grant from the National Institutes of Health, under the direction of E. R. Gabrielli, M.D., 40 apparently healthy volunteers were studied with a large battery of laboratory tests repeated annually. The aim was to observe the "preclinical phase" of certain diseases, i.e., the pattern of mild changes preceding the clinically observable signs and symptoms of the actual disease. These studies were recently expanded to include the investigation of the "community's normal values". Com-

puter techniques have been employed to store, analyze and interpret results. Edward Marra, M.D., our professor of preventive medicine, has been associated with the Erie County Health Department in a small, multiphasic health screening program, the Well Aging Clinic.

(3) "Any suggestions for persons below the age 60? Above the age 60?"

A comprehensive screening program should include the entire population, since many diseases could conceivably be traced back to the pediatric age. The initial pilot project(s) might be limited to a geographic area. A medical advisory task-force could compile the initial battery of tests. Careful, computer-assisted evaluation of the results of such pilot study(s) would serve as a guide for a subsequently launched nationwide screening program. The success of the broad program will depend on effective organization of the pilot project(s).

Effective screening is best integrated into programs of general health and social welfare activities. Isolation of a health screening program deprives it of full educational value to the recipient and of lasting interest for the physician.

(4) *Individuals interested in the subject:*

Edward F. Marra, M.D., professor of preventative medicine, school of medicine, State University of New York at Buffalo, Buffalo, N.Y.

Elmer R. Gabrielli, M.D., assistant clinical professor of pathology, 462 Grider Street, Buffalo, N.Y.

I trust that the above information will be of assistance to you and I will follow developments in the area with interest.

Sincerely yours,

DOUGLAS M. SURGENOR, *Dean.*

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STATE UNIVERSITY OF NEW YORK,  
DOWNSTATE MEDICAL CENTER,  
*Brooklyn, N.Y., August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In my mind, there is a place for multiphasic screening programs, but I am not at all sure that we have yet found how to do them well. What continues to disturb me is that too many people, shortly after a complete health checkup, die of a heart attack or of some other disease with sudden onset. This tells us that we have not learned how to examine with results and predict the future with a high degree of accuracy. On the other hand, I would not put off initiating the multiphasic health screening because of this. There are certainly many areas in which the prediction is accurate, such as radiographs of the chest, vaginal smears for uterine and cervical cancer, and many other types of activities.

We do not have anyone in this medical school who has special interest in this subject.

Sincerely yours,

ROBERT A. MOORE.

TEMPLE UNIVERSITY SCHOOL OF MEDICINE AND HOSPITAL,  
OFFICE OF THE DEAN,  
*Philadelphia, Pa., August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I am writing in response to your letter of August 23 and am very happy to give some information to you which may be helpful as you conduct your hearings referable to the advisability of multiphasic screening programs.

There is growing evidence that multiphasic health screening will probably prove to be a sound and economic way of detecting many chronic diseases at an early enough stage to reduce morbidity and the economic loss associated with advanced chronic disease. I am sure that you have a great deal of information from many sources around the country and I shall restrict my own comments to a specific study done in this institution.

Dr. Eugene Magnier, a member of our faculty, has been working on the development of a computerized multiphasic screening program which would include a wide series of blood chemistry tests, electrocardiogram, phonocardiogram, blood pressure, pneumotachogram, venous pressure, vital capacity, maximum breathing capacity and possibly several other determinations. A simulated model has indicated that the patient time would be less than 15 minutes and that the computer and personnel time would be quite limited. He has checked the validity of this system by examining a random sample of hospital charts and has been able to demonstrate that such computerized equipment would have saved time and money for 79 percent of the surgical patients and 85 percent of the medical patients admitted to the hospital.

Obviously, one cannot translate this study to an outpatient and presumably well population but my own opinion would be that the incidence of chronic disease is high enough in those above the age of 60 to warrant a multiphasic screening at least once for each individual and perhaps annually or biannually thereafter.

I know that Dr. Magnier would be very happy to give any assistance to you or your committee and if you would care to communicate with him you may do so through this institution.

I presume that your concerns relate almost entirely to this specific program in the chronic disease problem but if I can be of further help in your excellent efforts to meet this large problem I shall be happy to do so.

Sincerely yours,

ROBERT M. BUCHER, M.D., *Dean.*

TULANE UNIVERSITY,  
SCHOOL OF MEDICINE,  
*New Orleans, La., September 14, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: Screening programs are urgently needed if the health of the elderly is to be maintained and improved. To be



utilitarian, these programs must be efficiently operated; that is, laboratory tests, diagnostic procedures, and other examinations must be performed and interpreted rapidly, and screening facilities must be readily available to the population being screened. Experience in outpatient clinics in State and municipal hospitals for the indigent has shown that when diagnostic tests are interpreted on the same day they are made and the patient is informed immediately of the results and need for treatment, treatment is more likely to be accepted.

The multiphasic screening program of the Kaiser Foundation is a step in the right direction. Certainly, results of laboratory tests performed on completely automated equipment, including the electrocardiogram, can already be evaluated by computer, and the same will soon be possible for chest X-rays.

Automated systems will be necessary in screening programs for several reasons:

(1) People will demand that periodic health examinations be done quickly, with minimum loss of time from other activities;

(2) Physicians are becoming increasingly dependent upon such devices, and future physicians will be unwilling to use current laborious, time-consuming, and uninteresting methods to perform health examinations;

(3) As people become more health conscious and periodic health examinations become routine, health personnel will be inadequate to do these examinations;

(4) Although most of a physician's time is spent handling psychosomatic disorders, organic disease must be excluded before a psychosomatic origin can be established.

Preventive medicine is not my field, and I am sure your committee knows a great deal more about the health needs of the elderly than I. My interest in the practice of medicine in the future derives from my responsibility as a medical educator to prepare our graduates for the type of medicine they will have to practice. The predictions made in my address to our Owl's Club were extrapolated from the experiences of the past 75 years. I am enclosing a reprint of the address.

Sincerely yours,

OSCAR CREECH, Jr., M.D.

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TUFTS UNIVERSITY,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Boston, Mass., September 16, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of August 24, 1966, containing a series of questions related to multiphasic screening and health maintenance.

First, I would like to make two preliminary observations:

1. Health maintenance has so far been most successful with those population groups who are not able to reject it, namely infants, students, employees, soldiers, and prisoners.

2. A serious lack already exists between much basic knowledge of disease and the application of this knowledge to various population groups in a preventive fashion.

1. Multiphasic screening. Is there a place for it in health care? Of course there is an important place for it. I believe it should be located within the framework of a comprehensive health center. In the Commonwealth of Massachusetts a substantial multiphasic screening program was developed by the commissioner of health without the initial approval of the Massachusetts Medical Society about 12 years ago. Although the program turned up a great deal of illness, it also produced much bitterness from patients and practicing physicians. The program was finally discontinued. Patients generally are naive and have no concept of margin of error and fluctuation of values. Physicians who are not part of the multiphasic system are often angered by the implication to the patient that they have cared for him for years without having discovered a disease. Finally, many patients in the United States have no semblance of a personal physician and would be very alarmed by any positive result at a multiphasic screening examination without a prompt and ready outlet for their anxiety.

2. No members of the Tufts faculty have been actually involved in multiphasic screening.

3. During the next 2 years, the Department of Preventive Medicine of Tufts University School of Medicine will be involved in creating health maintenance programs for the entire population (6,000) at Columbia Point Housing Development and poor families from North Bolivar County, Miss. These programs will be carried out within the context of family center comprehensive center.

4. Individuals with special knowledge of multiphasic screening:

Dr. Valdo Getting, University of Michigan, School of Public Health, Ann Arbor, Mich.

Dr. Edward M. Holmes, Jr., Medical Director for Region 4, Vocational Rehabilitation Administration, Department of Health, Education, and Welfare, Region 4, Atlanta, Ga.

Sincerely yours,

WILLIAM F. MALONEY, M.D., *Dean.*

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THE UNIVERSITY OF ARIZONA,  
COLLEGE OF MEDICINE,  
OFFICE OF THE DEAN,  
*Tucson, Ariz., September 6, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health Study of the Elderly, U.S. Senate  
Office Building, Washington, D.C.*

DEAR SENATOR NEUBERGER: I have received your letter of August 24 with regard to the hearings which your committee has scheduled for September 20, 21, and 22 on the subject of multiphasic screening programs. While the interval until that date is very short, I am confident that you will develop sufficient information to be of help in preparing for those hearings. My own response to the four questions you have addressed to me follows. I hope you will find something of value in it.

(1) The principle of multiphasic screening is completely valid and there is, indeed, a definite place for it in our country at this time. I do think it is important, however, to note that multiphasic screening is essentially a technique for combining and compacting, objective measurements of the human body. It does not, of and by itself, "prevent" anything and those who would misrepresent it in this fashion do it a disservice. In other words, when multiphasic screening reveals a positive finding, if it is sustained, it indicates the presence and not the imminence of an abnormal situation, illness, or disease. Naturally, as a tool which can result in remarkably early diagnosis, it may have inestimable value in preventing secondary complications or expressions of an illness when it results in early therapy for the primary condition.

In my opinion, there are three routes by which multiphasic screening programs could be effectively established. First, it could be accomplished within the private sector of the practice of medicine. Second, it could be accomplished by basing the multiphasic screening programs in medical schools and certain other nonprofit health facilities. Third, it could be done under the jurisdiction of the U.S. Public Health Service. Within the private sector, the very same ethics which protect and maintain the integrity of competent medical practice on a personal basis will probably preclude the development of multiphasic screening programs. There is one exception, however. That is when a group of physicians elects to service a clientele through a closed-panel system. The Kaiser Foundation in California is a prototype of such an arrangement. With regard to medical schools, their primary objective is undergraduate medical education. Since the objective of a multiphasic screening program is primarily service (unless we conclude that the education of the patient about himself should be the proper concern of the medical school) there is a conflict here which would have to be resolved. The recent passage of the regional centers program has resulted in a redefinition of the service aspects of medical schools in a manner which will permit a broader approach to these problems than ever before. Hospitals and certain other nonprofit health facilities might accept this role although such a suggestion would likely provoke strong objections at a time when hospitals are using all possible approaches to reduce the total number of professional persons who are retained on a salaried basis. The Bureau of State Services of the U.S. Public Health Service could, of course, handle such a program very nicely. Indeed, there is rather good reason to think that "monitoring," rather than the specifics of treatment, properly belongs with the Public Health Service.

With respect to your question about the problems of acceptance by the public and the medical profession, let me say that I can think of no reason why a multiphasic screening program would not receive both prompt and enthusiastic acceptance by the general public. The medical profession, on the other hand, will likely object to the program although I would be quite surprised if the objection were very strong. The concern of the profession would be that a multiphasic screening program could become an invasion of the practice of diagnostic medicine, which is carried out under the jurisdiction of persons who might not be licensed physicians, and that the impersonal and machinelike approach of multiphasic screening is a poor substitute

for the interpersonal relationship on which the traditional concept of the practice of medicine has been based in our country. Both objections have real validity. Accommodation to the first should not be difficult if the accreditation and standardization of the laboratory testing procedures were assigned to the jurisdiction of appropriately trained and registered health personnel. Similarly, it may be necessary to consider assigning senior responsibility for the operation of individual multiphasic programs to licensed physicians in order to allow for the absorption of liability which may be involved should the performance of a diagnostic test result in a patient accident or, indeed, even a fatality. (I am assuming, of course, that if a multiphasic screening program were established, the approach to the program by the patient would be on a completely voluntary basis and the results of the testing procedures would be forwarded directly to a physician chosen by the subject patient.) As regards the impersonality and machinelike approach to diagnostic medicine, this is less serious provided that rather rigid guidelines were developed to insure that any steps which might be taken toward the interpretation of abnormal findings must be taken outside of the setting of the multiphasic screening program itself because of the personal nature of the problem. My earlier suggestion that results should be forwarded directly to a physician chosen by the patient not only insures that the personal element will be injected into the situation but also preempts the development of a false sense of security by the patient who has been informed directly that his testing was negative. Such a policy will also prevent protracted and unnecessary worrying by a patient who has been informed that certain tests may be abnormal, at least until this has been clarified by the physician.

(2) There are no members of our faculty or staff who have participated in the organization or operation of a multiphasic health screening program since the college of medicine at the University of Arizona is still in an early stage of development.

(3) At this time, I would not wish to make suggestions as to why effective screening should be substantially different for persons on either side of the age of 60.

(4) We have no persons working in our school at this time who have special knowledge of, or interest in, this subject.

If you have found any of the above material to be of sufficient interest or help that you would like to have any of it developed in additional depth, then I hope you will feel entirely welcome to call upon me.

Very sincerely yours,

MERLIN K. DuVAL, M.D.

UNIVERSITY OF ARKANSAS,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Little Rock, September 7, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: I felt honored to receive your letter of August 23 which you wrote me in your capacity as chairman of the

Subcommittee on Health of the Elderly. First, let me say that I have no qualifications or experience that makes me an expert regarding multiphasic health screening. Neither am I aware of any member of the faculty of this school of medicine having been involved in the development or operation of a multiphasic health screening program. Having disqualified myself as an expert, I am taking the liberty to comment as an individual with a deep interest in medicine.

I read with real interest the material which accompanied your letter. Certainly, Senator Williams should be complimented upon the masterful and scholarly manner with which he presented this subject to the Senate. The comments by leaders in the field of public health which accompanied Senator Williams' speech were quite convincing, and these are the words of individuals who are experts.

Screening by certain tests has, of course, been carried out for a selected population for considerable time. This selected group has been that segment of the population coming under good medical care. Whatever his complaint, an individual attending the outpatient clinic or admitted to the hospital of this institution will be screened for syphilis, diabetes, anemia, hypertension, cardiac abnormality, lungs by chest X-ray, and others. These screening measures not infrequently pick up abnormalities unrelated to the patient's presenting complaint, and these abnormalities would be missed without these screening techniques. Application of such techniques to the uncomplaining population could not help but bring to light many instances of unsuspected and early disease.

The selection of specific tests to be incorporated in a multiphasic screening program would require a great deal of professional study. I would consider it a mistake for any specific tests to be designated by legislation. Rather, it would seem more appropriate for the legislation to spell out the objectives desired and the age groups to be considered. Furthermore, there are some diseases which when found early lend themselves to treatment, and others which still are beyond medical science to deal with effectively. Of course, the finding of a significant volume of untreatable disease stimulates research in that particular field. The point I would make in this regard is the matter of objective. It would seem appropriate for legislation to give some guidance as to whether or not there should be concentration on diseases which lend themselves to therapy.

As a practical matter, I believe Senator Williams paid less attention to the matter of manpower problems relative to such a program than he should have. We all want to develop and implement every program possible that will contribute to the health of our people. However, at the level of implementation we are finding increasing difficulty in finding the people to do the job. With each new program, I believe we must make the provisions necessary to train the appropriate people to carry out the desired plan of action. From where I sit, training people means facilities and faculty; and provision of these requires more funds than we have had at our disposal to date.

Thank you very much for writing to me, and I have appreciated this opportunity to reply.

Sincerely yours,

WINSTON K. SHOREY, M.D., *Dean.*

UNIVERSITY OF CALIFORNIA, LOS ANGELES,  
*Los Angeles, Calif., September 14, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In answer to your letter of August 23, inviting our viewpoints in connection with a study of modern health screening methods by the Subcommittee on Health of the Elderly, we welcome the opportunity to comment on these vital and timely public health questions.

There can be no question about the inevitability of computerized diagnostic screening centers of the type proposed by Mr. Williams, and currently conducted by the Permanente Medical Group in Oakland and San Francisco. However, transition to an era based on such screening techniques involves a number of considerations which I believe have been confused by inadequate and perhaps erroneous information. Appropriate attention must be paid to these factors or the period of transition, probably quite rapid, could produce a period of chaos rather than improved medical care.

Unlike the acute diseases, chronic diseases are rarely cured. They must be observed and treated for prolonged periods, usually the lifetime of the patient. For this reason it is exceedingly improbable that the early detection of chronic disease will result in reduced rather than increased pressure on professional personnel. For example, prior to insulin, the average life expectancy of the diabetic was about 4 years. With insulin, his lifespan approaches that of a normal individual, obviously the result we desire, but one that increases medical service requirements. Screening procedures have added another dimension. Asymptomatic individuals with mildly abnormal glucose tolerance curves will now be referred to their physicians. Since, in the absence of curative techniques, early detection does not alter progression of abnormal glucose tolerance curves into clinical diabetes, these individuals will require an even longer period of professional observation. Similarly in glomerulonephritis; chronic hemodialysis and kidney transplantation as a means of treating kidney failure increase rather than reduce the professional burden. The problems of following all patients with proteinuria further add to this load, and, as in diabetes, the establishment of the diagnosis is not yet associated with any technique for slowing the inexorable course of glomerulonephritis. The situation with arteriosclerosis poses a similar problem. There is no conclusive evidence of a regimen which will decelerate the progress of arteriosclerosis, and in the foreseeable future the later clinical problems will probably be treated just as they are today. The patient must be examined frequently to abort complications as they occur.

It has been widely advocated that each individual be examined at least once a year for effective preventive medicine. While there is approximately 1 physician for every 750 individuals in the United States, those physicians available for triage include only general practitioners, pediatricians, and internists. Since they represent about 50 percent of all practicing physicians, the ratio of physicians to patients is reduced to 1 to 1,500. At this ratio, a physician practicing 5 days a week, 50 weeks a year, would have to see six patients a day in order to screen the total population. This would, of course, be in addition to

the time required for care of patients with overt disease. If the physician spent a minimum of 1 hour with each patient, this alone would require 6 hours a day.

Thus I question the proposition that the multiphasic health checkup would reduce the stress on the physician's time. Examination of diagnostic procedures performed by the Permanente survey indicates that very few of them are performed by the physician at the present time, but by the laboratory or the radiologist. Further, Mr. Williams quotes data from the Public Health Service indicating that in persons over 45 years, 29.2 percent have hypertension and hypertensive heart disease, 18 percent have arthritis and rheumatism, and 10 percent have bronchitis. Thus, in this age group, a minimum of 29.2 percent and a maximum of 57.2 percent, depending upon the duplication of diagnoses, would be referred for further examination on the basis of these three diagnoses alone. It is probable that for good preventive medicine almost all of these patients would have to be seen regularly. It is obvious, therefore, that whatever the approach, more patients will be seeing physicians than ever before. An important point is that the screening features amplify and supplement, but in no way replace, the usual history and physical examination. In fact, because early causes may be less obvious, early abnormalities usually require a more prolonged and careful examination. Certainly the diagnosis of obscure conditions, many of which are treatable, would not be picked up by the computer. Patients cleared by the computer might be reassured and not seek further examination.

As the computers become increasingly sophisticated diagnostically, the diagnostician will become increasingly responsible for the more sophisticated diagnoses beyond the reach of the computer. Therefore, the level of ability and training of physicians in many areas may actually require upgrading rather than downgrading because of computer assistance. As one involved in medical education at various levels for over 20 years, I doubt that the personnel performing diagnostic, and especially therapeutic procedures, can be safely downgraded. At our present level of achievement, further gains can be made only by improving the present quality of personnel and training.

There is one area in which multiphasic screening would undoubtedly conserve physician time. At present the physician must choose the procedures to complement his history and physical examination which have a high probability of yield in relationship to cost. Thus, he must examine the patient first, then order the tests, and at a subsequent time review the initial examination and correlate the test results. The availability of these results in advance, perhaps even supplemented by computer-determined additional tests, might increase his efficiency. Institutions which handle large numbers of outpatients, and especially those institutions where patients present themselves directly for hospitalization, would benefit.

In conclusion, there is no question that the proposed computerized techniques will improve the scope and accuracy of medical diagnosis. Yet, I question whether their full utilization will result in increased economy of health services. I believe that widespread use of screening procedures as proposed would increase the professional load at a rate faster than could be compensated by proposed expansion of training facilities. We are now at the level of medical achievement where a simple linear increase in results requires a logarithmic increase in

effort and economic and social expenditure. The goal of improved health must be sought, but it must be recognized that this is costly. In particular, the increased need for personnel at all levels is an overriding concern.

In answer to question (2) Dr. John Chapman (professor of epidemiology) has been involved in a multiphasic screening program evaluating the development of heart disease in county employees for the past 10 to 15 years. Ultimately, screening should be performed at all ages (question 3) and it would seem advisable to set up pilot programs on the basis, rather than for some arbitrary age group. Finally, question (4), Prof. Ralph Goldman, chief of chronic diseases and geriatrics and director of the Rehabilitation Institute would certainly be interested in this program.

Sincerely,

SHERMAN M. MELLINKOFF, M.D.

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UNIVERSITY OF CALIFORNIA,  
SAN FRANCISCO MEDICAL CENTER,  
OFFICE OF THE DEAN,  
*San Francisco, Calif., September 6, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: Your letter addressed to former Dean Reinhardt was referred to me for reply. Our current Dean, Stuart C. Cullen, is away from the medical center at the present time but I have discussed these matters with him and the comments that I will make reflect his opinions as well as those of numerous faculty members concerned.

We are very familiar with the multiphasic screening program adopted by the Kaiser Foundation in California and have had many discussions regarding multiphasic screening with Dr. M. F. Collen, who directs this program for the Kaiser foundation. Several members of the faculty have visited the multiphasic screening centers in San Francisco and Oakland, Calif. There is no doubt in our mind that some type of multiphasic screening will prove to be of significant value in the earlier detection and prevention of disease. Data is not yet available, based on long-term followup of patients participating in multiphasic screening to determine completely what type of screening and in what age group screening would be of most value in the earlier detection and prevention of disease. Therefore, it seems that university medical centers whose main commitments are to teaching, research and patient care would have a vital interest in developing new knowledge in this area of medicine.

The greatest block preventing the successful development of experimental multiphasic screening units in association with a university medical center is the demand for space and faculty time. It is our opinion that any bill which seeks to implement research and teaching in the area of multiphasic screening should provide funds for construction of multiphasic screening units as well as funds for adequate staffing. The funds for construction will probably have to be on the



basis of a 100-percent funding of new space, if necessary, as well as 100-percent funding of remodeling of existing space if such is available.

We believe that a special category for participation by university medical centers should be developed in pending legislation in addition to the proposed regional and community oriented health protection centers. This category should include demonstration and experimental centers housed in medical schools where the emphasis would be on teaching and research. In these special centers, service responsibilities would be defined in terms of teaching and research needs. Such units would fit in better with current teaching programs and would be more acceptable to medical school faculties. It would allow university medical centers to develop multiphasic screening units and treatment centers in conjunction with existing outpatient departments which would emphasize teaching and research without a mandatory increase in service load. Such a teaching and research unit would be valuable to the Nation's health because much research needs to be done in the area of integrating information received from multiphasic screening into the management of patients by individual physicians. This area of relating automated procedures to ongoing patient care, particularly as regards the rational use of data collected by automated methods, needs careful study.

In our opinion we would favor the inclusion of women, age 40 and older, in those covered by any multiphasic screening program because of the importance of screening for mammary and cervical cancer in this age group.

If we can be of any further assistance to you in this matter, please do not hesitate to write.

Sincerely,

ROBERT H. CREDE, M.D.,  
*Professor of Medicine, Chairman, Division of Ambulatory and  
Community Medicine, Acting Dean.*

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UNIVERSITY OF CALIFORNIA,  
CALIFORNIA COLLEGE OF MEDICINE,  
*Los Angeles, Calif., September 7, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in answer to your letter of August 23d concerning multiphasic screening methods, particularly in trying to prevent chronic illnesses.

You ask me to respond to several questions; the first being, is there a place for multiphasic health screening in health care in this country, and are there any particular problems anticipated? Answer: Not only is there a place for multiphasic health screening in the health care in the country, but there are scores and scores of places that are beginning to do it, some very extensively and some rapidly developing. The excellent and explosive growth of the automated equipment permits this, and any examination of the companies, such as Audiotechnicon or Beckman instruments, thoroughly demonstrates

this expanding area. It is already expanding so rapidly that the problem is to do it in a coordinated manner and to be sure that the material is available for physician study and analysis.

As you may know, this is a standard procedure now at many medical meetings, such as the American Medical Association, where physicians themselves while looking at the exhibits have these multiphasic screening tests so as to familiarize the physicians themselves with the techniques available and, thus, stimulate the efforts.

In view of the rapid acceleration in this area, I would question whether or not there is any need whatsoever to further stimulate it since its value is well known and it is such a logical method so broadly accepted by anyone with any knowledge in the medical field.

You ask whether any members of our faculty or staff have participated in multiphasic health screening programs. The answer is "yes", to variable degrees. Many of our faculty are in hospitals that already do this. Some county health departments do this, as well as, of course, numerous large industries. Again, this whole idea is by no means new.

In question 3 you ask for suggestions for people over 60 or below 60. I have always felt this age is entirely arbitrary and without medical substance. Screening methods that work well above that age work just as well below. Certain tests are obviously emphasized in older age groups and different from those in younger age groups. These differences are widely recognized by people in this area and need hardly occupy the attention of your committee.

May I repeat and emphasize again that although Kaiser Foundation does this, this is generally known in Government, particularly since that is a very fine hospital and has many and close contacts with the Government and an excellent publicity staff. Although it was an early starter of these screening programs, many other fine centers were in there doing the same and, as you know, the National Institutes of Health, under Dr. George Williams, already has very elaborate screening methods with great batteries of tests already generously supported by Federal research funds and others.

I do hope your committee will not make the mistake of feeling that in this sense it is moving into a new, unexplored, or untried area. It is being well done and as quickly as can be done with current personnel resources. Medicare, obviously, will stimulate it further. I would suspect the main problem will be to not have it overextend itself and end up by sacrificing quality and accuracy while these methods try to respond to great demands.

Respectfully,

WARREN L. BOSTICK, M.D.

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UNIVERSITY OF CALIFORNIA, SAN DIEGO,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*La Jolla, Calif., September 14, 1966.*

Senator MAURINE B. NEUBERGER,  
*U.S. Senate, Special Committee on Aging, Washington, D.C.*

DEAR SENATOR NEUBERGER: I am very pleased to respond to your letter of August 24 which was on my desk when I returned from vacation earlier this week.

I do believe that there is a place for multiphasic health screening in this country, but that there are problems in acceptance both on the part of the public and in the medical profession. In general, a voluntary multiphasic screening program will attract a segment of the public which is least in need of these services. By this I mean that the programs will primarily attract a middle-aged, middle-class clientele, and that very active measures must be taken to extend it to the young and the old where most of the unrecognized disease exists. In addition, the medical profession has long considered these programs as competitive to established methods of medical care. I am personally not in sympathy with this attitude, but I express it only as a reality which must be faced.

Unfortunately, because of the early formative stage of our school, we do not have many faculty with interest or any faculty who have participated in operation of multiphasic health screening health programs other than myself.

I do not consider myself qualified to make suggestions for an effective screening program either for those below or above aged 60 since this is a highly technical field with which I have not stayed abreast in recent years.

The individuals whom I am listing below have both special interest and knowledge of screening technics and I urge that you contact them during the course of your hearings.

David D. Rutstein, M.D., Chairman, Department of Preventive Medicine, Harvard Medical School, 25 Shattuck Street, Boston, Mass.

William B. Kannell, M.D., Director, Framingham Heart Program, Lincoln Street, Framingham, Mass.

With hope that your hearings are successful, I remain,

Sincerely,

JOSEPH STOKES III, M.D., *Dean.*

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UNIVERSITY OF CINCINNATI,  
COLLEGE OF MEDICINE,  
*Cincinnati, Ohio, September 20, 1966.*

SENATOR MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Since receiving your letter I have attempted at a very busy time to collect opinions from various informed members of our faculty concerning the points of interest to your subcommittee. We hope that the following observations will be of some interest and help.

1. Is there a place for multiphasic health screening in health care in our country? Are there any particular problems that may be anticipated in the acceptance of multiphasic screening programs by the public or by the medical profession? We believe that there is a place for multiphasic health screening. The yield from such efforts, however, may be relatively small in proportion to the economic outlay and wide application would immediately raise very serious questions of providing suitably expert technological personnel, and so forth, for implementation. If adequate medical interpretation can be provided

and suitable followup or periodic rescreening arranged we do not anticipate that there will be major difficulties in gaining acceptance by the medical profession or by the recipient of health care. Some danger exists of inducing a harmful response that will cause a dropout of a still productive individual but considerations of this nature should certainly not be a major deterrent. The availability of professional resources and adequate followup, and so forth, are, of course, a question of great import.

2. Have any members of the faculty or staff of your college participated in the organization or operation of multiphasic health screening programs? The Kettering Laboratory of the University of Cincinnati College of Medicine (now the Department of Environmental Health) has long been concerned with health screening procedures in industrial and other populations and has had considerable experience in this connection. It is a general observation that even in such high risk groups as children and certain categories of industrial workers which are more quickly distinguished and more easily followed than the general population returns have been somewhat disappointing. To my knowledge our faculty is not now engaged in such programs as that for example at the Kaiser Foundation.

3. Do you have any suggestions for effective screening or other health maintenance programs for persons below 60? Above 60? In our opinion any chronological age break is almost useless and instead multiphasic screening procedures should be directed toward the identification of major disease entities. This implies a careful definition and delineation of the goals of any particular program.

4. May we have names and addresses of any individuals who may have special knowledge of, or interest in our subject? Generally our faculty has a rather broad experience with care of the aged since increasing numbers of the elderly are cared for both in the Cincinnati General Hospital (650 beds) and the chronic disease facility maintained by the county and staffed by medical faculty members, the Drake Hospital (1,000 beds). Principal interest and responsibility in this area of care resides in the department of internal medicine under the chairmanship of Dr. Richard Vilter and in the division of public health and preventive medicine of the department of environmental health which is led by Dr. John Phair.

Sincerely,

CLIFFORD G. GRULEE, JR., M.D., *Dean.*

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THE UNIVERSITY OF CHICAGO,  
THE DIVISION OF THE BIOLOGICAL SCIENCES,  
OFFICE OF THE DEAN OF THE DIVISION,  
*Chicago, Ill., September 16, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: In response to your inquiry of August 24, 1966, a program of periodic examinations has been in effect at the University of Chicago Hospitals and Clinics since 1954. The objectives of the program have been the evaluation of individual health status and possible discovery of incipient disease, as well as the assess-

ment of screening procedures. Members of industrial organizations in the metropolitan area of Chicago have been the primary participants.

In addition to a battery of screening tests, review of the medical history and a complete physical examination are performed by a physician. When completed, the laboratory data are integrated with the physical examination and a final evaluation made by the physician. He discusses all findings with the individual and arranges the necessary referral and followup examinations as indicated. Four to five hours are required to complete the entire procedure. By such a program, a significant number of unsuspected abnormalities are detected and remedial action assured.

When screening tests only have been given by trained paramedical personnel the number of significant positive findings have been sharply reduced; that is, several cases of operable carcinoma would have been missed if the physical examination had not been done by the physician.

The number of abnormalities detected in our group by the routine application of screening tests, however, is significantly large and thus justifies the program under study by your subcommittee. But even in the automated program of the Kaiser Foundation, physician participation is required to interpret chest X-rays, mammography and photographs of the retina, as well as to provide a final evaluation. Proctoscopy in both sexes and pelvic examination with cervical smears for women, two procedures of high order detecting serious but remediable abnormalities when found in early stages, are omitted in that program because they do require the medical skill of a physician. These latter procedures, both beset with a certain amount of personal discomfort, require increasing recognition of their diagnostic value to promote their acceptance by the public as a part of a routine examination without an incentive being generated by obvious symptomatology. In the future it might be possible to train paramedical personnel in their performance since they do not lend themselves to automation. Or other procedures which may be used in substitution may be found through research.

Problems regarding acceptance of multiphasic screening programs by the public and the medical profession would be transitory as the point of view changed from a classical remedial action for disease to one of prevention of disease. Pediatricians have already achieved great success in "well-baby clinics" as primarily preventive in scope.

A less than complete examination and subsequent false assurance that no abnormalities were found may actually result in the disregard of symptoms and delay in medical care. The anxieties and frustrations associated with investigating false positive or false negative findings will also plague a small percent of the participating group. The program would have no value unless the individual could have prompt access to proper medical facilities for followup and total evaluation of any or all abnormal findings. In addition, feed-back information from the physician to whom the patient is referred is necessary in order to fully benefit from the knowledge of the incidence and course of disease, the assessment of the accuracy of the tests and the development of new techniques.

Dr. Fausto Tanzi, director of the periodic examination program at these university hospitals, has been associated with the program since

its inception. Dr. Henrietta Herbolzheimer is assisting him. Both would welcome the opportunity to give any possible assistance to your committee.

Sincerely,

LEON O. JACOBSON, M.D., *Dean.*

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UNIVERSITY OF COLORADO,  
MEDICAL CENTER,  
*Denver, Colo., August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Your letter of August 24, 1966 to Dean Conger has been referred to me in his absence.

I think there is definitely a place for multiphasic health screening, not only for the aged, but, in particular, for children. I think the impact of good preventive medicine would be felt not only in better health, but also in savings of tremendous sums in later hospitalization and physicians' bills. I also feel that multiphasic screening should not be limited to medical disease, but also to dental. The savings in manpower, outpatient services, and inpatient hospitalization engendered by good preventive medicine would far outweigh the cost of such programs. In our limited experience at the University of Colorado with this type of preventive medicine, we have had a wholehearted acceptance by the public. I have personally been engaged in mass screening for glaucoma. It is not possible with our limited means to keep up with the demand. I would anticipate no public problem. I also would not anticipate any problem with organized medicine if professional standards of excellence are maintained, since there would be such tremendous benefits both to the public and to organized medicine. The only problem I would anticipate at the present time is professional manpower.

There has been a limited participation in the past by members of our faculty in health screening of various types. There is a joint project now underway by the departments of pathology and obstetrics and gynecology to screen women in the State of Colorado for cervical cancer. This program is directed by Dr. Donald W. King, professor and chairman of the department of pathology, and Dr. E. Stewart Taylor, professor and chairman of the department of obstetrics and gynecology. Dr. J. Cuthbert Owens and myself have been active in the past in evaluating emergency rooms and their facilities throughout the State of Colorado. Dr. Owens is a professor in our department of surgery. This has been a project sponsored jointly by the American College of Surgeons, the American College of Physicians, and the American Hospital Association. Dr. John Cobb, professor and chairman of our department of preventive medicine, is extremely interested in development of good programs for screening as a part of preventive medicine in the State of Colorado. We are setting up a program to develop a graduate curriculum for laymen and physicians which would include training in this field.

Dr. Jerry Aikawa, chief of our central laboratories, is at present studying the use of multiple laboratory tests as a screening mechanism.

We have ordered the computer hardware and autoanalyzers to be able by the end of this fiscal year to run 14 blood tests at very minimal cost on each patient admitted to Colorado General Hospital. Dr. Aikawa also is developing questionnaires for patients based on that prepared by the Permanent Foundation which will be used on a trial basis during this academic year. These questionnaires provide a means of screening on new patients admitted to the outpatient department prior to their first visits. The questionnaires can be processed by data processing equipment and can pinpoint certain areas of suspected disease. With our new data processing and computer equipment, we hope to store tremendous amounts of data gathered at low cost on our patient population which can be analyzed in the future as a part of a multi-screening effort.

In answer to your question regarding suggestions for screening, I would suggest the use of multiple laboratory tests utilizing autoanalyzers and computers, and the use of objective tests for hearing and vision, which we are now developing on a research basis at the University of Colorado. At the present time we have developed a clinical test which provides an objective test of hearing on persons of all age groups. This is most important, however, in infants, the aged and in children where defects are suspected. A total or subminimal visual response can also be obtained on persons of all age groups and, again of most importance, in the very aged and in the very young. A means of testing for visual field defects is now well underway here and at other universities. These tests are achieved by means of electroencephalographic leads to the skin of the scalp which monitor evoked brain responses to sound and light stimuli. The responses are monitored by a programmer and computer which filter out random noise of the brain and amplify the response desired. The response is then plotted out on a graph.

I feel the initial use of simple but highly effective questionnaires which can be processed as we are planning to do, and data collected to pinpoint areas of disease will be helpful. Aside from laboratory tests on blood and urine, tonometry for screening glaucoma, screening of special senses with the use of electroencephalography, mass screening can certainly be done for heart disease using the electrocardiograph. It is also now possible with special blood and pulmonary tests to make assessments of persons with pulmonary disease such as emphysema. This, of course, would apply to persons in the middle- and upper-age groups. The development of ultrasonic devices also provides another method of mass screening for organic anomalies and possibly tumor masses. The use of ultrasonic devices is at the present time in its infancy but is being studied here at the University of Colorado and elsewhere in special projects. The use of special techniques in skin biopsy can also be utilized to detect degenerative and neoplastic disease as well as to give some idea of genetic patterns which might lead to early detection of "birth defects." I should think the Federal Government as well as the State government should support research into biochemical tests for substances which are present in the blood or urine which would lead to early detection of many "birth defects." An example of such is the phenylketonuria test now being done widely throughout various areas in the country.

I would submit to you three names in our institution who might have special knowledge. I have mentioned two of them above. They are Dr. John Cobb, professor and chairman of the department of preventive medicine, and Dr. Jerry Aikawa, chief of our central laboratories. I would also suggest the name of Dr. C. Henry Kempe, professor and chairman of the department of pediatrics. Each of these men may be reached by directing a communication to the University of Colorado Medical Center, 4200 East Ninth Avenue, Denver, Colorado, 80220. Should you desire further information about the possibility of screening for pulmonary diseases, I would suggest that you contact Dr. Roger S. Mitchell, professor of medicine and director of the Webb-Waring Institute for Medical Research and Dr. Thomas L. Petty of our division of pulmonary diseases. The latter two men may be reached at the above mentioned address also.

If you are interested in further information concerning objective tests for hearing and vision, I should be glad to supply it. I have been working with Dr. Geary McCandless of our department of audiology insofar as evoked visual responses are concerned.

I hope I have submitted to you some helpful information. Please do not hesitate to write if I can be of further help to you.

Sincerely yours,

GEORGE S. TYNER, M.D.,  
*Associate Dean and Assistant to the Vice President  
for Medical Affairs.*

UNIVERSITY OF LOUISVILLE,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Louisville, Ky., September 1, 1966.*

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: This letter is in response to your recent inquiry concerning multiphasic health screening.

Along with most physicians I believe such screening to be a valuable and necessary adjunct to comprehensive care.

The essential problems arise in connection with—

1. Who will do the work?
2. How may effective and continuing followup be arranged so that full potential advantages may be exploited?
3. What percentage of any age, ethnic or economic category of the public will cooperate beyond the first screen?

I do not profess to have any competence in estimating the answers, but I am certain that a program based on the level of medical indigency or age alone would not be terribly effective.

We, of course, in effect accomplish multiphasic screening as a by-product of our out patient clinics and ER activities, but it is not a formally organized program in the sense of your query.

My only suggestion would be to begin with demonstration programs on multiphasic screening so that some organized and reportable data may be collected for continuing planning.

Sincerely yours,

DONN L. SMITH, M.D., *Dean.*



UNIVERSITY OF ILLINOIS AT THE  
MEDICAL CENTER, CHICAGO,  
*Chicago, Ill., August 29, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR: I am writing in response to your inquiry of August 24 to Dean Bennett who is abroad and may not return to our campus in time to be helpful with your inquiry about health screening methods and chronic illness.

I am not aware of a single method or methods in use at our medical center that would necessarily be useful on a more widespread basis; however, we do have medical faculty who are seriously interested in several phases of this problem and I am furnishing the names of two of these:

Dr. Adrian Ostfeld, professor and head of the department of preventive medicine and community health, is in the midst of a large-scale research project that deals with examination and certain screening procedures of an older age population in order to discover information that may be useful in preventing stroke and vascular diseases. His mailing address is University of Illinois at the Medical Center, 1853 West Polk Street, Chicago.

Dr. Joyce C. Lashof, associate professor of preventive medicine and community health, and formerly director of the outpatient clinics in medicine at Presbyterian-St. Luke's Hospital, has conducted new multiphasic screening procedures on a large scale but with a restricted clinic population at the Presbyterian-St. Luke's Hospital. Her mailing address is Presbyterian-St. Luke's Hospital, 1753 West Congress, Chicago, Ill. 60612.

Sincerely yours,

NAT E. SMITH, M.D.,  
(For Granville A. Bennett, M.D., Dean).

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UNIVERSITY OF MARYLAND,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Baltimore, Md., September 6, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In reply to your letter of August 23, 1966, we do favor multiphasic health screening if done in conjunction with programs of comprehensive medical care. We do not believe there will be any major problem in acceptance by the patient and the doctor if the screening is done in conjunction with comprehensive medical care in which both the doctor and the patient are involved on a continuing basis.

We do conduct such screening and comprehensive medical care in this medical school on a limited basis. We hope to expand these programs when more resources are available. These programs have been under the direction of Dr. George Entwisle and Dr. Harle V. Barrett as far as adults are concerned and Dr. Ray Hepner for the children's programs.

I am enclosing a copy of a letter I have just received from Dr. Entwisle which may be of interest to your committee.

Sincerely,

WILLIAM S. STONE, M.D., *Dean.*

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UNIVERSITY OF MARYLAND,  
SCHOOL OF MEDICINE,  
DEPARTMENT OF PREVENTIVE MEDICINE AND REHABILITATION,  
*Baltimore, Md., September 1, 1966.*

WILLIAM S. STONE, M.D.,  
*Dean, University of Maryland School of Medicine.*

DEAR DR. STONE: Thank you for letting me review Senator Maurine Neuberger's letter to you of August 23 concerning the activities of the Subcommittee on Health of the Elderly. I would like to make a few comments about the content of his letter as well as the additional material that appeared in the Congressional Record.

First, some information for a few of the specific questions in Senator Neuberger's letter. We are planning for the development of a multiphasic screening program in our outpatient department. The medical care clinic of our outpatient department has been renamed the evaluation clinic and in this space is now located the medical screening room (transferred from the first floor), as well as the screening activities of the former medical care clinic. We have had a screening program in the medical care clinic for some years and it is our plan to enlarge this program for more of the ambulatory patients. Our screening program in the medical care clinic has consisted of the following for all adults: height, weight, blood pressure, STS, hemoglobin, urine (albumin and sugar), visual acuity, tonometry (over age 40), and cervical Papanicolaou smears (for all women over age 15). A modified program is available for the children. We were particularly interested in developing screening for cervical cancer and glaucoma in a public assistance population since both these conditions are much more common in the low social classes. You will note also that now we do routine PAP smears beginning in the older teenagers and not above age 40 as we did a few years ago. The most recently diagnosed patient with cervical carcinoma-in-situ in this screening program was a 29-year-old woman.

This screening program in the medical care clinic has been under the direction of Dr. Harle V. Barrett and he is trying to develop a larger multiphasic screening program for our outpatient department. We would hope to incorporate routine X-ray mammography on middle aged and older women, but the details of this have not yet been worked out.

Two or three years ago, we looked at our screening program in the medical care clinic and found that we were getting cervical Papanicolaou smears on slightly over half of the women over age 40. There are several reasons for this poor performance but we decided the best method for correcting this deficiency would be to have one of our nurses trained to do these Pap smears and have them done at the time the patient registers in the medical care clinic. This was discussed with Dr. Arthur Haskins and he approved this in principle, and for the last year and a half, one of our nurses has done routine

Pap smears on all eligible women. In this way, our program has been vastly improved. In addition, our nurse has also been trained by Dr. Richard Richards' staff in the performance of routine tonometry and this is also done at the time of registration on adults aged 40 and over. We feel that the use of paramedical personnel in performing these screening tests is necessary and should be encouraged further.

Senator Neuberger arranged for printing in the Congressional Record a number of letters from distinguished health officials in support of comprehensive screening and expressing interest in the establishment of health protection centers. It should be recognized that many individuals are not convinced of the value of multiphasic screening in terms of reducing morbidity and mortality. It is clear that for some screening tests (cervical smears, the best example) there is good evidence of reduced mortality or morbidity (glaucoma screening). There are, however, published papers indicating that individuals provided with periodic health examinations do not live longer than others not afforded these examinations, and a number of people have questioned the value of specific tests included in a multiphasic screening program. As you know, and as Senator Neuberger has pointed out, the Kaiser Foundation project should give us important information on the impact of a multiphasic screening program on morbidity and mortality. I think their data will be more useful since their multiphasic screening program is part of a larger comprehensive care program of their medical centers and presumably the physicians in this group practice will be acting directly upon the results of multiphasic screening. I think this is important and pertinent to question 1 of Senator Neuberger's letter since such multiphasic screening clearly will identify individuals at greater risk of dying from certain disorders.

Multiphasic screening programs frequently obtain, from participants, information other than laboratory tests. This information is in the form of personal or behavioral characteristics which is useful in identifying groups at greater risk of developing chronic diseases. For example, one can identify, using the data from the Framingham study, those individuals in an adult population who are at greater risk of developing clinical coronary heart disease than other groups in the same population. Identification of such individuals is important if (1) a method of management of the high risk group is available and (2) this method of care will reduce the risk of this identified group. The answer to the second point is not completely clear at the moment, and the best we can do now is to take an educated guess.

Our identification of individuals at greater risk of developing certain chronic diseases is based on the determination of the presence or absence of certain characteristics and these characteristics can be divided into two groups. One group represents those the physician cannot change, such as age, sex, race, and genetic background. The other set of characteristics include ones that might be changed but these characteristics relate directly to patient behavior and therapy requires changes in such behavior. Changes in obesity, fat intake, exercise, smoking habits, and long-term treatment of asymptomatic hypertension have been strongly recommended for a number of these chronic diseases, but we recognize that there are problems associated

with long-term behavioral changes in patients who feel quite well. More data in support of such behavioral changes are needed and the establishment of health protection centers should assist in providing these data. However, I feel that changes in behavior of the public will be best accomplished by the use of community campaigns complementing a medical program where the patients are provided continuity and coordination of care. In my judgment, individual behavior changes of the type mentioned above have the greatest opportunity for success in a situation where a patient is identified with a personal physician in a setting of comprehensive care. I feel, therefore, that the best data on multiphasic screening will be obtained in a setting where comprehensive care is also provided the population under study. As you know, we are hoping to develop this kind of program in our medical center for at least part of the ambulatory population and our plans along these lines include the development and appraisal of a multiphasic screening program. When successful, our comprehensive care program will provide services to a medically indigent population and the data from this program should complement the Permanente project since the latter is focused on a middle-class population.

I would hope that Maryland would be elected for the establishment of one of the proposed health protection centers.

Sincerely yours,

GEORGE ENTWISLE, M.D.

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THE UNIVERSITY OF MICHIGAN,  
 MEDICAL SCHOOL,  
 OFFICE OF THE DEAN,  
 Ann Arbor, September 1, 1966.

HON. MAURINE B. NEUBERGER,  
 Chairman, Subcommittee on Health of the Elderly,  
 Senate Office Building,  
 Washington, D.C.

DEAR SENATOR NEUBERGER: Thank you for your letter of August 23 referring to the study of modern health screening methods being undertaken by the Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging.

I will turn first to answers to your specific questions.

1. *Is there a place for multiphasic health screening in health care in our country?*

*Answer.* The term "multiphasic health screening" when examined closely is a confusing set of words. As I understand it, it refers to a data collection technique wherein a standard battery of inquiries, both verbal and laboratory, are developed and administered by nonphysicians with the results being organized and finally submitted to a physician who makes a judgment about their relevance to the health status of the individual. Since there is no way to examine for health as such, the actual screening procedure is for deviations from a range of normal and is an illness survey, in truth, rather than a health survey.

Such an approach to a patient is a direct extension of the traditional complete examination provided for patients by physicians. The real

question is to determine the extent to which one can accept the newer pattern of nonphysician data acquisition with physicians retaining the decisionmaking role. The exact place of this kind of effort is yet to be determined, but that there is an important place seems very highly probable indeed.

*1a. Are there any particular problems that may be anticipated in the acceptance of multiphasic screening programs by the public or by the medical profession?*

*Answer.* Acceptance by the public will undoubtedly be something less than complete. Already the chief criticism laid against physicians by the general public is the relatively impersonal and somewhat hurried contact that increasingly characterizes the patient-physician relationship. The intrinsic impersonality of screening batteries will accelerate this problem.

The acceptance of the medical profession will also be mixed since they will recognize that data acquisition is not, in fact, readily separable from judgment as to health status. The intellectual content of a skilled physician taking a medical history is different than the intellectual content of a nonprofessional person asking the same questions. There will also be concern about the effectiveness of the relationship between the data acquisition of the screening program and the system of professional responsibility for judgments based on that data. Finally, there will be the question of whether the capacities of this new data collection system should be added as resources to our present delivery system for health services or whether it will stand apart from it.

All of these matters have been handsomely described in the reports of the Commission on Chronic Illness which operated between June of 1949 and June of 1956. The results of this Commission's efforts were published in four volumes between 1956 and 1959. They include careful accounts of multiphasic screening programs in both an urban and a rural setting.

*2. Have any members of the faculty or staff of your college participated in the organization or operation of a multiphasic health screening program?*

*Answer.* Yes.

*2a. May we have names, addresses and a brief description of the program?*

*Answer.* Dr. William M. Mikkelsen, associate professor of internal medicine at the University of Michigan Medical School, is responsible for the periodic faculty health appraisal program which is a multiphasic screening program conducted under the auspices of the University of Michigan and serving faculty members at the university. The results of this multiphasic screening program now extend over almost 10 years.

Dr. Thomas Francis, Jr., professor of pediatrics and communicable diseases and professor and chairman of the department of epidemiology at the medical school and the school of public health at the University of Michigan, is senior investigator for the so-called "Tecumseh project" which is a total community health surveillance study which is, to my knowledge, unique within the United States.

Supported primarily by grants from the National Institutes of Health, this is a combined project of the medical school and the school of public health of the University of Michigan. It is an extended, long-term study in the epidemiology and natural history of disease, looking forward to the preventive and early detection criteria that can be utilized. The program focuses primarily on cardiovascular disease but inevitably involves total health surveys.

Dr. Frederick H. Epstein, professor of epidemiology in the school of public health, is associated with Dr. Francis in the Tecumseh project and has a special and direct interest in the multiphasic data collection on this population.

Dr. Harold J. Magnuson, professor and chairman of the department of industrial health of the school of public health and professor of internal medicine of the medical school of the University of Michigan. Dr. Magnuson has had very broad experience, both within the U.S. Public Health Service and more recently at this university, in the problems of periodic health appraisals in industry and the standardization of data collection and reporting. Although his special concern is with health hazards related to industry, in order to evaluate these a total health appraisal is, of course, necessary. A great deal has been done in industry to utilize nonphysician personnel and Dr. Magnuson's experience in this field has been important.

Dr. A. James French, professor and chairman of the department of pathology and director of laboratories at the University of Michigan Medical School. The whole question of how the laboratory is to be organized has been an important concern of Dr. French. In its simplest terms, it may be less expensive to do an automated batch of laboratory examinations on a single blood specimen than to be selective about which ones are to be done. The entire problem of automation of laboratory examinations is central to the concept of maximal application of laboratory techniques to health appraisal.

*3. Do you have any suggestions for effective screening or other health maintenance programs for persons below age 60? Above age 60?*

*Answer.* I would suggest that we are not yet prepared for nationwide programs and should look forward to investing in a series of carefully controlled experimental efforts of large enough dimensions so that they can be extended fairly rapidly to the general population. My relationship to the rural study in the chronic illness survey of the Commission on Chronic Illness and more recently to the Tecumseh study in Michigan has been from the viewpoint of an administrator rather than a fieldworker. From this viewpoint I have been impressed with the very great difficulty of obtaining funds for support of these efforts. For instance, in the chronic illness study in the Hunterdon County area no provision was made for followup studies after the initial survey. The crucial question of the actual effect of this kind of information gathering on the health of the population therefore remains unanswered and we are left only with a one-time effort. To my knowledge, the same problem exists in the urban study conducted in Baltimore. The size of the samples were restricted and the range of screening efforts was also constricted in large part as a result of shortage of funds for these pilot efforts.

In the Tecumseh study, the continuing health surveillance of the total community has been a point of extensive discussion and very difficult administrative problems, in large part because it does not fit precisely the mission of any one of the established budgetary units in the Federal Government. It is not so much that the surveillance has been left undone but that it has been done less extensively than we would have wished and at the cost of an enormous investment of man-hours that could possibly have been better expended. I cite these examples not as complaints but rather to indicate that the sort of careful study of effectiveness that is necessary has not yet been done. Before we go too far in establishing a new program no matter how plausible it may appear to be, I would hope that we have more secure data than are now available on the actual effectiveness of such a program in improving the health of the people. The peril is that we would establish an enormous data collection and analysis apparatus that in the last analysis would have a very limited effect on health. To avoid this, we need to understand more clearly how improved data collection can reinforce the professional decisionmaking and the education of the individuals concerned.

4. *May we have names and addresses of any individuals who may have special knowledge of, or interest in, our subject?*

*Answer.* I refer you to the publication cited previously from the Commission on Chronic Illness which lists a large number of people who have deep concern and experience in this effort. In particular I would recommend to you Dr. Edmund D. Pellegrino, who was director of medicine at the time of the rural chronic illness survey and subsequently helped to develop the medical center in Kentucky. Most recently, Dr. Pellegrino has been appointed professor and chairman of the Department of Medicine at the State University of New York at Stony Brook and he will direct the medical center during its planning phase.

I trust these responses are of value to you.

My own personal opinion is that this kind of multiphasic data collection related to health should be supportive of, rather than competitive with, other techniques of obtaining such health related information. Ultimately it should look forward to becoming a part of a national health information network. Although it is perfectly obvious that much data needed by the physician is already collected by technical personnel and that we must, to the fullest possible extent, utilize the physician as a decisionmaker rather than simply an information gatherer, it is not so clear that our present level of understanding of so-called multiphasic health screening will suitably accomplish this end. We badly need research efforts that are objective and critical. Much of multiphasic health screening has heretofore been undertaken by enthusiasts who have a prior commitment to its benefits. If full utilization of multiple screening is to be obtained, then these enthusiasts must submit their judgments to the same kind of analysis of actual effectiveness and acceptability that is characteristic of all other modes of diagnosis and therapy.

Sincerely yours,

W. N. HUBBARD, Jr., D.D., *Dean.*

UNIVERSITY OF MINNESOTA,  
COLLEGE OF MEDICAL SCIENCES,  
*Minneapolis, Minn., September 7, 1966.*

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: Miss Rausch has asked me to answer your letter of inquiry concerning the current status of multiphasic health screening.

The faculty of the University of Minnesota Medical School has been particularly interested in this problem during the past year, and it is our hope to develop an experimental clinic during 1967-68 in which we can explore some of the questions which you have raised. As a member of the outpatient clinic directors group of the university hospital, I have recently prepared a report for the directors of our outpatient clinics which explores some of the information currently available on this subject. On the assumption that you may be interested in this report, I will forward a copy to you. This report does not presume to cover all of the important work which is being done in this area; however, it may serve as a jumpoff point for you in your investigation of this complicated problem.

You have referred to the work of Dr. Collen in California. I have visited his laboratory and studied his clinical screening program and agree that it is very impressive. As you are well aware, a field which is moving rapidly will almost invariably demonstrate a variety of approaches to the solution of a common problem. The field of laboratory medicine is no exception. Two of the outstanding contributors to this field whose approaches have been somewhat different from that of Dr. Collen are Dr. David Seligson at Yale University and Dr. Ralph Thiers at Duke University. My opinions are included in the report which I am forwarding. I believe that the observations of Dr. Seligson and Dr. Thiers would be of particular assistance to you as their work in particular illustrates the breadth of this problem.

Yours sincerely,

PAUL E. STRANDJORD, M.D.,  
*Director, Clinical Chemistry Laboratory.*

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STUDIES OF THE UTILIZATION OF THE CLINICAL LABORATORY AS A  
ROUTINE ADJUNCT TO THE HISTORY AND PHYSICAL EXAMINATION

RATIONALE <sup>1</sup>

"Classically there are three major avenues of gathering information with reference to patient management: the history, the physical examination, and the laboratory examination. The roles of the history and the physical examination have become relatively well established. The role of the laboratory examination is rapidly changing,

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<sup>1</sup> P. E. Strandjord, *Lab. Med.—A Prospectus, Minnesota Med., May 1966, 773.*



however, and may be expected to change even more dramatically in coming years. It is now accepted practice to gather historical information and physical findings concerning all of the major systems of the body at the time of a detailed clinical examination. It will soon be feasible to provide a similar laboratory examination which will reflect information regarding many of the major systems of the body. Such a battery of tests will be directly analogous to the current screening type of physical examination which provides information regarding heart, lungs, liver, etc. Laboratory examinations of this type will be performed at the time of hospital admission, as well as during periodic health examinations. Information gathered from such examinations will be recorded in a form facilitating retrieval and will be helpful in detecting asymptomatic pathology, in facilitating earlier diagnoses, and in shortening periods of hospitalization. Data will be considered not only on the basis of what is normal in the general population, but what may be considered normal for an individual of a specific age and sex. In addition, compilation of such information will facilitate establishing normal values for given individuals. Values which could be considered normal in reference to norms based on the general population may appear abnormal when considered in reference to a patient's own established 'normal values.'

#### SUMMARY OF FINDINGS OF SEVERAL RECENT SCREENING STUDIES <sup>2</sup>

##### I. Glucose and diabetes mellitus.

A. Determinations of both blood and urine glucose concentration should be performed 1 hour after a "carbohydrate load."

B. A number of studies have shown that the average incidence of unsuspected diabetes is approximately 1.14 percent or 1 case of diabetes for every 100 people tested. (The number of undiagnosed cases of diabetes mellitus is probably equal to the number of known cases of this disease.)

C. False positive blood and urine glucose tests occur especially in young children and pregnant women.

D. Unsuspected abnormalities in blood sugar tests—2 percent, in urine sugar tests—6 percent.

##### II. Serum calcium and parathyroid function.

A. The incidence of unsuspected hyperparathyroidism is about 0.15 percent; hypoparathyroidism about 0.03 percent; and pseudohyperparathyroidism about 0.04 percent.

B. The incidence of unsuspected serum calcium abnormalities has been reported as being 0.96 percent or approximately 1 in 100 subjects tested.

##### III. Serum uric acid and gout.

A. Unsuspected gout—0.6 percent.

B. Unsuspected abnormalities in uric acid—4 percent.

##### IV. Kidney function tests and renal disease.

A. Unsuspected renal disease—0.5 percent.

B. Unsuspected abnormalities: BUN—1 percent, Cr—0.5 percent, Urine albumin—3.8 percent.

<sup>2</sup> The data include only findings picked up as a direct result of the screening procedures under investigation.

## V. Hemoglobin and anemia.

A. The incidence of unsuspected anemia is about 0.8 percent.

## VI. Serologic test for syphilis.

A. The incidence of unknown syphilis is about 0.3 percent. (The incidence varies significantly in different areas of the United States.)

## VII. Chest X-ray.

A. Unsuspected pulmonary abnormalities—0.8 percent.

B. Unsuspected cardiac abnormalities—0.5 percent.

## VIII. Blood pressure and hypertension.

A. Incidence of unsuspected hypertension—5 percent.

## IX. EKG and heart disease.

A. Unsuspected heart disease of various kinds—3 percent.

B. Six or twelve lead EKG is usually recommended.

## X. Height, weight, and obesity.

A. Approximately 6 percent of the population is overweight.

## XI. Impaired vision.

A. Sixteen percent of those tested are unaware they have faulty vision.

## XII. Impaired hearing.

A. Approximately 3 percent of the subjects tested are unaware of a hearing deficit.

The preceding outline mentions only some of the diseases and laboratory tests that have been studied. In most studies the incidence of unsuspected abnormalities is surprisingly high. Many of the people in these studies were considered to be well and healthy by themselves and by their physicians. Others may have been hospitalized during the study but not for the diseases or conditions that were discovered by the screening tests. In the majority of diseases or conditions discovered early diagnosis and early treatment are beneficial to the patient. Detailed information regarding the studies cited in this summary are presented in the following pages.

## REFERENCE SHEET 1

*Reference*

Boonstra, C. E., and Jackson, C. E.: The clinical value of routine serum calcium analysis, *Ann. Int. Med.* 57: 963-69, 1962.

*Location*

Caylor-Nickel Clinic, Bluffton, Ind.

*Population*

11,991 consecutive individuals appearing for clinic evaluation over a 29-month period from June 1959 to March 1962. The study excluded those persons on whom calcium determinations had been ordered and on patients with known malignancies.

*Purpose*

The survey was initiated by the occurrence of several cases of asymptomatic parathyroid adenomas during an investigation of the hereditary aspects of hyperparathyroidism.

*Examination*

(1) Serum calcium (ammonium purpurate method on the Auto-analyzer).

*Findings*

	<i>Percent</i>
Hyperparathyroidism .....	0.075
Abnormalities of parathyroid function.....	.1

*Summary of conditions found in 11,991 routine serum calcium analyses*

Hyperparathyroidism, primary:	
Confirmed by surgery.....	8
Well established clinically.....	1
Hypoparathyroidism:	
Idiopathic .....	1
Postsurgical .....	2
Milk-alkali syndrome.....	2
Multiple myeloma.....	1
Hypercalcemia secondary to malignancy.....	5
Hypervitaminosis D.....	1

## REFERENCE SHEET 2

*Reference*

Bryan, D. J., Wearne, J. L., Viau, A., Musser, A. W., Schoonmaker, F. W., and Thiers, R. E.: Profile of admission chemical data by multi-channel automation: An evaluation experiment, *Clin. Chem.* 12:137-43, 1966.

*Location*

Duke University Medical Center, Durham, N.C.

*Population*

(1) 1,581 consecutive hospital admissions to public and private wards of Duke University Medical Center—"DU."

(2) 642 consecutive patients entering the wards of a community hospital in a nearby town—"CH."

(3) 623 consecutive male patients entering Durham VA Hospital—"VA."

*Purpose*

To compare clinical chemical data obtained for incoming hospital patients from samples of blood submitted to the routine laboratory and from samples analyzed automatically in an admission battery—profile admission chemistries or "PAC."

*Examination*

- (1) Glucose.
- (2) Urea.
- (3) Sodium.
- (4) Potassium, all done on whole blood or serum.
- (5) Chloride.
- (6) Carbon dioxide content, all done on a multichannel autoanalyzer.
- (7) Calcium.
- (8) Phosphorus.
- (9) Total protein.
- (10) Albumin.
- (11) Uric acid.

*Findings*

Unrequested information in the PAC was beneficial to almost 1 per 10 patients entering DU and almost 1 per 20 at the VA.

In 12 cases at DU, unexpected findings resulted in substantially earlier institution of important therapy.

Example of pathology discovered at the VA as a result of PAC:

Diabetes.....	15
Renal disease.....	7
Gout.....	4
Hepatic disease.....	2
Multiple myeloma.....	1

*Distribution of unexpected findings (VA)*

Determination	Unexpected findings	
	Total	Medically significant
Sugar.....	31	16
Urea.....	7	4
Sodium.....	10	0
Potassium.....	25	1
Chloride.....	2	0
Carbon dioxide.....	6	1
Calcium.....	6	1
Phosphorus.....	10	2
Total protein.....	15	2
Albumin.....	9	4
Uric acid.....	28	23

REFERENCE SHEET 3

*Reference*

Oanelo, C.K., Bissell, D.M., Abrams, H., and Breslow, L.: A multiphasic screening survey in San Jose, California *Medicine*, 71:409, 1949.

*Location*

San Jose, Calif.

*Population*

942 employees in 4 industrial establishments—a department store, 2 units of a large food machinery corporation, and a manufacturer of paper labels. Manual and clerical workers, unskilled and skilled laborers, and executives; 694 males; 248 females; range of ages—15 to over 65.

*Purpose*

To combine several routine screening procedures into a more comprehensive general screen for economy and better service to these employees.

*Examination*

- (1) Chest X-ray (miniature).
- (2) Blood sugar (Folin-Wu).
- (3) Urine sugar (Benedicts).
- (4) Urine albumin (Roberts).
- (5) STS.

(6) History—with particular attention to familial incidence and symptoms of disease under consideration, also amount of food consumed and time interval since last meal.

*Findings*

Disease or condition :	<i>Number of new cases discovered</i>
Diabetes -----	9
Nephritis -----	2
Active TB -----	2

Test	Percent positive	Percent doubtful on basis of initial screen
Urine sugar -----	5.1	8.4
Blood sugar -----	4.3	-----
Urine albumin -----	2.2	2.2
STS -----	.3	.1
X-ray, lungs -----	-----	5.2
X-ray, heart -----	-----	1.4

REFERENCE SHEET 4

*Reference*

Collen, M. F. and Linden, C.: Screening in a group practice prepaid medical care plan, *J. Chron. Dis.*, 2 :400-08, 1955.

*Location*

Department of Medicine, Kaiser Foundation Hospital, Oakland, Calif.

*Population*

A random sample of 1,000 patients from a total of 9,403 patients at the Kaiser Foundation Hospital in 1952.

Sixty percent females; Range of ages, 25 to 55; average age of males, 43; average age of females, 39.

Occupations:

Males:	<i>Percent</i>
Craftsmen, operators, kindred workers -----	31
Professional and technical -----	20
Managers, officials, proprietors -----	12
Clerical -----	9
Unskilled laborers -----	8
Service workers -----	6
Females:	
Housewives -----	52
Clerical -----	20
Professional and technical -----	10
Service workers -----	5

*Purpose*

To evaluate the technique of multiple-screening techniques as applied to periodic health exams.

*Examination*

- (1) Health questionnaire, self-administered (modified Cornell Medical Index).
- (2) Height, weight.
- (3) Blood pressure.
- (4) Urine Albumin (SSA).
- (5) Hemoglobin (specific gravity of whole blood in CuSO<sub>4</sub>).
- (6) Blood and urine sugar (1 hour p.c. after 100 gm. glucose), (blood screened by Wilkerson-Heftmann, quant. method of Folin-Wu.; urine tested with Clinitest tablets).
- (7) STS (VDRL).
- (8) Chest X-ray (70 mm.).
- (9) EKG (lead 1).
- (10) Women over 35—breast exam (X-ray); pelvic organs exam; cervical smear.
- (11) All over 40—sigmoidoscopy.
- (12) All people tested—physical exam by an internist 1 week after the above tests.

*Findings*

Test done	Number of positives and doubtful per 1,000	Results of followup
Hemoglobin.....	96	39 retested by Klett—39 percent still low (37).
Urine glucose.....	101	
Blood glucose.....	20	15 retested by Folin-Wu, 2 D.M.'s confirmed.
Urine albumin.....	38	
VDRL.....	30	
EKG.....	167	
X-ray (lungs).....	96	
X-ray (heart).....	40	

Test done	Number of positives and doubtful per number of tests done	Results of followup
Breast exam.....	2 per 292.....	4 chronic cervicitis; 1 atrophis menopausal vaginitis; 1 pelvic tumor.
Pelvic organs exam.....	112 per 292.....	
Cervical smear.....	1 per 292.....	1 endocervical polyp.
Sigmoidoscopy.....	5.8 percent rectal or sigmoid polyps; 1 cancer of rectum.	

Lab exam: <sup>1</sup>	Percent
All normal.....	61.3
1 test abnormal or doubtful.....	30.2
2 tests abnormal or doubtful.....	7.3
3 tests abnormal or doubtful.....	1.0
4 tests abnormal or doubtful.....	0.2

<sup>1</sup> Males—55.9 percent with 1 or more abnormalities; females—52.9 percent with 1 or more abnormalities.

*Questionnaire.*—Most useful in appraising need for further investigation as to possible presence of physiochosomal disorders.

*Brief examples of new diagnosis.*—

In 20 duodenal ulcers—4 were previously known to the patient, 16 unknown.

In 64 hypertension, without heart disease—33 previously known, 31 unknown.

In 15 males with hernia—5 previously known, 10 unknown.

*Diseases diagnosed, number of cases per 1,000 patients*

All diseases.....	1,391
Partial list of diseases diagnosed:	
Pulmonary tuberculosis, inactive.....	35
Syphilis and its sequelae.....	9
Other infective and parasitic diseases.....	13
Malignant neoplasms.....	9
Benign neoplasms.....	54
Allergic disorders.....	39
Diseases of the thyroid.....	27
Diabetes mellitus.....	7
Obesity.....	189
Other endocrine and nutritional disorders.....	52
Blood disorders.....	47
Neurologic disorders.....	18
Eye diseases.....	18
Ear diseases.....	19
Rheumatic heart disease.....	6
Arteriosclerotic heart disease, including coronary disease.....	14
Hypertensive disease.....	88
Acute respiratory infections.....	15
Other diseases of respiratory tract.....	50
Duodenal ulcer.....	20
Urinary system diseases.....	10
Diseases of male genital organs.....	13
Infective diseases of uterus, vagina, and vulva (mainly cervicitis).....	48
Disorders of menstruation.....	21
Other female genital diseases.....	63
Congenital malformations.....	5

REFERENCE SHEET 5

*Reference*

Elsom, K. A., Scher, S., Clark, T. W., Elsom, K. O., and Hubbard, J. P.: Periodic health examination, *J.A.M.A.* 172: 5-10, 1960.

*Location*

University of Pennsylvania Diagnostic Clinic, Philadelphia, Pa.

*Population*

1,513 persons in executive positions employed in large and small industrial plants, banks, large supermarket chain, law firms, and other enterprises in and around Philadelphia.

From 1949 to 1958: 13 females; 1,500 males; range of ages—24 to 76, average age was 45.

*Purpose*

Part of a long-range investigation of the value of the periodic health examination; as well as the analysis of nature, distribution, and amenability of treatment of diseases detected.

*Examination*

- (1) Medical history and physical exam by an internist.
- (2) Hemoglobin.
- (3) wbc.
- (4) Differential.
- (5) "Urinalysis."
- (6) p.c. blood sugar.
- (7) STS.
- (8) Chest X-ray—P.A.
- (9) EKG—12 lead.
- (10) Sigmoidoscopy—on all over 40, on some under 40 when indicated.
- (11) Additional procedures done on request of the examining physician.
- (12) Many participants had 2 exams done (822), 6 to 23 months apart.

*Findings*

612 people had newly detected disease (40 percent).

Disease or new pathology :	<i>Number of cases</i>
Gastrointestinal (anal lesions, colon polyps)-----	<sup>1</sup> 240
Cardiovascular (hypertension arteriosclerotic heart disease)-----	<sup>1</sup> 189
Metabolic (obesity, diabetes)-----	<sup>1</sup> 179
Genitourinary (prostate)-----	<sup>1</sup> 71
Muscular, skeletal (hernia)-----	<sup>1</sup> 54
EENT-----	<sup>2</sup> 45
Skin-----	32
Respiratory-----	25
Psychiatric-----	17
Miscellaneous-----	<sup>3</sup> 12
Hematologic-----	11
Endocrinologic-----	<sup>4</sup> 8
CNS-----	<sup>5</sup> 4

<sup>1</sup> 81 percent of all new cases.

<sup>2</sup> In 57 percent of these 612 people, the disease was believed capable of resulting, if unchecked, in death or major disability.

<sup>3</sup> In 34 percent the disease was judged capable of producing minor disability.

<sup>4</sup> In 9 percent insignificant.

<sup>5</sup> In 93 percent of these disease conditions therapeutic measures are available which are considered beneficial.

Disease or condition :	<i>Number of diagnoses</i>
Obesity-----	182
Hypertension-----	157
Anorectal lesions-----	131
Colonic polyps-----	112
Prostatic lesions-----	67
Inguinal hernia-----	40
Diabetes-----	35
Anxiety state, mild-----	25
Arteriosclerotic heart disease-----	18
(a) Angina pectoris-----	5
(b) Unspecified AHD-----	7
(c) CHD-----	3
(d) MI-----	3
Peptic ulcer-----	21

In a total of 1,295 new diagnoses, these were distributed among 612 people.

Thirteen percent of these people had multiple new diagnoses—13 percent of these people had 54 percent of the total amount of detected disease.



## REFERENCES SHEET 6

*Reference*

Foote, F. M. and Boyce, V. S.: Screening for glaucoma, *J. Chron. Dis.* 2: 487-90, 1955.

Location	Population	Purpose	Examination	Findings
Philadelphia, Pa., J.A.M.A. 147:1127, 1951.	10,000 industrial employees, ages 40-65.	1st large-scale glaucoma- screening project.	Tonometry by oculists, acuities by assistants.	153 (1.53 percent)— previously known cases of glaucoma; 71 (0.71 percent)— borderline glau- coma — ("at least 2 percent") previously undiag- nosed cases of glaucoma.
Wright-Patterson Air Force Base in Ohio, <i>Am. Acad. Ophth.</i> 56: 982, 1952.	238 persons over age 40.	Glaucoma screen- ing survey.	Tonometry . . . . .	7 (2.9 percent)— abnormally high tensions.
A study by G. D. Phelps, <i>J. Iowa M. Soc.</i> 39: 519, 1949.	720 persons over age 45, seeking eye care in pri- vate practice.	Screening of pa- tients seeking eye care.	Routine tonom- etry.	— (5 percent)— incidence of glau- coma.
Cleveland, Ohio, <i>Sight-Saving Rev.</i> 24: 139, 1954.	12,803 persons over age 40.	A 1-day free screening proj- ect for glau- coma.	Tonometry by oculists.	23 (0.18 percent)— previously known cases of glaucoma; 217 (1.69 percent)— previously undiag- nosed cases of glaucoma.

