Case Study: Closing the Medication Management Loop

by Natasha Nicol, PharmD

Located in Florence, South Carolina, McLeod Health is a private, not-for-profit health care system with three hospitals that provide 12 counties in northeastern South Carolina with primary, secondary, and tertiary care. The main hospital, McLeod Regional Medical Center, is a 371-bed tertiary referral center.

Recently, McLeod became the first U.S. health care facility to implement full closed-loop medication processing using Med Administration Check (MAC), Siemens Pharmacy, and INVISION computerized physician order entry (CPOE) systems from Siemens Medical Solutions. Our use of this technology supports patient safety and integrates the electronic health record with sophisticated clinical decision support, lab results, and nursing clinical documentation.

The Challenge

At McLeod, our medication safety team defines “rate of harm” as the percentage of harmful events per 1,000 medication doses that result in temporary or permanent impairment of body function or in death. In 2001, the rate of harm at McLeod was 3.5. (The national average is 2.0 to 8.0.)

The medication delivery process is inherently complicated, with many steps leading from the physician’s initial order to the actual administration to the patient. Recognizing that this multi-step process offers many chances for error, McLeod aimed to eliminate as many steps as possible, and simplify those that remained with IT solutions.

The Solution

McLeod has been steadily working toward a goal of eliminating adverse drug events for several years. One of the first steps we took was to automate the drug distribution process through the use of profiled automated dispensing cabinets. This limited the drug selection by nurses to just those medications ordered for a specific patient through an interface with the pharmacy system.

We began piloting the MAC application in December 2003. At McLeod, the MAC system utilizes computers mounted on mobile carts equipped with wireless bar code scanners. A nurse begins by pulling the patient’s medications from the automated dispensing machine, accessing the patient’s electronic medication list on the MAC system, and then scanning each medication to be administered. The MAC system automatically checks the scanned medication against the medication ordered by the physician to verify that the medication, dosage, route, and time are correct. The final step is to scan the bar code on the patient’s wristband. If there is a mismatch, the system immediately notifies the nurse with an audible alarm and a visual alert. The MAC system utilizes computers mounted on mobile carts equipped with wireless bar code scanners.

In May 2004, we began using CPOE. We piloted it on one nursing unit in the hospital and gradually expanded the capability throughout the main hospital to all nursing units, including critical care units and the emergency department. A pilot group of five physicians has learned to manage the orders for their patients from anywhere in the hospital, their office, or even from home, using hospital desktop PCs or wireless devices. We are now gradually introducing more and more physicians to the CPOE application.

Technology has enabled us to implement many safety measures, but we knew that cultural changes were also vital to providing safe medication processes. With the leadership of the McLeod medical staff, we have developed numerous evidence-based, data-driven protocols with the goal of reducing variability and improving safety. In addition, the pharmacy department, with medical and nursing staff support, has brought pharmacists to the bedside, where they are an integral part of the patient-care team.

Results

McLeod’s vision is to make the medication delivery system safe for every patient, every time, while making it easy for caregivers to do the right thing and making it impossible for them to do the wrong thing. For example, if a physician enters a medication for a patient and the patient is allergic to it, upon order entry, the system warns the physician that a correction has to be made. The system prohibits the physician from proceeding without addressing that alert, either by overriding it or choosing a different medication.

We are continually improving medication safety at McLeod by combining the use of information management technologies with critical, internal process reviews to simplify and standardize workflow. Our health care information system is helping us to create and support a culture in which each health care provider can contribute towards improvement, share critical information, and assume responsibility in moving us toward our vision for patient safety.

From April 2002 through June 2004, we measured the following outcomes as a result of our process and technology changes:

- We decreased the time from order entry to medication administration from 92 minutes to eight minutes.
- We decreased the patient rate of harm for the neonatal, newborn, and pediatric population is continuously reaching a record-low rate of zero.
- We decreased harmful events to a six-month average of 0.52 per 1,000 doses.
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The specific benefits of the CPOE application include:

- Better legibility of orders
- Immediate access to all the latest patient results
- Orders communicated and completed faster in the pharmacy
- Reduced need for phone calls between pharmacists and physicians

With collaboration among various departments and the use of Siemens MAC, Pharmacy, and CPOE solutions, we have been able to close the medication management loop and automate the entire medication process at McLeod, thereby avoiding potential complications and helping our staff to save lives.

Since April 2001, Natasha Nicol, PharmD, has served as the director of pharmacy at McLeod Regional Medical Center. The recipient of a doctorate of pharmacy from the University of Maryland School of Pharmacy, she is also the chair of the McLeod Regional Medical Center’s Medication Safety Committee.

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Siemens Medical Solutions ........ Circle reader service #60 or visit www.usa.siemens.com/medical