SPECIAL ARTICLE

Effect of Bar-Code Technology on the Safety of Medication Administration

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ABSTRACT

BACKGROUND

Serious medication errors are common in hospitals and often occur during order transcription or administration of medication. To help prevent such errors, technology has been developed to verify medications by incorporating bar-code verification technology within an electronic medication-administration system (bar-code eMAR).

METHODS

We conducted a before-and-after, quasi-experimental study in an academic medical center that was implementing the bar-code eMAR. We assessed rates of errors in order transcription and medication administration on units before and after implementation of the bar-code eMAR. Errors that involved early or late administration of medications were classified as timing errors and all others as nontiming errors. Two clinicians reviewed the errors to determine their potential to harm patients and classified those that could be harmful as potential adverse drug events.

RESULTS

We observed 14,041 medication administrations and reviewed 3082 order transcriptions. Observers noted 776 nontiming errors in medication administration on units that did not use the bar-code eMAR (an 11.5% error rate) versus 495 such errors on units that did use it (a 6.8% error rate) — a 41.4% relative reduction in errors ($P<0.001$). The rate of potential adverse drug events (other than those associated with timing errors) fell from 3.1% without the use of the bar-code eMAR to 1.6% with its use, representing a 50.8% relative reduction ($P<0.001$). The rate of timing errors in medication administration fell by 27.3% ($P<0.001$), but the rate of potential adverse drug events associated with timing errors did not change significantly. Transcription errors occurred at a rate of 6.1% on units that did not use the bar-code eMAR but were completely eliminated on units that did use it.

CONCLUSIONS

Use of the bar-code eMAR substantially reduced the rate of errors in order transcription and in medication administration as well as potential adverse drug events, although it did not eliminate such errors. Our data show that the bar-code eMAR is an important intervention to improve medication safety. (ClinicalTrials.gov number, NCT00243373.)

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N Engl J Med 2010;362:1698-707.