*Comments*

Early detection of glaucoma is the most important factor in preventing loss of vision from this disease.

Early treatment greatly increased the likelihood of controlling pressure.

Properly conducted tonometric tests are a productive means of finding glaucoma among men and women over age 40.

At present 1 out of 8 blind persons has lost his sight from glaucoma and an estimated 1 million men and women over age 40 have the disease as yet unrecognized.

## REFERENCE SHEET 7

*Reference*

Roberts, D. W. and Wylie, C. M.: Multiple screening in the Baltimore study of chronic illness, *J.A.M.A.* 161:1442-446, 1956.

*Location*

Baltimore Multiple Screening Clinic, Baltimore, Md.

*Population*

2,024 people, out of 7,000, invited to take part in the screening tests (29 percent).

All ages from 17 to over 75; 922 males; 1,086 females; 1,562 white; 429 nonwhite.

*Purpose*

To study multiple screening as a device for early detection of chronic disease and to study the relative usefulness of various screening procedures.

*Examination*

- (1) Height, weight (for obesity).
- (2) Self-screening questionnaire (for heart disease).
- (3) Six-lead EKG.
- (4) Blood pressure.
- (5) Visual acuity test (American Optical Co. sight screener).
- (6) Hearing acuity test.
- (7) Miniature chest X-ray for TB, heart disease, other chest conditions.
- (8) Urine albumin (SSA).
- (9) Urine sugar (Clinitest, 45 min. p.c. 50 gm. glucose).
- (10) Blood sugar (Wilkerson-Heftmann, 50-70 min. p.c. 50 gm. glucose).
- (11) Hemoglobin (CuSO<sub>4</sub>, specific gravity).
- (12) STS.

*Findings*

Of the 652 persons with 1 or more major abnormalities, only 45 were already aware of the condition. The remaining 607 had newly discovered abnormalities.

*Summary of screening test results and of followup procedure*

Condition for which screened	Persons screened (1) <sup>1</sup>	Positive results		Followup completed with physician (4)	Condition confirmed	
		Total (2)	Previously unknown to screenee (3)		Total (5)	Previously unknown to physician (6)
Hypertension.....	2,021	150	67	41	31	11
Heart disease (electrocardiogram).....	2,020	247	194	123	43	<sup>2</sup> 16
Heart disease (X-ray).....	1,767	182	155	67	29	<sup>2</sup> 8
Heart disease (questionnaire).....	1,898	113	78	42	17	<sup>2</sup> 5
Tuberculosis.....	1,767	34	28	16	2	2
Other chest disease.....	1,767	64	50	17	2	1
Proteinuria.....	1,946	88	79	37	2	2
Diabetes.....	1,916	15	14	9	5	
Anemia.....	1,860	32	29	13	8	<sup>4</sup> 7
Syphilis.....	1,949	53	( <sup>3</sup> )	14	4	1
Obesity <sup>4</sup> .....	2,021					
Impaired vision <sup>5</sup> .....	2,006					
Impaired hearing <sup>6</sup> .....	2,016					

<sup>1</sup> Column (1) excludes persons not receiving a test and those for whom a test result was unsatisfactory.

<sup>2</sup> Total of previously unknown heart disease cases found by all tests was 23.

<sup>3</sup> Screenees were not asked if they already knew they had syphilis.

<sup>4</sup> 106 abnormal, and previously unaware of condition.

<sup>5</sup> 530 abnormal.

<sup>6</sup> 76 abnormal, and previously unaware of condition.

REFERENCE SHEET S

*Reference*

Schenthal, J. E.: Multiphasic screening of the well patient, J.A.M.A. 172: 1-4, 1960.

*Location*

Tulane University Cancer Detection Clinic, New Orleans, La.

*Population*

10,709 apparently healthy, consecutive examinees at the CDC, over a 12-year period.

Range of ages—10 to 89 (59 percent, 30–49; 18.7 percent, 50–59; 11.7 percent, 20–29); 24.5 percent males; 7.6 percent Negroes; 97 percent well patients of private physicians; 3 percent indigent, well patients of public clinics.

All socioeconomic levels, many occupations, most were gainfully employed or homemakers.

*Purpose*

To gather information on the value and technique of an initial or periodic examination of the asymptomatic person.

*Examination*

- (1) Medical history:
  - (a) By an internist.
  - (b) By a gynecologist on the females.
  - (c) Supplementary Cornell Medical Index.
- (2) Physical exam:
  - (a) Rectal and genital.
  - (b) Proctosigmoidoscopy, if acceptable.
- (3) Hematocrit.
- (4) Hemoglobin.
- (5) wbc.
- (6) STS.
- (7) "Urinalysis."
- (8) Chest X-ray.
- (9) Cytological study for uterine cancer on females.

*Findings*

Disease or condition	Cases	Percent	Frequency of findings which were previously unknown
A. Malignancies .....	77	0.72	All the malignancies were previously unknown.
Thyroid .....	1		
Tonsils .....	1		
Larynx .....	2		
Breast .....	17		
Lung .....	4		
Stomach .....	1		
Rectum .....	4		
Sigmoid colon .....	5		
Ovary .....	2		
Uterine cervix .....	15		
Uterine endomet .....	1		
Kidney .....	1		
Bladder .....	1		
Prostate .....	1		
Testis .....	1		
Skin .....	20		
B. Cardiovascular Diseases .....	2,106	20	348—17 percent of the 2,106 cases. Practically all unknown.
C. Gynecologic abnormalities—Diseases of cervix, adnexa, body of uterus vagina .....	15,280	165.3	
D. Gastrointestinal disorders, hemorrhoids, abnormal function of stomach and duodenum, colon, rectum .....	2,281	21	456—20 percent of the 2,281 cases.
E. Genitourinary tract diseases: chronic nephritis, lower urinary tract inflamed disease, prostatitis .....	664	6	378—57 percent of the 664 cases.
F. Neuroskeletal disorders: R.A., osteoarthritis, postural abnormalities .....	535	5	
G. Respiratory tract diseases: chronic asthma, bronchitis, bronchiectasis, pneumonitis, active TB .....	3,384	32	1,624—48 percent of the 3,384 cases.

<sup>1</sup> Of the 8,085 females studied.

8 percent of the 10,709 subjects were considered to have no abnormal findings.

92 percent of the 10,709 subjects were considered to have pathologic physiology.

## REFERENCE SHEET 9

*Reference*

Weinerman, E.R., Breslow, L., Belloc, N.B., Waybur, A., and Millmore, B.K.: Multiphasic screening of longshoremen with organized medical followup, *Am. J. Pub. Hlth.* 42: 1552-567, 1952.

*Location*

San Francisco Bay area, California.

*Population*

3,994 out of an estimated 5,200 San Francisco Bay area longshoremen—all males.

Range of ages—14 to over 65; median age, 49; 57 percent, 45-64.

70 percent were basic cargo handlers; other were supervisory, clerical, or mechanical workers.

*Purpose*

To study the potentiality of multiphasic screening in medical care programs providing comprehensive services.

*Examination*

- (1) Height, weight.
  - (2) Vision (eye charts).
  - (3) Hearing (audiometers).
  - (4) Chest X-ray (70 mm.).
  - (5) EKG—6 lead.
  - (6) Blood pressure.
  - (7) STS (VDRL or Mazzini—Kahn or Kolmer on positives).
  - (8) Hemoglobin (CuSO<sub>4</sub> specific gravity).
  - (9) Blood sugar (Wilkerson-Heftman, 50-70 min. p.c. 50 gm. sucrose).
  - (10) Urine sugar (Benedict's 50-70 min. p.c. 50 gm. sucrose).
  - (11) Urine albumin (SSA).
  - (12) Medical history (self-administered, modified CMI).
- (Known diabetics were not given the sucrose.)

*Findings—Results of diagnostic followup of longshoremen, June 18-Nov. 30, 1951*

Result	Number	Percentages		
Total men tested.....	3,994	100.0		
Men with 1 or more positive tests.....	2,521	63.1	100.0	
Followup not available.....	41		1.6	
Did not respond.....	660		26.2	
Responded to followup.....	1,820		72.2	100.0
All diagnoses pending.....	185			10.2
1 or more diagnoses completed.....	1,635			89.8
All findings negative.....	222			(12.2)
1 or more positive diagnoses.....	1,413	(35.4)		(77.6)
All previously known.....	640			45.3
1 or more newly discovered.....	773	(19.4)		54.7

TABLE 5.—Results of diagnostic followup by test, June 18, 1951–Nov. 30, 1951

Result	Test										
	Weight	Vision	Hearing	Chest X-ray	Blood pressure	ECG	Serologic test for syphilis	Blood sugar	Urine sugar	Urine albumin	Hemoglobin
Total men tested <sup>1</sup> .....	3,992	3,972	3,992	3,990	3,989	3,984	3,974	3,966	3,987	3,988	3,986
Men with positive test.....	<sup>2</sup> 361	944	501	166	837	666	412	156	199	92	5
Followup not available <sup>3</sup> .....	16	18	5	4	8	15	12	1	2	1	0
Did not respond.....	85	527	242	31	200	131	103	30	36	16	0
Responded to followup.....	260	399	254	131	629	520	297	125	161	75	5
Diagnosis pending.....	18	0	4	30	123	80	38	22	20	24	0
Diagnosis completed.....	242	399	250	101	506	440	259	103	141	51	5
Negative diagnosis.....	1	4	7	27	137	139	100	47	87	16	0
On basis of recheck test only.....				17			75	47	83	11	4
On basis of doctor's examination.....	1	4	7	10	137	139	25	0	4	5	0
Positive diagnosis.....	241	395	243	74	369	301	159	56	54	35	1
Previously known <sup>4</sup> .....	167	190	151	41	162	119	136	22	25	19	0
Newly discovered.....	74	205	92	33	207	182	23	34	29	16	1
Percent with positive test in total tested.....	9.0	23.8	12.6	4.2	21.0	16.7	10.4	3.9	5.0	2.3	0.1
Percent responding among those with positive tests.....	72.0	42.3	50.7	78.9	75.1	78.1	72.1	80.1	80.9	81.5	( <sup>5</sup> )
Percent with positive diagnosis among those with completed diagnosis.....	99.6	99.0	97.2	73.3	72.9	68.4	61.4	54.4	38.3	68.6	( <sup>5</sup> )
Percent with newly discovered diagnosis among those with positive diagnosis.....	30.7	51.9	37.9	44.6	56.1	60.5	14.5	60.7	53.7	45.7	( <sup>5</sup> )
Percent with positive diagnosis in total tested.....	6.0	9.9	6.1	1.9	9.2	7.6	4.0	1.4	1.4	.9	( <sup>5</sup> )
Percent with newly discovered positive diagnosis in total tested.....	1.9	5.2	2.3	.8	5.2	4.6	.6	.9	.7	.4	( <sup>5</sup> )

<sup>1</sup> Excludes unsatisfactory tests.<sup>2</sup> Includes 360 who were 40 percent or more overweight and 1 who was 25 percent or more underweight. The man who was underweight did not respond.<sup>3</sup> Includes a few men who through error were not referred.<sup>4</sup> Includes those not stated as "newly discovered" or "previously known."<sup>5</sup> Percentages not computed when base is less than 50.<sup>6</sup> Less than 0.05.

TABLE 6.—*Newly discovered and previously known diagnoses by selected diagnostic categories*

Diagnostic category	6th revision, international list No.	Number of cases			
		Total	Newly discovered	Previously known	Not stated
Total diagnoses.....		1 2, 318	1, 087	1, 107	124
I. Pulmonary tuberculosis.....	002.....	12	6	5	1
Syphilis and its sequelae.....	022-029.....	175	28	136	11
Other infective and parasitic diseases.....	Y 03 and residual, 001-138.....	31	15	15	1
II. Malignant neoplasms.....	140-205.....	11	7	4	-----
Benign neoplasms.....	210-239.....	6	4	2	-----
III. Diabetes mellitus.....	260.....	79	46	30	3
Obesity.....	287.....	378	138	213	27
Other allergic, endocrine, metabolic, and nutritional diseases.....	Residual, 240-289.....	36	17	17	2
IV. Diseases of the blood and blood-forming organs.....	290-299.....	2	2	-----	-----
V. Mental, psychoneurotic, and personality disorders.....	300-326.....	17	7	8	2
VI. Refractive errors.....	380.....	367	210	172	15
Impairment of hearing.....	398.....	224	85	131	8
Other diseases of the nervous system and sense organs.....	Residual, 330-398.....	106	50	47	9
VII. Chronic rheumatic heart disease.....	410-416.....	8	5	3	-----
Arteriosclerotic and degenerative heart disease.....	420-422.....	149	99	48	2
Hypertensive disease.....	440-447.....	344	188	143	13
Other diseases of the circulatory system.....	Residual, 400-468.....	70	47	21	2
VIII. Acute respiratory infections.....	470-473, 491-510.....	14	9	2	3
Silicosis and occupational pulmonary fibroses.....	523.....	6	4	1	1
Other diseases of the respiratory system.....	Residual, 470-527.....	65	34	25	6
IX. Diseases of the digestive system.....	530-537.....	51	19	28	4
X. Nephritis and nephrosis.....	590-594.....	9	6	2	1
Other diseases of the genitourinary system.....	600-637.....	34	22	12	-----
XII. Diseases of the skin and cellular tissue.....	690-716.....	14	6	6	2
XIII. Diseases of the bone and organs of movement.....	720-749.....	23	8	14	1
XIV. Congenital malformations.....	750-759.....	4	3	1	-----
XVI. Symptoms and ill-defined conditions.....	780-795.....	46	22	15	9
XVII. Injuries.....	800-999.....	7	-----	6	1

<sup>1</sup> 1,413 men had 1 or more positive diagnoses.

## REFERENCE SHEET 10

*Reference*

Wilkerson, H.L.C. and Krall, L.P.: Diabetes in a New England town, J.A.M.A. 135, 209-16, 1947.

*Location*

Oxford, Mass.

*Population*

3,516 persons in a community of 4,983 (70.6 percent).

1,680 males; 1,836 females.

Range of ages—from under 15 to over 75; average age was 30.

Farmers, millworkers, etc.

*Purpose*

(1) To determine prevalence of diabetes mellitus among the general population in a typical American community.

(2) To evaluate technics and methods of large scale diabetes diagnosis.

(3) To instill in members of a community a realization of the need for periodic examinations for diabetes.

(4) To discover early cases of diabetes so that through prompt treatment further progression and complications may be avoided.

*Examination*

(1) History.

(2) Urine sugar (Benedict's qual. and quant. on the positives).

(3) Blood sugar (Folin-Wu).

Blood and urine specimens were obtained approximately 1 hour after the midday or evening meal.

*Findings*

Total number tested.....	3,516
Diabetics previously diagnosed.....	40
Diabetics previously undiagnosed.....	30

	Persons with glycosuria and/or hyperglycemia	Glycosuria alone	Hyperglycemia alone
Total number.....	191	123	43
Persons diagnosed as diabetics.....	30	6	8
Unclassified.....	125		

<sup>1</sup> These people may become diabetics.

Previously undiagnosed diabetics—30 cases:

25 of these had both glycosuria and hyperglycemia on the initial test.

16 males and 14 females.

1.7 percent of the population in Oxford, Mass.

9 severe cases, 7 moderate, 9 mild, and 5 early or probable.

All persons with positive tests (one or both) initially were retested. Some of these also had glucose tolerance tests.

104 persons with glycosuria on the first test were negative on the second test. This was especially true in schoolchildren and pregnant women.

There was little difference between blood sugar levels of males and females at any given age.

There tends to be an increased blood sugar with an increase in age, as well as an increase in diabetes with increased age.

The FBS is unreliable as a means of diagnosing early diabetes—of 14 persons with abnormal GTT's, only 3 had an abnormal FBS.

As a single diagnostic procedure, 1 hour p.c. blood and urine specimens for glucose are recommended.

Both blood and urine glucose levels are necessary.

Repeat tests are recommended on positive blood and/or urine glucose tests.

## REFERENCE SHEET 11

*Reference*

Young, D.M., and Drake, Mrs. T.G.H.: Unsolicited laboratory information, unpublished material from the Technicon Symposium held in New York City, September 9, 1965.

*Location*

Toronto General Hospital, Toronto, Canada.

*Population*

398 patients randomly selected from the new patients being admitted to the medical OPD at the T.G.H. The study eventually will involve 1,000 such patients, and it was begun on May 11, 1964.

*Purpose*

To obtain information about the effect of unsolicited laboratory information on patients and on their physicians. Information was presented to clinicians for evaluation after patients left OPD.

*Examination*

- (1) Temperature.
- (2) Pulse rate.
- (3) Respiration rate.
- (4) Blood pressure.
- (5) Height.
- (6) Weight.
- (7) Blood grouping.
- (8) Hemoglobin.
- (9) Blood film scan.
- (10) ESR.
- (11) Routine urinalysis—specific gravity, sugar, protein, ketones, bile, urobilinogen, rbc, wbc, bacteria.
- (12) Blood sugar.
- (13) BUN.
- (14) Creatinine.
- (15) Na.
- (16) K.
- (17) Cl.
- (18) CO<sub>2</sub> content.
- (19) Phosphorus.
- (20) Uric acid.
- (21) Calcium.
- (22) Alkaline phosphatase.
- (23) Bilirubin.
- (24) SGOT.
- (25) PBI.
- (26) Cholesterol.
- (27) VDRL.

T.G.H. did a battery of 27 laboratory tests as their screen.



*Findings*

Of the 398 patients that have been screened so far :

No new information was provided by the screen.....	103
The new information was determined to be a lab error or an artifact.....	72
The new information served to confirm the diagnosis.....	65
The new information and abnormalities were considered to be insignificant.....	81
The new abnormalities required no treatment.....	23
The new abnormalities were significant and required follow-up.....	42
<hr/>	
The abnormalities had obscure significance.....	29
The information was erroneous.....	4
Additional diagnosis of diabetes mellitus.....	4
Additional diagnosis of uremia.....	2
Diagnosis changed from splenomegaly to polycystic kidneys.....	1
Diagnosis changed from AHD to asthma and chronic bronchitis.....	1
A probable case of hyperparathyroidism.....	1

Test done	Results abnormal, suggest a further diagnosis	Results abnormal, make a further diagnosis
Blood sugar.....	4	
BUN.....	5	
Creatinine.....	2	
ESR.....	4	
Urine WBC.....	8	2
Urine bacteria.....	5	1

TABLE I

Screening study	Population studied	Total number studied	Details of study on reference sheet No.	Total number of new diagnosis made or abnormalities found on basis of the screening tests	New diagnosis or abnormalities expressed as a percent of the number studied
Bluffton, Ind.....	People coming to an OP clinic.	11,991	1	21	0.18
Thiers' group:					
(a) Duke University.....	Hospital administration.....	1,581	2		36
(b) A community hospital.....	do.....	642			25
(c) VA hospital.....	do.....	623			24
Philadelphia, Pa.....	Executives.....	1,513	5	612	40
Baltimore, Md.....	Citizens of Baltimore.....	2,024	7	607	30
San Francisco, Calif.....	Longshoremen.....	3,994	9	773	19.4
Oxford, Mass.....	Citizens of Oxford.....	3,516	10	30	.86
Toronto General Hospital,	New patients being ad-	398	11	9	2.26
Toronto, Canada.	mitted to a medical OPD.	398	11	9	2.26

TABLE II

Disease or condition	Screening study	Details of study on reference sheet No.	Total number studied	New unsuspected cases found as a result of the screening tests	New cases expressed as a percent of the total number done
Diabetes Mellitus.....	Oxford, Mass.....	10	3,516	30	0.85
	T. G. H.....	11	398	4	1.00
	Thiers.....	2	623	15	2.45
	Baltimore.....	7	1,916	4	.21
	Pennsylvania.....	5	1,513	35	2.31
Uremia.....	Collen.....	4	1,000	2	.20
	San Jose.....	3	942	9	.95
	T. G. H.....	11	398	2	.50
Renal disease.....	Thiers.....	2	623	7	1.12
Nephritis.....	San Jose.....	3	942	2	.21
Anemia.....	Baltimore.....	7	1,980	7	.35
	Tulane.....	8	10,709	203	1.89
	San Francisco.....	9	3,986	1	( <sup>1</sup> )
	Collen.....	4	398	1	.25
Asthma and chronic bronchitis.....	T. G. H.....	11	1,000	37	3.70
Polycystic kidney.....	T. G. H.....	11	398	1	.25
Hyperparathyroidism.....	T. G. H.....	11	398	1	.25
Hypoparathyroidism.....	Indiana.....	1	11,991	9	.08
	do.....	1	11,991	3	.03
Pseudohyperparathyroidism.....	do.....	1	11,991	5	.04
Gout.....	Thiers.....	2	623	4	.64
Hepatic disease.....	do.....	2	623	2	.32
Multiple myeloma.....	do.....	2	623	1	.06
Hypertension.....	Indiana.....	1	11,991	1	.01
	Collen.....	4	1,000	31	3.10
	Pennsylvania.....	5	1,513	157	10.37
	Baltimore.....	7	2,021	11	.54
	Tulane.....	8	10,709	640	6.40
Heart disease.....	San Francisco.....	9	3,989	207	5.19
	Baltimore.....	7	2,000	23	1.15
	Tulane.....	8	10,709	88	.82
Vascular disease.....	Pennsylvania.....	5	1,513	18	1.19
Cardiovascular disease.....	Tulane.....	8	10,709	260	2.42
Tuberculosis.....	Pennsylvania.....	5	1,513	189	12.49
Other chest disease.....	Baltimore.....	7	1,767	2	.11
	San Jose.....	3	942	2	.21
Syphilis.....	Baltimore.....	7	1,767	1	.06
Obesity.....	do.....	7	1,949	1	.05
	San Francisco.....	9	3,974	23	.58
	Baltimore.....	7	2,021	106	5.25
	San Francisco.....	9	3,992	74	1.85
Impaired vision.....	Pennsylvania.....	5	1,513	182	12.01
	Baltimore.....	7	2,006	530	26.40
Impaired hearing.....	San Francisco.....	9	3,972	205	5.16
	Baltimore.....	7	2,016	76	3.77
	San Francisco.....	9	3,992	92	2.30

<sup>1</sup> Less than 0.05.

TABLE III

Laboratory test	Screening study	Details of study on reference sheet No.	Total number of tests done	Unsuspected abnormalities	Unsuspected abnormalities expressed as a percent of the tests done
Blood sugar.....	TGH.....	11	398	4	1.04
	Thiers.....	2	623	31	4.98
	San Francisco.....	9	3,966	34	.85
BUN.....	TGH.....	11	398	5	1.26
	Thiers.....	2	623	7	1.12
Creatinine.....	TGH.....	11	398	2	.50
Sodium.....	Thiers.....	2	623	10	1.61
Potassium.....	do.....	2	623	25	4.02
Chloride.....	do.....	2	623	2	.32
CO <sub>2</sub> .....	do.....	2	623	6	.96
Calcium.....	do.....	2	623	6	.96

TABLE III—Continued

Laboratory test	Screening study	Details of study on reference sheet No.	Total number of tests done	Unsuspected abnormalities	Unsuspected abnormalities expressed as a percent of the tests done
Phosphorus	Thiers	2	623	10	1.61
Total protein	do.	2	623	15	2.41
Albumin	do.	2	623	9	1.44
Uric acid	do.	2	623	28	4.49
Urine sugar	Tulane	8	10,709	1,232	11.50
	San Francisco	9	3,987	29	.73
Urine albumin	Baltimore	7	1,946	2	.10
	Tulane	8	10,709	1,169	10.91
	San Francisco	9	3,988	16	.41
Urine WBC	TGH	11	398	10	2.52
Urine bacteria	TGH	11	398	6	1.51
Renal casts	Tulane	8	10,709	1,168	10.89
ESR	TGH	11	398	4	1.04
X-ray (chest)	San Francisco	9	3,990	33	.83
X-ray (heart)	Baltimore	7	1,767	8	.45
EKG	do.	7	2,020	16	.79
	San Francisco	9	3,987	182	4.57
Tonometry	Philadelphia	6	10,000	-----	(1)
	Air Force Base	6	238	7	2.9
	Phelps	6	720	-----	5.00
	Cleveland	6	12,803	217	1.69

<sup>1</sup> At least 2.

*Plans for routine laboratory studies at the University of Minnesota hospitals*

Test	I	II	III
	All patients <sup>1</sup>	Tests selected on basis of findings in I	Age and sex selected
Height and weight	X		
Blood pressure	X		
Visual acuity	X		
Intra-ocular tension			X
Retinal photography			X
Audiometry	X		
EKG			X
X-ray:			
Chest			X
Abdomen			X
Dental screen	X		
Blood:			
VDRL	X		
Glucose (after carbo. load)	X		
Urea	X		
Calcium	X		
Sodium and potassium	X	(2)	
Cholesterol and triglycerides			
Total protein	X		
Protein electrophoresis	X		
Uric acid			X
Hemoglobin	X		
White blood cell count	X		
Lactate dehydrogenase	X	(2)	
Ornithine carbamoyl transferase	X		
Alkaline phosphatase	X		
Acid phosphatase	X		X
Urine:			
Glucose (after carbo. load)	X		
Protein	X		
Microscopic examination	X		

<sup>1</sup> Expanded or deleted as indicated by clinical judgment and economic considerations. It does not include, at present, tests such as motor performance, which would be selected on the basis of age and sex for pediatric patients.

<sup>2</sup> Bicarbonate and chloride if Na or K is abnormal.

<sup>3</sup> LDH isoenzyme separation if LDH is abnormal.

UNIVERSITY OF MISSOURI,  
MEDICAL CENTER,  
*Columbia, September 12, 1966.*

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Following receipt of your recent letter, Dr. Wilson has had an opportunity to discuss multiphasic screening with me and asked that I compose an answer to your letter.

There are several members of our faculty who have either past or current experience with multiphasic screening programs or participated in a more specific type of screening program. In addition, there are members of our faculty who are engaged in research activities which have a bearing on conduction of multiphasic health screening programs. Therefore, I will attempt to give a composite answer to the questions you ask.

First, a word in general in regard to multiphasic screening. We feel it is important to remember that this is screening and not necessarily diagnostic and that multiphasic screening can be an important tool in the hands of the physician to arrive at a diagnosis but it does not replace the history and the physical examination.

In answer to your question "Is there a place for multiphasic health screening in health care in our country?" we feel that the answer is definitely yes to this question but how effective and productive this will be will depend on how it is introduced, the understanding, both on the professional and the lay level and of reaching that plateau where laboratory data is wholly reliable and accurate.

From our past experience, for multiphasic screening to be acceptable to the public at large and to the medical profession and at the same time be most productive, it must be made available at the local level inasmuch as it is possible to do so. This may mean that we need to develop models whereby an automated basic screening could be done in each physician's office. This basic battery of screening tests might give the indication of whether the individual should go to his local community hospital for a more complex and sophisticated level of screening, and this battery of tests might indicate that the individual should go to a larger medical center where an even more complicated battery of screening tests would be given in addition to specialized testing.

In our personal experience with screening programs we feel that for it to be effective and reach as high a percent of the population of a particular area, it must have the complete understanding and acceptance, not only by the public but by the medical profession in that particular area, and that they must be given an opportunity to actively participate and be a part of the program if it is to be acceptable.

In addition to the above we need to make an accurate determination of which tests should be included in each level of screening for this to be most effective at the least cost to the patient.

In answering question 2, rather than attempt to list all of the faculty members and brief descriptions of all the programs various ones have

been involved in, I will briefly list the departments and heads of the departments:

Department of Community Health and Medical Practice, H. M. Parrish, M.D.

Department of Pathology, Fred V. Lucas, M.D.

Department of Pediatrics, Robert L. Jackson, M.D.

Department of Medicine, Thorpe Ray, M.D.

Department of Surgery, Section of Ophthalmology, John A. Buesseler, M.D.

Members of the above-named departments have had varying experience with specific screening programs, and a few have had experience in multiphasic screening programs. In addition, experimentation and research with automated screening, standardization of tests, and computerization of data and models of stages of screening are underway.

In answer to question 3, while many conditions, particularly chronic illnesses, are more apparent in individuals above the age of 60, many of these conditions started years before, even in childhood. Therefore, properly developed and with a measure of selectivity, it would seem appropriate for any screening program to be used at a time when it would be most apt to pick up the condition at its earliest beginning if we would hope to be effective in primary prevention.

It would seem important to realize that at the present time there are a number of problems before mass population screening can become a reality. One, of course, is adequate reference standards. These are yet to be developed although there is work in this area at the present time. However, quite frankly, such reference standards are either not available for a number of tests or if they are available, are often of poor quality. Another problem which should be mentioned is that of development of appropriate methods for sampling, the preservation, preparation, and transportation of biological materials in a standardized format. Another problem of which we are aware of and have been doing some work on, is what are the normal ranges which must be established by age range, sex, and race differences as well as other genetic variations. For instance, does screening for diabetes done by blood sugar method or a modified glucose tolerance test have varying levels of normal depending on the race, age, and sex of the individual? A fourth problem would seem to be one which is quite important and that is manpower. At the present moment there is a serious shortage of qualified individuals capable of staffing laboratories to handle such volumes of multiphasic screening and in addition, there is a need for additional training programs for both the professional and technical personnel.

I realize this is a rather brief report, however I will be happy to go into greater detail if there are any additional specific questions or aspects that you feel you would like to have us comment on.

In summary, we feel that multiphasic screening does have a real place in the practice of medicine particularly as we stride further into the realm of the practice of preventive medicine, and hopefully wherever possible, this would be primary prevention. We realize that there are many problems yet to be solved before this can be most effective

and feel that this should not be limited to any particular age group if it is to be most productive from the patient's standpoint.

Sincerely,

W. C. ALLEN, M.D.,  
*Assistant Medical Director.*

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THE UNIVERSITY OF NORTH CAROLINA,  
THE SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Chapel Hill, September 9, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Dr. William L. Fleming, assistant dean in this medical school and chairman of our department of preventive medicine, has answered for me your letter of August 23. I concur fully in his comments.

I would like to add that in our medical school Dr. George Summer and Dr. John Hill in collaboration have developed automated methods for the early detection of metabolic abnormalities in children which are associated with subsequently developing disease processes. The techniques of these two investigators make possible early institution of preventive and protective measures.

Thank you for your inquiry.

Sincerely yours,

ISAAC M. TAYLOR, M.D., *Dean.*

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THE UNIVERSITY OF NORTH CAROLINA,  
THE SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Chapel Hill, September 8, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Dr. Isaac M. Taylor, dean of the school of medicine, University of North Carolina, has asked me to answer for him your letter of August 23.

My answers to the questions you propose are as follows:

1. I think very definitely that there is going to be an increasing role for "multiphasic health screening" in health care in this country. However, I think that there will be problems in the acceptance of multiphasic screening programs both by the public and also by the medical profession. Some of these problems relate to questions concerned with the time and expense for the patient which may be involved in ruling out false positive screening tests. Other questions relate to whether or not such screening programs should be set up in connection with the actual practice of medicine to better insure physician involvement in the responsibility for their proper use and interpretation.

2. Dr. Robert R. Huntley of the staff of this medical school is the faculty member who has perhaps had the most experience with multi-phasic screening programs. His experience is unusual in that some of it has related to the actual use of screening procedures in connection with the private practice of medicine.

3. I don't believe that I would want to attempt to give a quick and superficial answer to your suggestions for effective screening programs for persons below and above age 60. Some of the obvious suggestions are readily available in connection with the discussion of results of other programs. I would be glad to attempt to develop some suggestions in collaboration with my colleagues for later transmittal to you if this were considered important.

4. I have mentioned the name of Dr. Huntley as a local resource. You have already mentioned the experience of the Kaiser Foundation in California. Their guidance would be invaluable both because of the automation they have achieved in the carrying out of their screening procedures and also because their screening procedures are done in connection with the active practice of medicine. I think also the Health Insurance Plan of New York would be another source of information about screening procedures.

Hoping this information will be of some benefit to you, I am,

Sincerely yours,

WILLIAM L. FLEMING, M.D.,  
*Assistant Dean.*

THE UNIVERSITY OF NORTH DAKOTA,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Grand Forks, October 21, 1966.*

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I am very late in answering your letter of August 23, 1966. This is a basic science 2-year school of medicine and as such we have no clinical faculty. We have no residents or interns in this community and therefore, no local programs underway.

1. To answer your direct questions, I think there is a place for multi-phasic health screening in health care in our country. There is certainly not enough medical manpower—that is, physicians—to do this job. We would have to develop aids of some sort like the Navy has with corpsmen to do the initial phases of the routines.

2. We have made a laboratory contribution to a communitywide test for diabetes in the past which worked very well. Dr. E. A. Haunz, 221 South Fourth Street, Grand Forks, an intern interested in diabetes, spearheaded the program. It was highly successful and we found a number of hitherto undiscovered cases.

We have had a screening program for glaucoma in cooperation with the Division of Vocational Rehabilitation, 418 East Rosser, Bismarck, N. Dak., with Merle Kidder as the head. We found some borderline cases in the older age group.

3. One area of health screening which is relatively simple to identify but extremely difficult to do anything about is the problem of obesity.

As patients get older their fat becomes a burden. A weak heart, diabetes, blood pressure, and all sorts of things are much worse when the patient is fat. Heroic measures are sometimes needed to convince the people that a rigid diet is necessary, and where it can be done, it does pay off. This I would feel is the most fruitful area.

Again I am sorry to be so delayed in writing this letter, but in a first reading I thought we had nothing to suggest.

I recall your visit and very effective talk at the fieldhouse a few years back on the "Hazards of Smoking." As I remember, it was well attended and the talk well received.

Best regards,

T. H. HARWOOD, M.D., *Dean.*

THE UNIVERSITY OF OKLAHOMA MEDICAL CENTER,  
*Oklahoma City, Okla., September 7, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Your recent letter to Dr. James L. Dennis, dean of the University of Oklahoma School of Medicine, has been called to my attention with the suggestion that I communicate to you some of our experiences in the State with multiphasic screening programs. The Oklahoma State Department of Health has had extensive experience with a mobile unit multiphasic screening program initiated in 1958. At the request of a civic sponsoring organization, the local physicians and the local health department, the mobile unit will spend from 4 to 12 weeks in a county, handling up to 80 persons per day. Tests currently in use include height and weight (for overweight), pulmonary function tests, chest X-ray (read for tuberculosis, heart size, and other pathology), hemotocrit, blood glucose, blood pressure, abbreviated electrocardiogram, tuberculin skin test, and cervical cytologies. This unit has been in continuous operation since 1960, and has at times had a waiting list of as many as 18 counties in Oklahoma attesting to its popularity with both the public and physicians. I take the liberty of enclosing two articles describing the unit and some of the results from the program.

I was involved in the initial development of this program (1960-62) and recognize many of the problems inherent in such programs relating to public and physician acceptance. The key to the success of this program, I am convinced, lies in the early inclusion of the physicians in each county in the planning phases. A more extensive discussion may be found in the enclosed reprints.

My present impression is that only a few of the screening tests, most notably cervical cytology and tonometry (glaucoma), are of demonstrable value in reducing morbidity or mortality. Unquestionably, many unrecognized and asymptomatic cases of hypertension, diabetes, arteriosclerotic heart disease, and chronic lung disease can be picked up in population screening programs. The next obvious question is, "Is there anything that a physician can do for such individuals which will reduce morbidity or mortality?" This is particularly true for the asymptomatic person over age 60. Before extensive case-finding pro-



grams are developed to detect these diseases, we should have evidence in hand that early detection is going to improve the health of these individuals. With a few exceptions (cervical cytology and tonometry), I don't think this evidence yet exists.

Cost analyses of the operations are discussed in the attached reprints. If we can provide any further information on specific aspects of this program, please let us know.

Sincerely yours,

ROBERT D. LINDEMAN, M.D.

UNIVERSITY OF PENNSYLVANIA,  
THE SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Philadelphia, Pa., August 31, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In reply to your letter of August 23, I want to congratulate the Subcommittee on Health of the Elderly for their wisdom. You are absolutely right in your opinion that multiphasic screening programs should and will play an increasingly important role in the medical care of our citizens of every age.

We at the University of Pennsylvania are currently planning a major push along these lines. As you probably know, there is now available automatic instrumentation (a Swedish instrument, I believe) which can do 30 analytical procedures on an extremely small sample of blood in several minutes. There is simply no doubt in my mind that within 5 to 10 years a number of medical centers and regional hospitals will have the facilities to do a biochemical profile on all patients admitted to their hospitals. The National Institutes of Health are doing pioneer work on this at the present time in an effort to reduce the costs per determination from approximately \$1 hopefully to 25 cents. Should this be possible, for a total cost of \$7.50 to \$10 a mass of important information could be presented to the physician before he sees the patient. To say that this would result in enormous improvements in medical diagnosis and possibly effect the saving of many lives would be an understatement.

I would prefer you to a more modest experiment which has been going on at Duke University Hospital during the past year or two. If I recall the data correctly, a battery of some 10 to 12 tests was routinely run on half of the patients entering the hospital. The other half were handled by the professional staff in the usual way. I have been told that 25 percent of the first group had abnormal findings which were not detected by physical examination. If these figures are correct, and they should be checked out, this provides very significant evidence of the benefits to be derived from such a procedure.

I believe this more or less answers your question 1. I have no doubt about the public's acceptance of such a program which has a potential of providing such benefits. With regard to question 2, we are planning for the development of just such a facility at the hospital of the University of Pennsylvania which we hope will serve not

only our own patients but a number of other hospitals in the region, and in addition may provide a service to many practicing physicians in the area. Our professor of biochemistry, Dr. Howard Rasmussen, has been working hard on these plans, and although we don't expect to have anything going in an effective way in less than 4 or 5 years, we are hopeful that the space and the necessary funding for instruments will be found. The initial outlay is, I believe, very high indeed.

Obviously, this kind of program can serve patients of all ages. Finally, I am completely convinced that these developments will have an enormous impact on the pattern of medical care in this country. I wish you and your committee much success, and hope you will feel free to call on me if I can ever be of any help.

Sincerely yours,

SAMUEL GURIN, *Dean.*

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UNIVERSITY OF PUERTO RICO,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*San Juan, P.R., September 13, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: A study of modern health screening methods is timely and necessary. There is no question that multiphasic health screening is an extremely important part of health care in our country in all age groups. I believe that there is a need for greater and more efficient use of known methods available, plus need for research for simpler methods where these are not readily available. An example of this need is tuberculosis where we must resort to combinations of tuberculin testing, X-rays and sometimes bacteriological examinations in order to detect the persons who are likely to have active disease. A simple test that would screen out these people would help enormously in preventing disease to the extent that it might be possible to eradicate it within a generation.

Our school is responsible for the health care of the northeast region of Puerto Rico which includes about 800,000 persons. For this reason, we are profoundly interested in multiphasic health screening.

Yours sincerely,

JOSÉ E. SIFONTES, M.D., *Dean.*

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THE UNIVERSITY OF ROCHESTER,  
SCHOOL OF MEDICINE AND DENTISTRY,  
*Rochester, N.Y., September 8, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Dr. Donald G. Anderson has referred to me your letter of August 23 about multiphasic screening examinations as it was his feeling that I could best answer your inquiries

because of past experience and recent discussions that we have had here.

I will answer your questions in the order they are written in your letter.

1. My personal belief is that there is a place for multiphasic health screening in health care in this country; this view is shared by some individuals in our medical community. There probably will be certain problems in acceptance of such a program by the public. A small number of possibly hypochondriacal individuals will over utilize the program and possibly show undue concern over the results of the examination. Balanced against this will probably be a much larger proportion of the population who will not utilize the program or if they go through multiphasic screening will not cooperate in followup of any abnormal findings. Acceptance of this type of a program by the medical profession appears to be quite variable, at least in this part of the country. The majority of the physicians with whom I have discussed this believe that it would not help them personally in their present practice. Several of the physicians with whom I have talked have felt that it can be utilized in certain population groups such as migrant laborers, industrial employees, and inhabitants of rural areas without physicians.

2. To the best of my knowledge no one in this area has participated in the operation of a program similar to that carried on by the Permanente Foundation. Certain individual physicians in this community do have a particular interest in this type of a program and probably will be involved in the near future. Their names are as follows:

Dr. Robert B. Burton, 277 Alexander Street, Rochester, N.Y. 14607. Dr. Burton is the medical director of the program for the Amalgamated Clothing Workers Union in this city.

Dr. Charles B. Sherman, Jr., Strong Memorial Hospital, 260 Crittenden Boulevard, Rochester, N.Y. 14620. Dr. Sherman is the past president of the Medical Society of the County of Monroe and has a particular interest in cancer detection.

Dr. James H. Sterner, Eastman Kodak Co., 343 State Street, Rochester, N.Y. 14650. Dr. Sterner is the medical director of Eastman Kodak and he has told me that he is involved in studies of periodic examinations.

Dr. Lawrence E. Young, University of Rochester School of Medicine and Dentistry, 260 Crittenden Boulevard, Rochester, N.Y. 14620. Dr. Young is professor of medicine and chairman of the department here in the medical school and chairman of the planning committee for the regional medical program in heart disease, cancer, and stroke.

Dr. Ralph C. Parker, Jr., University of Rochester School of Medicine and Dentistry, 260 Crittenden Boulevard, Rochester, N.Y. 14620. My present involvement is as coordinator for the regional medical program in heart disease, cancer, and stroke. I have had previous experience with comprehensive periodic health examinations while serving in the U.S. Navy Medical Corps.

We hope, as part of our regional medical program in heart disease, cancer, and stroke, to develop a pilot program in multiphasic health

screening. If our experience in the pilot program is satisfactory then hopefully we would spread this by establishing both fixed and mobile units and also by helping to train technicians who could perform this type of service for others.

3. In this question you suggest that there may be a difference between screening health programs for persons below the age 60 and above the age 60. Actually we are considering basing the types of examinations done on individuals not only on age groups which would be more finely divided than over or under age 60 but also on racial background and sex. Certain examinations would be indicated for a person of known ethnic background, male or female, at a certain age. Some of these tests might not be appropriate for an individual falling in another block. It is our present thinking that setting up examinations on this basis will lead to greater efficiency and greater yield.

The whole area of periodic examinations or screening examinations has been a matter for debate for some years. Enthusiasts for these programs can produce figures showing the large number of abnormalities picked up by these routine examinations, although apparently not all these abnormalities are of great significance. It has been pointed out by those less enthusiastic over this type of program that it would be completely impossible to involve the total population of this country in any sort of periodic health examination. Probably the application of such a program to certain high risk groups at appropriate intervals would be a reasonable solution at this time. Periodic health examinations are often done once a year; however, it is my experience that the natural histories of various diseases do not conform necessarily to our 365-day year which is based on astronomical rather than biological considerations.

This area needs a good objective study by various groups in different parts of the country involving sufficient numbers of people to give statistically valid results. Wider programs could then be developed on the basis of these findings. It would probably be a rather ineffectual use of our fiscal resources and health personnel to precipitate our country into a grandiose screening program that was not adequately based on valid studies.

Yours sincerely,

RALPH C. PARKER, JR., M.D.

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THE UNIVERSITY OF TENNESSEE,  
COLLEGE OF MEDICINE,  
*Memphis, Tenn., September 8, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of recent date in regard to the pending hearings on screening methods to detect chronic illness.

As in most aspects of the practice of medicine, the problem is not so much the techniques of early detection of disease but in implementation of these techniques. That is, whether it can best be done in the

private physician's office or in public clinics or some combination. Our department of preventive medicine, under the direction of Dr. Henry Packer, has had a depth of experience with mass screening techniques over a period of many years at the City of Memphis Hospitals. Dr. Packer and his associates first showed the value of tenometer recordings on all patients presenting themselves to the clinic beyond age 40. I believe that there would be tremendous reaction among the medical profession for federally supported mass screening clinics for all citizens. I therefore believe it should be implemented for the medically indigent group through existing public health channels such as State service funds to local public health departments. For the private patient it can best be done in the private physician's office. Here we in medical education have a great responsibility to emphasize preventive medicine and early detection of disease to our students both on the lecture podium and by precept so that they will practice this kind of medicine.

May I refer you to Dr. Henry Packer, professor of preventive medicine, University of Tennessee College of Medicine, 62 South Dunlap, Memphis, Tenn. 38103, who, I think, might have a great deal of interest to say to you and your committee prior to or during your hearings.

Sincerely yours,

M. K. CALLISON, M.D.

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THE UNIVERSITY OF TEXAS,  
GRADUATE SCHOOL OF BIOMEDICAL SCIENCES AT HOUSTON,  
*Houston, Tex., October 18, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Special Committee on Aging,  
U.S. Senate, Washington, D.C.*

DEAR MRS. NEUBERGER: I regret that your letter of August 31, in regard to health screening, did not reach me until yesterday. A change of address and the pursuant problems of forwarding my mail resulted in this unfortunate delay.

It would have been a welcome opportunity for me to comment upon the questions you posed, and especially to affirm the positive values of multiphasic health screening in health care in our country.

I followed the press reports of our committee hearings, and was pleased to learn of the support and encouragement that the concept of health screening apparently received. My own comments would have only added additional support. The work of Dr. Morris Collen, at Kaiser, is admirable, and his program offers a prototype which seems most desirable.

I shall look forward to reading the details of the committee hearings when they are available. If I can be of any assistance in the future, please do not hesitate to let me know.

Please accept my best wishes for your continued success.

Sincerely,

HELEN L. TINNIN, Ph. D.,  
*Associate Professor, Health Education.*

THE UNIVERSITY OF TEXAS,  
SOUTH TEXAS MEDICAL SCHOOL,  
OFFICE OF THE DEAN,  
*San Antonio, Tex., September 3, 1966.*

HON. MAURINE B. NEUBERGER,  
*Senate Office Building,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you very much for your courteous letter of recent date concerning the study of modern health screening methods to detect and prevent chronic disease in the elderly. The University of Texas South Texas Medical School is in a unique position to participate in such programs since it is a new school in its early developmental stages and is located in a community which has a high proportion of elderly medically indigent persons. Although there is no program in existence which meets these specifications, it is our desire to implement such a program at the earliest possible date. Through the cooperation of the Bexar County Hospital District hospitals, it will be possible to establish such a program in the near future with the cooperation of the various health agencies in the community.

I will request Leon Cander, M.D., who is professor and chairman of the combined department of internal medicine and physiology at the medical school, to provide me with his opinions concerning details of this study and will be happy to communicate these to you at an early date. Please let me know if I may be of any specific assistance to you in this worthwhile project.

Sincerely yours,

F. C. PANNILL, M.D., *Dean.*

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THE UNIVERSITY OF TEXAS,  
SOUTH TEXAS MEDICAL SCHOOL,  
OFFICE OF THE DEAN,  
*San Antonio, Tex., September 21, 1966.*

HON. MAURINE B. NEUBERGER,  
*Senate Office Building,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: As was promised in my letter to you on September 3, 1966, I should like to submit a little additional information to you concerning multiphasic health screening programs derived from consultation with Leon Cander, M.D., professor and chairman of the department of internal medicine and physiology. We both agree that the effective screening program should be aimed at pregnant women and individuals under the age of 16 in the initial phases. The schools, both public and private, could be utilized for the implementation of a program among children, and the pregnant women could be screened through a variety of existing health agencies. As the program is expanded to include other adults, every hospital in America should serve as a nucleus for health education which could then be dispersed into the community. A broad program of education should

be undertaken initially to make use of the community and voluntary health agencies which now operate more or less independently of one another.

Dr. Cander suggests that you contact Kendall Elsom, M.D. who is presently medical director of Scott Paper Co., International Airport, Philadelphia, Pa. Dr. Elsom has approached this problem from the standpoint of the industrial applications, but he does have a background which might be useful to your committee.

Although this information is somewhat fragmentary, please be assured that the faculty of this medical school stands ready to assist you and your committee in any way possible.

Sincerely yours,

F. C. PANNILL, M.D., *Dean.*

THE UNIVERSITY OF TEXAS—MEDICAL BRANCH,  
*Galveston, September 14, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I was pleased to learn from your letter of August 31, 1966, that your Subcommittee on Health of the Elderly is undertaking a study of modern health screening methods aimed at the early detection of chronic illness.

Those of us in this department feel strongly that there is a place for multiphasic health screening programs in this country as an integral part of comprehensive health care. Furthermore, it is likely that such comprehensive screening methods will receive increasingly wider use within the coming years. This is a logical outgrowth of the increasingly prevalent attitude among our citizens of an entitlement to good health.

It is clear from such automated centers now in operation that a rapid and accurate system of disease diagnosis can reduce the cost below that of conventional screening methods and at the same time make better use of the physician's time. As yet, we do not have an automated system of multiphasic screening in progress here. However, we would want such a plan to include individuals well below and above the age of 50.

It would not be surprising if the medical profession was somewhat slow in accepting this type of screening program since time would be required to convince physicians of the timesaving potential of such systems.

We hope it will be possible for you to keep us posted on developments related to your subcommittee activities.

Sincerely yours,

DON W. MICKS,  
*Professor and Chairman, Department of Preventive Medicine  
and Public Health.*

UNIVERSITY OF UTAH,  
COLLEGE OF MEDICINE,  
OFFICE OF THE DEAN,  
*Salt Lake City, September 13, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: I have received your letter regarding the activities of the Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging.

In general, I find it difficult to give very definitive opinions about these matters, but I will answer them as best I can.

1. The value of multiphasic health screening in health care is somewhat controversial. On the face of it, it appears that it should be of great value, but I am not aware of good documentation as to its actual value. Some tests that are simple and inexpensive would no doubt be of great value. Others that are more expensive and more time-consuming may not be. Obviously, there will be a point of diminishing returns.

In answer to the second part of the first question, I would say that the main problems would be in getting the medical profession in private practice to accept this, but I believe the public would like it.

2. So far as I know, none of our faculty have participated in the organization or operation of a multiphasic health screening program. We have discussed inaugurating such a plan for the faculty of the University of Utah, but have not actually done so.

3. I do not have any specific suggestions at this time.

4. I would suggest that you contact Dr. George R. Edison, clinical instructor and director of the student health service at the University of Utah.

In summary, I believe that multiphasic screening programs do have a field of usefulness, but it is hard for me to define exactly what it should be at this time. I believe we need more comprehensive studies on those that have been carried out in order to evaluate them.

We very much enjoyed your visit to the University of Utah a year or two ago and hope that you will be able to return soon.

Sincerely yours,

K. B. CASTLETON, M.D., *Dean.*

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THE UNIVERSITY OF VERMONT,  
COLLEGE OF MEDICINE,  
OFFICE OF THE DEAN,  
*Burlington, Vt., September 14, 1966.*

SENATOR MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR MRS. NEUBERGER: Thank you for your letter of August 24, 1966, inquiring about screening programs at Vermont. With the



development of inexpensive, rapid screening procedures, it is obvious these techniques will receive wider application in the coming years. Individual physicians and medical college teaching hospitals do, of course, utilize certain screening tests on a routine basis. These include serologic tests for syphilis, Pap smears for cervical cancer, urine and often blood sugar examinations for diabetes, and tonometry to detect glaucoma on all hospital admissions over age 40. Instruction in the techniques of multiphasic screening and interpretation of results is part of the medical college curriculum. Also research studies of unrecognized illness in certain populations are in progress. Skin testing of veterinarians for Q fever is one example.

The medical college per se has not yet embarked in multiphasic screening programs, but judging from experience of the Vermont Health Department, no major problems regarding public acceptance are anticipated. The University of Vermont Home Extension Service has done much to generate interest in the health department diabetes screening program which has tested some 16,000 people in the past 2 years. (These activities are described in a letter to you from Dr. Graveline dated August 26, 1966.)

For many years, the Division of Industrial Hygiene, Vermont Department of Health, has been taking annual chest X-rays of workers in the granite and talc industries. At first this program met resistance from local physicians. However, it soon became apparent that numerous people were calling on their family doctors for definitive diagnosis and treatment following annual X-rays; consequently, resistance by the medical profession was short lived. It should be recognized that screening is no substitute for a complete medical evaluation by one's family doctor or a specialist. It is merely a rapid, inexpensive way to identify certain people most likely to have a certain illness in its early stages.

You inquired about appropriate cutoff ages of people screened. That of course depends on a number of factors, including the disease or condition in question and what one regards as an acceptable return in terms of positive finding. For example, there is more deafness in the elderly, but because this handicap has important implications for education, screen testing of hearing is limited at present to a standard part of school health examinations. Again, the incidence of diabetes increases with age, and it is important that the person with incipient diabetes know it as early as possible. With the development of accurate, inexpensive tests, these techniques can now be used on a larger proportion of people in their young adult or middle years.

Dr. Duane E. Graveline, an instructor in the department of medicine, and director of the division of Chronic Illness Control in the Vermont Health Department, is the faculty member most actively involved in screening programs.

Thank you for the opportunity to pull together some of our ideas on this interesting and important topic.

Sincerely yours,

ROBERT J. SLATER, M.D., *Dean.*

THE UNIVERSITY OF VERMONT,  
COLLEGE OF MEDICINE,  
*Burlington, Vt., September 3, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of August 31 concerning multiphasic preventive health screening and the Senate hearings to be devoted to this subject on September 20 to 22. I feel honored by being consulted in this matter.

In reply to your inquiry, I must point out in the first place that I have no personal experience in health screening (except for the development of a new test concerning predisposing anomalies of the autonomic nervous regulation of cardiac function and metabolism, the predictive value of which still remains to be established).

However, a screening program of the type which you have in mind, is at present being initiated by the Vermont State Department of Health, Division of Chronic Illness Control, under the direction of Dr. Duane E. Graveline. A memorandum, issued by Dr. Graveline, is herewith attached, and I would suggest your contacting him directly.

Having been actively interested for many years in the problem complex of early prevention of degenerative heart disease both in theory and practice, I feel that the above-mentioned local program has great merit, and that it will be in line with Senator Harrison A. Williams' pioneering proposal for long overdue prevention-oriented legislation.

To complete my answer, I would like to add a specific comment with regard to the anticipated value of screening for degenerative (so-called coronary or ischemic) heart disease:

In sharp contrast to the foreseeable practical effectiveness of screening; e.g., unrecognized diabetes, glaucoma, tuberculosis, etc., the situation in the area of degenerative heart disease, this country's No. 1 health hazard, is quite different for several reasons:

Positive screening results for clearly recognizable morbid entities, such as those mentioned above, will, in all likelihood, be followed immediately by appropriate therapeutic action and will involve only a relatively small fraction of the population. On the other hand, more than one-half of the American people are potential candidates for disability and death from degenerative cardiovascular disease. About 250,000 persons per year die from it prematurely; i.e., under 65 years.

Screening techniques for so-called coronary proneness are probably less conclusive than those for the other, above-named diseases. Although this should not, by any means, constitute a deterrent from their maximal possible utilization, the inescapable question arises as to what the results of sophisticated screening will be in terms of positive preventive action beyond mere individually diagnosing the need for such action.

This dilemma is intimately connected with the national pattern of living habits as it has evolved from industrialization, prosperity, grow-

ing spiritual aimlessness, boredom, and a decline of self-control and willpower, symbolized by what the late President Kennedy called the soft American.

From this point of view, attempts at building up a universal national mass motivation for cardiac as well as general health maintenance, i.e., for adherence to a proper diet, daily vigorous exercising, nonsmoking, and development of a serene, positive outlook on life, appear as the most urgently needed preventive approach. For the time being, it remains a moot question as to whether positive cardiac screening results per se, and subsequent individual counseling will provide a sufficiently effective stimulus for the many millions of endangered adults to change their living habits.

One might expect that a Government-directed strong and incessant psychological reinforcement of collective motivation will be necessary to make diagnostic screening optimally fruitful for action, even if only in a limited but worthwhile minority of prospective heart victims.

Unfortunately, the medical profession (including cardiologists) is notoriously underinformed and lethargic in matters of scientifically rational heart disease preventability, and medical school curricula are totally inadequate in this respect.

To be sure, the recent reduction of smoking among physicians—and only among physicians—appears encouraging but it is probably motivated by fear of lung cancer rather than by concern about heart disease.

Preliminary attempts have been initiated by the undersigned to organize a nationwide "Doctor's Self-Survival League", by appealing to American physicians to practice themselves what they (ought to) preach on the grounds of their professional and moral responsibility for both their own and the Nation's health preservation. Premature deaths from heart disease among cardiologists are common, as again illustrated by the recent sudden death of the Chief of the National Heart Institute, Dr. Robert P. Grant.

Vast heart disease prevention programs have existed abroad for many years, consisting of perennial public educational campaigns, intensively prevention-focused medical school curriculums, large-scale organized physical fitness programs for adults, and the operation of thousands of rural preventive heart reconditioning centers.

In this country, the number of community exercise programs is increasing (usually conducted by YMCA's), and of more complex "Heart Attack Prevention Programs," e.g., those in Glens Falls, N.Y. (Dr. I. R. Juster) and here in Burlington at the University of Vermont and the local YMCA (see enclosure).

Even though these are only small beginnings, they may be regarded as an indispensable corollary to the highly desirable but merely preparatory diagnostic phase of preaction screening procedures.

Hoping that these comments will be found useful in a matter of grave and pressing national concern, I am,

Respectfully yours,

W. RAAB, M.D.,  
*Emeritus Professor Experimental Medicine.*

P.S.—Some pertinent publications are enclosed. If I can be of any further service, please let me know.

STATE OF VERMONT,  
DEPARTMENT OF HEALTH,  
*Burlington, Vt.*

Memorandum to: Vermont physicians.  
From: Chronic illness control division.

Cardiovascular disease is presently the leading cause of death in Vermont and the Nation. Coronary heart disease accounts for two-thirds of all heart disease deaths. Thirteen hundred persons per year die from coronary heart disease in Vermont, of which 250 occur in men under 65 years of age. Deaths in this latter group can be considered premature and potentially preventable. This group is the logical primary target of any organized prevention program.

Any effective program for the primary prevention of coronary heart disease must originate in the office of the practicing physician.

The Chronic Illness Control Division of the Vermont State Department of Health in conjunction with the Vermont State Medical Society, the Vermont Heart Association, and the University of Vermont Department of Medicine, and others, is developing a service program for physicians, in an effort to reduce the morbidity and mortality of coronary heart disease in Vermont.

For the practicing physician, the program would operate to assist in the identification and management of high coronary risk individuals. It would provide a referral service to aid in the identification of high coronary risk individuals, and a counseling service to assist in the management of individuals demonstrated to be in a high coronary risk group.

Function testing to aid in the assessment of a patient's coronary disease proneness will be conducted on an OPD basis by the cardiopulmonary lab of the University of Vermont Department of Medicine. This evaluation will be combined with a comprehensive questionnaire of daily living habits, a general physical exam, a 12 lead ECG, coronary cineradiography and chest X-ray, serum cholesterol, GTT, and other necessary tests.

The counseling service, directed entirely at the patient's wife to increase her familiarity with the rationale for obesity control, diet regulation, smoking discouragement and encouragement of physical activity, will promote the concept "What the wife can do to help her husband." Public health nurses will play a key role in this wife orientation.

Your suggestions and guidance for the continued development of this service would be appreciated.

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THE UNIVERSITY OF VERMONT,  
COLLEGE OF MEDICINE,  
*Burlington, Vt., September 12, 1966.*

HON. MAURINE B. NEUBERGER,  
*Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Your letter of August 31 was followed by another similar one, dated September 7, but I trust that, in the meantime, you received my reply of September 3.

Today I would like to add only one additional point concerning the screening for risk of degenerative heart disease:

Since more than half of the American people are potential risks for death from cardiovascular disease, these individuals, as well as practically all others, are in definite need of those simple but nearly universally neglected health measures which are apt to prevent the fatal, and often prematurely fatal, outcome.

Thus, sophisticated cardiac screening would be of particular practical value only under two specific conditions:

(1) Relatively advanced and recognizable indications of an urgent and immediate need of energetic preventive measures, such as a gradually progressing intensive exercise regime, drastic diet adjustments, and complete abstinence from smoking. (All of these rules being in principle equally desirable for everyone else.)

(2) Presence of pathological conditions which would require complete or partial or temporary exclusion from the above-mentioned, relatively drastic health rules, if (except nonsmoking) potentially detrimental because of incompatibility with the subject's specific pathological condition (e.g., congestive heart failure, malnutrition, etc.).

Thanking you again for the privilege of having been consulted, I am,

Respectfully yours,

W. RAAB, M.D.,  
*Emeritus Professor, Experimental Medicine.*

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UNIVERSITY OF WASHINGTON,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Seattle, Wash., September 17, 1966.*

Senator MAURINE B. NEUBERGER,  
*Senate Office Building,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you very much for the opportunity to comment on the general subject of modern health screening methods, a matter which I understand is to be studied by the Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging.

May I say at the outset that I have long had an interest in the matter of health screening and periodic checkups and have very mixed feelings about them. First of all, I have very little question indeed that within the foreseeable future we will have developed a large number of very sensitive predictive biochemical and physiological analytical techniques which will enable us to predict disease before actual symptoms occur, in fact, I suspect we will be able to predict disease successfully in the offspring by performing certain biochemical analyses on parents. It is true that many such tests will also be performed automatically, inexpensively and rapidly and that the results of these tests will be correlated by computer, and their implications provided to the physician for subsequent study and use. It is my hope that when the truly predictive tests become available it will be

possible actually to prevent the occurrence of certain types of diseases before any symptoms develop. I should like, however, to emphasize that we are not yet at that point. There are some tests which can be performed which do demonstrate early disease and, of course, are therefore very helpful. But these are relatively small in number and many of them are not truly predictive of disease, but rather indicate early disease.

There are many conflicting points of view concerning the value of periodic checkups, very strong positions being held by proponents and opponents on the basis of very little good scientific evidence. It is my personal suspicion that at the present stage of the art we are moving rapidly from a point where it would be difficult to justify extensive physical and laboratory checkups on every person in the United States, because the cost would far outweigh the benefits, to a point where the application of specific biochemical and physiological tests to mass population, if done in a selected way, will be useful in preventing disease. I am enclosing a copy of the latest volume of the Archives of Environmental Health which contains an excellent article by Dr. G. S. Siegel of the USPHS entitled "An American Dilemma—The Periodic Health Examination." In addition I would recommend two of the very brief editorials which are indicated in red on the front page.

I believe the article expresses the concern of many of us very well. I am concerned that we as a nation not proceed to support large scale screening efforts until we have adequate scientific evidence that such efforts are indeed useful and economically feasible. I should like to also reaffirm my position that ultimately they will be so. I am not certain whether or not they are appropriate at the moment. Therefore I should like to urge support of research in the development of new diagnostic techniques of new predictive tests, and of means of automating existing tests. I would also like to urge support of large scale population studies which could determine the suitability of such testing procedures and of the long-term benefits provided by such procedures. It is all very well to diagnose disease early, but analyses must also be made of the benefits provided to the individual in whom disease is recognized. In other words, it is often not possible to do much for people suffering from certain disease even though the disease is recognized. Research into the types of developments listed above might well become an appropriate part of the regional medical programs concept which is now being implemented through the National Institutes of Health.

Needless to say, even if a multiphasic health screening program is put into effect in many areas in the country it will not necessarily be accepted by the public or by the community of physicians. There may be a reluctance to participate in such a program because of the implied impersonal approach. The private physician will continue to be concerned that large screening programs not be used to channel his patients into other systems of medical care.

In summary I am pleased indeed that the Subcommittee on Health is considering this very important area and focusing attention upon it. I suspect that the committee's interest will stimulate interest throughout the country and will precipitate a more thorough evaluation of such screening methods than has been available heretofore. I would urge the committee very seriously to consider recommending financial sup-

port for study and research in multiphasic screening methods and that it also consider the possibility of advocating support of pilot studies which might be applied on a relatively wide scale, and which might determine the effectiveness of these programs and their acceptability by the general public and by physicians. I feel that our scientific and sociological knowledge in this field is not yet at a level that it would be wise to recommend support of multiphasic screening programs on a nationwide basis.

Sincerely yours,

JOHN R. HOGNESS, M.D., *Dean.*

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VANDERBILT UNIVERSITY,  
*Nashville, Tenn., September 20, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I asked Dr. Frank Blood, director of the central laboratories, to prepare a statement in answer to your letter. The enclosed is his reply and I wholeheartedly concur.

Sincerely yours,

RANDOLPH BATSON, M.D.,  
*Director of Medical Affairs.*

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STATEMENT FROM DR. FRANK BLOOD, DIRECTOR, CLINICAL LABORATORIES

During the past 10 years there has been a phenomenal development in the methodology and instrumentation used by the various disciplines which make up the clinical laboratory organization in hospitals and clinics. The greatest advances have been made in the areas where quantitative determinations are performed such as the biochemical laboratories. Analytical procedures which utilize spectroscopy, flame photometry, electrometry, coulometry, electrophoresis, chromatography, atomic absorption spectra, polarography, and so forth are no longer relegated to the research laboratory but are available for clinical laboratory use.

Equipment and techniques now available make it feasible to perform large numbers of analyses rapidly and accurately. Since the newer analyzers decrease personnel requirements, the cost per determination is low enough to make health screening programs economically feasible. This has been demonstrated in a number of hospitals that have already introduced routine inpatient screening techniques with phenomenal success. In one study nearly as many abnormalities were uncovered by the screening process as were detected by the conventional diagnostic procedures.

Ideally the screening program should not be restricted to the elderly but should be available to all adults since early diagnosis and treatment of disease is often important.

Acceptance of such techniques by the younger physician is usually not a problem but the older practitioner may not be as receptive to this

approach. However, evidence of the success that can be realized is perhaps best shown by the annual physician's health evaluation laboratory which is available at the AMA meeting each year.

Data processing of laboratory results makes screening programs even more valuable. Programing can be such that preliminary diagnoses are available with a minimum of participation by the physician. Needless to say, the final treatment and the manner in which the patient is handled must be a function of the medical doctor.

Before screening programs can be effective, trained personnel must be available to operate the new instruments but of equal importance is the need for persons to maintain and repair the equipment. Automated equipment required for screening programs is complicated and effective preventive maintenance is a necessity.

Individuals at Vanderbilt who have a special knowledge and interest in this type of program are Dr. Frank R. Blood, director of clinical laboratories, and professor of biochemistry, associate professor of pathology, and Dr. Guilford G. Rudolph, director of blood chemistry laboratory and associate professor of biochemistry.

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WASHINGTON UNIVERSITY,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*St. Louis, Mo., September 6, 1966.*

Senator MAURINE NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging,  
U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of August 24. I would agree that the people of the United States will demand, and should receive, better health care in the future. As you know, this will require more medical and paramedical manpower than we now have.

May I answer your questions as they are numbered.

1. Yes; there is a place for multiphasic health screening in health care in our country. You ask, however, if there are problems in such a program. Yes; there are several. First, many physicians find it dull work to employ routine screening procedures in persons who appear to be healthy. Thus, there may be a problem to some degree in acceptance by the medical profession. Second, adults in this country have not accepted routine health appraisal for themselves when available as well as they have the "well-baby" care routinely provided for their children by specialists in pediatrics.

The two previous problems can be surmounted in time. Third, however, health screening programs may be harmful to certain people in some instances. Any physician with much clinical experience knows this. Cardiac cripples have been created by the finding of electrocardiographic abnormalities in persons previously enjoying good health. The state of our present knowledge is not sufficiently advanced to make prognostic statements based upon many of these abnormalities, but neither do we know for sure which have no sig-



nificance (and should be withheld from the patient). I pick but one example. There are many instances, of course, in which health appraisals serve to prevent illness or disability.

2 and 4. Yes. Our department of preventive medicine conducted, for several years, annual health appraisals for the executives of certain corporations. Dr. Robert Shank, professor of preventive medicine, organized this program.

I hope these comments are helpful.

Sincerely,

M. KENTON KING, M.D.,  
*Dean.*

WAYNE STATE UNIVERSITY,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Detroit, Mich., September 19, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Dean Ernest Gardner has referred me your questionnaire on the detection of illness in our elderly citizens. There has been a good deal of thought on the problem in Detroit, but the majority of our plans are still on the drawing boards.

No large-scale screening clinics now exist which are specifically designed for the elderly person. The two largest outpatient facilities in the city are in the Detroit General (Receiving) Hospital and in the Henry Ford Hospital. Both of these organizations provide comprehensive medical examinations on request, but these remain a part of the general medical clinics and neither seeks out nor caters the elderly citizen. Costs vary from full pay (Henry Ford) to a variable sliding scale based on income (Detroit General). A large number of the patients at both hospitals are 60 or more years of age.

The Wayne State University presently has no hospital or clinics of its own, but utilizes a number of the voluntary and public institutions within the city for training. One of the voluntary teaching units, Harper Hospital, has established the Rand Geriatric Health Evaluation Clinic which gives complete examinations to citizens over age 60 for a total cost of \$15, including as many X-ray and other examinations as are necessary. Utilization of this relatively new clinic by the community, however, has not been large.

The Detroit total action against poverty programs, supported in part by the Office for Economic Opportunity, have recently established six neighborhood community health centers; these also have not been heavily utilized by our senior citizens. The programs for the aged poor have been increasing their impetus, however, and there is now operating a community action program to locate and provide health and other social services for the older age group.

Two significant programs for the future are being designed for our elderly citizens. Wayne State University is constructing a \$2 million Luella Hannan Gerontology Center within the new Detroit Medical Center. Its purpose will be to provide demonstration housing and social programs (including health care) for the elderly, and to carry out

multilateral research in gerontology. Housed within the building will be the Institute of Gerontology, cosponsored by Wayne State University and the University of Michigan, with the additional responsibility for training workers in the field. The Hannan Center will, therefore, act as a community model for services to the elderly, but will not serve large numbers of people directly.

A unit which will provide large-scale health services in the future is the University Outpatient Building in the Detroit Medical Center. Preliminary planning is now in progress and the facility should be available for use by 1971. It is being designed to supplant and replace existing outpatient departments of the major hospitals in the central city. Its key functions will be to provide excellent and large-scale community service, training and research based in three areas: (1) prevention of disease, where causative factors are known, (2) earlier diagnosis, implying mass screening techniques of the general public, and using updated and simplified testing methods, and (3) rehabilitation of afflicted individuals—physical, mental, and social. We are thinking very much along the lines of fully automated, computerized diagnostic laboratories within the building.

If I can supply any further information, please call on me at any time.

Yours sincerely,

THOMAS A. BRUCE, M.D.,  
*Assistant Dean, Associate Professor of Medicine.*

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WESTERN RESERVE UNIVERSITY,  
SCHOOL OF MEDICINE,  
OFFICE OF THE DEAN,  
*Cleveland, Ohio, August 31, 1966.*

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: I am at somewhat of a loss to know how to answer your letter of August 24 in regard to the screening of elderly people.

Our institution has been so heavily involved in so many other areas that we have not thought much about this particular problem. We do have two people here who have developed a rapid screening test for diabetes that can be given from a mobile unit which has proven most successful. These people are Gerald T. Kent, M.D., and Jack R. Leonards, M.D. The Public Health Service knows about this and has supported this project with enthusiasm.

One of the things that does occur to me is that I would most rather see money spent on research on the whole problem of care and its delivery than to go more directly toward screening methods. One of the great problems with screening devices is that they often detect illnesses for which there are no possibilities to provide care.

In addition to the people I have mentioned, Max Miller, M.D., of our faculty is involved with widespread studies of diabetes and is particularly interested in the problems of diabetic complications that arise in either treated or untreated patients.

The Kaiser plan is excellent but is a special situation in which they have a captive population for which they are responsible. It is also clear that they are getting more data than they quite know what to do with. This may not be an applicable experience in another setting. There is also some danger in the screening problem of the fragmentation of patient care if the screening is not geared in properly to the people who have to do the followup, but this is an obvious problem I am sure you have considered.

I attach names of persons who are particularly interested in various fields other than those I have mentioned. In any case if they are of interest to you, I can assure you that these are excellent men.

Sincerely yours,

DOUGLAS D. BOND, M.D.,  
*Dean, School of Medicine.*

#### LIST OF PEOPLE INTERESTED IN HEALTH SCREENING

Gerald T. Kent, M.D., associate clinical professor of medicine, 10515 Carnegie Avenue, Cleveland, Ohio 44106.

Jack R. Leonards, M.D., associate professor of biochemistry, Western Reserve University, School of Medicine, 2109 Adelbert Road, Cleveland, Ohio 44106.

Max Miller, M.D., associate professor of medicine, University Hospitals, 2065 Adelbert Road, Cleveland, Ohio 44106.

Joseph M. Foley, M.D., professor of neurology, director of Division of Neurology, University Hospitals, 2065 Adelbert Road, Cleveland, Ohio 44106.

Herman K. Hellerstein, M.D., associate professor of medicine, director, Cardiovascular Clinic, University Hospitals, 2065 Adelbert Road, Cleveland, Ohio 44106.

