

How BPOC Reduces Bedside Medication Errors

White Paper

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Abstract

Medication errors are a significant source of harm to patients in U.S hospitals, with 400,000 patients sickened, injured, or killed as a result of medication errors each year, including 7,000 deaths. Bedside Point-of-care (BPOC) technology improves patient safety where it matters most: at the point of medication administration to the patient. This white paper discusses how BPOC improves patient safety and reduces patient harm, specifically focusing on medication errors avoided. It also describes what needs to take place at individual hospitals to maximize the benefits achieved with BPOC.

Medication errors prevalent

Preventable medication errors are a significant risk to patient safety. Conservative estimates suggest that as many as 400,000 patients in U.S. hospitals are sickened, injured, or killed as a result of medication errors each year, including approximately 7,000 deaths (Institute of Medicine, 1999, 2007). Medication errors occur in nearly one out of every five doses given to patients in the typical hospital (Barker et al, 2002). Intravenous (IV) medication errors pose the greatest risk of harm, with 54 percent of potential Adverse Drug Events (ADEs) associated with IV medications (Kaushal et al, 2001).

Studies indicate that the greatest percentage of medication errors that reach the patient occur at the point of administration. Medication errors are typically categorized according to the four phases of the medication use process: prescribing errors (39 percent), administration / documentation errors (38 percent), transcription errors (12 percent), and dispensing errors (11 percent).

Research also suggests that large percentages of prescribing, transcription, and dispensing errors are identified before medication administration to patients. In one study, nearly half of all prescribing errors and roughly one-third of transcription and dispensing errors were intercepted before the administration phase. This compares to only 2 percent of administration errors being intercepted before reaching the bedside (Leape, L. L. et al, 1995). Hence, the administration phase of the medication-use process poses the greatest danger to patients by far. After taking into account intercepted errors, the true error rate was 51 percent for administration/ documentation errors, 20 percent for prescribing errors, 11 percent for transcribing errors, and 10 percent for dispensing errors.

Existing medication administration error data understates the problem. Studies have shown that voluntary reporting results in significantly underestimated rates of medication errors and ADEs. Voluntary reporting rates are thought to be low because of time pressures faced by clinicians, fear of punishment, and lack of perceived benefit (IOM, 2007). Some improvements have been achieved through non-punitive reporting environments, but these rates still vastly underestimate the incidence of medication errors (Rosich & Resar, 2005). Hence, we simply do not know the true extent of the problem. BPOC systems not only help improve safety during medication administration, they should also provide hospitals and health-systems with data for understanding the true incidence medication administration errors, leading to a better understanding of their root causes.

Hospital environments conducive to medication errors

Accurate medication administration in a hospital setting depends on flawless performance from nurses and other clinicians. However, given the complexity of modern patient care and the resulting increased demands on nurses and clinicians, medication errors can be extremely difficult to avoid. Nursing performance involves continual multi-tasking, with simultaneous distractions and interruptions. Distractions that occur while nurses are administering medications increase the probability of medication errors, and like other routine nursing processes, medication administration often becomes rote, making errors even more likely to occur.

The sheer number of medications used today has resulted in a much greater risk of administration errors. Medications are often incorrectly identified because of similar names, hard-to-read labels, and look-alike packaging. Moreover, while the first three phases of the medication use process have secondary checking procedures in place, the administration phase typically involves a single caregiver at the bedside, with no additional checks or co-worker review to prevent errors during this most critical part of the process.

Experienced nurses are just as likely to make medication errors as their less experienced colleagues, and errors often occur even when nurses have every reason to think they are doing everything right. Indeed, this lies at the heart of the problem, as it is precisely when all is apparently going smoothly that serious medication errors are likely to go unnoticed.

Behavioral factors

Cognitive psychologists have studied the psychology of human error extensively, discovering that with any skills-based behavior, task performance becomes largely automatic after repeated practice. As the individual becomes more used to the behavior, he or she performs it with diminishing conscious effort and even awareness. In the case of medication administration, this pattern can lead to dangerous situations wherein nurses fail to notice that they are administering the wrong medications to patients (Humanfactorsmd.com, 2008).

