



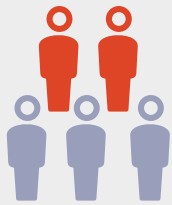
PREVENTING MEDICATION ERRORS IN HOSPITALS

DATA BY HOSPITAL ON NATIONALLY STANDARDIZED METRICS

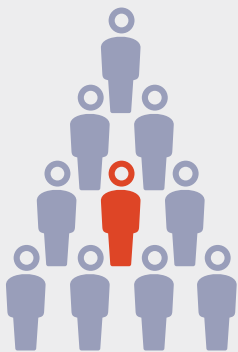
FIGURE 1

COMPUTERIZED CHECKS DO NOT CATCH ALL MEDICATION ERRORS

When hospitals tested their computer systems using orders that all contained potentially harmful, preventable errors, the systems failed to flag the following:



39% of potentially harmful orders



13% of potentially fatal orders

When it comes to medication errors, one decimal point could mean the difference between life and death. Entering in a wrong dose could result in a patient receiving ten times the recommended amount of a drug. Equally dangerous, an unrecorded medication allergy could result in a deadly drug reaction. Roughly one in 20 hospital patients has experienced an adverse drug event (ADE).^{1,2} An ADE refers to any injury occurring at the time a drug is used, whether or not it is identified as a cause of the injury. These events are often preventable or caused by errors in the ordering process.³ Adverse drug events can result in a longer hospital stay and increased costs averaging \$3,000 per patient.⁴

TECHNOLOGY CAN HELP REDUCE MEDICATION ERRORS

Computerized Physician Order Entry (CPOE) systems are remarkably effective at reducing the rate of serious medication errors. A study led by David Bates, M.D., Chief of General Medicine at Boston’s Brigham and Women’s Hospital, demonstrated that CPOE reduced error rates by 55% – from 10.7 to 4.9 per 1000 patient days.

Rates of serious medication errors fell by 88% in a subsequent study by the same group.^{5,6} Research estimates that implementation of CPOE systems at all non-rural U.S. hospitals could prevent three million adverse drug events each year.⁷

Despite improvements in recent years, data from Leapfrog’s most recent survey of hospitals on this topic shows that not all hospitals

have implemented CPOE systems for preventing such errors. In addition, CPOE systems sometimes do not alert physicians when they have input orders containing serious medication errors. Hospitals' continued reporting of this data will help to monitor progress and allow patients to choose hospitals based on their medication safety practices.

CPOE allows physicians to input medication instructions into a computer system that can access patient information such as allergies, existing medications, and lab results. The system checks the prescription order to check for any potential problems. This substantially reduces the risk of medication errors.^{8,9}

To verify that hospital CPOE systems stay up-to-date with changes in available medications and in record-keeping systems, Leapfrog developed an evaluation tool in collaboration with leading academic researchers. Hospitals enter simulated patient data into their system, and are then given a list of orders—some containing a potentially harmful or even fatal error—to run through their CPOE system. Leapfrog's CPOE tool is the only known system in the U.S. that allows hospitals to test how well their CPOE systems are detecting prescribing errors.¹⁰

On the 2015 Leapfrog Hospital Survey, hospitals' CPOE systems failed to flag 39% of all potentially harmful drug orders, or nearly two out of every five orders (Figure 1). The systems also missed 13% of potentially *fatal* orders. If administered to actual patients, all of these orders had the potential to cause injury or even death.

The most common unflagged errors related to medications or dosage include:

- Diagnosis (e.g., prescribing a beta blocker to a patient with asthma),
- Kidney function (e.g., a drug that must be processed by the kidneys given to a patient with impaired kidney function without reducing the dose accordingly), and
- Monitoring (e.g., the failure to display a reminder to test drug levels after issuing a medication, when such follow-up is clinically indicated).

Hospitals' ability to correctly flag potential errors has improved only slightly (one percentage point) since 2014. Without accelerated improvement, patients will continue to receive medications or dosages that increase their risk of injury or death.