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WOMAN'S MEDICAL COLLEGE OF PENNSYLVANIA,  
OFFICE OF THE PRESIDENT AND DEAN,  
*Philadelphia, Pa., September 19, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: I am pleased to respond to your request of August 24 for some comments on modern health screening methods intended to detect and help prevent chronic illness.

Although I spent several years in the teaching of preventive medicine in a university and medical school setting, I have not actually been involved in the technical details for at least 6 years. Because of the rapid progress of all medical science it is possible that my knowledge and comments are substantially out of date, but I feel that I can offer a few comments for you to do as you wish.

I am convinced that there is a very real place for multiphasic health screening in our country. This offers an efficient and effective method for detecting important health problems in their early stages. In order to be effective, however, it must commonly be rigorous enough so that in any particular area, i.e., eye disease, heart disease, it will inevitably identify many persons who will be subsequently recognized as normal.

Any screening that is not refined enough to pick up practically all of the identifiable disease will inevitably miss a good deal, and I feel that there are great dangers in thus giving individuals a false sense of security. When the screening is fine enough to include practically all of the real disease, there is danger of both the public and the medical profession being discouraged by the apparent identification of significant numbers of people who ultimately prove to be "normal." This problem can only be handled effectively by the best efforts at educating both the public and the medical profession regarding the function of screening.

I believe that a number of our staff have helped in the organization or operation of screening programs. If you would like to seek further opinions I would suggest that you write Dr. Katharine Sturgis, chairman, department of preventive medicine of this college. She has much experience in public health work and I believe could provide useful opinions to you.

While I am sure that there should be different screening methods for the young, the middle-aged, and the aged, I do not have enough modern technical knowledge to feel that my opinion could be particularly worthwhile to your committee.

If I or any members of our faculty can be of help to you and your committee, please do not hesitate to so indicate. We would be glad to do so.

Yours sincerely,

GLEN R. LEYMASTER, M.D.,  
*President and Dean.*

YALE UNIVERSITY, SCHOOL OF MEDICINE,  
*New Haven, Conn., September 9, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,*  
*Washington, D.C.*

MY DEAR SENATOR NEUBERGER: Thank you for your letter of August 24 regarding screening methods to detect chronic illness which are being considered by the Senate Special Committee on Aging.

I am impressed with the potential value of such a program but have serious reservations as to the advisability of its inauguration at this time. The medical resources of the country, in terms of manpower and facilities, are temporarily overwhelmed in adjusting to the impact of the Medicare and regional medical programs and are hardly in a position to take on additional large-scale projects. It would seem to me far more advisable for the Federal Government to devote its efforts first to building up the supply of health personnel and hospital and clinic facilities. A detection program would be of little value unless means are available to do something about the illnesses detected.

Despite these reservations, the program is certainly worthy of exploration and demonstration on a small scale while personnel and facilities are being developed.

Sincerely yours,

VERNON W. LIPPARD, M.D.

## B. STATE HEALTH DEPARTMENTS AND AGING COMMISSIONS

The following form letter was mailed to the commissioner of health for each State and the State agency on aging:

U.S. SENATE,  
SPECIAL COMMITTEE ON AGING,  
*August 18, 1966.*

DEAR \_\_\_\_\_: The Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging is beginning a study of modern health screening methods intended to detect and thus help prevent chronic illness.

We are, therefore, writing to you and others who may be able to give us information and viewpoints on our subject.

You are, I am sure, familiar with limited screening programs to identify such diseases as glaucoma, diabetes, tuberculosis, etc. The subcommittee already has much information indicating that substantial benefits would result from more comprehensive screening programs reaching greater numbers of people.

We are impressed, for example, with the multiphasic screening program conducted for members of the Kaiser Foundation in California. Participants receive a battery of tests within 2½ hours, with the help of latest equipment and computer evaluation of data. Final diagnosis is made by a physician after he studies all records.

We are also interested in less elaborate, but strikingly effective, programs such as the mobile health testing effort in Washington, D.C.

I might add that the subcommittee will give due attention to automated or semiautomated device systems that may be capable of speeding large-scale screening of individuals.

Some devices, already in use, increase efficiency and save the precious time of the physician—an important factor at a time when experts are concerned about shortages of medical manpower.

Some thought has been given in Congress to public screening programs. The enclosed floor statement describes, for example, a proposal to offer free, voluntary screening for persons past age 50.

Our hearings—now tentatively scheduled for September 20, 21, and 22—will not deal with any single legislative proposal or any one method of health screening. We want to receive objective, informed, and widespread opinion on the cost of chronic disease today and the potential helpfulness of screening to prevent such affliction. The advent of medicare, of course, adds a weighty argument for greater emphasis on prevention. But an even more fundamental factor is that such emphasis is long overdue.

We will welcome any comments you may wish to give to us, and we will be especially interested in the following:

1. Have any health screening programs within your State been particularly helpful in detecting diseases that may become acute in later years? May we have brief description of the program and the results?

2. Can you give us information about the prevalence of chronic disease within your State in age groups from 40 to 50, 50 to 60, and 60 and beyond?

3. Do you have any suggestions for effective screening or other health maintenance programs for persons below age 60? Above age 60?

4. May we have names and addresses of any individuals who may have special knowledge of, or interest in, our subject?

5. Is there a need for a multiphasic health screening program? Are there any particular impediments to the acceptance of such a program by the public or by the medical profession?

We would like to have your response for study before the hearings. We would appreciate receiving it by September 8, if at all possible.

I am also sending a similar letter to your State agency on aging. Perhaps you would care to consult with each other or even submit a joint reply.

Thank you for your courtesy and help.

Sincerely,

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly.*

Most State health departments and commissions on aging collaborated on their responses. The letters received by the subcommittee follow:

STATE OF ALABAMA,  
DEPARTMENT OF PUBLIC HEALTH,  
*Montgomery, Ala., August 25, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*Special Committee on Aging,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR: This is in reply to your letter of August 18 requesting information on health screening methods.

(1) One of our most effective screening programs is carried on by the Bureau of Maternal and Child Health in conjunction with the prenatal and postnatal clinics, and the well-child clinics. Prenatal and postnatal care of indigent patients is offered by 77 clinics. Appropriate testing for anemia, the venereal diseases, diabetes, the Rh factor, and phenylketonuria is available to prenatal cases. Complete postpartum care is also available to these patients following delivery. At this time Papanicolaou smears are obtained, and processed by the State Bureau of Laboratories. Cauteries are also made available in the postpartum clinics. Immunization for poliomyelitis and tetanus is a routine procedure.

PKU testing is required by law in Alabama, and an extensive program has been established for the identification of phenylketonuria.

This service is available to all county health departments, physicians, and hospitals through the bureau of laboratories.

Tuberculin testing of infants and children is also carried out by the bureau of maternal and child health. The preschool health evaluation is another effective screening program. In addition to obtaining a comprehensive medical history which is made a part of the cumulative health record, it is recommended that each child undergo an extensive examination which includes screening for vision, hearing, and mental health evaluation. Dental evaluation, nutrition consultation, accident prevention education, and indicated laboratory examinations are other services offered.

Tuberculosis screening is done through cluster and spot surveys in areas of the State where the highest incidence of the disease is reported. In these surveys during 1964 (latest final figures available), 50,760 persons were X-rayed and 43 cases of tuberculosis were found. Diagnostic clinics are also operated by the State health department. In these clinics 35,567 X-rays resulted in the identification of 381 new cases of tuberculosis, 330 cases of heart disease, 41 suspicious for cancer, and 2 cases of histoplasmosis.

(2) We are unable to give you any information about the prevalence of chronic disease within the State of Alabama. To our knowledge, no studies have been done.

(3) Screening for diabetes among relatives of known diabetics should be most productive. Plans for such a program are now underway in this State.

(4) Mr. K. W. Grimley, executive secretary, Alabama Tuberculosis Association, 900 South 18th Street, Birmingham, Ala. The association has been active in case finding of emphysema and other respiratory diseases and may be able to contribute some information of interest to you.

(5) We believe that there is a need for a multiphasic health screening program and that there would be no particular impediments to the acceptance of such a program by the public. There possibly might be resistance to such a program by the medical profession, who almost assuredly would resist any type automated or semiautomated program resulting in diagnosis from paperwork rather than in person-to-person contact.

I hope this information will be helpful to you.

Sincerely yours,

IRA L. MYERS, M.D.,  
*State Health Officer.*

DEPARTMENT OF HEALTH AND WELFARE,  
DIVISION OF PUBLIC HEALTH,  
*Juneau, Alaska, September 7, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you very much for your letter of August 18, 1966, concerning the study of health screening methods being carried out by the Subcommittee on Health of the Elderly. I regret that I was unable to reply before September 8 as you requested.

In attempting to compile information which would be meaningful to you, I find that, in brief, Alaska currently recognizes chronic diseases, particularly in the aged, as a problem which, in relation to other problems in the State, is relatively minor, and warrants at this time no special emphasis which would detract from efforts to control more immediate problems.

Except for tuberculosis, we have attempted no significant screening programs, for a number of reasons. We have a small number of aged people, and our population is widely dispersed. Among the natives, necessary treatment is obtained at Federal hospitals, while the non-natives will frequently go to other States for treatment, or will move from Alaska if chronic diseases are a problem. Consequently, information about prevalence of chronic diseases in Alaska is incomplete.

While recognizing the obvious benefits from a multiphasic health screening program, we have found that it is extremely expensive, if not impossible, to carry such programs into the remote areas of the State, and that when carried out in population centers, such programs can be expected to add little to available knowledge. It is probable that multiphasic screening programs would be welcomed by the medical profession, and that the only difficulty in establishing such programs is the feeling that the expense of carrying such programs to remote areas could be more effectively applied to other health needs of the State.

We much appreciate the interest of you and your colleagues in this question, and we shall be glad to give you any further information or assistance which may be possible.

Very truly yours,

THOMAS R. MCGOWAN, M.D., D.P.H., *Director.*

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ARIZONA STATE DEPARTMENT OF HEALTH,  
*Phoenix, Ariz., August 26, 1966.*

SENATOR MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in reply to your letter of August 18 on health screening methods. The application of modern technology seems to offer a truly remarkable opportunity to improve health by detecting chronic disease at an earlier, more manageable stage. The number and distribution of our physician population makes the most efficient use of their time mandatory. Therefore, I enthusiastically support the concept of multiphasic screening as proposed in the Adult Health Protection Act of 1966.

A program to be most productive should be directed at a high risk population, but if disease is found at an earlier age much more can be expected in medical, human, and economical benefit. For this reason, I would hope that screening programs would be available to persons much under 60. I feel the forties would be a better starting point.

We have many retired persons in Arizona; a fair number of them live in planned communities which are especially adaptable to screen-



ing plans. I sincerely hope that funds can be found to initiate screening activity on a much larger scale than is presently possible.

Currently the Arizona State Department of Health, in cooperation with the Arizona Heart Association, is planning a pilot heart sounds screening program for schoolchildren using computerized electronic equipment. If this program is successful it will be expanded.

Unfortunately, prevalence data for chronic diseases is at present unavailable from Arizona, since it involves morbidity studies and only deaths are reported. A health survey would be needed to obtain this information.

I can cite cervical cancer, a disease in which death is theoretically completely preventable by screening and adequate treatment. In 1963, there were 47 deaths reported in Arizona from this disease. The figures for 1964 and 1965 are 56 and 64, respectively. In the first half of 1966 there have been 34 reported cervical cancer deaths in the State. The toll of these preventable deaths is rising in the face of stepped-up, but relatively small and isolated, local screening programs. The economic impact of these losses are great enough, but the social and human costs are the most important since the victims are usually young or middle-aged women with growing children.

This is only one small example of how enlarged, better funded screening programs could benefit the State. Early case-finding in all chronic illnesses would bring additional years of productive life to the afflicted individual.

I see promise in the idea of a mobile screening unit, especially for rural areas.

In urban areas, with adequate physician population, health maintenance clinics for the aging and aged population could be most useful. These clinics would provide diagnostic services to persons who do not have a private physician in a more traditional manner, preserving direct contact between the patients and physician.

I hope your committee will find my thoughts in this matter of some use.

Sincerely yours,

GEORGE SPENDLOVE, M.D., M.P.H.,  
*Commissioner.*

ARKANSAS STATE BOARD OF HEALTH,  
*Little Rock, September 2, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
New Senate Office Building,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Your letter of August 18, 1966, concerning modern screening methods for the prevention and detection of the chronic diseases is acknowledged and appreciated.

The magnitude of preventable chronic disease is undetermined in Arkansas. However, since about 12 percent of our population is 65 years of age or over, we feel that it is of major significance. The entire one-third of the northern part of our State is becoming a retirement and resort area and without a doubt the chronic disease problem will become more acute from year to year.

There has been no organized multiphasic screening programs within the State. The division of tuberculosis control conducts chest clinics in several counties and does skin tests and X-rays on high risk groups. Public health nurses are screening for diabetes in a few counties. Plans are underway in the division of maternal and child health to start screening for cervical cancer in selected counties. As is evident, we are screening only a small percentage of the total population for a limited number of conditions. A well-organized multiphasic screening program would determine our chronic disease problem and get preventive, as well as corrective, medical care to large numbers of people who are in need of such care.

There is only one free medical clinic in the State and that is here in Little Rock at the University medical center. Obviously, if screening is to be of paramount advantage, these clinics must be located in many areas throughout the State so that people can get to them for treatment.

One of the greatest deterrents to a screening program in this State is the lack of adequate public health personnel, particularly nurses, for followup purposes. Many counties have only one public health nurse trying to do a generalized public health program as well as the additional programs that are being added on from time to time. Due to our low salary scale and to the advent of nursing programs in various other State departments that offer higher salaries than we are permitted to offer, we have difficulty keeping our public health nurses as well as recruiting for additional ones. There is also an acute need for more and better teaching facilities for all kinds of nurses in the State.

I feel that the public as a whole would accept and appreciate a well-developed multiphasic screening program. Some of the medical profession would resent such a program in the beginning but, once the value of the operation has been established, I think that the majority of physicians would cooperate and work with the program to the best of their abilities.

May I congratulate you and the other members of the Subcommittee on Health of the Elderly for your diligent efforts toward the prevention and alleviation of the chronic diseases in our aged population.

Sincerely yours,

J. T. HERRON, M.D., *State Health Officer.*

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STATE OF CALIFORNIA,  
DEPARTMENT OF PUBLIC HEALTH,  
*Berkeley, Calif., September 19, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I am pleased to respond to your recent letter concerning health screening programs. Unfortunately, other commitments here in California preclude my personal appearance before your Subcommittee on Health of the Elderly. However, I am glad to present my views for the record.

Dr. Nemat Borhani, chief of the bureau of chronic diseases of the California State Department of Public Health, will present a detailed report on our activities in the health screening field, and he will repre-

sent the Association of State and Territorial Chronic Disease Program Directors on the same subject.

The various chronic diseases now account for three-quarters of the annual deaths in California. One-third of these occur among persons less than 65 years of age. Thousands of Californians who might otherwise continue normal and productive lives die needlessly or become disabled from chronic diseases each year.

While the trend has been toward a higher proportion of deaths and disability from the chronic diseases, we now have many indications that this trend can be checked. For example, the cancer death rate, particularly among women, is already declining. This is especially true of the common form of the cancer of the uterus in which there has been a spectacular drop in the death rate during recent years. In California, at least, the death rate from the common forms of heart disease, that is heart disease associated with high blood pressure and coronary artery disease, has started to decline. Such facts have been insufficiently emphasized. Together with the well-known accomplishments in the field of diabetes control, tuberculosis control and the control of other important diseases, these recent indications of success with respect to cancer and heart disease suggest what we may anticipate in the future.

The most important element in the situation is that these favorable trends could be greatly accelerated through organized programs of health screening. What has been achieved in the case of tuberculosis, diabetes, cancer of the uterus and other forms of cancer, hypertensive heart disease and many other chronic diseases is due to a relatively simple form of attack on the problems. That attack consists of early detection of the disease process and prompt treatment with modern methods. The technical basis for a successful attack on many important chronic diseases is well established. All that is needed is organization in the full-scale application of available tools.

This should take the form of health screening programs such as those now being considered by the Congress.

In your letter, you refer to my advocacy of the establishment of 5 to 10 more health screening projects such as that undertaken by Dr. Morris Collen at the Kaiser Foundation hospitals. I believe that at least 5 to 10 more projects of similar magnitude should be undertaken promptly. Such endeavors would advance our understanding of the potential accomplishment through health screening, would aid in the refinement of present tests and lead to the discovery of new tests, would popularize the concept of health screening among physicians, other health personnel and the general public, and would permit exploration of how health screening should be conducted in different parts of the country and in different kinds of institutions. Since Dr. Collen will be presenting testimony to your committee, I believe that it would be better for him to give estimates of the costs of such centers. In this connection, however, I would like to emphasize that a considerable proportion of the cost of the Kaiser project is attributable to research and development. The actual provision of service on a large scale utilizing presently established means of detection would be in the order

of magnitude of \$15 to \$20. This would include the cost of multiphasic screening embracing tests for more than a dozen important chronic conditions. This does not include the cost that would be necessary for the followup medical care of individuals found to have the chronic conditions.

A brief history of health screening programs in California, which you requested, will be presented by Dr. Borhani.

The development of automated and semiautomated techniques for health screening have vastly increased the potential and reduced the cost of such programs. Proper organization is needed if we are to make the best use of such technological improvements. I believe that we are on the verge of even greater developments. We should be organized to apply promptly the new developments as well as what is already known concerning the early detection of chronic diseases.

You inquire also about differing screening tests for differing age groups. It is true that various chronic diseases affect the various segments of the population in differing degree. Screening programs should be designed to take this fact into account. I believe that the final responsibility for such matters should be left in the hands of the physician responsible for the individual projects. Only in this way will we favor the development of new understanding through actual experience based on different points of view. For example, we now realize that the Papanicolaou smear, the cystologic test for cancer of the uterus, should be applied to women in their twenties or even younger, rather than waiting until women reach the so-called cancer age. Some years ago many physicians believed that the Papanicolaou smear should be limited to women over the age of 35 years. Further experience, based upon the ideas of a relatively few physicians, has shown the fallacy of the older prevailing viewpoint.

In closing, I should like to emphasize one aspect of the current situation in respect to the development of health screening programs. You have asked about the desirability of establishing several more projects along the lines of that at the Kaiser Foundation hospitals, and I have indicated above my opinion on that question. However, much more can and should be undertaken through congressional action. A great deal could be accomplished with Federal support of health screening programs, organized on a somewhat less extensive basis than that at the Kaiser facilities. We need programs like that of Dr. Collen to test the limits of what can be accomplished and demonstrate what should be available to all persons 5 years from now. In the meantime, a large network of health screening programs should be organized throughout the country, utilizing health departments, clinics, hospitals and other health agencies.

I hope that you and your committee will give favorable consideration to proposals for Federal support to health screening programs utilizing what is now known, as well as to programs for research and development in this field.

Sincerely yours,

LESTER BRESLOW, M.D., *Director of Public Health.*

STATE OF COLORADO,  
DEPARTMENT OF PUBLIC WELFARE,  
Denver, Colo., September 7, 1966.

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging  
U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: We are pleased to note that your subcommittee is beginning a study of modern health screening programs. This has been an area too long neglected in our work with older people. Conservation of health during the early years may well help make later years more fruitful and less burdensome. Early detection of chronic disease with a rapid followup of effective treatment should provide this conservation.

Dr. Roy Cleere, director of the Colorado State Department of Public Health, has provided you with available statistical data and general comments on programs in Colorado. Drs. Lichty and Morton and Mr. Gonring, of his staff, have met with Mr. Robinson, director of the Older Americans Division of my staff, to discuss your request. It is their feeling that we should turn our attention to comments on the need for such programs and leave the technical answers to them.

I would, however, like to comment on one screening project which I am aware of in the Metropolitan Denver area. Park Manor, a non-profit high rise for the elderly, has conducted a screening program for the past 4 years. This has been for its residents and has been in cooperation with Presbyterian Hospital. The Presbyterian Hospital Association is the sponsor for both the hospital and Park Manor. Mr. Gary Stay, Park Manor administrator, has been the motivator for this project, and it is his feeling that the program is effective.

We do wish to stress that the success of any multiphasic screening project will depend on the willingness of the private physician to participate. As an example, Park Manor's success can be partly attributed to the fact that when a screening test is scheduled, the resident's private physician is sent a letter showing what tests will be given, when, and where. The physician is asked to indicate which tests he wishes his client to have, and where he wants the results sent. As the program has progressed, some residents have requested their physicians to cooperate.

I have focused on this program because it is one that has been conducted under private auspices and has proved worthwhile.

I am enclosing a copy of the letter which they send to the physician, the listing of tests given, and a report of the first testing in 1963.

This project has been so successful that the Conference on Nonprofit Housing for the Aging and the Denver Department of Health and Hospitals have jointly submitted a proposal to the U.S. Public Health Service for expansion of the program. This would include 8 of the 13 units in Denver. We understand, unfortunately, that this has been turned down. Hopefully, it will be resubmitted, as we believe that the project has great merit.

It is our belief that the persons who would benefit most from a multiphasic screening program are those who do not see a physician until conditions are so acute that they must. Most professionals believe

that older persons are reluctant to consult a doctor because "It is too expensive," "He will put me in a nursing home," "My doctor isn't here any more and I don't trust these new doctors," and other reasons which I am sure you have heard before.

In general, I endorse the idea of a multiphasic screening program. How it can be implemented should be in the hands of the private physician and the local health departments.

If we can be of further assistance, please let me know.

Very truly yours,

CHARLINE J. BIRKINS, *Director.*

[Enclosures]

FEBRUARY 14, 1966.

Re Mrs. -----  
 Mrs. -----  
 Mrs. -----  
 Miss -----

DR. ROBERT BOSWORTH,  
 1776 Vine,  
 Denver, Colo.

DEAR DR. BOSWORTH: As the personal physician of the above-named residents of Park Manor, you may wish to make available to them the clinical tests which are given each year. These clinical tests are provided annually without charge to any Park Manor resident as a service of the Park Manor medical care program. The results of the tests, of course, will be sent to you on completion. The Presbyterian Hospital Association is vitally interested in the health aspects of the residents.

If you would like to have these tests made available to your patients, please promptly return the enclosed forms specifying the tests you desire.

Sincerely,

The Presbyterian Hospital Association of Colorado.  
 ROY R. ANDERSON, *Executive Director.*

If you have any question about this program, please call Dr. Michael Lubchenco, medical adviser to the executive director. KE-4-9011

THE PRESBYTERIAN HOSPITAL ASSOCIATION OF COLORADO,  
 19th and Gilpin Streets,  
 Denver, Colo.

GENTLEMEN: In the lower left-hand corner of this order form appears the name of a patient of mine who is a resident of Park Manor. Please perform the tests indicated by a check mark below and send the results to me.

<i>Check if desired</i>	<i>Test</i>
----	Blood screening examination, including hemoglobin, hematocrit, white blood cell differential, blood urea nitrogen, and cholesterol, acid phosphatase on males, uric acid, fasting blood sugar, P.B.I.
----	Urinalysis.

- X-ray.
  - Electrocardiogram.
  - Blood pressure.
  - Cytology examination of female genital tract.
- Very truly yours,

Dr. -----

-----  
No charge for this service by order of Roy Anderson.

#### PARK MANOR CLINICAL TESTING PROGRAM

Following is a statistical analysis of the medical testing program of Park Manor residents given in February 1963. Table I shows the number of tests made and the abnormalities noted. (See table I.)

These abnormalities include small deviations from normal ranges to clinically significant deviations. These tests are significant only when coupled with further pathological tests and diagnostic techniques to determine whether the abnormalities are meaningful. The results of all of these tests upon completion have been made available to the personal physician of each resident. Any corrective treatment or further diagnostic examinations is the responsibility of the physician.

A copy of the medical testing results are kept in the medical file of each resident. This medical file is kept in the infirmary and is automatically made available to the personal physician of any resident who makes a "house call" on a patient in Park Manor.

Very little work has been done to establish normal ranges for clinical tests of elderly people who live in the Rocky Mountain area. Table 2 presents a statistical analysis of the pathological profile of Park Manor residents. (See table II.)

It may be noted that variations appear when compared to normal ranges for healthy adults. It is thought that these differences are the results of the aging process. Similar statistical evaluations will be made each year for the purpose of developing information indicating normal ranges for the elderly. With a larger sample it will be possible to make valid statistical evaluation of the hematology and chemistry profile of the various elderly age groups within the sample. The Park Manor residents range in age from 63 to 98 years. The association is fortunate in having the present sample of 120 elderly well persons, and the facilities to achieve this objective.

In April of 1964 the program was carried on again with an unexpected degree of success. Approximately 90 residents participated in the program with a high degree of acceptance by the residents and their physicians. Since that time, it has become common for the physician calling on a resident to request the results of "last year's testing program."

A careful analysis has not been made to determine the number of abnormalities, standard deviations, and so forth, because of the lack of available staff to make these computations. However mean averages have been made and are recorded on chart III.

Inasmuch as it is the responsibility of the resident physician to take action on any unusual condition which has been brought to light

through the program, at this time Park Manor is simply compiling the data for use by the physician, but are recording it for possible future research.

CHART I.—Results of Park Manor clinical tests, February 1963

	Number tested	Abnormalities noted <sup>1</sup>
Urine test:		
Specific gravity.....	28	0
WBC/HPF.....	28	5
Albumin.....	28	1
RBC/HPF.....	28	0
Sugar.....	28	0
Acetone.....	28	0
LPF casts/4.....	28	1
Mucus.....	28	0
Blood chemistry:		
Glucose.....	38	6
BUN.....	38	6
Cholesterol.....	37	19
Uric acid.....	35	4
PBI.....	36	2 6
Hematology routine:		
Hemoglobin.....	37	3
Mematocrit.....	37	1
WBC.....	37	3
SEGS.....	37	6
Lymphocytes.....	37	11
Others.....	37	None
Electrocardiographic tests.....	27	14
TB Tine tests.....	32	12
Chest X-ray.....	62	
Inactive tuberculosis.....		2
Heart pathologies.....		6
Other chest pathologies ((14 x 16) X-ray films have been made of the above and brought to the attention of their doctors).....		8
Cytology examinations.....	11	(4)

<sup>1</sup> In general, significant only when correlated with clinical condition or supported by additional laboratory tests.  
<sup>2</sup> Borderline.  
<sup>3</sup> Positive.  
<sup>4</sup> All negative.

CHART II.—Hematology and chemistry profile of Park Manor residents, February 1963

[(N=37) Females]

	Unit	Mean	S.D.	Range	Healthy adults range <sup>1</sup>
Hematology:					
Hematocrit.....	Percent	42.9	1.0	40.9-44.9	45-50
Hemoglobin.....	mg./100 ml.	14.1	1.0	12.1-16.1	14-18
White blood cell count.....	Cells/mm. <sup>3</sup>	6,608	428.1	5,752-7,464	4,500-11,000
Neutrophiles.....	Percent	57.92	9.6	38.72-77.12	59
Chemistry:					
Glucose, fasting.....	mg./100 ml.	77.42	3.86	69.7-85.14	65-110
Blood urea nitrogen.....	mg./100 ml.	16.3	4.9	6.5-26.1	8-22
Cholesterol.....	mg./100 ml.	260.5	48.8	162-358	150-250
Uric acid.....		5.2		2.5-7.5	3-6
Protein bound iodine.....	mg./100 ml.	5.86	1.0	3.86-7.86	3.4-8.0

NOTE.—Range=Mean ±, 2 S.D.

<sup>1</sup> These are the normal adult values of the NIH Clinical Pathology Laboratory which performed the determinations on the aged as listed in this table. The exact age ranges for these comparative values of younger adults are not available.  
<sup>2</sup> Actual.  
<sup>3</sup> Presbyterian Normal.



CHART III.—Park Manor 1964 medical testing program

n=89

	<i>Mean average</i>
Blood chemistry:	
F. glucose-----	108.9
BUN-----	12.4
Cholesterol-----	204.0
PBI-----	6.17
Hematology:	
Hemoglobin-----	13.9
Hematocrit-----	43.2
W.B.C.-----	6418.7
Segs percent-----	58.4
EKG:	
Abnormal-----	36
Borderline-----	10

PARK MANOR TESTING PROGRAM 1966

Should the above-named patient wish, please perform the tests indicated by a check mark and send the results to my office. It is understood there is no charge for this service.

Blood chemistry (includes BUN, serum cholesterol, acid phosphatase on males, fasting glucose, PBI, and uric acid.

Hematology routine.

Urinalysis.

Electrocardiogram.

Audiometric screening.

Cytology vaginal exam. Dr. \_\_\_\_\_ Please sign and return to Park Manor, 1801 East 19th Avenue.

Name of resident \_\_\_\_\_

PARK MANOR MEDICAL TESTING PROGRAM, 1964

----- Blood screening examination, including hemoglobin, hematocrit, white blood cell differential, blood urea nitrogen, cholesterol, acid phosphatase on males, uric acid, fasting blood sugar, P.B.I.

----- Urinalysis.

----- Cytology examination of female genital tract.

----- Glaucoma Test.

----- Chest X-ray.

----- Electrocardiogram.

Please perform the tests indicated by a check mark above and send the results to me. It is understood there is no charge for this service.

Dr. \_\_\_\_\_

PARK MANOR MEDICAL TESTING PROGRAM, 1965

----- Blood chemistry, (BUN, S. cholesterol, acid phosphatase on males, F. glucose, PBI, electrophoresis of serum proteins, uric acid.

----- Hematology Routine.

----- Urinalysis.

- Cytology vaginal exam-  
 ination.  
 ----- Electrocardiogram.  
 ----- T.B. tine test.  
 ----- Periodontial examination.  
 ----- Hearing and test.

Please perform the tests indicated by a checkmark above and send the results to me. It is understood there is no charge for this service.

Dr. -----

STATE OF COLORADO,  
 DEPARTMENT OF PUBLIC HEALTH,  
 Denver, Colo., August 30, 1966.

Senator MAURINE B. NEUBERGER,  
 Chairman, Subcommittee on Health of the Elderly, Special Commit-  
 tee on Aging, U.S. Senate, Washington, D.C.

DEAR SENATOR NEUBERGER: The Colorado Department of Public Health has been interested in the problems of systematic early detection of chronic disease for the past several decades and welcomes the opportunity to discuss our views with the subcommittee. We have recognized a number of basic premises for the successful performance of systematic early detection ("screening"):

(a) Early detection of chronic disease offers the best opportunity for maximum benefits of treatment and prevention of complications.

(b) Although it is widely believed that early detection and adequate treatment will arrest the progress of and/or prevent the complications of chronic disease, there is enough medical controversy so that evidence of these beneficial effects needs to be gathered for documentation.

(c) In order to avoid gross waste of funds and personnel, and occasionally fraud, it is necessary to know what proportion of cases of detectable disease might be missed by a given screening test as well as what proportion of positive screening tests actually represent disease. In other words, the proportions of false negative and false positive test results that can be expected from screening tests are critical data on which to base plans for disease detection programs.

(d) Disease screening activities will have the highest yield when used among high-risk groups. For certain diseases, factors such as poverty, urban residence, advanced age, and presence of other disease definitely increase the risk of occurrence.

(e) Programs for early detection of chronic diseases will encounter the least opposition when used in areas and among population subgroups in which medical services are deficient.

Thus, we strongly believe that the laudable aim of universally available early detection services for the chronic diseases will be most efficiently reached by careful and selective programs which yield scientific evidence of beneficial effects as they progress. Not only must early detection services be technically effective, but they must be provided in a manner which preserves the dignity and privacy of individual citizens and in a form acceptable to practicing physicians. With this preamble, we shall now answer the questions you posed.

1. Chronic disease screening programs in Colorado: Although the State health department presently has no mobile or stationary multiple-screening facilities in operation, we have recently been working toward the development of such a program under the auspices of the "heart-cancer-stroke-regional medical program," for which the planning grant application has just been submitted. Our future activities will be guided by the premises previously stated.

Presently, a number of screening activities exist in Colorado. The State health department and the Tuberculosis-Respiratory Disease (TB-RD) Society cooperate in the maintenance of a chest X-ray screening program. The TB-RD Society has begun screening for emphysema and chronic bronchitis by pulmonary function tests but has encountered problems in definition of abnormality and in professional acceptance. A former statewide health department diabetes detection program lapsed with withdrawal of USPHS personnel, and the only remaining community diabetes screening activities are the blood and urine tests provided by the Diabetes Association. The Society for Prevention of Blindness holds four to six glaucoma-screening clinics per year with the assistance of the health department. The State health department has aided in the establishment of Papanicolaou smear services for detection of cancer of the cervix in six areas of the State, and during the past year the Colorado Medical Society has urged provision of this type of service in all parts of the State. Special occupational groups (e.g., pesticide workers, uranium miners, Trappist monks, etc.) have received periodic health examinations as part of special studies. A number of industries in Colorado provide periodic health examinations for their executives. Several retirement homes offer periodic screening for occupants. All these screening programs listed are of limited scope and coverage, and none have provided sufficient data for education of the public or the medical profession to the need for more widespread services.

2. Chronic disease prevalence in persons over 40 in Colorado: Although attempts have been made to estimate the prevalence of various chronic diseases in Colorado based upon estimates made elsewhere or upon mortality statistics, we have no direct, population-based, prevalence data for chronic diseases in Colorado. This is a serious deficit in terms of planning for service and prevention programs. Knowledge of variations in risk of disease is of major assistance in assessing size and localizations of chronic disease needs and program dimensions, as well as a baseline for measurement of program effects. We badly need chronic disease prevalence data, and these could be provided by special, communitywide, screening programs.

3. Suggestions for effective screening and health maintenance programs: Because our knowledge of what should constitute the optimum health maintenance program is still incomplete and because we do know that there are wide variations pertaining to local circumstances and utilization, it is of the utmost importance to provide opportunities for local options and decisions so that programs can be suited to local needs. One of the biggest dangers to the ultimate success of an optimum health maintenance program for everyone is that a few "ideal" pro-

grams might be imposed from distant agencies without adequate knowledge of or sensitivity to local circumstances. Unneeded enemies are thereby collected, and popular acceptance is delayed.

There is a very good chance that the heart-cancer-stroke regional medical programs will develop early detection programs. This avenue should be encouraged and given several years to develop. Additional generalized multiple-screening programs will compete for already-short funds and personnel. In the meantime, special scientific studies of efficiency and efficacy of screening methods should be encouraged, since our knowledge needs augmentation.

4. An individual with special knowledge and experience in the field of screening for chronic diseases is Dr. William E. Morton who happens to be a member of the chronic disease section of this department, supported jointly with the Colorado Heart Association. Others in Colorado with special interest in screening for chronic disease are Drs. R. S. Johnson and Arthur Warner (Denver Health Department), Drs. J. C. Cobb and C. W. Eisele (University of Colorado Medical School), Drs. William Lester, and D. A. Fischer (TB-RD Society and National Jewish Hospital), Drs. Paul Isbell and B. T. Daniels (Colorado Medical Society and Colorado Chapter American Cancer Society), Drs. Paul Sheridan and Karl Sussman (Colorado Diabetes Association), and Dr. George Tyner (Colorado Society for Prevention of Blindness).

5. Multiphasic health screening needs and impediments: We believe that a definite need exists for multiphasic health screening, particularly in rural areas and particularly among the medically indigent. Since not everyone agrees as to the existence or the extent of the need, we believe that initial efforts to establish multiple screening facilities should be cautious and should be focused upon the need for documentation of the nature, size, and distribution of our chronic disease problems. The need for local program adaptability must be kept in mind.

Though some might regard local medical opinions as impediments, we believe successful multiple screening programs can only be maintained with the advice and consent of local medical practitioners. Their cooperation is essential and, in our experience, has always been available if the screening program could be shown to adequately fulfill a demonstrated need.

The local variations in lay opinions about health and disease are sometimes ignored when new programs are developed. Screening tests which frequently result in unbelievably diagnoses or in diagnoses for which no practical treatments exist will soon lose favor and be avoided. Preliminary and concomitant lay and professional education are often more important than the screening program itself in effecting change in community health status.

It is hoped that these remarks will be of assistance to you. We are interested in this field. We are working toward more effective activities. We are aware of some of the pitfalls to be avoided. Further inquiries would be welcomed.

Sincerely,

ROY L. CLEERE, M.D., M.P.H., *Director.*

GOVERNMENT OF THE DISTRICT OF COLUMBIA,  
DEPARTMENT OF PUBLIC WELFARE,  
*Washington, D.C., September 6, 1966.*

HON. MAURINE B. NEUBERGER,  
*Special Committee on Aging,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Responding to your suggestion that the Department of Public Welfare and the Department of Public Health reply to your letter of August 18, 1966, in some collaborative manner, my staff has consulted with Dr. Murray Grant's staff and found very substantial agreement regarding the widespread need for effective preventive health care for adults, here in the District of Columbia.

It is my understanding that the Director of Public Health will supply you with current biostatistical data and other pertinent information and professional opinion. I would like, therefore, to make some observations of a more general nature.

1. The need for the kind of program outlined in the Adult Health Protection Act is all too distressingly apparent. In the District of Columbia we have recently been presented with a report of findings by workers in the medicare alert program, a copy of which is enclosed.

The report reveals that poverty and disabilities of a significant number of older persons serve to isolate such persons from the help that is available to them and such isolation serves to reinforce the conditions of deprivation from which they are suffering. A broad program of preventive health care introduced at an earlier age when mobility is greater and acuity better, could forestall such suffering for many and make possible a healthier and happier old age. Age 40, the present minimum for free multiple screening and referral by the Department of Public Health in the District of Columbia would seem to be an appropriate minimum age, inasmuch as it coincides for many persons with the onset of major physiological changes.

2. Such a health screening program should be expanded to include a 16th and a 17th examination; i.e., dental and oral examination and podiatric examination. There is widespread total or partial edentulousness among older persons which impairs both nutrition and communication, can contribute to other kinds of physical malfunction, and damages the self-image of sensitive persons. Foot health is a major problem for older persons and is a significant hinderance to mobility demanded by urban living.

3. Because of the isolation due to lack of radios, telephones, daily newspapers and even concerned human contact, the elderly poor, lacking also the funds to pay for transportation to health centers, have failed fully to avail themselves of existing health facilities. If the findings of the medicare alert workers are relevant, as I believe them to be, it will be insufficient to increase the available screening facilities unless provision is also made to provide funds under the same program or under other Federal programs such as the antipoverty program to employ guidance assistants to seek out persons in need of such health service and to help them not only to get to the screening centers but also to the place of referral for actual treatment.

Additionally, some means should be found to pay for public transportation for the many elderly poor for whom the cost of 50 cents for a round trip D.C. Transit fares inhibits them from taking advantage of free clinics to which they have access at present. The pitifully meager income of substantial numbers of elderly persons is reflected in the fact that the average monthly payment for approximately 45,000 elderly social security beneficiaries is \$72.67, putting the annual average (of about \$872) at less than half the poverty index of \$1,800 for a single person. Essentially, it may be persuasively argued, preventive health measures cannot be meaningful for those most in need, unless coupled with efforts to provide adequate subsistence income, proper housing and improvement of the shocking living conditions found by the medicare alert aids, whose report, referred to earlier, detailed lack of "proper bed or bedding on which to rest \* \* \* rats, falling plaster, and the thoroughly dilapidated houses sheltering many of the elderly poor."

4. The effectiveness of the multiphasic health screening program which the Adult Health Protection Act would offer, it would seem to me, might be highly dependent upon the successful development of techniques to reach segments of the target population to educate them to the significance of availing themselves of the program. In the District of Columbia the higher death rates of nonwhites compared to whites in the upper age brackets may be in part attributable to lack of knowledge of availability of health services, as well as lack of education regarding proper health habits, which may have resulted from restricted amount of public school education received by immigrants from rural areas of recent decades. In metropolitan centers such as this, therefore, it would be especially important to provide a means of informing and motivating the target population to utilize the facilities made available.

5. Should the Federal Government provide the multiphasic screening program described in your communication, the establishment of the centers would offer an opportunity for the Federal agencies to encourage the use of these facilities by vigorous promotion of health maintenance education for their employees who comprise a substantial proportion of the working population in this and some other metropolitan areas.

In the District of Columbia, such cooperative activity by Federal agencies could be of great assistance in demonstrating for the total community the importance of a comprehensive health maintenance and protection program.

I should like to express my appreciation to you and your committee for the attention and effort you are devoting to the needs of our aging and aged citizens. As Chairman of the District of Columbia Interdepartmental Committee on Aging, I am keenly aware of many urgent and unmet needs of these groups. You may be sure that the hearings you have scheduled, September 20 through 22, will be followed by me and my staff with great interest.

Respectfully,

DONALD D. BREWER, *Director.*

FLORIDA STATE BOARD OF HEALTH,  
*Jacksonville, August 31, 1966.*

HON. MAURINE NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Senate Office Building,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of August 24, 1966, in which you requested additional information pertaining to a community health profile screening program in Florida.

A community screening program was established in the city of Monticello, Jefferson County, Fla., in February 1963. This program was implemented with the assistance of the local physicians and has furnished continuous health profile screening of the general public of that county since its inception. The purpose of the project is to screen the apparently healthy population and to refer the abnormal screenees to their physicians.

Jefferson County was chosen due to the relatively small, stable population and the interest by local physicians, county health groups and the general population in conducting and participating in such a program. This county lies in rural, northern Florida with a population of 9,543 with a median age of 23.5. Other statistics of interest pertaining to Jefferson County are as follows: 10 percent of the population is over 65 years of age; about 8 percent of the total population is on State welfare and over 50 percent of the residents over age 65 are receiving old-age assistance. As can be easily seen, this county has low economic indexes with a high indigent population.

The Jefferson County program is currently being supported by funds from the Florida State Board of Health and the Jefferson County Health Department. The staff for this program consists of (1) a full-time public health nurse who performs the screening examinations; (2) the county health officer who supervises the program; (3) part-time clerical assistance by the chief clerk of the county health department. Laboratory support is furnished by the Florida State Board of Health laboratory in Jacksonville.

This screening program has conducted, as of July 31, 1966, 60,131 tests on 3,818 persons. One thousand four hundred and six persons have been referred for 1,865 abnormal screening test results. The screenees are referred to their private physicians when abnormalities are found.

Attached are the forms being used. (Enclosure 1), an informational brochure for the screenee; (enclosure 2), referral criteria standards; (enclosure 3), health profile screening form; (enclosure 4), the monthly reporting form used in the program; (enclosure 5), letter to persons with abnormal screening results, with copy to the private physician.

We are of the opinion that health profile screening of the general population is one way to provide early identification of those persons who may have insidious chronic diseases and bring them to treatment. Please notify us if we may provide you with further information.

Sincerely yours,

WILSON T. SOWDER, M.D., *State Health Officer.*

[Enclosures]

HEALTH PROFILE SCREENING UNIT, JEFFERSON COUNTY HEALTH  
DEPARTMENT, MONTICELLO, FLA.

ABOUT YOUR TRIP THROUGH THE HEALTH PROFILE SCREENING UNIT

Most physicians prefer to treat diseases before they have become serious or chronic. Screening examinations such as you have just completed, are not diagnostic, but may point to conditions for which you need to consult your physician.

Results of your screening examinations are reported only to your physician. However, you will be notified in writing within a few days if for any reason your tests are considered not to be within normal limits.

Health profile screening examinations have been planned to best fit your needs, considering your sex and age. A check on your history, height, weight, blood pressure, eyes, X-ray of the chest, blood sugar and other screening examinations are given to provide your physician with valuable information, which may indicate your health profile index or health picture.

In case you are advised to visit your physician for further study, you are urged to do so promptly as may be consistent with your convenience. Remember that these screening examinations do not replace a thorough physical examination which can only be done by your doctor of medicine.

This Health Profile Screening Clinic is made possible by the physicians of your county, Healthyways Inc., Jefferson County Health Department and the Division of Chronic Diseases, Florida State Board of Health.



WATCH YOUR WEIGHT, NORMAL WEIGHT IS CONSIDERED IMPORTANT TO GOOD HEALTH

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Name (Last)	(First)	(Middle)	Age	Sex	Age	Exam Date	Screening No.
Address (Number and Street)							Telephone No.
Physician's Name and Address				Permission Granted To Perform Screening Tests And To Send Report To Physician			
				Signature:			

1. HISTORY Have you now or recently had any of the following?
- |  |  |   |
|--|--|---|
| <input type="checkbox"/> Fainting or Coma                | <input type="checkbox"/> High Blood Pressure           | <input type="checkbox"/> Vaginal Bleeding after Menopause |
| <input type="checkbox"/> Convulsions, Epilepsy           | <input type="checkbox"/> Shortness of Breath           | <input type="checkbox"/> Contact Bleeding                 |
| <input type="checkbox"/> Double Vision or Blurred Vision | <input type="checkbox"/> Swelling of Ankle or Feet     | <input type="checkbox"/> New Lump No. Nox                 |
| <input type="checkbox"/> Persistent Headaches            | <input type="checkbox"/> Coughing or Vomiting of Blood | <input type="checkbox"/> Other                            |
| <input type="checkbox"/> Difficulty in Swallowing        | <input type="checkbox"/> Blood in Stool Movement       | <input type="checkbox"/> None of These                    |

ARE YOU UNDER THE CARE OF AN M.D. FOR ANY OF THE ABOVE? (LIST)

RELATIVE OF: GLAUCOMA  DIABETES

TESTS	FINDINGS						FOLLOW UP					
	Inches	Pounds	Percent Overweight		Percent Underweight		Ref	Know	How	Often	Last	
2. Height and Weight												
3. Blood Pressure and Pulse Rate			Ma Hg		Pulse							
4. Visual Acuity With and Without Glasses	Without 20	Right Eye	With 20	Without 20	Left Eye	With 20	Muscle Balance					
5. Tonometry		Right Eye		Left Eye		Other						
6. Hearing	Right Ear		Left Ear	7. Visual Acuity								
8. VDRL	<input type="checkbox"/> Reactive 1: Dil.		<input type="checkbox"/> Weakly Reactive		<input type="checkbox"/> Non Reactive							
9. Blood Sugar	Fasting %		10. Cholesterol		%							
11. Hemoglobin	Gm.				<input type="checkbox"/> ND							
12. Urine Sugar	<input type="checkbox"/> Neg <input type="checkbox"/> 1+		<input type="checkbox"/> 2+ <input type="checkbox"/> 3+		<input type="checkbox"/> 4+ <input type="checkbox"/> ND							
13. Albumin	<input type="checkbox"/> Neg <input type="checkbox"/> 1+		<input type="checkbox"/> 2+ <input type="checkbox"/> 3+		<input type="checkbox"/> 4+ <input type="checkbox"/> ND							
14. Spec. Gravity	1.0 <input type="checkbox"/> ND		PH									
15. Feces: Para-Ova	<input type="checkbox"/> Neg <input type="checkbox"/> Pos		Type		<input type="checkbox"/> N.D.							
16. Occult Blood	<input type="checkbox"/> Neg <input type="checkbox"/> Pos 1+		<input type="checkbox"/> 2+ <input type="checkbox"/> 3+		<input type="checkbox"/> 4+ <input type="checkbox"/> ND							
17. Chest X-Ray	<input type="checkbox"/> Def. Thc. <input type="checkbox"/> Susp. Thc.		<input type="checkbox"/> Calc. Tumor <input type="checkbox"/> CVP		<input type="checkbox"/> Other: <input type="checkbox"/> Negative <input type="checkbox"/> Un-ND							
18. Tuberculin	<input type="checkbox"/> Neg. <input type="checkbox"/> Pos.		MM									
	<input type="checkbox"/> Normal <input type="checkbox"/> ND											
	<input type="checkbox"/> 1:1000 <input type="checkbox"/> 1:10000											

Health Profile Screening Unit, Monticello, Fla.

Month of \_\_\_\_\_ 196\_

	Total reporting period	Total to date
Total number of persons examined.....		
Total number screening examinations administered.....		
Average number of tests per person.....		
Number of persons found with abnormal screening levels.....		
Total number of screening tests, not within normal levels.....		
Average tests per person, not within normal limits.....		

Reason for referral	Total, reporting period		Total to date			
	Number examined	Number referred	Number confirmed	Number examined	Number referred	Number confirmed
1.....						
2.....						
3.....						
4.....						
5.....						
6.....						
7.....						
8.....						
9.....						
10.....						
11.....						
12.....						
13.....						
14.....						
15.....						
16.....						
17.....						
18.....						
19.....						
20.....						

Comments : .....

.....

.....

Signed .....

Health Officer

*Jefferson County health profile screening unit referral criteria, revised  
July 1, 1965*

Screening procedures	Eligibility <sup>1</sup>	Levels for referral to physician <sup>2</sup>
1. History.....	All ages.....	Any abnormality not under care of physician.
2. Height and weight.....	do.....	Those 25 percent or more over average weight (if patient desires).
3. Blood pressure.....	Age 21 and older.....	Systolic 160 and greater or diastolic 100 and greater.
Pulse rate.....		All arrhythmias.
8. VDRL.....	Age 21 and older.....	All reactors.
9. Blood sugar.....	Age 35 and older, age 21 and older if relative of diabetic, gross overweight, or female who gave birth to a baby weighing over 10 pounds.	180 mg. percent and greater if food or drink intake less than 1 hour; 160 mg. percent and greater if food or drink intake 1 to 2 hours; 130 mg. percent and greater if food or drink intake more than 2 hours; 50 mg. percent and lesser if post prandial between ½ and 2 hours.
10. Cholesterol.....	Age 35 and older.....	All 250 mg. percent and over.
11. Hemoglobin.....	Age 12 and older.....	All 10 gms. and below.
12. Urine sugar.....	All.....	All positives.
13. Albumin.....	do.....	Do.
17. Chest X-ray.....	Age 21 and over; 1-21 should receive PPD or Tine.	Any abnormality.
19. Electrocardiogram.....	Age 35 and older.....	Do.
20. Pap smear.....	Women age 21 and older or married, except in last 3 months of pregnancy.	All grades III, IV, V, to be biopsied, suggest grade II be repeated within 3 to 6 months.

<sup>1</sup> To be eligible the screenee must give the name and address of the physician to whom referral will be made, if indicated.

<sup>2</sup> Screening levels should be set up after consultation with the physician who will be receiving the referees

NOTES

Screening tests are for apparently healthy persons and those with known disease are eliminated from screening programs.

Screening is not diagnostic but points to the people who should consult their own physician for further medical workup.

Results of the selected abnormal screening findings are reported only to the physician, not to the screenee himself.

Through screening, those people most likely to need medical attention are referred to their doctor. Thus, the physician's time can be better utilized for early diagnosis and treatment.

HEALTH PROFILE SCREENING UNIT, JEFFERSON COUNTY HEALTH DEPARTMENT, MONTICELLO, FLA.

DEAR -----: This is to advise you that certain of your screening examinations recently taken at the Health Profile Screening Unit, indicate the need for further study by your physician for a possible disorder of the -----.

Please make an appointment with your physician at your earliest convenience. In accordance with your wishes, a copy of your records has been sent to your physician for his information.

Yours truly,

-----,  
*Director, Jefferson County Health Unit.*

STATE OF GEORGIA,  
DEPARTMENT OF PUBLIC HEALTH,  
*Atlanta, Ga., September 2, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: It is a privilege to respond to your letter of August 18, 1966, concerning your study of modern health screening methods intended to detect and thus help to prevent chronic illness.

This department became interested in the development and use of various screening procedures for the early detection of illnesses during 1942. The coordination of blood testing surveys for syphilis with X-ray screening for tuberculosis and other chest diseases into a multiple testing program was first tried in 1942 and proved to be economical and effective. In 1949, anthropometry and diabetes testing was added to our mass testing efforts and we added cardiological review of X-ray films for evidences of cardiac abnormalities.

These multiple screening activities were carried on for several years by mobile teams that visited all areas of the State. Approximately 1,400,000 Georgians were screened before this activity was discontinued because of a lack of funds and the accumulation of evidence through repeat surveys that adequate followup and treatment was not being accomplished.

We believe that screening for the early identification of chronic and other diseases can be an effective public health tool only in those situations wherein adequate resources and facilities are available to follow-up the screening procedures with the proper definitive diagnosis and treatments. Such followup, diagnosis and treatments cannot be accomplished unless the full interest and cooperation of the medical profession can be obtained.

We are now carrying on separate screening programs with adequate followup, for syphilis, tuberculosis, diabetes, arthritis, pulmonary diseases, and cardiovascular diseases. We operate a multiphasic screening program for the State employees in the Atlanta area. We intend to start a program for detecting early cancer of the cervix through cervical smear cytology on medically indigent females in the immediate future. We will continue to develop screening programs either separately or in various multiples as they become acceptable to the

medical profession in the State and as resources become available for adequate followup.

I will respond to your specific questions in the same order in which you posed them.

1. In our State several health screening programs are helpful in detecting diseases that may become acute in later years. Approximately 31½ years ago, the Georgia Department of Public Health instituted a new program designed to plan and carry out screening programs for the early detection of chronic diseases. Young men just graduated from college with a B.S. or B.A. degree are recruited for this program. They are then given intensive training in the chronic diseases more likely to cause complications, deformity, and disability in later years. They are also trained in health education, interviewing, counseling, and public relations. Following this training these men are assigned to the various local health districts in Georgia to assist the medical director and public health nurse in planning and implementing programs for chronic diseases. These include screening and survey for early detection of diseases in order that these individuals be referred to their family physician for thorough examination, diagnosis, and necessary treatment. In this way we have in many instances and will in the future be able by "secondary prevention" to prevent complications, deformity and resulting disability. These young men assigned as health program representatives throughout the State of Georgia have been of great assistance to the medical directors and have taken an administrative burden off the public health nurse allowing her more time for her professional duties. We feel that this program has proven very worthwhile and with the advent of medicare and the possibility of multiphasic programs in age groups 40 years and over, these men will prove more valuable to the community as our chronic disease programs expand. At present the program emphasis is on diabetes, glaucoma, and arthritis.

Similar programs are being carried on for tuberculosis and syphilis case finding and followup.

2. Since the chronic illnesses are not reportable diseases we have no reliable information regarding the prevalence of these diseases. We use the figures compiled and made available by the U.S. Public Health Service through its National Health Survey and its National Institutes of Health.

3. An effective multiphasic screening program for chronic diseases should be directed principally toward the population between 40 and 60 years of age. The screening procedures should include anthropometry, blood pressure, electrocardiography, chest X-ray, breast X-ray in females, visual acuity, audiometry, tonometry, blood glucose determinations, hemoglobin, VDRL for syphilis and white blood cell counts. Additional screening tests should be added as their value and practicality are demonstrated. Such screening should be done in fixed locations within communities where adequate resources for proper followup, diagnoses and treatment are available and the local medical profession is interested and cooperative. Health maintenance programs for individuals over 60 should be developed in close association with the individual's personal physician. The health problems of this age group do not lend themselves to mass screening procedures.

4. You have already contacted Dr. Lester M. Petrie, director of our preventable disease branch, concerning his direct testimony on this subject.

5. There is a definite need for a multiphasic health screening program, provided that financial support and personnel are made available to provide followup services.

Any worthwhile screening program must have a well organized referral and followup system as an integral part of the program if its objectives of health care for all those found to need medical attention is to be attained. Discovery of an illness or defect does not of itself assure that the subject will automatically seek the required medical care.

The acceptance of a multiphasic screening program by the public has been previously demonstrated. Such acceptance will be more complete if a concurrent health education and public information program is conducted. Acceptance by the medical profession could only be determined after a full discussion of the aims and purposes of the programs with the representatives of these groups.

We appreciate this opportunity to submit the above comments.

Sincerely,

JOHN H. VENABLE, M.D., *Director.*

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STATE OF HAWAII,  
DEPARTMENT OF HEALTH,  
*Honolulu, August 23, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: This is to reply to your letter of August 18, 1966, with regard to your Special Committee on Aging and its study of modern health screening methods intended to detect and thus help prevent chronic illness.

We of the Department of Health of the State of Hawaii have been conducting screening surveys now for well over 3 years, though by no means are they on the order and scale of those conducted by the Kaiser Foundation in California. Neither have we employed a computer for the evaluation of the data we have found. We do feel, however, that our surveys have been meaningful and have revealed some interesting findings.

In answer to your first question then, our health screening programs have followed three basic patterns. First, those conducted for specific reasons in limited area; second, those conducted for specific diseases statewide; and third, those conducted in cooperation with voluntary service organizations. As an example of the first pattern, I cite a survey conducted on the workers of the Lihue (Kauai) Plantation. This was done to ascertain the prevalence of undiagnosed chronic conditions in what was considered to be a "high risk" group. Of the 860 cases screened, 155 were referred to private physicians for followup. This survey, in addition to the routine physical examination, included electrocardiographic examination, serum cholesterol, serum uric acid, and a simple pulmonary function test.

Another example of the specific, though limited, type of screening was carried out on the residents of the Hana (Maui) area. The purpose of this was to determine the general health of a relatively isolated group and a predominantly Hawaiian population. Of the 281 cases seen in this survey, 15 were referred to their private physicians predominantly for cardiovascular problems which seem to be significantly higher among people of Hawaiian descent.

An example of, or survey for, specific diseases on a statewide basis has been our ongoing efforts in the field of diabetes screening. In the year 1965, for example, 9,291 persons were screened, of which a total of 265 new diabetes cases were recorded and referred to their physicians. This survey is made available to industry as well as to the people at large as, for example, the Hawaii health fair and the county fairs as they occur on the neighbor islands. We feel that this program has been very beneficial in educating the general public as to the seriousness of this disease.

An example of surveys conducted in cooperation with voluntary service organizations would be our glaucoma screening project which has been carried out in close cooperation with the Lions Clubs of Hawaii. Here, again, this survey was made available to entire communities given in public buildings following adequate public announcements. As the result of these surveys, 22,927 people were examined and 232 previously undiagnosed cases of glaucoma were referred to their private physicians.

In answer to your second question, I am enclosing a Xerox copy of page 63 taken from the 1964 statistical report of the department of health which lists the prevalence of chronic diseases by age group throughout Hawaii.

In answer to the third question, it has been our experience that in order to have effective screening, the primary prerequisite is adequate public announcement and notification. In the case of persons below age 60 this is particularly necessary, for health education must be continually employed in order to bring in those who would not normally seek a physician's advice unless they were seriously ill. For persons over 60, the problem is one of transportation to the site or place of examination, and we have on one occasion gotten around this by having a team of physician examine residents and/or patients in convalescent, nursing, and care homes.

In answer to your fourth question, the screening procedures within our department of health are conducted by the chronic disease branch, and any inquiry regarding these activities may be directed to Wilbur S. Lummis, Jr., M.D., executive officer of the medical health services division.

In answer to your last question, we in Hawaii feel that there is a definite need for encouragement of multiphasic health screening programs and we feel that in proportion to the amount of money that has been available and the effort we have extended, our programs have been successful and well received. The only impediment we have found to the acceptance of these programs, if it can be called that, is a general reticence on the part of the medical profession because of fancied intrusion upon the private practice of medicine. This has been counteracted to some extent by efforts on the part of the State legislature to mandate by law, State operated clinics for the diagnosis and treatment of chronic disease. Whether or not this will come about in

the future is a matter of speculation, however, at this point. As you undoubtedly realize, the advent of medicare has made for a "status quo" feeling on the part of legislatures until it is seen how effective the Federal programs in the field of health will be.

It is hoped that this has been of some help to you in your study, and if there is any way in which we may be of further service to you, please advise us.

Sincerely yours,

LEO BERNSTEIN, M.D., *Director of Health.*

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STATE OF ILLINOIS,  
DEPARTMENT OF PUBLIC HEALTH,  
*Springfield, August 31, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging,  
U.S. Senate, Washington, D.C.*

MY DEAR SENATOR NEUBERGER: This is in reply to your letter of August 18, 1966. Since you also sent a comparable letter to the State Agency on Aging, which in Illinois is the department of public aid, we have conferred with them and have agreed upon the following reply.

In regard to your specific questions, the State of Illinois does have screening programs for diabetes which is conducted by our local health departments; for glaucoma, which is done in cooperation with the Illinois Society for the Prevention of Blindness; for the prevention of rheumatic fever, both primary detection programs and secondary prophylaxis programs, which is accomplished with the assistance of the Illinois and Chicago Heart Associations; Papanicolaou screening programs for cancer, which are performed by local hospitals and in cooperation with many private practicing physicians; and the TB screening program, which is a responsibility of the Department of Public Health as well as many local TB sanatorium boards.

We are enclosing the latest information available on these programs.

In regard to the prevalence of chronic diseases within the State of Illinois for specific age groups, we have not conducted surveys in this respect but have extrapolated from the health statistics from the national health survey the estimated number of persons in Illinois having chronic conditions limiting their major activity. Likewise, we also enclose the 12 leading causes of death in Illinois for the year 1965 and deaths from all causes.

Health screening activities below age 60 include preschool and school exams, prenatal and postnatal exams, and multiphasic exams in housing centers, particularly in the metropolitan areas.

We are familiar with the multiphasic programs conducted for members of the Kaiser Foundation in California; however, we have no counterpart of such a program in Illinois. We believe that there is common agreement on the need for a multiphasic health screening program. We also believe that to gain proper acceptance, these programs should be done insofar as possible on a local basis in order to gain the support of the public and the medical profession.

Yours sincerely,

FRANKLIN D. YODER, M.D.,  
*Director of Public Health.*

IOWA STATE DEPARTMENT OF HEALTH,  
*Des Moines, Iowa, September 8, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

MY DEAR SENATOR: Thank you for your letter of August 18, 1966, concerning screening methods intended to detect and thus help prevent chronic illness.

We have had some interest in Iowa with chronic disease screening but have developed no extensive programs as yet. We have had limited experience with diabetes, carcinoma of the cervix, and glaucoma screening and have participated in the testing of heart disease screening methods. Although we have not developed a multiphasic screening program, we believe it would be more logical and economical to do multiphasic screening than to do separate screening for several different single diseases.

We too have been impressed with the multiphasic screening program of the Kaiser Foundation. Two points in particular stand out in the Kaiser program; (1) the large number of automated or semi-automated measurements and automated handling of data; and (2) the fact that the entire screening procedure is a part of the physician's evaluation of the patient. As we understand the program, every patient who is screened in the Kaiser unit has the results reviewed and his examination completed by his physician. Also each physician who sees patients who participate in this program is familiar with the unit and the results it produces.

During the past year the Lions Clubs of Iowa and the Department of Ophthalmology at the University of Iowa, under the direction of A. E. Braley, M.D., professor and head of the department of ophthalmology, have been doing glaucoma screening. Local scheduling and promotion is done by the Lions Clubs. The university then sends a glaucomobile and staff to do the testing. The results are referred to the patient's private physician. Significant glaucoma suspects have been found in this program.

We have no specific statistics about the prevalence of chronic diseases in Iowa in various age groups beyond that which we interpolate from national statistics and the limited data available on death certificates.

We feel that when discussing multiphasic screening one should be flexible with regard to age. Certainly screening for diabetes, glaucoma, and many other chronic diseases is most productive in the older age groups and in some cases screening should probably be restricted to certain age groups; however some other illnesses such as amblyopia ex anopsia necessitate screening in young age groups. It may be that generalized multiphasic screening should be reserved for those over 45 or some other specific age and that specialized programs be set up for the special problems of the younger age groups. In any case, however, we believe that any Federal legislation should allow the development of the most suitable program in the given local situation.

In response to your final question, there might not be a need for a multiphasic health screening program if: Every individual in the general public was motivated to visit his physician for periodic health appraisals and if the necessary physician and ancillary medical manpower was available to do these health appraisals (including review



of history, physical examinations and appropriate laboratory and special tests). Even in such an ideal setting, a program such as the Kaiser Foundation one, providing automated data collection and analysis would be helpful. Since we do not live in such an ideal situation, multiphasic screening is probably even more desirable to make the best use of our medical manpower. As much as possible we believe that multiphasic screening should be developed as an integral part of the physicians' complete examination. When this is not possible, a multiphasic examination with results sent to the physician for his followup can also be valuable if he fully understands the tests and results and knows the appropriate followup measures. In theory, such multiphasic screening examinations would be of benefit, however, the medical climate in Iowa at the present time precludes the feasibility of such a program here in the immediate future. Iowa has not developed a pattern of numerous clinics, in fact the only existing clinics are at the University of Iowa in Iowa City, and at Broadlawns Polk County Hospital in Des Moines. In general, medical care is provided in Iowa by the private physician and he has been very reluctant to give up any part of that care. Even among the physicians who recognize the benefits of multiphasic screening there may be some resistance because it is felt that patients whose screening results are negative sometimes develop a false sense of security. This is certainly a danger but should not occur in a properly planned program which adequately informs the public of the place that multiphasic screening has in their total health care.

Thank you again for the opportunity to express our viewpoints on this subject.

Sincerely yours,

ARTHUR P. LONG, M.D., Dr. P.H.,  
*Commissioner of Public Health.*

RAY L. SCHWARTZ,  
*Executive Secretary, Commission on the Aging of the State of Iowa.*

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COMMONWEALTH OF KENTUCKY,  
DEPARTMENT OF HEALTH,  
*Frankfort, Ky., September 13, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging,  
The U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you very much for giving us an opportunity to comment on legislation concerning multiphasic screening programs. We have just this summer inaugurated two new screening programs in Kentucky and are currently planning a third one.

I would like to answer your specific questions and then add some general comments on screening as we see it here in Kentucky. Incidentally, a definition of screening which I like is "a process conducted by medical or paramedical persons to separate, in a given population, those persons most likely to have a specific illness from those who most likely do not." Persons suspected of being ill are referred to their private physician who makes the final decision.

*Question 1*

During the period between January 1964, and July 1965, 2,645 adults were screened in 12 eastern Kentucky counties under community health project 19-6. The largest number of referrals were for abnormal laboratory values on urinalysis. Other leading conditions were vision problems, genecologic problems, gastrointestinal disturbances, hypertension, hearing defects, obesity, and anemia.

Another project, conducted by a local health department, screened 1,842 persons in a single central Kentucky county. I am including several tables showing data on that project. The health officer who designed and conducted this project is now director of our division of epidemiology which includes the office of chronic disease where current screening programs are administered.

In July the office of chronic disease began supporting county health departments with cervical cancer detection programs and blood sugar testing for diabetes. These programs have the double objective of identifying suspected cases and collecting epidemiological data. I am sorry that we do not yet have enough data to be meaningful.

Another screening project funded by OEO and operated under a contract by the State health department is completing its first year in Leslie County. Data from this project is just now going to the key punchers. I will be happy to send you a copy of the report when it is completed.

*Question 2*

I believe the fact that I cannot answer this question with any degree of certainty indicates the need for an expended screening program with built-in data collection. We have a cancer morbidity reporting system which we estimate reports approximately 25-30 percent of the cancer occurring in the State. In the 12 month period ending August 31, 1966, we received the following:

Age	Male	Female	Total
30 to 39.....	156	55	211
40 to 49.....	250	139	389
50 to 59.....	325	327	652
60 and over.....	660	1,007	1,667
Total.....	1,391	1,528	2,919

Another indication is our rheumatic fever registry. For the past 3 or 4 years we have received between 650 and 700 requests per year for prophylactic penicillin. This gives us no information, however, on what percent of the total incidence or prevalence these requests represent.

A large part of the problem of obtaining incidence and prevalence data stems from the fact that emphasis on chronic disease programing is relative recent. We are currently working with the University of Kentucky Medical Center and other interested groups to develop a more complete and accurate reporting system. I could give you figures from our Kerr-Mills program but they would apply only to public assistance recipients, in the State as a whole.

*Question 3*

I think this question will be answered in my general comments below.

*Question 4*

Strawn W. Taylor, director, division of research, planning and statistics; C. Hernandez, M.D., M.P.H., director, division of epidemiology; Omar L. Greenman, administrative director, office of chronic disease; Sherrill W. Ritter, Jr., administrator, community action health project. All these persons have their office in the State health department.

*Question 5*

I think there is a paramount need for more multiple screening in Kentucky. In fact, the major emphasis in our chronic disease program for several years ahead will be on screening in local communities. We are fortunate here in that the Kentucky Medical Association has taken an active interest in screening. Official KMA committees have devoted many hours to assisting in the development of the cancer and diabetes screening activities. Only in rare and isolated instances has a county medical society voted against participating. Public acceptance, without exception, has been greater than we anticipated.

One of the inadequacies in our screening programs has been the necessity to direct our efforts toward a specific disease because categorical Federal funds are being used. My staff and I feel that many other referable conditions could be detected if it were possible to provide complete screening services during a single visit rather than having separate detection clinics for each disease.

Another problem is the lack of concentrated populations. Kentucky has 120 counties but only 18 of them have a city with 10,000 or more population. Only 3 cities in the State exceed 50,000 people. Any programs developed here must be designed to provide comprehensive screening yet be practical in rural areas where saturation points will be reached in a relatively short time. This means that any Federal legislation, if it is to benefit all States, must allow considerable latitude and flexibility so that the States and local communities can tailor services to their particular needs. For this reason I would be very reluctant to establish eligibility criteria based on age or income.

Age is only one of several factors considered in identifying a high-risk group to screen. For instance, glaucoma is rare in young people while renal diseases are usually evident before age 50. I feel that other etiological factors should be used in determining who shall be screened for what diseases.

I would also advise against eligibility restrictions based on economic status. First, the screening program can also be an educational process. The woman who gets a "pap" test because her club goes en masse hopefully will go to her private physician the next year. If we exclude such persons then we end up serving only those who will always look to an agency for their medical needs. Second, if we see only people who cannot afford to go to a private physician we have a biased sample of the population and no reliable data on the overall health status of the community.

I apologize for both the length and brevity of this letter. Much more can be said in support of screening as a public health activity; yet I have so little to offer you in the way of actual experience. We

are just beginning to expand and emphasize screening here in Kentucky and everyone is excited about it. I concur completely with your statement on the need for and benefits of comprehensive screening. Prevention, whether primary or secondary, has always been a basic goal for public health.

Please accept my sincere appreciation for your interest in this field and let me know if I can be of any assistance in the coming months.

Sincerely yours,

RUSSELL E. TEAGUE, M.D., M.P.H.,  
*Commissioner of Health.*

[Enclosures]

TABLE I.—*Distribution, by sex, of persons screened and referred, Hardin County multiphasic screening program, November 1964 to April 1965*

Sex	Estimated population	Number screened	Percent screened	Number referred for any suspected condition	Percentage referred of screened
Male.....	46,802	565	1.2	295	52.2
Female.....	26,098	1,277	4.9	638	50.0
Total.....	72,900	1,842	2.5	933	50.7

TABLE II.—*Distribution, by race, of persons screened and referred, Hardin County multiphasic screening program, November 1964 to April 1965*

Sex	Estimated population	Number screened	Percent screened	Number referred for any suspected condition	Percentage referred of screened
White.....	67,500	1,780	2.6	899	50.5
Nonwhite.....	5,400	63	1.1	34	54.8
Total.....	72,900	1,842	2.5	933	50.7

TABLE III.—*Distribution, by age group, of persons screened and referred, Hardin County multiphasic screening program, November 1964 to April 1965*

Age group	Estimated population	Number screened	Percent screened	Number referred for any suspected condition	Percentage referred of screened
Under 6.....	9,112	0	0	0	0
6 to 9.....	4,811	48	1.0	3	6.2
10 to 19.....	16,184	108	.7	31	28.7
20 to 29.....	20,704	174	.8	68	39.1
30 to 39.....	8,384	331	3.9	121	36.6
40 to 49.....	6,051	406	6.7	172	42.4
50 to 59.....	3,426	353	10.3	215	60.9
60 to 69.....	2,260	251	11.1	167	66.5
70 to 79.....	1,458	125	8.6	112	89.6
80 and over.....	501	46	9.0	44	95.7
Total.....	72,900	1,842	2.5	933	50.7

TABLE IV.—Distribution, by annual income,<sup>1</sup> of persons screened and referred, Hardin County multiphasic screening program, November 1964 to April 1965

Income	Estimated population	Number screened	Percent screened	Number referred for any suspected condition	Percentage referred of screened
Less than \$1,000.....	5,468	190	3.5	141	74.2
\$1,000 to \$1,999.....	7,509	241	3.2	154	63.9
\$2,000 to \$2,999.....	10,789	191	1.8	112	58.6
\$3,000 to \$3,999.....	14,653	192	1.3	104	54.2
\$4,000 to \$4,999.....	10,060	154	1.5	70	45.5
\$5,000 to \$5,999.....	6,415	186	2.9	68	36.6
\$6,000 to \$6,999.....	4,884	179	3.7	74	41.3
\$7,000 to \$7,999.....	3,937	142	3.6	51	35.9
\$8,000 to \$8,999.....	2,770	95	3.4	39	41.1
\$9,000 to \$9,999.....	1,822	58	3.2	26	44.8
\$10,000 and over.....	4,593	131	2.9	38	29.0
Unknown.....	.....	83	0	56	67.5
Total.....	72,900	1,842	2.5	933	50.7

<sup>1</sup> Estimated population having a particular income is based upon 1960 census data on family income and represents persons making that income or a member of a family having that income.

