Are We Any Safer After 20 Years?

By Erica Li, MD, and David Nash, MD, MBA

Twenty years ago, the Institute of Medicine published the landmark report *To Err is Human: Building a Safer Health System*. The report shocked the nation, stating that anywhere from 44,000 to 98,000 deaths occur every year from preventable medical errors. The report was a huge wake-up call—this was the first time we realized that medical errors are common, costly, and preventable. At that time, the Institute of Medicine (now named the National Academy of Medicine) urged the nation’s health care system to reform, with an ambitious goal of decreasing medical errors by 50%.

Almost immediately, we saw the health care system respond. For instance, the Agency for Healthcare Research and Quality (AHRQ) was very quickly tasked with sponsoring and coordinating research in patient safety. But the question remains, Have we made any progress in the past 20 years? Much has been written about the impact of *To Err is Human*, but we want to focus on issues of concern for the regular readers of *P&T*.

**Hospital-acquired infections: Before To Err is Human**, the concept that you could get sick by going to the hospital to be treated for something else was unheard of. Since 1999, there has been great research and effort to decrease rates of hospital-acquired infections. In 2005, Topal et al. published a prospective cohort study that showed improvement in rates of catheter-associated urinary tract infections with electronic health record documentation changes and implementation of a new nurse-driven protocol. The key to success was creating a culture shift by promoting shared accountability and not placing individual blame. The next year, Pronovost et al. were able to achieve a significant and sustained decrease in the rate of catheter-related bloodstream infections in the intensive care unit through system-wide interventions. We have come a long way in identifying hospital-acquired infections and implementing interventions to change the culture of patient safety and minimize error.

**Medication-related errors**: Early studies on adverse events showed that medication-related errors make up the single largest category of adverse events. In the last 20 years, we have looked at these medication-related errors and attempted to address them. Computerized physician order entry (CPOE) allows physicians to place orders electronically, as opposed to verbal or handwritten orders. Implementation and use of CPOE in health systems have expanded rapidly since *To Err is Human*. A 2013 meta-analysis found that the likelihood of a prescribing error was reduced by 48% when using CPOE. When CPOE systems are paired with clinical decision support systems, physicians can be notified in real time of drug–drug interactions, drug allergies, and inappropriate doses. These systems have now been developed further to help with ordering of tests, procedures, and consultations.

However, new technologies have unintended consequences. In a study looking at medication alerts, 6.6% of all electronic prescriptions generated alerts. That translates into at least dozens of alerts per day. Constantly being faced with countless alerts creates alert fatigue, a term that describes desensitization to alerts, even if they are critical. This is a serious challenge we have not yet figured out how to solve.

In another effort to reduce medication errors, the Food and Drug Administration (FDA) proposed the bar-code label rule. This rule went into effect in April 2004 and requires bar codes on certain drugs and biological products. These bar codes ensure that the correct drug at the correct dose is given to the correct patient at the correct time. Bar code medication administration (BCMA) programs have been shown to reduce medication errors by 65% to 86%. In fact, at our home institution of Thomas Jefferson University Hospital, we have reached our goal BCMA compliance rate of greater than 95%.

**Adverse event reporting**: *To Err is Human* catalyzed efforts to capture and understand medical errors. One of its key recommendations was to create voluntary and mandatory reporting systems. Since then, reporting systems have become widespread. In fact, the FDA has its own adverse event reporting system, MedWatch. However, studies have shown that many adverse events still go unreported. What’s more, the usefulness of incident reporting remains unclear. We currently have the infrastructure developed to collect data on adverse events, but looking into the future, we need to harness this and determine how to effectively investigate incidents to implement system-wide improvements.

**Medication adherence**: In the last 20 years, there has been a good deal of research examining medication adherence. Kini et al. published a systematic review in 2018 evaluating methods to measure adherence and interventions to improve adherence. In summary, the most useful interventions include combination pills to reduce daily pill burden, consultations with pharmacists for co-management, and reminders for patients such as telephone calls to prompt refills. However, it is impor-
tant to recognize the many possible reasons for nonadherence. These don’t just include patient- and therapy-related factors but also socioeconomic and health system factors. To effectively improve adherence, we need to tailor strategies for the patient in front of us.

**Future of precision medicine:** Precision medicine is the idea that we could use a patient’s own genomic information to create unique therapies targeted for that patient. One exciting example is chimeric antigen receptor (CAR) T-cell therapy, which is currently being offered to children with acute lymphoblastic leukemia and adults with advanced lymphomas. CAR T-cell therapy involves drawing blood from patients and separating out T cells. These T cells are then genetically engineered to produce receptors on their surface. These special receptors allow the T cells to recognize and attach to proteins found on tumor cells. The engineered CAR T cells are then infused back into the patient, allowing the T cells to recognize and kill cancer cells.

Similarly, researchers are now trying to use genomic data to target medications for patients. For example, genomic data help us to choose the most effective antihypertensive or anticoagulant for a particular patient, while reducing side effects. Precision medicine could allow us to save on opportunity costs while maximizing our current therapies.

In large part due to *To Err is Human*, we have taken huge strides to better understand our health system’s role in medical errors. Looking back now, we can appreciate the advances we have made in changing the way we think about patient safety. We have reduced hospital-acquired infections and medication-related errors. However, medication-related errors remain the number-one inpatient category for error even after all these years. As we look into the future, we still have a lot of work to do. Perhaps the emergence of value-based payment agreements will motivate our health systems to pay even further attention to reducing error.

**Dr. Li is a Family Medicine Physician and a Population Health Research Fellow in the Department of Family and Community Medicine at the Sidney Kimmel Medical College of Thomas Jefferson University in Philadelphia. Dr. Nash is the Founding Dean Emeritus of the Jefferson College of Population Health and the Dr. Raymond C. and Doris N. Grandon Professor of Health Policy at Thomas Jefferson University in Philadelphia. He has been the Editor-in-Chief of P&T for more than 20 years.**

**REFERENCES**


*Excerpt from the executive summary of To Err is Human: Building a Safer Health System*

“The goal of this report is to break this cycle of inaction. The status quo is not acceptable and cannot be tolerated any longer. Despite the cost pressures, liability constraints, resistance to change and other seemingly insurmountable barriers, it is simply not acceptable for patients to be harmed by the same health care system that is supposed to offer healing and comfort. ‘First do no harm’ is an often quoted term from Hippocrates. Everyone working in health care is familiar with the term. At a very minimum, the health system needs to offer that assurance and security to the public. A comprehensive approach to improving patient safety is needed. This approach cannot focus on a single solution since there is no ‘magic bullet’ that will solve this problem, and indeed, no single recommendation in this report should be considered as the answer. Rather, large, complex problems require thoughtful, multifaceted responses.”