Leapfrog asks hospitals to test their CPOE system annually using the CPOE evaluation tool. To fully meet Leapfrog's standard, hospitals must:

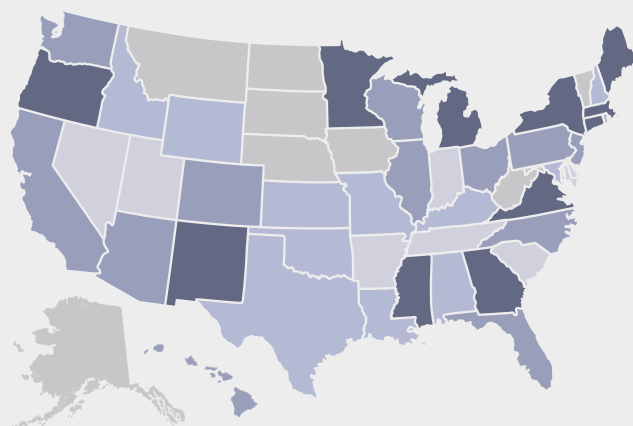
- Demonstrate that the system alerts physicians to at least 50% of common, serious prescribing errors; and,
- Order at least 75% of inpatient medication orders through a CPOE system.

FIGURE 2

USE OF COMPUTERIZED PHYSICIAN ORDER ENTRY (CPOE) VARIES WIDELY BY STATE

THE PERCENTAGE OF REPORTING HOSPITALS MEETING LEAPFROG'S STANDARD FOR CPOE

- Fewer than five hospitals reporting in 2015
- 20-49%
- 50-59%
- 60-74%
- 75-100%



Visit www.leapfroggroup.org/cp to view performance by hospital.

Using these combined criteria, nearly two-thirds of hospitals (64%) fully met the standard, showing a considerable improvement compared to 14% in 2010. However, some hospitals (4%) still reported that they did not have an inpatient CPOE system at all.

State-by-state comparisons also show where use and effectiveness of CPOE is lacking. Among the states with the lowest percentage of hospitals meeting Leapfrog’s standard were Indiana (25%) and Nevada (35%). Five other states also had fewer than 50% of hospitals meeting the standard (Figure 2). Among the states with the most hospitals meeting the standard were Maine (85%), Georgia (83%), and New York (81%). In addition, there were eight other states that had 75% or more hospitals meeting the standard.

HOSPITALS CAN PROMOTE GREATER ACCOUNTABILITY

Hospitals can supplement computerized checks with manual reviews to promote medication safety. Medication reconciliation is the process of identifying the most accurate list of all medications a patient is taking—including name, dosage, frequency, and route—and using this list to provide correct medications for patients.¹¹ This process can reduce medication errors and adverse drug events.¹²

Leapfrog asks hospitals a series of fifteen questions regarding their efforts to implement policies and procedures that can prevent adverse drug events. Over half (62%) of reporting hospitals indicated that they conduct all medication reconciliation activities in this list. Nearly all hospitals had implemented processes for documenting patient medications at admission (98% of hospitals) and shared the updated medication list with patients and their families or caregivers at discharge (99% of hospitals; Figure 3). However, not all hospitals had implemented the policies to ensure adherence to these processes. Only 84% of hospitals held their senior administrative leadership accountable for these processes through their performance review of compensation, and only 88% of hospitals had staff time or a budget allocated to developing best practices.

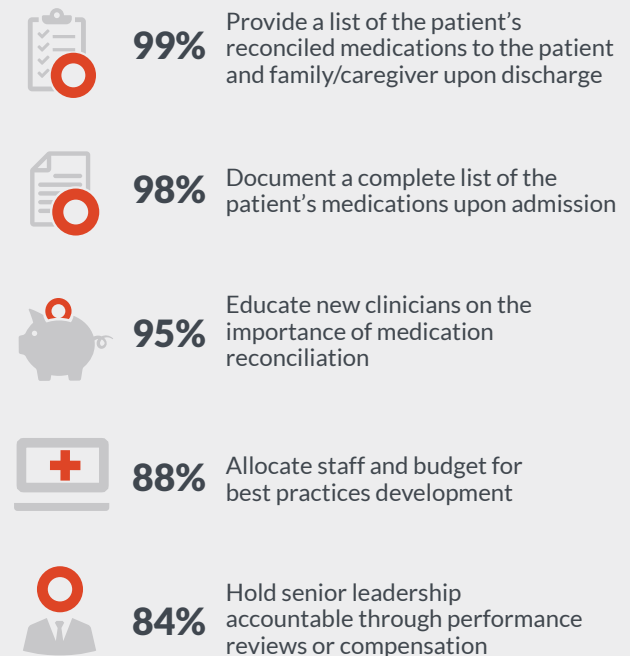
MORE TRANSPARENCY AND QUALITY IMPROVEMENT ARE NEEDED

Disappointingly, some hospitals declined to report their data at all. Leapfrog’s CPOE Evaluation tool is the only known system in the U.S. that allows hospitals to test how well their CPOE systems are detecting a wide variety of prescribing errors. An increase in the number of hospitals reporting to the Leapfrog Hospital Survey would allow more providers to test the efficacy of their medication safety tools, and identify areas where the tools could help to prevent harm to patients. Further, the publicly reported information by hospital can also empower patients to use the results to make more informed decisions when choosing a hospital for care.