TABLE V.—Number and percent of abnormal readings on tests for adverse health conditions, Hardin County multiphasic screening program, November 1964 to April 1965

Condition	Total screened	Number of normal readings on tests	Number of abnormal readings on tests	Unsatisfactory	Percent abnormal
Hypertension.....	1,791	1,628	163	0	9.1
Visual disturbance.....	1,813	1,492	321	0	17.7
Hearing loss.....	1,817	1,651	166	0	9.1
Diabetes.....	1,706	1,620	86	0	5.0
Syphilis.....	1,706	1,648	17	41	1.0
Anemia.....	1,842	1,793	36	13	2.0
Kidney disease.....	1,785	1,658	127	0	7.1
Heart disease.....	1,693	1,526	167	0	9.9
Pulmonary disease.....	1,693	1,500	191	2	11.3
Glaucoma.....	1,155	1,123	32	0	2.8
Cystic fibrosis.....	135	135	0	0	0
Intestinal parasite.....	1,651	1,581	25	35	1.5
Cervical carcinoma.....	860	850	10	0	1.2
Health questionnaire.....	1,828	1,100	728	0	39.8

TABLE VI.—Results of referrals to private physicians for suspected conditions, pital, July 1, 1964, to June 30, 1965

Suspected condition	Number referred	Confirmed and newly detected	Confirmed but previously known	Not confirmed	Not yet determined <sup>1</sup>	No response from physician
Hypertension.....	138	10	69	5	24	30
Visual disturbance.....	259	21	123	3	56	56
Hearing loss.....	108	10	55	2	20	21
Diabetes.....	80	11	10	32	12	15
Syphilis.....	17	1	1	5	8	2
Anemia.....	30	11	5	4	4	6
Kidney disease.....	125	12	18	48	21	26
Heart disease.....	167	17	63	30	31	26
Pulmonary disease.....	183	20	60	20	34	49
Glaucoma.....	32	1	0	10	9	12
Cystic fibrosis.....	0	0	0	0	0	0
Intestinal parasites.....	26	11	1	7	3	4
Cervical carcinoma.....	10	2	0	8	0	0
Health questionnaire.....	585	48	240	92	88	117

<sup>1</sup> Patient has not seen physician, patient still under diagnostic study, or patient referred to another physician.

*Cost analysis, Hardin County multiphasic screening program*

1. 1,665 VDRL tests at \$0.50.....		\$832. 50
2. 1,606 tests for intestinal parasites at \$1.50.....		2, 409. 00
3. 864 pap smears at \$3.....		2, 592. 00
4. 1,693 electrocardiograms at \$1.50.....		2, 539. 50
5. 1,527 chest X-rays at \$1.....		1, 527. 00
6. Salaries:		
Graduate nurse.....	\$4, 461. 33	
Clerk-typist II.....	898. 05	
Laboratory technician.....	811. 80	
Social security.....	165. 90	
		6, 337. 08
7. Travel.....		60. 46
8. Supplies and equipment.....	6, 804. 84	
Less unused supplies.....	-1, 206. 80	
		5, 598. 04
9. Building.....		3, 358. 00
10. Volunteer time.....		3, 463. 20
<b>Total cost.....</b>		<b>28, 716. 78</b>
		<hr/>
Total screenees.....		1, 842
Cost per screenee.....		\$15. 58
		<hr/>
<b>Total cost excluding:</b>		
VDRL's.....	\$832. 50	
Test for parasites.....	2, 409. 00	
Building.....	3, 358. 00	
Auxiliary volunteers.....	3, 463. 20	
		-10, 062. 70
		<hr/>
<b>Total.....</b>		<b>18, 654. 08</b>
Cost per screenee.....		10. 12

LOUISIANA STATE BOARD OF HEALTH,  
New Orleans, La., September 7, 1966.

Re letter of August 18, 1966.

HON. MAURINE B. NEUBERGER,  
Chairman, Subcommittee on Health of Elderly,  
U.S. Senate, Washington, D.C.

DEAR SENATOR NEUBERGER: I am delighted to hear of your interest in special health projects directed toward the chronically ill and aged. Multiphasic health screening activities show great promise for effective employment in many aspects of preventive medicine.

An attempt to answer your five specific questions is made as follows:

(1) The Louisiana State Board of Health has been, and is involved in health screening activities. Some of these specific screening activities include vision, syphilis, speech and hearing, cancer, tuberculosis, etc. We do not have any multiphasic health screening programs.

(2) The population in Louisiana for the age group of 65 years and over is 265,000. It is estimated that 80 percent of those over age 65 suffer from one or more chronic diseases.

We have more than 650,000 residents between the ages of 45 and 65 years of age. These people can be expected to develop similar illnesses unless more adequate and appropriate preventive medical procedures are applied.

(3) Health screening programs will be more effective and less expensive as they are made more comprehensive. Employment of automated equipment and technicians when applicable would improve the potential of success of such ventures.

(4) Some individuals who may have special knowledge or interest in the subject are included in the following:

Joe Barbaccia, M.D., M.P.H., associate professor for public health, Tulane University, 1430 Tulane Avenue, New Orleans, La.

Ben Freedman, M.D., M.P.H., director, Division of Preventive Medicine and Public Health Training, Louisiana State Board of Health, New Orleans, La.

Charles M. Sprague, M.D., dean, School of Medicine, Tulane University, 1430 Tulane Avenue, New Orleans, La.

Loye Copeland, Director, Social Security, Federal Office Building, New Orleans, La.

J. D. Martin, M.D., M.P.H., medical director, Standard Oil Co., Baton Rouge, La.

Rodney Jung, M.D., M.P.H., director, New Orleans City Health Department, City Hall, New Orleans, La.

Clark Corliss, executive director, Social Welfare Planning Council, 211 Camp Street, New Orleans, La.

Findley Raymond, executive secretary, Louisiana Tuberculosis & Respiratory Diseases Association, 305 Barrone Street, New Orleans, La.

William Frye, M.D., chancellor, Louisiana State University, School of Medicine, New Orleans, La.

Ben O. Morrison, M.D., M.P.H., geriatrics consultant, Louisiana State Board of Health, New Orleans, La.

(5) An adequate and appropriate multiphasic health screening program is needed in Louisiana.

Undoubtedly there will be some opposition to the implementation of such a program. None of the problems will be insurmountable.

Adequate financing, competent personnel to plan, organize, and implement a multiphasic health screening program will insure its success. The benefits of an effective preventive medicine program aimed toward the over-age-50 group could be improved by dropping the age to include those age 39 and over.

Thank you for your interest in the health problems of the chronically ill and aged. If we can be of further assistance please feel free to call on us.

Sincerely yours,

ANDREW HEDMEG, M.D., M.P.H.,  
*State Health Officer.*

STATE OF MAINE,  
DEPARTMENT OF HEALTH AND WELFARE,  
*Augusta, Maine, August 31, 1966.*

Senator MAURINE M. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Your Subcommittee on Health of the Elderly will undoubtedly find itself exploring some very interesting and important problems, and to some extent may find itself in unexplored fields.

This may well be a very appropriate time to begin this kind of exploration because of the foreseeable availability of new methods and new devices, but more importantly perhaps is the completely new aspect placed on these problems by the removal of financial barriers through titles 18 and 19 of Public Law 89-97. These two titles are obviously going to be the basis for a complete reorientation in the ways in which we have looked at many medical problems. It is entirely possible that your subcommittee will find it difficult to come to any conclusions until such time as the impact of these two titles on the system of providing medical care becomes more apparent and as we are able to learn more about the extent to which the application of these titles will contribute to the control of some of our chronic disease problems.

We have operated, on various limited bases, a variety of health screening programs that have been relatively standard in nature. They have been expensive and at times we have been forced by the distribution of resources to apply these programs in geographic areas other than those of greatest need.

We have very little localized data on the prevalence of chronic diseases in the various age groups in this State. We have had to depend, for planning purposes, on estimates and data from studies elsewhere.

I think a great deal of work needs to be done in defining the most useful and economic multiphasic screening methods for some of the screening programs that are now being used on a project or experimental basis leave much to be desired if one is considering widespread application.

Sincerely yours,

DEAN FISHER, M.D., *Commissioner.*

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THE COMMONWEALTH OF MASSACHUSETTS,  
DEPARTMENT OF PUBLIC HEALTH,  
BUREAU OF CHRONIC DISEASE CONTROL,  
DIVISION OF ADULT HEALTH,  
*Boston, September 7, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate,*  
*Special Committee on Aging,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in reply to your letter addressed to Dr. Frechette, commissioner of public health. In my reply I have tried to give you the kind of information which you have asked for.

I thought that your subcommittee might be interested to know of a trial of multiphasic screening clinics which took place in this State. The Massachusetts Department of Public Health and the Massachusetts Medical Society jointly sponsored a number of multiple screening clinics about 15 years ago. They were designed so as to (a) evaluate the specificity and sensitivity of screening tests; (b) to find out what induced people to come to the clinic; and (c) to study the costs of and techniques needed for the operation of such clinics in a local health department and general hospitals. The organizers of the



clinics recommended that (a) only procedures giving a low proportion of false positive or false negative interpretation be used, and (b) that the recording of height, weight, pulse, blood pressure and temperature be omitted because experience revealed that these procedures were either unreliable in the clinic setup, disclosed conditions that were already known or could readily be determined at the time the person sees his doctor.

Thus, as one clinic succeeded another, certain tests were added and others were omitted. The physical examination, for example, was reduced from 20 minutes to 10 minutes and eventually dropped entirely. A total of about 10,000 persons were screened and a battery of 14 tests was used, including a 222 questionnaire and a physical examination. The last and a few other tests, as described above, were later dropped.

There is no doubt that this series of multiple screening clinics in Massachusetts succeeded in their primary purpose of selecting tests which were proven to be of value in that they detected a significant amount of previously unsuspected disease in a large number of persons. Nevertheless they failed in one most important respect, they did not, despite the official support of the medical society, meet with the approval of the practicing physicians. As a consequence, multiple screening clinics petered out and, to my knowledge, there are not today any public multiple screening clinics in Massachusetts. There are of course hospitals, clinics, and private practices where anyone can get a complete physical checkup including screening tests as a private patient.

#### SOME CHRONIC DISEASE DATA

According to "Selected Chronic Disease Data," 1964, compiled by the division of adult health, Massachusetts Department of Public Health, it was estimated that—

1. More than 2 million of the 5 million persons in Massachusetts (40 percent) have one or more chronic conditions.
2. About 1 million (20 percent) of the State population are affected by conditions leading eventually to disability such as cardiovascular disease (including stroke and hypertension), arthritis, rheumatism, cataracts, glaucoma and other vision impairments, severe hearing impairment, mental illness, diabetes and cancer.
3. An estimated 500,000 people (10 percent) have some degree of activity limitation due to chronic conditions.
4. At least 250,000 persons (5 percent) in the Commonwealth are limited in their major activity or gainful employment because of chronic illness.
5. An estimated 110,000 persons, a little more than 2 percent of the total population in Massachusetts, are unable to work or keep house because of a physical disability.

In 1960, in Massachusetts, there were 571,609 persons 65 years and over and these comprise 11.1 percent of the total population of the State. Massachusetts has a higher proportion of elderly persons than for the country as a whole. There is, of course, a direct relationship between age and increasing incidence and prevalence of chronic disease.

*Estimates of overall prevalence of cardiovascular disease in Massachusetts, 1960: By sex for ages 45 and over*

Sex and age	Total	Heart conditions	High blood pressure
<b>Males:</b>			
45 to 54.....	52,000	21,000	31,000
55 to 64.....	32,000	33,000	44,000
65 to 74.....	96,000	48,000	48,000
75 plus.....	63,000	37,000	26,000
<b>Females:</b>			
45 to 54.....	20,000	11,000	9,000
55 to 64.....	30,000	20,000	10,000
65 to 74.....	35,000	23,000	12,000
75 plus.....	18,000	12,000	6,000
<b>Total, both sexes: Ages 45 plus.....</b>	<b>396,000</b>	<b>210,000</b>	<b>188,000</b>

Furthermore, a total of about 32,000 persons or about 56 percent of all deaths occurring in Massachusetts in 1960 were due to cardiovascular disease.

*Framingham (Mass.) heart study*

*Arteriosclerotic heart disease: Initial examination 1949-52*

Sex and age	Number examined	Number with arteriosclerotic heart disease	Rate per 1,000
Males, 45 to 62.....	941	43	46
Females, 45 to 62.....	1,128	21	19
<b>Total.....</b>	<b>2,069</b>	<b>64</b>	<b>32</b>

*Coronary disease: Incidence rate for 10 years' followup, 1952-62*

Age at entry	Population	Coronary heart disease	Incidence rate per 1,000
<b>Males:</b>			
45 to 49.....	352	45	127.8
50 to 54.....	354	50	141.2
55 to 59.....	263	49	186.3
<b>Females:</b>			
45 to 49.....	445	21	47.1
50 to 54.....	421	27	64.1
55 to 59.....	370	41	110.8

*Cancer*

Massachusetts has a higher incidence rate and prevalence ratio of cancer than the United States as a whole. There were 187 deaths per 100,000 population in Massachusetts compared with 149 in the United States. No accurate figures are obtainable at the moment for the amount of screening for cancer going on in the State. A number of hospitals have made cervical cancer detection a part of the normal admission procedure for women over 25 years of age and a number of community programs for cervical cancer detection have been held or are presently being planned.

*Glaucoma*

In 1962 at 20.3 cases per 100,000 population, glaucoma shared the honors with cataract for first place as leading causes of blindness in Massachusetts.

In conclusion, because of our past experience with previous trials of multiple screening in Massachusetts, particularly with difficulties which arose between the program organizers, patients and physicians, we consider it most important that steps be taken to insure that good relations exist between the organizers and operators of multiphasic screening programs and the private practitioner.

I hope that the above is of use to your subcommittee. If you think we can help you in any way, please do not hesitate to call on us.

Yours sincerely,

MYER HERMAN, M.D., D.P.H.,  
*Director.*

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STATE OF MICHIGAN,  
DEPARTMENT OF PUBLIC HEALTH,  
*Lansing, Mich., September 9, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Reference is made to your inquiry concerning our feeling in Michigan with respect to multiphasic and other health screening programs.

We are convinced from our experience in screening that a program for the early detection of incipient diseases, although far from perfect, is a program of very great benefit to our adult population. With recent social legislation making resources available to provide comprehensive health services for the people of this Nation, the need for a technique such as multiphasic or multitest screening has now reached a critical stage.

As we expand and make available the benefits of modern curative medicine, we must be equally aware of our responsibility for the early detection and prevention of the chronic disabling and crippling diseases that now deprive people of the productive years of their life and make them a burden to society, as well as create demands on the extreme end of the medical care spectrum, specifically those that need to be institutionalized or require long term care. Multiphasic screening currently is the most economical and efficient means of providing periodic assessments of an individual's health. This type of screening has a great potential in conserving the health of those who work and pay taxes and thus provide revenue for all of our other "Great Society" programs. It has been clearly established that early detection of incipient chronic diseases with proper medical management can, in a great many instances, reduce the crippling effects or progression of the conditions and add many productive and healthy years to the individual's life.

A good example is in the field of diabetes control. After decades of experience in treating diabetics, the Joslin Clinic reports that those who receive treatment shortly after the onset of their disease live longer than diabetic patients in general. This is true at any age level

and an example is the group from 45 to 49 years of age. Here, Joslin reports that 43.4 percent of those treated early were alive 20 years later, as opposed to 29.2 percent of all diabetic patients. This is just one example of the many reports available to justify early detection and treatment. The pattern has been clearly established in many, although by no means all, areas of chronic disease. Early detection and treatment means a longer productive and healthy life and is a sound investment in the public health of this Nation.

Multiphasic screening as well as individual disease screening, has been an important part of our disease prevention program. It has been demonstrated successfully in Michigan since 1954. We have experienced very good reception on the part of the public and in many instances the demand for the screening programs by individuals has exceeded the capacity of the clinics. Before 1954, most of our screening was pointed primarily at the detection of single disease entities, such as, tuberculosis, chronic lung disease, lung cancer, and certain types of heart abnormalities. Since 1954, we have conducted 33 multiphasic clinics and have screened 31,279 persons. The efficiency of these clinics is under study and plans are being developed to provide additional services and demonstrations. In addition to the multiphasic screening, we have also continued to screen a large number of Michigan residents for individual diseases, such as, diabetes, glaucoma, and cervical cancer. The screening procedures include the following steps:

1. Community organization and promotion;
2. Registration, including the name of the patient's physician to whom the report is to be sent;
3. The screening procedure;
4. Laboratory testing, where indicated, and X-ray interpretation;
5. Reports are then sent to the patient's designated physician for his information in making a diagnostic disposition and treatment, if indicated.

It should be emphasized that the patient is not informed of the results of the test but told only that he has an abnormality and that he will need to report to his doctor for further examination.

6. The final procedure is the followup by letter or, if necessary, a visit to encourage the patient to report to his physician, and to obtain from the physician the report of the results of his examination.

It should be noted that screening is not an attempt to make diagnoses or to treat. This is left entirely to the patient's personal physician. Screening merely separates those who have presumptive evidence of disease from those who presumably do not. In our screening programs we work cooperatively with the voluntary health associations involved, such as, the Michigan Tuberculosis and Respiratory Disease Association, the Michigan Diabetes Association, the Michigan Heart Association, and the cancer societies. There has been very good cooperation between the Michigan Department of Public Health and the Michigan Commission on Aging in screening endeavors.

Many of the problems we have experienced in coordinating our multiphasic screening programs with the medical profession no longer exist. This is reflected in the development of close working relationships with the various professional medical groups in the State. As

an example, we participate with voluntary health organizations in the screening of members of the Michigan State Medical Society at their annual meeting. We anticipate that the medical profession will support multiphasic health screening as an important medical service component to relieve their already overtaxed resources. Screening activities require many precious hours of a physician's time that can be more effectively utilized in the diagnosis and treatment of persons with suspected abnormalities rather than to use his time for the examination of healthy individuals. Multiphasic screening can include any test that can be done by technicians and when automated can be done expeditiously and at reduced cost.

We appreciate the opportunity to discuss this subject with you.

Sincerely,

ALBERT HEUSTIS, *Director.*

MISSISSIPPI STATE BOARD OF HEALTH,  
*Jackson, Miss., September 2, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: This replies to your inquiry dated August 18, 1966. I have consulted with my staff members who have particular concern and responsibility relating to the questions in your letter.

For many years we have maintained a statewide screening program through mobile and stationary X-ray service for the detection of tuberculosis and other chest diseases. In addition, selective screening continues for syphilis.

Relating more specifically to your questions, the following information is given:

1. (a) The diabetes screening program screened 22,222 persons in this State in 1965. There were 395 new cases found and 145 old cases referred back for treatment. This screening was done in local county health departments, industry, nursing homes, civic clubs, and other community groups. The majority of diabetic cases detected was in the 40-plus age group.

(b) We have recently begun some multiple-screening testing for glaucoma, visual acuity, diabetes, and hypertension at one time. This was planned with the welfare department to screen welfare clients, and involving rehabilitation workers for referred and followup. The referral rate for glaucoma in this population (estimated mean age of 60) is approximately 10 percent with a diagnosed rate of 6 percent. The referral rate for diabetes is over 6 percent with diagnosis confirmed in about 3 percent. Yields for hypertension approximate those found elsewhere related to age.

We expect to expand this activity in the future if funds are available.

2. We have conducted no studies on prevalence of chronic disease in this State but have applied rates from the national health survey to make estimates on the problems here. Also, our screening programs have provided some information on probable prevalence rates.

3. My suggestion would be the age of 40 as the starting of a productive age for multiple screening. However, we should not prescribe an

arbitrary age limit in legislation. There should be flexibility in planning such programs at the State and local levels.

4. No comment on this.

5. The public has demonstrated its willingness to participate in multiscreening programs. In our programs where the general public is invited to participate in more than one test, usually the facility is overwhelmed. Indigent groups are very hard to work with and response is negligible when invited to participate in a single program, but when invited to participate in a screening program that offers more than one test, such as eye, blood sugar, and so forth, the response, from our experience, has been that from 60 to 90 percent of those indigent persons invited will participate.

Any health screening program must provide support for community organization, informational, and referral services. This can best be extended through local organized health departments. It is important, therefore, to offer program support from the Federal level permitting flexibility in use of funds for local program support.

The medical profession is usually cooperative when the screening emphasis is within their particular specialty. For example, ophthalmologists are very cooperative in regard to eye screening; cardiologists to hypertension; and internists in diabetes or cancer screening. In some instances the first reaction of the medical profession is negative, but on proper presentation and implementation the screening programs are usually accepted by them.

This again emphasizes the necessity of local organization and implementation to assure that each person who is identified as a suspect is referred to and reaches the treatment and services he needs. This requires joint planning and work by all concerned local agencies and groups.

Sincerely,

A. L. GRAY, M.D.,  
*Executive Officer.*

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THE DIVISION OF HEALTH OF MISSOURI,  
*City of Jefferson, August 29, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I have your letter of August 18, in which you speak of your interest in modern health screening methods. The Missouri Division of Health did a multiple screening program in Jefferson County, Mo., several years ago. Some 5,000 persons were screened for the usual things. Our experience in this program lead us to believe that unless the private physician is brought more closely into the program and until he accepts these techniques, the program is not particularly fruitful.

The St. Louis City Health Department is doing a screening program at the Pruitt Igoe housing project in St. Louis City. This is being supported as a pilot project with Federal funds.

We find in these projects that people do not go to their physician regularly and quite frequently do not follow up on a screening procedure. We do find frank diseases, such as glaucoma and diabetes and

find these diseases at times when therapy will prevent further damage to the individual. I believe the Public Health Service, as we, would consider the California project you mentioned as the ideal utilization of multiphasic screening. This, of course, is primarily laboratory detection of detectable diseases. Where these laboratory tests can be done and with prompt referral to a physician for interpretation and therapy if necessary, is the proper route and the most fruitful. Results can be expected with this type technique.

I imagine that the State of Missouri has the same general prevalence of chronic diseases as other States in the Midwest would have in the various age groups. Certainly screening programs should be aimed at those over 40 for diabetes and glaucoma and other ages for other specific diseases.

In answer to your question No. 4, the following two individuals may be of some help to you regarding the subject: Carl E. Rice, M.D., health officer, Jefferson County Health Department, Hillsboro, Mo. Earl W. Shelton, M.D., Pruitt Igoe housing project, 3635 North Newstead, St. Louis, Mo.

I think that I have answered your last question, "Is there a need for a program and what are the impediments to acceptance of the program?"

We know many things in medical science concerning the early detection and prevention of disease. It is difficult to get the individual involved in the disease process interested in many instances. It is also difficult to change habits and points of view of the physicians concerning the utilization of these techniques in his office practice.

Sincerely,

L. M. GARNER, M.D., M.P.H.,  
*Acting Director.*

STATE OF MONTANA,  
STATE BOARD OF HEALTH,  
*Helena, Mont., August 25, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Senate Office Building,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: I appreciate the opportunity to respond to the questions posed by the U.S. Senate Subcommittee on the Health of the Elderly.

Montana has not had any multiphasic screening program with the exception of one done in 1963 in Lake and Sanders County. Unfortunately the person in charge of the survey did not report his findings. We have participated in cervical cancer screening through the papanicolaou smear test. The enclosed copy of the March 1964, Treasure State Health Bulletin explains this program to some extent.

Hearing screening has been done on adults. This program is described in the January 1965 issue of Treasure State Health.

The best indications we have of the prevalence of chronic illness is the survey done in Missoula County in 1962. A copy of the survey report is enclosed.

We feel that some kind of multiphasic screening program is needed for adults in Montana. This would be particularly true for some of our rural areas which lack adequate numbers of physicians. Because of the small number of persons in any given locality in Montana, the Permanent type clinic is not suitable. When you live 50 or more miles from the nearest doctor, you don't make a visit to the doctor's office just to find out what your blood pressure is.

It might be advisable to place a nurse in such a community to perform routine clinical tests, the results of which to be reported to both the doctor and the patient. There is a question as to whether such activities might infringe upon the medical practice acts of the various States.

Sincerely yours,

JOHN S. ANDERSON, M.D.,  
*Executive Officer.*

STATE OF NEVADA,  
DEPARTMENT OF HEALTH AND WELFARE,  
HEALTH DIVISION,  
*Reno Nev., August 31, 1966.*

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR MRS. NEUBERGER: In answer to your letter of inquiry dated August 16, 1966, we believe that overall protection is the real key to the prevention of chronic illness in the aged. Known methods of prevention must start in the prospective mother and father, then proceed to excellent care of the mother in pregnancy, thus bringing about a successful and normal child at birth. Next on the agenda is to take care of the normal child. This means not only the medical and physical care, but loving care, which can only be brought about by a home filled with love based on dignity, with a Christian belief in a true God.

Known methods of prevention must be utilized to prevent the preventable diseases, accidents, and poisonings. Physical education, training, and early methods of rehabilitation must be carried out. All of these tend to prevent chronic illness and disabilities in all walks of life.

Now, to be more specific and answer some of your questions:

1. Screening programs have really only just started in Nevada. A very fine tuberculosis care and control program began in 1960. Through the mobile X-ray and clinic screening, many cases of early disease have been uncovered and cared for by medical and surgical procedures. Public screening in glaucoma clinics has been carried on throughout the State about once a year, resulting in bringing to light some unknown early cases.

No real programs in diabetic screening or in early cardiovascular diseases, arthritis, etc., have been carried out. Believing in prevention and early diagnosis of disease, a mobile multiphasic screening unit has been proposed and budgeted for, believing that such a unit would be of untold advantage in the State of Nevada because of long distances



between small towns with no or scanty medical services. This was rejected by higher authority.

2. No.

3. I believe in annual physical examinations for all people, especially above 50 years of age.

4. None known to be especially interested.

Francis M. Kernan, M.D., 202 California Avenue, Reno, Nev., is chairman of the State medical association committee on chronic illness and aging.

Through this committee an attempt to find unknown diabetics is carried out once a year through the medical profession. This, to my way of thinking, is only halfheartedly supported by the profession.

5. Need. Yes. I believe it could be done if money and staff provided under the guidance of the State division of health, chronic illness and aging program. See question No. 1.

I hope this brief information may help in your investigation.

Best wishes.

Sincerely yours,

B. A. WINNE, M.D.,  
*Chief, Bureau of Preventive Medicine.*

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STATE OF NEW HAMPSHIRE,  
DEPARTMENT OF HEALTH AND WELFARE,  
DIVISION OF PUBLIC HEALTH,  
*Concord, August 30, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: May I commend you on this approach to ascertaining opinions and facts relative to the needs and activities in each State, within the specialty of preventive medicine. Unlike the housing contractor who installs a sink 5 feet above floor level because he is over 7 feet tall, you are endeavoring to build in reply to specific needs of individual States.

The emphasis on screening, most particularly on multiphasic screening, is entirely justified. However, we must not lose sight of the fact that screening is only one leg of the tripod that supports good public health. It has been our experience that continuing physician and patient education are vitally essential to effective public health programming. We are implementing all three factors in our existing programs.

On separate charts enclosed I have attempted to answer questions Nos. 1, and 2 as posed in your correspondence, and in part, the answer to question No. 3. An additional sheet contains the names you requested in query No. 4.

Question No. 3: It is our ambition to present, in a mobile operation, multiphasic screening to all of our citizens residing in areas ill equipped and financially unable to carry such a burden unaided. New Hampshire enjoys a population wherein 11.4 percent have passed the

age of 45 years, but not yet age 55; while 17.9 percent are past the age of 55 years, according to the 1960 report of the New Hampshire Bureau of Vital Statistics. They reside in rural as well as urban and suburban areas. To present a comprehensive program of detection, education and medical attention, in all specialties, necessitates bringing the service to the community. We are presently meeting these demands in disassociated programs that should be integrated.

Question No. 5: Arrangements have been made for Mendon MacDonald, M.D., representing the New Hampshire State Medical Society, and Mr. Edward J. Jensen, public health representative for this division, to observe at firsthand the procedural methods and results obtained by the Permanente Medical Group. They will arrive in Oakland, Calif., on October 20, 1966, and will submit, on their return, a report of their impressions to this office; to the public health committee of the State medical society and to the president of the society. It is this involvement of private physician and public health agency, at inception, that encourages me to predict wholehearted cooperation from the medical profession in establishment of expanded screening programs. The vast majority of New Hampshire physicians recognize that the presumptive findings of sensitive and specific screening enables them to concentrate their talents for diagnosis and treatment on the percentage of the population demonstrating a demand for action and remedy. The enclosed photocopy, in part, of page 7 from the July 1966 issue of the New Hampshire Medical Society newsletter substantiates my anticipation of receptiveness toward such supplemental service as we may be in a position to offer.

The need for multiphasic screening, of a quality to guarantee the maximum degree of accuracy, is made obvious by projections on the charts enclosed. It is also obviated by the shortage of medical and paramedical personnel within this State as well as nationwide. We are keenly interested in a prototype of the Permanente installation within New Hampshire should investigation confirm the claims of sensitivity, productivity and efficiency.

Although many worthwhile assistance programs guarantee the payment for medical attention, it becomes increasingly clear that supplying medical service demands immediate and expanded action. We are engaged in recruitment and training of local personnel who can assist in identification of medical needs; in broadening of physician knowledge within chronic disease interests, and, patient-family education to enable knowledgeable adherence to treatment-therapy routines established by these physicians.

The productivity of physician-patient-department cooperation which has evolved from the aforementioned efforts to supply services where exigencies exist, bring us to the realization that we are merely scratching the surface. It is hoped that your committee will be able to provide the impetus necessary to make supply and demand a commensurate reality.

Sincerely,

MARY M. ATCHISON, M.D., MPH.,  
*Director.*

STATE OF NEW JERSEY,  
DEPARTMENT OF HEALTH,  
*Trenton, August 29, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in reply to your letter of August 18. Mrs. Eone Harger, director of the division on aging and I have collaborated in the answers.

The theory of multiphasic screening per se is a very attractive one. To make the process effective, efficient, and reasonably economical for large groups of people of varying ages is difficult. A basic belief of ours is that it is most effective and efficient when it is part of comprehensive medical care. It is probably optimum as a part of prepaid medical care systems and where there is built-in followup.

We, too, are greatly impressed by the splendid developments in California, but even there, there is much yet to be learned.

Specific mass tests applied to high risk populations for specific conditions have proven themselves many times. Examples include tests for syphilis, tuberculosis, and diabetes. New Jersey's diabetes control program includes screening primarily directed at relatives of diabetics and persons over 40 or obese.

A multiphasic screening program which developed in part out of an extensive and intensive study of chronic illness has been carried on for some years at the Hunterdon Medical Center in Flemington, N.J. Dr. Robert Henderson is the medical director of this outstanding institution. The screening is a part of the extensive services provided by the center. Even here details of evaluation have been difficult.

We can, of course, supply detailed data on mortality by age group but we do not believe that the pattern is significantly different than the national data. Data regarding morbidity on a broad base are limited. The best data are probably Blue Cross experience relating only, however, to hospitalization under these specific circumstances.

In our experience of public screening programs there are significant and expensive problems in getting sustained, sufficiently large groups of people to participate, in having the data fully utilized and well interpreted and certainly in followup. They may be quite expensive, at least in terms of instances of newly discovered, remediable, or preventable disease or disability.

There are enormous potentialities in the further automation and development of better laboratory procedures applicable to large volumes. The increased accessibility and fuller use as a part of good health maintenance and medical care systems can make great contributions.

Sincerely,

ROSCOE P. KANDLE, M.D.,  
*Commissioner of Health.*

STATE OF NEW MEXICO,  
DEPARTMENT OF PUBLIC HEALTH,  
*Santa Fe, August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging, U.S. Senate,  
Washington, D.C.*

MY DEAR SENATOR NEUBERGER: Thank you for your letter of August 18, 1966, requesting our viewpoints and information on health screening methods for chronic disease. The New Mexico Department of Public Health and the New Mexico Department of Public Welfare have contributed to the answers to your questions that follow.

1. *Have any health screening programs within your State been particularly helpful in detecting diseases that may become acute in later years? May we have brief description of the program and the results?*

New Mexico has conducted several screening programs in the past few years:

(a) The division of dental health has conducted an oral cytology project in their itinerant dental clinics and through practicing dentists during the past 2 years. Sixty cytology smears have been performed with one case discovered.

(b) Venereal disease case finding is active in the State with contact, jail, premarital, and pregnancy screening.

(c) Screening methods for tuberculosis are being analyzed by a project administered by the Division of Preventive Medicine. This involves contact followup and screening of school children by skin testing.

(d) Papanicolaou smears for cervical cancer are performed on selected indigent patients in local health departments. A recent U.S. Public Health Service Community Health Grant to the Department of Pathology of the University of New Mexico School of Medicine will increase this service to Albuquerque residents and Indian patients.

(e) In 1959-60 the New Mexico Department of Public Health conducted a diabetic screening program through its local health departments. Screening tests were performed on 13,884 persons. Patients saw their family physicians for followup. Fifteen new cases of diabetes were diagnosed and 121 cases were potential diabetics on whom adequate followup information was not available.

(f) A multiphasic screening program was conducted by the New Mexico Department of Public Health at an agricultural extension service course for women in June 1966. The 268 women participants had height, weight, blood pressure, urine sugar, urine protein, and blood sugar determinations performed. The electrocardiogram was abandoned early in the program as it was evident that it was a poor screening technique. Excluding overweight, 93 abnormalities were found. Followup evaluation is now underway on this group.

(g) Dr. Marian Hotopp, District I Health Officer is planning an adult health maintenance program for a low income rural area of

northern New Mexico. Medical care is not readily accessible in this remote four-county area. The program is being funded by a contract from the Gerontology Branch of the Division of Chronic Diseases of the U.S. Public Health Service. Itinerant clinics will be established for health screening of elderly residents. The clinics will include a nutritional and medical history, laboratory tests, and a limited physical examination. Counseling, physician referral, and followup are planned. The project will attempt to study the most effective techniques and personnel, and the feasibility of this type of program.

2. *Can you give us information about the prevalence of chronic disease within your State in age groups from 40 to 50, 50 to 60, and 60 and beyond?*

New Mexico mortality data are available from death certificates. This is best summarized in, "Vital Statistics of the United States," which is published by the National Center for Health Statistics of the Public Health Service, U.S. Department of Health, Education, and Welfare. Further comparative data are analyzed in the President's Commission on Heart Disease, Cancer, and Stroke—"Report to the President—a National Program to Conquer Heart Disease, Cancer, and Stroke," volume II, February 1965.

Morbidity data are not generally available for nonreportable diseases. The discharge diagnoses of patients hospitalized during fiscal year 1965 under the New Mexico Department of Public Welfare old age assistance program (all patients over age 65) are shown on the enclosed chart.

3. *Do you have any suggestions for effective screening or other health maintenance programs for persons below age 60? Above age 60?*  
Suggestions are discussed under question No. 5.

4. *May we have names and addresses of any individuals who may have special knowledge of, or interest in, our subject?*

(1) New Mexico Department of Public Health, 408 Galisteo Street, Santa Fe, N. Mex. 87501; Edwin O. Wicks, M.D., D.P.H., director; Leo D. O'Kane, M.D., chief, division of preventive medicine; Leonard J. Voelker, D.D.S., M.P.H., chief, division of dental health; Marion Hotopp, M.D., M.P.H., District I health officer.

(2) New Mexico Department of Public Welfare (State agency on aging), 408 Galisteo Street, Santa Fe, N. Mex. 87501; Leo T. Murphy, director; Mrs. K. Rose Wood, supervisor, State program on aging.

(3) New Mexico State Special Hospitals' Board (for geriatric and tuberculosis facilities) Fort Bayard, N. Mex. 88036; George W. Bryan, executive director.

(4) New Mexico Medical Society, 3010 Monte Vista Boulevard, NE., Albuquerque, N. Mex.; Ralph R. Marshall, executive secretary; Thomas L. Carr, M.D., president; R. C. Derbyshire, M.D., chairman, public health committee.

(5) New Mexico regional medical program for heart disease, cancer, stroke, and related diseases, 900 Stanford Drive, NE., Albuquerque, N. Mex.; Reginald H. Fitz, M.D., project director.

(6) University of New Mexico School of Medicine, 900 Stanford Drive, NE., Albuquerque, N. Mex.; Reginald H. Fitz, M.D., dean; Solomon Papper, M.D., chairman, department of medicine

(7) Albuquerque Area Office, Division of Indian Health, U.S. Public Health Service (Includes New Mexico and parts of Colorado and Arizona) 502 Gold, SW., Albuquerque, N. Mex.; Robert L. Zobel, M.D., Rrea Medical Director.

5. *Is there a need for a multiphasic health screening program? Are there any particular impediments to the acceptance of such a program by the public or by the medical profession?*

The New Mexico Department of Public Health and the New Mexico Department of Public Welfare feel that there is a need for such preventive services. However, any such programs should be well planned, and studied, for feasibility prior to initiation. Our past experiences of acceptance by the medical profession bring the following precautions to mind:

(a) We must be certain that early diagnosis of a disease may lead to prevention of complications. Screening should be limited to diseases for which unequivocal preventive or therapeutic treatment is available.

(b) Screening tests must be both sensitive and specific so that they would not falsely reassure nor falsely alarm the populace.

(c) Cost feasibility must be closely examined. For example, diabetes screening of persons less than age 25 yields only two cases per 1,000 persons screened with current methods. The natural history of diabetes in this age group would probably cause most of these diabetics to seek medical care within a short time.

(d) Adequate followup must be insured. Initial programs should be designed to study this aspect of multiphasic screening.

With attention to the above precautions and close cooperation with involved parties, I think the impediments to acceptance of such a program would be markedly diminished.

Thank you for this opportunity to express our viewpoints.

Sincerely yours,

EDWIN O. WICKS, M.D., D.P.H., *Director.*

*In-patient hospital care: Number of hospital discharges, by admission diagnosis of the disease or injury for which the person was being cared for in the hospital, July 1, 1964, to June 30, 1965*

Item	Total categories	Assistance program					
		Old-age assistance	AFDC		ANB	AD	GA
			Adults	Children			
Total discharges.....	7,954	3,091	2,092	1,347	74	1,165	185
Tuberculosis.....	11	3	5	1	0	2	0
Other infective and parasitic diseases.....	54	11	7	29	1	5	1
Malignant neoplasms.....	252	136	46	0	0	64	6
Benign and unspecified neoplasms.....	79	26	29	10	0	12	2
Diabetes mellitus.....	210	85	41	10	9	51	14
Other allergic, endocrine, metabolic, and nutritional diseases.....	126	40	24	20	1	35	6
Diseases of the blood and blood forming organs.....	80	31	12	14	0	18	5
Psychoses.....	8	4	1	0	1	2	0
Other mental, psychoneurotic and personality disorders.....	84	20	31	10	2	20	1
Vascular lesions affecting central nervous system.....	166	140	4	2	2	17	1
Diseases of the eye.....	222	152	21	8	7	34	0
Other diseases of nervous system and sense organs.....	155	36	30	26	1	55	7
Rheumatic fever and chronic rheumatic heart disease.....	35	7	6	11	0	9	2
Coronary artery disease, angina pectoris.....	56	27	7	0	1	18	3
Other arteriosclerotic and degenerative heart disease.....	138	116	7	0	1	13	1
Hypertensive heart disease.....	33	24	2	0	0	6	1
Other hypertensive disease.....	77	48	12	0	1	14	2
Other heart disease.....	400	264	29	7	3	96	1
Other diseases of circulatory system.....	166	89	31	7	3	32	4
Upper respiratory diseases.....	343	68	30	207	1	33	4
Pneumonia.....	664	330	43	221	3	61	6
Other diseases of respiratory system.....	138	80	13	10	3	27	5
Ulcer of stomach and duodenum.....	151	68	43	8	4	23	5
Appendicitis.....	112	5	20	82	0	4	1
Hernia of abdominal cavity.....	121	56	22	19	1	19	4
Diseases of the gallbladder.....	251	92	107	1	2	36	13
Other diseases of the digestive system.....	545	233	86	115	6	91	14
Diseases of the urinary system.....	320	142	67	38	4	65	4
Diseases of breast and genitalia.....	378	95	201	27	3	36	16
Delivery with or without complication.....	700	2	645	43	0	10	0
Complications of pregnancy and puerperium.....	165	1	153	7	0	3	1
Diseases of skin and cellular tissue.....	134	52	26	32	2	19	3
Arthritis.....	44	21	3	2	0	15	3
Other diseases of the bones and organs of movement.....	65	20	20	4	0	19	2
Congenital malformations and certain diseases of early infancy.....	25	7	4	13	0	1	0
Symptoms, senility, and ill-defined conditions.....	542	234	86	124	4	87	7
Fractures and dislocations.....	322	188	36	67	2	33	16
Head injury (excluding skull fracture).....	24	4	5	13	1	1	0
Laceration and open wound.....	59	11	14	21	1	9	3
Other effects of accidents, poisonings, and violence.....	197	34	47	82	1	23	10
Special conditions, examinations without sickness, and other admissions.....	54	7	11	27	0	7	2
Diagnosis unknown or not reported.....	248	102	65	29	3	40	9

Source: Medical care program, 1964-65, New Mexico Department of Public Welfare.

STATE OF NEW YORK,  
DEPARTMENT OF HEALTH,  
*Albany, August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I am really pleased to learn of the study of modern health screening methods being undertaken by the Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging and wish to express my support for any program which will promote the development of illness detection programs for our older adult population.

There is no doubt in our minds that community programs directed at the detection of those chronic illnesses for which reliable screening methods are available and for which something can be done, when detected, is our best approach toward curtailing the morbidity and disability processes so common among the aged today and thereby reducing the cost of medical care. In addition, research directed at the improvement of detection methods needs more financial support than has been available to date.

I will answer your specific questions as they were presented:

1. The three major health screening programs in this State have been as follows:

(a) Multiphasic health screening for State employees in the Albany area. During the past year approximately 6,000 employees have received a battery of screening tests, primarily for cardiovascular and respiratory disease. It is planned to expand this group during the next several years to offer repeat examinations at 3-year intervals. Additional screening tests will be added as the program develops.

(b) A well aging conference is being carried out by the Erie County Department of Health in Buffalo. This is now in the last year of a 3-year demonstration and it is expected that it will be absorbed by the department of health on a continuing basis next year.

(c) The New York City Department of Health has been operating four continuing screening programs for diabetes and glaucoma.

We are collecting the results on these three programs and will forward them to you as soon as they are available.

In addition, we have numerous programs throughout the State in diabetes and glaucoma detection, some on a continuing basis, others on a more periodic or irregular scheduling. Some of these programs are offered primarily for educational purposes such as those conducted at the annual meetings of the State medical society, the Association of County & Town Officers, and the Association of Mayors. A major program is conducted as part of the State exposition each year and reaches several thousands of individuals.

2. While several surveys of chronic disease in New York State give figures for disease prevalence by age group, we find the estimates of the national health survey more reliable.

3. It is our opinion that the Kaiser Foundation program in California, to which your letter refers, represents the ultimate in screening programs today. The program should be available to persons of all ages although the tests would vary according to age group.



However, we do need simpler types of operations at the community level to provide screening service only and to augment rather than replace the examination of the patient in the office of his physician, whether this be in private group or clinic practice. It is our goal to make screening programs available to supplement the medical programs of titles XVIII and XIX from the viewpoint of preventive medicine.

4. The following persons may supply more information on the programs noted in answer to question 1:

(a) I. Jay Brightman, M.D., assistant commissioner for chronic disease services, New York State Department of Health.

(b) William Mosher, M.D., commissioner of health of Erie County, City Hall, Buffalo, N.Y.

(c) Irving Starin, M.D., assistant commissioner of community health services, New York City Department of Health, 125 Worth Street, New York City.

5. Our attitude concerning the need for multiphasic health screening programs has been indicated above. In our three major programs, as well as the special programs at the State exposition, in diabetes and glaucoma detection days, the proper response has been good. In the State employees program, there have been only 15 percent outright refusals to participate. During the first year of operation there was little followup among these refusals and it is believed that this percentage can be reduced by intensifying the educational activities of the program.

It is my belief that the medical profession is much less opposed to this type of program than it was several years ago. In fact we have participated in detection programs for physicians at the State medical society annual meeting and several county medical societies have had similar programs of their own. Of course, there will be some areas where an ultraconservative attitude may serve as at least a partial barrier to program development.

Sincerely yours,

HOLLIS S. INGRAHAM, M.D.,  
*Commissioner of Health.*

NORTH DAKOTA STATE DEPARTMENT OF HEALTH,  
*Bismarck, August 31, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: In a recent communication, the Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging requested information regarding screening programs to identify chronic diseases.

The report, compiled jointly by the State department of health and the Governor's council on human resources, is as follows:

1. Glaucoma clinics have been conducted in local areas for persons over 35 years of age. These have been sponsored by a community organization with consultation and assistance provided by the State department of health. Local physicians provided equipment, medica-

tion, and services gratis. In 1965-66 3 clinics were held with 665 persons tested and 56 referred for further medical care.

Cancer detection clinics (Pap smear) have been conducted in 1964-66 with 1,170 women tested. These are organized and planned locally with the physicians. The State department of health provides consultation and assistance to the planning groups.

One multiphasic health survey was conducted on the Fort Berthold Indian Reservation in 1958. The North Dakota State Department of Health was in charge of the program. The Public Health Service, Bureau of Indian Affairs, North Dakota Tuberculosis & Respiratory Disease Association, and private physicians of the area contributed.

2. We have no statistics on the prevalence of chronic disease in North Dakota.

3. In the less populous rural States, it is felt that health screening programs will be more successful if planned on a community basis to insure interest and participation.

4. No one with special knowledge of subject.

5. There is a need for a multiphasic health screening program. In our opinion there will be some reluctance on the part of the medical profession to approve and/or participate in a screening program at this time, mainly as a result of recent health legislation.

In a rural State such as North Dakota the implementation of a successful statewide screening program presents more difficulty than in metropolitan areas.

Sincerely,

JAMES R. AMOS, M.D.,  
*State Health Officer.*

THOMAS W. PAGEL,  
*Executive Director,*

*North Dakota Governor's Council on Human Resources.*

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STATE OF OHIO,  
DEPARTMENT OF HEALTH,  
*Columbus, Ohio, September 9, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Special Committee on Aging,*  
*Washington, D.C.*

MY DEAR SENATOR: The Ohio Department of Health has for many years assisted interested local public health departments and other groups to conduct community screening programs to detect unknown diseases that may be acute and result in disability and loss of life in later years.

An example of this is the community diabetes detection screening program. This begins with an invitation from the local public health department and the county medical society and includes comprehensive public information concerning diabetes. The health department staff and the local volunteers receive special information about diabetes as well as how to conduct a screening program. The Ohio Department of Health furnishes technicians and equipment for the screening operation. Whole venous blood samples are analyzed for glucose in the Ohio Department of Health central laboratory in Columbus with the use of the autoanalyzer.

The screenees who are suspect diabetics are invited to return for further tests, a 2-hour postglucose test or a complete glucose tolerance test. The local health department sends the positive laboratory results to the family physician, who makes the diagnosis.

The diabetes screening program is open to individuals 35 years and older, overweight adults, those with a family history of diabetes and women who have given birth to infants exceeding 9 pounds.

The diabetes screening program is most often offered to a whole community, as a county, and the screening operations are held in many locations in the area, cities, villages, and rural. The schedule is published in the local newspapers, and is on the radio and TV where available.

The diabetes screening program is well liked by the public and the medical profession alike and we operate on a yearly schedule.

During the period July 1, 1965, through June 30, 1966, 35,540 Ohio citizens were screened for diabetes through our community programs. In 1966, 20 communities are scheduled for the diabetes detection service.

Other examples of successful screening programs in Ohio, include:

(1) Preschool and school vision and hearing screening, in cooperation with the schools and local health departments. The Ohio Department of Health acts as a consultant and the local areas plan and execute the screenings. Children's bureau funds have been used to open 18 pediatric, otological diagnostic centers covering most of Ohio, excepting, Cleveland, Toledo, Lima, Allen County and Cincinnati.

(2) The Ohio Department of Health assists schools and local health departments in tuberculin testing procedures (technicians and materials) and furnish the mobile X-ray bus for the followup chest X-ray for the positive tuberculin reactor.

(3) Local interest groups need assistance in planning and the operation of a glaucoma screening program. We furnish consultation, assist in obtaining an ophthalmologist to do the testing and furnish eye drops, registration forms, and other materials.

(4) July 1, 1966, Ohio's new law required screening of all newborns for phenylketonuria, became effective.

(5) The department assists in the organization and financing of local cervical cancer screening programs for women.

Most of the time screening tests are conducted separately, but where there is local interest for offering more than one type of screening test at the same time, as diabetes screening and tuberculin testing, or glaucoma testing, et cetera, the multiple testing is planned.

When one type of screening test is offered many people may be served, but when multiple testing occurs, fewer people can be tested, but those few receive a variety of screening tests. It is our opinion that the most important factor in the screening plan is to be sure that the citizen with a positive test consults his family physician for diagnosis and treatment. In Ohio the local health department public health nurses are responsible for all of the details of directing the patient to the physician.

The suggested lower age limit of 50 years for a screenee to be eligible for multiple screening centers service is too old. If an age limit is necessary, 35 years would be more successful in identifying early

chronic diseases in the stage most likely to respond to medical treatment.

Community screening programs are generally well received in Ohio by its citizens and the medical profession alike.

Sincerely,

E. W. ARNOLD, M.D.,  
*Director of Health.*

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STATE OF OHIO,  
DEPARTMENT OF MENTAL HYGIENE AND CORRECTION,  
*Columbus, Ohio, August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I recently received your communique relating to the study of modern health screening methods and will attempt to respond as to the applicability of this particular technique from the standpoint of the department of mental hygiene and correction.

I would like to preface my remarks by stating that we do not have any definite screening program relating to mental health of the elderly individual at present. To date this type of procedure is far from being perfected so that it may be computer programed and thus be applied to large numbers as in a screening procedure. It is, of course, quite true that there are members of our organization who have provided a screening technique for the Armed Forces in the past but this still consists primarily of the 1-to-1 (examiner-examinee) ratio. As you readily recognize, this type screening procedure is quite laborious and the findings are not as accurate as that ascertained in other fields of medicine.

To implement any form of screening program in the area of mental health and mental retardation would require recruitment of competent, experienced personnel, an area already plagued by severe manpower shortages. In spite of this, however, I feel that it is quite imperative that some form of screening program be instituted in conjunction with the program already developed by the department of health in a joint effort to ward off the various forms of mental illness so prevalent in the aged. It is unfortunate but most mental disorders in this age group progress to a severe degree of chronicity due to the lack of adequate screening techniques. I am sure you are aware of the fact that there is a considerable amount of supportive data to indicate that much of this chronicity (up to 50 percent) could be prevented by early screening and early treatment if the facilities and manpower were in existence to implement same. I am sure you are aware of the fact that our State is moving in the establishment of community mental health centers which will assume much of the burden of screening and treatment in the near future.

It is my opinion that there is much to be done in conjunction with the department of health in screening and treatment of all age groups for certainly we cannot continue to dichotomize the soma and the psyche as we have been so prone to do in the past.

The department of mental hygiene and correction wishes to express our desire to cooperate in any future programing generated by your

committee and I would greatly appreciate your keeping us informed of any developments in this mutual area of interest.

Sincerely,

MARTIN A. JANIS, *Director.*

STATE OF OKLAHOMA,  
STATE DEPARTMENT OF HEALTH,  
*Oklahoma City, Okla., September 1, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: I was happy to hear about your study of modern health screening methods intended to detect and thus help prevent the disabling effects of chronic illness. Certainly the prevention of disabilities from chronic illness is one of the most significant public health problems today. The population trend, with more people every year being added to the older age groups, makes it more important than ever that we begin in the early years to take steps toward the prevention of the ill health and disabilities associated with chronic illness, which actually, for some, render the so-called golden years only years of physical, mental, and economic distress. With the advances in medical science, we are adding each year many more chronically ill aged and aging people to the vast reservoir of folks in our long-term-care facilities, as well as to our general hospitals. Hence, early detection of chronic illness, adequate followup, and early treatment are essential unless we want to continue building more long-term-care facilities and spending larger sums of private and public funds for health care of these individuals.

Multiphasic screening began in Oklahoma in 1958. Our present program, which has been well accepted by both the public and the medical profession, is described in detail in the enclosed article.

It is our feeling that screening program design and operation are determined by factors of population size, distribution, and sophistication. Availability of medical practitioners and facilities, and incidence of disabling conditions are also very important. The desired results to be achieved and resources available influence whether the screening program is primarily casefinding, public education, or professional stimulation and education.

It has best suited the needs of Oklahoma to operate a mobile unit offering screening tests since this is a predominantly rural and semi-urban State, with medical practitioners and centers far too few. Case-finding has been an important aspect of the program; however, its design and operation reflect another major purpose—public education. We have found it profitable to capitalize on local needs and enthusiasm by offering screening after we have received requests from three county organizations: (1) the county medical society, because all positive findings are referred directly to the private physician named at time of screening, and because local physicians are expected to select diseases for which screening will be done, eligibility, and referral levels; (2) the county health department, because we depend on the

public health nurse to do all necessary followup of referrals; (3) a local organization countywide in scope which will be willing to work with the State health department in publicity and promotion and to furnish voluntary appointment chairmen and hostesses. From the beginning of this local support activity, through screening and follow-up, education is stressed. Creating an awareness of the need and encouraging citizens to take the responsibility for early detection in their health care program constitute a focal point of our educational effort. When, as a result of the screening test, a previously undiagnosed condition is suspected the screenee is referred directly to his private physician. Local health department nurses follow the case to its conclusion.

Data processing equipment and automated analysis equipment have been used where feasible. Highly sophisticated computer processes have not yet been found desirable here. However, as our aged population increases, the benefits of additional speed will be recognized.

We will endeavor to answer your questions in the order in which they were asked in your letter of August 18:

(1) In the above brief description and with enclosed references, we feel this question has been answered.

(2) As far as prevalence of chronic diseases within our State according to age groups is concerned, we do not have figures other than our breakdown showing positive findings on persons screened. These figures are shown in table 6 of the enclosed reprint.

(3) Screening programs are valuable in certain population groups. We feel that screening procedures should be available for most persons over age 35. In certain individuals, such as the very obese and blood relatives of diabetics, this age level should be lowered.

(4) In the Oklahoma State Department of Health, Dr. C. M. Bloss, chief, preventive medical services; Mr. Bill Burk, head of field services; Miss Alwyn Lamont, supervising nurse; and Dr. Forest R. Brown, chief, community health services, all have knowledge and are interested in this subject.

(5) We feel, based upon our experience, that there is a need for multiphasic health screening for certain diseases where the yield is significant. These screening programs should be coordinated with across-the-board health education programs; sophisticated to the extent of acceptance by the local medical community; and stressed as being screening programs—not diagnostic clinics.

Since initiation of multiphasic screening in Oklahoma, 36 of our 77 counties have been covered, more than 100,000 persons have been examined, and approximately 425,000 tests have been performed. We feel that the lay public is extremely interested in health conservation when it is properly and adequately presented to them. We also feel that multiphasic health screening is an important part of health maintenance and that the need for it will continue to grow.

While it is desirable that more recent and sophisticated testing equipment be made available for use in large population areas, we feel that some provision should be made for reaching the rural areas. In Oklahoma our highest per centum of aged people are found in the rural counties. The mobile unit is the only means we have of offering multiphasic screening at this time. However, we do plan to expand

our diabetes and cervical cancer detection program as a part of regularly scheduled on-going programs in local areas; this has already been accomplished in several counties. On-going glaucoma screening programs have been established in nine county health departments.

The fact that our program has been well accepted and is in continuous demand throughout the State indicates some satisfaction from both lay and professional groups.

We would be happy to have a representative(s) from Oklahoma meet with your committee, if you desire. We have recently completed the production of a 16-millimeter motion picture film (14 minutes) which shows how the multiphasic program is organized and operated in Oklahoma. If you desire its use, we will be happy to reserve it for you.

Sincerely yours,

KIRK T. MOSLEY, M.D.,  
Commissioner of Health.

*Results of multiphasic screening in 12 Oklahoma counties, 1960-62*

	Total	Percent		Total	Percent
Number persons screened.....	32,963	100.0	Hemoglobin, age 21 and over:		
Referred to physician (questionnaire sent).....	6,698	20.3	Number screened.....	22,360	100.0
Questionnaires returned.....	4,659	69.5	Referred.....	1,026	4.6
Heart disease, age 35 and over:			Questionnaires returned.....	663	64.6
Number screened.....	23,299	100.0	Confirmed.....	392	59.1
Referred.....	814	3.5	Tuberculosis, age 35 and over:		
Questionnaires returned.....	567	69.7	Number screened.....	23,328	100.0
Disease confirmed.....	354	62.4	Referred.....	97	4
Blood pressure, age 21 and over:			Questionnaires returned.....	57	58.7
Number screened.....	21,844	100.0	Disease confirmed.....	23	40.4
Referred.....	1,950	8.9	Tuberculin test, ages 1 through 34:		
Questionnaires returned <sup>1</sup> .....	858	65.2	Number screened.....	10,510	100.0
Disease confirmed <sup>1</sup> .....	335	39.0	Positive.....	785	7.5
Diabetes, age 35 and over:			Negative.....	7,379	70.2
Number screened.....	22,369	100.0	Not read.....	2,346	22.3
Referred.....	758	3.4	Obesity, <sup>2</sup> age 15 and over:		
Questionnaires returned.....	515	67.9	Number screened.....	32,579	100.0
Disease confirmed.....	252	48.9	Males.....	12,745	39.1
Cervical cytology, age 35 and over:			Females.....	19,834	60.9
Number screened <sup>3</sup> .....	5,840	100.0	Males, overweight.....	497	3.9
Referred, classes III and IV.....	96	1.6	Females, overweight.....	2,118	10.6
Questionnaires returned.....	90	93.7	Total overweight.....	2,615	8.0
Cancer confirmed.....	37	41.1			
Confirmed for other than cancer.....	20	22.2			
Referred, classes I and II.....	491	8.4			
Questionnaires returned.....	303	61.7			
Confirmed (not CA).....	141	46.5			

<sup>1</sup> Based on 9 counties only.  
<sup>2</sup> Based on 6 counties only.  
<sup>3</sup> More than 25 percent overweight.

Results of multiphasic screening, 1960-66

Procedures and diseases screened for	1960		1961		1962		1963		1964		1965		Total	
	Number screened	Number positive	Number screened	Number positive	Number screened	Number positive	Number screened	Number positive	Number screened	Number positive	Number screened	Number positive	Number screened	Number positive
Total number of tests made.....	69,803	<sup>1</sup> 6,888	85,631	3,967	86,004	4,790	93,537	5,201	185,281	2,635	208,294	5,427	728,550	<sup>2</sup> 28,908
Total number persons screened.....	31,858	<sup>2</sup> 6,888	<sup>2</sup> 16,966	<sup>2</sup> 3,967	14,539	3,198	15,198	3,458	86,498	2,566	150,350	5,205	295,379	25,282
Total number referred to physician.....						3,198		3,458		1,694		3,377		11,727
70-millimeter chest X-ray.....	21,174	1,155	12,681	822	11,215	672	10,660	660	67,174	959	55,217	655	178,121	4,923
Heart.....		724		545		488		469		459		326		3,011
TB.....		143		61		56		42		134		96		532
Other.....		288		216		168		149		366		233		1,420
Blood sugar, diabetes.....	6,344	222	9,058	546	9,043	397	9,123	310	{ <sup>4</sup> 12,377 8,320 162 }	{ <sup>4</sup> 559 182 }	27,845	1,930	82,110	4,126
Tuberculin test, TB.....	17,750	3,935	7,820	1,244	4,034	342	4,446	347	40,365	( <sup>5</sup> )	68,095	( <sup>5</sup> )	146,536	5,868
EKG, heart disease.....	<sup>6</sup> 122	20	<sup>6</sup> 1,901	583	<sup>6</sup> 1,058	317	2,556	( <sup>6</sup> )	2,699	119	2,744	169	11,080	1,208
Blood pressure, hypertension.....	6,437	891	9,778	1,856	9,093	1,081	9,499	1,253	7,204	204	6,929	337	48,940	5,632
Copper sulphate drop test, anemia.....			11,680	499	12,019	480	13,661	655	9,645	80	8,945	109	35,950	1,823
Cervical cytology, Ca.....			19	0	4,834	72	6,601	79	5,214	49	5,684	55	22,352	255
Cervical cytology, other.....						421		567		224		489		
Height.....			12,585		12,799		15,119		10,038		9,185		59,726	
Weight.....	8,988	665	12,585	918	12,799	998	15,119	1,330	10,038	359	9,185	308	59,726	5,078
Audiometer, hearing defects.....			33	0							2,810		36,350	203
Urinalysis.....			65	9										
Vital capacity.....	7,426	( <sup>7</sup> )	7,426	( <sup>7</sup> )	9,110	( <sup>7</sup> )	6,753	( <sup>7</sup> )	2,825					
Dental exams.....									160				160	
Cholesterol.....									178	8	521	42	699	50
Glaucoma.....									79	4	982	19	1,061	22
Visual acuity.....									131				131	

<sup>1</sup> Positive tuberculin tests in mental hospitals account for high positive results.

<sup>2</sup> Number tests positive and number persons positive (total) not distinguishable for some years.

<sup>3</sup> 2,104 screened at Central State Hospital not included; 409 also.

<sup>4</sup> Diabetes only unit.

<sup>5</sup> Not available.

<sup>6</sup> EKG made only when blood pressure elevated.

<sup>7</sup> Screening procedures changed from specific gravity to volume (hematocrit) in 1962.

<sup>8</sup> Positive determinations not made, these tests done for study purposes only.



STATE OF OKLAHOMA,  
DEPARTMENT OF PUBLIC WELFARE,  
OKLAHOMA PUBLIC WELFARE COMMISSION,  
*Oklahoma City, Okla., September 1, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Please refer to your correspondence dated August 18, 1966, regarding the beginning of a study of modern health screening methods intended to detect and thus help prevent chronic illness. I was pleased to hear about your study and feel that methods of prevention of disabilities from chronic illness is certainly of great significance in public health problems of today.

Personnel from the State health department were contacted since they are responsible for the development and use of modern health screening methods. It was found that their reply to your request of them included statistics, as well as methods of screening used. It would appear from the State health department's reply to you that the only additional information we would be able to offer would be on questions 4 and 5.

The following people, we feel, have special knowledge of or interest in this subject:

Dr. John W. DeVore, president of the Senior Citizens Foundation, Inc., 1214 North Hudson, Oklahoma City, Okla., who has placed interest in and emphasis on rehabilitation and aging;

Rev. Joseph Shackford, assistant pastor, St. Luke's Methodist Church, 15th and North Robinson, Oklahoma City, Okla.;

Mr. L. O. Parsons, State chairman of the National Association for Retired Civil Service Employees, 2124 Barclay Road, Oklahoma City, Okla.;

Mr. H. V. Grietz, State chairman of the American Association of Retired Persons, 1417 North Drexel, Oklahoma City, Okla.; and,

The State Information and Referral Service, 624 15th Street NE., Oklahoma City, Okla.

The above-named persons and organizations have been very instrumental in helping develop interest in and education of persons in the community for the multiphasic screening clinics to be scheduled for and carried on in the different areas of the State.

In relation to any particular impediments to the acceptance of the program by the public and medical profession, I feel that impediments are the result of lack of knowledge. Based on the results of the number of counties covered in the State and the number of persons reached, it would appear any such impediments would be overcome by a well-organized educational program in the community where screening would be held, and including key people, as well as agencies, in this program. It would appear that multiphasic health screening is an important part of health maintenance, and with a continued growth of enlightening the public, the need will continue to grow.

We are happy to provide you with the information, and should you feel the need for further information, please let us know and we shall be happy to provide it.

Sincerely,

L. E. RADER,  
*Director of Public Welfare.*

STATE OF OREGON,  
OREGON STATE BOARD OF HEALTH,  
Portland, Oreg., September 7, 1966.

SENATOR MAURINE B. NEUBERGER,  
Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging,  
U.S. Senate,  
Washington, D.C.

DEAR SENATOR NEUBERGER: This is in reply to your letter of August 18, 1966, relative to the hearing on September 20, 21, and 22, 1966, before the Special Committee on Aging relative to comprehensive screening programs.

While prevention of disease and amelioration of crippling or handicapping condition is a prime responsibility of public health and while we have considerable knowledge, in many instances, of how this can be accomplished we have not, in Oregon, progressed as much as we should have liked. Screening programs are not new to public health and some, as for instance the mass X-ray screening for pulmonary tuberculosis and blood testing for syphilis, have been promulgated, proposed, and successfully carried out. Those in the area of chronic disease are relatively new and not accepted by the groups who must of necessity plan and carry out the programs. We shall expand on this later in answer to your fifth question.

It is perhaps pertinent that the chronic disease section of the Oregon State Board of Health is not quite 3 years old and that it has taken some time to recruit an adequate staff and get various program activities initiated.

*Question No. 1*

The Oregon State Board of Health has carried out several screening programs which have been of value in gaining experience and in pointing up the value of such programs.

*Diabetes screening.*—During 1965, a total of 5,928 persons had blood tests for elevated blood sugar; 1,157 were suspicious and referred to their private physician and 216 were diagnosed as new cases of diabetes (see attachment No. 1). The followup on the suspicious screenees was not entirely satisfactory as 454 of the 1,157 referred (37 percent) either did not see their physician or the physician failed to make a report of his findings. Of the 703 persons on whom we obtained followup reports, 216 or 30.7 percent were diagnosed as new cases of diabetes. This figure is about twice as high as the national figure. At the present time we have no explanation for this high figure.

We should like to point out that the Oregon State Board of Health has just recently approved a statewide diabetes program consisting of (1) public education, (2) patient education, (3) professional education, and (4) mass screening. We hope eventually to screen 40,000 to 50,000 individuals each year.

*Vision screening.*—In 1964, we undertook to do vision screening on residents of nursing homes and homes for the aged in the Portland metropolitan area (see attachment No. 2). In 114 facilities in the 5 county area 3,344 or 70 percent of the residents were screened and 2,309 or 69 percent were referred for further examination, again higher than the apparent national figures.

*Dental screening.*—A recent dental screening was carried out at the Columbia Park Hospital (mentally retarded) and the findings are set forth in attachment No. 3. It is interesting to note that in this hospital for the adult retardates 241 of 245 patients were screened and that only 49 or 20 percent needed no dental care at the time of the examination. Another interesting aspect of this study was the estimate that the dental work needed by this group would cost a minimum of \$22,000 at the current rates.

*Question No. 2*

We do not have figures on the prevalence of chronic diseases in Oregon other than those available from the death certificates and these figures are about in line with the national figures.

*Question No. 3*

If we are to accomplish very much in the field of chronic disease prevention we will need added emphasis on health maintenance at all ages. This should include a health plan for each individual and each family. In addition to this individualized health plan there needs to be increased health counseling wherein the individual could have the opportunity to discuss and get help with his health problems as well as information relative to health maintenance. Age 60 is a rather artificial division since individual health plans and health counseling should be initiated in the very early years. Also many of the chronic diseases have their onset in the middle-age years. Screening tests ought to be applied at all age levels and to all groups even though some screening programs (tests) will yield a higher number of positive results if applied to certain "high risk" ages or groups. Of course, limits of time, money, personnel, and facilities may well dictate the extent of these programs. It should be pointed out that even those individuals who are well off financially do not very often have an individualized health plan or get preventive health counseling. The idea has simply not caught on as yet—likewise, the health insurance which rewards one for staying well or healthy as versus the insurance which pays off only when one is ill.

*Question No. 4*

We are sorry to report that we do not know of any persons in Oregon who are especially interested or presently active in the field of health maintenance or chronic disease screening. The Bess Kaiser Hospital, 5055 North Greeley Avenue, Portland, is interested in developing such a program for its clientele, approximately 83,000 in the Portland area.

*Question No. 5*

We in public health are well aware of the need and potential value of programs directed toward (1) health maintenance, (2) health counseling, and (3) early detection (screening); and as indicated earlier have initiated some such (pulmonary tuberculosis, syphilis, vision, dental, and diabetes). In general we are faced with certain problems in this area:

A. Lack of acceptance of the idea on at least a part of the medical profession in Oregon. While mass X-ray screening for pulmonary tuberculosis and blood testing for syphilis have been generally accepted these are directed at finding "communicable diseases". Detec-

tion of the chronic diseases is not generally considered to be a public function. We, however, are not totally discouraged. It took 2 years of patient conversation and discussion before the State board of health was able to come up with a cooperative diabetes program proposal which received approval of all the groups that had an interest in this matter. Other areas of detection and prevention will undoubtedly be approved after similar patient groundwork has been done.

B. Lack of demand on the part of the general public might be considered another impediment. In general, the public has not asked for such programs. Where screening programs have been put on the public has taken advantage of the opportunity but we have not been asked when they will be repeated.

C. Local health departments have their problems relative to more and more demands being made of them while their staffs do not increase proportionately with these demands. Therefore, local health departments look with askance at any new program, even though they might well accept the idea that it would be beneficial to the community.

D. Professional staffs are, of course, in short supply both for full and part-time employment in the sorts of programs we envision. While much of the work in screening programs can be done with trained paramedical help, this is not yet accepted by the medical or nursing professions. Nonprofessionals, at the present time, are not available to do health counseling and there is some doubt that they could be trained to take more than a minor assisting role in such a program.

E. Financing of these programs is another, but probably the least important, problem at this time. Sufficient funds will not overcome the other impediments such as aversion to the whole concept of public detection, the accusation of socialized medicine, lack of public demand, or lack of personnel. State and local funds are usually not forthcoming unless and until there is a public demand for a program and this is not yet evident, in spite of our tactful promotion.

We would not wish to be misunderstood. We are heartily in favor of the proposed "Preventicare" bill being considered by the Special Committee on Aging and believe it may eventually be of help to us here in Oregon. However, we doubt that we will be in a position to take advantage of the proposed legislation in the immediate future. Much spade work over the next few years will be necessary before we can truthfully say that we are actively engaged in a comprehensive "Preventicare" program.

Sincerely,

RICHARD H. WILCOX, M.D.,  
*State Health Officer.*

COMMONWEALTH OF PENNSYLVANIA,  
DEPARTMENT OF HEALTH,  
*Harrisburg, September 6, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: It is a privilege and a pleasure to be afforded this opportunity to present some factual information on the screening programs for chronic disease prevention and control in Pennsylvania.

Many of our programs are limited in scope, such as the junior chamber of commerce program for amblyopia exanopsia which is limited to children, or the radiotelemetry program which is limited to heart disease suspects. We feel that our program in diabetes mellitus detection, the X-ray survey program in homes for the aged, glaucoma screening, the health examination and diagnostic service as well as the study on "Research in the Problems of Aging" at Lankenau Hospital, and the Health-O-Rama of Allegheny County are worthy of comment.

Dr. Edward L. Bortz of Lankenau Hospital in Philadelphia perhaps has more special knowledge in the problems of aging than any other professional person in Pennsylvania. He has devoted a great part of his life to this subject and I am sure would be very happy to answer any inquiries you might direct to him.

Several members of my staff have special knowledge on different parts of our screening program and I would like to provide you with any specific information concerning our programs that you may wish from this source.

Sincerely,

C. L. WILBAR, JR.,  
*Secretary of Health.*

[Enclosures]

#### *Screening for Chronic Diseases in Pennsylvania*

During the 1965 fiscal year, 923 previously undiagnosed diabetics were discovered among 3,026 persons referred to their physicians from 100,143 persons screened; 561 additional persons were reported by their physicians as "previously known diabetics." These persons are for the most part over 40 years of age. The cost to the Commonwealth per case screened was 62.6 cents; the cost per newly diagnosed case was \$66.83. Our program differs from others perhaps in that our results are processed by an optical scanner or mark reader which, in effect, reduces the information on the registration forms to punch cards. From these, five tables are routinely prepared giving (1) age distribution of screenees, (2) race-sex distribution, (3) results of screening high prevalence groups, (4) retesting and referral results, and (5) results according to weight status. Thus we find, among other things, that we seldom find cases in screening in the third decade of life (we do not screen below age 21), that mothers of large babies are a high prevalence group when they reach their late forties or early fifties. This aids us in finding more cases more economically and more efficiently.

We screened 7,446 persons over 40 years of age for glaucoma during the 1965 fiscal year at a cost of 64 cents per case. We unfortunately do not yet have results of referrals. We hesitate to combine this with other screening procedures since our State medical society does not condone testing except in hospital or clinic type atmospheres due to the danger of foreign bodies lodging in anesthetized eyes.

