Practical Evidence from the Field:

New Proof That BPOC Can Help Hospitals Eliminate 100 Percent of Serious Five Rights-Related Medication Administration Errors

by Vicki D. McKendrick, RN, Executive Director and Chief Nursing Officer, IntelliDOT Corporation

To err is human, but this adage offers no comfort when nurses mistakenly give the wrong medication or dose to a patient.

The quest to uncover and eliminate medication administration errors at the bedside resulted in the first large published study, appearing in 2002 in the *American Archives of Internal Medicine*, which examined medication errors at multiple hospitals: *"Medication Errors Observed in 36 Health Care Facilities,"* by KN Barker, DW Bates, EA Flynn, RL Mikeal and GA Pepper. The study offered definitive evidence of serious errors causing serious harm to patients multiple times on a daily basis.

With the implementation of an advanced handheld wireless BPOC solution, IntelliDOT Corporation believes hospitals now have a realistic way to eliminate these errors. To test this premise, IntelliDOT used a methodology similar to Barker et al in *"Medication Errors Observed in 36 Health Care Facilities,"* to conduct a medication administration error prevention study. The study spanned June 2004 to September 2008 and was conducted in partnership with 10 hospitals that have implemented IntelliDOT Bedside Medication Administration™ (IntelliDOT BMA™). IntelliDOT worked with each hospital to conduct pre- and post-implementation studies of medication errors in order to establish baseline performance measures and validate subsequent performance improvement.

A practical approach to error measurement

The *"Medication Errors Observed in 36 Health Care Facilities,"* study based its findings on 36 hospitals with one nurse observer and 50 medication passes at each hospital. In contrast, the IntelliDOT team used two nurse observers and looked at a larger sample of medication passes and nurses based on total volume over multiple shifts. In addition, the results are based on a comparison of two identical observations in the same patient care areas – the first conducted before the implementation of IntelliDOT BMA and the second conducted approximately 60 days after the implementation. Two registered nurses trained in observational study methodology observed 250 medication administration events in each phase of the study. Each observer followed multiple nurses throughout his or her shift and between 20-30 nurses at each hospital were observed.

The observers recorded a coded patient identifier, drug product, dose, dosage form, route of administration, time of administration, and patient identification method(s). They also recorded medication-related procedures as specified by individual hospital policy such as taking medication specific vital signs or obtaining an additional witness for high alert medications. Prior to the medication pass, they compared each dose with the original medication order on the current medication administration record (MAR). In the cases of wrong patient, wrong drug, or wrong dose, the observer stopped the nurse from continuing with the administration to prevent potential harm to the patient. Following the medication pass, they compared each dose administered as written by the prescribing physician in the patient's chart. If there was a difference, the error was described and categorized. One hour following the end of each shift, the observers checked the MARs for documentation of clinical observations as required by hospital policy.

100 percent elimination of serious errors

Data from the observation studies has been compiled for ten hospitals. Cumulative data from 2,389[1] medication administration

Multiple Hospital Error Study

Ten hospitals studied between 06/04 and 09/08

	Pre IntelliDOT	With IntelliDOT
Med administration observations	2389 (100%)	2389 (100%)
Total errors[1]	591 (24.7%)	224 (9.4%) (timing errors only)
Serious errors[2]	39 (1.6%)	0 (0%)
Patient *not identified* per policy	1792 (75.0%)	0 (0%)
Clinical parameter *not charted* per policy	137 (5.73%)	1 (0.04%)

[1] Total errors = Wrong time, wrong route, wrong dose, wrong med, wrong patient
[2] Serious errors = Wrong med, wrong patient, wrong dose

observations revealed that serious five rights-related medication errors were reduced from 39 events prior to the implementation of IntelliDOT BMA to zero events recorded during the post-implementation observations, which took place approximately 60 days after implementation. Serious errors were defined to be the administration of the wrong medication, wrong dose, or administration of a medication to the wrong patient. In addition, incidents of patients not properly identified per hospital policy were reduced from 1,792 (75 percent of all administrations) to zero as a result of barcode scans of wristbands by the IntelliDOT System to identify patients at the bedside before giving medication.

While the numbers show a dramatic reduction in serious errors and procedural deficiencies, additional information gathered in the study reinforces the value of a comprehensive BPOC system designed to eliminate workarounds and other shortcomings that have been found with some systems. For example, at one of the participating hospitals, two near misses were detected and averted by the IntelliDOT System during the post-implementation observation. A nurse attempted to administer a medication at 09:00 but the IntelliDOT handheld device issued a warning that it was scheduled to be given at 21:00. In another example, the IntelliDOT System prevented a nurse from administering an oral chemotherapy medication instead of a vitamin, thus averting a potentially serious mistake. While anecdotal, incidents like these throughout the ten hospitals are part of the observed performance improvement which included reducing timing errors and eliminating more serious errors involving the wrong drug, both of which were classified as "potentially harmful" to the patient.

The pre-IntelliDOT observations included additional anecdotal evidence. At one hospital, the observers also documented three of the 250 medication passes as "wrong patient." In each case the observers noted that the nurse was interrupted and then inadvertently walked into the wrong patient's room. While the observers stopped medications being administered in these three instances, all were potentially serious errors. In the post-implementation observation using IntelliDOT BMA, there were no serious medication errors observed because the nurses were alerted that they were about to make an error.

As conscientious professionals, nurses want to go home after a shift knowing that they have done everything right in caring for their patients that day. As these studies illustrate, by using an advanced BPOC system, that is quite possible.

