

Enhancing medication safety with computerized alerts

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Medication errors are responsible for a large number of adverse drug events in patients each year, and the use of medication-related abbreviations accounts for nearly five percent of these errors. Strategies to reduce the use of problematic abbreviations -- which can lead to overdose or incorrect or missed medications because of staff misinterpretation -- have largely focused on education, primarily a “Do Not Use” list of abbreviations produced by professional and regulatory bodies. However, there has generally been poor compliance by hospital staffs with this practice.

In a study published in [JAMIA](#), the *Journal of the American Medical Informatics Association*, Jennifer S. Myers, MD, patient safety officer of the Hospital of the University of Pennsylvania, and her colleagues found that computerized alerts inserted within an electronic progress note program could reduce the use of these abbreviations, ultimately enhancing patient safety.

Some examples of problematic abbreviations include:

- IU (for international unit), possibly mistaken as IV (intravenous) or 10 (ten)
- µg (for microgram), possibly mistaken for mg (milligrams), resulting in a one thousand-fold dosing overdose
- D/C (for discharge), possibly interpreted as “discontinue whatever medications follow” (typically discharge medications)
- MS, could mean either morphine sulfate or magnesium sulfate

In the study, 59 Penn internal medicine interns were randomized to one of three groups: a forced correction alert group, an auto-correction alert group, or a group that received no alerts.

In the first -- or forced correction alert group -- an alert identified the unapproved abbreviation, informed interns of the correct non-abbreviated notation, and forced them to correct the abbreviation before allowing them to save or print their note. For example, when the physician attempted to type in "QD" (relying on a customary -- but non-intuitive -- abbreviation for "daily"), the pop-up precluded the term from being entered and instead directed the physician to "use 'daily' instead."

In the second -- or auto-correction alert group -- physicians received an alert when an unapproved abbreviation was entered, but instead of forcing the interns to make a correction, an auto-correction feature displayed the correction and automatically replaced the abbreviation with the acceptable non-abbreviated notation. Group 3 was a control group and received no alerts.

Over time, physicians in all three groups significantly reduced their use of the problem abbreviations as measured by frequency of electronic alerts triggered and within subsequent handwritten notes. Alerts with the forced correction feature lowered the use of abbreviations to a much greater extent than alerts with an auto-correction feature. "It may be that forcing physicians to correct abbreviations themselves, as opposed to having it automatically done for them, better solidifies their knowledge of these banned abbreviations," said Myers.

An unanticipated finding was that reductions in abbreviation use were observed in the control group. Even though they were not directly exposed to alerts, their behavior may have been influenced by the improving documentation patterns of the interns exposed to the intervention who worked with them.

“Eliminating error-prone medication abbreviations has been extremely challenging for hospitals, and there are few effective strategies in the literature for addressing it,” said Myers. “Given the strong association between abbreviation use and [medication errors](#), it’s vital for healthcare leaders to consider multiple strategies, including the alerts we tested, as effective additions to [medical](#) education and training.”

Provided by University of Pennsylvania School of Medicine

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