The chest X-ray survey program for the detection of tuberculosis in residents of county and other homes for the aged was continued during 1965. A total of 11,534 14-by-17 X-rays were taken with findings of

possible tuberculosis in 201; suspected pulmonary disease requiring further investigation in 48; and neoplasm in 48. Other pulmonary abnormalities of lesser importance were noticed in 682 cases, and cardiac enlargement was reported in 3,051 cases. Immediate diagnostic study and further screening by X-ray were recommended in 638 cases. (A copy of the IBM data by sex and race is attached.) The results of these surveys were referred to each home for necessary followup investigations, as a result of which 18 active tuberculosis cases were admitted to State tuberculosis hospitals for further treatment. These surveys were accomplished by personnel and equipment of the State division of tuberculosis control at a cost of \$2.80 per film, the total expenses amounting to \$36,910.12.

We have sponsored research in aging at Lankenau Hospital in Philadelphia since 1958. The subjects are examined in detail from a physical, psychological, social, and mental standpoint. They are not screened in the sense that they do not have a battery of tests and then are referred depending on test results, but they are intensively studied so that much is being learned concerning the physiology of aging. This is an expensive and time-consuming process and is not adaptable to general use. Somewhat comparable to health examinations performed in many centers are those of the health examination and diagnostic service of Lankenau Hospital. These are not automated but are extremely thorough and probing. The attached brochure adequately describes them.

Four times each year as a community effort, sponsored mainly by the Health Department of Allegheny County, the United Fund, and the Health Research & Services Foundation, a massive multiphasic screening program is held in the Pittsburgh area. The exact number of tests varies from time to time and frequently exceeds 20. Including medical supplies, equipment, and promotion, the cost is about \$15,000 per session.

During the last fiscal year they screened 21,742 persons for anemia and uncovered 814 persons whose findings were suspicious enough to warrant referral to their physician; 16,606 persons were screened for diabetes and 312 were referred; 28,765 had chest X-rays of which 808 were suspicious; 8,485 were tested for hearing, and 3,860 showed a deviation from normal; 10,173 had their visual acuity checked, and 1,903 were referred to ophthalmologists. This is but a brief summary of a program and more detail can be furnished if it is desired.

We have no exact statistics as to prevalence of chronic diseases within Pennsylvania but our screening results approach the published national averages. It is felt that screening is effective at all ages but is most effective in those under 60 years of age. We feel that our diabetes and glaucoma programs have been particularly helpful in detecting diseases that may progress and be disabling in later years. We have discussed the feasibility of establishing clinics to detect those who would be particularly apt to have cerebral vascular accidents in later years. This type of clinic is more difficult to organize and staff than are other detection programs so that we have not yet implemented any of this type of screening program.

*Pennsylvania Department of Health, tuberculosis mass X-ray statistics, combined group studies Nos. 6 and 7, 1965 annual report, both sexes and races*

	All ages	Under 15	15 to 24 years	25 to 44 years	45 to 64 years	Over 64 years
Grand total.....	11, 534	3	20	160	1, 027	10, 324
Possible tuberculosis.....	201			2	13	177
Chest suspect.....	48				1	47
Nontuberculosis findings:						
Neoplasm.....	48				2	46
Mediastinal.....	10					10
Parenchymal, generalized.....	141				8	133
Parenchymal, localized.....	310			4	23	283
Cardiac enlargement.....	3, 051		1	18	199	2, 833
Pleural.....	114				2	112
Diaphragmatic.....	107			3	10	94
Other.....	935			1	48	886
Recommendation:						
Immediate diagnostic study.....	635			7	35	593
Further screening with 14 by 17.....	3					3
Unsatisfactory film.....	397	2	4	11	65	314
Essentially negative.....	6, 820	1	15	121	681	6, 002

TENNESSEE VALLEY AUTHORITY,  
Chattanooga, Tenn., September 13, 1966.

HON. MAURINE B. NEUBERGER,  
U.S. Senate,  
Washington, D.C.

DEAR SENATOR NEUBERGER: I appreciate your letter of August 31, 1966, and I am glad to learn of your interest in modern health screening methods.

In TVA, laboratory screening tests are an important part of our health program. These tests are performed both in our medical centers and in a mobile health clinic which serves employees in areas remote from these centers. The mobile clinic visits these areas approximately every 2 to 3 years. Our program provides for systematic scheduling of tests and followup of results. We believe this tie-in is essential to the effectiveness of multiple screening.

Our battery of tests includes a medical questionnaire, height and weight determinations, blood pressure reading, orthorater test for visual skills, audiogram, (hearing test), electrocardiogram, chest X-ray, blood test for syphilis, and measuring of hemotocrit, hemaglobin, cholesterol, blood glucose, and uric acid. We also perform a urinalysis and determine intraocular tension (glaucoma test). Our electrocardiograms are now being processed by computer in a cooperative study with the Public Health Service.

Although we expect to have a low percentage of abnormal findings on some tests in our younger employees (for example, electrocardiogram, cholesterol, and tonometry), we believe the baseline information we obtain is valuable both for individual health guidance and for epidemiological studies.

In answer to your question concerning the place for such testing in our country, I believe that multiphasic health screening is a valuable tool in health care and health maintenance, provided it is used in a manner that assures adequate followup of findings.

Very truly yours,

O. M. DERRYBERRY, M.D.,  
Director of Health.

STATE OF TENNESSEE,  
DEPARTMENT OF PUBLIC HEALTH,  
*Nashville, September 2, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In response to your letter of August 18, 1966, the following answers and comments are submitted:

1. *Have any health screening programs within your State been particularly helpful in detecting diseases that may become acute in later years? May we have brief description of the program and the results?*

The following health screening programs conducted by the Tennessee Department of Public Health are either in operation or planned to start in the immediate future:

*Tuberculosis control*

Under operations of the present Tennessee State Division of Tuberculosis Control program, the tuberculin skin test is used to screen 800,000 to 1 million individuals who are estimated to be infected with tuberculosis germs, from the total State population of approximately 4 million persons. Emphasis is placed on X-ray examination, sputum cultures, treatment and followup of this group of individuals.

During 1965, a total of 334,397 tuberculin tests were made. Of this number, 17.4 percent were found to be reactors. During this same year, 112,242 chest X-ray examinations were made, and 948 new cases of tuberculosis were found; 1,771 individuals were hospitalized for tuberculosis in the four State tuberculosis hospitals; 251 deaths were attributed to tuberculosis in the State during 1965. There were approximately 100 fewer new cases reported for 1965 than were reported for the previous year.

With the recent addition of personnel, the volume of tuberculin tests and X-ray examinations expected to be made during the present year will be substantially increased over the volume of such examinations done during the previous year.

*Family planning clinics*

There are 79 of these clinics operated in 73 of the counties. The name family planning is a misnomer. They are, in fact, multiphasic screening clinics for eligible patients in the child-bearing age.

The usual routine consists of a detailed present and past history of illness. Following this, the patient is weighed, blood pressure is taken, a sample of blood is taken for a VDRL test, and a hematocrit test. A tuberculin test is performed and a urinalysis is done. Following this, the patient is routed to the clinic examining room where she is seen by a physician who makes a careful physical examination of this patient with especial attention being given to heart and chest and a Papanicolaou smear for possible cervical cancer.

If there are abnormalities located during the physical examination, the patient is then routed to either her physician or through him to the clinic for specialty services. This latter is especially true if defects of heart, breast tumors, or positive Pap smears are found.

The clinics vary in size, depending upon the area, from 35 to 40 patients to 3,000 or more who are carried on the active rolls.



*Diabetes detection*

A diabetes detection program has been started in Tennessee by the Tennessee Department of Public Health. The initial testing program will begin as a pilot project in a county selected by this department because of its stable population. This will be a well-rounded program encompassing two phases. Phase I will be to test all first-degree relatives of diabetics and mothers who had born to them babies weighing 9 pounds or greater. Phase II will be to test all persons 25 years of age or older except known diabetics. Overweight people and those 40 years of age or over will be extracted from phase II. Those persons screened positive are to be referred to their private physician for further testing and diagnosis. The physicians will then send their results and diagnosis to the diabetes detection program so that the screening program can be evaluated as to its effectiveness.

*Multiphasic screening in Shelby County*

Multiphasic screening has been a program in Memphis-Shelby County for several years. Although no individual operation covers all the various tests, these tests are offered to the public at the Memphis-Shelby County Health Department and at the University of Tennessee Medical School 5 days a week. The various tests offered are diabetes, glaucoma, serology, cervical cytology, and X-ray and skin tests for tuberculosis. The minimum age limit for each test varies with the type of test.

Persons who are screened positive are referred to their private physicians for further testing and diagnosis. The physician then sends his results and diagnosis to the project for evaluation of the effectiveness of the program.

*Oral cytology program*

Since considerable evidence has been gathered to show that cytological examination is a reliable screening procedure for the detection of early cancer of the mouth, it was felt that the oral cytology test should be another tool available to the dental profession in being able to more effectively practice preventive dentistry. In June 1963, a statewide oral cytology program was begun to educate practicing dentists to the following:

- (1) The value of exfoliative cytology tests in the practice of preventive dentistry.
- (2) To acquaint them with the intraoral cytological smear technic as a screening tool for early cancer detection.
- (3) To acquaint them with the recommended followup procedures that should be implemented when a report of findings is positive. To acquaint them with resources that are available in their geographic area for further diagnosis and treatment.

A second phase of the project was to educate the public to the significance of oral cytology testing in an overall preventive dental program for individuals and groups of individuals.

The Division of Dental Health has conducted a number of dental surveys in nursing homes and homes for the chronically ill and aged. Chronic lesions of one type or another are not uncommon in these aged and chronically ill people. Therefore, the exfoliative cytology test has been an additional diagnostic tool that the division could use in assessing the dental health status of these people.

This program has been a joint endeavor of the College of Dentistry of the University of Tennessee, the Division of Dental Health of the Tennessee Department of Public Health, and the Tennessee State Dental Association. The College of Dentistry of the University of Tennessee has been responsible for the educating of the dentists to the smear technic and for providing the pathologists to read the smears. The Division of Dental Health has been responsible for the followup phase of the program.

Since its beginning, approximately 58 percent of the dentists of the State have enrolled in the program and better than one-half of these have submitted 1,770 smears. A total of 105 of these smears has been positive, suspicious, or suggestions of malignancy.

#### *PKU screening*

The Division of Laboratories has been conducting a program based on the Guthrie test to discover cases of phenylketonuria in the newborn. The main sources requesting the tests are the hospitals in Tennessee. The program has been in effect about 2 years averaging some 25,000 tests per year. The results have yielded seven proved cases of PKU.

#### *PhonoCardioScan screening for heart disease*

It is planned by the heart disease control program of the Tennessee Department of Public Health, in conjunction with the Metropolitan Nashville-Davidson County Health Department, to evaluate the use of PhonoCardioScan as a means of mass screening for heart disease. The objectives of this project are as follows:

- (1) To determine the recall rate of the PhonoCardioScan under field conditions.
- (2) To evaluate the use of such screening procedures as part of a school health program.
- (3) To estimate the anticipated cost of such a screening program when applied to a school health program.
- (4) To determine the yield of unknown heart disease as a part of a larger cooperative study with the Congenital Heart Disease Section of the Heart Disease Control Branch of the U.S. Public Health Service.

2. *Can you give us information about the prevalence of chronic disease within your State in age groups from 40 to 50, 50 to 60, and 60 and beyond?*

The enclosed table will give you the available statistics at this time. We are in the process of revising these statistics.

3. *Do you have any suggestions for effective screening or other health maintenance programs for persons below age 60? Above age 60?*

Recent legislative action in the health field has established a number of programs aimed at upgrading the Nation's health by the creation of new programs entirely divorced from programs already in effect with similar aims. Apparently no consideration was given to utilizing programs in the public health field, which with limited personnel were endeavoring to meet similar goals. This not only called for more personnel than would be needed if such personnel were added in ongoing programs, but in some instances, suggested the construction of buildings or centers where such were already in existence:

In the establishment of a multiphasic screening program for persons age 50 or over, or for that matter at any age level, the State of Tennessee is, I believe, in a unique position. There are 94 county health departments in the State consisting of 95 counties. These health departments, with some exceptions, have adequate space for conducting a program.

In order to carry on a multiphasic screening program, the personnel, of course, would need to be increased. Mass testing programs of any type will necessitate a close look at the types of tasks that have to be done in performing these tests. It is anticipated that there will be a need for employment of a larger number of technicians for the performance of certain procedures, leaving the professional nurse free for functions that can only be done by a person with the educational background and experience that the nurse has. The nurse may also be expected to give supervisory guidance and training to technicians in some of these programs.

We have already seen the necessity for employment of technicians in one mass testing program—tuberculin testing—as tuberculin testing technicians have been employed by the division of tuberculosis control to administer tests by the Heaf method with nursing personnel being available to give supervisory guidance and administer the Mantoux test and interpret the testing program as indicated.

Further, since a multiphasic screening program will consist to a great extent of laboratory procedures, the Tennessee Department of Public Health laboratories would fit adequately into such a program. This division consists of a central laboratory and five branch laboratories. The laboratories are located in the six major cities and are geographically located so service is provided to 94 local health departments. At the present time, only the central laboratory is equipped to undertake any type of large scale screening program. However, this type program could be expanded to the branch laboratories if funds were made available.

Automated equipment, such as the autoanalyzer, and microtiter equipment, which are presently used in the central laboratory, are designed mainly for mass screening programs. Therefore, the undertaking of a multiphasic screening program would be an expansion of our present program instead of an entirely new endeavor.

4. *May we have names and addresses of any individuals who may have special knowledge of, or interest in, our subject?*

The following names are submitted:

Dr. J. M. Bistowish, director, Metropolitan Nashville-Davidson County Health Department, 311 23d Avenue North, Nashville, Tenn.

Dr. Eugene W. Fowinkle, assistant director, Memphis-Shelby County Health Department, 814 Jefferson Avenue, Memphis, Tenn.

Dr. Henry Packer, 295 North McLean, Memphis, Tenn.

5. *Is there a need for a multiphasic screening program? Are there any particular impediments to the acceptance of such a program by the public or by the medical profession?*

There is a need for a multiphasic health screening program. There will undoubtedly be impediments to the acceptance of such a program by the public and by the medical profession. This, however, is not a new problem. All new programs started by the department of

public health experienced resistances from the public and the profession. However, with proper health education employed, the public, after much work in the communities, will as in the past cooperate. The extent of cooperation will, of course, vary considerably, but in most instances the efforts are worthwhile. In the State of Tennessee, the relationship among the department of public health, the Tennessee Medical Association, and individual physicians, has been on a high level for many years. There are always some individuals who may not favor a program, but, by and large, we have been happy over the cooperation offered.

I hope this information will be of some use to your committee.

Sincerely yours,

R. H. HUTCHESON, M.D.,  
*Commissioner.*

TEXAS STATE DEPARTMENT OF HEALTH,  
*Austin, Tex., September 1, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In reply to your letter of August 18 relative to information on chronic diseases and multiphasic screening experiences in Texas, I am enclosing a copy of a letter from Dr. Howard E. Smith, director of the Division of Chronic Diseases, addressed to Dr. Nemat O. Borhani of the California State Department of Public Health, who will appear at your committee hearing and summarize the experiences of the chronic disease program directors in the United States.

Sincerely,

J. E. PEAVY, M.D.,  
*Commissioner of Health.*

TEXAS STATE DEPARTMENT OF HEALTH,  
*Austin, Tex., September 1, 1966.*

NEMAT O. BORHANI, M.D.,  
*Acting Chief, Bureau of Chronic Diseases,  
Division of Preventive Medical Services,  
California State Department of Public Health,  
Berkeley, Calif.*

DEAR DOCTOR BORHANI: In reply to your letter requesting information from Texas on our experiences in multiphasic screening programs for the purpose of your appearance before the Senate hearings, I am glad to advise you of our background on this matter.

The State Department of Health has had no experience in Texas with multiphasic screening programs. At this time a true multiphasic screening program involved in an adult health service is being developed by the city health department of Houston, Tex. Dr. Francine Jensen, director of their chronic disease division, is well along in her planning for early activation of the multiphasic screening program in their new health department facilities.

Up until this point the Texas State Department of Health has been involved in selective screening programs involving tuberculosis, dia-

betes, and a cancer detection service. Various voluntary agencies in the State have conducted limited glaucoma detection programs. The screening programs promoted and assisted by the State department of health have involved the community through the local health department. Since local health departments provide the major resources for followup of the screening programs and there are so many areas without adequate facilities for evaluation and diagnosis, major emphasis has had to be focused on local health departments. The goal of these conducted screening programs has been quality rather than quantity. Much of the potential value of screening programs is lost unless there are adequate diagnostic and followup services available. Accessibility of the more comprehensive diagnostic services is to be found principally in the larger urban centers.

There is little question but that multiphasic screening involving multiple tests would uncover much suspected chronic disease in this State. The acceptability of this type of screening program by the medical profession has been untested at this point. The factors in the past which have had to be considered in the development of a program of this type include the cost of the program, shortage of personnel for its operation, and the incompleteness of adequate resources for diagnosis of suspects, especially in the medically indigent population. In many areas of the State there is a definite shortage of physicians for referral of suspects and the long distances required of suspects to reach medical resources are deterring factors.

We in the State department of health are looking forward to the experience in Houston with enthusiasm and consider it a pilot project for this area. There is little question about the need for services of this type but the main difficulty involves providing this type of service to large segments of the population in a quality program.

Yours very truly,

HOWARD E. SMITH, M.D.,  
*Director, Division of Chronic Diseases.*

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UTAH STATE DEPARTMENT OF HEALTH,  
*Salt Lake City, Utah, September 7, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of August 18, 1966, expressing your interest in modern health screening methods intended to detect and thus help prevent chronic illness. You and your subcommittee should be commended for the leadership provided in the area of screening for chronic illness.

Robert W. Sherwood, M.D., our director of the division of preventive medicine, recently visited the Kaiser Foundation in San Francisco, Calif. We, like you, are impressed with the effectiveness of the Kaiser Foundation multiphasic screening program.

I have noted with interest the attention which your subcommittee is giving to automated or semiautomated device systems that may be capable of speeding large-scale screening of individuals. The Utah State Department of Health, Division of Laboratories, has purchased

and has in operation a single channel autoanalyzer which has a capability of 60 determinations per hour. Thirty-two separate determinations can ultimately be carried out on the analyzer. At the present time, however, the laboratory is equipped with only two manifolds, one for blood glucose and one for blood cholesterol determinations, on this machine. It has been used in a number of pilot studies in mass screening for diabetes in Utah. The machine has the capability of making mass screening possible for a number of chronic conditions for which reason it was purchased.

We concur with you that emphasis on development of effective mass screening programs for identification of disease in the elderly and chronically ill is long overdue.

In reply to your specific questions:

1. The Utah State Department of Health in cooperation with the Utah State Medical Association and local health departments has conducted 14 diabetes screening clinics over the past 3 years, some of which were held in conjunction with glaucoma screening clinics. In the diabetes screening clinics approximately 3,000 individuals were screened, of which 34 new cases of diabetes were confirmed by followup physician evaluation (other cases are still under followup). Through the cooperative efforts of State and local agencies 68 glaucoma screening surveys were held from December 1959, through May 1965. A total of 34,636 individuals were screened and 342 verified new cases of glaucoma were found.

Since 1963, 49,076 preschool children have been screened for visual defects. Of this number, 1,125 were referred for further evaluation, of which 191 had verified amblyopia ex anopsia.

In recent years, Utah has carried out an extensive tuberculin testing program as a part of the statewide tuberculosis eradication project. For example, during the 1965-66 academic year, 22,176 children were tested and read. Of this number, 52 or .027 percent had positive tuberculin reactions. During this same period of time 8,099 school personnel were tuberculin tested and read, of which 748 or 9.2 percent were found to be tuberculin positive.

During the summer of 1966, a tuberculin testing survey of all the residents of a specific geographic area of the Navajo Indian Reservation in San Juan County was undertaken. Fifteen hundred Navajo Indians, approximately 80 percent of the total population of the area, were tuberculin tested and read. Of this number, approximately 24 percent were found to be tuberculin positive.

Utah's tuberculosis eradication program plan includes X-ray examination of all positive tuberculin reactors to identify cases and lifetime followup of cases and reactors and the use of chemoprophylaxis when medically indicated.

During the calendar year 1965, 4,670 screening chest X-ray films were taken on the Utah State Department of Health mobile chest X-ray unit. In addition to the taking of screening X-rays of all tuberculin positive reactors, screening X-rays were taken in selected high incidence areas of the State without previous tuberculin testing.

The Utah State Department of Health in cooperation with the Utah State Medical Association and the University of Utah College of Medicine carried out a demonstration cancer detection program from July 1, 1962 through December 31, 1965. The program was conducted at the

University of Utah College of Medicine Teaching Hospital. During 3½ years a total of 5,473 cervical smears were obtained from 4,498 women who participated in this screening project, of which 16 smears were positive.

Since 1950 the USPHS Occupational Health Field Station in Salt Lake City has carried out surveillance of uranium miners at regularly scheduled intervals. Between 1950 and 1960 about 6,929 examinations were performed. Beginning in 1957, sputum samples were routinely collected and stained with the Papanicolaou technique. A total of 54 miners have developed carcinoma of the lung. The miners ranged in age from 36 to 66 years of age.

In a 15-county area of which 5 are in Utah, the evidences thus far indicate an apparent increase in pulmonary pathology among underground uranium miners. Of these, respiratory neoplasms markedly exceed the number usually expected.

The Utah State Department of Health works in cooperation with the U.S. Public Health Service in gathering data for the 20-year population study in reaction to radioactive fallout in southern Utah. Although the age of the population presently under study is that of young people, there may well be the implication of future increased chronic diseases due to the fallout as this population ages. This study is concerned primarily with patterns of thyroid pathology and its relationship with exposure to radioactivity.

The study consists of two separate approaches. One of these involves a medical examination of the children in Washington County. As a result of examination, 35 were referred for additional medical evaluation. The second area of thyroid study centers around persons under the age of 30 who have had thyroid surgery. Data for this have been compiled from hospital records, physicians, and in some cases, the patients.

A pilot multiscreening program, cosponsored by the Utah State Department of Health and the Salt Lake County Department of Health was conducted in Salt Lake County nursing homes during 1964. The project was undertaken to determine some of the medical problems of nursing home patients and as a guide for planning to meet their needs.

The screening program included tonometry for glaucoma, breast cancer by palpation, blood sugar for diabetes, Mantoux and Tine test for tuberculous infection, screening chest X-rays on the Utah State Department of Health mobile chest X-ray unit for tuberculosis, lung cancer, and heart abnormalities, and cytology for uterine and cervical cancer. The findings of the screening program included 9 glaucoma, 5 breast cancer, 4 diabetes, and 93 positive tuberculin reactors.

2. We have no accurate statistics available on the prevalence of chronic disease in the age groups specified. However, in a recently conducted community health study of Salt Lake County, which county represents almost 50 percent of the total population of the State of Utah, the task force on chronic illness and handicapping conditions estimated that there are 82,000 chronically ill persons in Salt Lake County. This report did not provide estimates by age groups. In a second task force committee report on personal health needs of aging (65 and over), it was reported that the largest percentage of persons

over 65 is found in Salt Lake City and comprises 10.42 percent of the population.

The prevalence of chronic disease cannot be measured with any degree of reliability by mortality statistics; however, mortality statistics do provide some concept of the proportions of chronic disease within the community.

The leading causes of death in Utah in 1964 in the 45 to 64 age group were diseases of the heart, 35.2 percent; malignant neoplasms, 21.3 percent; accidents, 8.7 percent; vascular lesions affecting central nervous system, 5.5 percent. In the 65-years-and-over age group diseases of the heart, 41.9 percent; vascular lesions affecting central nervous system, 14.9 percent; malignant neoplasms, 12.7 percent; accidents, 3.7 percent.

3. Several of the approaches of the studies in chronic disease screening have been listed in reply to question No. 1. At the present time, the Utah State Department of Health with the cooperation of the Salt Lake County Medical Society is developing a screening program for the Kennecott Copper Corp. which may be modeled somewhat after the Kaiser Foundation in California.

Under consideration is the development of a chronic disease screening program for the faculty of the University of Utah through the student health service of the university.

Likewise, under development is a unique multiphasic screening program for people 62 years of age and over who will soon be residing in a nonprofit high-rise apartment of 227 units which will house in excess of 300 persons. The objectives of this pilot study are to develop a model structure and program for health preservation necessary to provide a group of older adults with a meaningful life, giving dignity and happiness to the residents. The project will endeavor to include such activities as are needed to fill the physical, social, emotional, and spiritual needs of the residents. By participating in such a broad health program, it is anticipated that it will be possible to prevent or reduce the severity of health crises and personal and social maladjustments which so frequently develop in later maturity. It is planned to use approximately 20 medical screening tests in the program.

Other areas of screening activities under consideration include a screening program for elderly Navajo Indians who are residents of San Juan County and live primarily on the reservation in the State of Utah. Screening programs within senior citizen centers in principal cities of Utah and other industries in addition to Kennecott Copper Corp. are also being considered.

One of the general hospitals in Salt Lake City is now doing cervical cancer screening by the Papanicolaou technique for all admissions to the outpatient clinic. It is planned that this service will be extended to include all hospital admissions in the near future. The Utah State Department of Health is suggesting that other hospitals follow this plan in screening of cancer detection.

It has been determined that in 1964, 30 percent of the adult women over age 20 in Utah were screened for cervical cancer.

The Utah State Department of Health in cooperation with the Utah State Medical Association is encouraging the use of hospital admission chest X-ray screening in the major cities in Utah as a means



of detecting tuberculosis, lung cancer, and certain types of heart disease.

It is anticipated that the multiphasic screening programs as reported in answer to question No. 1 will eventually be developed for nursing homes throughout the State of Utah (a second such screening activity is underway at the present time in a Cache County nursing home).

4. The following individuals have expressed special interest in the subject of multiphasic screening programs:

Robert W. Sherwood, M.D., director, division of preventive medicine, Utah State Department of Health, Salt Lake City, Utah.

John Ward, M.D., head, department of preventive medicine, University of Utah College of Medicine, Salt Lake City, Utah.

George Edison, M.D., director, student health service, University of Utah, Salt Lake City, Utah.

Victor Kassel, M.D., private practitioner in geriatrics, 465 East South Temple, Salt Lake City, Utah.

Robert Gray, Ph. D., associate professor of sociology, University of Utah, Salt Lake City, Utah.

Mrs. Harold Lamb, chairman, Task Committee on Personal Health Needs of the Aging, 2604 Evergreen Avenue, Salt Lake City, Utah.

5. The screening activities undertaken so far in Utah have had sufficiently high yield of chronic disease to indicate that there is a definite need for these kind of screening activities. Impediments to this program by the public or the medical profession are decreasing. The increased interest of the Salt Lake County Medical Society in screening programs for chronic disease is evidenced by its assuming leadership in developing a multiphasic screening program for Kennecott Copper Corp.

We are pleased to have this opportunity to contribute to the activity of your Subcommittee on the Health of the Elderly.

Sincerely,

G. D. CARLYLE THOMPSON, M.D.,  
*Director of Public Health.*

STATE OF VERMONT,  
DEPARTMENT OF HEALTH,  
DIVISION OF CHRONIC ILLNESS CONTROL,  
*Burlington, August 26, 1966.*

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR MISS NEUBERGER: With respect to your letter of August 18, 1966, we have several ongoing screening activities and some concepts concerning multiphasic screening which possibly will be of some interest and value to you in your committee hearings.

Diabetes: During the past 2 years 16,000 Vermonters, 25 years of age and older, have been screened for diabetes using the Unopette capillary micro method with autoanalyzer processing. Out of the approximately 600 positive screenees referred to their physicians for definitive diagnosis 162 cases of previously unsuspected diabetes have been confirmed. Modification of the program during the past year has

included closer coordination of the screening clinics with the local practicing physician, more effective followup measures and more comprehensive screening of industrial employees throughout the State. Much of the success of our community screening clinics for diabetes has been due to our close and effective liaison with the University of Vermont home extension service personnel. Through their organization of extension homemaker clubs they have been quite effective in initiating the community requests for screening, handling local publicity, and other arrangements, and serving as registrars during the actual screening clinic.

At the request of a local community and with the coordination of a local physician Department of Health personnel provide the actual clinic, including supplies, equipment, informational literature, processing of the results, and administration of the followup program.

A program to assist in more routine office screening for diabetes by practicing physicians has been initiated. Fifty-five physicians throughout the State have indicated their interest in utilizing the Unopette technique more routinely in their offices. In response to their request we have visited each physician in his office, demonstrated the technique, arranged for the necessary equipment and supplies, and developed the mailing procedures for specimen processing. The specimens are mailed in to the State laboratory for processing on the auto-analyzer and results are forwarded back to the referring physician.

**Glaucoma:** A training program in the use of tonometry for glaucoma screening has been developed as a service to practicing physicians throughout the State. Fifty-two physicians have indicated their interest in learning the technique of tonometry and incorporating this as a routine office measure. Demonstrations and training in the use of the tonometer has been given to each physician on an individual basis in his office. Special arrangements for ordering the tonometers at a somewhat reduced cost to the physician have been made. Physicians have been extremely enthusiastic about this opportunity to learn this technique.

At the DeGoesbriand Memorial and the Mary Fletcher Hospitals, the two largest hospitals in the State, both located in Burlington, a program to provide glaucoma screening as a routine on all hospital admissions over 40 years of age has been initiated. Department of health personnel, working in conjunction with the department of ophthalmology specialists, will be developing the training program for the entire intern and medical resident staff.

**Multiphasic screening:** A feasibility study to determine the most effective approach to multiphasic screening in the State has been ongoing for some time. In the very near future it is expected that as a pilot project a prototype multiphasic screening clinic will be established. We are particularly interested in providing screening for such diseases as diabetes, glaucoma, and amblyopia. We believe it is important, at least in this prototype stage, that only a fairly small number of high yield screening tests be done, and such tests be those that can be performed effectively by clinic nurses, and ordinarily not require the direct participation of a physician. At this stage we believe such clinics should start small and be designed for maximum flexibility. Consideration must be given to the utilization of all the latest equipment and technique for sophisticated and efficient clinic operation.

On the basis of information gained during our pilot study phase we expect over the next several years it may be desirable to set up a regional network of continuously operated screening clinics, fully coordinated with county medical societies, health associations and other interested health agencies, and serving as a screening service for the local practicing physicians.

I feel that serious consideration should be given the age cutoff on large-scale federally endorsed screening programs. At least one such program has mentioned a cutoff age of 50. One might ask, why not 40, and at least for diabetes our yield with an age cutoff of 25, makes large-scale screening well worth the effort. Consider the requirement for amblyopia screening of preschool children. Very few States have ongoing programs in this area. A great deal remains to be done, and I doubt that a cutoff age can be selected which would be entirely satisfactory. Even though the yield is less when screening the younger age groups ordinarily, the total gained in terms of man-years of health preserved must be considered.

Thank you for this opportunity to present some of our views on this important health matter.

Sincerely,

DUANE E. GRAVELINE, M.D.,  
*Director, Division of Chronic Illness Control.*  
R. B. AIKEN, M.D., M.P.H.  
*Commissioner.*

GOVERNMENT OF THE VIRGIN ISLANDS OF THE UNITED STATES,  
INSULAR DEPARTMENT OF SOCIAL WELFARE,  
*Charlotte Amalie, St. Thomas, V.I., September 20, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In response to your letter of August 18, 1966, we enclose report submitted by our department of health. We hope that this information will be helpful to you.

Sincerely,

MACON M. BERRYMAN, ACSW,  
*Commissioner.*

SCREENING PROGRAMS IN PUBLIC HEALTH FOR THE AGED AND CHRONICALLY ILL, DIVISION OF PUBLIC HEALTH SERVICES, VIRGIN ISLANDS DEPARTMENT OF HEALTH

The Division of Public Health of the Virgin Islands Health Department conducts a series of screening programs designed to detect evidence of illness which may arise in later life.

*Diabetes.*—A continuous screening of patients over 18 years who attend hospital clinics. Blood analysis are performed by an auto-analyzer.

*Heart disease.*—Routine screening of all patients for hypertension and heart disease.

School health program includes screening tests for streptococcal infections by the method of fluorescent antibodies examination.

*Tuberculosis*.—Periodic screening of high risk groups by time tests and X-rays.

*Cancer*.—Screening by papanicolau smears for cervical cancer. Other screening tests are being proposed.

*Glaucoma*.—Screening program is being scheduled for operation within the next 2 months.

Plans are being made for screening programs in kidney diseases, mental retardation, and cancer of other sites in the body. The screening tests have been extremely helpful in detecting cases early.

In cancer, of 480 screened cases 4 persons were detected to have early invasive malignant cancer. In diabetes, 300 cases of the disease were discovered in 9,990 persons screened.

The most prevalent chronic diseases in the various age groups are as follows:

Ages 40 to 50: Heart disease, diabetes, cancer.

Ages 50 to 60: Hypertension, heart disease, cancer.

Ages over 60: Hypertension, cancer, heart disease, diabetes.

In order to improve the screening program it is necessary to develop greater numbers of facilities in various districts in the community. These facilities must be easily accessible, and must be comfortable and adequately staffed.

Screening for persons under 60 years must be performed at times that are suitable for the working class, such as early evening. Arrangements for the screening should be adequate to provide maximum tests or workload in the minimum of time without creating inconvenience to the patients.

The person engaged in the screening program whose interests are directing the programs is: C. Warren Smith, M.D., M.P.H., assistant commissioner of health, division of public health, department of health, St. Thomas, Virgin Islands.

There is great need for multiphasic screening and plans are being made for such screening. Further, appropriations from Federal and local governments are needed to develop effective multiphasic screening.

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COMMONWEALTH OF VIRGINIA,  
DEPARTMENT OF HEALTH,  
*Richmond, Va., August 31, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

MY DEAR SENATOR NEUBERGER: This has reference to your letter of August 18, 1966, relative to health screening methods intended to detect chronic disease. Multiple screening tests have certain limitations, such as motivation of people to take such tests, the difficulties of proper followup in many instances, and a lack of criteria for administering and evaluating the tests when done. These limitations do not affect the Permanente group in California as they have a captive clientele and followup may be easily accomplished.

To comment on your questions: there has been an annual multiphasic screening in Alexandria, Va., for approximately the past 10 years, and

which has been very successful. It is noted, however, that many people return each year and that at times followup is difficult. The tests used in this screening are varied each year. Tests selected this year will be blood sugar for all over 40 years of age, height, weight, visual acuity and depth perception, chest X-ray, blood pressure, urinalysis for sugar and albumin, and a dental examination.

We also have a mobile trailer which has been active on the Eastern Shore of Virginia for the last three summers, primarily for services to migrant laborers. This has also been very successful. Although this mobile clinic will accept individual cases of any type, multiphasic screening is also employed. It is hoped this trailer can be used in other rural areas in the State when the migrant season wanes.

In order to give service to many more chronic illness patients the State health department has established a home nursing program in certain areas of the State: (Caroline, Hanover, Culpeper, Greene, Orange, and Washington Counties and in Bristol, Hampton, and Portsmouth). This program is at present undergoing expansion, and has shown itself to be an excellent medium for discovering and bringing to treatment many chronic illnesses.

We are constantly doing categorical screening of two or more diseases throughout the year, such as chest X-ray for tuberculosis combined with blood sugars for diabetes and serologies for syphilis.

Of all chronic illnesses diagnosed in the home nursing program the following indicates frequency of primary diagnoses:

	Percent		Percent
Infectious and parasitic diseases	6.6	Respiratory	5.6
Neoplasms	9.1	Digestive	3.7
Allergic, endocrine, etc.	11.0	Genitourinary	5.5
Blood dyscrasias	3.5	Bones and organs of movement	2.7
Nervous system	9.7	Congenital malformations	.5
Mental, psychoneurotic	13.8	Injuries	3.7
Circulatory	21.3	All others	3.3

#### Age breakdown in percentages:

	Percent		Percent
Under 40 years	21.0	50 to 60 years	18.1
40 to 50 years	11.6	60 years-plus	49.3

We have no suggestions for screening below 60 years, or above that age except in specific instances such as diabetes over 35 or 40 years.

Individuals with special knowledge of multiphasic screening in Virginia are:

Thomas F. McGough, M.D., director, Alexandria Health Department, 517 North St. Asaph Street, Alexandria, Va.

Belle D. Fears, M.D., director, Accomack-Northampton Health Department, Cross Street, Nassawadox, Va.

Robert W. Moseley, M.D., regional director, Virginia State Department of Health, 1314 East Grace Street, Richmond, Va.

We feel there is a definite need for good multiphasic screening provided good followup is available and carried out. Screening is not worth the time, effort, and expense unless followup is done.

We are in the process of expanding our laboratory testing to include more in chronic disease detection. Such tests as the Guthrie test for PKU, blood glucose (clinitron and Kett-Summerson colorimeters), FTA-ABS for syphilis, FTA for group A streptococcus are now in

use. Such equipment as the spectrophotometer, autoanalyzer, and fluorometer are on order.

I trust this information will be of value to you in your hearings on September 20, 1966.

Sincerely yours,

MACK I. SHANHOLTZ,  
*State Health Commissioner.*

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STATE OF WEST VIRGINIA,  
DEPARTMENT OF HEALTH,  
*Charleston, August 31, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Senate Office Building, Washington, D.C.*

DEAR SENATOR NEUBERGER: I appreciate the opportunity to further comment on the Adult Health Protection Act of 1966.

Since Senator Williams of New Jersey was kind enough to solicit my comments on this act prior to its introduction in the U.S. Senate my comments were made a part of the Congressional Record. In this communication I shall attempt to comment briefly on each item contained in the second page of your letter.

1. We, in West Virginia, have had limited experience in health screening programs, such as tuberculosis, diabetes, cancer, and other chest diseases. Although it is difficult to determine the degree of prevention brought about by health screening programs, we certainly feel that many primary conditions have been discovered and treatment instituted which prevented the advancement of these conditions to a secondary stage. These screening examinations have been conducted in our hospital and health department clinics and our mobile traveling units. Our funds have been limited, which has prevented a full expansion in this direction.

2. The prevalence of chronic disease in West Virginia in age groups 40 to 50, 50 to 60, and 60 and beyond is just about the average for the United States. We have been successful in reducing markedly the prevalence of acute illnesses, but so far we appear to be fighting a losing battle in reducing the occurrence of chronic illness in these age groups.

3. I feel that State and local health departments have the required knowledge for effective screening programs for the adult population, but lack the manpower and tools to work with.

4. The following names and addresses of persons interested in this subject are:

Dr. James Walker, 1323 Quarrier Street, Charleston, W. Va.

Dr. N. Allen Dyer, director, bureau of heart disease control, State department of health, 1800 East Washington Street, Charleston, W. Va.

Dr. Richard Flood, president, West Virginia State Medical Association, 2116 Pennsylvania Avenue, Weirton, W. Va.

Dr. Weigle Parks, past president, West Virginia State Medical Association, C. & P. Telephone Co., Lee Street, Charleston, W. Va.

Dr. Daniel Hale, Medical Arts Building, Charleston, W. Va.

5. I can definitely see there is a great need for multiphasic health screening programs in West Virginia. To my knowledge there are no particular impediments to the acceptance of such a program, providing the public and the medical profession are made thoroughly aware of the objectives and the benefits that may be derived. A well organized health education program certainly would be essential.

If I can be of further assistance, please feel free to contact me.

Sincerely,

N. H. DYER, M.D., M.P.H.,  
*State Director of Health.*

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THE STATE OF WISCONSIN,  
STATE BOARD OF HEALTH,  
*Madison, September 12, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee  
on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your inquiry regarding our experience and viewpoints on multiphasic health screening methods. The Wisconsin State Board of Health has 25 years of experience with screening programs for early detection of disease and continues to offer an expanding statewide screening program to the general public, using three mobile units which visit each area in Wisconsin approximately every 3 years.

The objective of our first screening program was tuberculosis case finding. With the decline of tuberculosis prevalence, radiographic heart disease and lung cancer case finding, screening for hypertension and later examinations for diabetes were added to the program. At present, we are embarking on an evaluation of various screening tests for cervical cancer to determine the feasibility of adding these tests to our mobile unit screening program. We are also considering the addition of screening for glaucoma. The recent development of automated laboratory equipment and tests also offer a potential for handling large numbers of specimens which may allow for screening of various chronic and degenerative diseases and further extension of the mobile unit screening program.

Our experience shows that screening programs for a single disease on a statewide basis is not very productive. However, as we continue to add new screening services, the yield of the previously offered services is increased, as well as providing for detection of new cases of the particular disease for which screening was added. Our experience also indicates that the motivation of the public to participate in a multiphasic health survey is influenced by the type of screening tests offered. Persons having diabetes in the family are likely to be attracted to diabetic screening. Persons whose anxieties center around heart disease respond to those screening tests.

Our studies show that the ratio of newly diagnosed cases to the previously known cases is declining as we return to communities previously screened, probably because the same segment of the population (50 percent of the participants) is being rescreened. It is necessary to consider this factor in evaluating the yield of the screening program, since the initial results are higher than the findings in sub-

sequent years. It is interesting to note that 70 percent of screened persons referred for medical followup complied with the advice, the same as the 70 percent of compliance which was observed in our immunization studies. This encourages us to continue our screening activities, since we know that approximately three-fourths of those recommended for followup diagnosis profit from the screening. Efforts to attract a larger part of the susceptible population for screening, especially those over 40 years of age, for early signs of disease with increasing health education activities and a well developed followup and referral system to physicians or clinics for more definitive diagnostic procedures are essential elements in a fruitful screening program.

Health screening programs in fixed centers patterned after the multiphasic Kaiser Foundation program are suitable for large metropolitan areas. The Milwaukee Health Department is applying for a project grant to develop a limited multiphasic health examination program which we are supporting as a desirable and needed service. We are, however, continuing to recognize the needs of the sparsely populated rural areas and consider the mobile units necessary to meet these needs.

In noting the rapid advances of laboratory sciences and computer services, which make large-scale screening procedures feasible, mention should be made of the University of Wisconsin's project on computerized diagnostic data. This includes computerized history taking with automated laboratory findings. This information is immediately available to the physician in the course of his examination of the patient for more effective diagnosis. Screening procedures of apparently healthy individuals for detection of early stages of disease must be differentiated from those diagnostic procedures to meet the needs of the practicing physician in determining the significance of the screening findings.

Distinction must be made between the value of present screening procedures in different disease conditions. Early detection of tuberculosis, cervical carcinoma, diabetes, and glaucoma can prevent the serious sequelae of these diseases and enable the detected individuals to lead a useful life. Detection of lung cancer by routine radiographic examination is disappointing, as it is rare to find an individual with lung cancer who can be cured. There are no published large-scale studies that clearly show that early detection and treatment of hypertensive or arteriosclerotic heart disease will prolong a patient's life. Weight reduction, dietary control, medication, exercise, and other measures have little effect on reducing mortality from cardiovascular diseases.

Multiphasic health screening programs are valuable in the study of the natural history of chronic diseases. Establishment of health screening centers in large metropolitan areas will have considerable impact on the morbidity and mortality of the population served. This is particularly true for the high risk populations in the crowded slum areas who do not ordinarily go to physicians' offices. Availability of medical services for diagnostic followup of screened individuals must be determined, especially in the sparsely populated rural areas.

Research is needed on behavioral aspects of individuals to health care. Motivation to participate in health screening programs, ac-



ceptance of followup recommendations and acceptance of physicians' recommendations needs better understanding.

In regard to specific information requested in your letter, the enclosed materials may be useful to provide detailed information on health screening findings in Wisconsin. The Commission on Aging has referred your similar letter to us to be covered by our reply. Dr. Warner Slack, University of Wisconsin Medical Center, Madison, Wis., should be a useful contact regarding his developments on automated history taking. Dr. Edward Krumbiegel, health officer, city of Milwaukee, Milwaukee, Wis., is developing the project of multiphasic health screening in Milwaukee referred to above.

We strongly support the need for health screening programs. Public health departments at State and local levels have the skill, experience and personnel to carry out these programs. In the more populated areas, the people can be well served by local health departments.

In rural areas, however, strong State health department screening programs are some of the very important factors in carrying out the important function of preventing disease and saving lives. Failure to support these efforts by State health departments would bypass many citizens who live outside of metropolitan complexes.

Sincerely yours,

JOSEF PREIZLER, M.D.,  
*Deputy Director, Section on Preventable Diseases*  
(For E. H. Jorris, M.D., State Health Officer).

## C. MANUFACTURERS OF MEDICAL EQUIPMENT

The subcommittee mailed the following form letter to a number of manufacturers of medical or allied equipment:

UNITED STATES SENATE,  
SPECIAL COMMITTEE ON AGING,  
*August 17, 1966.*

DEAR -----: As you may know, there has been some interest within Congress lately about health screening programs and other efforts to reduce chronic disease among older Americans. One obvious reason for such interest is the advent of medicare. Another is simply that such programs are long overdue.

It now appears that the Health of the Elderly Subcommittee of the U.S. Senate Special Committee on Aging will conduct hearings in September on a national effort to detect and prevent chronic disease, utilizing multiphasic health screening techniques. We will give considerable attention to the value of health screening programs for Americans past 40 or 50 years of age. The enclosed floor speech by Senator Harrison Williams describes one proposal for such screening. Undoubtedly it will be discussed at the hearing.

Such proposals put great emphasis on the use of specially designed equipment capable of speeding the entire screening process. Automated or semiautomated equipment could give physicians accurate information needed for final diagnosis and save significant amounts of their valuable time.

I am writing to you and other manufacturers of medical equipment to ask whether you have any thoughts or suggestions on the subject. I would be especially interested in:

(a) Any new equipment—operational or experimental—which may be of use in screening programs.

(b) Methods of using computer technology with such equipment for faster and more accurate reports on screening results.

(c) Any forecasts you may wish to give on the use of such equipment in future years.

Your help and interest will be most appreciated. I would like to have your reply by September 1, if at all possible, for staff study before the hearings.

Sincerely,

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly.*

Responses received by the subcommittee from the manufacturers follow:

AMES Co.,  
DIVISION MILES LABORATORIES, INC.,  
*Elkhart, Ind., August 24, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you very much for your letter of August 17, 1966. I have read it and the enclosed speech by Senator Williams with great interest.

The proposed national health screening program seems sound to us. Several of our products are used in health screening programs.

At the recent annual meeting of the American Medical Association in Chicago, June 26-30, 1966, our Labstix reagent strips, Clinitest reagent tablets and Ictotest reagent tablets were used to determine urinary albumin, sugar, occult blood, ketones, pH and bilirubin in the health screening of the attending physicians.

Our dextrostix reagent strips are used to determine blood glucose on fingertip blood in a number of diabetic screening programs, including that of the Pennsylvania Health Department. Our product, Glucola, a carbonated, sugar beverage for glucose tolerance testing, is administered to patients prior to blood glucose testing.

Our future plans include the development of additional tests for diagnostic blood and urinary screening.

Another recent Ames product is the Volemetron for the determination of blood volume. This is a computerized, electronic, radiation detection instrument which requires only the comparison of a blood specimen taken before and after injection of slightly radioactive material. The computer accomplishes the entire calculation.

Our entire product line is diagnostic equipment. The approach is either to develop a very simple test, which can be completed on the spot, or to develop an instrument for as completely automated an analysis as is possible.

The largest volume use of our products is in health screening. Even though we have for years committed ourselves to the belief that health screening is increasing, the volume has exceeded our expectations. We certainly feel that you are in the trend of the times.

The plan to have community health screening centers linked by data transmission lines to regional centers with computer data handling and collation seems excellent.

We can only conclude from our experience to date that the forecast is for more and more multiple diagnostic screening with the analysis accomplished either by a simple, on-the-spot test or a completely automated instrument and the data being collected and collated by computers tied into telephone or other communications networks.

Please let us know if we can provide you further information.

Very truly yours,

C. M. WHITLOCK, JR., M.D.

ASSOCIATION FOR ADVANCEMENT  
OF MEDICAL INSTRUMENTATION,  
*Cambridge, Mass., September 9, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Reference your letter of August 19, 1966, requesting my comments relative to the pending hearings on health screening programs, techniques, use of instruments, and other preventive medical efforts to reduce chronic disease among older Americans.

As a member of the board of directors of the Association for the Advancement of Medical Instrumentation, I am indeed interested in the multiphasic health screening program. Instrumentation technology, educational systems, and information storage and retrieval capabilities and experience have led me to study the application of these capabilities to the medical/health field and more particularly to the multiphasic or diagnostic aspect of the medical/health problem.

Indeed, the results of my studies lead me to believe that the gap between technology and public policy is widening. Modern technology should and can be interfaced with the problems of preventative medicine.

Conclusions of studies which relate directly to the questions asked in your letter are:

1. Modern technology of sensing or detection, recording, analyzing, storing for later display of physical phenomena is directly applicable to the multiphasic health screening problem. Indeed, some of this technology is already being utilized as demonstrated by the Kaiser Permanente group in San Francisco.

2. Instruments can be developed and already are on the market applicable to the multiphasic screening problem such as automatic reading of blood pressure; autoanalysis of a blood specimen sold by Technicon Corp.; computers for diagnostic and storage of information for later retrieval purposes; sensors such as Bell & Howell/CEC's blood pressure transducer; utilization of monitoring equipment for the cardiovascular aspect of the medical diagnostic problem such as Bell & Howell/CEC's recording systems utilized at Cedars of Lebanon Hospital in Los Angeles, Calif.

3. The results of research efforts by medical groups to include our universities as sponsored and supported by the National Institutes of Health, and the Defense Department are applicable to the proposed multiphasic screening program. The recently enacted legislation by the Congress on regional medical programs for heart, cancer, and stroke, Public Law 89-239, hopefully will encourage the direct application of the research on heart, cancer, and stroke to the preventative aspects of the health problem. Bell & Howell conducted a company funded study effort to determine how to best apply present and future technology relative to instrumentation, educational equipment, and information storage and retrieval to assist in the implementation of Public Law 89-239 in the State of California.

I believe that instrumentation technology will provide a means of assisting the physician to ultimately provide better diagnosis and treatment of our citizens. Specifically, I visualize the need for central

clinical lab facilities which can process automatically many human specimens such as urinalysis, blood, and bacteriological for providing quick reliable indicators of impending disease. Certainly, these centers can be utilized both for preventative as well as after a disease strikes for diagnostic reasons. As an example, there are technical reasons to believe that the quantitative and qualitative aspects of bacteriology can be automated for the clinical lab's use in diagnosing pathogenic problems for the physician; thus contributing materially to the process of determining and preventing illness by a much quicker method.

I visualize the need for computer centers which can diagnose cardiovascular diseases by a doctor telephoning a patient's electrocardiograph to the computer center and upon analysis, receive in return within minutes a diagnosis of the patient's problem.

I visualize the utilization of diagnostic centers in every community much like those proposed by Dr. DeBakey in the report of the President's Commission for initiating the preventative diagnosis of heart, cancer and stroke. These diagnostic centers can serve as the first step to determining if a medical problem exists which the individual's family doctor can prescribe the proper treatment.

In the final analysis, we are optimistic that instrumentation technology is capable of providing better health care for our citizens if this technology is wisely applied after careful consideration by the medical profession of this country. The interface between the technology as proposed by the researcher and manufacturer with the physician for such a movement is already begun as exemplified in the recently organized Association for the Advancement of Medical Instrumentation.

Multiphasic screening programs are entirely feasible and I endorse the need for and urge that the Congress act as a catalyst to bring about the timely utilization of technology for this problem. Private enterprise is prepared and can, by proper utilization, speed the utilization of this concept. In the final analysis, public policy is needed to assist in closing the gap.

Enclosed is an article written by a noted cardiologist for your information. I appreciate the opportunity to respond to your questions relative to the health screening programs under study by your committee.

Best wishes for your continued success.

Sincerely,

PHILLIP G. BARDOS.

#### THE DEPLORABLE TIME LAG IN CLINICAL APPLICATION OF ELECTRONICS

[The American Journal of Cardiology, July 1965]

We all tend to feel a little smug about modern day medicine. We proclaim it to be dynamic in research and progressive in applying the newest technics. This is true for the most part. It isn't true, however, in medical electronics. In this subdiscipline, we haven't caught up with the past, let alone the present. Some authorities estimate that medicine is 25 to 30 years behind in requisitioning electronics for diagnosis and research.

There would appear to be two basic reasons for this. One reason is the astronomical cost of applying electronic principles to medical problems. The electronics industry simply can't afford this engineering cost because eventual medical markets are too small for a profitable return on the investment. Most electromedical instruments we use today have come into medicine via the back door, so to speak; these devices were originated for other purposes and then redesigned for us.

The second reason for the time lag is that the cost of engineering electromedical instruments is high. In the laboratory where my colleagues and I work, for instance, it is necessary to employ an electronics engineer or to consult others occasionally for guidance, depending on the project. We have found the benefits of a full-time electronics engineer are enormous. Equipment breakdowns do not panic and paralyze team effort, and the experimental data are always impeccable.

I feel strongly that all of us who are engaged in cardiologic research would make swifter progress if we could take advantage of the electronic principles already available and promote the funds needed to employ engineers to assist us. We should encourage medical schools to set up departments of biomedical engineering and elective courses in light, heat, and sound. We should also make available postgraduate courses in physiology and biochemistry for the physicist and engineer.

Let us make an inventory of where we stand.

Roentgenology, radiation therapy and electrocardiography were the first important electromedical areas to be developed. They now represent the most complete application of electronic principles to medicine. For instance, new image-intensifier screens and cinema technics enable a radiologist to study movement of the heart and perform angiocardiology with a very minimal amount of radiation. The electrocardiograph of the 1920's weighed more than a ton and was difficult to use. With the advent of the transistor, it has become small, light, and portable, in addition to being simple to use.

The development of the cathode-ray oscilloscope and direct recorders just prior to the Second World War advanced the fields of electrocardiography, vectorcardiography, phonocardiography and cardiac catheterization because they enabled the clinician to read the result immediately; but little has been added to the field in the last 20 years. Although interest continues to increase, as exemplified by sparkling attendance at electro- and vectorcardiographic courses, it has become a static area.

The stain gage, which utilized a simple Wheatstone-bridge principle, is the result of electronic research during World War II. This device accurately measures blood pressure via an indwelling catheter and has eliminated the clumsy mercury column and unwieldy lead-lines. Because of its small size and easy maneuverability, its adaptation has proved to be an unbelievable boon to diagnostic cardiac catheterization and experimental physiologic research.

But further technics must be developed to monitor the blood pressure over prolonged periods of time. Plethysmograph and photoelectric cell technics for recording blood pressure fail when shock supervenes or vasopressor drugs are used because both these states cause such a severe peripheral vasoconstriction that peripheral pulsation cannot be recorded with fidelity. The field of cardiogenic and other shock states is awaiting the development of new pressure monitor technics.

Cournand and Richards were awarded the Nobel prize for the practical demonstration that a sudden change in the oxygen content in various chambers of the heart may be due to shunting of blood through an abnormal pathway and thus be used to detect a congenital or acquired cardiac defect. Up to now it was necessary to determine the oxygen content of blood from samples by the tedious Van Slyke technic. Now, however, it is possible to measure oxygen content rapidly and accurately by electronic methods.

Automatic measurement of oxygen and carbon dioxide tension, pH, may be measured from electrodes imbedded in tissue in but a few seconds. Imbedded needles will soon automatically record sodium and potassium and other chemistries. We can well conceive how such technics will bare innermost secrets of life and lead to new concepts of disease and its treatment and also how they will soon be applied to monitor the patient at surgery or in an intensive care unit.

Vascular surgeons are utilizing oxygen electrodes to determine adequacy of regional circulation, because of the strong correlation of oxygen with the blood flow of tissue. Also, simple thermister needles which automatically measure temperature of tissue have been adapted for the diagnosis of peripheral vascular disease. They can be used to evaluate effectiveness of vascular surgery immediately during an operation.

Platinum electrode technics, which sense minute amounts of hydrogen gas or ascorbic acid, have been applied to detect shunts between various chambers of the heart; now they are used in the experimental laboratory to measure the transit time of labeled blood through the myocardium and blood vessels of the body. Their full application in pharmacology and diagnosis have not been tapped.

Electronic application of dye-dilution technics in the late 1950's proved to be invaluable to determining valvular insufficiency and cardiac output. However, in shock states and arrhythmias where there is an inadequate mixing of the indicator because the circulation is slowed, the nitrous oxide and dye-dilution methods to calculate flow have yielded spurious results.

The electromagnetic flowmeter, because of its accuracy and simplicity, promises to revolutionize hemodynamic studies. Until recently, measurement of blood flow required the insertion of cannulas into the lumen of a blood vessel and diversion of the circulation to metering devices by extracorporeal circuits. The new, small, electromagnetic flowmeters have eliminated the false resistance produced by extracorporeal technics. However, many electromagnetic flowmeters are being used with high signal-to-noise ratio, with drift problems due to overload and with circuits that are supposed to provide electrical zero but are unable to do so. The manufacturers should be required to prove their instruments through government control as the drug industry is required to do by special agencies. In fact, we cannot accept the published reports utilizing the electromagnetic flowmeter until we have assurance that the instrument is not providing spurious results.

Ultrasonic methods have advantages but unfortunately do not calculate negative flow accurately. Because both the electromagnetic and ultrasonic flowmeter can be applied directly to the outside surface

of a blood vessel, they allow an intact vasomotor apparatus not previously possible.

Most physiologic principles compounded through the years are based on previous flow technics. They require reinvestigation with more modern methods that eliminate false resistances and destruction of vasomotor innervation. Because of irregularity of blood flow during cardiac arrhythmias, it has not been possible to record mean flow over a period of time with any degree of accuracy. Recently developed analog computers incorporated into the electromagnetic flowmeter circuit have simplified this problem because they automatically and accurately measure the undersurface of the flow tracing over a predetermined period. Whereas before it took many hours to compute flow, it is now possible to put the whole story together in a most dramatic fashion within a few minutes. Now the flow of as many as eight organs can be computed at one time; thus it is possible to compare the vasomotor response of each vital organ.

The contribution of radioactivity to the study of the circulation in the past 30 years has been limited. Radioactive sodium was first used in 1947 to study the flow of blood through the chambers of the heart in a technic called radiocardiography. It is now used to demonstrate delay of blood flowing through the chambers of the heart and lungs and to measure cardiac output.

Recently, radioisotopes were utilized to study the flow through the coronary vessels, but the methods have yet to be confirmed with experimental studies. Radioactive renograms have proved of value in demonstrating retarded flow through a diseased kidney. This, of course, helps to detect renovascular hypertension which is amenable to surgery.

Radioactive beads ranging from 15 to 120  $\mu$  can now be used to measure the size of collateral vessels in the heart. It has already been shown that the collateral circulation in the normal dog's heart is initially very small but increases significantly about 3 weeks following a myocardial infarction. At 7 to 12 weeks following a coronary occlusion it is 120  $\mu$  in diameter. These beads offer great promise to determining the factors which improve the all-important collateral circulation after a coronary occlusion.

Electrocardiographic monitoring is an important tool in a coronary care unit; and because it offers a large market, manufacturers are rapidly developing spectacular instruments. Hughes Day showed that an alarm system that registers cardiac arrest and tachycardias permits the revival of more than 60 percent of patients who would die of cardiac arrest subsequent to myocardial infarction. Only 4 minutes are allowed for the physician to apply resuscitative maneuvers, and if it were not for the alarm system, a warning that arrest has occurred would not be possible.

Because early detection of an arrhythmia might prevent death from cardiac arrest, most anesthetists now monitor the surgical patient's electrocardiogram by cathode-ray oscilloscope during operations.

Memory loops have been applied to capture and store abnormalities in rhythm in intensive care units. Recently, a tape-recording electrocardiograph monitor has been developed by Holter to store the



electrocardiogram on magnetic tape over prolonged periods while the patient conducts usual activities. A computer is able to analyze 10 hours of such electrocardiographic tape recording within 10 minutes. This Holter monitor translates each cardiac cycle so that abnormal cardiac rhythms and serial S-T segment or T wave distortions can be readily detected in a new graphic form. Already this has been applied to confirm the cause of transient cerebral strokes due to cardiac arrhythmias and also the exact factor which may precipitate coronary insufficiency. The effects of emotional tension and environment can now be placed in their proper perspective.

Many years ago it was demonstrated that ventricular fibrillation could be converted to a normal rhythm by a direct high-voltage shock. Now this technique has been perfected and popularized and has saved the lives of thousands who would have succumbed to cardiac arrest. Surgeons may now purposely induce ventricular fibrillation so that the heart will be relatively still during its surgical repair because at the conclusion of an operation the normal rhythm of the heart may be returned by shock. Principles of electric countershock have been extended to the conversion of ectopic cardiac arrhythmias by programed capacitor discharge.

Electrical pacemaking that can be applied externally, or inserted into the body of patients to maintain the heart rhythm, has proved practical, thanks to the contributions of Lillehei and Zoll. It has reduced suffering and saved many lives.

Innermost secrets are now being probed in the study of electrical potentials within and without a single cell. The electrophysiology of the heart, and shifts of electrolytes across a cell membrane, can now be investigated with the new intracellular electrodes. These will provide a physiologic understanding of the cause of arrhythmias and cardiac decompensation, promising improved treatment.

There is interest now in thermography, based on the World War II infrared devices used to detect camouflaged tanks by picking up the heat from their engines. From the preliminary work, it would appear that thermography might be an excellent tool to pinpoint carotid artery occlusions.

Subsidies? These and other developments would obviously move ahead faster if the electronics industry could afford to redesign its devices for our use. In some countries, the industry is aided by government subsidies because it is allied with defense. I will not attempt to argue here the political implications of government subsidies.

But electronics is definitely allied with medicine and biology. Certainly, among the funds that Congress allocates for medical research some money could be found (1) to bear the cost of designing and redesigning medical instruments; (2) to make available electronics engineers for medical research laboratories; (3) to program elective courses in electronics for the medical student; (4) to provide elective courses in physiology and biochemistry for the engineer or physics student; and (5) to set up schools of biomedical engineers.

Technical programs. Much progress will be made if cardiologists are kept up to date on the application of electronic principles and, of course, this can best be done by programing these advances at annual

scientific meetings and arranging special programs on the subject in depth.

**The Future.** I envision that the future cardiologist's life will be more interesting because of developments in electronics. The field has hardly been scratched. Electronics will uncover the cause of many cardiac disorders. New surgical and medical procedures will follow the discovery of electronic diagnostic methods as surely as cardiac surgery followed the discovery of the catheter technics.

Clinical cardiologists and the researcher of the future will require a good knowledge of electronics, but I doubt that this will supplant the bedside examination. It will always be necessary for the cardiologist to be a master in history taking and examination and to keep his clinical wits working.

ELIOT CORDAY, M.D., F.A.C.C.,  
*President, American College of Cardiology.*

BARNES ENGINEERING Co.,  
*Stamford, Conn., September 1, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: This will acknowledge your letter of August 17 together with its enclosure.

Whereas I was familiar in a general way with the floor speech delivered by Senator Harrison Williams, I was delighted to receive a copy from you in order that I might read it in detail. In this connection, let me say that I am in complete agreement that there does exist today in the United States an increasing need for modern instrumentation designed specifically for use in multiphasic health screening programs in order to lessen where possible the burden which such programs will inevitably place upon physicians.

For many years, I have been interested in the design, development, and application of instruments in connection with problems of an analytical or diagnostic nature. In particular, it has been my pleasure for the past 4 years to have participated in the introduction of a new diagnostic technique referred to as thermography and in the creation of suitable instrumentation for this technique. In a medical sense, the word "thermography" is used to designate the technique of producing in pictorial form an accurate and reliable thermal map showing skin temperatures.

Thermography may be said to have come into being in 1956, when it was shown that the temperature of the skin overlying a breast cancer was abnormally elevated as compared with that of the same area of the opposite breast. This observation has been confirmed subsequently in many hospitals and medical institutions both in this country and abroad. At the AMA meeting in Atlantic City in June 1963 the model M1-A Thermograph was introduced to the medical profession, and since that time, 25 of these units have been installed in the United States and 5 in Western Europe. Although some of these units are being used clinically, the majority are still being employed to explore

the potentials of this new modality. Among the U.S. medical institutions using thermography are the following:

- Albert Einstein Medical Center, Philadelphia, Pa.
- Temple University, Philadelphia, Pa.
- Emory University, Atlanta, Ga.
- Columbia-Presbyterian Medical Center, New York City.
- Memorial Hospital, New York City.
- St. Vincent's Hospital, New York City.
- Brookdale Hospital Center, Brooklyn, N.Y.
- Norwalk Hospital, Norwalk, Conn.
- M. D. Anderson Hospital and Tumor Institute, Houston, Tex.
- Gynob, Inc., San Diego, Calif.
- Winsor Memorial Heart Research Foundation, Los Angeles, Calif.

Memorial Hospital of Long Beach, Long Beach, Calif.

Interest in thermography is increasing and, as may be seen from the attached bibliography, the medical literature on this subject is building up rapidly. Several pilot screening programs in connection with studies of breast diseases are underway, including one sponsored by the American Cancer Society.

In the most recent annual report of Barnes Engineering Co., a brief discussion on medical instrumentation was included, a part of which is given below:

The human body in the absence of disease is remarkably symmetrical from a skin temperature point of view. Thus, if the left shoulder of a man should be hotter than the right, we can be sure that something is wrong. This fact appears to have been known to and appreciated by the ancients. Although Hippocrates himself advised that "The physician should examine, if one side is hotter than the other," it is only within recent times that instrumentation has been available for measuring skin temperature. Today no physician would practice medicine without a clinical thermometer nor would any hospital record of a patient's illness be acceptable without a complete temperature chart or graph. However, few physicians and hospitals are equipped to measure and record skin temperature. This is true in spite of the fact that ample evidence exists that an accurate knowledge of skin temperature can reveal a great deal of valuable information of diagnostic nature. The cause would appear to lie in the lack of suitable instruments for making the desired skin temperature determinations.

Here again, infrared radiometers (thermometers) and infrared scanning cameras (thermographs), because they operate passively, without the requirement for external irradiation of any nature, and without contacting the skin, offer great promise in filling this need. Based to a large extent upon experience in supplying infrared radiometers and thermographs to meet military needs and requirements, the company in 1963 introduced to the medical profession a line of products specifically designed for medical use. Since that time much has been written both in medical journals and in the lay press concerning the potentials of thermography. During the past year, for example, at least 20 technical papers dealing with thermography have been published in which the results of medical research and evaluation work were discussed. Specific applications described include the use of thermography for the evaluation of wound healing and trauma;

the assessment of burns and the viability of skin; the localization of the site of placental implants during the last trimester of pregnancy; the study and visualization of peripheral vascular insufficiencies and diseases; the localization of metastatic cancer in soft tissue and in bones; the detection of cerebrovascular insufficiencies due to internal carotid artery occlusion and the examination of breasts for the presence of benign and malignant lesions. Because of its complete safety and the information which it reveals, it is hoped that this technique can be employed as a screening procedure.

In response to the three questions raised in your letter, I would like to reply as follows:

(a) Thermography is a new approach to diagnosis which has already been evaluated in many medical institutions and which appears to show promise for use in screening programs. Its potential for use in connection with the diagnosis of certain types of stroke, the diagnosis of malignancies including breast cancer, and its use in studying peripheral vascular diseases has been demonstrated. Medical literature on these subjects is readily available.

(b) Since the physical parameter measured is skin temperature, which may be expressed numerically, this method lends itself readily to use in connection with computers.

(c) Since thermography is based upon so fundamental a phenomenon as skin temperature, and since skin temperature under controlled ambient conditions appears to be influenced largely by conditions which exist within the body, it seems logical to believe that localized changes of skin temperature patterns will reveal pathological changes within the body. Thus, it would appear that if an individual could be examined by thermographic techniques at periodic intervals, any changes which might be observed in his or her skin temperature pattern would serve as a signal to the physician that some pathological change has occurred within the body. Skin temperature patterns are unique for each individual and have been likened to crude fingerprints. Unlike normal fingerprints, however, these patterns change with pathology and, therefore, would seem to offer diagnostic possibilities. It is my personal belief that the time will come when thermography in some form or another will take its place as a routine part of all medical examinations.

During the past 4 years, many interesting papers have appeared in medical journals covering various aspects of thermography. I am enclosing herewith reprints of several of these which I hope may be of interest to you.

Very sincerely,

R. BOWLING BARNES, *President.*

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BECKMAN INSTRUMENTS, INC.,  
Fullerton, Calif., September 19, 1966.

Hon. MAURINE NEUBERGER,  
U.S. Senate,  
Washington, D.C.

MY DEAR SENATOR NEUBERGER: At the request of Mr. Thomas Biggs, we are supplementing the information supplied to you on September 2, 1966, in response to your letter of August 17, 1966. This supple-

mental information describes several additional new pieces of equipment which may be of use in screening programs. Several of these new items are presently being evaluated in or for screening programs, and at least one is being used in research studies.

Two of the instruments, the phonocardiogram and the electrocardio-analyzer, were initially designed and developed by the Humetrics Division of the Thiokol Chemical Corp. and are now being investigated on a joint basis by Thiokol and Beckman.

#### 1. PHONOCARDIOGRAM (PCS)

The PCS is an instrument which, through the use of a self-contained analog-digital computer, analyzes heart sounds, beat by beat, as they occur and displays the results in terms of deviations from preset normal range limits. The instrument also determines and records whether the deviations occur during the systolic or diastolic portions of the heart cycle or at the time of the second heart sound. At present a predetermined number of such deviations in a given number of heart cycles indicates that the subject being examined needs further examination by a cardiologist. The PCS is therefore a screening device and not a diagnostic device.

The PCS has been evaluated as a screening device for finding suspicious heart sounds in schoolchildren by several professional groups. Limited evaluation has been made on adults. At present it appears that some modifications in the instrument may be needed to improve its performance on adults.

Information regarding the performance of the PCS in screening children as well as forecasts of the future use of this type of instrument may be obtained directly from the physicians who conducted the studies. These include:

(a) Robert E. Durnin, M.D., Cardiology Division, Childrens Hospital, Los Angeles, Calif.

(b) Donald C. Fyler, M.D., Cardiology Division, Childrens Hospital, Los Angeles, Calif.

(c) Martin E. Levy, M.D., Chief, Congenital Heart Disease Section, Heart Disease Control Branch, U.S. Public Health Service, Washington, D.C.

(d) Robert A. Miller, M.D., director of Pediatric Cardiology, Cook County Hospital, Chicago, Ill.

(e) Jeremiah Stamler, M.D., Board of Health, Chicago, Ill.

(f) Angelo Taranta, M.D., Associate Director, Irvington House Institute, New York, N.Y.

#### 2. ELECTROCARDIOANALYZER (ECA)

The ECA is an instrument which, through the use of a self-contained analog-digital computer, analyzes the electrocardiogram, cycle by cycle, as it is generated and displays the results in terms of deviations of 16 preselected electrocardiograph parameters from preset normals. The instrument, in its present state, utilizes 5 of the 12 standard electrocardiograph leads; deviations from the present normals for each parameter from the specific lead being analyzed are indicated by red lights on the instrument panel. Persons whose ECA

results indicate deviations from the normal should be reexamined by further conventional electrocardiography. Thus, the ECA is a screening device and not a diagnostic device. It could be used as a first-stage screening device to reduce the load on a centralized computer which is used for more detailed analysis of conventional electrocardiograms.

The ECA has been evaluated on adults by several professional groups. Information regarding the results of these evaluations and forecasts regarding the use of this type of instrument may be obtained directly from the physicians who conducted the studies. These include:

- (a) Leonard Scherlis, M.D., head, Department of Cardiology, University of Maryland, Baltimore, Md.
- (b) Jeremiah Stamler, M.D. (given in the previous list as (e)).
- (c) Weldon Walker, M.D., White Memorial Hospital, Los Angeles, Calif.

### 3. METABOLIC MONITOR

The respiratory quotient obtained is the ratio of oxygen inspired to the carbon dioxide expired. The specific activity is the ratio of the radioactive carbon dioxide to the total carbon dioxide expired. The instrument therefore measures oxygen inspired, carbon dioxide expired, and measures the radioactive carbon dioxide expired as a separate quantity. From this one determines the respiratory quotient and specific activity.

### 4. BREATH ANALYZER

The metabolic monitor measures three constituents of the breath. Additional components in the breath have significance at the present time with respect to the health of a patient. Trends in these and other components may have further significance on predicting the onset of disease. Components of the breath are measured by a highly sensitive gas chromatograph. The components of interest at the present time are in the parts-per-million range and include acetone, ethanol, acetaldehyde, butanol, and isopropanol. Additional unknown components are being explored both qualitatively and quantitatively. The output of this instrument is readily automated for use in multiphasic screening programs.

### 5. PAROTID ANALYZER

Parotid secretion obtained from the parotid glands in the mouth have shown component correlation with that of the blood for certain constituents. Analysis of total protein urea, nitrogen, glucose, and amylase are measured in the parotid secretion. These are compared to blood analyses for each individual on a mass screening basis. Lack of correlation between parotid tests and blood tests may have predictive health significance.

