Medication Errors: Bar-Coded Medication Administration

What We Know

› The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP; a United States-based council consisting of 27 healthcare organizations, including the American Hospital Association, the American Nurses Association [ANA], the Food and Drug Administration [FDA], and The Joint Commission [TJC]) defines a medication error as “any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing; order communication; product labeling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use”(3,11)

• Medication errors are common occurrences in the healthcare setting, occurring at a rate of ~ 1 for every 5 doses in a typical United States (U.S.) hospital and resulting in 7,000 preventable deaths each year, therefore, nurses need to be trained in the use of BCMA technology (5,12,14,15,16)

• Common medication errors include those related to prescribing errors, transcribing errors, administering the wrong medication, administering the wrong doses of the medication, administering the medication using the wrong route or time interval, and failing to administer the prescribed medication(6)

• Transcription, dispensing and administration of medication occur in 50% of preventable errors and are the easiest to improve. When electronic medication administration systems (eMAR) are used in conjunction with bar-coded medication administration (BCMA), one study saw a 100% improvement in transcription errors; a 93%-96% decrease in dispensing errors, and 80% decrease in administration errors(10)

• Only 50% of all hospitals in the U.S. are using the BCMA system. Of the ones that are using it, reduction in medication errors range from 60%-93%(2,3)

› Medication errors can occur at any point during medication use, including prescribing, transcribing, dispensing, administering, and monitoring, but a disproportionately large number of errors occur during medication administration, which is one of the most frequent activities performed by nurses(6,12,15,16)

• Many medication errors can be linked to failure of the nurse to verify the 6 “rights” of medication administration, which are the right patient, right medication, right dose, right time, right route, and right documentation (3,6,16)

› The use of bar-code technology at the bedside has the potential to prevent medication errors by confirming the 6 “rights” of medication administration and creating an additional layer of safety for the patient (4,5,12,15,16). BCMA requires nurses to scan the patient’s identification bracelet and the medication barcode using a handheld device before administering the medication (3,5,6,15,16)

• If the nurse scans the wrong medication or the wrong patient’s identification bracelet, an alarm or some other mechanism will notify her/him (3,15)
• BCMA technology is usually implemented in conjunction with an eMAR. By self-scanning his or her identification badge, the nurse electronically documents administration of medication. Because the prescriber enters the prescription order electronically, this technology has the potential to reduce transcription errors\textsuperscript{(3,12,15)}

\begin{itemize}
  \item In addition to verifying the 6 rights of medication administration, BCMA technology can identify other potential problems, including omitted doses, an incorrect rate of medication administration, doses administered without an order, extra doses administered, and expired doses administered\textsuperscript{(3,16)}
\end{itemize}

› Researchers in some studies have reported significant reductions in medication errors after the implementation of BCMA technology \textsuperscript{(5,9,12,16)}

• After the implementation of BCMA technology, investigators in a 2010 study of 14,031 medication administrations and 3,082 order transcriptions observed a 41\% reduction in medication administration errors, a 51\% reduction in the rate of potential adverse drug events, and a 27\% reduction in the rate of timing errors in medication administration\textsuperscript{(12)}

\begin{itemize}
  \item Researchers who conducted a 6-month pilot evaluation of BCMA technology at a 542-bed medical center reported a 71\% reduction in medication errors after implementation of the system\textsuperscript{(9)}
  
  \item Investigators in Japan reported that implementation of a BCMA system led to a significant reduction in wrong-patient injection drug errors from 17.4 per year to 4.5 per year, but was not associated with a significant reduction in wrong-drug errors\textsuperscript{(13)}
  
  \item One study found that implementing the BCMA can prevent wrong patient errors, but not the preparation of the wrong drug\textsuperscript{(8)}
\end{itemize}

• The implementation of BCMA technology appears to be cost-effectivedue to improvements in patient safety\textsuperscript{(15)}

› Unintended consequences of BCMA technology include users bypassing use of the technology or relying on it too much, both of which may increase the risk of errors\textsuperscript{(5,12-15)}

• Several research groups have documented study results that show poor compliance with BCMA systems; the workarounds or shortcuts that can be used by bypassing key safety features in the BCMA system include removing the patient’s identification band from his or her wrist and taping it to the doorway or bed, potentially leading to the patient receiving a medication that was ordered for a previous occupant of the bed, and documentation of medication administration before actual administration\textsuperscript{(5,7)}

• Other potential problems with the implementation and use of a BCMA system include poor quality of print on the label or wristband, barcodes lacking on some medications, scanner malfunction, lack of nurse ability to see the patient’s entire medication record using the handheld device, and providing care in emergency situations\textsuperscript{(4,5,15)}

\begin{itemize}
  \item BCMA technology may be more difficult to implement and use in an ED than in other patient care settings; reasons for this disparity may include\textsuperscript{(4)}
    \begin{itemize}
      \item an inability to use BCMA for orders that have not been added to the system, including verbal orders given during performance of cardiopulmonary resuscitation (CPR) or other emergency situations
      \item a lack of provision for BCMA use by physicians, who may administer medications in emergency situations
      \item the additional steps involved in medication administration using BCMA technology compared with the previously established method
    \end{itemize}
\end{itemize}

› Some drug manufacturers have started adding information to drug bar codes (e.g., lot number, expiration date) to assist in tracking medication recalls\textsuperscript{(1)}

\section*{What We Can Do}

› Learn about the use of BCMA technology and its potential to reduce medication administration errors and increase patient safety; share this information with your colleagues

› Collaborate with other nurses in your facility to evaluate and implement a BCMA system

› Avoid the use of workarounds when using BCMA technology, and encourage others to avoid their use also to improve patient safety
Coding Matrix

References are rated using the following codes, listed in order of strength:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>M</td>
<td>Published meta-analysis</td>
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<tr>
<td>SR</td>
<td>Published systematic or integrative literature review</td>
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<tr>
<td>RCT</td>
<td>Published research (randomized controlled trial)</td>
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<tr>
<td>R</td>
<td>Published research (not randomized controlled trial)</td>
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<tr>
<td>C</td>
<td>Case histories, case studies</td>
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<tr>
<td>G</td>
<td>Published guidelines</td>
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<td>RV</td>
<td>Published review of the literature</td>
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<td>RU</td>
<td>Published research utilization report</td>
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<td>GI</td>
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<td>Policies, procedures, protocols</td>
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<td>Unpublished research, reviews, poster presentations or other such materials</td>
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<tr>
<td>CP</td>
<td>Conference proceedings, abstracts, presentation</td>
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References

1. FDA, bar codes, and scanners. (2014). *Briefings on The Joint Commission*, 25(7), 5-7. (GI)