

Barcode Medication Administration (BCMA)

NQF#: Not NQF endorsed

Developer: The Leapfrog Group

Data Source: Leapfrog Hospital Survey; AHA Annual Survey IT Supplement

Description: The Leapfrog Hospital Survey standard includes:

- Hospital implementation of a BCMA system in applicable units
- Compliance with both patient and medication scans at the bedside prior to administration
- Types of decision support the BCMA system provides
- Hospital structures to monitor and reduce workarounds

To fully meet 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 seven of the following types of decision support, which have been identified as best practices by the Leapfrog BCMA Expert Panel: wrong patient, wrong medication, wrong dose, wrong time, vital sign check, patient-specific allergy check, and second nurse check needed
- Have implemented at least six out of the eight identified best practice processes and structures to prevent workarounds. These include: 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.

Evidence 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:

- Impacts large numbers of 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

Evidence of High 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.
- 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.

Opportunity:

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

Evidence:

- Pre-post studies of medication errors with BCMA implementation, expert opinion

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.