If there is any further information you wish, please don't hesitate to call on us.

Sincerely yours,

S. B. SPRACKLEN  
(For Dr. T. B. Weber).

BELTONE ELECTRONICS CORP.,  
*Chicago, August 31, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

MY DEAR SENATOR NEUBERGER: We wish to thank you for your inquiry of August 17 asking whether we have any suggestions regarding any new biomedical equipment which may be of use in screening programs and for methods of using computer technology with such equipment for faster or more accurate reports on screening results.

We are enclosing information on our automatic psychoacoustic data processing station, which we hope will be of interest to your committee. Although the enclosed information describes the computer station in the form of an automatic audiometer, programed and modified to make psychoacoustic evaluations for the determination of hearing pathology, such equipment may also be modified to accept and evaluate many psychophysical quantities such as blood pressure, EKG potentials, and muscle activity.

This type of equipment is extremely versatile and could be useful for large-scale testing purposes, in clinics for diagnostic purposes, or as a research tool in clinical situations requiring more thorough examination.

The Beltone automatic psychoacoustic data process station was developed in response to a need in industry and the Armed Forces for a small flexible data processing device capable of automatically testing and recording hearing loss in accordance with a complex criteria long used in manual testing by the medical and paramedical profession.

The development of this equipment was funded entirely by the Beltone Electronics Corp. in accordance with a long-range plan for research in this area.

The factors that led to the development of the data process station may be best understood by considering the deficiencies of contemporary automatic audiometers in relation to the much needed capabilities incorporated in our apparatus, as explained in the enclosed brochure.

Thus, we have made it technically feasible to standardize, nationally, mass screening test procedures for evaluating hearing loss in a manner that is not variable with respect to operator training and experience, or operator fatigue.

Beltone has also conducted research studies and has created devices in the area of monitoring and recording equipment for cardiac patients requiring intensive care. A significant achievement in this regard has been the development of equipment of exceptionally high reliability with extraordinary immunity to artifacts associated with patient motion and electrode preparation and placement. Here again, as in the case of the psychoacoustic data process station, the effort has been in the direction of reliability and the reduction of artifacts associated with the variable level of training, experience, or fatigue of personnel.

If you would like any additional information or details regarding any of these devices, please let us know.

Sincerely,

CHESTER K. BARNOW.

CONTINENTAL X-RAY CORP.,  
*Chicago, Ill., August 24, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for requesting from us in your letter of August 17 our comments on equipment for the proposed health protection centers.

We have done quite a bit of work on development of specialized equipment for mammography. This equipment, in addition to providing superior films of the breast, particularly lends itself to mass screening programs because it has the inherent capability of producing four to five times as many exposures in a short period of time as conventional X-ray equipment used for mammography. This would be a serious limitation in the use of conventional equipment for mass breast cancer surveys.

The enclosed brochure, printed in 1964, describes the equipment and mammographic technique for use in combination with our conventional X-ray equipment to perform other types of diagnostic work.

More specialized equipment with basically the same concept for use where only mammographic procedures will be performed, and similar in appearance to our model SP-100RH in the enclosed photograph, has also been developed.

Equipment of this latter type has been installed at a Kaiser Foundation institution in San Francisco, and at Emory University Clinic in Atlanta, Ga., where it is presently being used for cancer detection work for the Public Health Service.

We hope this information will be of value to you and we welcome the opportunity to be of further service, if possible.

Very truly yours,

DONALD G. WORDEN,  
*Vice President.*

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CONTROL DATA CORP.,  
*Rockville, Md., August 25, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Senate Office Building,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of August 19, 1966.

Control Data Corp., while not engaged in the manufacture of medical instruments and equipment, has been most active in the biomedical field through computer applications. The enclosed article from a recent issue of Electronic News and the brochure on our 1700 computer illustrate, to a degree, some of our work in this field.

If I can be of any further assistance, please do not hesitate to call on me.

Sincerely,

HUGH P. DONAGHUE,  
*Assistant to the President.*



FISHER SCIENTIFIC CO.,  
Pittsburgh, Pa., August 31, 1966.

Senator MAURINE B. NEUBERGER,  
*Health of the Elderly Subcommittee,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: We have your letter of August 17 with regard to the interesting work which your Subcommittee on the Health of the Elderly is doing in preparation of the hearings to be held next month, and we have read with interest the speech which Senator Harrison Williams made describing one proposal for screening.

We are in the process of completing the engineering of an automated instrument which we have developed in the field of hematology and this instrument will be useful in the health screening of important blood tests. Unfortunately, we are not in a position to divulge any further information at this time for our field testing of finished, final models cannot be made before July 1967. However, this is the type of instrument which will fit into any screening program that is designed in the outline by Senator Williams and this will rather readily adapt itself to direct coupling into a computer.

We regret we can't give you any more information or can't be more specific but we did want you to know that we are doing work in this important area.

Sincerely,

BENJAMIN R. FISHER, *President.*

GENERAL ELECTRIC CO.,  
Schenectady, N.Y., September 13, 1966.

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for informing me of your interest in health evaluation methods. I appreciate the opportunity afforded me to express my opinion.

It is my conviction, following 10 years of experience with our periodic health evaluation program at the General Electric Co. plant in Schenectady, that the recurrent examination of people is worthwhile; that it does result in early detection of disease and that it does provide important opportunities for health counseling. I have enclosed the paper of Dr. Grimaldi because it reports a recent measure of dollar savings, describes our own program in some detail, and reviews the controversy surrounding periodic health examinations. A cost per examination figure would not be meaningful since our periodic examinations are only one part of the industrial medical service.

Our program combines screening tests and examination of the patient by a staff physician. In this sense it differs from pure multiphasic screening with which I have had no direct experience. The Public Health Service Monograph No. 67, 1961, entitled "Principles and Procedures in the Evaluation of Screening for Disease" aptly describes this form of health evaluation.

Through my association with the periodic health examination research group (evolved from a group originally convened by the Public

Health Service), I have had the privilege of meeting Dr. Collen, and learning of his work with automated multiphasic screening. There is certainly considerable advantage to developing methods which can be applied to large populations, in a standardized manner with appropriate quality controls. The major problem in any large scale disease detection program would be the establishment of guidelines for appropriate action by the physician who would receive the test results, and be faced with the necessity of taking some action. Facilities are now lacking for the performance of the diagnostic tests that would be indicated by the positive or borderline cases identified by the multiphasic screening programs.

I believe any program of periodic health evaluation would be well received by the public. The response of our employees, at all levels, has been enthusiastic. While the family physician might also accept this type of service for his patients, their subsequent dispositions would add to his already heavy patient load.

The chronic diseases of later life are not the result of a single causative agent such as bacillus or a toxic chemical, but probably the result of interaction between several causative agents, and an alteration of the defense mechanisms of the individual, thus increasing his susceptibility.

In youth, periodic health examinations should include measurement of fatness by more meaningful, careful methods than height-weight relationships, attention to the degree of fitness by some measure of response to exercise, evaluation of posture, measure of visual, auditory and dental hygiene status, blood pressure, urinalysis for sugar, protein and blood; auscultation of the heart or recording of the sounds by phonocardiogram, measure of mechanics of lung functions by forced expiratory spiogram, hematocrit tests for anemia, particularly in women. Health counseling should be provided for with regard to risk factors and preventive measures considered helpful, such as avoidance of smoking, regular exercise, and effects of alcohol.

In older age groups, and I believe age 40 is a more meaningful level than age 50, periodic health examinations should include tests for visual acuity, tonometry measurement of ocular pressure, electrocardiogram, chest X-ray, hematocrit test for anemia, blood smear, urinalysis for sugar, albumin and blood, spiogram, blood pressure, sigmoidoscopy, and in females papanicolaou smear for cancer of the cervix, plus palpation of breasts. Inspection of skin, palpation of thyroid and prostate are also areas where significant yield of abnormalities is realized with opportunity for successful therapy.

With regard to frequency, I am inclined to favor a 3-year interval.

Judgment as to the relative merits of periodic health examinations, and multiphasic screening, or combination of the two, and selection of specific laboratory procedures are difficult. They will depend on many factors which undoubtedly will be discussed in your hearings. Periodic health screening is an important and necessary tool in early detection and prevention of disease, and in addition contributes to the understanding of normalcy.

I will look forward with interest to the results of your deliberations.

Very truly yours,

ROBERT E. SANDRONI, M.D.,  
*Physician-Preventive Medicine Industrial Clinic.*

GENERAL ELECTRIC CO.,  
 Milwaukee, Wis., August 30, 1966.

HON. MAURINE B. NEUBERGER,  
 Chairman, Subcommittee on Health of the Elderly,  
 U.S. Senate, Washington, D.C.

DEAR SENATOR NEUBERGER: Without question, the health screening concept which your subcommittee is studying will continue to gain recognition as an important step in illness control. In addition, it is also possible that this concept may be the step which curbs our rising medical costs by signaling the necessity for early preventative medical treatment. The General Electric Co. has been aware of this growing need for several years but has yet to identify how we can best contribute to the solution of this problem through the development of equipment. Our present patient care product line comes close to performing some of the tests which may be used in screening examinations, but these products are not directly applicable to this function. Products in this category are:

1. Cardiac monitor—used to monitor coronary patients and other intensive care patients using electrocardiographic detection techniques.

2. Arrhythmia recorder—used to monitor heart rhythm changes which often lead to ventricular fibrillation.

Enclosed are product data sheets which describe these products.

As you know, computer technology is an important link in the health screening system which you are considering. General Electric has recently established a new department called "Medinet," which has the responsibility for providing hospitals and other medical institutions with information handling, processing, and transmission capabilities. Since they may be able to provide significant inputs to your study, I have forwarded a copy of your letter to the Medinet supply manager, Dr. Jordan J. Baruch. For your information, his address is: Medinet, 100 Galen Street, Watertown, Mass.

Because of our long-term interest in the medical business, I would appreciate receiving copies of information generated by your subcommittee. Please advise if we can be of further help to you.

Yours very truly,

H. G. TAUS,  
 Manager, Product Planning, Medical.

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GULTON MEDICAL INSTRUMENTS,  
 Willow Grove, Pa., August 26, 1966.

HON. MAURINE B. NEUBERGER,  
 U.S. Senate,  
 Subcommittee on Health of the Elderly,  
 Washington, D.C.

DEAR SENATOR NEUBERGER: Thank you for your letter of August 19, 1966, describing the current interest in detecting and preventing chronic disease by means of mass screening techniques.

Gulton Medical Instruments Division of Gulton Industries has pioneered in the manufacture of a wide variety of sensors, instruments, and medical systems designed for diagnosis of physiological variables.

Measurements include blood pressure, electrocardiogram, heart rate, phonocardiogram, electroencephalogram, respiration rate, body temperature and electromyogram. Descriptive literature is enclosed for your review.

The personnel of Gulton Medical Instruments have had considerable experience in wireless physiological broadcasting techniques. This is a relatively new concept which enables patients to move about freely without the use of obstructive wires, while body functions are being recorded for evaluation. An automatic blood pressure system has also been developed. The data which is acquired is suitable for use with most computer systems.

The rapid population growth in the United States coupled with newer diagnostic techniques points up the present need for mass automated screening techniques if the present status of general health in the United States is to be maintained and advanced.

Although many "off-the-shelf" products are currently available, industry is ready to develop and supply additional instrumentation which may be required to implement these programs. This has been demonstrated by the rapid advancement of space technology when the program was given impetus by Federal support and encouragement.

We appreciate the opportunity to work with you in this important undertaking and hope that you will call upon us whenever we can be of help.

Very truly yours,

BERNARD SCHWARTZ,  
*Director of Marketing.*

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INTERNATIONAL BUSINESS MACHINES CORP.,  
*Yorktown Heights, N.Y., August 29, 1966.*

Senator M. B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In response to your inquiry of August 19, 1966, regarding the use of computer technology in health screening programs, I am pleased to provide you with the following information on this subject:

(1) The research effort by Dr. Ralph Thiers of Duke University has indicated that a battery of clinical laboratory tests for screening of patients can be of significant value to the physician in treating his patient. The Kaiser Foundation program of Dr. Morris Collen indicates that clinical laboratory tests for screening of healthy persons can be of value in the control of many diseases. Several other hospitals are also adapting similar screening procedures.

(2) The administration of a battery of clinical laboratory tests for screening of patients and nonpatients would not have been practical without the use of automated laboratory instruments for chemistry and hematology tests. With such equipment, it is possible today to perform multiple analysis on a patient's blood for a cost as low as 10 cents for each test.

(3) In spite of the high degree of automation in laboratory instrumentation, highly trained technologists still spend an esti-

mated 30 to 40 percent of their time on routine data processing tasks such as identification of patient and specimen, calibration of the instrument, and the calculation and transcription of results. Computer technology can and is making a valuable contribution here in improving control, improving the utilization of medical technologists, which are in short supply, and providing accurate test results in machine-readable language. The availability of patient and test result information in machine-readable language allows the economical processing and dissemination of this information by computer for medical and public health research.

(4) IBM has recognized this data processing need in the clinical laboratory. The recently announced IBM 1080 data acquisition system was specifically developed to eliminate the data processing bottleneck in clinical and research laboratories of medical institutions and pharmaceutical companies. An important feature of the 1080 system is a solution for the problem of specimen identification, presently a source of error that cannot be tolerated.

(5) For your information, I am enclosing a copy of the manual, "IBM 1080 Data Acquisition System for the Clinical Laboratory." I have also forwarded to you a copy of my paper "Laboratory Data Acquisition Systems for the Clinical Laboratory" which I will give at the forthcoming joint annual meeting of the College of American Pathologists and the American Society of Clinical Pathologists on September 19, 1966, in Washington, D.C. The paper describes the operation and medical significance of a data processing system in the clinical laboratory of Dr. A. E. Rapoport at Youngstown, Ohio.

If I can be of further assistance to your committee, please let me know. In the meantime, accept my congratulations for your leadership in developing this excellent health screening program.

Sincerely yours,

W. J. CONSTANDSE,  
*Manager, Advanced Hospital Systems.*

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INTERNATIONAL BUSINESS MACHINES CORP.,  
*Yorktown Heights, N.Y., September 13, 1966.*

Senator M. B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In regard to your inquiry of August 19, 1966, which has been answered by Mr. W. J. Constandse, I respectfully mention another IBM development effort which has potential value for health screening purposes. This is our clinical decision support (CDS) system which is being developed in collaboration with physicians in several medical schools including Columbia, Cornell, Duke, Georgetown, and Southern California.

The CDS system contains a store of current medical knowledge required for examination and diagnosis of diseases. This knowledge is organized into sequences of logical decisions and, in effect, represents programmed medical knowledge regarding each disease. This is applicable to all diseases and has now been completed, as a first try, for

about 800. Extension to treatment and followup is planned but has been explored less extensively. Initial field tests are to start within a few months.

The system will be designed to request and accept patient data, process each item in terms of its stored medical knowledge, request additional data needed to include or to exclude each disease, generate the medical record, and print the probable diagnosis or, if desired, the diagnosis implicated to date. Patient data include not only the laboratory results referred to by Mr. Constandse in his letter to you dated August 29, but also symptoms, physical findings, and results of special tests of any kind.

This system is more general than one needed for screening alone, but a screening module could be extracted with reasonable ease. I am taking the liberty of enclosing a report entitled "Concept of a Clinical Decision Support System," by Dr. F. J. Moore that discusses this type of system.

I would be glad to furnish any additional information if you feel this would be helpful to the valuable work of your committee.

Sincerely yours,

EVON C. GREANIAS,  
*Manager, Medical Information Systems.*

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IIT RESEARCH INSTITUTE,  
*Chicago, Ill., September 14, 1966.*

SENATOR MAURINE B. NEUBERGER,  
*Chairman, Special Committee on Aging,  
New Senate Office Building, Washington, D.C.*

DEAR SENATOR NEUBERGER: Mr. Libbey, of our Washington office, has called our attention to the subcommittee hearing on "Special Committee on Aging," which will take place during September. The subjects to be discussed by your committee are of extreme interest to the IIT Research Institute.

IIT Research Institute, formerly Armour Research Foundation of Illinois Institute of Technology, is an independent, not-for-profit, contract research organization whose work encompasses nearly all the physical and biological sciences and their related technologies. Since its founding in 1936, IITRI has completed more than 13,000 projects for over 3,500 industrial and Government clients.

Today, with a staff of 1,800 and an annual research volume of over \$25 million, IITRI ranks as one of the world's largest and best known independent research organizations.

IITRI is keenly aware of the need to apply its experience in physical systems to the problems arising in biology and medicine. In recognition of this need, IITRI established its medical engineering center and olfactronics and odor sciences center. These centers permit scientists, engineers, and medical researchers to bring their creative skills to bear on problems of mutual concern.

Since your committee will be concerned with new methods for detection and prevention of chronic illness, we feel that the following activities under development at IITRI should be brought to your attention.

We believe it entirely conceivable that automated or semiautomated large-scale screening of individuals can ultimately be accomplished through detection and analysis of gaseous vapors given off by the human body. Current research activities under the direction of Dr. Andrew Dravnieks, head, olfactronics and odor sciences center at IIT Research Institute, has shown that it is possible to measure, quantitatively, gaseous vapors both odorous and nonodorous exuded by human beings. Furthermore, it has been established that there are significant differences in the odor pattern between different individuals.

The characteristic odor pattern from human beings is presumably related to the general activities and physiology of each individual. Thus, it is conceivable that some illnesses, at least, could be detected through a careful analysis of exuded vapors. This technique would be admirably suited to large-scale automated screening since physical contact with the subject is not required; thus, the development of olfactive instruments to detect characteristic odor patterns associated with certain illnesses can be anticipated.

While the science of olfactronics is in its early stages and present experiments have not been carried far enough to establish the practical application of these techniques, sufficient information is in hand to warrant their serious investigation. A significant body of information must be collected on the odor signatures of individuals and additional advances must be made in the electronic identification of such odors before practical application can be made. Nevertheless, the ultimate possibilities are so attractive and initial data so encouraging that we feel this approach should be seriously considered.

For several years, IITRI has had a continuing research program with Children's Memorial Hospital of Chicago, Ill. This program is concerned with developing automatic techniques for processing vectorcardiograms. One area of research has centered around developing discriminant functions for a variety of specific heart ailments. A second area is concerned with implementing computer techniques to record and process large numbers of patients. Methods of digitizing FM recordings of vectorcardiogram data have been developed and techniques for selecting "good data," isolating single heartbeat cycles, and selecting and measuring specific points in the cycle are being investigated.

For some time IITRI's medical engineering center, together with several medical specialists, have been concerned with the development of internal diagnostic instruments. This family of instruments will allow the examining physician to make rapid and accurate diagnosis of internal areas heretofore virtually inaccessible, without the use of exploratory surgery. One instrument of this family called the proctosigmoidoscope is now being clinically tested by Dr. B. F. Overholt, Gastrotechnology Department, University of Michigan Hospital. Dr. Overholt has been successful in navigating under visual control up to 43 centimeters of the lower bowel tract. Visual examination of this cancer prone area heretofore has not been possible without the aid of a surgeon. With the control (maneuverability) and flexibility of these instruments, visualization of "blind" areas of the stomach, duodenum, upper lung lobes, etc., will be possible.

Cancer and other diseases will be able to be detected in early stages when treatment and cure may be still possible or a patient on examination can be assured he or she is "clean."

We would be very happy to provide you with further information regarding these activities or other activities at IITRI. If desired, we would also be willing to meet with you and/or your committee in Washington. Our Washington office will remain in contact with your committee.

Sincerely yours,

W. E. REYNOLDS,  
*Manager, Biomedical Engineering Center.*  
Dr. J. J. BROPHY,  
*Vice President.*

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LEHIGH VALLEY ELECTRONICS,  
ENGINEERING & MANUFACTURING CO., INC.,  
*Fogelsville, Pa., October 6, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: In response to your recent request for information on our progress in instrumentation related to health screening programs, we can say that several systems applicable to this general purpose have been designed and in use for over a year. A typical system is illustrated in the attached brochure.

Work was carried out by, among others, Robert E. Correll, Ph.D., senior psychologist and director of the neurophysiology laboratory at Hartford Hospital, Hartford, Conn.

The attached letter from Dr. Correll explains the project in considerable detail, and probably represents our best illustration of the activity and instrumentation in this field.

If we can be of further assistance in your investigation of this area, please do not hesitate to call on us.

Very truly yours,

C. T. NEFF,  
*Vice President and General Manager.*

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HARTFORD HOSPITAL,  
*Hartford, Conn., September 16, 1966.*

MR. JOSEPH D. FESKANIN,  
*Chief Engineer, Lehigh Valley Electronics,*  
*Fogelsville, Pa.*

DEAR JOE: In response to our discussion of September 14, 1966, I will describe, from our perspective, the human factors apparatus which, together, we have developed over the past 3 years.

We originally conceived the need for a testing process which would—

(a) facilitate a greater introduction into clinical testing of the controls which are generally exercised in the experimental laboratory and which would allow investigation of the clinical significance of demonstrated relationships in the fields of perception and verbal learning and memory;

(b) allow repetitive testing with minimal practice effects;

(c) minimize the demands on the patient for general comprehension of directions and procedures;



- (d) require a minimal amount of physical activity and/or verbal facility;
- (e) allow adequate testing of the wheelchair or nonambulatory patient;
- (f) increase the reliability and the precision of measurement of intellectual functions;
- (g) minimize the subjective factors of examination introduced by varying examiners and examiner-patient interactions; and
- (h) allow the examination to be carried out by a relatively untrained technician.

In addition to these requirements, we were interested in an apparatus which would maintain flexibility in programing for research purposes. To these ends the apparatus which we now refer as the human factors apparatus was devised, with the further provision that from both electrical and physical standpoints its use would be compatible with the simultaneous recording of EEG's. While amenable to a variety of testing designs, the following tests served as the frame of reference in devising the apparatus, and reflects our particular interest in brain function and in the psychophysiology of aging.

1. Tapping rate—allow measurement of number of taps within a fixed time interval, taps to an arbitrarily determined incorrect key, and variability in response over time.

2. Alternation tapping—where in taps are made to right and left keys alternately with counts obtained of number of responses per unit time, number of incorrect taps, and number of perseverative errors.

3. Reaction time—using either visual or auditory stimuli with measurement of reaction time to the nearest millisecond with the auditory stimulus set at a fixed decibel above threshold.

4. Differential reaction time using both auditory and visual stimuli in random sequence with key choice dependent upon stimulus modality and count obtained of incorrect choices as well as reaction time.

5. Oddity resolutions—stimuli presented on closed circuit television with responses obtained in terms of number of correct and incorrect responses and reaction time for the response.

6. Concept formation—requires the subject to form a concept through responding to images projected on a television screen with trials continued until a predetermined level of accuracy has been achieved. Counts are automatically accumulated of trials to criterion.

7. Paired associate learning—projected entirely as a visual motor desk in a design requiring sequential multiple choice responding with counts obtained trials to criterion.

8. Perceptual monitoring—requiring the subject to vary his response on a continuous performance test in relation to a randomly projected stimulus with a measure taken of reaction time to the stimulus.

9. Reversal learning—requiring the subject to reverse a perceptual motor response pattern acquired under testing conditions to a fixed performance level.

While our ability to utilize this apparatus to its full extent has been limited by difficulties in obtaining the necessary personnel and funding, we have obtained some experience in its use with both patient and

nonpatient groups. We are impressed by the ease with which a reasonably bright but inexperienced technician can be trained to conduct an examination, by the accuracy and reproducibility of the data obtained, by the ease with which patients accept the examination situation and by the flexibility of the apparatus.

Yours truly,

ROBERT E. CORRELL, Ph. D.,  
*Senior Psychologist and Director,  
Neurophysiology Laboratory.*

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MAICO ELECTRONICS INC.,  
*Minneapolis, Minn., September 6, 1966.*

SENATOR MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: You wrote to us recently as chairman of the Subcommittee on Health of the Elderly asking for our opinions on medical equipment that could be used in the work being done under the auspices of your committee.

You ask if there is any new equipment, operational or experimental, which could be of use in screening programs.

In recent years automatic audiometers have appeared on the market in an attempt to provide a rapid method of hearing testing. Unfortunately, it takes a considerable amount of time to train the person taking the test to understand and to manipulate the controls in such a manner that accurate testing can be accomplished. In those areas where young people, or people who learn easily, are checked periodically (Air Force), this type of testing can save a great deal of time because once the test procedure is learned, it is easier to repeat the test.

The situation in screening, however, is different. Group screening tests are being discredited in some areas by professional people in the industry because many hearing problems may have their roots in areas of psychological significance. It is almost imperative that individual observations of the subject be made during the screening tests. A test, although we attempt to make it objective, is, in effect, many times subjective and does not allow for true scientific analysis. Objective tests, such as the checking of blood or urine where no psychological implications are involved, should be more readily relegated to medical machinery processes. Hearing tests, if they are to be meaningful, I don't believe lend themselves to this type of processing.

You ask whether or not the method of using computer technology with the new equipment available could result in faster or more accurate reports.

Since we see this as a simple handling of numbers or selection by formula and not as an instrument to be used for individual analysis, we see the computer being of some help. On an individual test basis, however, a computer would be of little value because of the possibility of relatively complex analyses that are made of the audiometer test results—results that do not yet allow themselves to fall into formula-type examination.

You ask whether or not we could make any forecasts as to the use of special equipment in the future.

In our particular field of hearing analysis and hearing aids we will first have to resolve our problems to ones of a purely objective and scientific status. We are a long, long way from this point according to the medical and audiological profession. In fact, it is the considered opinion of some people that hearing problems may never resolve themselves to such simple, straightforward scientific solutions.

If I had any suggestions to make toward the work that your committee was doing, it would be that possibly some of the findings you already have before you, and certainly those that will be produced as a result of your studies, be used to give counsel to the people guiding the prevention of disease in the youth of the country. Hearing problems that appear in the aged many times could be avoided if assistance had been provided during the early years of a person's life.

If we can be of any further help to you, please do not hesitate to let us know.

Sincerely yours,

JOHN J. KOJIS, *President.*

MAGNAFLUX CORP.,  
Chicago, Ill., August 26, 1966.

HON. MAURINE B. NEUBERGER,  
*U.S. Senate, Special Committee on Aging, Subcommittee on Health of the Elderly, Washington, D.C.*

DEAR SENATOR NEUBERGER: Your letter of August 17 and the attached copy of Senator Williams' floor speech were read with great interest. You ask for thoughts or suggestions on new equipment—operational or experimental—which may be of use in screening programs.

Since 1952 the application of pulsed ultrasound for medical diagnosis has excited the interest of an increasing segment of the medical profession. Some of this development has been limited to the research laboratory, but clinical use is growing rapidly. Low-intensity ultrasound in the frequency range of 1 to 10 MHz applied to the body surface is reflected or bounced back to the transducer-receiver and provides information about volume structure or condition.

When an ultrasound transducer is applied to the side of the head, the returned signal can give information about the position of the midline structure of the brain such as is obtained from angio-encephalography or ventriculography; the shifting of the midline structure is usually evidence of a displacing structure such as a tumor or a subdural hematoma. The effectiveness of this type of screening has been clinically demonstrated.

The clinical value of ultrasound screening for breast cancer is now being investigated by Dr. Robert Egan, Emory University Clinic, Atlanta, Ga., as a part of the cancer control program of USPH. Magnaflux Corp. designed and furnished the equipment being used.

There is some experimental evidence that liver pathology may more readily be found by ultrasonic scanning than by the rather inadequate presently used methods. This too is in the investigative stage.

Presbyterian-St. Lukes Hospital in Chicago is using another of our ultrasonic designs for the detection of pericardial effusion. Other diagnoses by ultrasound are also being investigated there.

Arterial occlusions may be detected by an ultrasound doppler effect. Equipment designed for this purpose is now being clinically evaluated.

It is our belief that ultrasound diagnostic techniques will prove immensely valuable in the foreseeable future because they afford a body volume examination which is harmless, painless and quick, free from the radiation problems that are associated with the only other body volume diagnostic procedure—radiology.

We will be happy to provide any additional information we can, should you desire it.

Very truly yours,

D. T. O'CONNOR,  
*Vice President, Engineering and Development.*

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MED-SCIENCE ELECTRONICS,  
*St. Louis, Mo., September 16, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

MY DEAR SENATOR: Please pardon the delay in responding to your inquiry of August 19th which referred to your search for equipment and instrumentation for mass screening purposes.

The equipment we manufacture is designed for mass screening for pulmonary function deficiencies and is, we feel, compatible to the program you have under study. Almost everyone over the age of 40 has, to some degree, a lung disfunction, whether it be the result of a disease such as TB or emphysema, or due to air pollution or to a genetic trait. The purpose of our equipment is to measure quickly the degree of capability of the lungs and then from tables, to determine whether the capability lies within the normal ranges for the age, sex, height and weight of the patient. With our equipment a technician can quickly screen and choose those patients who require the doctor's attention for further study and treatment.

With the instruments described in the enclosed "Automated Pulmonary Function Testing" brochure, up to 30 patients can be tested in an hour with complete accuracy since all of the test values are automatically printed on tape with patient identification also printed opposite each value. This setup requires only a technician in attendance to change the disposable mouthpiece and instruct the patient in the single forced expiration. There is no cross-contamination as the patient inhales room air and expires into the spirometer. The output signals on the pulmo-digitizer on the installation as shown, operate the decoder mechanism on the printer and at the proper time depresses the "print" mechanism. The pulmo-digitizer without the printer could be provided with an output cable which could be adapted for use with a coded or magnetic tape printer for use with computers.

It is our opinion that automated pulmonary function testing utilizing printed digital readout techniques is the ultimate answer for mass screening programs. The interest already shown by several of the Federal agencies in this approach has been most gratifying and would seem to indicate a trend.

Thank you for writing to us. We are pleased that you are also interested in this problem. If we can be of further service to you please let us know.

Yours very truly,

ROBERT H. STEGEMAN,  
*President.*

To: Donald A. Linden.

From: M. E. Fitzwater.

Subject: Information for response to Senator Neuberger's letter request dated August 17, 1966.

The Philco Corp., Western Development Laboratories, bioastronautics research and development efforts have been directed toward assuring the well-being of astronauts in space. Emphasis has been placed upon physiological and psychological screening information acquired in such a manner as to not detract from ongoing activities. Direct application of techniques and methods are to long-term orbital and deep-space manned missions.

Results of analyses show direct correspondence between the on-board spacecraft screening system and the potential ground health screening system. As a consequence, the entire area of preventive screening, physicians office, mobile and fixed clinics, hospitals, and local and regional instrumentation and data processing requirements are under study.

Response to questions posed by Senator Neuberger are:

1. New equipment: The Philco automatic medical monitor (brochure describing prototype enclosed). The system is adaptable to operating tables, beds, dental chairs, home monitoring via telephone, and so forth. With an accessory unit, it can provide a full set of ECG patient waveforms.

Patient data has been successfully converted to digital format for computer analysis.

In addition to application cited in the accompanying proposals, the system is being installed in a Mercury automobile for the Ford's driver safety research program. Further, the unattached sensor instrumentation is being used to provide interpersonal psychophysiological information feedback in order to increase interpersonal communication and reduce stress.

Independent research is being conducted to automatically mass screen several leads of electrocardiographic waveform for possible cardiac and pulmonary defects.

2. Methods of using computer technology: The problem of health information automation is being approached from the patient point of view. This approach has lead to the position that rapid access of an individual's updated records should be available to qualified sources upon authorization where and when it is of benefit to the patient.

Current efforts are in terms of (1) the overall information systems problem and (2) heuristic computer equipment and programming support of medical diagnosis and treatment. The latter enables the data processor to interrelate patient data and the judgment of medical experts in computer self-learning.

3. Forecasts: Electronic data processing instrumentation such as above will be used to assist the physician in identifying normal and pathological conditions.

# **Philco Automatic Medical Monitor**

**A SCREENING SYSTEM FOR CARDIAC & CARDIAC-RELATED INVESTIGATIONS**

519

## PHILCO AUTOMATIC MEDICAL MONITOR

### SUMMARY

The Philco Automatic Medical Monitor is a physiological sensing system that obtains cardiac and cardiac-related data without applying electrodes to any area of the body. These data consist of an electrocardiogram, plus a recording of both the audible and inaudible sounds of the heart — all within 20 seconds. Compared with the time conventionally required, this method of screening large numbers of people in a short space of time offers advantages that appear unsurpassed.

We would like to point out, however, that as remarkable a tool as the Monitor appears to be, it is only that — a tool; it does not, and cannot, make a diagnosis. Rather, the Monitor merely places at the physician's disposal a large amount of physiological data in an extremely short amount of time. The physician himself still interprets the data that result from the screening and makes his own diagnosis.

In this context, we use the word "screening" to denote one thing only: the use of medical sensors to permit a single decision — namely, that further examination by the physician is desirable.

### DESCRIPTION

The Monitor consists of two EKG sensors, one PKG sensor, an amplifier electronics package, and a recorder. The EKG sensors pick up the signals used to make the cardiogram, while the PKG sensor records the heart sounds. As the amplifier package processes the information gathered by the sensors, the recorder displays the information simultaneously on a conventional strip-chart.

The location of the sensors is completely non-critical. To demonstrate this, we mounted them in a swivel chair commonly found in business offices. While this particular design is the one that this brochure mainly deals with, we wish to point out that the system's versatility allows the sensors to be inserted just as easily (if not *more* easily) in a hospital bed, an examining table, or an operating room.

### CHAIR MODEL

In the chair version of the Monitor, the armrests house the EKG sensor, while the back of the chair contains the PKG sensor. The person to be examined, fully clothed and free of wires, electrodes, and paste applications, sits comfortably in the chair, with his palms resting naturally on the armrests and his back touching the rear of the chair.

While he is seated in this position, minute electrical heart impulses are picked up by the EKG sensor and are transmitted to the processing unit, which then amplifies the impulses and sends them to the recorder, where they are displayed on the strip-chart. While the EKG sensor is making the cardiogram, the PKG sensor is simultaneously monitoring the heart sounds and displaying these along with the EKG. Twenty seconds later, the screening is completed, and the information is ready to be evaluated by the physician.

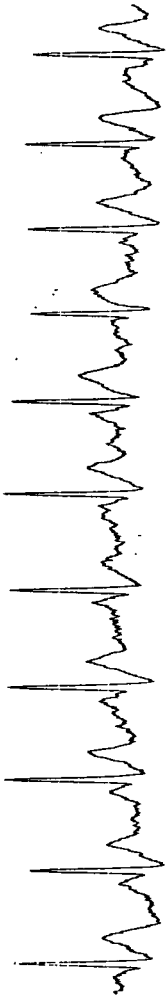
We believe that this version of the Monitor, consisting of the chair, electronics package, and recorder, has perhaps the most widespread potential for usage in the medical community at the present time. However, if desired, we can supply other versions of the system that perform the same functions — the only differences being the manner in which the data are gathered and the way in which they are displayed.

For instance, we can change the type of chair in which the sensors are mounted — to a dentist's chair, for example, as we have recently done. Or, we can eliminate the chair altogether and allow the person being screened to walk about freely in the room. Similarly, we can eliminate (or supplement) the recorder by using lighted displays, audible alarms, etc. In fact, so versatile is the system that we believe we can adapt its design to fit any number of specialized uses that the medical community may need and of which we are presently unaware.

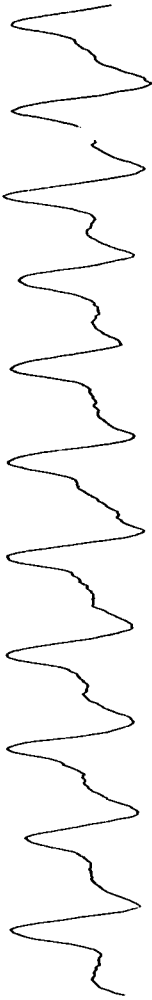




Chair Model



EKG



Pulse



Respiration



PKG

Typical Results

### RESEARCH MODEL

At the present, the greatest interest in the Monitor appears to center in its ability to enable the physician to screen people quickly for possible cardiac conditions. However, the Monitor can also be adapted to provide additional physiological data for research. To illustrate, by making a slight modification in the electronics package of the chair model, we can use the same armrest sensors to obtain respiration waveform and rate, pulse waveform and rate, and the degree of emotional reaction to psychological stress. Thus, on one convenient strip chart, we can display simultaneously such readings as pulse, respiration, and emotional reaction—as well as the EKG and PKG data already described.

From these five measurements we can determine the heart rate. Further, it appears that enough information is obtainable from these sources to derive blood pressure by analyzing the interrelationships of these readings, rather than by obtaining the blood pressure directly through the use of a pressurized cuff. It may also be possible to derive still further data, such as pulse velocity, blood flow velocity, cardiac output, and inspiration/expiration ratio.

All of this data can be collected while the physician conducts nominally unrelated examinations. For example, while he is determining the overt body response to anesthetics or pharmaceuticals, the Monitor is providing specific, objective correlations between these agents and their internal manifestations on heart rate, pulse, respiration, etc.

## DEVELOPMENT OF THE MONITOR IN COMING YEARS

Looking into the future, we can envision a hospital system that continuously monitors the essential body functions of all patients. Any significant changes in the patient's condition would be immediately displayed in a central "display room," thereby providing a degree of continuous monitoring that is presently unattainable.

### CAPABILITIES

1. EKG/Impedance Sensor
  - a. Electrocardiogram
  - b. Body tonicity
  - c. Respiration
  - d. Pulse waveform
  - e. Emotional response (galvanic skin response)
2. PKG Sensor
  - a. Audible heart sounds in the region of 30-500 cps
  - b. Inaudible vibrocardio heart thrusts in the region of <0.5-30 cps

### CORRESPONDENCE AND INQUIRIES

Please address any requests for additional information on the Philco Automatic Medical Monitor to:

Philco WDL Division  
3875 Fabian Way  
Palo Alto, California  
Attn: Biomedical Department

PRINCETON APPLIED RESEARCH CORP.,  
*Princeton, N.J., August 30, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in response to your letter of August 19 requesting information on automated or semiautomated medical equipment of our manufacture which may be useful in health screening programs. The establishment of health protection centers, as proposed in Senator Harrison Williams' recent floor speech, would undoubtedly be a major contribution in providing medical care and health services to the general public. We wholeheartedly agree with the concept and objectives of this program.

Our company is not directly involved in the development of medical instrumentation. We are primarily a manufacturer of precision electronic instruments designed for applications in the fields of physical, chemical, and biological research. Recently, we have become aware of the application of some of our instruments to specific medical problems; and our research and development activities have been broadened such that we now have in the early development stages instruments which will have some application as diagnostic tools for the analysis of certain specific medical problems.

We currently have an instrument in production which is being evaluated for use as an audiometer for hearing tests in nonresponsive children. Instruments of this type, our model TDH-9 Waveform Eductor (specifications for which are enclosed) have also previously been used in the investigation of neurological disorders and electroencephalographic signal analysis. In addition, we have under development an instrument which employs correlation techniques to recover very weak signal information buried in noise. For example, Barlow and others (see W.A. Rosenblith, editor, *Processing Neuroelectric Data*, MIT Press, Cambridge, Mass., 1962) have demonstrated that significant changes occur in the auto- and cross-correlation functions obtained from electroencephalographic signals of patients with brain tumors. Also, use has been made of cross-correlation to localize that area of the brain that is responsible for uncontrollable muscular twitching in some diseases. Signals from strain gages attached to twitching members cross-correlated with EEG signals from various parts of the brain permit the identification of the offending area.

This general class of signal processing and correlating instruments falls within our current activities and is primarily designed for use in physical research applications but also is useful in the specific fields of medical analysis described above. All instruments are directly compatible with peripheral equipment for on-line computer use to facilitate the processing of large quantities of data. Our activities specifically directed to the development of instruments for the medical field are, unfortunately, in the very early stages of investigation; and we regret that we are not in a position to supply a more detailed response to your inquiry.

We appreciate your referring this question to us and hope that the enclosed material will be helpful to your study staff. Please feel free to contact us again if you require additional information.

Very truly yours,

O. C. CHAYKOWSKY,  
*Vice President, Marketing and Sales.*

SCIENTIFIC PRODUCTS,  
DIVISION OF AMERICAN HOSPITAL SUPPLY CORP.,  
*Evanston, Ill., September 6, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Special Committee on Aging, Washington, D.C.*

DEAR SENATOR NEUBERGER: This letter is in response to your August 17, 1966, inquiry regarding medical equipment for screening and accurate diagnosis on the timesaving basis.

(a) There are several pieces of equipment which should be given consideration. You are no doubt familiar with the Technicon Auto-Analyzer equipment, both the single channel and 12-channel machines. Just recently, Hycel, Inc., of Houston, Tex., has announced the availability of their Mark X Automated Chemistry device effective sometime the first quarter of 1967. This Mark X will handle 10 routine tests and will give you an answer once every 90 seconds once it's in operation. This Mark X has the added advantage of being able to have a stat test inserted at any time rather than having to wait until the end of the run. This device is available either on outright purchase at \$45,000 per piece of equipment, or on a lease basis at so much per test or so much per month, whichever would best fit into the individual laboratory's program. We would be happy to discuss this with you further because Scientific Products is a distributor of this equipment. The Coulter Electronics Co., will also have an automated system available to handle red and white blood counts, hemoglobin and blood volume sometime early in 1967. It's contemplated that this device will sell somewhere in the neighborhood of \$15,000 to \$20,000 but that has not been finalized. There is at least one other piece of automated equipment for doing blood chemistries which should be available sometime in 1967 but I'm not at liberty to divulge that information right at this time.

(b) Methods of using computer technology for faster and more accurate screening reports have been discussed at some length in the past. One of our pathology consultants to Scientific Products, Arthur E. Rappoport, M.D., director of laboratories, Youngstown Hospital Association, Youngstown, Ohio, is chairman of the Committee on Laboratory Management and Planning of the College of American Pathologists, of which he is also a governor. Dr. Rappoport is also a consultant to IBM on laboratory data acquisition systems and we consider him foremost in this field in the country. He has assisted the IBM company in creating the recently announced IBM 1080 data acquisition system for clinical laboratories which couples automated and manual laboratory test instruments to computers. This system is the most advanced computer application in existence for handling the enormous flow of information produced in the laboratory. I'm sure that if you wish additional information on this matter, Dr. Rappoport would be glad to cooperate with your committee.

(c) So far as forecasts for the future are concerned, we're convinced that automation is the salvation to laboratory procedures because of the ever-increasing shortage of adequately trained and competent laboratory personnel to do these tests on a routine basis.

There are a good many of the more exotic tests that probably will never be automated and these technically competent people are needed to run those particular test procedures. Therefore, automation is a must in our estimation.

I would be remiss if I didn't also call to your attention the fact that a good many disposable items are also helping solve this shortage of personnel and improve the automation and speed of testing. These disposable items are made of plastics in some cases and in other instances they are paper disposable units and in some cases there are even metal disposables such as finger lancets. These disposables not only save time but they also improve the quality of patient care by eliminating cross infection in a good many instances. If we can be of any further assistance, please let us know. Our company is the largest distributor of clinical laboratory supplies and equipment in the United States and we'd be only too glad to help in any way possible.

Sincerely,

C. G. SCHMIDT,  
*President.*

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SMITH KLINE INSTRUMENT Co.,  
*Philadelphia, Pa., September 19, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Subcommittee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: We were pleased to learn of your subcommittee's interest in national health screening programs. I am sure that your hearings in September will contribute to a better understanding of the opportunities and advances in early detection, diagnosis, and prevention of disease, especially as it affects our older citizens. Productive and decisive screening techniques, along with reliable supporting medical instrumentation, become urgent as the ratio of patients to physicians, nurses, and technicians becomes disproportionate.

Screening is, of course, representative of only one of the three important phases of patient care; that is, information gathering (screening and testing by the medical team), information processing (diagnosis by the physician), and information feedback to the patient (treatment). As such screening must come first and, therefore, assumes even greater importance. Some examples of new medical instrumentation systems will help illustrate this.

Since you are already familiar with the Kaiser Foundation multiphasic program pioneered by Dr. Morris Collen, I will only mention it here as an outstanding example of progress in the theory and practice of health screening. We have been privileged to work with Dr. Collen on the idea and consider his work most encouraging. This program uses more or less standard instrumentation with very advanced information recording, processing, and retrieval systems.

An example of completely new instrumentation with which we have been involved is diagnostic ultrasound, a technique for screening many parts of the body for abnormalities. Also important are improvements on older techniques such as new spirometers to make detection of emphysema easier and more efficient. Disposable equipment (that is,

sigmoidoscopes) have also added a new dimension to medical screening.

In other areas, a major contribution will be made to mass screening programs with the use of automated laboratory equipment for blood chemistry determinations.

Computer technology has made possible the streamlining of all screening programs. With our hospitals and doctors' offices being buried even deeper under loads of written records, only the computer can assemble, process, and make available the necessary data at a useful rate. Community computer systems for health screening are already proving their worth in several areas.

Screening for health problems, however, is valuable only when the population can be motivated to participate. Just as important as the screening equipment per se will be the program to alert the potential patients to make use of the facilities.

I hope these comments will be helpful, and if members of my professional staff can assist you or your staff members, please don't hesitate to call on us.

Sincerely yours,

DAVID W. CLARK, *President.*

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SONOTONE CORP.,  
*Elmsford, N.Y., September 2, 1966.*

SENATOR MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for inviting our reply to the questions concerning hearing test equipment which you outlined in your letter of August 17, 1966.

We are very much encouraged by the increasing emphasis on preventive medicine through early diagnosis plus prompt remedial action. Particularly is this important in connection with hearing deficiency, where procrastination is almost the rule rather than the exception and where people instinctively try to hide or cover up a loss of hearing rather than to acknowledge it.

Universally administered audiometric screening tests would separate into two groups, those whose hearing was adequate from those who needed more thorough investigation and analysis. Such tests should routinely be part of the physical examination and the screening audiometer equipment could remain relatively simple and reasonable in cost as at present. If more specific programing of the screening results is desired, this could be done. It would require additional research and development work, which we could handle.

Those that have a hearing loss greater than the passing level of the screening test should be studied further to provide the information required for adequate medical diagnosis. In addition to physical examination of the ears, the hearing test should include pure tone air conduction and bone conduction checks, with masking as required, speech tests and other data which could be transferred from a standardized audiogram to punch cards for computer storage and reference systems.

Specifically in response to your questions:

(a) Whether we have any new equipment, operational or experimental which may be of use in screening programs.



The answer to this is yes. We have audiometer designs that can be applied for this purpose. In addition we have acquired experience in building screening and medical audiometers over the years, sufficient to enable us to handle the development and production of special screening units should new specifications result from your committee hearings.

(b) Methods of using computer technology with such equipment for faster and more accurate reports on screening results.

One approach that occurs to us is combine the screening test with the interview of the patient. This is a pass-fail situation. Assuming that the early discussion involving getting the patient's name, age, etc. takes place in a reasonably quiet room, he could be exposed to pulsed test tones at various frequencies which would issue from a sound source placed on the interview desk. The patient would be asked to report the number of pulses he heard, closing one ear then the other. The record card would be marked accordingly. If the patient failed the screening test, the interviewer would immediately schedule him for a complete audiometric examination.

(c) Forecast as to the use of screening equipment in future years.

This is difficult to estimate for it is tied in with the number of health centers contemplated and their size. But we would assume that each center would be provided with six to eight screening units.

We feel that the coordinating efforts of your special committee will be most important and valuable in helping to establish equipment standards and general procedures in the health screening areas. This in turn will assist manufacturers in developing and producing uniform basic equipment that will be needed.

Sonotone would appreciate the opportunity of working with coordinating groups or boards that may be set up to work out equipment matters.

I hope these comments may be useful to your committee and thank you for the privilege of offering them.

Very truly yours,

EVERETT P. WEBER,  
*Manager, Hearing Aid Division.*

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TECHNICON INSTRUMENTS CORP.,  
OFFICE OF THE CHAIRMAN OF THE BOARD,  
*New York, August 22, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

MY DEAR SENATOR: In the absence of Mr. Edwin C. Whitehead, I am writing in reply to your letter of August 19.

The subject of health screening is, of course, one in which we are vitally interested, as you will see by the enclosed brochures describing our Autotechnicon Ultra, SMA-4 and SMA-12. These instruments have revolutionized the clinical and pathological laboratory. More than 200 are currently in use, not only in this country, but throughout the world.

A battery of four SMA-12's was recently demonstrated at the AMA convention in Chicago, where blood from approximately 2,000 pathologists was examined quickly and easily.

You might also be interested in the results of a study recently conducted here at Technicon where our employee group was tested on the survey model SMA-12. Out of 220 blood sera collected on what can be considered a normal and well population, we obtained 33 abnormal values on 29 individuals.

We hope these brochures will be of interest to you and to the members of your committee. If additional copies are required we will, of course, be pleased to furnish them.

Sincerely yours,

EDWIN C. WEISKOPF, *Chairman.*

TECHNICON INSTRUMENTS CORP.,  
New York., August 29, 1966.

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

MY DEAR SENATOR: We are pleased indeed to send you cost data that we have worked out here to demonstrate the savings made possible by use of the SMA-12.

The cost is, of course, heavily influenced by the number of samples run per day, as you will see by the following table:

	Samples per day		
	100	50	25
Amortization of equipment (\$20 per day) .....	\$0.20	\$0.40	\$0.80
Reagents and supplies (\$13 per hour) .....	.91	<sup>1</sup> 1.30	<sup>2</sup> 1.56
Labor (\$40 per day technologist) .....	<sup>3</sup> .60	.80	<sup>4</sup> .80
Cost per sample .....	1.71	2.50	3.16

<sup>1</sup> 5 hours.  
<sup>2</sup> 3 hours.  
<sup>3</sup> 1½ technologists.  
<sup>4</sup> 1 technologist ¼ time.

A review of laboratory charges for tests performed manually indicates that the battery of 12 tests performed by the SMA-12 would normally cost a patient in the area of \$65 to \$75.

Of equal importance, we feel, is the elimination of a number of steps such as sorting and separation of samples, calculation of results, transcription, etc., which not only reduces labor costs but cuts down the possibilities for error enormously.

Your interest is certainly appreciated, and we urge you to call on us for any further assistance we can offer in your investigation prior to the hearings.

Sincerely yours,

EDWIN C. WEISKOPF, *Chairman.*

TRACOR, INC.,

*Austin, Tex., September 20, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Washington, D.C.*

MY DEAR SENATOR NEUBERGER: I appreciate the opportunity of answering your letter of August 17. I apologize for my delay; however, my travel schedule prevented an earlier reply.

Concerning the question of new equipment, either operational or experimental, I would like to say that I feel that there has been considerable progress in the field of new equipment in the past decade, particularly that which can be automated. My personal activities have been restricted to developing automatic instruments for screening hearing and vision.

I know of work being done at the Kaiser Foundation Hospital at Oakland, Calif., and I sincerely hope that you have asked these people to reply to your letter since I feel that their contributions are highly significant. They probably have had more experience in automating medical examinations than any other group in the country.

Our automatic recording audiometric equipment has been used by the military since 1955 and is now accepted as the standard equipment throughout all of the departments of the military. We hope to introduce within the next few months a similar machine for measuring visual acuity. Such equipment permits the testing of large numbers of people in a very accurate manner without the need of highly trained persons to operate the equipment. I feel this trend in instrumentation must continue, and it would be most helpful to manufacturers if they could have the support and encouragement of groups such as yours.

Having been in this field of automation of certain medical equipments for 12 years, I would say that there are a number of obstacles which very definitely impede the development and use of automated equipment.

The first, and possibly the foremost, is the reluctance of physicians to accept new techniques even though they do not directly affect the health and well-being of the patient. I completely understand their need for conservatism in the use of new drugs or new methods of treatment, but I am at a loss to understand their reluctance to accept automated ways of doing things which they now must do manually with high-priced technicians.

The second factor which I feel affects the development of new instrumentation is the rulings of Congress which prohibit certain agencies such as the National Institutes of Health and the National Science Foundation from entering into research and development contracts with profitmaking organizations (industry). In almost every other scientific area industry has made notable advances to science and its applications. This lack of support of industry by the Federal agencies most directly involved with medical instrumentation is, in my opinion, a severe handicap to the development of medical instrumentation. It is especially precarious for a commercial concern to develop a medical instrument using its own research funds since the acceptance of new instruments by the medical profession may be nebulous and in most cases is certainly extended over a long period of time. As a result of this, the money of private companies is nor-

mally diverted into product areas where the cost of development can be returned to the company in a reasonable time by sales of a product. I feel your committee is in a very strong position to help remedy this situation. In general, private companies are as careful about spending Federal funds as are universities, and Federal agencies will normally receive as much for dollars spent with private industry as they will for dollars spent with universities and "not for profit" foundations. I certainly support the idea of Federal grants to universities since I served as a professor of physics for 17 years. I ask only that profit-making organizations be given Federal support and encouragement as well as an opportunity of sharing some of these funds in an effort to develop better medical instruments.

Sincerely yours,

WAYNE RUDMOSE, *Senior Vice President.*

ULE,

21 SPENCER STREET, STONEHAM, MASS.,

*August 29, 1966.*

Senator MAURINE B. NEUBERGER,  
*U.S. Senate, Special Committee on Aging,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: Your letter of August 19 in reference to the hearings to be held in September on health screening programs has caused much excitement within our company.

For sometime we have been getting more deeply involved in research medicine in a number of aspects having to do with photo-optical instrumentation. As we progressed further into the effort it became obvious that there was and is a crying need for this type of instrumentation. In this case we are not referring to medical equipment as such but the recording tools necessary to many research and diagnostic efforts. Medicine is constantly engaged in diagnosis, whether it be on a research basis or direct patient evaluation.

The automated diagnostic devices of today were the research devices of yesterday. As our great progress continues in every facet of the effort there are constant findings of import. In many cases it is a matter of updating the techniques via instrumentation.

In this phase ULE has had the good fortune to work closely with a number of doctors concerned with the visualization of the fundus (inside) of the eye. It has been generally accepted that the information gained has great meaning in detecting the presence and condition of a wide variety of chronic diseases. Diabetes, leukemia, hypertension, detached retina, and microaneurysms are being detected via photographic means.

ULE has progressed, with the aid of these doctors, to a point where we have an operating system capable of cine fundus photo recording well beyond any other recent system. This you will find attested to by the letters we have attached. They are self-explanatory (Camtech was our distributor at one time). Even Zeiss, the manufacturer of the Zeiss Fundus Camera, states that our ULE CineFlash in conjunction with their unit has produced the best results ever seen.

The importance of this operational equipment at this very moment is immense. However, additional research is needed in order to fur-

ther simplify and increase its usefulness in recording the information. Information that is an important part of early detection in disease preventative planning programs. By giving the clinic a recording means that can fulfill this requirement you then place in the hands of the doctor histological information that can be critically evaluated in relatively short time.

An examination of these films will readily indicate certain types of abnormalities which then can be related to other findings, point out need for further examination and to the need for the all important preventative medical attention.

At the present time Fundus photo-recording is being done, for the most part, in limited areas where research is most important. As a straight clinical effort a certain amount of work is done but limited due to the present nature of the procedures. Several aspects have been worked on at ULE in the effort to increase information content and simplicity of operation.

At the present time our ULE CineFlash can record, via the Zeiss Fundus camera, over 300 frames of information in the all important fluorescein dye examinations. This is being done without injury or discomfort to the eye. The increased information gained in this manner has led to the statements in the attached letters.

To further enhance the possibilities inherent in this type of recording we have been experimenting with a means for a straight clinical procedure that could be handled by any technician. Utilizing any of the rapid process photographic systems from Polaroid for a 10-second single shot to others which would give a multiple amount of frames of reference in just minutes; then this entire field of information can be dramatically expanded.

In reference to possible computer technology there is some thought being given to establishing historical information on size of blood vessels in relation to age and health conditions. This work is under investigation by a Dr. Schwartz of Cleveland. He indicated, on a visit at our plant, that ours was the first system he had seen that could enable him to proceed with the research intended. We gathered that information of this nature could be computerized and provide some guidelines of consequence.

The question of speed of dye flow as shown by the films could be analyzed for computer input and thereby possibly establish other plateaus of diagnostic importance.

In other words, we are greatly concerned with your third point of forecasts in the use of instrumentation.

At ULE, being a young company, we must of necessity look for support to continue the various areas of research in photo-optical instrumentation as applied to medicine. It is difficult or almost impossible, to our knowledge, to obtain this directly. Grants are given to those directly in medical research and the support then flows out from their needs. This makes for great difficulty for seldom is a grant large enough to devote to a single phase of instrumentation. If support could be gained specifically for instrumentation it would be a great advantage. Work could be carried on with a number of doctors in any number of related efforts. In the same way that you are going to use "Multiphasic Health Screening Techniques" we could apply a similar method toward resolving these urgent needs that in turn could be applied to the program you outline.

Also enclosed are several separate sheets which give greater detail on equipment we have designed or are in state of research. There are excellent possibilities here for devices that have meaning in this most needed and worthwhile effort.

It is our hope here at ULE that we may play some small part in the progress of the program.

Please feel free to call upon us for further information and if needs be, to appear at the hearings.

Sincerely,

HY SHAFFER.

VARIAN,  
611 HANSEN WAY, PALO ALTO, CALIF.,  
*September 2, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you for your letter of August 17, 1966, regarding the forthcoming Senate hearings on a national effort to detect and prevent chronic diseases, and the opportunity to express some of our thoughts on the subject.

We have been studying the medical instrumentation and equipment field for some time in an attempt to identify major potential improvements in existing diagnostic equipment and new diagnostic techniques which may be useful in the detection of chronic diseases. You may be interested in some of our tentative conclusions which are as follows:

1. X-rays are now, and will continue to be, one of the most useful diagnostic techniques for the detection of a variety of chronic diseases. Consequently it is of interest to consider major improvements which may be made in this diagnostic technique. It appears that there are at least two areas in which major improvements may be made. First, research work at the Tulane University School of Medicine, the Jet Propulsion Laboratory of the California Institute of Technology, and other institutions suggests that certain techniques may be used to enhance X-ray photographs such that substantially more information may be extracted visually by the radiologist. Second, it appears that technological advances in X-ray equipment may make it possible to obtain X-ray photographs of greater resolution with lower dosages to the patients. Either or both of these developments would be expected to contribute to earlier detection of diseases and to provide additional improvements in the diagnostic process.

2. Currently in the diagnosis of heart disease, a number of simple tests and measurements would normally be made. These include blood pressure measurement, examination by stethoscope of the heart's rhythm and sounds, blood tests, chest X-rays and fluoroscopy, and electrocardiograms. Many kinds of heart disease can be diagnosed or ruled out by these tests alone. If further tests are found to be necessary, a number of additional procedures are available including cardiac catheterization, special X-ray techniques and more detailed analysis of heart sounds. Improvements in these techniques and the development of new diagnostic methods can be expected in the future. Among the more interesting of the new developments is the spectrographic analysis of heart sounds by means of an instrument originally

developed at Bell Telephone Laboratories for voice analysis. This instrument appears to yield a substantial amount of useful information about the heart and is potentially a valuable tool in the detection of heart disease.

3. As you may know, the American Cancer Society is currently completing a study to evaluate the effectiveness of thermography as a means of detecting breast cancer. Also, research work performed by Dr. Ernest H. Wood, currently of Columbia-Presbyterian Medical Center, suggests that thermography may be useful in the detection of incipient occlusions of the carotid artery, a major cause of stroke. If these diagnostic techniques prove to be useful, simple screening tests can be envisioned.

4. Along with many others, we also anticipate the growing use of automated methods for clinical chemistry, computer analysis and pattern recognition of biophysical data, and the further development of radioisotope and ultrasonic diagnostic techniques.

We will be extremely interested in following the progress of your hearings and would appreciate receiving copies of any reports which might become available describing the work of your subcommittee.

Thank you again for your kind consideration. We would be pleased to provide you with any additional information you may desire.

Sincerely yours,

WILLIAM J. MCBRIDE, JR.,  
*Technical Assistant to the President.*

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VOICEPRINT LABORATORIES, INC.,  
*Somerville, N.J., September 8, 1966.*

MRS. MAURINE B. NEUBERGER,  
*Subcommittee on Health of the Elderly, Special Committee on Aging,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I hope that my tardy reply will be excused and arrive in sufficient time to be of value in your committee deliberations. I am presently in Europe and your letter was forwarded to me for reply.

The enclosed material and scientific papers will, I hope, provide basic information relative to our new and presently unique analysis method for the investigation of heart and other body sounds. I am the developer of the spectrographic analytical method for identifying people by their voices, called Voiceprint identification. The basic techniques used have proven (see enclosed papers) effective in the analysis and diagnosis of certain heart murmurs, respiratory disorders (asthma and emphysema) and emotional stress.

Beginning this school year, we will begin a pilot study experiment of a rapid automated heart screening analysis of schoolchildren. We have developed the art and programing which will allow low-cost screening of normal from abnormal hearts. This program will be supported in part by the American Heart Association. The same heart screening method can be applied to screening elders. We would like to propose our method and will appreciate your advice.

Very truly yours,

VOICEPRINT LABORATORIES, INC.,  
L. G. KERSTA, *President.*

WARNER-LAMBERT PHARMACEUTICAL CO.,  
*Morris Plains, N.J., September 16, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, Special Committee  
on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Warner-Lambert Pharmaceutical Co. is most interested in the approach taken by your subcommittee in establishing preventive medical programs for our older citizens.

In that regard, I would like to present some brief background information on a new development of our company which may have a place in such programs. Called the Robot Chemist, this automated instrument is capable of conducting 120 chemical analyses an hour. It will not only help relieve the present critical shortage of clinical technologists, but will also help cope with the greatly increased workloads generated by Federal health programs.

The Robot Chemist is not yet on the market, but we have made plans to introduce it at the American Chemical Society's annual meeting in New York next week.

Essentially, the Robot Chemist is an analytical instrument designed to duplicate, automatically, the manual steps performed in a chemical analysis. Capable of performing almost any assay conducted by medical technologists, the machine precisely duplicates their techniques, thus simplifying the training process.

While the average technologist can perform about 20 tests an hour, once its sequential operation is underway, the robot can produce test results every 30 seconds. In addition to speed, the machine provides accuracy, reproducibility, and reliability of test results. The robot's flexibility not only permits rapid changeover from one test to another, but also assures that any newly developed procedures can also be handled.

An important feature of the instrument is that it prints out its test results in digital fashion thus making it compatible with almost any electronic data processing system. This means that in the near future, the robot's test results will be fed directly to a computer, dispatched to the patient's ward and printed out right on his chart. Such information can also be stored as research data to help establish "normal" levels for various age groups or geographic locales.

Because of its versatility, we believe this "automated test tube" will find application in even the small size hospitals and will effect economies in hospitals and clinics running as few as 10 tests of 1 kind per day.

Several major hospitals have used experimental models of the robot in their day-to-day operations. The nearest such installation is Norfolk General Hospital where Dr. Edward Levy conducted the research.

The present critical situation in our hospital labs will probably lead to an initial preponderant use of the robot in that area. However, the instrument is also adaptable for use in industrial quality control procedures and in monitoring water pollution.

As the hospital increasingly becomes a focus for community health care, we believe the Robot Chemist and similar automated devices will become necessary standard equipment. One recent estimate suggested that if the U.S. population expands at its present rate, it is conceivable



that by 1980, the services of every man, woman and child now living in this country will be required to do just the lab tests we conduct now.

It is within this framework of a shortage of trained professionals and a geometrically increasing number of tests, that we believe the Robot Chemist will make an important contribution to the health standard of our Nation.

We understand that arrangements are being made with members of the subcommittee staff to have the Robot Chemist available for viewing by members of the subcommittee on September 21 in Washington. We would be most happy to do anything possible to make the demonstration of the operation of the Robot Chemist most meaningful to the members of the subcommittee.

Sincerely yours,

ALFRED E. DRISCOLL.

WASHINGTON ENGINEERING SERVICES CO., INC.,  
*Kensington, Md., August 29, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Washington, D.C.*

MADAM: Thank you for your letter of August 19 regarding the proposed Health of the Elderly Subcommittee hearings.

Though Wesco is not a manufacturer of medical instrumentation, we are engaged in a program which will certainly assist the life scientist in his research.

Specifically, Wesco is producing a "Users Guide to Life Sciences Instrumentation." The objective of the guide is to provide a communication—the interface between the user and the manufacturer, and as such the guide is oriented to the life scientist.

The life scientist who wants to use the best of what is available is confronted with two major problems:

1. What is available?
2. How do I compare them?

Wesco, realizing an immediate need for a convenient form in which to find the answers to these questions developed the guide as an information service for the biomedical instrument user.

Wesco collects the instrument manufacturers' data sheets, and catalogs. After examining instrument manufacturers' descriptive literature the instrument is then assigned to a functional category based on the function of the instrument what the instrument does rather than what it is. This system permits computer manipulation of the data for all categories of instruments, for storage and retrieval purposes.

Should a life scientist or researcher require an instrument for a particular function and want to know whether the instrument is commercially available the data is immediately provided. The data is presented in a standardized format, in nontechnical engineering terms.

The guide is offered on a yearly subscription basis in two formats: Hard copy in loose leaf binders and on microfiche.

I am taking the liberty of enclosing additional literature we have prepared which explains the guide in somewhat greater detail.

We have exhibited our guide at the Medac exhibition and symposium in Boston last month. Comments about our guide from both

the manufacturers and the life scientist were extremely encouraging: In particular, BIAC (The Bioinstrumentation Advisory Council) of the American Institute of Biological Sciences, The Franklin Institute Research Laboratories, The Southern Cross Manufacturing Corp., and a special assist from the Biomedical Instrumentation Branch of the National Institutes of Health.

Thank you very much for your interest in our company; should you require further information please do not hesitate to contact us.

Very truly yours,

HERMAN LEVINE,  
*Assistant Director for Special Programs.*

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ZENITH RADIO CORP.,  
*Chicago, Ill., October 20, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Washington, D.C.*

MADAM: We acknowledge receipt of your August 17, 1966, letter relative to equipment which may be used in health screening programs for Americans past 40 or 50 years of age.

At the present time, the medical electronics still in its infancy at Zenith, our operational medical equipment is limited to our portable monopulse defibrillator. However, our projected research forecast includes experimentation on varied specialized equipment which may, in the future, prove useful in a program such as the one outlined in your letter.

We take this opportunity to thank you for contacting Zenith, and add that the Subcommittee on Health of the Elderly is to be commended on the intent and scope of its proposed legislation.

Please excuse the tardiness of this reply, which was occasioned by your letter being lost "en route" to this office.

Very truly yours,

SCOTT B. MORENCY,  
*Manager of Administration,  
Government and Special Products Division.*

## D. MISCELLANEOUS

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The subcommittee corresponded with many medical and health-related societies and organizations.

U.S. SENATE,  
SPECIAL COMMITTEE ON AGING,  
*August 29, 1966.*

DEAR ———: The Subcommittee on Health of the Elderly of the U.S. Senate Special Committee on Aging is beginning a study of modern health screening methods intended to detect and thus help prevent chronic illness.

As has been found with limited screening programs to identify such diseases as glaucoma, diabetes, tuberculosis, and so forth, the subcommittee believes that substantial benefits would result from more comprehensive screening programs reaching greater numbers of people.

One example is the multiphasic screening program conducted for members of the Kaiser Foundation in California. Participants receive a battery of tests within 2½ hours, with the help of latest equipment and computer evaluation of data. Final diagnosis is made by a physician after he studies all records.

Our hearings—now scheduled for September 20, 21, and 22—will not deal with any single legislative proposal or any one method of health screening. We want to receive objective, informed, and widespread opinion on the cost of chronic disease today and the potential helpfulness of screening to prevent such affliction. The advent of medicare adds a weighty argument for greater emphasis on prevention.

We will be especially interested in your views and responses to the following:

1. Is there a place for multiphasic health screening in health care in our country? Are there any particular problems that may be anticipated in the acceptance of multiphasic screening programs by the public or by the medical profession?

2. Do you have any suggestions for effective screening or other health maintenance programs for persons below age 60? Above age 60?

We would like to have your response for study before the hearings. Thank you for your courtesy and help.

Sincerely,

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly.*

In addition to the responses to the foregoing letter from the medical and health-related societies and organizations, the subcommittee received several unsolicited responses which are included herein.

AMERICAN CANCER SOCIETY, INC.,  
New York, N.Y., September 23, 1966.

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: My apologies for the delay in replying to your letter of August 29 which was on my desk when I returned a few days ago from several weeks at our cottage in northern Minnesota.

Your inquiry concerning "modern health screening methods to detect and thus help prevent chronic illness" is of very special interest to the American Cancer Society because of the many patients with cancer in whom a diagnosis is not made until the disease has progressed beyond the stage at which cure is possible.

Because of the relatively high curability of most cancers when treated while the disease is still in an early and asymptomatic stage, the American Cancer Society has for many years advocated regular annual physical examinations for all adults. In various parts of the country cancer detection centers have been supported by the society for this purpose. Also, in order that early detection of cancer could be made available to more patients in all communities, cancer detection examinations in the physician's office have been encouraged by the society in its educational program to both the public and the medical profession.

Because the yield of positive cases of cancer from examination of asymptomatic patients has been understandably quite low, there has been considerable difference of opinion among various public health authorities and physicians as to the value of such examinations. There is no question that in the terms of money this is an expensive procedure for the number of cancers found. Nevertheless, there have been some very gratifying results which have encouraged the American Cancer Society to support this program. The remarkable success of the Papanicolaou smear cytological examination in markedly cutting down the death rate of cervix cancer in this country is well known to you. Similarly, but less striking results have been obtained in the early detection of oral cancer, skin cancer, rectal and colon cancer, and breast cancer through periodic physical examinations.

In regard specifically to multiphasic screening examinations, this is a valuable experiment in attempting to make the physical examination of asymptomatic patients more efficient and economical. Because of the high incidence of cancer in this country, one can be sure that possibly the most rewarding results of these studies will be in detecting early cancer. Accordingly, the American Cancer Society is following the work in this field with considerable interest. As a matter of fact, the current issue of *Ca—A Cancer Journal for Clinicians*, which we publish for physicians, carries a special interview on this subject. I will enclose a copy of this issue for your information.

In answer to your questions specifically: First, Is there a place for multiphasic health screening in health care in our country? The answer is yes, certainly on a research basis to develop more information and to improve techniques for this important aspect of health care. Are there any particular problems that may be anticipated in the acceptance of multiphasic screening programs by the public or by the medical profession? The cost in money and the amount of work in-

volved to find relatively few remedial conditions will always be a problem, because the value of a saved life or a prolonged life is impossible to measure in dollars. Also, the medical profession can be expected to be concerned with the impersonalization that the automation may bring about. As you know, a close patient-physician relationship is an essential part of American medical practice. If this type of screening can be worked out within the regular fabric of American medicine as it exists today, it will be more acceptable to physicians than if some other approach is used.

Second, Do you have any suggestions for effective screening or health maintenance programs for persons below age 60? Above age 60? The question of age of the patient in regard to screening is not easily answered despite the fact that cancer occurs mainly in older persons. Age incidence, however, varies for different forms of cancer, and actually there are many cases of cancer in younger people. One must avoid, if possible, arbitrary age limitations which tend to prevent younger people from having an opportunity to be cured of cancer. In these younger age groups, there are many productive years to be gained by the prevention or cure of cancer. In cervical cancer when the cytological program for early diagnosis first began, the program was primarily offered to women over 45 years of age. Experience soon revealed that there were many patients below this age who were unjustifiably being denied a chance for cure. The age gradually was moved down to 40, 35, and finally at present there are many cases of cervical cancer being found in women under 21 years of age. I think one can say that the age factor should be flexible and should vary for the various tests performed in the multiphasic screening program.

I have enclosed several reprints from the University of Minnesota Cancer Detection Center which point out some of the advantages of regular periodic cancer detection examinations.

We appreciate very much your having asked our society for information on this subject, and I do hope our reply will be helpful to you.

Most sincerely,

HAROLD S. DIEHL, M.D.

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THE AMERICAN COLLEGE OF PHYSICIANS,  
*Philadelphia, Pa., August 31, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

MY DEAR SENATOR NEUBERGER: There probably is a place for multiphasic screening in health care. My fear is that its appeal will outstrip the ability to do it accurately and adequately. Without very close physician control, it could lead to several serious problems. The absence of any positive tests doesn't exclude the possibility of serious disease not detected by tests. In other words, some persons might have a false sense of security because tests were negative. False positive tests would be almost as bad and some people would develop phobias about disease. The most serious problem, however, would be the extra load this would put on the present supply of health personnel.

It would be of interest for your committee to get a report from the AMA on their program of examining physicians who attend their

convention. This is a multiphasic screening and I believe has been a highly successful way of getting physicians to become aware of their own illnesses. There are many reasons why physicians don't get their own health examinations. Whether the AMA screening turns up more or less disease would be interesting. You should also get information from the Mayo Clinic on this subject. For many years, they have been doing executive health examinations. Recently I believe they have or are planning a pilot study to see if it is feasible to do a large number of tests before having the patient examined by the physician. They are interested also in finding out costs of such reverse procedure.

