How to Avoid CPOE Pitfalls
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Take precautions when rolling out the technology to diminish the chances of serious medical errors.

Patient safety has always been a priority at the Medical University of South Carolina (MUSC). However, over the last two years, the hospital has taken its initiative to a new level with the help of computerized physician order entry (CPOE).

"We saw CPOE as being the final closing piece of the patient safety initiative. We first needed bar-coded medication administration but to truly close that loop, we needed CPOE," says Melissa Forinash, MUSC's director of patient care systems.

Forinash says the hospital has reaped many patient safety-related benefits since it began rolling out CPOE in 2008, the most significant of which is clarity of order communication. To date, nearly 600 providers at MUSC have been trained to use the system in various hospital units. In May, eight more units and an additional 140 users went live on the system. The hospital hopes to complete campuswide deployment of the technology by early next year.

Meet Meaningful Use Criteria
Like many hospitals nationwide, MUSC hopes to meet meaningful use criteria—a component of which is the use of CPOE—to qualify for EHR incentive funds. In its proposed rule dated January 13, the Centers for Medicare & Medicaid Services (CMS) defines CPOE functionality as "entailing the provider's use of computer assistance to directly enter medical orders (for example, medications, consultations with other providers, laboratory services, imaging studies, and other auxiliary services) from a computer or mobile device. The order is also documented or captured in a digital, structured, and computable format for use in improving safety and organization."

In its final rule dated July 13, the CMS includes CPOE use in its core set of meaningful use objectives, stating that "CPOE is a foundational element to many of the other objectives of meaningful use, including exchange of information and clinical decision support." The final rule states hospitals and eligible providers (EP) must use the technology during the first of three stages for achieving meaningful use. During stage 1, CPOE requirements will focus only on medication orders. The requirement pertains to orders entered directly by "any licensed healthcare professional who can enter orders into the medical record per state, local, and professional guidelines." More than 30% of all unique patients with at least one medication on their medication lists and who are seen by an EP or admitted to an eligible hospital, including critical-access hospitals or their emergency departments, must have at least one medication order entered using CPOE. The only exceptions to this requirement are EPs who write fewer than 100 prescriptions during the EHR reporting period. During stage 2, this requirement will jump to 60%. Stages 2 and 3 could also bring with them a whole slew of additional measures related to CPOE for services beyond medication orders, according to the rule. Stage 1 criteria don't require the electronic transmittal of orders to the pharmacy, laboratory, or diagnostic imaging centers.

Although the American Recovery and Reinvestment Act will most likely spur CPOE adoption nationwide, hospitals shouldn't lose sight of the opportunity to impact patient safety through optimal technology implementation and use, says Jeannell Mansur, RPh, PharmD, FASHP, practice leader of medication safety for Joint Commission Resources in
Oak Brook, Ill.

Joint Commission Resources launched a new Safe Adoption of Technology Consulting Service in March in response to what Mansur says has been a “flurry of activity around technology implementation and related patient safety gaps.” As part of its on-site evaluation process, consultants perform a technology tracer that examines how technology, including CPOE, supports the prescribing, dispensing, and administration of certain high-risk medication processes, such as those related to pediatric medication and chemotherapy. “It’s a very effective means of looking at all aspects of the medication process,” says Mansur.

Angie Nicholas, MD, FAAFP, senior director of product management for Siemens Healthcare in Malvern, Pa., says community hospitals in particular may give more priority to CPOE to qualify for incentive funds. Nicholas, who has significant experience in the clinical setting—and currently maintains her own clinical practice—also leads Siemens’ Physician Workflow Team, which focuses on CPOE and other IT adoption.

**Understand the Importance of Patient Safety**

However, despite this anticipated growth in CPOE usage, experts say the technology will produce less-than-optimal results if hospitals don’t focus on a foolproof implementation plan and resist the temptation to hastily adopt a solution that may not be the best fit.

“The performance of CPOE in detecting potentially harmful errors is more about implementation than the product employed,” said Jane Metzger in a CSC Healthcare press release. Metzger, a principal researcher for the Waltham, Mass.-based company, is also one of the lead authors of a recent study demonstrating the variability of CPOE’s effectiveness and its impact on patient safety.

The study, which involved 62 leading hospitals, found that in some facilities CPOE detected as few as 10% of orders that could have been potentially harmful. In others, it detected 82% of these potentially harmful errors. The mean score for detection through CPOE was 44%. The hospitals performed the voluntary self-assessment as part of the 2008 Annual Safe Practices Survey of the Leapfrog Group, which provided deidentified assessment information for the analysis.

The Joint Commission has long since warned about the patient safety implications of CPOE. In 2008, it issued a sentinel event alert focusing on specific technologies, including CPOE. The alert highlighted several factors that contribute to error, including inadequate planning, insufficient testing or training, and an overreliance on vendor advice.

