

# Teaching future doctors the basics of medication errors

January 19 2011

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Medical students should have basic knowledge of common medication errors before they begin seeing patients at the hospital, and researchers from the Johns Hopkins Children's Center report that allowing them to play detective by watching, spotting and analyzing medical errors as they occur can go a long way toward helping prevent potentially fatal mistakes in their future practices.

The observational course, now taught as part of the Johns Hopkins School of Medicine curriculum, was piloted in the 2008-2009 academic year, and an analysis of its impact published online Jan. 12 in the journal *BMJ Quality and Safety in Healthcare*.

The course was part of a nine-week pediatric rotation at Hopkins Children's during which 108 second, third and fourth-year medical students shadowed and observed doctors and nurses perform daily work on inpatient and outpatient units. The instruction combined personal observation of actual [medical errors](#) in the making or near-misses and required students to deconstruct the errors, the investigators say.

Students began the course by watching a video of a child receiving the wrong medication. They were then asked to reconstruct the events leading up to the error, answering questions such as "What happened and why?" and "What can be done to prevent future errors?" The students then applied the same watch-spot-analyze approach to their daily rotation in the hospital. Each day's rotation ended with students discussing any near-misses or errors they witnessed and ways to prevent them from

happening. Students were also encouraged to speak up about errors and report them to attending physicians and senior doctors before they reached the patient, as well as log the errors in the hospital's electronic system that keeps track of such events. On several occasions, the drills led to the reporting of patient-safety concerns by students and were dealt with promptly. In one instance, a student reviewing a chart noted that the patient's weight had been entered incorrectly, which would have led to the wrong medication dose.

“Beyond providing first-hand, observation a course like this one may give teaching hospitals an untapped and invaluable resource for spotting and preventing medication and other errors — medical students,” says lead investigator Robert Dudas, M.D., a pediatrician at Hopkins Children's.

Allowing [medical students](#) to spot mistakes while observing physicians, nurses and hospital staff “in the trenches” teaches them how and why [medication errors](#) occur and what can be done to prevent them, the Hopkins researchers say. It also fosters an open culture by encouraging them to speak up about and point out mistakes made by others.

“The foundation of patient safety lies in a solid understanding of how and why medication errors happen, combined with a sobering reality check that mistakes do happen,” says co-investigator Marlene Miller, M.D., M.Sc., a pediatric patient safety expert at Hopkins Children's.

Most of the 108 students (76 percent) who took the pilot course said they felt so enlightened by the course that it should be made part of the regular curriculum, which it now is. They also reported three times greater willingness to report such errors to colleagues, teachers and hospital officials responsible for patient safety.

The students' views on medication errors became more realistic after the

course. After the course, 89 percent students reported a better understanding that in their future practice they will witness colleagues and other hospital staff making errors, compared with 57 percent before taking it. And after completing the course, 79 percent of students acknowledged they themselves will likely make mistakes that could harm patients, compared with 64 percent before the course. Being aware of one's own fallibility is critical in preventing errors, the investigators say.

Also, after the course, more students (94 percent) reported a better understanding that disruptions in the flow of care — such as transferring a patient from one unit to another — are high-risk periods for medication and other errors, compared with 81 percent before taking the course. More students (75 percent) reported feeling comfortable reporting medication errors to authorities after taking the course, than before (50 percent).

The critical importance of teaching patient safety basics during medical school has been well established, yet few schools make patient safety part of their curricula, delaying training in this crucial area until young doctors start post-graduate training in a specialty or residency, the Hopkins researchers say.

“Studies have shown that the majority of medication errors involve junior doctors recently graduating from medical school, so we must instill patient-safety tenets early on during medical school and before these young doctors enter the hospital for hands-on-training,” Dudas says.

Dudas adds that while new patient-safety systems alerting physicians of medication-error risk and periodic safety drills are important, they will make little difference if a physician lacks a basic appreciation for the root causes of many errors.

Research by Johns Hopkins and other institutions indicates that most errors stem from the complexity of the medical system, a system that involves a multiple-step process of calculating dosages, prescribing, dispensing and giving drugs, with the most common causes of medication errors attributed to misinterpretation of the patient's weight, mathematical errors of computation, misinterpretation of orders, and giving extra doses or missing doses.

Previous research indicates that certain medication errors in children, and adults, can be reduced or prevented by computerizing drug orders with built-in double- and triple-checking mechanisms that reduce the likelihood for miscalculation or misinterpretation, something that Hopkins Children's is already doing. In 2006, Hopkins researchers demonstrated that Web-based ordering systems make it less likely to order and give a child a wrong dose. However, because computerized orders can prevent only certain types of errors, it is critical to find new ways and design new systems that reduce other types of errors as well, such as dispensing and administration errors, while at the same time recognizing the human factor.

Errors are common during every step of the medication process, but they occur most often during the prescribing and administering stages, according to an Institute of Medicine report. When all types of errors are taken into account, a hospital patient can expect on average to be subjected to more than one medication error each day, the report states.

**More information:** [qualitysafety.bmj.com/content/.../2010.041376.abstract](http://qualitysafety.bmj.com/content/.../2010.041376.abstract)

Provided by Johns Hopkins University

Citation: Teaching future doctors the basics of medication errors (2011, January 19) retrieved 18 April 2024 from

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