FIGURE 3

HOSPITALS IMPLEMENT PROCESS IMPROVEMENTS BUT DO NOT ALWAYS ENSURE ACCOUNTABILITY

THE PERCENTAGE OF HOSPITALS THAT HAVE IMPLEMENTED PROCESSES TO DO THE FOLLOWING:





METHODS

The Leapfrog Group annually invites all adult general acute-care and free-standing pediatric hospitals in the United States to voluntarily report on topics such as high-risk procedures, maternity care, health care-associated infections, medication safety, nursing safety, and Never Events through its annual hospital survey. In 2015, a record 1,750 hospitals submitted a survey, representing 46% of hospitals nationwide. This report uses final hospital data from the 2015 Leapfrog Hospital Survey (data submitted through December 31, 2015).

The Leapfrog Hospital Survey includes measures that are endorsed by the National Quality Forum (NQF) and/or aligned with those of other significant data-collection entities, including the Centers for Medicare and Medicaid Services (CMS) and The Joint Commission. Leapfrog partners with the Armstrong

Institute for Patient Safety and Quality at Johns Hopkins Medicine to review survey measures and standards, and updates them annually to reflect the latest science. Additionally, panels of volunteer experts meet regularly to review the survey measures and recommend performance standards for each subject area covered in the Leapfrog Hospital Survey. The full list of survey measures included in the 2015 survey is available [here](#).

The Leapfrog Group's [CPOE Evaluation Tool](#) was developed by Dr. David Bates, Dr. David Classen, Jane Metzger and colleagues—with funding from the Agency for Healthcare Research and Quality (AHRQ) as well as others. Individual bricks-and-mortar hospitals are required to test their CPOE system annually and perform within specified parameters in order to fully meet the CPOE standard.

1. Effect of Computerized Physician Order Entry and a Team Intervention on Prevention of Serious Medication Errors, *JAMA*, October 1998.
2. The Impact of Computerized Physician Order Entry on Medication Error Prevention, *Journal of the American Medical Informatics Association*, July-August 1999.
3. Incidence of Adverse Drug Events and Potential Adverse Drug Events: Implications for Prevention, *JAMA*, July 1995.
4. The costs of adverse drug events in community hospitals, *Joint Commission Journal on Quality and Patient Safety*, March 2012.
5. Effect of Computerized Physician Order Entry, *JAMA*, 1998.
6. The Impact of Computerized Physician Order Entry, *Journal of the American Medical Informatics Association*, 1999.
7. Adverse Drug Events in Hospitalized Patients: Excess Length of Stay, Extra Costs, and Attributable Mortality, *JAMA*, January 1997.
8. Effects of Computerized Physician Order Entry and Clinical Decision Support Systems on Medication Safety: A Systematic Review, *Archives of Internal Medicine*, June 2003.
9. Effect of Computerized Physician Order Entry, *JAMA*, 1998.
10. Development of the Leapfrog Methodology for Evaluating Hospital Implemented Inpatient Computerized Physician Order Entry Systems, *Quality and Safety in Health Care*, April 2006.
11. Medication Reconciliation Review, Institute for Healthcare Improvement, Accessed March 2016.
12. Hospital-Based Medication Reconciliation Practices: A Systematic Review, *JAMA Internal Medicine*, July 2012.

About The Leapfrog Group: Founded in 2000 by large employers and other purchasers, [The Leapfrog Group](#) is a national nonprofit organization driving a movement for giant leaps forward in the quality and safety of American health care. The flagship [Leapfrog Hospital Survey](#) collects and transparently reports hospital performance, empowering purchasers to find the highest-value care and giving consumers the lifesaving information they need to make informed decisions. [Hospital Safety Score](#), Leapfrog's other main initiative, assigns letter grades to hospitals based on their record of patient safety, helping consumers protect themselves and their families from errors, injuries, accidents, and infections.

About Castlight Health: Our mission is to empower people to make the best choices for their health and to help companies make the most of their health benefits. We offer a health benefits platform that engages employees to make better healthcare decisions and guide them to the right program, care, and provider. The platform also enables benefit leaders to communicate and measure their programs while driving employee engagement with targeted, relevant communications. Castlight has partnered with more than 190 customers, spanning millions of lives, to improve healthcare outcomes, lower costs, and increase benefits satisfaction.

For more information, visit www.castlighthealth.com and connect with us on [Twitter](#) and [LinkedIn](#) and [Facebook](#).