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Concerning Patient Safety and Medication Errors

Before the
Senate Special Committee on Aging

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Good morning, Mr. Chairman and Senator Breaux, and members of the Committee. My name is Janet Corrigan. I am the Director of the Institute of Medicine's Board on Health Care Services, which is responsible for IOM work in the areas of health care delivery, financing, benefits coverage, access and quality of care. For the last three years I have also directed the IOM's Quality of Health Care in America Project, and I am here today representing the IOM Committee which in late 1999 released the report *To Err is Human: Building a Safer Health System*, and most recently, the report *Crossing the Quality Chasm: A New Health System for the 21st Century*.

In its first report, the IOM Committee on the Quality of Health Care in America concluded that as many as 44,000 to 98,000 people die in a given year as a result of medical errors, more than the number who die from motor vehicle accidents (43,458), breast cancer (42,297), or AIDS (16,516). These numbers reflect only patients who died in hospitals, and only deaths for which there was adequate documentation in the medical record to concur that the death was attributable to error.

Medication errors are one of the most common types of errors. The Harvard Medical Practice Study, a study of more than 30,000 discharges from 51 hospitals in New York State, found that adverse events, manifest by prolonged hospitalization or disability at the time of discharge or both, occurred in 3.7 percent of hospitalizations, and about one-half of these adverse events were judged to have been preventable.¹ Drug complications were the most common type of adverse event (19 percent), followed by wound infections (14 percent) and technical complications (13 percent).

Medication errors occur frequently in hospitals. For example, an analysis of nearly 300,000 medication orders written during one year in a tertiary-care teaching hospital, estimated the overall error rate to be 3.13 errors for each 1,000 orders written and the rate of significant errors (those likely to result in adverse clinical consequences) to be 1.81 per 1,000 orders.² These estimates of the incidence of medication errors are undoubtedly low because many errors go undocumented and unreported, and some errors go undetected in the absence of computerized surveillance systems.³

An estimated 770,000 people are injured or die each year in hospitals from adverse drug events (ADEs),⁴ defined as an injury resulting from medical intervention related to a drug. Not all, but many, if not most, of these adverse drug events are preventable.

In hospital environments, most medication errors can be classified into one of five categories: dose error, known allergy, wrong drug/wrong patient, route error or

error in frequency.⁵ Over 50 percent of errors occur at the time of physician ordering or nursing administration. Two studies attribute a sizable proportion of ADEs (42 to 60 percent) to excessive drug dosage for the patient's age, weight, underlying condition, and renal function.⁶ The potential for medication-related error increases as the average number of drugs administered increases.⁷

Most studies of medication error have focused on hospitalized patients. We know very little about errors that occur outside the hospital. In 1998, nearly 2.5 billion prescriptions were dispensed in U.S. pharmacies at an estimated cost of about \$92 billion.⁸ Errors undoubtedly occur in the prescribing of drugs in physician office practices, the dispensing of drugs by pharmacists, and the administration of drugs by patients and their families.

I want to emphasize that errors are seldom due to carelessness or lack of trying hard enough on the part of health care professionals. More commonly, errors are caused by faulty systems, processes and conditions that lead people to make mistakes, or fail to prevent them. They can be prevented by designing systems that make it hard for people to do something wrong and easy to do it right. Safe industries, such as aviation, chemical manufacturing, and nuclear power, learned this lesson long ago. While insisting on training and high standards of performance, they recognize these are insufficient to insure safety. They also pay attention to factors that affect performance, such as work hours, work conditions, information technology, team relationships, and the design of tasks to make errors difficult to make. They create safety by design. Health care must do likewise.

The good news is that much of the knowledge and technology needed to prevent most errors already exists. The key to reducing many types of medication errors is the wise use of computerized systems. Since the mid-90s, the Agency for Healthcare Research and Quality has funded numerous evaluations of computer monitoring systems that prevent and detect ADEs. The results of these evaluations are very promising--anywhere from 28 to 95 percent of ADEs can be prevented.^{9,10,11,12,13}

Many leading health care organizations devoted to improving patient safety have called for the implementation of computerized medication order entry systems. These include the National Patient Safety Partnership, the Massachusetts Coalition for the Prevention of Medical Errors, the Institute for Healthcare Improvement, the National Coordinating Council for Medication Error Reporting and Prevention, and the American Society of Health-System Pharmacists.¹⁴ The time has come for all health care organizations and clinicians to act on these recommendations.

As important as medication errors are, they are only "the tip of the iceberg." In its most recent report, *Crossing the Quality Chasm: A New Health System for the 21st Century*, the IOM Committee concluded that safety reflects only a small part of

the unfolding story of quality in American health care. Other defects are even more widespread. A synthesis of the literature conducted by The RAND Corporation, found over 70 major publications in leading peer reviewed journals since 1987 documenting serious and extensive quality problems throughout the U.S. health care system.¹⁵

As medical science and technology have advanced at an extraordinary pace, the health care delivery system has floundered. We fall far short in our ability to translate knowledge into practice, and to apply new technology safely and appropriately. As currently structured, the health care enterprise, does not make the best use of its resources.

