

## Analysis of quickly stopped Rx orders provides new tool for reducing medical errors

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By studying medication orders that are withdrawn ("discontinued") by physicians within 45 minutes of their origination, researchers at The University of Pennsylvania School of Medicine have demonstrated a systematic and efficient method of identifying prescribing errors. The method, they say, has value to screen for medication errors and as a teaching tool for physicians and physicians-in-training. The report is published in the July/August 2008 issue of the *Journal of the American Medical Informatics Association*.

Dr. Ross Koppel and colleagues at Penn's Department of Biostatistics and Epidemiology used a hospital's computerized physician order entry (CPOE) system to track prescriptions that were discontinued within 45 minutes. They found the rate of errors among the quickly stopped orders was 66%. The Rx problem may have been detected by the ordering physician, another physician, a pharmacist, or a nurse, but the prescribing physician issues the stop order.

The University of Pennsylvania team examined each order stopped within a two-hour time period, and when relevant, each subsequent order. Then they interviewed the prescribing physicians, asking about why they stopped the orders—looking at both who caught the error and the doctor's own explanation for the change. Often the reason for the change was obvious, e.g., a medication for the wrong eye, or a dose that was far too large. Sometimes the reasons were more subtle, e.g., a more appropriate antibiotic. Dr. Koppel notes the classes of drugs most likely to be quickly discontinued made sense because they were often among

the most difficult-to-prescribe: low therapeutic index drugs, insulin, antiretrovirals, antineoplastics, and immunosuppressive drugs.

Prof. Koppel (a sociologist by training) said that although they originally focused on the two-hour period, they found that 45 minutes was the most efficient time cut for the measure. "Because this type of analysis is so new, we didn't know how long the post-ordering timeframe should be until we did it." By analyzing the discontinued orders within 15-minute time blocks, we were able to glean insights into the most efficacious time parameter to maximize ratios of inappropriate-to-appropriate medication orders.

"Also, we did not count orders that were stopped within the first minute. That's so we didn't include typos and the kind of errors that would be the equivalent to tearing up a flawed paper prescription when writing it," said Koppel.

The researchers had a live transmission of every medication order as it was written, and were able to interview the ordering physicians within hours, often within minutes. The team conducted the research over the course of two months, selecting times and days that reflected the physicians' ordering patterns at the hospital.

Currently, methods of identifying prescribing errors are plagued with inaccuracies stemming from several systematic biases. Self-report and reports by colleagues are known to substantially under-represent reality. Examining medical records misses errors linked to undocumented diagnoses, as well as being time-consuming and expensive. Other manifestations of medication error go unrecognized, write the authors, because symptoms are often complex, patients have multiple problems and polypharmacy may obscure causes and outcomes. The paper identifies eight methods of detecting medication error and summarizes their shortcomings. Koppel added that "prescription errors are often

obscured by the messy reality of illness, multi-faceted treatments, and the rapid pace and complexity of an acute care hospital"

The measure proposed here, while preliminary, indicates that 66% of prescriptions discontinued within 45 minutes after their origination are inappropriate. Even beyond the ratio comparisons, the value of this measure is several-fold: When linked to a CPOE system, it is rapid, constant (24/7), and does not depend on possibly biased evaluators, self-report, or others' reports. Data collection is also cost-free as part of a CPOE system.

Moreover, suggested one of the study's co-authors, Brian L. Strom, MD, MPH, Chairman and Professor of the Center for Clinical Epidemiology & Biostatistics at Penn, "although the remaining proportion of rapidly stopped orders could not be substantiated as inappropriate, it could be argued that almost all of these orders were perceived as problematic by their authors—that is why they stopped them."

Difficulties identifying and measuring medication errors are a constant theme of the hospital patient safety literature. Many scholars indicate such difficulties are critical barriers to addressing medication errors. Koppel added that "Our method does not replace the others, but may add a technique that appears both efficient and objective. It can identify and help physicians who are having problems with a particular group of medications or patient types and can help post-graduate medical educators focus on areas requiring additional training."

Source: University of Pennsylvania

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