

## Barcode Medication Administration (BCMA)

**NQF#:** N/A

**Developer:** The Leapfrog Group

**Data Source:** Leapfrog Hospital Survey

**Description:** Bar code medication administration (BCMA) systems are electronic scanning systems that use both a bar code on a patient's ID bracelet and the medication package to help ensure the right patient gets the right medication at the right time. To achieve Leapfrog's BCMA standard, hospitals must:

- Have implemented BCMA systems at the bedside in 100% of their medical and/or surgical units (adult and pediatric), intensive care units (adult, pediatric, and neonatal), and labor and delivery units
- Have achieved 95% compliance with scanning both patients and medications during administration
- Have a BCMA system that includes all five of the following types of decision support: wrong patient, wrong medication, wrong dose, wrong time, and second nurse check needed
- Have implemented at least six out of the eight identified best practice processes and structures to prevent workarounds including: having a formal committee that meets routinely to review data reports on BCMA system use, having back-up systems for hardware failures, having a help desk that provides timely responses to urgent BCMA issues in real-time, conducting real-time observations of users using the BCMA system, and engaging nursing leadership at the unit level on BCMA use. Additionally, information from these structures is used to implement quality improvement projects or monitor previous quality improvement projects focusing on the hospital's BCMA system. Results from the quality improvement projects are evaluated and demonstrate that these projects have resulted in higher adherence to standard medication administration processes. Finally, resolution of system deficiencies and/or problems that may have contributed to the workaround are communicated back to the end user.

**Rationale:** Medication errors often have tragic consequences for patients. Many serious medication errors result in preventable adverse drug events (ADEs), approximately 20% of which are life threatening. According to the 1999 Institute of Medicine report, *To Err is Human*, medication errors alone contribute to 7,000 deaths annually. Despite clinicians' best efforts, over 40% of serious and life-threatening ADEs are preventable. Errors resulting in preventable ADEs occur during all stages of the medication process, including ordering, administration, transcription, and dispensing. Over 30% of errors are committed at the point of administration.

BCMA implementation can be remarkably effective in reducing medication administration errors. A study of BCMA-eMAR implementation in an academic medical center demonstrated a 41.1% relative reduction in non-timing errors in medication administration. This also resulted in a 50.8% relative reduction in potential ADEs due to such errors.

Additionally, effective BCMA implementation has demonstrated financial benefits. While BCMA implementation costs approximately \$2,000 per harmful medication error averted, this is less expensive than the estimated \$3,100-\$7,400 cost of a harmful error.

### Citations for Rationale:

- Bates DW, Cullen DJ, Laird N, et al. Incidence of adverse drug events and potential adverse drug events: Implications for prevention. *JAMA*. 1995;274(1):29-34.
- Bates DW, Spell N, Cullen DJ, et al. The costs of adverse drug events in hospitalized patients. *JAMA*. 1997;277(4):307-311.
- Bonkowski J, Carnes C, Melucci J, et al. Effect of barcode-assisted medication administration on emergency department medication errors. *Acad Emerg Med*. 2013;20(8):801-806.
- Kohn LT, Corrigan JM, Donaldson MS (eds): *To Err is Human: Building a Safer Health System: a report from the Committee on Quality of Healthcare in America*, Institute of Medicine, National Academy of Sciences. National Academy Press, Washington DC, 1999.
- Poon EG, Cina JL, Churchill W, et al. Medication dispensing errors and potential adverse drug events before and after implementing bar code technology in the pharmacy. *Ann Intern Med*. 2006;145(6):426-434
- Poon EG, Keohane CA, Yoon CS, et al. Effect of bar-code technology on the safety of medication administration. *N Engl J Med*. 2010;362(18):1698-1707.
- Sakowski JA, Ketchel A. The cost of implementing inpatient bar code medication administration. *Am J Manag Care*. 2013;19(2):e38-45.
- Seibert H, Maddox R, Flynn E, Williams C. Effect of barcode technology with electronic medication administration

record on medication accuracy rates. Am J Health-Syst Pharm, 2014;71:209-218.

**Impact:**

- Most hospitalized patients
- Medication errors contribute to 7,000 deaths annually
- Research estimates that implementation of BCMA systems could result in a 50%-80% reduction in potential ADEs caused by medication administration errors

**Citations for Impact:**

- Bates DW, Cullen DJ, Laird N, et al. Incidence of adverse drug events and potential adverse drug events: Implications for prevention. JAMA. 1995;274(1):29-34.
- Kohn LT, Corrigan JM, Donaldson MS (eds): To Err is Human: Building a Safer Health System: a report from the Committee on Quality of Healthcare in America, Institute of Medicine, National Academy of Sciences. National Academy Press, Washington DC, 1999.
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**Opportunity:**

- Opportunity for improvement exists, as demonstrated by the coefficient of variation for the measure.

**Evidence:**

- Supported by suggestive clinical evidence.

**Citations for Evidence:**

- Poon E, Keohane C, Yoon C, Ditmore M, Bane A, Levtzion-Korach O, et al. Effect of bar- code technology on the safety of medication administration. N Engl J Med, 2010;362:1698- 1707.
- Seibert H, Maddox R, Flynn E, Williams C. Effect of barcode technology with electronic medication administration record on medication accuracy rates. Am J Health-Syst Pharm, 2014;71:209-218.