Chronic conditions affect almost half of the U.S. population and account for the majority of health care expenditures. Yet there remains a dearth of clinical programs with the infrastructure required to provide the full complement of services needed by people with even the most common conditions, such as asthma, heart disease, and diabetes. Physician groups, hospitals and other health care organizations operate as silos, often providing care without the benefit of complete information about the patient's condition, medical history, services provided in other settings, or medications prescribed by other clinicians.

Health care delivery has been relatively untouched by the revolution in information technology that has been transforming nearly every other aspect of society. The IOM Committee believes that information technology must play a central role in the redesign of the health care system if a substantial improvement in quality and safety is to be achieved over the coming decade. The Internet has enormous potential to transform health care and to improve quality, safety, access and efficiency. Central to many information technology applications related to care delivery, is the automation of patient-specific clinical information.

The challenges of applying information technology to health care should not be underestimated. Health care is undoubtedly one of the most, if not the most, complex sector of the economy. The number of different types of transactions (i.e., patient needs, interactions, and services) is very large. Sizable capital investments and multiyear commitments to building systems will be required. Widespread adoption of many information technology applications will require behavioral adaptations on the part of large numbers of patients, clinicians, and organizations.

In the absence of a national commitment and financial support to build a national health information infrastructure, progress on quality and safety improvement will be painfully slow.

Thank you for this opportunity to testify. I would be happy to answer any questions the Committee may have.

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- ¹ Brennan, Troyen A.; Leape, Lucian L.; Laird, Nan M., et al. Incidence of adverse events and negligence in hospitalized patients: Results of the Harvard Medical practice Study I. *N Engl J Med.* 324:370-376, 1991. See also: Leape, Lucian L.; Brennan, Troyen A.; Laird, Nan M., et al. The Nature of Adverse Events in Hospitalized Patients: Results of the Harvard Medical Practice Study II. *N Engl J Med.* 324(6): 377-384, 1991.
- ² Lesar, Timothy S.; Briceland, Laurie, et al. Medication Prescribing Errors in a Teaching Hospital. *JAMA* 263(17): 2329-2334, 1990.
- ³ Classen, David C. et al., Computerized Surveillance of Adverse Drug Events in Hospital Patients. *JAMA* 266(20):2847-2851, 1998.
- ⁴ Agency for Healthcare Research and Quality, *Research in Action*, Issue #1, March 2001. See also, Classen DC, Pestotnik SL, Evans RS, et al. Adverse drug events in hospitalized patients. *JAMA* 1997; 277(4):301-6; Cullen DJ, Sweitzer BJ, Bates DW, et al. Preventable adverse drug events in hospitalized patients: A comparative study of intensive care and general care units. *Crit.Care Med* 1997; 25(8):1289-97.; Cullen DJ, Bates DW, Small SD, et al. The incident reporting system does not detect adverse drug events: A problem for quality improvement. *Journal on Quality Improvement* 1995;21(10):541-8.
- ⁵ Agency for Healthcare Research and Quality, *Research in Action*, Issue #1, March 2001.
- ⁶ Classen DC, Pestotnik SL, Evans RS, et al. Adverse drug events in hospitalized patients. *JAMA* 1997; 277(4):301-6; and Evans RS, Pestotnik SL, Classen DC et al. Prevention of adverse drug events through computerized surveillance. *Proc Annu Symp Comput Appl Med Care* 1992; p 437-41.
- ⁷ Cullen, David J., Sweitzer, Bobbie Jean; Bates, David W., et al. Preventable Adverse Drug Events in Hospitalized patient: A Comparative Study of Intensive Care and General Care Units. *Crit Care Med* 25(8):1289-1297,1997.
- ⁸ National Wholesale Druggists' Association. *Industry Profile and Healthcare Factbook*. Reston, VA. 1998.
- ⁹ Cullen DJ, Bates DW, Small SD, et al. The incident reporting system does not detect adverse drug events: A problem for quality improvement. *Journal on Quality Improvement* 1995;21(10):541-8.
- ¹⁰ Bates DW, Spell N, Cullen DJ, et al. The costs of adverse drug events in hospitalized patients. *JAMA* 1997; 277(4):307-11.
- ¹¹ Bates DW, Cullen DJ, Laird N, et al. Incidence of adverse drug events and potential adverse drug events. *JAMA* 1995;274(1):29-34.
- ¹² Bates DW, Miller EB, Cullen DJ, et al. Patient risk factors for adverse drug events in hospitalized patients. *Arch Intern Med* 1999; 159(21):2553-60.
- ¹³ Evans RS, Pestotnik SL, Classen DC, et al. Preventing adverse drug events in hospitalized patients. *Ann Pharmacother* 1994;28(4):523-7.
- ¹⁴ IOM. *To Err is Human: Building a Safer Health System*. National Academy Press, 1999.
- ¹⁵ IOM. *Crossing the Quality Chasm: A New Health System for the 21st Century*. National Academy Press, 2001. See Appendix A: Schuster, MA, et al., *The Quality of Health Care in the United States: A Review of Articles Since 1987*.