GUEST EDITORIAL

Implementation, CPOE, and Medication Errors

The March 9 *JAMA* article titled "Role of Computerized Physician Order Entry Systems in Facilitating Medication Errors"[1] was guaranteed to gain the attention of anyone with an interest in computerized physician order entry (CPOE), whether that interest is positive or negative. Those in favor of CPOE, as a means of preventing errors, were quick to point out that the system on which the study was based was a last-generation system and that the problems mentioned had been resolved. The media, of course, were quick to pick up that CPOE systems can cause errors. How do we achieve the promised benefits of CPOE and minimize the generation of new errors?

MISLEADING TITLE

The title leads the reader to believe that CPOE systems facilitate medication errors. It is unfortunate that this title was used because it leads to sensationalism. It is also not reflective of the purpose of the study, which as stated in the objective was "To identify and quantify the role of CPOE in facilitating prescription error *risks*" [emphasis added]. My recommendation is not to stop using CPOE because it facilitates medication error risks, as these authors found out, but that we should implement CPOE with the resources and methodologies to identify *both* benefits and error risks. I do, however, applaud the authors for using such a sensational title, as it has surely put CPOE on "the agenda" and hopefully will result in vendors' evaluating their software applications more critically for the kind of errors reported in this study or reported by their clients. Who will not include questions in their CPOE request for proposals, or ask at vendor demonstrations, about how the proposed system prevents these kinds of errors?

DID WE REALLY EXPECT IT TO BE THAT EASY?

The content of the article clearly highlights that it is not "just the CPOE system itself" but the way that it is implemented and used in the environment that has facilitated medication error risks. Thus, the article provides a valuable message for CPOE system developers, implementers, and hospital administrators. How CPOE systems are installed, adopted by clinicians, and maintained are just as important, if not more important, than system selection. The message, that implementing CPOE is not just about installing hardware and software, is critical to disseminate. With CPOE, the paper chart and order communication processes that have evolved for over a century are being replaced. It is unrealistic to expect that these processes will be computerized without many resources and numerous alterations.

MEDICATION ERRORS ARE "UNANTICIPATED" ONLY IF YOU ARE NOT LOOKING OR LISTENING.

One of the more alarming findings of this study was that these errors were unanticipated. A question that should be asked of the system is, "What processes are in place to obtain feedback from clinicians or to provide feedback to the vendor?" How can we convince vendors and administrators that formative evaluation is a critical part of CPOE implementation? Moreover, resources are essential to follow up on user concerns, especially those that address safety.

In a University HealthSystem Consortium benchmarking study of 10 organizations widely recognized for their CPOE achievements, CPOE was described as not perfect, cheap, or easy to install, but the study results clearly showed that the benefits outweighed the effort and cost.[2] These sites used a variety of different vendor systems and identified that there were opportunities for improvement in their organizations. Some of the improvements that were suggested included: more clinician usage of clinical decision support or the system's safety features; more integration of the CPOE system with other services and departments; and increased data mining to support process improvement initiatives. They suggested surveys, focus groups, and rounding on the units as ways to obtain user feedback. This group of experts identified seven critical success factors as essential to success in the development, implementation, and adoption of CPOE: (1) systemwide planning; (2) supportive organizational culture; (3) leadership involvement; (4) workflow design; (5) stakeholder input; (6) adequate training; and (7) rapid response to user concerns.

WHAT DO WE DO FIRST?

Which of these CPOE medication error risks is most likely to cause patient harm? How do you assess harm? I have seen different reactions from two nurses on the same unit during CPOE implementation. They each expressed opinions, at opposite ends of the continuum, on how the system was working. One nurse found the system easy to use, and said, "It does not take much time, once you get used to it." This same nurse also thought that medications and test results were available sooner and thought that this would also help reduce medication errors. The other nurse thought that the system took time away from the patient, and worried that new orders would be missed. Which nurse is right?

The National Coordinating Council for Medication Error Reporting and Prevention[3] defines a medication error as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer." This group also provides error outcome categories to rate harm severity ranging from "No error" (Category A), that is, events that have the capacity to cause error, to "Error, Death" (Category I), that is, an error occurred that may have contributed to or resulted in the patient's death.

In May 2003, CPOE was added as a cause of error by MEDMARx (US Pharmacopoeia, Rockville, MD) to their medication error reporting program.[4] There were more than 7000 errors reported for 2003. However, MEDMARx found that facilities that implemented CPOE reported fewer harmful medication errors. They suggest that CPOE errors are a result of design flaws, poor or insufficient decision support rules, inadequate training, and user resistance. Hicks and colleagues[4] have recommendations similar to those of Koppel et al,[1] urging careful pilot testing to ensure that errors are prevented, not perpetuated, by the new system. While it is important to understand all errors related to CPOE implementation, the primary focus should be on prevention of errors that cause harm. Nurses must advocate for medication error reporting and studies, which analyze error types, frequencies, and the degree of patient harm.

SHOULD THERE BE SAFETY STANDARDS SPECIFICALLY FOR CPOE SYSTEMS?

There are no standards for CPOE safety features. There were no safety standards when cars were first made either. With an innovation, especially a complex one, it takes constant monitoring to identify when the innovation is not performing as desired or has unanticipated effects. As part of the healthcare industry, we should not have to go through an *Unsafe At Any Speed*[5] circumstance such as that experienced by the automobile industry. Incorporating safety recommendations from organizations such as JCAHO into clinical systems should be a priority. For example, how can CPOE systems help make it very difficult to enter orders on the wrong patient? Would changing the distance between patient names, variation between font size and colors, and/or two patient identifiers on every screen in the order process help clinicians pick the right patient, even when they are rushed, stressed, and tired? I would like to think that as representatives of the healthcare industry, we are proactive in identifying and resolving patient safety issues and that with each new release the potential for errors diminishes. Nurses play a valuable role in uncovering and reporting medication errors, as well as making suggestions for safety standards.

PUTTING THE PIECES TOGETHER

If the installation of CPOE is to result in a safer patient environment, studies such as the one by Koppel et al[1] are necessary. It is also crucial to highlight the joint responsibility of vendors and clinical sites in CPOE adoption. Vendors and clinical sites are responsible for seeking and measuring implementation outcomes, continually searching for ways to enhance the product and improve workflows to minimize errors and improve opportunities to realize the promised benefits of improved quality of care and decreased costs.

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I wish to thank the authors for conducting this important study and sparking such controversy. In addition to controversy, I hope this sparks the incorporation of evaluation into CPOE projects for ongoing measurement of outcomes. More studies are needed to provide evidence on what works, and what does not, so that we have a stronger knowledge base to guide our practice as nurse informaticists.

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