I am sure there would not be much resistance by the public if the screening was under good auspices. Except in groups, medical centers and hospitals, I am quite sure there will be great resistance by practicing physicians. They will contend and I believe justifiably that this tends to interfere with the doctor-patient relationship, that it puts too much emphasis on tests and too little on physicians and finally many would feel a much better procedure is to start with a good history and physical examination and then order only tests indicated.

I have no specific suggestions except to emphasize my strong conviction that this kind of thing to be done properly will demand plenty of good physician control and will need many more technicians at a time when we are already in short supply of physicians and health personnel. Anyone can propose all sorts of good theoretical plans for health, but personnel is essential and this will take much time to supply.

Sincerely yours,

EDWARD C. ROSENOW, Jr., M.D., F.A.C.P.,  
*Executive Director.*

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AMERICAN DENTAL ASSOCIATION,  
*Chicago, Ill., October 3, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: The American Dental Association appreciates the opportunity to comment on your subcommittee's study of health-screening methods.

Prevention of disease is the keynote of the association's major program activities. The detection of dental diseases at their incipient stages as a prime preventive measure has been a mission of the dental profession throughout its history as a profession. To accomplish that mission the association has joined with public health agencies over the years to alert the public to the need for regular and frequent visits to the dental office. A twice-a-year visit to the dental office for examination and treatment will best assure each person the preservation of his natural dentition.

The dentist performs a significant health screening when he conducts a thorough examination of his patient's teeth and gums. With the help of X-rays the dentist can discover areas of decay which might escape visual examination and thereby save teeth which otherwise might have to be extracted. The dentist who sees his patients fre-

quently, especially those in the middle and upper years, can treat those diseases of the gums which, if left untreated, cause loss of teeth, including healthy teeth.

The need for extensive development of multiphasic health screening programs is the subject matter of the subcommittee's pending deliberations. With the advice and expert testimony received from representatives of the health sciences during the subcommittee's recent hearing, a responsible judgment will assuredly come from the subcommittee. The American Dental Association is certain that the subcommittee will give consideration to recommending that there be a large share of private effort and support in any multiphasic health screening program proposed by the subcommittee.

If the subcommittee recommends establishing a multiphasic health screening program as a national goal, that program should include an oral examination. The following statement prepared by the staff of the association's council on dental therapeutics is a concise expression of the significant benefit that will result from inclusion of oral examinations in multiphasic health screening programs:

An oral examination, including full mouth X-ray survey (Panorex), should be a part of a multiphasic health screening program. This will be of great value in detecting systemic disease as well as local pathologic conditions which may exert an adverse effect upon the individual's health.

Some of the systemic diseases that may manifest themselves in the oral cavity prior to or after the advent of general symptoms are:

Leukemia	Tuberculosis
Anemia	Histoplasmosis
Metastatic tumor	Syphilis
Vitamin deficiencies	Sarcoidosis
Hyperparathyroidism	Actinomycosis

Many local oral conditions that present general health problems are:

1. Oral cancer (more precisely squamous cell carcinoma has a 30-percent survival rate; there are 30,000 new cases per year and 6,000 deaths per year).
2. Periodontal disease.
3. Poorly fitting dentures and restorations (these may cause bone resorption, hypertrophic tissue, and cancer).
4. Dental caries.
5. Salivary gland tumors.
6. Benign tumors.
7. Retained root tips.
8. Abscesses; cysts and odontogenic tumors.
9. Leukoplakia (pre malignancy).
10. Ulcerations (pre malignancy).
11. Unidentified radiolucent and radiopaque areas in the bone of the mandible and maxilla.

In behalf of the American Dental Association, I request that you include this letter in the record of your subcommittee's hearings on modern health screening methods and the desirability of establishing a multiphasic screening program as a national goal.

Sincerely yours,

JOHN B. WILSON, D.D.S.,  
*Chairman, Council on Legislation.*

AMERICAN FEDERATION OF LABOR &  
CONGRESS OF INDUSTRIAL ORGANIZATIONS,  
*Washington, D.C., September 13, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: President Meany has asked me to reply to your letter of September 7, in regard to your plans to study modern health screening methods as a way of detecting and preventing chronic illness. I think this action by your subcommittee is most timely. The rapid increase in medical care costs is a matter of concern to us. On the other hand, the application of automated, electronic and computer equipment to medicine shows great promise of reducing cost and reducing illness. We plan to follow your study of multiphasic screening closely as we have, for many years, advocated preventive medicine.

In response to your specific questions, we do think there is a place for multiphasic health screening in this country and its importance may well justify congressional action to stimulate its development. It can be anticipated that there will be some problems associated with the continuity of care when diagnosis is separated from treatment, but such problems are solvable. Automated multitest laboratories will, of course, be able to serve the diagnostic needs of many physicians in a community. This implies a need for better organization of physician and other medical services. I think it significant that it was the Kaiser-Permanent medical centers in Oakland and San Francisco rather than a local medical society which secured a Public Health Service grant to test the feasibility of automated multitest laboratories.

If, as a result of your subcommittee's study, multiphasic health screening appears to be economically and medically feasible, we would hope that such preventive services could be extended to the entire population regardless of age.

Sincerely yours,

RICHARD E. SHOEMAKER,  
*Assistant Director, Department of Social Security.*

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AMERICAN GASTROENTEROLOGICAL ASSOCIATION,  
*Colorado Springs, Colo., September 19, 1966.*

HON. MAURINE B. NEUBERGER,  
*Special Committee on Aging,  
U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: I am pleased to reply to your inquiry of August 29. Although I shall concern myself primarily with gastrointestinal disorders, I prefer to begin with some personal views of broad considerations.

Prevention of disease should be the eventual objective of all our health fields. Next in priority should be the identification of chronic diseases in their initial stages, in order to allow more effective therapy. There are many limitations to the identification of a disorder before it has presented definite symptoms or abnormal physical signs. Routine



screening of wide segments of the asymptomatic population for very prevalent disorders of great disability, such as diabetes and tuberculosis, seem desirable, especially since techniques for these are readily available, reasonably efficient, and of minor cost in money and time. Also, it would seem that much could be done to establish programs of education and data acquisition by which important disorders having very strong hereditary tendencies could be identified at an early stage. But for the remaining diseases, it would seem only practical and necessary to await definite symptoms or abnormal physical signs before embarking on diagnostic screening procedures. When symptoms or abnormal physical signs appear, relatively simple, automatically processed data of certain types for large numbers of persons might be feasible; these comprise questionnaires on symptoms (such as the Cornell Medical Index) and a battery of laboratory data obtainable from a single blood drawing, urinalysis, and stool specimen. Any further "routine" screening procedures would seem impractical because of the expense in time, money, and devotion of highly trained personnel, and should be pursued only as individually indicated by the presenting symptoms, laboratory abnormalities, or genetic information.

Most disorders of the gastrointestinal tract cannot be forecast readily, or identified in their incipient stages, by the screening of asymptomatic individuals. Even comprehensive screening of persons with gastrointestinal symptoms results in a very low yield of definite diagnoses of important and treatable conditions. This is largely because gastrointestinal symptoms are so prevalent in the nondiseased population.

Although cancer of the gastrointestinal tract is reasonably prevalent, and it is very important to identify it early in order to offer "curative" therapy, routine screening of large numbers of persons over the age of 45 years by the more elaborate and definitive techniques of gastric analysis, proctosigmoidoscopy, and X-ray examinations of the gastrointestinal canal, has yielded returns quite inadequate to justify the effort. Indications for pursuing more elaborate and definitive diagnostic tests, including even gastrointestinal X-rays, must still rest upon the presence of the appropriate combination of historical information, symptoms, physical abnormalities, and screening laboratory test aberrations in given individuals. Certainly potential is a more efficient and automatic manner of identifying such combinations than the average personal physician's factual awareness, alertness, and availability of individual patient time.

Very truly yours,

WADE VOLWILER, M.D.

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AMERICAN GYNECOLOGICAL SOCIETY,  
*New York, N.Y., September 13, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In response to your letter of August 29, the American Gynecological Society will be glad to render assistance in the study by your subcommittee of modern health screening methods. Our society consists of 127 members, nearly all of whom are

active or retired department heads of obstetrics and gynecology, in medical schools or major teachings hospitals. I believe we could be of most use by making available one or more of our members, to provide you with expert opinion.

Our major area of interest in health screening is that dealing with the use of various methods to detect genital cancer. This includes periodic pelvic examination and the use of the Papanicolaou smear. Considerable data now exists on the yield and unit cost of vaginal smears, as well as the effect such programs have on the elimination of advanced genital malignancy in the community.

In reply to your two specific questions, I can offer the following personal views:

1. It is obvious that multiphasic health screening, as a means of early disease detection, is not only good medicine but good economics. For most diseases, the generalization holds that early diagnosis means simpler and more effective treatment. However, the built-in danger of such programs is the "false sense of security" engendered in the minds of those subjected to screening, and among physicians as well. Considerable wisdom is needed both in the selection of program content, and in publicizing its objectives.

Physician acceptance of such programs depends largely on the channels followed when abnormal results are obtained on screening. Further investigation and treatment by institutions or agencies would be resisted; referral to personal physicians would be accepted as is the case in many cancer detection programs at the present time.

2. I would make a plea for program emphasis on the events surrounding marriage and conception. Among the indigent, and even among the economically privileged, the premarital, preconceptional, or first prenatal visit is the first serious contact that women have with those concerned with health. The yield in disease detection may be small, but the educational opportunities are enormous. If one regards education of the public to periodic screening for protection of health as a valid objective, this is an ideal time to start.

If I can be of help, please let me know.

Sincerely yours,

GORDON W. DOUGLAS, M.D.,  
*Secretary.*

COTUIT, MASS., *September 7, 1966.*

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Senate Office Building, Washington, D.C.*

DEAR MRS. NEUBERGER: Thank you very much for your letter of August 29 advising me that the Subcommittee on the Health of the Elderly of the U.S. Senate Special Committee on Aging is undertaking to study modern health screening methods intended to detect and prevent chronic illness. That is indeed a challenging problem and I am delighted that you cared to solicit my opinion before the hearings open on September 20, 21, and 22. May I answer your question, giving you my immediate reaction and then possibly at a later date after I've talked it over with other members of the medical profession, I shall write to you again:

First of all, yes, I am certain that there is a place for multiphasic health screening in the health care of our country. Representative Fogarty advised me last winter that they were contemplating the introduction of a bill for having five centers to try out a screening program for the elderly. These five centers were to be set up so that anyone could walk in for their screening test for a number of diseases. My first reaction was and still is that if there is to be a multiphasic health screening, first regulation should be that no person should receive such screening more than once a year unless requested by the doctor; it would be preferable to have all the requests made through a doctor and certainly the results must be returned to the patient's personal physician. My recommendation for restricting such tests to a yearly basis is to prevent the hyperchondriacal patient from thinking up a new complaint every two weeks or every month and coming in for a repeat examination. On the other hand should a patient develop a bona fide new symptom they ought to be able to be sent in within the year for a second screening test.

You ask me if there were any particular problems to be anticipated in the acceptance of such a program by the public or by the medical profession. Yes, I believe the public is going to have to be educated on what screening tests do. There is never going to be 100 percent correct screening test which will always detect an abnormality and never overdiagnose. Nevertheless, screening tests can be a useful guide and pick up many abnormalities which otherwise may not be detected and thus alert the physician to illnesses which might pass unnoticed.

The medical profession must learn to make better use of our paramedical personnel in order to give better care to more people. Health screening tests will shorten the time required for routine health examination and hence allow them more time for their ill patients. On the other hand, the medical profession as a whole is conservative and it may take some time before they appreciate the advantages to be gained from screening tests.

In answer to your second question concerning any suggestions for effective screening or other health maintenance programs for persons above or below the age of 60, I personally hope that at least some regional medical programs will include some screening tests for heart disease in their total program. Such programs must include the examination of the people under 60. Our great aim is to prevent the early coronary, those which happen between 40 and 60 rather than those which occur in the 70's and 80's. I'm quite certain that you will agree with me that death of acute coronary thrombosis when one is 80 is not a bad way to go; the death of a young man who still has a future before him is the tragedy. Any preventive program must start long before 60 years of age.

The above expresses my personal reactions to your questions. I have called a committee meeting of the American Heart Association for Thursday, September 9, and shall write you in more detail after that meeting.

Sincerely yours,

HELEN B. TAUSSIG, M.D.,  
*President, American Heart Association.*

COTUIT, MASS.,  
September 19, 1966.

MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In reply to your letter of September 14th, the American Heart Association will be glad to include our communication in your hearing record but please do not confuse my personal comments in my personal letter to you with those of the American Heart Association.

With best wishes.  
Sincerely,

HELEN B. TAUSSIG, M.D.,  
*President, American Heart Association.*

P.S.—I am enclosing a copy of a personal letter to me from Dr. C. Moses, chairman of AHA Committee on Medical Education.

DEAR HELEN: Since my letter yesterday went out without my review so that you would get it promptly, I'd like to say that the president of the Industrial Medical Association is Donald C. Bews, medical director, Bell Telephone Co., Montreal, Canada.

In addition, I've gotten some information that may be useful to you with regard to the multiphasic screening program: It is my understanding that the Kaiser Permanente program is a 7-year program and that it is being constantly revised on the basis of their experience. I think this kind of pilot program should be encouraged although it is not yet in the final form.

Some additional individuals who might be useful to Senator Neuberger in phases of multiphasic screening are Dr. Victor Gilbertson, University of Minnesota, Minneapolis, Minn.; Barclay Hutchinson, M.D. at the Harvard School of Public Health; and Thomas Peery, M.D. at George Washington University, School of Medicine, who for many years was responsible for the American Medical Association's physician screening program in connection with the annual meeting.

Best personal regards.  
Very truly yours,

CAMPBELL MOSES,  
*Chairman of Committee on Medical Education,*  
*American Heart Association.*

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AMERICAN HEART ASSOCIATION, INC.,  
*New York, N.Y., September 12, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: The American Heart Association greatly appreciates the opportunity to discuss with you the consideration of multiphasic screening programs and some of the basic problems inherent therein before your committee has developed firm legislation. It is an unusual privilege and we are deeply honored that you value our opinion.

I am sure you realize that the American Heart Association speaks with authority only in the cardiovascular field and those areas which have an additive effect on cardiovascular disease, such, for example, as diabetes and emphysema and so forth. The American Heart Association is, as you know, dedicated to fight all aspects of heart disease and has long been interested both in the detection and the prevention of cardiovascular disease.

To answer your second question first, the American Heart Association is unanimous in its opinion that any program for detection of heart disease to be effective must start long before 60 years. The basic changes which are manifest after 60 years have had their origin many years earlier. The limitation of any program for detection of disease for the purpose of the prevention of chronic illness to persons over 60 years would be of extremely limited value.

As regards to your first question, the medical profession is confronted with the problem of yearly physical examinations. Such examinations when combined with continuity of care have proved to be of benefit to the patient. In such a program continuity of care is quite as important, if not more important, than any single examination. At the present time yearly physical examinations are manifestly impossible for large segments of the population.

For this reason a multiphasic screening program may seem to be as a possible solution. It is, however, not the magic solution which it may at first glance appear to be. A screening program at best merely screens for certain factors. In the screening of each specific factor, the problem is always the percentage of the abnormality thereby detected versus not only the percentage missed but also the number of false positives. Thus each determination which is screened must be carefully evaluated and the inherent errors in the screening program must be understood and correctly equated.

For example: Every patient cannot have a fasting blood sugar taken a specific number of hours after his last meal. Nevertheless the time of his last meal, the amount and the quality of it influence the determination as does his metabolism and his activity during the intervening period. Granted that all of these elements are recorded and their answers fed into the computer, in the final evaluation the patient's comprehension of the relevance of the questions asked by the computer and his reliability to answer them honestly are also important factors. Consequently the evaluation of the data by the physician in relation to his particular patient remains the hallmark of evaluation and therapy. No computer has yet been devised into which a series of tests can be fed and from which the answer will emerge whereby the patient is told what to do and when and how he should do it. The detection of an abnormality loses its value unless we know its significance and what to do to correct it and how to do it.

One of the most successful programs of the American Heart Association in the prevention of cardiovascular disease has been in the field of acute rheumatic fever and rheumatic heart disease. The success of the program lay in the discovery of the means to prevent recurrences of acute rheumatic fever by the prevention of streptococcal infections. Later it was shown that prompt and adequate treatment of a streptococcal infection markedly reduced the incidence of initial attacks of

acute rheumatic fever. Detection was not important until we had an effective means of treatment. Actually after this knowledge was available our educational program has been so strong that recent studies in the detection of heart disease in schoolchildren by heart sound screening programs have uncovered relatively few children with rheumatic heart disease whose condition was unknown or untreated.

A similar phenomenon can be seen in what little is known concerning the prevention of congenital malformations of the heart. First of all, the cause must be known. Thus the observation that rubella when contracted by the mother in early pregnancy seriously injured the fetus had to be made, then the doctors needed to be convinced of the truth of the observation, and now we are working to produce an effective vaccine. In the meantime our efforts are directed to the prevention of the exposure of young married women to the rubella virus.

In brief, to have an effective preventive program we must first have the knowledge of how to prevent or cure the disease and then educate the public and the medical profession concerning methods of detection and prevention of the disease. Purely passing on to the individual a large amount of information about his health as ascertained by computer analysis of a multiphasic screening program is of no great value in the prevention of disease. Indeed it may cause great confusion in the patient's mind.

Computer analysis even when limited to known factors and those suspected to be of etiological importance when obtained in an uncoordinated, poorly integrated screening program without physician interpretation and application is of little use and may give the patient false security and either introduce or increase an element of cardiac neurosis.

This is not to imply that multiphasic screening programs are all bad or impossible but certainly intensive study in this area is necessary in order to evaluate the effectiveness of the program in the detection and prevention of disease. Carefully controlled pilot programs in this area are certainly indicated and careful evaluation of results of such studies should be made before launching on a nationwide multiphasic screening program.

The American Heart Association sincerely hopes the same such pilot programs will be incorporated into at least some of the regional medical programs. Commonsense tells us that it is the part of wisdom to determine the value of such pilot program before launching on a nationwide multiphasic screening program.

In addition a great deal of public and professional education will be necessary to make such a program successful. The first step in convincing the physician of the value of the program is to prove that it is true. Without physician cooperation little hope exists that such a program will meet with success.

The public must be educated as to its limitation of the program. A screening program is a program to detect abnormalities. Does the person exist who does not in some way deviate from the normal? Fortunately for the vast majority, minor deviations are of no serious consequence. But exactly where is the line to be drawn between a minor and major abnormality and what is to be done about the abnormality when it is detected? When the answer is known, there is no substitute

for the physician's advice; when the answer is unknown, research is indicated.

For the above reasons, the American Heart Association does not believe that knowledge is yet sufficient for a nationwide multiphasic screening program to be an effective measure in the prevention of chronic illness. Consequently we do not believe that legislation in this area is indicated at the present time.

Thanking you again for your gracious letter soliciting our opinion. If I can be of any further help, I shall be happy to discuss the matter with you.

Most sincerely yours,

HELEN B. TAUSSIG, M.D.,  
*President, American Heart Association.*

P.S.—I am enclosing a list of names and addresses of persons who have had experience in the field and whose opinion you might find helpful.

HELEN B. TAUSSIG, M.D.

The following individuals may be of some interest to you and your staff in finding knowledgeable individuals in the area of multiphasis screening:

Kenneth D. Rogers, M.D., professor of preventive and social medicine, University of Pittsburgh. Dr. Rogers, a pediatrician by background, has been on the U.S.P.H.S. study section engaged in project site visits to the Kaiser Permanente program. He is knowledgeable in this area and an articulate and clear-thinking supporter of pilot projects.

Dr. Laurenceus O. Underdahl, Mayo Clinic, Rochester, Minn., is president of the American Diabetes Association and could probably give intelligent testimony on the diabetes problem. I am absolutely certain that T. S. Danowski, M.D., professor of medicine at the University of Pittsburgh and last year's president of the diabetes association could offer intelligent advice.

I do not know the current president of the Industrial Medical Association personally but he is Donald C. Bewis, M.D., Bell Telephone Co. of Canada, Montreal, Canada. The president a few years ago was Dr. John Lauer, medical director, International Telephone & Telegraph Co., Park Avenue, New York City. He is experienced and knowledgeable about multiphasic screening but unfortunately he is leaving for a month out of the country on Wednesday, September 14.

H. B. T.

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AMERICAN HOSPITAL ASSOCIATION,  
*Washington, D.C., September 20, 1966.*

Hon. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Special Committee on Aging, U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: Dr. Edward L. Crosby, executive vice president of the American Hospital Association, has asked me to reply to your recent letter. The American Hospital Association has promoted routine screening tests upon the admission of patients to

hospitals. Although the pertinent public health necessities have permitted hospitals to relax stringency concerning screening for tuberculosis and syphilis, hospitals in the past were most cooperative in this regard. Currently the association is promoting routine testing of new-born infants for phenylketonuria and also promoting routine Papanicolaou smear examinations of all appropriately aged females who are admitted to a hospital.

We should very much like to have hospital participation in a program of multiphasic health screening, not only for inpatients but also for outpatients. Certainly the availability of equipment and personnel in local hospitals should be taken into account during any planning for a multiphasic screening program in a community. It should be noted that if a program of this type should be established in such a way as to directly involve hospitals, the Joint Commission on Accreditation of Hospitals would have an interest. The association has always cooperated with and supported the Commission in the establishment of standards for all patient care activities in hospitals.

In general, the American Hospital Association does not believe that public health programs should be established primarily for any one age group but should be available to all below age 60 and above 60 alike.

The American Hospital Association should very much like to participate in planning for multiphasic health screening programs that might be pursued at the national level, just as the local community hospitals should participate in the planning for their local communities.

Sincerely yours,

VANE M. HOGE, M.D.,  
*Acting Director, American Hospital Association.*

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PHILADELPHIA, PA., *September 7, 1966.*

HON. MAURINE B. NEUBERGER,  
*Special Committee on Aging,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: It has come to my attention that the Health of the Elderly Subcommittee is interested in learning about diagnostic screening devices which might be practical and applicable for the detection of the various degenerative processes of aging.

One of the most promising instruments now available in this category is the thermograph. It has been a source of great satisfaction to me to have had experience with the use of this apparatus over the past 4 years at the Albert Einstein Medical Center of Philadelphia. After examining more than 6,000 patients, we have gained a fairly good perspective on the diagnostic range of this instrumentation. Since more than 95 percent of all breast cancers can be spotted on thermograms, use of thermography in this field alone as a screening procedure should prove exceedingly effective.

Occlusion of the carotid artery, one of the common causes of stroke, also can be spotted by a screening procedure before the calamity occurs. As a matter of fact, all forms of peripheral vascular disease are amenable to better diagnostic resolution by the use of this method. We have spared amputation in several cases of diabetic gangrene by careful



serial thermographic examinations on patients placed first on conservative therapy, and in cases where vascular surgery is indicated, thermography offers a delicate index of the success of operations, often before clinical signs become manifest. And so the range of usefulness of this new method of studying temperature changes in the body has been extended into cancers in all forms, primary as well as metastatic implants; into the field of arthritis, trauma, orthopedics, surgery, obstetrics, gynecology, et cetera. As a matter of fact, this new discipline encompasses all of medicine and surgery as does the use of the ordinary clinical thermometer, except that in the case of thermography, more than 60,000 temperature recordings comprise each thermogram instead of the single, isolated reading of the oral thermometer.

Enclosed is a recent publication which outlines the applications of thermography in detail. I would be glad to furnish additional information if you need it and will call on me.

Very truly yours,

J. GERSHON-COHEN, M.D.

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AMERICAN NURSES' ASSOCIATION, INC.,  
*New York, N.Y., September 2, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in reply to your request for the views and responses of the American Nurses' Association to certain questions related to multiphasic screening programs.

Question No. 1. Is there a place for multiphasic health screening in health care in our country? Are there any particular problems that may be anticipated in the acceptance of multiphasic screening programs by the public or by the medical profession?

The literature indicates that multiphasic health screening is effective in the early diagnosis of the various health problems for which tests were made. If the screening program is accompanied by sound programs of individual and group health education, it seems proper to assume that the promotion of positive good health and the prevention of health problems will be greatly enhanced. It seems practical to suppose that such programs would provide a recognizably sound basis for the epidemiology of health and disease on which future programs would develop.

The American Nurses' Association supports the concept of multiphasic health screening. It believes that qualified public health nurses, other registered nurses employed in public health nursing services, and other supportive personnel such as practical nurses and home aides, are important members of the screening and continuity of service teams.

The American Nurses' Association anticipates that the public, which has in the last two decades become more concerned with matters of health and public supported health programs, would welcome and use multiphasic screening programs designed for their local communities.

Question No. 2. Do you have any suggestions for effective screening or other health maintenance programs for persons below age 60? Above age 60?

Multiphasic health screening programs should be made easily available to people of all ages—from infancy through old age. If such programs can be made attractive to school administrators and the managers of employee services through attention to details such as scheduling of clinics and appropriate reporting, it would seem that more efficiency in the conduct of the programs and better utilization of the communities health personnel would result.

Through community effort, every person now past the age of 60 should receive information about screening programs through their contacts with professional people as family physicians, nurses, social and recreational workers, and their contacts with the social security administration, welfare workers and other knowledgeable people.

The American Nurses Association recommends to the Subcommittee on Health of the Elderly the timely and comprehensive report of the National Commission on Community Health Services, *Health is a Community Affair*.

Sincerely,

Mrs. JUDITH G. WHITAKER,  
*Executive Director.*

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#### STATEMENT OF RUSSELL M. KOCH, O.D.

Senator Neuberger and members of the Subcommittee on Health of the Elderly, I thank you for the opportunity to present this statement on behalf of the American Optometric Association.

I am Russell M. Koch, an optometrist, and I practice in Elk City, Okla. Within the American Optometric Association I serve as chairman of the Committee on Vision Care of the Aging and it is in that capacity I make this statement.

The American Optometric Association believes that old age can well be the golden age of a person's life and we firmly believe that the optometric profession can help make it a golden age by proper care of the person's most vital sense—vision.

Optometrists in the United States serve more than 60 million people annually. During the daily conduct of his practice, the optometrist is frequently the first health care practitioner to detect ocular disorders and systemic diseases. Thus the profession of optometry is a first line of defense in the field of health.

Any good health data acquisition system will include vision. Optometrists as vision care specialists have long recognized the value of vision screening and at the same time have become aware of screening limitations. To serve the purpose for which it is designed, a program for detecting and preventing chronic disease must utilize the most accurate, expeditious, and reliable techniques available.

Because optometrists have developed both screening programs and screening instruments, they have made valuable contributions to a number of multiphasic health screening programs. The services of optometrists are available for program planning and coordination in addition to evaluating screening results.

Especially among older people, it is known that ocular health conditions are frequently manifested by impaired vision, such as

low visual acuity, reduced accommodation and unbalanced neuromuscular conditions. Because of the close relationship between impaired vision and ocular health, optometrists have made many contributions to the fields of screening which involve visual impairments.

For example, Dr. Elwin Marg of the University of California at Berkeley developed the electronic tonometer used in testing intra-ocular pressure, a prime consideration in glaucoma detection. Another optometrist, Dr. Robert Koetting, of St. Louis, Mo., designed and patented the multiple target screener for rapid field charting, also a necessary consideration in detecting glaucoma. The late Dr. Carl Sheppard of the Illinois College of Optometry helped design targets for the first keystone vision screening instrument which is widely used today by driver-license examiners and industrial health care units.

Optometry has developed and utilized other screening instruments for visual impairments such as the orthorater, sight screener (used in the national health survey), and the Titmus tester. Together with the aforementioned keystone tester, these instruments are used with schoolchildren, with employees in numerous industrial and office situations, with driver-license applicants and renewals and institutionalized older people.

Undoubtedly the instruments and procedures in use today will be improved in the future. As the percentage of the population over 50, 55, and 60 years increases, more highly specialized screening tests for these people will be developed. The comprehensive screening programs currently under discussion will probably make the multiphasic programs of today appear as antiquated as the Model-T Ford. Optometry looks forward to aiding in the development of new health census modalities and to serving as a resource in comprehensive screening programs of large community groups.

We wish to compliment this subcommittee for its timely investigation and offer our assistance whenever you believe we can be of help.

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AMERICAN SOCIETY OF INTERNAL MEDICINE,  
*San Francisco, Calif., September 14, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Special Committee on Aging,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Your August 29 letter was sent to an address from which we moved some 5 years ago. Unfortunately your hearings are now less than a week away. To prepare recommendations on such short notice would require hasty, inadequately considered comments which would not be in keeping with the importance of your topic; indeed they might be a disservice to those you aim to help. Is there a possibility that our comments might be accepted at a later date?

Our society is composed of some 9,000 highly trained specialists in internal medicine. Internists are extremely interested in the topic your subcommittee plans to discuss on September 20—modern health

screening methods intended to detect and thus help prevent chronic illness. The care of the elderly, the chronic illnesses, and particularly the complex conditions, fall squarely within the scope of care provided by internal medicine. Thus our comments would be pertinent to your problem; but, they should not be casually made.

I can offer one preliminary point; there are two aspects to the problem you are studying. One is the state of development of scientific knowledge on the subject. You will want to learn how much can be detected soon enough to "help prevent chronic illness."

The other point is the organization by which such knowledge is made available to those who should benefit from it. Our society is particularly concerned with this latter point. Cost and convenience to the patient are only two facets. There are also the questions of preserving the quality and integrity of the service under the organizational regulations which are inevitable in a planned program of this scope.

I am sure that our society would like to offer helpful comments in this latter area. But, these comments would not be available on the short notice you have given. In fact, this is a matter on which one of our committees might wish to devote considerable time to thoughtful discussion.

Our president is presently out of the country and it is unlikely that I can get any thoughtful response from our group for at least 60 days. But, I think our people would like to be helpful to you in this area if that would not be too late for your purposes.

Yours sincerely,

ALBERT V. WHITEHALL, *Executive Director.*

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DIAGNOSTIC SURVEY PROGRAM,  
*Beverly Hills, Calif., September 19, 1966.*

HON. MAURINE B. NEUBERGER,  
*Special Committee on Aging,*  
*U.S. Senate,*  
*Washington, D.C.*

DEAR SENATOR NEUBERGER: Thank you very much for your interest in the prevention of disease.

Based upon our experience here at the Beverly Hills Medical Clinic in the past 15 years, during which time we have been doing extensive annual physical examinations of executives for about 60 companies, it is my very firm conviction that in the area of vascular and metabolic disease the state of the art has advanced to the point where we can detect and predict the deteriorative trends in those significant areas of vascular and metabolic diseases which account for approximately 63 percent of our deaths.

The area of malignant and neoplastic disease is not responsive to prediction, but the areas of vascular and metabolic disease are responsive to the detection of deteriorative trends, and also to early reversal, rest or deceleration.

There are a number of criteria which must be embraced in such a program:

1. Accuracy within a range of 2 percent.
2. Periodicity of examination.

3. Recognition of biochemical, psychoemotional, physical and genetic individuality.

4. That approximately 60 to 70 percent of the efforts and funds be devoted to research and teaching, inasmuch as the concept of predictive medicine is a frontier which, up to now, has not been embraced.

The medical and paramedical personnel are those who are currently involved in research and teaching projects in our major research and teaching institutions.

The program should be set up under circumstances of rigid rules with an amount of flexibility which would allow rapid advancement to be made in medical and paramedical areas such as electronics and computerization.

A book is currently in the process of publication under the title "The Art of Predictive Medicine: The Early Detection of Deteriorative Trends," compiled and edited by myself and George R. Cowgill, Ph. D., Sc. D., professor emeritus, Yale University. I will forward you a copy of the book, which will probably be available in a few weeks.

I should be happy to be of any help that I can with respect to your effort in this area, and I should like to say that I find your interest eminently worthy of praise.

I sincerely thank you.

Sincerely yours,

W. L. MARXER, M.D.

FEDERATION OF PROTESTANT WELFARE AGENCIES, INC.,  
New York, N.Y., September 15, 1966.

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: On receiving your letter, I secured the views of the professional staff in our division on aging. On the basis of their thinking, I recommend comprehensive health screening programs reaching large numbers of people.

Because of its potential effectiveness in prevention and early detection, multiphasic screening seems a logical and economic method of attack on chronic disease. Since we do not have a medical consultant on the staff, it is not possible to comment authoritatively on the technical questions you raised.

Among our 57-member institutions providing long-range care to the elderly—homes for the aged and hospitals for the chronically ill—it is the general observation that a majority of patients would not have required institutional care, always an expensive form of care, until a later point had they received appropriate and adequate preventive medical services to forestall unnecessary physical and mental impairment. We strongly support your committee's efforts to find ways to insure early diagnosis and preventive measures.

Very sincerely,

THEODORE PEARSON, *President.*

GROUP HEALTH COOPERATIVE OF PUGET SOUND,  
*Seattle, Wash., September 14, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
 U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in reply to your letter of August 31, 1966.

I believe there is a place for multiphasic health screening in our health care programs of today. However, I believe that such programs must be very carefully studied and carefully related to the population groups screened. otherwise such programs are terribly wasteful of time, effort, and money; and the amount of "new" disease they uncover can be very limited.

In answer to your second question, I definitely believe that screening programs must be age oriented. They also must be sex oriented, and should be somewhat oriented to the occupation of the individual, the area in which the individual lives, and even somewhat altered by the individual's race, religion, personal habits such as smoking, and so forth.

With regard to the under-50, over-50 age grouping, I believe such programs to be truly productive should be even more closely related to age than that. For example, in our program we find that the health needs of people over 65 years of age are quite different than people between 50 and 65. People in their young adult years have entirely different needs and problems. Also teenagers have particular problems and needs. And, of course, we have been involved in close supervision and followup of children in the pediatric age group for many years, now.

In answer to your third question, Group Health Cooperative of Puget Sound has been involved in a screening program for all new members of our organization for the past 15 years. Our program involves a questionnaire and certain basic laboratory procedures and X-ray examinations. We are very interested in the new automated equipment and the use of a computer, and plan to study several of these programs in detail in the near future.

I realize my comments are quite general. However, perhaps you will find them of some value in your committee hearings. If you have need for further specific information and you feel I may be of assistance to you, please feel free to contact me.

Sincerely,

HAROLD F. NEWMAN, M.D.,  
*Director.*

HEALTH INSURANCE PLAN OF GREATER NEW YORK,  
*New York, N.Y., September 12, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
 U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: This is in reply to the questions raised in your letter of August 29, 1966, about the experience in HIP with general physical examinations and screening programs. I want to take up each of the five sets of questions separately.

(1) As mentioned in previous correspondence, our estimate that 20 to 25 percent of our subscribers avail themselves each year of the opportunity to have a general physical examination is based on impressions rather than on a detailed study of the situation in total HIP. The figure was intended to apply to the adult enrolled population. While we do not have data on the extent to which persons in each age group appear for these examinations, a recent review of the situation among those over 65 years of age indicates that 6 percent have a general physical examination annually.

Several years ago we did conduct a study in one of the medical groups affiliated with HIP (Montefiore Hospital Medical Group) on certain aspects of general physical examinations. Results were published in the American Journal of Public Health, volume 52, No. 11, November 1962, in the article "Evaluation of a Mailed Health Questionnaire" by George B. Hutchison, M.D., F.A.P.H.A.; Sam Shapiro, F.A.P.H.A.; and Paul M. Densen, D. Sc., F.A.P.H.A. (Copy enclosed.)

Although this study was not designed to determine the long-term value of periodic physical examinations in reducing disability or mortality, the following observations may be useful to you. On review of the article you may find other items equally pertinent to your subcommittee's interests.

(a) Telephone calls to a sample of adult members of the medical group for the purpose of scheduling them for a physical examination increased the proportion who would ordinarily have an examination from 21 percent (no special effort) to 29 percent (table 2).

(b) Among patients who appeared for the examination and who had not had a general physical the year before the study,<sup>1</sup> 13 percent had negative findings; 49 percent had positive findings but no treatment was recommended principally because the condition was related to a recently concluded illness or there was no current therapy or investigation required for it; and 38 percent had positive findings for which treatment was recommended (table 6).

(c) In almost half of the cases (46 percent) with positive findings and recommended treatments, the condition was judged to be curable under current medical practice in the community (table 7; also, pp. 1915-1917 for listing of conditions in this category). In over half the positive cases (55 percent) the condition was not previously diagnosed. (It should be noted that as a proportion of all persons examined, the number found to have curable diseases represents 16 percent; the number with new disease represents 21 percent.)

(d) Comparison of the nature of the group that responded to the special effort to appear for an examination (study group) with that of the control group for whom no such effort was made led to the following conclusion (p. 1903):

"An objection to such efforts might be that only a select group of patients respond and that these are in large measure patients with a high degree of medical curiosity and little in need of special case-finding efforts. An opposing argument would be that pa-

<sup>1</sup> Figures refer to subgroup of patients for whom a special effort was made to have them appear for a general physical examination.

tients with great need of medical care neglect such care through passive disinterest but would be seen if someone else took the initiative. The findings here indicate that patients will indeed respond to this sort of effort but that neither the pessimistic nor the optimistic prediction is well supported. There is some tendency for the study group patients responding to be more healthy than the control group patients, but a substantial proportion of both groups have conditions that are placed under treatment, and the picture as a whole is not strikingly different between the two."

(2) Enclosed are reprints of an article on our breast cancer screening project and an editorial that commented on this program ("Evaluation of Periodic Breast Cancer Screening with Mammography," by Sam Shapiro, Philip Strax, M.D., and Louis Venet, M.D., *Journal of the American Medical Association*, vol. 195, No. 9, Feb. 28, 1966).

Briefly, periodic breast cancer screening with mammography and clinical examination is being evaluated to determine whether it results in a reduction of breast cancer mortality among women. Representative samples of women aged 40-64 years enrolled in the Health Insurance Plan of Greater New York have been randomly assigned to a study and control group each of which contains 30,000 women. Those in the study group are offered an initial screening examination and two followup examinations at annual intervals. Control group women continue to receive medical care as usual.

More current results of the study than appear in the enclosed article continue to be consistent with the hypothesis that a screening program of the type undertaken results in earlier detection of breast cancers than is ordinarily experienced and that mammography contributes significantly to this situation. Findings in the initial screening examinations of 19,500 women have led to 49 histologically confirmed breast cancers (rate of detection, 2.50 per 1,000). Twenty of these cases had biopsy recommendations on radiologic evidence only, 20 on clinical evidence only, and 9 on clinical and radiologic evidence. No evidence of axillary node involvement was found in 80 percent of the radiology-only cases; 70 percent of the clinical-only cases; and 18 percent of the clinical and radiologic cases. The control group has a breast cancer incidence rate of 1.44 per 1,000 person-years of exposure. About 44 percent of the histologically confirmed control cases had no nodes involved. The corresponding figure in general population studies is 40 to 45 percent.

These relationships are encouraging. However, the crucial question in this evaluation study is whether mortality from breast cancer is lowered because of the screening, and definitive findings on this issue will require at least 5 years of followup.

(3) Our centralized clinical laboratory is now being used for blood chemistries and other laboratory tests, including Papanicolaou tests requested as part of the general physical examination (routine blood and urine tests are carried out by technicians in the medical groups). Use of automated equipment has resulted in economies and increased reliability of results. Under consideration is a research project in which an assessment would be made of the cost and benefits of carrying out a broad spectrum of blood chemistries whenever a blood sample is drawn for any reason; i.e., in connection with a general physical examination or when ordered by a physician for a patient with symptoms.



(4) In our judgment important deterrents to increasing the proportion of the adult population that receives comprehensive physical examinations include high cost, inconvenience to the patients, and a serious drain on physician time. The type of program that Senator Harrison A. Williams has been interested in appears to offer reasonable possibilities for overcoming these problems on a broad community basis. It is our assumption that any examination program would fully utilize equipment and techniques which conserve physician time and reduce costs. Also, I would expect that a great amount of attention would be given to the need for gaining the support of physicians in a community for a program of general physical examinations and for assuring a close tie between the patient's personal physician and the program. One of the outcomes would be the encouragement of patients to appear for periodic general physical examinations.

(5) Our staff would be interested in cooperating actively in the establishment of a model health protection center in New York City that is publicly supported. I have in mind the possibility of utilizing the HIP setting with its 700,000 members (470,000 adults). The diversity of our population and its geographic distribution in the New York area provide unusual opportunities to test procedures and their effectiveness in increasing responsiveness of the population to a physical examination program and in determining the type of observations that will be most meaningful to the patient's personal physician. Our current practices would in effect be replaced by a new organizational structure for periodic examinations and a new approach to both physicians and patients.

Please feel free to call on Mr. Sam Shapiro or myself for any further information regarding the above points.

Sincerely yours,

JAMES BRINDLE, *President.*

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KINGS COUNTY RESEARCH LABORATORIES, INC.,  
*Brooklyn, N.Y., August 31, 1966.*

Senator MAURINE B. NEUBERGER,  
*Chairman, Senate Subcommittee on Health of the Elderly,*  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: The kind of computerized automated medical laboratory facility (envisaged by Senator Williams) receiving human specimens, performing analyses, and reporting test results to physicians on a daily basis, has been in existence for some time. It is our laboratory.

Kings County Research Laboratories has been serving the medical profession for more than 40 years. We were among the first to utilize the autoanalyzer. We were the first private laboratory in the United States to perform single and multiple blood analyses under computer control. We were the first to make available to physicians in their offices a daily laboratory service such as is described or envisaged by Senator Williams. More than 1,500 practicing physicians avail themselves of our laboratory facilities on a daily basis with its incidental daily pickup and delivery courier service. Hundreds of others utilize the mails to transmit their patients' specimens to our laboratory for analyses and test results are reported to them by return of mail.

Our laboratory facilities have been utilized to screen a segment of a densely populated area (Bushwick Health Center, Brooklyn, N.Y.) with 10 analyses being performed on a single sample of blood serum. The reports were then made available to the physicians of such persons.

Within the next few months we expect to make available to our physician-subscribers 20 analyses of a single sample of blood serum. The report of such multiple blood test results will be furnished on our form of IBM prepunched report card. These blood tests and other analyses performed at our laboratory are invaluable aids to the practicing physicians in making diagnoses.

Our equipment and method of operation are described in the accompanying booklets and reprints. We constantly are changing and improving with a view toward making laboratory analyses more accurate and reliable at a fraction of the heretofore usual or conventional fees charged by hospital laboratories and the like.

Respectfully yours,

MURRAY A. BLAIVES, *Codirector.*



 **KINGS  
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LABORATORIES, INC.**  
700 SIXTH AVENUE BROOKLYN NEW YORK 11210

Dear Doctor:

After more than ten years of the successful use of automated laboratory equipment, we have reversed the current trend of high, ever-mounting costs for clinical laboratory analyses.

The KCRL 10-in-1 Series enables you to provide your patients with an accurate, comprehensive blood chemistry study at an amazingly low fee.

This booklet explains how and why we can do this. We invite your critical evaluation and suggest that you try at least one KCRL Series...so that you can see for yourself what a truly outstanding medical value it really is.

Kings County Research Laboratories, Inc.

  
Director

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**The KCRL  
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involves:**

- **Personnel...** highly skilled technicians, bacteriologists, and chemists
- **Equipment...** most modern clinical laboratory equipment available...including Auto-Analyzers
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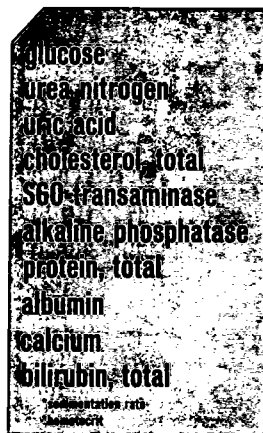
With our automated system of analysis  
we can provide you with a  
**10-test biochemical profile of a patient**  
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You can use the KCRL 10-in-1 Series  
as "Preventive Medicine"  
to periodically check the  
health of  
your patients...

or...

when a  
patient  
requires  
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tests.

The following pages explain why and how we can  
provide you with this 10-in-1 service at such an  
amazingly low cost... and how you (and through  
you, your patients) can take advantage of this.



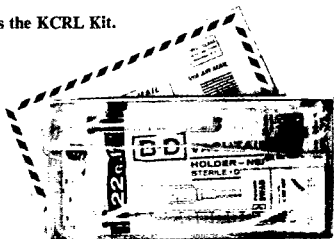
\*you perform (at your option)

"The combination of the sedimentation rate with the hematocrit is excellent for screening purposes for the two procedures give information about the plasma proteins, the degree of anemia, the estimation of the white cell count and the presence of jaundice, hemolysis and lipemia."

From *Textbook of Clinical Pathology*,  
S. E. Miller, M.D., The Williams & Wilkins  
Co., 1960, P. 49.

## Putting the KCRL 10-in-1 Series to work:

This is the KCRL Kit.

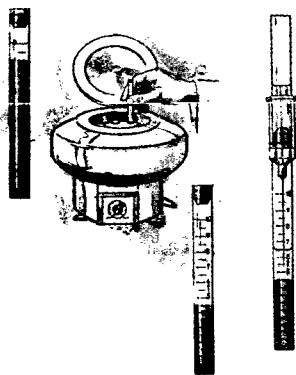
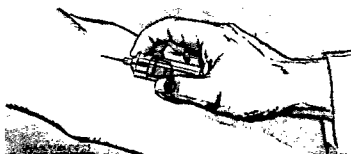


Each KCRL Kit contains everything you need to take one specimen of blood from a patient . . . plus an IBM card with your name pre-printed on it . . . and complete instructions. (A description of the KCRL Kit is given on page 9.)

We provide you with a supply of KCRL Kits . . . and keep your supply current. When you decide a patient should have a 10-in-1 Series, you carry out step 1 and we carry out step 2.

### 1. YOU (or your assistant)

- a** . . . print patient's name on the IBM card.
- b** . . . take a specimen of the patient's blood, using the special graduated *Vacutainer*<sup>®</sup> specimen tube provided for this purpose in the Kit.
- c** . . . perform sedimentation rate and hematocrit, if you desire. (Complete instructions are provided in every Kit.)
- d** . . . centrifuge the blood sample to separate the red blood corpuscles from the plasma. (Note: if you do not have a centrifuge, see bottom of next page.)
- e** . . . transfer the plasma to a second tube by means of the long-needle *Vacutainer* Holder Assembly.
- f** . . . place the tube of plasma and IBM card in the kit box (addressed, postpaid to KCRL) and mail.



\**Vacutainer* is a registered trademark of Becton, Dickinson & Co.

## 2. WE...

**a** ... pick up your specimen from our special post office box ... and rush it to our laboratories.  
(Pick-ups are made several times daily.)



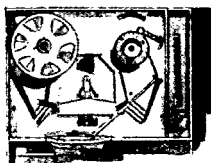
**b** ... route the specimen immediately to our IBM DEPARTMENT.  
Here the specimen receives a lab identification number which is key-punched onto the patient's IBM card together with his name. (Your name and number are already on the card.)



### C THE REST IS AUTOMATIC



The specimen is then conveyed to our AUTOMATED LABORATORY. The 10 tests are automatically performed on the one specimen of plasma ... and the test results from each of the AutoAnalyzers are automatically fed into the IBM computer.



Upon completion of the 10-test cycle, the IBM computer prints the test results on the patient's IBM card.

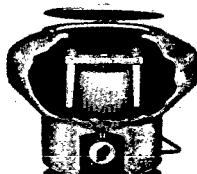


The completed IBM card is immediately mailed back to you, usually within hours after receipt of specimen.

#### If you don't already have a centrifuge...

We have made arrangements for any physician using KCRL 10-in-1 Series to order a centrifuge, ideal for handling the normal work load of routine tests.

For complete ordering information, write to KCRL.



5

## How we can afford to do these 10 tests for only \$9.50



### SPECIAL AUTOMATED EQUIPMENT

KCRL has developed a completely automated and continuous system of 10 analyses capable of receiving, handling, testing and presenting results on blood specimens sent in by physicians.

The "heart" of this new KCRL system is the Technicon Auto-Analyzer. This instrument has achieved an outstanding reputation for performing automated analytical procedures. (See Gradwohl's Clinical Laboratory Methods and Diagnosis, 1963 ed., pp. 301-13.) Previously, however, the use of continuous automation has been limited usually to analyzing specimens for one determination.

NOW, AT KCRL, we can automatically and continuously do 10 determinations on a single sample of blood.

### TREMENDOUS SAVINGS IN TIME

It averages only 2 minutes for KCRL to complete the 10 determinations in a 10-in-1 Series. If these same 10 determinations were done in the usual routine laboratory manner, it would take one technician anywhere from 2 to 3 hours to complete.

This tremendous saving in time and the accompanying saving in labor costs is one of the principal reasons why it is possible to offer the KCRL 10-in-1 Series at the low fee of \$9.50.

Another advantage in the use of this special automated equipment is the increased accuracy and precision of the results. In addition, the factor of human error is largely eliminated.

### LARGE VOLUME

Justification for the great expense involved in setting up and maintaining this automated, continuous, 10-in-1 Series is necessarily based on a large volume of tests. As a general rule, the more tests we do, the less it costs us per test. And we pass these savings on to your patients, through you.

Thus, in the final analysis, it is the factor of large volume that makes the concept of a 10-in-1 Series practical and economically feasible.

\*T.M. Reg. U.S. Pat. Off. Technicon Instrument Corp.



### IBM DATA PROCESSING MACHINES

Coordination of high-speed IBM Data Processing machines with the KCRL 10-in-1 AutoAnalyzer system greatly reduces the high cost of clerical work. The IBM machines completely eliminate a major portion of time-consuming procedures, for example, interpolating and recording of test results, addressing, billing, etc.

No sorting of specimens required. When a 10-in-1 Series specimen arrives at KCRL in the familiar Kit box, it goes directly to the 10-in-1 Receiving Dept. where it is immediately processed. The specimens do not have to be classified into various test batteries because each blood specimen undergoes the same 10 determinations and the AutoAnalyzer is set up to continuously and automatically perform these 10 determinations. The savings and added benefits inherent in this method are passed on to your patients through you, the doctor.

### YOU HELP KEEP THE COST DOWN, TOO

That's right. The few simple operations that you (or your assistant) are called upon to do also help us achieve this outstanding medical value.

You print your patient's name directly on the IBM card. This saves us time; no transferring of patient's name from label to lab sheet to result form.

You take a sample of blood, centrifuge it, draw off the plasma. Therefore, the specimen is ready for analysis when it arrives at our laboratories.



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## STABILITY OF PLASMA MAKES LONG-DISTANCE TESTING POSSIBLE

The plasma specimen that you prepare for the KCRL 10-in-1 Series is stable for many days (if you follow the simple directions). It has been established that if the blood specimens are taken as directed, the chem-

ical constituents to be tested will remain stable for at least seven days . . . and may be mailed to our laboratories without being affected by temperature or time.

References: 1. Roger F. Weisberg, and A. Morrison, *The Stability of Glucose in Serum*, *Clinical Chemistry*, June, 1962, P. 334.  
 M. J. Lynch et al, *Mailing of Biologic Specimens*, *Medical Laboratory Technology*, W. B. Saunders Co., 1963, P. 16.  
 A. Cantow, M.D., and M. Trumper, Ph.D., *Blood Glycolysis*, *Clinical Biochemistry*, W. B. Saunders Co., 1969, P. 55.  
 Dep. of Army and Air Force, *Preservation of Blood*, *Methods for Medical Laboratory Technicians* (TMB-227; AFM 160-14) Aug., 1951, P. 204.

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## ASSURING TEST ACCURACY AND RELIABILITY

The IBM Computer at KCRL is programmed to carry out a continuous automated system of quality control. High and low standards plus quality control specimens of plasma are automatically tested with each group of specimens processed at the KCRL Automated Laboratory. Thus, both test results and laboratory

procedures are continually checked for accuracy and reliability.

Automation, inherent in the KCRL system, also greatly enhances test accuracy and reproducibility since, with automation, the factor of human error is largely eliminated.

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## WHY THESE TEN TESTS!

The ten tests in the KCRL series were specifically selected to present a broad spectrum of the patient's present biochemical status. These tests determine the

direction further studies should take and could indicate those systems which are subject to stress.

### KCRL 10-IN-1 SERIES

<i>Test</i>	<i>Normal Values (under fasting conditions)</i>	<i>Test</i>	<i>Normal Values (under fasting conditions)</i>
albumin	3.5-5.0%	urea nitrogen	10-20 Mgms. %
alkaline phosphatase	2-12 King-Armstrong Units	uric acid	2-6.5 Mgms. % (Men)
bilirubin, total	0.1-1.0 Mgms. %		2-5.5 Mgms. % (Women)
calcium	9-11.5 Mgms. %	hematocrit	40-50 vol. %—average—45 (Men)
cholesterol, total	150-250 Mgms. %		37-45 vol. %—average—41 (Women)
glucose	70-110 Mgms. %	sedimentation rate	0-9mm. in 1 hr. (Men)
protein, total	6-8%		0-20mm. in 1 hr. (Women)
SGO-transaminase	4-40 units		

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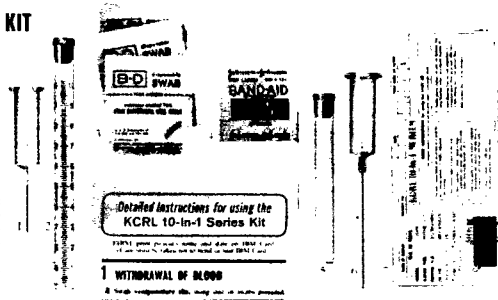


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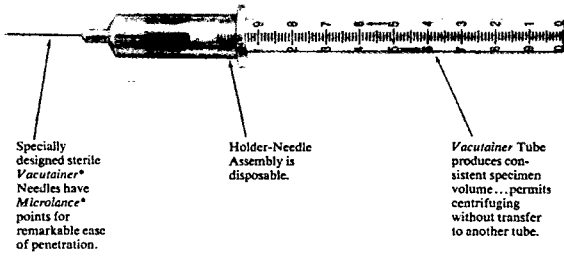
**This is the disposable KCRL KIT**

- fast, easy to use
- minimum of handling
- no contamination or spillage problems

1 Sterile *Vacutainer* Holder-Needle Assembly (for drawing blood); 2. Special graduated KCRL *Vacutainer* tube; 3 disposable swabs; 4 spot Band-Aid; 5 plasma receiving tube; 6 *Vacutainer* Holder-Long Needle Assembly (for transfer of plasma); 7 IBM card; 8 Detailed instructions.



**Vacutainer tubes make blood collection and plasma transfer easier... simpler.**



Specially designed sterile *Vacutainer*\* Needles have *Microlance*\* points for remarkable ease of penetration.

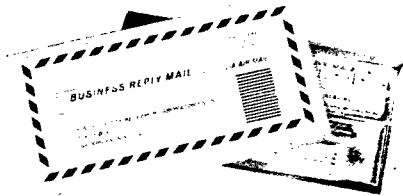
Holder-Needle Assembly is disposable.

*Vacutainer* Tube produces consistent specimen volume... permits centrifuging without transfer to another tube.

\**Vacutainer* and *Microlance* are registered trademarks of Becton, Dickinson & Co.

**The Kit box also serves as a postpaid specimen mailer.**

- You send back to KCRL (1) specimen tube of plasma (placed in transparent plastic mailing pouch) and (2) IBM card (after printing patient's name and date). Everything else is disposable.



*KCRL 10-in-1 Series***A giant step forward in Diagnostic and Preventive Medicine**

The importance of clinical laboratory tests in an effective program of health evaluation and health maintenance has long been recognized. But the costs of competent laboratory services are not negligible. And a complete

series of tests only for preventive purposes was considered beyond the practical economic means of most patients.

The advent of clinical automation brought hope of remedying this situation. Tests were adapted to automatic processing on electronic instruments . . . enabling determinations to be carried out much faster and more accurately. While these instruments were costly, they were justified on the basis of increased volume which would also greatly reduce the cost per test.

**Periodic Health Evaluation.** The KCRL 10-in-1 Series is a major breakthrough in showing the economic practicality of laboratory tests in a sound program of periodic health evaluation. It meets all the important requirements\* for such a program:

1. Capable of detecting dysfunction of the major organ systems at an early stage
2. Suitable for use at regular intervals without harm to the individual
3. Relatively inexpensive
4. Causes little inconvenience to the patient and not wasteful of the physician's time

5. Yields information upon which health counseling can be based.

\*From a paper entitled "The Role of the Laboratory in Health Evaluation" by Thomas M. Peery, M.D., Department of Pathology, The George Washington University School of Medicine and The George Washington University Hospital, Washington, D.C. . . . given at the Technicon International Symposium, New York, N.Y., Sept. 16-18, 1964.

Within a limited range there is a "norm" for each procedure. For example, just as an EKG taken when the patient is in good health is desirable for comparison when cardiac disease is suspected, so a base line should be established for chemical values of the blood constituents. Any definite variation at a later date may make predictable certain disease entities.



Now, for less than ten dollars, the KCRL 10-in-1 Series provides a broad profile of the patient's blood chemistry. No longer do you, the doctor, have to consider the patient's ability or inclination to pay a \$35 or \$40 laboratory bill for what he considers only a routine check-up.

The KCRL 10-in-1 Series heralds a new era in medicine wherein the diagnostic aspects of laboratory tests are brought within the economic reach of practically everyone.



## Nation-Wide KCRL "Per-Test" Service

KCRL also offers physicians a wide range of clinical laboratory tests on a "per-test" basis. With this Service, you can order one or any number of the tests listed below. Physicians will find the KCRL "Per-Test" Service both reliable and economical either when they require specific

individual tests or when they wish to check positive or "abnormal" results from a KCRL 10-in-1 Series. A price list and complete details about the KCRL "Per-Test" Service will automatically be sent to all physicians who use the KCRL 10-in-1 Series.

## BIOCHEMISTRY

Bilirubin, Total  
Direct  
Indirect  
Bromsulphalein (BSP)  
Calcium  
Cephalin Flocculation  
Chloride  
Cholesterol, Total  
Creatinine  
Fibrinogen (plasma)  
Gamma Globulin  
Glucose  
Glucose Tolerance Test  
Iodine, Protein Bound  
Iron  
Iron Binding Capacity  
Lactic Dehydrogenase  
Lipids, Total  
Phosphatase, Acid  
Phosphatase, Alkaline  
Phosphorus  
Potassium  
Protein Electrophoresis  
Protein, Total with A/G  
Sodium  
Thyro-Binding Index (T-3)  
Thymol Turbidity  
Transaminase SGOT-T  
Transaminase SGP-T  
Urea Nitrogen (BUN)  
Uric Acid

## CLERICAL

Routine (Nose, throat, ear, eye,  
wound, abscess, urethral,  
sputum, urine, stool,  
cough)

## Blood

Sensitivity Tests

## SMI ARS

Nose

Sputum

Throat

Urethral

Vaginal

## SERUM

Ova & Parasites

Occult Blood

## IMMUNOLOGICAL

Complete Blood Count (CBC)

Differential

Erythrocytes (RBC)

Hematocrit

Hemoglobin

Hemoglobin Electrophoresis

Leukocytes (WBC)

Lupus Erythematosus (LE Prep)

Platelets

Reticulocytes

## AGGLUTINATION &amp; SEROLOGICAL

Anti Streptolysin Titer (ASO)

Blood Group & Rh Factor

Cold Agglutination

Coombs, Direct

Coombs, Indirect

C Reactive Protein (CRPA)

Febrile Agglutination

Heterophile Antibodies (HAT)

Latex Fixation

Serological Test for Syphilis

## URINARY

Addis Count

Bence-Jones Protein

Catacholamines (VMA)

Concentration Test

Diagnex (blue)

17 Keto Steroids (17 KS)

17 Ketogenic Steroids

Phenacetyl sulphathiazole (PSP)

Porphyria

Pregnancy

Routine, microscopic

Routine, chemical

Serotonin

Sulkowitch

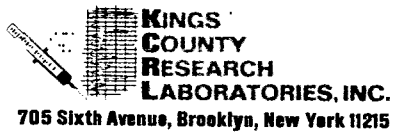
Urobilinogen



## the KCRL Story

Kings County Research Laboratories, established in 1928, is a large clinical laboratory located in Brooklyn, New York . . . staffed by highly skilled technicians . . . utilizing the most modern clinical laboratory equipment available and the most accurate laboratory techniques and procedures.

KCRL services physicians locally in the Metropolitan New York Area on a "pick-up and delivery" basis and nationally by mail. If you are interested in obtaining information about these low-cost KCRL services, write to KCRL.



ARLINGTON, VA., *September 29, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: The subject of your hearings on modern screening methods to help prevent illness is of vastly greater importance than is implied by concentration on the technical-medical aspects. It is part of a new branch of economics, hitherto neglected, which may be summarized by the phrase: "investment in human capital." In the health section of the Rand Corp.-Budget Bureau study on "program budgeting" (p. 176), "more and better control and prevention" of disease is presented not only in the interest of health, but also in the interest of economy. In the preface to this study, Mr. Charles L. Schultze, Director of the Bureau of the Budget, directs attention to the President's memorandum of August 25, 1965, to the heads of all Federal Government departments and agencies that they should introduce a new planning-programing-budgeting system in Government." One aspect of this, according to the Budget Director, is "systematic accuracy of objectives and alternate means of attaining these objectives."

Beginning with a study I was assigned to do in the Social Security Administration, where my ideas were ignored, and continuing as a private citizen, I have been harping on this subject in letters to newspaper editors and in material in the records of the House Ways and Means Committee, Senate Finance Committee and the Joint Economic Committee. I referred to testimony before your subcommittee in a letter to the chairman of the Senate Finance Committee. A witness appearing before your subcommittee discussed a question I had raised which was in the record of the Ways and Means Committee, but I was frustrated in bringing question and answer together, that is, in promoting "dialog."

My letter to the chairman of the Senate Finance Committee (pp. 1123-1125, 89th Cong., 1st sess., hearings, et cetera, on H.R. 6675, "social security") is critical of prevailing cost concepts in the health field, and of the usurpation by the actuary of the role of the economist. "In actuarial parlance, every benefit to a human being is a cost to a fund but in economic language every benefit has a cost we want to minimize," I said. Senator Russell B. Long, now chairman of the Finance Committee, made similar points on the Senate floor just before the Social Security Amendments of 1965 were passed. He emphasized "cost burden" in place of "cost" (often most ambiguous) and said the medicare program "can better be judged by an economist than an actuary." To date, his words have been unheeded in the implementation of medicare.

The records of the hearing before the Joint Economic Committee, 89th Congress, 2d sess. (Feb. 23, 1966), "An Economic Symposium: Twentieth Anniversary of the Employment Act of 1946," pages 101-210, show that Dr. Kermit Gordon, Chairman of the Health Insurance Benefits Advisory Council, "would be happy to discuss the administration of the medicare program" with me. I had raised the question of

the relationship between "actuarial soundness" and "economic feasibility." At first, Mr. Robert J. Myers, Chief Actuary of the Social Security Administration, claimed I was exaggerating the difference between these two; but in his last letter to me, he said that certain figures useful for "actuarial projections" are not so for determining "economic feasibility." As yet I have been unable to get sufficient discussion of the economics of medicare from anyone officially concerned with it. Nor can I find any evidence that even a first step has been taken in the direction of the objective of the President's memorandum of August 25, 1965. However, I note that there will be in the future a reexamination of our "national health effort in making the policy decisions that are inevitable when resources in manpower, research capability, and funds are not unlimited." The Assistant Secretary for Program Coordination, HEW, Mr. William Gorham, states this in the foreword of the study, "Estimating the Cost of Illness," which its author, Mrs. Dorothy P. Rice, presented to your committee on September 20. The very title of this study, presented by a representative of the Social Security Administration, shows that the "reexamination," Mr. Gorham speaks of, has not been begun in that agency. What is missing is "systematic accuracy" of terminology, an essential first step toward the Budget Director's objective of "systematic accuracy of objectives and alternate means of attaining these objectives."

The faulty terminology of "Estimating the Cost of Illness" implies that President Johnson was boasting of "higher costs," when in fact he did boast that since he entered office health expenditures by the Government had doubled. According to this study, the "expenditures for the various health services" are identical with the "direct cost of illness." But spending more for health when you are getting more for your money does not mean higher costs. The rich do not have higher costs than the poor although they spend more money. Human capital is like nonhuman capital; when more is spent to improve machinery this enables it to produce at a lower cost.

The tables in this study giving "total economic cost" of various illnesses involve the addition of "direct costs," which are actual expenditures to "indirect costs" which are imputed value figures. I doubt that economists on Mr. Gorham's staff will agree that this is a true "total economic cost" of health services in any sense useful in cost-benefit analysis.

Numbers are tossed at us to and by the U.S. Congress and nobody cares to clarify their meaning so that alternate choices may be reasonably compared. One instance of this is the statement appearing in reports of both the House Ways and Means Committee and the Senate Finance Committee that "hospital costs have been increasing at a faster rate than earnings." Even an exact differential is given for this, 2.7 percent (in fact, percentage points are confused with percent). The arithmetic turns out to be correct but nobody knows what economic sense it makes.

I request inclusion of this letter into the record of your hearings in order to invite more public discussion of a neglected subject.

Yours sincerely,

SIDNEY KORETZ.



LAHEY CLINIC FOUNDATION,  
LAHEY CLINIC DIVISION,  
*Boston, Mass., August 22, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Your letter of August 17th, relative to your committee hearings in September on a national program to detect and prevent chronic disease, utilizing multiphasic health screening techniques, reaches us here at the Lahey Clinic Foundation at a time when we are definitely vitally interested in establishing just such a program and have known for some time of the importance of such a program.

For many years we have been interested in health surveys and have conducted these very extensively in certain groups of patients and have more recently become vitally interested not only in determining more accurately their value in the detection and prevention of disease, but also in a method of automation utilizing a computer. For instance, at the present time we are planning definitely an exploratory and research effort along these lines with the newly organized medinet service in which physicians of the foundation will provide the multiphasic screening program and the medinet will supply the equipment and the computer technology that is involved.

We have even greater concern, however, about the deficiencies of the present standard methods of disease detection and evaluation, and it is in this area that we plan to intensify our research to make these tests far more reliable and meaningful, which is the basis for any success in this important program. It is our firm conviction that this is a most important aspect of medicine of the future and we will need support and help in financing these phases of development of this vital program.

I believe that Senator Harrison Williams' proposed legislation to establish regional and community health protection centers is an excellent expansion of these programs, but these can only be as successful as the automated screening techniques, and especially the detection tests themselves which can be relied upon to detect these serious diseases in a stage when preventive measures can be instituted.

I wish your committee every success in your evaluation of this important proposed legislation.

Sincerely,

HERBERT D. ADAMS, M.D.,  
*Director.*

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LAHEY CLINIC FOUNDATION,  
LAHEY CLINIC DIVISION,  
*Boston, Mass., September 1, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: In response to your letter of August 25 expressing your interest in further information regarding our plans

for the development of our own multiphasic screening health program, I must be frank to say that we have reached only a preliminary discussion stage with the Medinet Service and hopefully over the next 10 to 12 months we might possibly work out some kind of a program with them. We are simultaneously carrying on a similar exploration with IBM who currently operates our basic computer system. The development of such a pilot program will be extremely costly in time taken by our Staff and our computer personnel and for research and equipment.

As far as I know, the only medical multiphasic screening program that is now in actual operation is at the Permanente Medical Clinic Group of the Kaiser Medical Foundation, 3772 Howe Street, Oakland, Calif., who now have in operation a multiphasic automated program for obtaining the history and many of the usual laboratory and physiological tests that are widely used in a satisfactory basic examination. This has been reported in detail in the *New England Journal of Medicine*, volume 274, No. 4, pages 194-198, January 27, 1966. Some of our staff have been actively looking into all available information on this subject as well as having studied the Permanente program. This Permanente program certainly has demonstrated that this is feasible, although in setting up our own multiphasic screening program, we feel that this would not be complete without an added phase in which this clinical automated data would be interpreted and applied to the patient by a highly experienced physician, thereby making a final clinical application of this data and keeping the proper relationship between patient and physician, which as you know, is so essential.

The other problem that this has raised for us is just how effective these screening tests are in detecting the various common diseases. Some of these tests such as those for diabetes are quite effective. However, one of the most serious deficiencies is in the detection of the degree of coronary sclerosis which may be advanced, but still asymptomatic, and the common tests such as electrocardiogram are commonly of no value in detecting the presence or the extent of the disease. To state this deficiency graphically, there are cases in which all of these screening tests are negative on this examination and the patient has died suddenly with a "heart attack" (coronary occlusion) within a day or two of this examination, which certainly illustrates better than anything else a most serious deficiency in these tests. Another area in which the incidence of the disease is very high and the need for a reliable screening test is great, is in cancer. There are improved tests in this disease but there still is no good test to invariably pick up cancer at a very early stage. There are other similar important instances of such deficiencies in testing programs.

It is in these specific areas, particularly in the assay of cardiac reserve and in the detection and localization of cancer in its asymptomatic phase that we must concentrate our efforts and research to improve these tests of detection if our screening health surveys are to be of any significant value.

This, in brief, presents some of the problems as we see them today in respect to such health screening examinations and we feel that this should be one of our primary efforts to carry out research and improve

this valuable method of maintaining the health of the population of our country.

Sincerely,

HERBERT D. ADAMS, M.D.,  
*Director.*

MAYO CLINIC,  
*Rochester, Minn., September 12, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: Dr. Victor Johnson recently retired as the Director of the Graduate School of the University of Minnesota. Dr. Drew Miller of that organization has referred to me your inquiry with the questions concerning the health of the elderly and programs currently studying techniques by which this may be assessed. Because of my interest in executive health programs, this inquiry has been referred to me for reply.

You have mentioned in your letter that a program is being undertaken by the Kaiser Foundation in California. Certainly this is one program which should deserve your interest and that of your committee.

There are other programs under consideration which likewise might be of interest to you. Some studies have been designed to study the value of periodic health examinations, particularly in industry and with respect to executives in industry. A number of clinics cooperating in this type of program have joined together with physicians in the U.S. Public Health Service as a study group, meeting annually for over 10 years. Acting chairman of this study group is Dr. Norbert J. Roberts, associate medical director of Standard Oil of New Jersey, 30 Rockefeller Plaza, room 2400, New York, N.Y. I am sure he could provide you with interesting information of the study to date.

Also the Life Extension Examiners in New York City has had an experience of the type you are studying. I would suggest that you get in touch with them:

I trust this information will be helpful for you and your committee. If I can be of further service, please let me know.

Yours sincerely,

HADDON CARRYER, M.D.

NEW YORK, N.Y., *September 15, 1966.*

HON. MAURINE B. NEUBERGER,  
*U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: The materials enclosed are submitted for your consideration in the Health of the Elderly Subcommittee's forthcoming inquiry into health screening methods.

I am Keeve Brodman, clinical assistant professor of medicine at Cornell University Medical College; physician to out-patients at the

New York Hospital-Cornell Medical Center; president and director of research at the Medata Foundation; fellow of the New York Academy of Medicine; fellow of the New York Academy of Science; fellow of the American Psychiatric Association; fellow of the American Medical Association; associate member of the Institute for Electrical and Electronic Engineers; born in New York City, August 5, 1906; B.S., College of the city of New York, 1927; M.D., Cornell University Medical College, 1931; active Army service, 1942-44, major, M.C.; research for the O.S.S., 1945-46; major time spent in research, 1927 to date; more than 50 publications beginning in 1928, those referring to screening methods listed on page 15 of the enclosed manual for the Medical Data Screen.

This Medical Data Screen Manual describes a method, presently in operation, that rapidly and inexpensively makes mass comprehensive screenings of people for 100 common diseases. Within 6 months this method will be able to service half a million people a week. The method is fully automated and puts no strain on the time or the resources of either the medical profession or of patients. It makes use of a questionnaire to collect a medical history and a computer to analyze the data collected, and brings significant information on symptoms and diseases to the physician's attention for his decisions and utilization. Because it detects early disease symptoms, the Medical Data Screen facilitates the control and prevention of diseases.

The enclosed manual for the medical data screen contains the desired information in detail. Also enclosed are several publications on the method and specimen copies of the computer report to the physician. It is estimated that the range of cost for service on the medical data screen will be between \$8 and \$12 per patient.

I am convinced that the simplicity and effectiveness of the medical data screen make it a useful instrument for the control of disease.

Sincerely yours,

KEEVE BRODMAN, M.D.

The Journal of the American Medical Association

September 12, 1966

Computer Contribution

## Computer-Aided Diagnostic Screening for 100 Common Diseases

*Keeve Brodman, MD, and Adrianus J. van Woerkom, PhD*

The heavy load of his professional duties often leaves the practicing physician little time to question each patient fully about symptoms other than those associated with the present illness. Consequently, unless the patient himself brings additional symptoms to the attention of the physician, diseases, some of grave importance, may be overlooked.

This communication describes the results of a study of the effectiveness of a multiple-screening method devised to identify patients who have complexes of symptoms significant for 100 diseases frequently encountered in medical practice. The objectives of the method are to screen patients for these diseases effectively, rapidly, and without strain on the physician's time or facilities.