But isn’t CPOE supposed to enhance patient safety? Isn’t the technology touted specifically for its ability to reduce medication errors, remove illegibility concerns, standardize abbreviations and acronyms, improve workflow, and help physicians make more informed decisions?

**Know Why CPOE Fails**

CPOE’s failure to work 100% of the time can possibly be traced to poor design that can lead to human error (eg, selecting the wrong dosage or wrong drug), says James G. Anderson, PhD, a professor of medical sociology and health communication at Purdue University.

“Some studies have found CPOE introduces new errors if the interfaces aren’t designed properly or if the information provided to the physician is not given in a way that he or she can easily access and use it,” he notes. “The more screens a physician has to go through to enter an order, the more likely mistakes will be made.”

Although Anderson’s own research hasn’t focused specifically on CPOE, he has studied the accuracy rate of e-prescribing. Most recently, he conducted a clinical simulation study during which he and colleagues at the University of Victoria in British Columbia used computer screen capture as well as audio and video taping to monitor the e-
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The study found that physicians made a significant number of errors that went undetected before orders were electronically sent. More specifically, 84% of the errors were associated with display visibility (ie, being unable to easily find information), 77% were associated with problematic data entry (ie, entering orders electronically), and 66% were associated with problematic default content (ie, having insufficient options from which to choose).

The type and frequency of these errors could easily occur on a larger scale due to a poorly planned CPOE implementation in a hospital setting, says Anderson.

"Everybody is looking for a cure-all solution, but the truth is that as long as you’re having humans taking care of other humans, there’s going to be error," says Deborah DeWaay, MD, an assistant professor of internal medicine and a hospitalist at MUSC. DeWaay, who was the chief resident for internal medicine when CPOE was initially rolled out at the hospital, helped coordinate training schedules and served on various committees to provide input regarding usability.

A hospital’s CPOE error rate could depend largely on whether physicians can easily access electronic information in various parts of the chart, says DeWaay, adding that accessing information online is sometimes more time consuming—and more frustrating—than ordering via paper. "Before CPOE, charts and medication lists were at the bedside. It’s harder to get [this information] off the computer," she says.

Errors in a paper-based world were frequently caught before orders were sent simply because physicians had to physically go to a patient’s bedside, says DeWaay. With CPOE, face-to-face interactions aren’t necessary to complete an order.

"When a physician goes to a bedside to write an order later in the day, he or she may incidentally notice changes in the patient’s status and be more inclined to check in with the nurses while they are at the bedside. At a computer, there is no opportunity to incidentally notice how the patient is doing," she says.

Mitigate Your Risks

Just because a hospital has CPOE doesn’t mean there’s no need to ensure other patient safety precautions, says Forinash. "I think it would be foolhardy for anyone to assume that CPOE is going to answer all patient safety concerns. It won’t. It introduces another layer of risk that must be assessed and managed," she says.

The following are several ways in which hospitals can mitigate patient safety risks before, during, and after deploying CPOE technology:

Address Alert Fatigue

Alert fatigue occurs when physicians are inundated with alerts to the point that they begin to ignore them.

"There’s a great deal of variation from hospital to hospital as to the types of alerts that prescribers see at the point of care," says Mansur. "I don’t necessarily think it’s a bad thing to limit the alerts. If you bombard providers with too many alerts, they may eventually ignore them."

At MUSC, alerts are deliberately kept low so as not to overwhelm or frustrate physicians. Pharmacists also receive back-end alerts through the pharmacy system as an added layer of precaution and in case something needs to be brought to a physician’s attention, according to Forinash.

Notifying physicians only of severe allergies and the most significant interactions seems to be effective in most hospitals, says Nicholas. "Physicians don’t need to be aware of every single drug interaction. The minor ones are called minor for a reason. Notify the pharmacist of those, and he or she can decide whether it’s something the physician needs to know," she says.

Some errors are better solved by human fixes than by electronic alerts, says DeWaay. For example, MUSC reduced its alerts for duplicate orders and instead performed massive education to solve the problem.

To meet meaningful use criteria, hospitals and EPs must implement drug-drug, drug-allergy, and drug-formulary checks for CPOE. In its final rule, the CMS acknowledges the challenges associated with alert fatigue related to these checks; however, it says the benefits of these alerts far outweigh any inconvenience they may cause to a provider. "We recognize alert fatigue is a potential occurrence with drug-drug and drug-allergy checks. However, meaningful use seeks to utilize the capabilities of certified EHR technology, and any means to address alert fatigue requires a critical evaluation of each
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We believe this is beyond the scope of the definition of meaningful use. We believe these checks are valuable and improve patient care and therefore do not remove them to address alert fatigue.”

