

Computerized Decision Support Intervention Reduces Prescribing of Undesired Drug-Drug Combination But Delays Care

Strom BL, Schinnar R, Aberra F, et al. Unintended effects of a computerized physician order entry nearly hard-stop alert to prevent a drug interaction. *Arch Intern Med* 2010;170:1578–83.

Study Overview

Objective. Improving physician prescribing is an urgent priority given the large numbers of prescribing errors that occur and the many patient injuries that result. Although computerized physician order entry (CPOE) can reduce medication errors, finding ways to improve CPOE's effectiveness is an important clinical and policy priority. The study sought to determine the impact of a "hard-stop" intervention in a CPOE system.

Design. Randomized controlled trial.

Setting and participants. Nearly 2000 clinicians practicing at 2 academic hospitals affiliated with the University of Pennsylvania.

Intervention. The intervention was a pop-up alert that basically prevented physicians from ordering warfarin for patients already on trimethoprim-sulfamethaxazole (Bactrim), or vice versa. It appeared with an explanation for the alert. Ordering physicians could override the alert by stating that the trimethoprim-sulfamethoxazole was for *Pneumocystis carinii* pneumonia prophylaxis or by calling the pharmacy. The control group received the standard practice of a pharmacist intervention program.

Main outcome measures. Number of orders successfully stopped and potential unintended clinical consequences.

Main results. More than half (57.2%) of orders were successfully stopped in the intervention group compared with just 13.5% in the control group (adjusted odds ratio, 0.12 [95% confidence interval, 0.05–0.33]). There were 4 instances of clinically important unintended consequences in the intervention group (a delay of treatment with trimethoprim-sulfamethoxazole in 2 patients and a delay of treatment with warfarin in another 2 patients), leading to early termination of the study.

Conclusion. Using "hard stops" is a highly effective way of deterring certain types of prescriptions but must be used cautiously given the potential for unintended clinical consequences.

Commentary

Tens of thousands of Americans die each year due in part to medical errors, and finding ways to improve care is a national priority. Medication errors are the most common type of medical error, and improving prescribing practices is a key component of any strategy for reducing these types of mistakes. For over a decade, we have had clear evidence that CPOE, when applied effectively, can substantially reduce medication errors. Yet the effectiveness of CPOE varies, partly because physicians are usually able to override even clinically important alerts and prescribe medications that may not be optimal for the patient.

One way to improve medication safety is to create "hard stops." This intervention, which imposes a barrier to a

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physician ordering a medication, may be an effective tool when applied judiciously, such as in cases where a medication order will almost surely result in more harm than good. Such is the case with concomitantly prescribing warfarin and trimethoprim-sulfamethoxazole. These 2 drugs, both clinically quite important and useful, can be highly dangerous when used together. It is the rare clinical case when concomitant use can be clinically justified. This motivated Strom and colleagues to conduct a randomized trial to understand the consequences of using a hard stop for prescribing these 2 medications together.

There is 1 important limitation to the Strom study worth noting: it was conducted at an academic medical center with only 2 hospitals involved. Whether such a "hard stop" intervention would be as effective (ie, as acceptable to physicians) in nonacademic settings is unclear. This limitation of generalizability is important as one considers the value of the overall findings.

There are 2 important findings of the study. First, the concomitant prescription of these 2 important and commonly used drugs fell sharply; second, there were several clinically important unintended consequences. Do these unintended consequences mean that we should avoid using hard stops? No. Instead, the study results suggest that the findings should be understood in context of each other: compared

with the intervention group, in the control group there were an additional 91 concomitant orders of warfarin and trimethoprim-sulfamethoxazole, exposing all of these patients to dramatically higher risks of bleeding. While it is hard to know whether that benefit outweighs the 4 cases in which a patient failed to receive important treatment, it certainly suggests that the costs and benefits of the hard-stop system is not straightforward. One approach would be to design hard-stop systems where if a provider failed to use other anticoagulation (as a substitute for warfarin) or antibiotics (as a substitute for trimethoprim-sulfamethoxazole), a pharmacist might be alerted to intervene. Such an approach would both retain the benefit of the hard stop but reduce the downside.

Applications for Clinical Practice

Improving prescribing and reducing medication errors is a high clinical priority, and the study by Strom and colleagues offers both reasons for optimism and caution. CPOE systems themselves will not be the cure-all for reducing medication errors. However, they do seem to be part of a broader strategy to ensure that all patients receive medications that are effective and safe.

—Review by Ashish K. Jha, MD, MPH