

PATIENT SAFETY ALERT™

A quarterly supplement on best practices in safe patient care

HCA nears completion of systemwide eMAR

A million medical errors identified and thousands of medical incidents already have been averted

While most American hospitals and health systems have yet to take the plunge into electronic medication administration (eMAR), Nashville, TN-based HCA (Hospital Corporation of America) soon will complete the implementation of eMAR across its entire network of 190 U.S. hospitals. According to HCA, eMAR is in place in less than 10% of U.S. hospitals; of these, about half are HCA facilities and about another third are VA facilities.

Already, HCA's system has demonstrated its value. In 2004, even before all hospitals were on-line, there were 51 million doses scanned, 1 million errors identified, and 20,000 serious medical incidents averted. The 2005 numbers, which will be released soon, are anticipated to be even more significant. And beyond the identification of errors and averted incidents, HCA already is using the data to identify process problems and as a foundation for PI projects aimed at bringing those numbers down.

HCA's eMAR system got its impetus in 2000, when 126 employees and physicians representing each division of HCA came together in an intensive two-day meeting to review evidence describing the scope of medication errors and the effectiveness of potential solutions. From the meeting surfaced the ideas behind two new technologies for improving medication practices: eMAR and ePOM (electronic provider order management).

Since such systems were in use by so few hospitals at the time, what led HCA to believe they made sense? "Basically, the main thing that influenced us was the research that was out there — plus common sense," recalls **Jane Englebright**, RN, PhD, vice president of quality and patient safety. "Bar-coding technology itself has been around for awhile, and as we got going, the

results pushed us to go even faster."

Here's how eMAR works:

- Each patient admitted to an HCA facility receives an armband with a bar code. The bar code corresponds to the patient's current medical record, including drug history, allergies, and lab results. Bar-code identifiers also appear on shrink-wrapped doses of medication.
- Before a medication is administered, bar codes on the patient armband and the medication are scanned, allowing the nurse or therapist to verify the right patient is receiving the right drug in the right dose at the right time.
- The software checks each medication against the patient's drug history and lab results. If conflicts or potential drug interactions are identified, warnings alert the nurse to double-check, verify, and/or call the doctor before administering the medication.

The hardware was a bigger challenge than the system, for staff and management, Englebright says. That's because HCA was using MEDITECH as the vendor for its clinical information system, so there wasn't a steep learning curve on the technology. "It was harder moving from a hard-wired system to wireless and to a mobile workstation. For example, some of our hospitals had gone to carpeting in the halls to control noise, but that makes it harder to roll the carts."

In finding the right equipment, HCA went through a couple of different generations and still is looking for the ideal hardware. "It's not a one-size-fits-all situation. Different patient environments need different hardware," she adds. At present, HCA is using Dell for its equipment.

Equipment was not the only adjustment that had to be made, Englebright says. "Some processes had to be changed. For example, it was common

practice to have one multidose vial for all nurses on the floor. When you have all you need right at the bedside, however, multiple vials make more sense."

As Englebright points out, eMAR does not address the ordering or distribution phases of medication but focuses on the administration phase. Nevertheless, the system provides a wealth of information. "We can tell how many of the errors were the result of missed doses, wrong patient/wrong med, and so on. We were surprised at how many errors were wrong-med errors."

The most common error, she notes, was the administration of a sustained-release formulation when it should have been an immediate-action formulation. "It was, however, a little comforting the patients were not getting the wrong meds."

In terms of serious medical incidents averted, of course, the only things that can be measured are errors that didn't happen. "If it was the wrong med for the wrong patient, we assumed it to be serious, even though it could have been a vitamin that was given," Englebright says.

The "warnings" referred to earlier are a key component of the system. When the nurse is at the patient's bedside, he or she pulls up on the computer screen a medical profile that has a list of all the meds the doctor has ordered. The nurse then scans the dose. "If it is incorrect, they get a visual and an auditory warning — a little beep — she says. "Then they check the patient's armband, and if it's not a match, they also get a warning." At any point along the way, the nurse can abort the process, "and that's what we count as an averted error," Englebright adds.

In December 2004 alone, eMAR at HCA hospitals evaluated 7.4 million medication doses. The bar-coding system noted 233,540 warnings and prevented 183,215 doses from being administered. Without eMAR, HCA anticipates 2% of the doses would have been given in error.

In addition to helping staff avoid potential errors, are the data being used educationally to help lower the number of potential errors? "Yes. Absolutely," Englebright notes. "Probably one of the most important things we've done is looking at our late meds. You can get the computer to tell you what happened in the process of a chart, which can point out why you are late." This has led to quite a bit of process improvement activity, she says. "The No. 1 reason, it turns out, has been in X-ray. The system does *not* tell you how to fix that. That's what individual teams at hospitals need to figure out, now that we know where the problem lies."

HCA gradually is rolling out the ePOM system as well. It is a process in which physicians submit medical orders for their patients using a clinical software application in CPCS, HCA's Clinical Patient Care System. The system is designed to automate prescribing and clinical decision making and improve timeliness of care.

HCA says ePOM will increase patient safety because it will:

- reduce medication ordering errors and injury to patients;
- improve accuracy and completeness of physician orders;
- reduce time from order to initiation of order;
- reduce physician time spent on admission, discharge, and transfer orders;
- increase physician use of clinical information system.

"In studies we've looked at, the most common errors involved lack of information on the patient or lack of information about the drug — not knowing interactions, and so forth. We think the computer is a wonderful tool to solve those problems, Englebright adds. If, for example, a physician is going to order a heart medication, the patient's pertinent lab results will be displayed on the screen as they order it."

More than 400 physicians in three pilot facilities have reviewed the electronic provider ordering software. Physicians in 12 more facilities will be live on ePOM by the end of 2005. The rollout to all HCA U.S. hospitals will continue as pilot results are reviewed. Englebright says she is extremely pleased with what the eMAR system has shown and taught staff at HCA. "Last year, while we were still rolling out and only 114 hospitals were on-line, we know we gave 51 million doses through the system. How did we *ever* think we did this right all the time? We averted over 1 million errors last year."

In addition to improving performance within its own facilities, HCA has gathered a wealth of information it is willing to share to improve patient safety in all hospitals. "We are currently attending conferences and sharing our results, and we hosted two recent meetings where people from other organizations have come in and seen the eMAR in action," Englebright adds.

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