“Slips” and “lapses” are common causes of medication errors, typically occurring when a nurse’s attention is diverted. A common type of slip is a “capture,” which occurs when a new behavior that is not yet well-learned is replaced by a similar, more familiar behavior. For example, a nurse who has programmed a specific type of infusion pump so many times that the sequence of steps is virtually automatic, may incorrectly program a newer model that requires a slightly different sequence. “Description” errors are slips that occur when the objects of different actions are in close proximity, are similar in appearance, or both, e.g., when the wrong control on an EKG is adjusted because it is close to other controls that look the same (AHRQ, 2008).

“Loss-of-activation” errors are lapses where a person forgets what he or she is doing in the middle of a sequence of actions (e.g., a radiologist forgetting what he is looking for after retrieving a comparison study), or omits a step in a routine sequence (e.g., failing to “double-check” for blood-type in an organ transfer protocol (Humanfactorsmd.com, 2008).

Changes in routine are another major cause of medication errors. Once a task becomes automatic, it becomes very difficult to modify, resisting changes in policies and procedures, and even aggressive education. In such cases, “forcing functions,” can be very effective. A forcing function “prevents the user from taking an action without consciously considering information relevant to that action” (Soegaard, 2008). It compels the user to focus his or her attention on a specific action, thereby disrupting automatic performance. BPOC systems should reduce the likelihood of behavioral factors from contributing to medication administration errors.

Bedside point-of-care

One of the most effective ways to reduce medication administration errors and ADEs is bedside point-of-care (BPOC) technology. Hospital BPOC systems allow identification of nurses, patients, and medications via bar code scanning. BPOC is close to being a forcing function. It does not *force* attention to specific actions, but it does compel awareness of potential mistakes before they are made.

In hospitals with BPOC systems, all medications and patients are bar coded. Nurses identify themselves via scanner-equipped terminals in the patient room, handheld units, or mobile wireless carts, and then

scan both patient and medication bar codes immediately prior to administering medications to patients. The BPOC system identifies the medication and compares it to the patient's medication profile in the system database. If the nurse attempts to administer the wrong medication or wrong dose, or administer a medication at the wrong time, the BPOC system warns the nurse with visual and auditory alerts.

The BPOC process helps minimize errors under a variety of conditions common to modern hospitals, including sicker patients taking greater varieties of medications, continual nurse interruptions, confusing labeling and dosages, discontinued medication orders, and continued availability of medications for patients who have been transferred or discharged.

Bedside point-of-care is proven effective in reducing medication errors and ADEs. The U.S. Department of Veterans Affairs (VA), which treats nearly 5.8 million patients per year (U.S. Dept. of Veterans Affairs, 2008), already uses bar codes in its hospitals nationwide, and the result has been a dramatic reduction in medication errors. For example, the V.A. medical center in Topeka, Kansas, reported that bar coding reduced its medication error rate by 86 percent over a nine-year period (USFDA, 2006).

Improved patient safety

BPOC systems cannot eliminate all medication errors. When designed, implemented, and used correctly, however, they can help hospitals and nurses improve patient safety significantly. BPOC systems serve as a final check before nurses administer medications to patients, thus complementing and supporting caregivers' clinical patient-care expertise.

If the nurse is about to administer the wrong medication, the BPOC system identifies the mismatch and alerts the nurse with visual and auditory warnings, thus effectively verifying the five rights—right drug, patient, dose, time, and route. Appropriately designed BPOC systems employ both “hard stops,” preventing nurses from documenting medication administrations, and “soft stops,” issuing warnings when nurses scan the right medication at the wrong time, prompting the nurse to record the reason for the unscheduled administration and then allowing the process to continue.