Customize the Technology

Most vendor systems are customizable to fit a specific organization’s culture, says Nicholas, who frequently conducts hospital-specific physician usability tests during which she watches physicians navigate CPOE systems to determine which alerts can be turned off entirely, which ones can be left on, and which ones should require a reason or rationale for overriding the alert. Vendors can also provide education, assist with workflow redesigns, and begin the rollout with a pilot program to test its effectiveness.

Ensure Proper Training

Training is the most important part of CPOE implementation, says Nicholas. Everyone involved with the technology needs to understand how it will affect their responsibilities and workflow, she adds.

At MUSC, physicians on staff must complete a set of one-hour computer-based training (CBT) modules as well as a one-hour class. Attending physicians can choose either CBT or the class. Nurses receive approximately four hours of training that covers feature/function education (eg, how to enter verbal or telephone orders into CPOE) and electronic workflow management (eg, viewing and taking action on orders).

“Mandating the training helped us immensely,” says Forinash. “Due to the short time allotment, we had to really tailor what we taught in the class, which is why the CBTs were important. We teach them the feature/function in the CBTs and then when they came to class, we would answer questions and hit the high points of workflow issues or answer some of the more frequently asked questions.”

Seek Physician Input

CPOE will be successful only when the project is led by clinicians rather than IT staff, says Nicholas. “In the end, if physicians can’t use it, you’re not going to get any of the benefits associated with it,” she explains.

Redesign Workflow Before Implementation

“When you take a bad process and try to computerize it, all you’ve done is make a bad process worse. It’s not the fault of the computer. It’s the fault of the computer in conjunction with a bad process,” says Nicholas. “Hospitals need to change workflow prior to CPOE implementation to better reflect how it will work once [the process] is computerized.”

Hospitals must keep in mind that undesirable outcomes could be the result of a larger and more systemic process-related problem, says Anderson. “If it’s an egregious error, there’s a tendency to blame the individual and not the system. Most of the time, it’s not an individual being negligent or careless; it’s the system,” he says.

Preserve Lines of Communication

Don’t let CPOE replace traditional face-to-face communication, says Forinash. In a paper-based world, physicians and nurses are interacting together on the unit or at the patient’s bedside; however, all that changes when physicians can enter orders from anywhere in the hospital or from home.

“In some ways, [CPOE] reduces communication. There’s a lot of perceived loss of control for nurses, who have always been the core of order management and communication to other departments and services. A nurse may not even know the order has been issued unless he or she looks for it,” she says.

To help combat the issue, MUSC implemented a policy stating physicians must call nurses when entering a stat order to alert them that such a decision has been made.

Some hospitals also print out an order summary so nurses have a piece of paper to reference, says Nicholas, and others use an electronic notification system.

Hospitals may need to come up with creative solutions to keep lines of communication open after CPOE goes live, says DeWaay. For example, at MUSC, physician work areas are closely integrated with nursing stations to encourage face-to-face dialogue.

“If people interact with each other, they’re more likely to communicate better overall,” she says. “There’s a team environment. If you physically remove people from a central location, you’re going to lose that. I think that can be a problem and a patient safety issue.”

Address Change Management

Managing the risks associated with the human side of any major change, such as CPOE...
implementation, is challenging, says Erik J. Van Slyke, managing director of Solleva Group, which helps organizations plan for, implement, and manage changes such as technology and outsourcing implementations, mergers and divestitures, and restructuring.

“In hospitals and the broader world of organizations, the human side of change is frequently overlooked because the focus on implementing the technical solution can be quite consuming,” he says. “To reduce these risks, administrative and management staff must go beyond basic communication and prescriptive solutions issued by edicts from the top. It is about anticipating these challenges and finding ways of engaging staff to create solutions.”

**Provide Support, Develop a Feedback Loop**

At MUSC, nursing informatics specialists employed by the nursing department provide around-the-clock coverage to answer questions and assist physicians and nurses. These specialists are referred to as “red coats” because of the red coats they wear distinguishing them from other employees. If a red coat can’t answer a question, an on-call IT clinical analyst can be paged. Physicians at MUSC can also e-mail questions or enhancement requests to the hospital’s CPOE support team.

When CPOE errors do occur, ensure there is a feedback loop to examine why they occurred and how they can be prevented in the future, says Anderson.

**Don’t Be Too Reliant on the System**

“In standard procedures, there’s a lot of checking and double checking. But when the whole system gets automated, all of that sort of gets replaced. You begin to rely on the automation,” says Anderson.

The danger with that strategy is that some alerts may be turned off without the physician’s knowledge or certain nonformulary drugs may not be subject to alert checks, says Mansur.

The bottom line is that CPOE will never truly replace human intelligence, says Anderson, adding that physicians must ensure they don’t become so dependent on the technology that they overlook errors that might otherwise have been caught.

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