

Innovative System Detects Medication Errors in Real Time

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Several hospitals are reporting significant improvements in medication error rates, following implementation of a unique system to detect medication errors in real time and to put systems in place to avoid those errors in the future.

The system--AU MEDS (Auburn University Medication Error Detection System)--was developed by Auburn University and first installed in 1997 in two 500-bed hospitals located in the Southeast. It is currently used in seven hospitals, with some institutions reporting that their medication accuracy rates have improved from a low of 80% on average before implementation to 95% and more.

As opposed to self-reporting systems, which depend on a healthcare worker recognizing and reporting that an error has been made, AU MEDS is a medication error detecting system managed by specially trained certified medication observers (CMOs).

The CMOs are nurses and pharmacists who are employed by the hospitals but trained on-site to Auburn University standards. They are supported via a 24-hour, seven-day-a-week hotline to ensure that the data they collect and record are accurate and in accord with standardized definitions.

Toby Clark, RPh, MS, FASHP, formerly Pharmacy Director of the University Hospital of Illinois, which purchased AU MEDS in the winter of 2000, said the system is unique because it is an error detection system that perfectly complements the traditional error incident reporting systems in use today.

Accuracy Rate Reaches 98%

"It gives clues that we have never had before into the accuracy of medication administration to patients, which causes me to be a very strong believer in it," said Mr. Clark. Statistics from several of the hospitals that have implemented AU MEDS show an accuracy rate of "greater than 98%," he added.

Tim Martin, PharmD, Director of Pharmacy for DCH Regional Medical Center in Tuscaloosa, Ala., described the system as "highly reliable for detecting errors." The medical center is in the process of implementing AU MEDS (see sidebar).

One of the benefits of AU MEDS, said Dr. Martin, is that there is little delay between the time an error is observed and the time in which it can be corrected. "With the usual voluntary reporting system, a report has to be written, delivered and analyzed. Now we have an observer who can say, 'Right now, in real time, I just saw this happen, and I know how to improve it,' " he said.

AU MEDS is able to detect errors that a reporting system might overlook because it documents "what is administered to a patient and, uniquely, compares what was administered to what was prescribed," said Mr. Clark. "The difference between what was administered and what was prescribed should be zero. But when it is not, AU MEDS gives us clues as to why the wrong medication was administered or why medication was administered when it should not have been," he added.

AU MEDS, Dr. Martin said, also gives hospitals the ability to "look at data over time--;to look at data that are more sensitive to small occurrences, so you can see trends and patterns that the observer might miss. For example, we might pick up, over two or three observing sessions, that a particular drug name sounds like another drug name, that two drugs look alike or that an abbreviation was being used for a drug. You might not pick that up in one session, but once you look at aggregated data over a period of time, you might say, well, clearly we need to look at this issue. It's unique. I don't know of anything else on the market like it."

AU MEDS was invented by Kenneth Barker, PhD, Director of the Center for Pharmacy Operations and Designs at Auburn University, and developed with colleagues Betsy Flynn, PhD, RPh, and Robert Pearson, MS, RPh. In mid-September, Auburn University signed an agreement with MedAccuracy LLC giving the company the exclusive right to license and distribute the technology.

Christopher Thomsen, Vice President of Trade and Business Development for MedAccuracy, said the company is projecting that AU MEDS will be in use in 40 to 50 hospitals by September of next year.

Research conducted by the Auburn Group and published in the *Archives of Internal Medicine* (2002;162:1897-1903) and the *American Journal of Health-System Pharmacy* (2002;59:2314-2316) found that a medication error occurred in one out of every five medication dosages given in hospitals and skilled-nursing homes. The study, conducted in 36 institutions located in Georgia and Colorado, found that 7% of the errors were potentially harmful to patients.

Dr. Martin also said that research indicates that just one adverse drug event--meaning an error that causes harm--adds an average of \$4,000 to \$5,000 in costs to hospital stays, and that approximately one in every 100 errors results in an adverse drug event.

Thus, a system like AU MEDS, Dr. Martin said, has the potential "to have a very big impact on the cost of care." In addition, it makes it easier for hospitals to "do whatever is needed to keep our patients' confidence in our healthcare systems," he added.

--Liz Parks

The AU MEDS System in Action

The DCH Regional Medical Center in Tuscaloosa, Ala., an acute care system with four hospitals, is in the process of implementing the AU MEDS medication error reduction system in two of its hospitals, one with 380 beds and one with 158 beds.

In the 380-bed hospital, DCH is using two certified medication observers (CMOs), one a pharmacist and one a nurse. In the 158-bed hospital, there is one CMO--a nurse. The CMOs are all employed by the hospital, and the role of CMO is just one of their many professional responsibilities.

Trained "to be as invisible as possible," as Tim Martin, PharmD, Director of Pharmacy for DCH, noted, the CMOs "shadow" nurses as they go through the process of administering medications.

Using data collection forms, the CMOs record every event that occurs during the administration of a medication, including such key variables as the time a medication was administered, to which patient, in what dose and by which route.

The CMOs then go back to the physician's orders and compare what actually occurred to what should have occurred. They do the same in the pharmacy to see whether the medication dispensed was exactly what was prescribed. When a deviation from a physician's order is noted, the observer looks for potential causes of the error, such as illegible handwriting, sound-alike or look-alike drugs, or an incorrect drug dispensed or administered in place of the correct drug.

The CMO enters all the data into the AU MEDS data collection software system installed on a personal computer. The software can then analyze the data as well as print reports, graphs and details of particular errors observed.

An observation session, Dr. Martin said, requires approximately 12 to 16 hours of work, including observation, record review and data entry. DCH started with observation on 30 individual nursing units, and is almost finished with that part of the process.

"We try to observe until we have a statistically significant sample, usually about 75 to 100 medication administration events or passes," Dr. Martin said. On some nursing units, Dr. Martin said, 75 passes are gathered quickly, while others require several days of observation.

In this initial process, DCH is developing a baseline that Dr. Martin said will be used to "monitor our improvements over time. We believe that not only is [the AU MEDS system] going to be able to give us valid data that are much better than the voluntary reporting system, but it is also going to help us evaluate the effectiveness of new technologies that we are about to introduce: a new computerized prescribing order entry system and bedside verification bar-code technology. We certainly want to know, after we spend a lot of money on these technologies, that we can demonstrate improvement."

Dr. Martin said that already, even before a full set of data has come back from the AU MEDS project, DCH has been able to make changes that have improved safety simply because the CMO

said that "if we make this little change, it will make it much more difficult for this particular type of error to happen."

In one case, the pharmacist CMO added an electronic rule to DCH's pharmacy management system, Dr. Martin explained. "We coded the system so that when the pharmacist entered the order, it would bring the lab value directly to the pharmacist's awareness. In some instances, a high lab value for, say, the serum level of a drug could mean the patient needs a lower dose than what was originally prescribed."

--LP



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