BPOC systems can also prompt nurses to check patients' vital signs and other clinical parameters before administering medications. BPOC technology helps prevent medication errors and ADEs related to patient allergies, wrong administration times (too early or too late) and duplicate doses.

BPOC improves patient safety beyond simply alerting nurses to wrong medications, doses, and administration times. It also provides up-to-date drug reference information, online references, and even visual images of tablets and capsules—all via the BPOC system. Most systems allow users to enter comments and medication alerts on customizable screens. Some BPOC systems interface with laboratory systems, thereby allowing nurses to view up-to-the-minute lab results before administering medications. The ideal BPOC system can email and/or page specific alerts and user actions to caregivers and managers in real time.

Accurate documentation

In addition to their safety benefits, BPOC systems ensure more accurate documentation. By recording necessary and accurate administration information automatically at the actual time of administration, electronic documentation further reduces the likelihood of medication errors and ADEs.

Automated documentation greatly enhances the accuracy of both the transcription and the documentation phases, recording the precise time of each dose and reducing the potential for human error. All caregivers, including physicians, can view the eMAR simultaneously and in real-time, ensuring that

prescribing changes are based on the most accurate information available, and also helping hospitals meet federal and state regulations and standards.

A wealth of actionable data

One of the most powerful aspects of BPOC technology is its ability to capture a wealth of useful data for improving hospital medication administration processes. BPOC systems can track all of the items listed below and generate scheduled reports automatically. The reports can help nursing managers quantify incidences of early administration, failure to scan patients, wrong medications scanned, “near misses,” and so on. Reports can also help managers analyze the reasons for these mistakes.

- Canceled administration
- Early administration
- Late administration
- Held dose
- Early administration canceled
- Medication bar code not found
- Medication scanned late
- Medication not scanned
- Late administration canceled
- Wrong medication scanned
- Patient scanned late
- Patient not scanned
- Wrong patient scanned

BPOC data can also be used for trend analysis of medication administration documentation. Manual systems require nurses to shuffle through stacks of paper to discover omitted doses, early administrations, etc. The accuracy of preprinted Medication Administration Records (MARs) depends solely on the diligence of individual nurses in recording actual administration times, and there is no way to trend this information in hospitals using manual systems. BPOC systems track the documentation information automatically.

BPOC systems also improve billing accuracy in hospitals by capturing medication charges at the point of administration instead of at the point of dispensing, thereby improving the accuracy of patient billing and reducing the likelihood of payor audits. To achieve the full benefits of their BPOC investments, hospitals must ensure that the available data is reviewed and used for continuous quality improvement.

Combating medication administration errors

As with other methods of reducing medication errors, maximizing BPOC effectiveness requires rigorous adherence to relevant best practices. Modern hospitals are typically busy, hectic working environments. Nurses have strong incentives to create time-saving workarounds, which affect patient safety by increasing the likelihood of medication errors. For example, nurses sometimes employ “out-scanning,” i.e., creating a reference sheet of bar codes of commonly used medications and then scanning from the sheet instead of from the actual medication packages, thus defeating the purpose of bar code scanning.

Documenting why and when nurses use workarounds rather than follow scanning procedures is a useful first step in combating workarounds. Understanding the efficiency of the workaround can help identify workflow enhancements that do not defeat the effectiveness of the BPOC system.

Reducing barriers to BPOC

Achieving the benefits of BPOC across the U.S. healthcare system requires that all hospital managers work to implement BPOC in the near future and break down the barriers to its adoption, and successful implementation and use. Sustained management support at all levels and ensured utilization of the powerful features of BPOC systems—including comprehensive reports and data analyses—can help increase their use.

BPOC adoption is spreading rapidly. At the end of 2007, BPOC systems were in use in approximately 20 percent of U.S. hospitals. All experts in the field expect this number to grow rapidly until BPOC becomes a standard of care. The continued efforts by hospital administrators and managers, and patient care nurses are the key to achieving the full benefits of this powerful technology industrywide.

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