The method, called the Medical Data Screen (MDS), is in essence a laboratory-type procedure, in which a questionnaire is used to collect comprehensive histories and a computer is used to categorize and analyze items of history for each of the 100 diseases. The study of its effectiveness was undertaken by the comparison of diseases identified by the method and those diagnosed by physicians.

### Description of the Study

The data for this study were obtained from the practices of four internists of Cornell University Medical College and the New York Hospital who act as personal physicians to their patients. Additional material for study was provided by a busy general practitioner with an office in New York city.

Each of the physicians asked unselected office patients to complete a medical questionnaire. The patients of the four internists are of middle-income status and range in age from 13 to 65 years. Those of the general practitioner are of lower educational and socioeconomic status than those of the internists. The internists provided data on 208 patients, while 44 cases were drawn from the general practitioner.

From the Department of Medicine, New York Hospital-Cornell Medical Center, New York.

Reprint requests to 1300 York Ave, New York 10021 (Dr. Brodman).

The questionnaire, called the Medical Data Index (MDI), is a descendant of the Cornell Medical Index, which was developed in 1947 to elicit a general medical history.<sup>1</sup> The MDI collects information specifically for the 100 diseases dealt with in this study. It consists of 150 questions, grouped in categories that refer to organ systems or classifications of diseases, is self-administering, and requires of a patient only that he circle "Yes" or "No" after each question.

For this study, the information on the questionnaire obtained from the patients was processed and analyzed by a computer programmed with the MDS. The programming and statistical methodology involved have been described in relation to the Cornell Medical Index<sup>2-4</sup> and for this study has not been modified for the MDI.

Briefly, the significance of a symptom  $j$  for a disease  $k$  is measured by

$$S_{jk} = [(p_{jk} - P_k) / 2\sqrt{P_k}] - 1,$$

where  $p_{jk}$  is the relative frequency of the symptom in the disease and  $P_k$  is the relative frequency in all patients generally. The factor 2 in the denominator yields a convenient scale and the subtraction of 1 eliminates doubtful values. Each significance value is then corrected for age and all values for a disease are summed, after which the sum is compared to the average sum found with patients who were diagnosed by physicians as having the disease. A sum which equals or surpasses the average sum constitutes an identification of the disease in the patient being tested.

Computer output sheets containing the names of the diseases identified for each patient by the MDS method were given to the physicians. Each of the physicians then consulted his records and indicated for each disease identified for a patient whether or not he had diagnosed the disease. He noted whether he had diagnosed the disease (A), had diagnosed not this but a differential disease (B), did not know whether or not the disease was present (C), or had evidence from his examination of the patient that neither this disease nor any closely

Table 1.—Distribution of Sex and Age, by Internist

	Internist				All
	1	2	3	4	
Males, %	36	48	41	47	40
Females, %	64	52	59	53	60
Average age males, yr	52	54	42	42	47
Average age females, yr	52	53	39	38	46
No. of cases	83	23	68	34	208

allied disease was present (D). Further, the physician listed all the diseases he had diagnosed for the patient and that the MDS method had not identified (E if the disease is one of the 100 considered by the method and F if it is not).

It is recognized that showing the computer output to the physician introduces a bias in favor of the physician. In a preliminary study in which data from the method and those from the physician were collected independently, the physician eventually had to be asked about diseases that were identified by the method and that he had not named. With the four internists almost all of these diseases fell into categories B, C, or D.

The diseases considered for this study are the 100 diagnosed most frequently in the adult outpatient departments of the New York Hospital during the years 1948 to 1949 and 1956 to 1958.

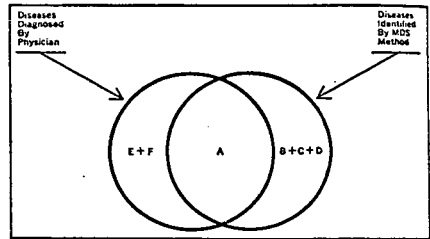
### Results

Table 1 shows the variations, by physician, of sex and age of the population studied. Patients of physicians 1 and 2, who practice in the city, have a significantly greater average age than those of patients of physicians 3 and 4, who practice in the suburbs. Physicians 1 and 2 are themselves somewhat older than physicians 3 and 4.

The relation of the number of diseases diagnosed by physicians and identified by the MDS method is shown schematically in a Venn diagram in the Figure and numerically in Table 2. In the Figure the area A, showing the intersection of the diseases which were both diagnosed by the physicians and identified by the MDS method; represents a measure of the effectiveness of the screening method in identifying the diseases diagnosed by physicians.

This relation between the number of diseases diagnosed by the physicians and identified by the MDS method is shown numerically in the first three lines of Table 2. Table 2 shows that all the physicians diagnosed an average of 2.9 diseases per patient and the MDS method identified an average of 3.8 diseases per patient, and of these an average of 1.7 diseases per patient represents the intersection, that is, the method identified an average of 1.7 diseases per patient that the physician had diagnosed.

The difference among physicians in the average number of diseases per patient diagnosed



Diseases diagnosed by physicians and identified by the Medical Data Screen (MDS) method.

( $A+E+F$ ) is small and not significant statistically, with the possible exception of physician 2. There is, however, a larger average number of diseases per patient identified by the MDS method ( $A+B+C+D$ ) for physicians 1 and 2 than for physicians 3 and 4. It is not clear whether this difference is related to the greater average age or the place of residence of the patients of the first two physicians as compared to the last two.

The method identified an average of 1.1 diseases per patient (B) that are differential to the diseases diagnosed by physicians. For about three quarters of these differential diseases, the method had also identified the disease diagnosed by the physicians, and where it did not the failure is either a false-negative (E) or the disease diagnosed was not one of the 100 of the MDS (F).

For an average of 0.4 diseases per patient identified by the method the physician had no information as to whether or not the disease actually was present (C), while for an average of 0.5 diseases per patient the physician had definite information from his examinations that the disease was not present (D). Diseases in category C inform the physician that the patient has previously unrecognized significant symptom complexes, while diseases in Category D are false-positive in that they are incorrect identifications of diseases.

Table 2.—Number of Diseases per Patient, by Internist\*

	Symbol	Internist				All
		1	2	3	4	
All diseases identified by MDS method	A+B+C+D	4.2	5.4	2.8	2.3	3.8
All diseases diagnosed by physician	A+E+F	2.7	3.8	3.1	2.6	2.9
Diseases both identified and diagnosed	A	1.8	2.6	1.3	1.5	1.7
Diseases only identified by MDS	B	1.6	1.3	0.6	0.6	1.1
Differential to diagnosed diseases	C	0.4	0.1	0.8	0.3	0.4
Presence unknown to physician	D	0.4	1.4	0.3	0.2	0.5
Known not to be present	E	0.6	0.6	1.1	0.8	0.7
Diseases only diagnosed by physician	F	0.3	0.6	0.7	0.4	0.5
100 of MDS		83	23	68	34	208
Others						
No. of cases		83	23	68	34	208

\*Psychoneurosis was not included in this analysis.

Table 3.—Ratio of Diseases per Patient, by Internist\*

Symbol	Internist				All	
	1	2	3	4		
Diseases diagnosed by physician						
% of all that are of 100 common	$(A+E)/(A+E+F)$	89	84	77	88	83
% of all identified by MDS	$A/(A+E+F)$	67	68	42	58	59
% of 100 common identified by MDS	$A/(A+E)$	75	81	54	65	71
Diseases identified by MDS						
Presence unknown to physician, %	$C/(A+B+C+D)$	10	19	29	13	11
Known not to be present, %	$D/(A+B+C+D)$	10	26	11	09	14
No. of cases		83	23	68	34	208

\*Psychoneurosis was not included in this analysis.

Table 3 gives certain ratios for the above data. It is seen that 83% of all diseases diagnosed by the physicians were of the 100 common diseases  $(A + E)/(A + E + F)$ . This high proportion indicates the applicability of the MDS method for office practice. Of all diseases diagnosed by the physicians,  $A/(A + E + F)$ , the method identified an average of 59%. When only the 100 common diseases of the method are considered, the method identified 71% of the diseases,  $A/(A + E)$ .

There are some differences between the results with patients residing in the city (physicians 1 and 2) and in the suburbs (physicians 3 and 4). The most striking difference is for physician 3, where the low percentage of diseases identified may be related to the physician's belief that every disease a patient ever had is worthy of consideration in evaluating his present status even though all the signs and symptoms of the disease may have been absent for years. For this study, he listed for each patient every disease he had ever diagnosed. Physician 3 also diagnosed the lowest percentage of common diseases,  $(A + E)/(A + E + F)$ .

These data indicate that, except for physicians who, like physician 3, require information on all diseases that the patient ever had, the MDS screening method identified up to 81% of common diseases and 68% of any diseases diagnosed by highly trained and experienced internists in their office practice.

Table 4.—Number of Diseases per Patient, by General Practitioner and Internist\*

Symbol	General Practitioner	Average, All Internists	
All diseases identified by MDS method	$A+B+C+D$	5.7	3.6
All diseases diagnosed by physician	$A+E+F$	2.4	2.9
Diseases both identified and diagnosed	A	1.7	1.7
Diseases only identified by MDS			
Differential to diagnosed diseases	B	1.5	1.1
Presence unknown to physician	C	2.4	0.4
Known not to be present	D	0.0	0.5
Diseases only diagnosed by physician			
100 of MDS	E	0.7	0.7
Others	F	0.0	0.5
No. of cases		44	208

\*Psychoneurosis was not included in this analysis.

The four internists involved in this study, as do most others, spend considerable time examining their patients. General practitioners, on the other hand, because they have to see so many patients, have less time to spend with each. In an attempt to evaluate the effectiveness of the MDS screening method in their office practice, patients of a very active general practitioner were studied. In all essential characteristics except for their low educational and socioeconomic status, these patients are similar to those of the internists.

Results for the patients of the general practitioner are given in Table 4, with comparison of the results of the average of all four internists. In most respects, results with the patients of the general practitioner and of the internists are similar. For example, the same average 1.7 common diseases per patient were both diagnosed and identified (A).

The most striking difference is in the number of identifications by the MDS method about which the physician had no information as to whether or not the disease was present (C). While the internists had no information about an average of only 0.4 diseases per patient identified by the method, the general practitioner had no information about an average of 2.4 diseases per patient. Again, while the internists stated that 0.5 diseases per patient identified by the method were not present (D), the general practitioner made the statement for only one disease.

The basis for these differences may lie in the extent of the practice of the general practitioner; because he sees so many patients, there is insufficient time for him to make a comprehensive investigation of each, in addition to investigating the present illness. The nature of his practice does not permit him to make positive statements about the entire patient as frequently as the internists are able to do.

All of the material discussed to this point refers to diseases other than psychoneuroses. Table 5 shows the numbers and percentages of patients in whom a psychoneurotic disorder was diagnosed by the internists and identified by the screening method. An average of 24% of all 208 patients were diagnosed by the physicians as having psychoneurosis, but this disease was identified by the method in only 9% of the patients, that is, only 39% of the psychoneurotic disorders diagnosed by the internists were identified by the MDS. This figure is significantly lower than the 71% which the method identified of diseases other than psychoneurosis. The incidence with which different physicians diagnosed psychoneurosis in their patients varied considerably among these four physicians. Physician 2 diagnosed by far the highest percentage, 65%. When questioned, he explained that in investigat-

ing and treating patients with organic diseases, he also inquires specifically about symptoms and behavior patterns which may be related to the emotions; it may be that he is more aware than are other physicians of the presence of minor psychoneurotic disorders. That his patients do have a high incidence of psychoneurosis is indicated not only by the frequency with which he diagnosed the diseases but also by the many symptom complexes of organic diseases found in his patients by the MDS method when the physician had evidence from his examinations that the organic diseases were not actually present (line D in Table 2). It is well-known, of course, that patients with psychoneurosis often complain of symptoms of organic diseases which they do not have.

Of the 44 patients of the general practitioner, 29% were diagnosed as psychoneurotic, about the same proportion as for patients of the internists, and the disease was identified by the MDS method in 19%; that is, two thirds of the psychoneurotic disorders diagnosed by the general practitioner were identified by the MDS. It is not known why a higher proportion of cases with these disorders were identified for patients of the general practitioner than for those of the internists, but it may be that patients with little education have psychoneurosis of a more simple and easily detected pattern than do patients with a higher educational and socio-economic background. On the other hand, it may be that atypical cases of psychoneurosis were neither diagnosed by the general practitioner nor identified by the method.

#### Statistics for the MDS Method

Because the MDS method analyzes only the complaints made by patients, it permits only presumptive identification of disease and does not yield proven diagnoses. Basically, the method gives answers for 100 diseases to the question: "Is there evidence that this disease should be considered diagnostically for this patient?" The answer given is "Yes" or "No," and a yes answer simply recommends that the physician consider the disease when making his diagnostic evaluation.

As does a physician, the MDS method considers a symptom to be significant for a disease if it occurs comparatively frequently in patients with the disease and comparatively infrequently in all patients generally. Data for each sex are considered independently. It similarly simulates what is postulated to be what a physician does when he judges the significance for a disease of a whole complex of symptoms, by summing the significance of each symptom, making a correction for the patient's age, and then matching this value of the patient's complex with the average age-corrected complexes of

Table 5.—Patients With Psychoneurosis, by Internist

	Internist				All
	1	2	3	4	
% diagnosed psychoneurotic by physician	20	65	16	18	24
% identified psychoneurotic by MDS	10	13	04	15	09
% of those diagnosed that were identified	47	20	27	83	39
No. of cases	83	23	68	34	208

symptoms found in patients of the same sex in whom the disease was diagnosed by physicians. With the MDS computer-aided statistical method, only those patients are identified as having symptoms of the disease whose complexes of symptoms are comparable to those of the average patient. Only typical cases are therefore identified; a physician, on the other hand, by recalling his own and other published experiences with unusual patients, and by using as yet unknown processes of thinking, can recognize atypical cases.

Illustrations of how a patient's sex and age influence the identification of diseases by the MDS method are shown in Table 6. The table compares the disease identified for hypothetical patients of each sex and various ages who claimed identical symptoms on the MDI questionnaire. It is obvious from the table that the method discriminates in its identification of diseases according to the sex and age of the patient, and that the results are consistent with what clinical experience indicates are diseases to be considered for a symptom complex.

#### Comment

Physicians generally recognize the importance of taking a history of the present illness but frequently neglect the comprehensive history. Certain problems associated with a comprehensive medical history may have contributed to this situation; for example, physicians rarely have time to question each patient in detail about symptoms not related to the present illness, and it is often difficult to estimate how much symptoms reported by a patient are associated with an organic disease and how much with an emotional disturbance.

Table 6.—Diseases Identified for Specific Complaints, by Sex and Age\*

Age	Disease Identified	
	Men	Women
20	Disorder function of stomach	Disorder function of stomach
	Disorder function of intestines	Disorder function of intestines Somatization reaction, digestive
40	Ulcer of duodenum	Ulcer of duodenum
	Disorder function of stomach	Disorder function of stomach
	Chronic enteritis	Disorder function of intestines
	Disorder function of intestines	Disorder function of intestines
60	Ulcer of stomach	Disorder function of stomach
	Ulcer of duodenum	Chronic enteritis
	Chronic enteritis	Disorder function of intestines
	Disorder function of intestines	Cholelithiasis

\*Complaints were indigestion, abdominal pain, intestinal trouble.



When a physician interrogates a patient orally, he can easily obtain important elaborations of any symptom the patient reports and he can draw inferences from the way the patient reports his symptoms. On the other hand, the use of a questionnaire to elicit the history, as in the MDS method, has certain advantages. Time is saved, a questionnaire is impersonal and easy for a patient to answer, and the results obtained can readily be analyzed statistically by comparing the symptoms of a particular patient with those of other patients.

The results offered here illustrate that it is easy to collect a significant medical history from a patient with a standardized questionnaire and that, with the aid of an effective statistical method and a computer to analyze data on the questionnaire, it is usually possible to obtain a valid appraisal of a patient's total medical problem. Even though the only data considered by the method described above are derived from a questionnaire that takes only about 15 minutes for the patient to complete, the medical appraisals obtained with the method are surprisingly accurate and complete.

The MDS is presented here because it yields information useful to the medical profession and not solely because the method has been justified mathematically. It assigns unselected patients to any one or more of 100 disease categories, using as the basis of assignment only the answers to a self-administered questionnaire. Other computer methods attempt to diagnose one of a few related diseases in patients preselected for these diseases, and use data from preselected physical and laboratory examinations.

Although most of a practicing physician's time is spent in caring for the present illnesses of patients, it is often desirable that he have information about a patient's symptoms in regard to a wide variety of organic and emotional disorders. The chief usefulness of a method like MDS would appear to be in supplying information about the whole patient rather than solely about the present illness; thus, the method has potential value in preventive medicine.

It is believed that a method like the MDS can assist the medical profession in obtaining information about the vast reservoir of significant symptoms not spontaneously reported and illnesses undetected to which the medical profession generally does not have access without expending an excessive amount of time. Ostensibly healthy people, as well as those who seek medical care, often harbor such symptoms and illnesses.

It is not generally recognized that patients under care for chronic disorders require periodic comprehensive reappraisals of their total medical problem as often as do ostensibly healthy people. Without a

screening method it is rarely possible for physicians to make these reappraisals easily.

The screening method discussed here does not rate the clinical importance for the patient of each symptom complex identified, nor does it rate the risk of not recognizing other unidentified disease complexes. Until the storage capacity of a computer approaches that of a human being, and until more is known about the heuristic processes by which a human makes decisions, value judgments like these can be trusted only to a physician; they cannot be assigned safely to any laboratory or computer system now in existence or that it appears will be in existence in the foreseeable future. For these and other reasons, clinical application of the MDS method can only be as an adjunct to the medical profession in its care of patients.

There are, of course, some obvious limitations to the MDS method. Because it identifies symptoms only as they are observed by the patient, it does not readily detect evidences of disease which can be identified with confidence only through physical examinations or special laboratory procedures. Further, the method cannot identify symptom complexes of a disease when the patient does not report his symptoms, is asymptomatic, or reports symptoms markedly different from those usually found in the disease. The method can identify only typical symptoms of diseases, while physicians can identify atypical evidence of disease. Results, however, show that in the sample studied typical complexes of symptoms are found for these common diseases by the MDS method in a large majority of cases.

#### Summary

In an automated multiple-screening method, the Medical Data Screen questionnaire is used to collect a patient's comprehensive medical history and a computer is used to analyze the data collected. The method quickly and without burden to the physician or patient identified about six out of any ten diseases and seven out of ten common diseases diagnosed in office patients by a sample of practicing physicians. The method is a laboratory-type procedure designed to bring information to the physician about any one or more of 100 common diseases. This laboratory procedure serves as a source of information and as an adjunct to the medical profession in its care of patients.

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MANUAL  
Second Edition

M D S  
MEDICAL DATA SCREEN

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*Distributed by*  
Medical Data Corporation  
P. O. Box 120, New York, N. Y. 10038

Printed in U.S.A.

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M D S

## MEDICAL DATA SCREEN

### Nature and Purpose of the Medical Data Screen

A physician may require information about a patient's symptoms beyond those associated with the present illness. The Medical Data Screen (MDS) meets this need by rapidly making available to the physician a large body of comprehensive information concerning a patient's medical and psychiatric symptoms to assist him in the diagnosis of any of 100 common diseases.

In the operation of the MDS, a patient reports his symptoms by answering questions on the Medical Data Index-Health Questionnaire (MDI). An electronic computer, programmed with the MDS, next matches the patient's symptoms with complexes of symptoms often found in these 100 diseases, and the names of the diseases for which the patient is found to have significant complexes of symptoms are then reported to the physician.

This computer-aided method of medical data screening is essentially a laboratory procedure. It makes use of modern technology to supply the physician with a large body of information about a patient's symptoms otherwise not readily obtainable. The physician uses information obtained with the Medical Data Screen in a manner similar to his use of any laboratory finding, i.e., in conjunction with all information collected concerning the patient and in accordance with his own clinical judgment and experience.

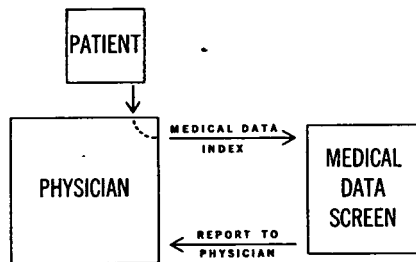
The MDS method attempts a difficult task—namely, to assign *unselected* patients to any one or more of 100 diverse disease categories, using as the basis for assignment only the answers to a *self-administered questionnaire*. It performs this task with a large proportion of correct assignments and a low incidence of false positive assignments. It should not be confused in its purpose and effectiveness with other computer methods which attempt to identify one of a few related

diseases in patients *preselected* for these diseases and where input data are obtained from *preselected physical and laboratory examinations*. The MDS method gives preliminary information on the total medical status of unselected patients in relation to 100 diseases most commonly diagnosed in medical practice and upon which selection for further examination of patients may be based.

### Description of the Method

As shown diagrammatically in Figure 1, the operation of the MDS method follows four steps:

Figure 1  
Operation of MDS method



1. The patient responds to questions on the MDI provided him by his physician. This may be done at the time the physician sees the patient, or before.
2. The completed MDI is mailed for analysis to the Medical Data Laboratories of the Medical Data Corporation. Where there is a need for quick analysis, data can be transmitted by telephone or teletype between the office of the physician and the Laboratories.
3. At the Medical Data Laboratories, the data are processed and analyzed by computer. In the

analysis, the patient's symptoms are matched with the symptoms of other patients who were diagnosed by physicians as having any of the 100 diseases.

4. Results of the computer analysis are sent to the physician for his interpretation and use in the form of a report listing those diseases for which the patient has claimed significant complexes of symptoms.

#### Technique of Using the MDS Method

The MDS is designed to supply information to the physician to assist him during his investigation of the total medical problem of patients, teen-aged through elderly. It may be used by the physician at the time of comprehensive examination of the patient, or preliminary to such examination when temporary deferral of the examination is indicated because of the pressing nature of the patient's immediate medical problems.

It has been found that the most effective technique for using the MDS as part of the physician's examination of the patient is for the MDI questionnaire to have been completed and the results of the MDS analysis known to the physician prior to the time of examination. This procedure permits the physician to draw provisional diagnostic inferences which he can test at the time of examination.

Until all examinations are completed, the MDS report remains a record of disease complexes. After the patient has been examined fully, and when tests and consultations are completed, the physician may make any necessary additions or modifications to the MDS report. The report can then serve as a systematized and detailed diagnostic record of the physician's medical appraisal of the patient at the time of examination and as a summary for future reference and comparison.

#### The MDS Report to the Physician

Results of the MDS analysis are reported to the physician on the MDS output sheet in the form of

a letter addressed to the physician, which identifies the diseases for which the patient made significant complexes of complaints on the MDI questionnaire. It designates the patient's name, address, sex, age, and the dates on which the questionnaire was completed and received for analysis.

Each disease named in the report is associated with the name of the organ system in which it occurs. Detailed information for each disease includes the International Classification of Diseases numerical code designation for the disease identified, the name of this disease as it appears in the ICD, and the MDS alphabetical code designation and name for each associated organ system. The use of the MDS output sheet is facilitated by data being printed in standard medical nomenclature and by the arrangement of these data by organ systems.

#### Interpretation of the MDS Report

##### *General*

As has been stated, the computer lists on the MDS report the names of the diseases for which a patient claimed significant complexes of symptoms. When interpreting this information, the physician will recognize that these symptoms were claimed for any one of four reasons:

1. The patient has the disease named.
2. The patient has a closely related disease which produced a constellation of symptoms resembling that usually found in the disease named.
3. The patient has an emotional disturbance with complaints similar to those usually found in the disease named.
4. The reason may be obscure, as is occasionally the case. It may be, for example, as happens in atypical cases, that the reference data do not apply to a particular patient.

In all instances, the physician decides which of the reasons applies by interpreting the MDS report in the context of all of the data concerning the patient which he has available to him both from the report and all

other sources. Until the presence of the disease identified by the MDS is confirmed by appropriate examinations, this list of diseases represents presumptive not proven diagnoses.

#### *Preliminary Inspection*

The Psychiatric Section (Section N) is best reviewed first, since any complaint a patient makes may be related to his emotions as well as to his organic disorders. Secondly, it is desirable to inspect the organ systems named in the MDS report so that the physician may be aware of the full scope of the patient's disease complexes. With each patient, some of these symptom complexes may interest the physician more than others.

#### *Organic Diseases*

It is a major purpose of the MDS method to relieve the physician of the rote task of identifying the diseases for which the patient's symptoms are frequently significant. This task involves matching the patient's symptoms with the constellations of symptoms usually found in 100 common diseases. With this task accomplished, it then remains for the physician to determine why the patient made the particular complaints that he did.

The most important part of the interpretation of the MDS report is therefore made when the physician decides why the patient claimed each disease symptom complex identified by the MDS method.

The medical profession recognizes that a similar complex of symptoms may occur in several related organic diseases as well as in a psychiatric disturbance. When this occurs, the MDS report calls the physician's attention to this problem in differential diagnosis by naming each of the diseases. However, to differentiate among these diseases the physician must seek information other than that available to the MDS method, such as data from physical examinations and other laboratory procedures.

Patients with a disease not included in the 100, may or may not have a cluster of symptoms which is identified by the MDS as significant for a similar

disease among the 100. All information uncovered by the MDS method should be interpreted in accordance with established principles of evaluating laboratory or screening data, and with the understanding that the presence or absence of a typical complex of complaints does not in itself prove or disprove the presence of a disease.

No rules can be given here on how to determine the clinical significance of a constellation of symptoms for an individual patient. Interpretations must necessarily be based on the physician's own training, knowledge, experience and insight, and on the medical characteristics of the patient.

#### *Psychiatric Disturbances*

The complexes of emotional complaints identified by the MDS are listed separately on the report to the physician in a psychiatric section (Section N). As suggested above, the section is best reviewed first in the interpretation of the report. Given the knowledge that a patient has a complex of symptoms often found in a psychiatric disturbance, the physician is better prepared than otherwise to evaluate the full meaning of other complexes of symptoms which may, at first, appear to be related solely to organic disorders.

Specifically, the MDS identifies patients who have complexes of symptoms significant for six psychiatric disturbances: anxiety, hysteria, depression, somatization circulatory, somatization digestive, and psycho-neurosis mixed. Some patients may be identified as having complexes of more than one of these disorders. Such cases are characterized by positive responses to many questions scattered throughout the MDI-Health Questionnaire. In somatization circulatory and digestive, complaints are likely to be especially numerous in the circulatory and digestive sections of the questionnaire, where the constellations of complaints may resemble closely those characteristic of structural diseases.

If a patient records an extensive number of complaints on the MDI, many disease complexes may be identified on the MDS report. Examination of these patients often reveals that many of these complexes

are associated with an emotional disturbance more than with the diseases named.

Patients who are thus falsely identified by the MDS method as having symptoms of organic diseases often show clusters of symptoms identified as one or more of the psychiatric disorders. As has been stated, the presence of a large number of unrelated disease complexes of symptoms, if not found by examination to be associated with a severe systemic disease, is indeed suggestive of an emotional disturbance.

The incidence of correct and false identifications of emotional disturbances by the MDS is lower than that found for organic diseases. Identification of the relatively mild and often transient emotional disorders that are most commonly found in medical practice and identified by the MDS is complicated by the wide diversity among people of subtle elements in life experiences and in personality structure which contribute to the making of psychoneurotic complaints.

Results With the Method

Some indication of the effectiveness of the MDS method in identifying diseases among office patients was shown in a recent study (19). Patients were cared for by internists who made a detailed comprehensive investigation of each patient and by a general practitioner who investigated only the present illness. Diseases identified by the method were compared with those diagnosed by the physicians, and these comparisons are shown diagrammatically in Figure 2 and numerically in Tables 1, 2 and 3.

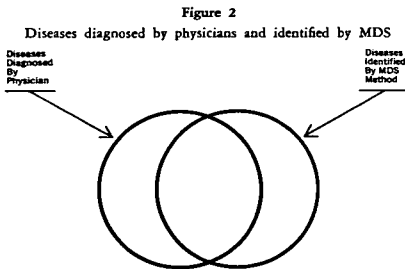


TABLE 1

Average number of diseases by internist and MDS.

Diseases diagnosed by physician .....	2.9
Diseases identified by MDS method .....	3.8
Diseases both diagnosed and identified ....	1.7
Number of cases .....	208

Results with patients of internists are shown in Table 1. Internists diagnosed an average of 2.9 diseases per patient of which 1.7 were identified by the MDS method. Of the remaining diseases, half were of the 100 and not identified (false-negatives) and the other half were not of the 100.

The MDS identified an average of 3.8 diseases per patient, and, as above, 1.7 were diseases that the physicians diagnosed. In addition, the method identified about one disease per patient to be considered for differential diagnosis and about one disease per patient that either the physician had not recognized or that was a false-positive.

TABLE 2

Average number of diseases by general practitioner and MDS.

Diseases diagnosed by physician .....	2.4
Diseases identified by MDS method .....	5.7
Diseases both diagnosed and identified ....	1.7
Number of cases .....	44

Table 2 shows results with a general practitioner which generally are similar to results with internists. The chief difference between the two is that the general practitioner made few diagnoses other than of the 100 diseases of the MDS method and that the method identified a large number of disease complexes which the physician had not previously recognized. This may be expected since a general practitioner has to care for so many patients that he lacks time to make a comprehensive examination of each.

TABLE 3

Average ratios of diseases by internist, general practitioner and MDS.

	INTERN- IST	GENERAL PRAC- TITIONER
DISEASES DIAGNOSED BY PHYSICIAN		
% of all that are of 100 common ..	83	100
% of all identified by MDS .....	59	71
% of 100 identified .....	71	71
DISEASES IDENTIFIED BY MDS		
% presence unknown to physician	11	42
% known not to be present .....	14	0
Number of cases .....	208	44

Table 3 shows certain ratios for the internists and general practitioner. Of all diseases diagnosed by the internists, 83% were of the MDS 100 diseases as were almost 100% of the diseases diagnosed by the general practitioner; this high proportion indicates the wide applicability of the MDS method in the practice of medicine. The Table further shows that the MDS effectively identified 71% of the 100 diseases most commonly diagnosed by physicians.

Some diseases were identified by the MDS method whose presence was unknown to the physician, 11% for internists and 42% for the general practitioner. Information about these diseases enlarges the physician's knowledge of his patient. In addition, internists knew that 14% of diseases identified were not present and were often associated with emotional disturbances.

All the above tables refer to diseases other than psychoneurosis. For psychoneurosis, half of the disorders diagnosed by internists were identified by the MDS, as were two-thirds of those diagnosed by the general practitioner.

### How the MDS Is Useful

#### 1. *It supplies information about the whole patient.*

It is usually desirable for the physician to have information about a patient's symptoms in regard to a wide variety of organic and emotional disorders; unless such information is available, crucial disorders may be overlooked.

With the MDS method, the physician quickly obtains information which aids in the early recognition and diagnosis of any of 100 common diseases, including several psychiatric disorders. He can then integrate this comprehensive medical and psychiatric information into his diagnostic evaluation of the patient under study.

The MDS makes it possible to obtain desired information about the vast reservoir of symptoms not spontaneously reported and illnesses undetected, to which the medical profession generally does not have access without expending an excessive amount of time. Ostensibly healthy people, as well as those who seek medical care, often harbor such symptoms and illnesses.

The medical profession recognizes the risk of overlooking important diseases, especially in their early stages, unless frequent surveys are made of the total medical status of both patients and ostensibly healthy people. However, such surveys of large numbers of people have heretofore been impossible; limitations of patient's time and money and physician's time and facilities have enabled only few people to obtain investigation of their total medical problem while others, of necessity, have had to do with a consideration of their chief complaint only. Use of the MDS technique provides assistance with this problem by making available to the medical profession surveys of the total medical status of all individuals under their care.

#### 2. *It supplies information quickly.*

Information about the patient's symptoms is returned to the physician usually on the same day on



which the Medical Data Index-Health Questionnaire is received. This speed is made possible through the use of an electronic computer to match the patient's symptoms with those characteristically found in persons of the same sex and age who are known to have one of the 100 diseases. With the use of the MDS method, physicians are relieved of some routine tasks with typical patients and so may find time to deal with challenging problems beyond the scope of the computer, such as those which require use of the physician's human and clinical experience and judgment.

3. *The method supplies information with little burden to the physician or the patient.*

The physician merely orders the Medical Data Screen as he would any laboratory test. He instructs the patient to complete the MDI-Health Questionnaire which then serves as the specimen for the test. The results of the MDS are returned to the physician for evaluation and use as would be any other laboratory findings.

It is necessary for the patient only to complete the MDI-Health Questionnaire and to return it to the physician. Patients find little difficulty in understanding and answering the questions on the printed form, and can usually complete it in 10 to 15 minutes in the physician's office or in their own homes. Help in answering the questionnaire may be given to patients unable to read, due either to illiteracy or visual defects.

4. *It aids the physician in his care of the patient.*

The MDS method indicates areas in which the patient's symptoms suggest evidence of disease, and in which the physician may profitably expend diagnostic efforts. When the physician receives the MDS report prior to his examination of the patient, he has important information which can aid him in the oral interview and in the establishment of rapport, and he can include in his interrogation and examination an investigation of the symptom complexes that have been identified on the MDS report. In addition,

the information can be used in a manner similar to the use of information from any other source. The method assures that symptoms of a great many common and comprehensive diseases will not be overlooked while the physician is focusing his attention on the present illness.

Since the method provides information about the whole patient, the physician, through its use, can easily care for the present illnesses of many patients and simultaneously screen them for a large number of other diseases.

By calling early attention to symptomatic evidence of disease, the MDS has value in preventive medicine. In analyzing symptoms by disease complexes, it serves to coordinate and give meaning to seemingly isolated symptoms, thus leading the physician to examine, or refer the patient for appropriate examinations of diseased organ systems not involved in the present illness.

Comparison of reports of MDS examinations made over the course of time yields information about changes that may have occurred in the patient's symptoms and medical status, thus indicating possible development or progression of disease. This factor may be of particular importance in the care of people undergoing periodic health examinations.

It is not generally recognized that patients under medical care for a chronic disorder require periodic comprehensive medical examinations and reappraisals of their total medical problems as often as do ostensibly healthy people. Unfortunately, physicians lack the time to make such investigation frequently with these patients. By supplying physicians with significant information about their patients' total medical status, the MDS enables physicians to make these reappraisals easily. It identifies the patients in need of examination and the symptom complex in need of investigation, so that the physician need not spend excessive time with those patients who have not developed important disease symptoms since their last comprehensive examination.

### Where the MDS Is Useful

The Medical Data Screen is applicable in situations such as the following:

#### 1. *In the practice of medicine*

*In general medical practice, private or hospital.* It provides a preliminary comprehensive survey of the medical status of the patient, as described above.

*In medical specialty practice, private or hospital.* The MDS offers a background of information about the whole patient, against which manifestations and progress of the disease in the specialty may be evaluated. It assists in the identification of patients who require referral to general medical or other specialty physicians for opinion and treatment.

*In group practice.* The rapid preliminary MDS survey aids the physician who is first consulted to evaluate the patient's total medical problem, and assists him in determining to which of the other members of the group the patient might properly be referred.

*In hospital admission departments.* It helps the admitting physician in the assignment of patients for investigation and treatment.

*In periodic examinations.* The method serves as a multiple screening of the patient, and aids in identifying diseased areas which require special evaluation or investigation. It contributes to the comprehensive record of the state of the patient's health at the time of examination.

*In the examination of large numbers of patients with only a limited number of physicians available.* Since patients with typical complaints of any of 100 diseases are screened by the MDS, the physician may use the information reported to order his time for maximum effectiveness in his work. He can, for example, examine particular patients initially for those diseases for

which the MDS identified significant complexes of symptoms.

#### 2. *In special situations.*

*In industrial medicine.* It can serve as an aid to the medical department in its attempt to maintain personnel in a high state of health. The MDS gives the industrial medical department information about symptom complexes for a wide variety of diseases in a form that is easy to review and interpret without placing a heavy burden on the resources of the department. Diseases of interest to the department or the industry are easily selected for consideration.

*In military, government, and health and welfare agencies.* It can serve as an aid in evaluating applicants or in-service personnel where the medical status of personnel is of importance in the valuation.

*In schools.* It can serve as an aid to the medical division of a department of education or of any institution with students, in assessing the medical status of professional staff or students.

#### 3. *In teaching and research.*

*In medical teaching and continuing education.* It can serve to emphasize to students that the making of valid interpretation of medical data can be a logical procedure, even with data that have the high emotional content of medical and psychiatric complaints. The form of the MDS report stresses the desirability of recording data precisely and in a form that is concise, specific, easily reviewed, and not buried in a mass of negative information. Because the MDS report gives the patient's symptoms as well as the associated diseases, it emphasizes the association of symptoms into significant disease complexes and fosters skills in the interpretation of symptoms.

*In mass health surveys.* It can aid in the making, and comparison, of multiple screenings

for 100 common diseases in large or small population groups. These populations may be inpatients or outpatients or may be ostensibly healthy people, selected on the basis of occupation, geographic distribution, etc.

### Limitations of the MDS Method

As has been stated, the MDS method carries out routine tasks of matching patients' symptoms with those found in 100 common diseases and so is essentially a laboratory procedure. This screening method does not rate the clinical importance for the patient of each complex identified, nor does it rate the risk of not recognizing other unidentified disease complexes. Value judgments like these can be trusted only to a physician; they cannot be assigned safely to any computer system now in existence.

Final responsibility for all diagnostic decisions belong to the physician. For these and other reasons, clinical application of the MDS method is as an adjunct to the medical profession in its care of patients.

Because the MDS method analyzes symptoms as they are observed by the patient, it does not readily detect evidences of diseases which can be identified with confidence only through physical examination or special laboratory procedures. Further, the MDS cannot identify symptom complexes of a disease when the patient does not report the symptoms, is asymptomatic, or reports symptoms markedly different from those usually found in the disease. For these reasons, the MDS does not identify every disease that every patient has.

A disease may be falsely identified if a patient has a related disease which is producing symptoms resembling those usually found in the disease identified. No information is available to the MDS method as to which is the presenting symptom, and the MDS does not identify which of the patient's symptom complexes is associated with the present illness.

### Summary

The MDS method is essentially a laboratory procedure that brings to the medical profession a kind and volume of information about the whole patient which is not readily available otherwise. Some of the more obvious advantages of the method include the wide applicability of the comprehensive information it develops; the relevance of this information to the medical and psychiatric status of individuals, teen-aged through elderly; the high validity of the information; the ease with which it is obtained; and the speed and low cost of the method.

## APPENDIX

### Statistics for the MDS Method

Because the MDS method analyzes only complaints made by the patient, it permits only presumptive identifications of diseases and does not yield proven diagnoses. Basically, the method gives answers for 100 disease to the question: "Is there evidence that this disease should be considered diagnostically for this patient?" The answer given is a "Yes" or a "No", and a "Yes" answer simply recommends that the physician consider the disease when making his diagnostic evaluation of the patient.

Several publications describe the statistics of the MDS. The questionnaire used in the early studies was the Cornell Medical Index and in the later studies the Medical Data Index (10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20).

As does a physician, the MDS method considers a symptom to be significant for a disease if it occurs comparatively frequently in patients with the disease and comparatively infrequently in all patients generally. Similarly, it measures the significance of a whole complex of symptoms for a particular disease after making a correction for age, and then matching the complex reported by the patient with the age-corrected complexes of symptoms characteristically found in patients of the same sex who were diagnosed by physicians as having the disease.

Briefly, the mathematics for the MDS method may be expressed thus: The significance of a symptom  $j$  for a disease  $k$  is measured by

$$S_{jk} = [(P_{jk} - P_k) / 2 \sqrt{F_k}] - 1,$$

where  $P_{jk}$  is the relative frequency of the symptom in the disease and  $P_k$  is the relative frequency in all patients generally. Each significance value is then corrected for age and all values for a disease are summed, after which the sum is compared to the average sum found with patients who were diagnosed by physicians as having the disease. A sum which equals or surpasses the average sum constitutes an identification of the disease in the patient being tested.

In the computer-aided statistical MDS method, only those patients are identified as having symptoms of a disease whose complexes of symptoms are comparable with those of the average patient. Only typical cases are therefore identified; a physician, on the other hand, by recalling his own and other published experiences with unusual patients, and by using as yet unknown processes of thinking, can recognize atypical cases.

TABLE 4  
Diseases identified by sex and age

Age	MEN	WOMEN
20	Disorder function of stomach Disorder function of intestines	Disorder function of stomach Disorder function of intestines Somatization reaction, digestive
40	Ulcer of duodenum Disorder function of stomach Chronic enteritis Disorder function of intestines	Ulcer of duodenum Disorder function of stomach Disorder function of intestines
60	Ulcer of stomach Ulcer of duodenum Chronic enteritis Disorder function of intestines	Disorder function of stomach Chronic enteritis Disorder function of intestines Cholelithiasis

Age and sex influence the identification of diseases by the MDS method. Table 4 shows the identification made for the same 3 symptoms (indigestion, abdominal pain, intestinal trouble) claimed by men and women of different ages. Differential diseases identified for the physician's consideration are given in each case. It is obvious from the Table that the method discriminates in its identification of

diseases according to the sex and age of the patient, and that the results are consistent with what clinical experience indicates are diseases to be considered in making differential diagnoses for patients claiming the symptoms named.

### Description of the MDI Health Questionnaire

The questionnaire is a four-sided, letter-sized sheet headed *Medical Data Index-Health Questionnaire*. The heading explains the purpose of the form to the patient. It is self-administered with 10 to 15 minutes generally being the time required for completion of the form. The printed directions instructing the patient to circle the "Yes" or the "No" after each question are easily followed.

The questionnaire, a descendant of the Cornell Medical Index (1, 2, 3, 4, 5, 6, 7, 8, 9), consists of medical questions stated in informal language and designed to be understood by people with a reading knowledge of simple English. The questions are, in many respects, similar to those asked by a physician when he is undertaking a detailed review of systems. Questions are identical for men and women except for eight questions referring to the genital system.

Technical terms rarely occur, but when they are necessary an explanation is given in parentheses; so, for example, abdomen is explained as "belly" and mucus as "slime". Questions relate to various categories in the following manner:

Bodily symptoms — "Do you often vomit (throw up)?"

Past illnesses — "Did you ever have a tumor or cancer?"

Feelings — "Are you discouraged and depressed?"

Questions on the MDI are grouped in sections each of which pertains to a specific body area.

A specimen copy of the MDI for men is shown on the following 4 pages.

(MEN)

History Number \_\_\_\_\_

MEDICAL DATA INDEX

HEALTH QUESTIONNAIRE

Today's date \_\_\_\_\_

Print your name \_\_\_\_\_

Your home address \_\_\_\_\_  
Street City State Zip Code

How old are you? \_\_\_\_\_

This questionnaire is for laboratory analysis.

Print name of physician to receive report \_\_\_\_\_

Address of physician \_\_\_\_\_  
Street City State Zip Code

DIRECTIONS

This questionnaire is for *MEN only*

If you can answer **YES** to the question asked, put a circle around the **Yes**

If you have to answer **NO** to the question asked, put a circle around the **No**

Answer all questions. If you are not sure, guess.

*Please disregard numbers. They are for laboratory analysis.*

A. HEAD AND NECK

Do you suffer from frequent headaches? Yes No 001  
 Do you get pains when you suddenly twist your neck? Yes No 002  
 Has your neck become enlarged or swollen? Yes No 003

B. EYES

Is your eyesight blurred even when you wear glasses? Yes No 004  
 Do you suffer from eyestrain? Yes No 005

Is your eyesight rapidly getting worse? Yes No 006  
 Do you have pains in your eyes? Yes No 007  
 Do you see bright colored rings around every light? Yes No 008  
 Are you troubled with burning or itching of your eyes? Yes No 009  
 Do your eyes continually blink or water? Yes No 010  
 Are your eyes all red and inflamed? Yes No 011  
 Do you see everything double? Yes No 012  
 Is one of your eyes turned in or turned out? Yes No 013

C. EARS

Are you hard of hearing? .....	Yes	No	014
Do you hear constant noises in your ears? .....	Yes	No	015
Do you have pains in your ears? .....	Yes	No	016
Do you have a running ear? .....	Yes	No	017

D. MOUTH

Is there any cavity or decay in your teeth? .....	Yes	No	018
Are any of your teeth loose or wobbly? .....	Yes	No	019
Do you get toothaches? .....	Yes	No	020
Do you have a painful swelling in your gums or jaw? .....	Yes	No	021

E. NOSE AND THROAT

Is your nose all stuffed up? .....	Yes	No	022
Do you suffer from a running nose? .....	Yes	No	023
Do you have a painful sore throat? .....	Yes	No	024
Did a doctor say that your tonsils are enlarged? .....	Yes	No	025
Is swallowing very difficult and painful? .....	Yes	No	026

F. RESPIRATORY SYSTEM

Do you have trouble in breathing? .....	Yes	No	027
Do you have a severe head cold? .....	Yes	No	028
Do you suffer from many heavy chest colds? .....	Yes	No	029
Are you troubled with frequent coughing? .....	Yes	No	030
Do you cough up a lot of thick greenish sputum (spit)? .....	Yes	No	031
Do you sometimes cough up blood? .....	Yes	No	032

G. CARDIOVASCULAR SYSTEM

Does every little effort leave you short of breath? .....	Yes	No	033
Do you often get out of breath just sitting still? .....	Yes	No	034
Do you have to sleep propped up high in bed? .....	Yes	No	035
Are you troubled with thumping of the heart? .....	Yes	No	036
Does your heart often race like mad? .....	Yes	No	037
Do you get pains in the heart or chest? .....	Yes	No	038
Are your ankles usually very swollen? .....	Yes	No	039
When you walk, do you get sharp pains in the calves of your legs? .....	Yes	No	040
Do you get flashes of extreme heat? .....	Yes	No	041
Do you get wringing sweats even in cool weather? .....	Yes	No	042

H. DIGESTIVE SYSTEM

After eating, do you belch for a long time? .....	Yes	No	043
Do you suffer from indigestion (upset stomach)? .....	Yes	No	044
Do you often vomit (throw up)? .....	Yes	No	045
Do pains in the abdomen (belly) often double you up? .....	Yes	No	046
Do you suffer from intestinal trouble? .....	Yes	No	047
Are you usually constipated? .....	Yes	No	048
Do you often get diarrhea (frequent loose bowel movements)? .....	Yes	No	049
Are your bowel movements full of mucus (slime)? .....	Yes	No	050
Are your bowel movements bloody? .....	Yes	No	051
Do you have pain when you move your bowels? .....	Yes	No	052
Have you had jaundice (yellow eyes and skin)? .....	Yes	No	053

GO TO NEXT PAGE

I. URINARY SYSTEM

Do you get up many times at night to urinate (pass water)? ..... Yes No 054  
 During the day, do you have to urinate very often? ..... Yes No 055  
 Do you lose control of your water? ..... Yes No 056  
 Do you get burning pain when you urinate? Yes No 057  
 Is your urine cloudy? ..... Yes No 058  
 Is your urine often bloody? ..... Yes No 059

J. GENITAL SYSTEM

Do you have trouble starting your stream when urinating? ..... Yes No 060  
 Is your stream very weak and slow? ..... Yes No 061  
 Do you have trouble emptying your bladder? Yes No 062  
 Did a doctor say that you have prostate trouble? ..... Yes No 063  
 Do you have a burning discharge from your genitals (privates)? ..... Yes No 064  
 Have you had treatment for your genitals? Yes No 065  
 Is there a swelling or lump on your testicles (balls)? ..... Yes No 066  
 Are your testicles very painful and sore? Yes No 067

K. MUSCULOSKELETAL SYSTEM

Do your muscles and joints feel stiff? .... Yes No 068  
 Do you often have pains in your joints? Yes No 069  
 Are your joints often swollen? ..... Yes No 070  
 Does moving your shoulder cause pain? .... Yes No 071  
 Do you suffer from weak and painful feet? ..... Yes No 072  
 Do pains in the back trouble you? .... Yes No 073  
 Does coughing or sneezing cause sharp pains in your back? ..... Yes No 074  
 Is your back bent or twisted? ..... Yes No 075

L. SKIN

Do you have a red itching rash on your scalp? ..... Yes No 076  
 Do you have acne (pimples) all over your face or chest? ..... Yes No 077  
 Is any skin on your fingers red and sore? ... Yes No 078  
 Do you have a scaly rash on your elbow or knees? ..... Yes No 079  
 Do you have an itching red rash between your toes (athlete's foot)? ..... Yes No 080  
 Has your skin become dry and rough? Yes No 081  
 Did you recently break out in a large boil? Yes No 082  
 Have you developed a mole or a wart on your skin? ..... Yes No 083  
 Do you have growths or lumps on your body? ..... Yes No 084  
 Do you have a cyst (swelling) at the bottom of your backbone? ..... Yes No 085

M. NERVOUS SYSTEM

Do you usually feel tired and worn out in the morning? ..... Yes No 086  
 Is your walking weak and unsteady? Yes No 087  
 Are you often dizzy and wobbly? ..... Yes No 088  
 Do your hands shake and tremble? ..... Yes No 089  
 Is any part of your body paralyzed (with-out power)? ..... Yes No 090  
 Do you have numbness or tingling in any part of your body? ..... Yes No 091  
 Do you get spells of unconsciousness (complete blackout)? ..... Yes No 092

TURN TO NEXT PAGE

N. ILLNESSES

Do you have			
Migraine (one-sided headaches)?	Yes	No	093
Sinusitis (in your nose and face)?	Yes	No	094
Hay fever?	Yes	No	095
Asthma?	Yes	No	096
Tuberculosis (TB)?	Yes	No	097
A goiter (in your neck)?	Yes	No	098
Heart trouble?	Yes	No	099
High blood pressure?	Yes	No	100
Peptic ulcers (stomach ulcers)?	Yes	No	101
Gallbladder disease or gallstones?	Yes	No	102
A liver disease?	Yes	No	103
Kidney or bladder disease?	Yes	No	104
Kidney stones?	Yes	No	105
A hernia (rupture)?	Yes	No	106
Hemorrhoids (piles)?	Yes	No	107
Varicose veins (swollen veins)?	Yes	No	108
Arthritis (rheumatism)?	Yes	No	109
Severe anemia (thin blood)?	Yes	No	110
Did you ever have			
Epilepsy (fits or convulsions)?	Yes	No	111
Diabetes (sugar disease)?	Yes	No	112
Syphilis (bad blood)?	Yes	No	113
A tumor or cancer?	Yes	No	114
Rheumatic fever or growing pains?	Yes	No	115
A nervous breakdown?	Yes	No	116
O. GENERAL HEALTH			
Do you often take medicines?	Yes	No	117
Do you take two or more alcoholic drinks a day?	Yes	No	118
Do you smoke more than a pack of cigarettes a day?	Yes	No	119
Are you usually hungry?	Yes	No	120

Are you very much overweight?	Yes	No	121
Have you recently lost a lot of weight without trying?	Yes	No	122
Do you feel weak and without energy?	Yes	No	123
Does any little effort wear you out?	Yes	No	124
Do you suffer from nervous exhaustion?	Yes	No	125
Are you troubled by pains and aches?	Yes	No	126
Are you frequently ill in bed?	Yes	No	127
Do you often feel miserable and ill?	Yes	No	128
Do you wear yourself out worrying about your health?	Yes	No	129
P. FEELING REACTIONS			
Do you worry about everything?	Yes	No	130
Are you often scared?	Yes	No	131
Do you sometimes sweat and tremble?	Yes	No	132
Do frightening thoughts keep troubling you?	Yes	No	133
Do you often have nightmares?	Yes	No	134
Are you a nervous person?	Yes	No	135
Do you wake up worried and unhappy?	Yes	No	136
Do you get mixed up when you have to do things quickly?	Yes	No	137
Does your work fall to pieces when a boss watches you?	Yes	No	138
Do you have many small accidents and injuries?	Yes	No	139
Has your thinking become slow?	Yes	No	140
Do you find it hard to make up your mind?	Yes	No	141
Would you like to have someone stay at your side to advise you?	Yes	No	142
Are you discouraged and depressed?	Yes	No	143
Do you feel all alone and frightened?	Yes	No	144
Is life sad and hopeless?	Yes	No	145
Do you often cry?	Yes	No	146
Do you need help because you are depressed and troubled?	Yes	No	147
Are you all keyed up and jittery?	Yes	No	148
Do you feel continually tense and jumpy?	Yes	No	149
Do all sorts of little things upset you?	Yes	No	150



Questions on the form for women are identical except for eight questions referring to the genital system.

## (WOMEN)

### J. GENITAL SYSTEM

Are your menstrual periods now very painful? .....	Yes	No
Are you now very weak or sick with your periods? .....	Yes	No
Are you now being troubled with the change of life? .....	Yes	No
Do you have bleeding when it is not your period? .....	Yes	No
Do you get dragging down feelings in your back and abdomen (belly)? .....	Yes	No
Are you troubled by a vaginal discharge or itching? .....	Yes	No
Do your breasts often become painful and swollen? .....	Yes	No
Have you noticed a lump in your breasts? .....	Yes	No

### Validity of the Questionnaire

Prior to the construction of the MDI, the 100 diseases most frequently diagnosed in adults, aged 14 years and over, at the outpatient clinics of The New York Hospital were identified.

The questionnaire was devised to elicit the complaints most commonly made by patients with any

one of the 100 diseases. The questions that were incorporated into the MDI were tested for validity with office and hospital patients, and were found to yield significant information about the 100 diseases.

The accuracy and usefulness of each question on the MDI were tested rigorously. Only those questions that yielded valid responses and that aided in the statistical identification of patients with any of the 100 diseases were selected for inclusion in the MDI. Selection was based on the content of questions after several variations of the form of each question were tested and the form was used which reflected maximum comprehension and validity.

In Table 5 on pages 16 and 17 are listed the 100 diseases for which the MDI-Health Questionnaire was composed and tested. A code designates each disease and organ system for the Medical Data Screen. The three-digit numerical code stipulating the disease is that of the International Classification of Diseases, while the MDS alphabetical code indicates the organ system diseased.

The identification of diseases by the MDS method for a typical case is here shown for a 42 year old male patient with the following numbered complaints on the MDI questionnaire: 8, 30, 33, 50, 55, 80, 95, 105, 117, 122, 124, 130, 131, 134, 137, 142, 148 and 149.

For this patient the following diseases were identified by the MDS method, all of which were found by the physician when he examined the patient.

RESP	D16-	MAL NEOPL LUNG
URIN	G602	CALCULI KIDNEY
SKIN	K131	DERMATOPHYTOSIS
PSYCH	N310	ANXIETY REACT

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TABLE 5

The 100 diseases of the MDS method.\*

DISEASES OF THE EYE

EYE	A370	CONJUNCTIVITIS or ophthalmia
EYE	A380	REFRACTIVE ERROR
EYE	A384	STRABISMUS
EYE	A385	CATARACT
EYE	A387	GLAUCOMA

DISEASES OF THE EAR

EAR	B390	OTITIS EXTERNA
EAR	B39-	OTITIS MEDIA without or with mastoiditis
EAR	B398	DEAFNESS

DISEASES OF THE BUCCAL CAVITY

BUCCAL	C210	BENign NEOPLasm of BUCCAL cavity
BUCCAL	C530	DENTAL CARIES
BUCCAL	C53-	DISOrder of SUPPORTing structure of TEETH
BUCCAL	C533	DISOrder of OCCLUSION or tooth development

DISEASES OF THE RESPIRATORY SYSTEM

RESP	D16-	MALignant NEOPLasm of LUNG or bronchus
RESP	D240	HAY FEVER
RESP	D241	ASTHMA
RESP	D47-	ACUTE Upper Respiratory Infection
RESP	D502	CHRONic BRONCHITIS
RESP	D510	HYPERTrophy of TONSILS or adenoids
RESP	D512	CHRONic PHARYNGITIS or nasopharyngitis
RESP	D513	CHRONic SINUSITIS
RESP	D514	DEFLECTed NASAL SEPTUM
RESP	D515	NASAL POLYP

DISEASES OF THE CIRCULATORY SYSTEM

CIRCUL	E41-	CHRONic RHEUMATIC Heart Disease
CIRCUL	E420	ARTERIOSCLEROTIC Heart Disease or coronary disease
CIRCUL	E433	FUNCTIONal DISease of HEART
CIRCUL	E440	essential benign HYPERTENSION with Heart Disease
CIRCUL	E444	essential BENign HYPERTENSION without mention of heart
CIRCUL	E450	general ARTERIOSCLEROSIS
CIRCUL	E453	PERIPHeral VASCular DISease

DISEASES OF THE DIGESTIVE SYSTEM

DIGEST	F151	MALignant NEOPLasm of STOMACH
DIGEST	F15-	MALignant NEOPLasm of large INTESTine or rectum
DIGEST	F540	ULCER OF STOMACH
DIGEST	F541	ULCER OF DUODENUM
DIGEST	F544	DISOrder of FUNCTION of STOMACH
DIGEST	F572	CHRONic ENTERITIS or ulcerative colitis
DIGEST	F573	FUNCTIONal DISOrder of INTESTines
DIGEST	F574	ANAL FISSURE or fistula
DIGEST	F581	CIRRHOSIS of LIVER
DIGEST	F584	CHOLELITHIASIS

DISEASES OF THE URINARY SYSTEM

URIN	G600	INFECTION of KIDNEY
URIN	G602	CALCULI of KIDNEY or ureter
URIN	G605	CYSTITIS

DISEASES OF THE MALE GENITAL ORGANS

MA GEN	H610	HYPERPLASIA of PROSTATE
MA GEN	H611	PROSTATITIS
MA GEN	H613	HYDROCELE
MA GEN	H614	ORCHITIS or epididymitis

\*Capital letters represent abbreviations used on the MDS report.

DISEASES OF THE FEMALE GENITAL ORGANS

FE GEN	1170	MALignant NEOPLasm of BREAST
FE GEN	1213	BENIgn NEOPLasm of BREAST
FE GEN	1214	UTERine FIBROMYOMA
FE GEN	1215	other BENIgn NEOPLasm of UTERus
FE GEN	1620	CHRONic CYSTic disease of BREAST
FE GEN	1630	INFECTive DISease of UTERus, vagina, or vulva
FE GEN	1631	UTERovaginal PROLAPSE
FE GEN	1634	DISorder of MENSTRUATION
FE GEN	1635	MENOPAUSAL SYMPToms

DISEASES OF THE BONES AND  
ORGANS OF MOVEMENT

BONES	J722	RHEUMATOID ARTHritIs or allied condition
BONES	J723	OSTEO-ARTHritIs or allied condition
BONES	J735	DISPLACEMENT of intervertebral DISC
BONES	J741	SYNOVITIS, bursitis, or tenosynovitis
BONES	J745	CURVATURE of SPINE

DISEASES OF THE SKIN AND CELLULAR TISSUE

SKIN	K131	DERMATOPHYTOSIS
SKIN	K19-	MALignant melanoma or other NEO-PLasm of SKIN
SKIN	K220	BENIgn MELANOMA of skin
SKIN	K221	PILONIDAL CYST
SKIN	K222	BENIgn NEOPLasm of SKIN
SKIN	K226	LIPOMA
SKIN	K228	HEMANGIOMA or lymphangioma
SKIN	K690	BOIL or carbuncle
SKIN	K691	CELLulitis of FINGER or TOE
SKIN	K696	INFECTIOUS WART
SKIN	K700	SEBORrheic DERMATitIs
SKIN	K701	ECZEMA
SKIN	K705	ERYTHEMATous condition
SKIN	K706	PSORIASIS or similar disorder

SKIN	K708	PRURITIS or related condition
SKIN	K713	DISease of HAIR or hair follicles
SKIN	K714	DISease of sweat or SEBACeous GLANDS

DISEASES OF THE NERVOUS SYSTEM

NERV	L353	EPILEPSY
NERV	L354	MIGRAINE
NERV	L791	HEADACHE

MISCELLANEOUS DISEASES

MISC	M02-	SYPHILIS or its sequelae
MISC	M030	acute or unspecified GONORRHEA
MISC	M250	SIMPLE GOITER
MISC	M251	nontoxic NODULAR GOITER
MISC	M252	THYROTOXICOSIS with or without goiter
MISC	M253	MYXEDEMA or cretinism
MISC	M260	DIABETES mellitus
MISC	M287	OBESITY, not specified as of endocrine origin
MISC	M29-	ANEMIA
MISC	M322	USE OF ALCOHOL
MISC	M460	VARICOSE VEINS of lower extremities
MISC	M461	HEMORRHOIDS
MISC	M463	PHLEBITIS or thrombophlebitis of lower extremities
MISC	M560	HERNIA of abdominal cavity

PSYCHONEUROTIC DISORDERS

PSYCH	N310	ANXIETY REACTION
PSYCH	N311	HYSTERical REACTIon
PSYCH	N314	neurotic-DEPRESSIVE REACTIon
PSYCH	N315	SOMATization reaction affecting CIR- CULATORY system
PSYCH	N316	SOMATization reaction affecting DI- GESTIVE system
PSYCH	N318	PSYCHoneurotic DISorder MIXED or unspecified

NATIONAL ASSOCIATION OF HEARING & SPEECH AGENCIES,  
*Washington, D.C., September 2, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

MY DEAR SENATOR NEUBERGER: It is my hope that the following thoughts will be of some assistance to you and your committee as you consider modern health screening methods for detecting and thus helping to prevent chronic illness.

1. There is no doubt that there is a place (in fact a great need) for multiphasic health screening in this country. Such a nationwide movement—for instance in the area of human communication (hearing, speech, vision)—would present an opportunity for diagnosis and proper treatment of impairments that could eliminate any serious delay in the total development of the human organism, particularly in terms of maturation, learning, and productivity. At the present time we are working with the National Society for the Prevention of Blindness toward development of a national educational and screening program which would permit evaluation of a child's communication senses at a very early age, and thus provide an opportunity for corrective measures which would permit a youngster the very best opportunity for learning as he became of school age.

Perhaps the National Institute of Neurological Diseases and Blindness at NIH has best expressed this—"Man's ability to communicate through use of visible and audible codes often has been said to be the major attribute which has permitted him to progress both mentally and physiologically far ahead of other forms of animal life. A child learns to talk because he hears, and he talks as he hears. These, in turn, lead to the brain's development of the comprehension of language, the use of common symbols which permits an individual to properly interpret and compete in the world into which he has been born.

"When the delicate mechanisms of hearing and speech and vision are disturbed, the consequences for the individual may range from mild handicaps to ultimate problems as serious as distorted emotional development or mental retardation. The consequences are not limited to the individual; they extend through the family, the community, and the entire Nation in the expression of difficult interpersonal relationships, employment restrictions, economic responsibilities, safety precautions, and many other areas of daily living.

"Diagnosis and proper treatment of impairments of the human communication process along with appropriate rehabilitation will eliminate serious delay in the total development of the human organism, particularly in terms of maturation and learning, and can make him a productive citizen."

If we can develop an effective nationwide program for multiple screening for hearing, speech, and visual handicaps it is our feeling that we will have performed one of the greatest services possible for all children. In other words, whether a child was born without handicap or with damage from such problems as mental retardation, cerebral palsy, or other neurological problems, following proper screening we would be able to program for that child's maximum development as it depended on his communication senses.

I foresee no particular problems for the multiphasic screening programs other than: (1) The spiraling shortages of health personnel and (2) our inability to stimulate parents and others into taking advantage of such health movements. The first of these problems I believe can be remedied by training programs which would permit volunteers to learn the more simple techniques of screening for hearing and vision problems. As to the second problem—public apathy—I believe we will have to improve the effectiveness of our health communication processes. Having been associated with Dr. Jonas Salk during the polio vaccine episode—I can recall the public's tremendous financial response to the emotional campaigns of the National Foundation. However, I also am aware that we had to go into highly publicized mass inoculation programs before the same public which had made possible the development of the polio vaccine moved in any great numbers toward using it.

2. I believe the information I have presented in item one might be considered my suggestion for effective screening (in terms of human communication) for persons below age 60. For those above 60—we presently have before the Public Health Service a grant proposal that would permit us to demonstrate this need and our capability to serve it by establishing hearing, speech, and language services for the chronically ill and aged in hospitals, nursing homes, and related facilities. Naturally this would include screening as well as diagnosis and assessment, treatment and rehabilitation of hearing, speech, and language problems among the age group over 60.

It is my hope that this information will be of assistance to you and your committee. If additional thought can be provided by this office or by any of our professional people, please advise us of your needs.

Best wishes,

TOM COLEMAN,  
*Executive Director.*

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NATIONAL MULTIPLE SCLEROSIS SOCIETY,  
*New York, N.Y., September 14, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
Senate Office Building, Washington, D.C.*

DEAR SENATOR NEUBERGER: We are very interested in the work of the Subcommittee on Health of the Elderly and appreciate the opportunity you have given us to express our opinion of multiphasic health screening.

We feel that multiphasic health screening has an important and essential place in health care in this country if the goal of preventing diseases is ever to be achieved. The problems we would anticipate with such programs would be the need for more education of the public and professional persons throughout the country. In order for screening and health maintenance programs to be effective, it is essential to have a well informed and educated public motivated to take advantage of these programs. Efforts devoted to education of the public, as well as professional persons, is essential to the success of this undertaking.

The medical profession should, of course, be involved from the outset in planning for multiphasic health screening in their communities. We would also urge that representatives from local health and welfare agencies be included in planning these programs in their communities.

In carrying out these screening programs, the importance of follow-up must be stressed to persons of all age groups. However, study is needed to find ways to motivate the general public to heed the advice for followup when this is indicated. A broad range of health services is required to meet the needs of age groups. The expansion of screening and health maintenance programs will necessitate the expansion of treatment facilities.

We will look forward with interest to learning the results of your survey and wish you much success with your efforts.

Sincerely,

PATRICIA A. PATTERSON,  
*National Assistant Director of Patient Services.*

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NATIONAL SOCIETY FOR THE PREVENTION OF BLINDNESS, INC.,  
*New York, N.Y., September 16, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

DEAR SENATOR NEUBERGER: I regret that my absence from the country has delayed this reply to your letter of August 29, 1966, relative to the "study of modern health screening methods intended to detect and thus help prevent chronic illness."

In answer to your questions we do believe there is a place for multiphasic health screening, properly organized and administered, provided that there is appropriate services and facilities available for arriving at a definitive diagnosis and for providing necessary treatment for those discovered to have a health problem. I am sure your subcommittee will have available the results of several studies that have been made regarding the response of persons to multiphasic screening programs. Of course, one of the major difficulties is the load thrown upon the already overburdened professional services and health facilities to do the followup, without which the screening accomplishes relatively little and may produce distress for those who are unable to obtain the attention recommended.

The screening programs presently engaged in, on a categorical basis as contrasted with the multiphasic programs, have some advantage in the educational impact they make possible in the community.

I am enclosing some of the society's publications that have been found useful in its initiation, promotion, and conduct of screening programs in the field of vision. I call to your attention particularly the publications, "Organization of Glaucoma Screening Programs" and "Preschool Vision Screening."

I am sure that the subcommittee's study will produce information that should be helpful in meeting what I would conceive to be one of its objectives—to give greater emphasis to preventive medicine as a

means not only to improve the Nation's health but to lower costs of the various health care programs of Government.

As the society's name implies, we have been concerned almost solely with prevention from the society's beginning in 1908.

Please let us know if you believe we can be of further assistance to the subcommittee in its study.

Respectfully yours,

JOHN W. FERREE, M.D.,  
*Executive Director.*

NEW JERSEY COLLEGE OF MEDICINE AND DENTISTRY,  
*Jersey City, N.J., August 25, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly, U.S. Senate,  
Washington, D.C.*

DEAR SENATOR NEUBERGER: It is with pleasure that I reply to your recent letter concerning the forthcoming hearings of the Special Committee on Aging addressed to Dr. McCormack whom I have had the honor to recently replace. Since Dr. McCormack is a close personal friend and since your letter appeared to be directed more to the spokesman for this institution rather than to Dr. McCormack as a person, I am sure he would concur not only to my replying to it but also in my brief remarks.

We, in New Jersey, of course, take special pride and interest in this hearing because of Senator Harrison Williams' identity with the proposed Adult Health Protection Act of 1966.

Responding to your specific questions may I say that I believe there is a place for multiphasic health screening and that there are already early indicators that at long last, after at least a generation of minimal progress, its value is being recognized. This, of course, is in great measure due to the recent availability of the necessary computer and other technical hardware which makes the task feasible. Unfortunately, this school has had no direct experience in such programs and our contacts are the same as those quoted either in your letter or in Senator Williams' act.

However, after reading the material you provided which quoted a number of eminent authorities on this subject, many of whom I know, I would like to offer a few random thoughts. First of all, since I agree in essence with all that has been recorded, I shall not repeat any of these basic truths. Rather, I should like to refer to points which I felt were either not covered or perhaps so lightly covered that their emphasis was lost.

I believe that the most important reason why most physicians have not sufficiently stressed prevention, is that they were not sufficiently taught to do so during the period of their medical education. Currently, this country has some bright examples of medical schools trying to correct this deficiency, but we have a long way to go. One of the difficulties in teaching is that until facts are known and solid material is available to teach, one can't begin. This then moves the problem back to research. Our most glaring difficulty, therefore, is the lack of scientific knowledge about the complex ramifications of prevention of



disease and multiphasic screening. Most patient care ventures, regardless of their humanitarian intentions, fail to survive and to attract supporters unless they are founded on a strong basis of scientific fact.

Therefore, please permit me to say that I believe the best chance to further the concept of prevention of disease in all age groups is to build it upon the foundation of sound research and inspired education at the undergraduate level. Fortunately, this type of research and training requires a demonstration population and, therefore, the two could be appropriately blended. Although research has been mentioned it appears somewhat tangential. I would prefer to see the research and training as the point of emphasis serving, of course, the needs of people in the process. If funds could be made available to strengthen selected existing departments of preventive medicine and to provide them with the facilities and personnel to operate a demonstration patient screening clinic, I think the high mission could be most adequately and most permanently met. Such a program, in due time, would become a routine part of our health care service, not a separate and isolated function. In this way, it will reach down to every citizen in every community and not only to those convenient to regional centers.

Thank you for this opportunity to express our opinions on this most worthwhile and timely subject. The New Jersey College of Medicine and Dentistry will watch these hearings with great interest and sincerely offers to your committee any cooperation within our power.

Cordially,

ROBERT R. CADMUS, M.D.,  
*President.*

PERIODIC HEALTH EXAMINATION COOPERATIVE  
RESEARCH PROGRAM,  
*Philadelphia, Pa., September 13, 1966.*

HON. MAURINE B. NEUBERGER,  
*Chairman, Subcommittee on Health of the Elderly,  
U.S. Senate, Washington, D.C.*

MY DEAR SENATOR NEUBERGER: Mr. Biggs kindly offered me the opportunity to submit testimony with reference to the periodic evaluation of the health of elderly individuals, especially by the technique of multiphasic screening. Unfortunately, other requirements preparatory to departing tomorrow on a foreign trip have precluded my preparation of anything that might be submitted formally. I should like, however, to offer a few remarks which might subsequently be elaborated upon if you desire.

I am a specialist in internal medicine whose clinical work for the past 17 years has been exclusively limited to the periodic evaluation of health, primarily because of my employment in the medical service of the Standard Oil Co. (New Jersey). In addition, I have been teaching this subject at the University of Pennsylvania for the past 13 years. While the people that I have examined have not been elderly, I have had considerable interest in the subject of the health of the elderly and the problems of retirement, and have done some teaching at New York University and the University of Pennsylvania on this subject.

The enclosed reprint of an article that I wrote on "The Values and Limitations of Periodic Health Examinations" will suggest to you that I fundamentally believe in the value of such clinical work. The enclosed reprint of a rebuttal that I wrote to a letter published in the *Annals of Internal Medicine* will suggest something of the scientific attitude that I feel appropriate toward periodic examinations.

As logical as periodic examinations are, well controlled and valid data measuring their value are still required. This is even more true with respect to multiphasic screening examinations. That these examinations result in the discovery of disease is beyond question. What should be raised as a legitimate question is whether or not the ultimate difference in the health experience of those examined is of a magnitude to justify the cost of what is done in terms of the time, skills, facilities, and dollars.

That I am fundamentally optimistic with respect to the fact that eventually good data will be had and will justify periodic health evaluations is suggested by the third reprint enclosed, which is an extract of an author's proof sheet just received of an article that I authored and which will be published shortly.

It is my conviction that it would be premature to have now legislation which would offer multiphasic screening programs to the total elderly population on a tax-supported basis. Perhaps the day will come when evidence will be available to justify a proposal of this sort. To date, however, it seems to me that the only appropriate action with respect to such examinations is that which is already being accomplished—namely, the support of soundly planned scientific studies designed to measure the value of such examinations.

Sincerely,

N. J. ROBERTS, M.D.

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