1. *250 medication administration events were observed at 9 hospitals and 139 were observed at one hospital*

Barcode Point-of-Care – What's Right and What's Wrong

by Vicki D. McKendrick, RN, Executive Director and Chief Nursing Officer, IntelliDOT Corporation

Despite the endless rhetoric in Washington, D.C. and earnest roundtable discussions at healthcare industry summits about improving patient safety, the news is still not good:

"The number of serious problems and deaths linked to medications reported to the government set a record in the first three months of this year . . ."

Medication-caused deaths, problems spike, The Associated Press, Wednesday October 22, 2008

The Associated Press article states that the Food and Drug Administration received nearly 21,000 reports of serious drug reactions, including over 4,800 deaths. The article also cites 20,745 medication error incidents – 38 percent higher than average over the previous four calendar quarters. The 4,800 patients that died represented 23 percent of the incidents and marked a nearly 3 percent increase since the final quarter of 2007. The nonprofit Institute for Safe Medication Practices made an analysis of federal data going back to 2004 and scrutinized yearly totals dating to the 1990s. While the industry group's report cited two drugs in particular at the root of the majority of the errors, too many individuals – and sometimes the wrong individuals – are receiving the wrong medication or the wrong dose, resulting in unnecessary patient deaths and injuries.

Barcode point-of-care (BPOC) technology is being adopted by some hospitals in hopes of eliminating medication administration errors. The adoption has been fueled by a variety of healthcare industry research starting with the landmark 2002 report published in the *American Archives of Internal Medicine, "Medication Errors Observed in 36 Health Care Facilities"* by KN Barker, EA Flynn, GA Pepper, DW Bates, and RL Mikeal. But many U.S. hospitals and their CIOs are still on the fence when it comes to adopting BPOC for a number of reasons.

Those considering a third-party BPOC system are concerned that integration is too complex, while others looking at BPOC systems offered by the hospital's HIS vendor are finding that systems are too expensive or not user friendly. In turn, some hospitals that have invested in a BPOC system aren't achieving patient safety goals because the nurses "work around" the safety prompts. Research is showing this occurs because the system is not intuitive and does not support their workflow. So are hospitals simply wasting time and money on BPOC?

Not at all. But in order for BPOC to deliver on its promise of helping hospitals eliminate medication errors, CIOs and other healthcare decision makers must be armed with knowledge to make the best technology investment possible with the goal of eliminating medication errors. Not all BPOC systems are designed and built the same – some, in fact, have hardware and system issues that exacerbate threats to patient safety. So let the buyer beware, and most of all, be wise.

What's wrong with BPOC

Even the most expensive BPOC system from a leading HIS vendor is not worth the investment if the systems are so difficult to use that nurses resist following complicated directions or "work around" obstacles in the hardware or software. Systems that are not easy for nurses to learn, use, and carry are at the top of the list of what's wrong with BPOC. The same goes for systems that cause additional work for pharmacists. Therefore, consider the following key "features" as red flags when evaluating BPOC systems:

- BPOC Systems must have simple and easy processes to allow pharmacists to manage multiple generic equivalent brands – each with different NDC codes – allowing all to scan successfully at bedside.
- BPOC Systems must have reliable connectivity so that nurses can access the most recent data available as well as capture and document medication administrations.
- If the BPOC system can ensure all medications scan successfully at bedside, the common BPOC system practice of allowing nurses to manually select medications from a list – instead of scanning at bedside – can be eliminated. More than any other factor, this practice leads to the most dangerous and pervasive workarounds.
- If the BPOC system is portable and easy to take into the patient's room, the common BPOC system practice of allowing nurses to scan the medication first when outside the patient's room – before scanning the patient's wristband – can be eliminated. Again, this "workaround" eliminates the safety net that BPOC is supposed to provide.
- If the BPOC system is portable and easy to use – as opposed to bulky hardware such as laptop carts that can be left outside the patient's room – the nurse will be able to easily see and act upon alerts that otherwise might be missed, thus putting the patient at risk.
- If the BPOC system is easy to use, alerts can be integrated into the software as opposed to making them optional, thus eliminating the ability to "skip" alerts and not document a reason why it was not heeded.

- If the BPOC system provides individual hardware for every nurse, alerts such as reminders for medications due and other tasks can be sent directly to a nurse on a patient-specific basis. With some systems, multiple nurses are required to share the same hardware and there may be restrictions on use, some hardware cannot be used in isolation rooms for example. Such inflexibility often results in poor user compliance.

Even the most conscientious nurse would be tempted to "work around" such an inflexible and poorly designed BPOC system. That's why it is so important to listen to nurses and thoroughly investigate any potential BPOC purchase.

Elements that make BPOC work

Ask any nurse what an effective BPOC system needs and they will tell you the system must be easy to learn, use, and carry. Plus, it must conform to their workflow, not the other way around. Most of all, the hardware and software must be purpose-built and well designed so as to allow them to use the device with one hand, leaving one hand free to care for their patients.

Ask any CIO what an effective BPOC system needs and they will tell you that ease of integration with the existing HIS and pharmacy system is at the top of the list. With these requirements – and the ultimate goal of patient safety in mind – consider these key "features" as green lights when evaluating BPOC systems.

- Compatibility with all wireless systems, and wireless security protocols assuring HIPAA-compliant protection of patient information during transmission from access point to devices.
- Well designed and built hardware that is easy to maintain.
- A vendor provided service and support system that provides 24x 365 telephone, and when needed prompt on-site support.
- Interfaces backed with service and support that allow uninterrupted services.
- Databases designed to store all medication data upon receipt of the product into the pharmacy and recognize all medication bar codes at bedside regardless of manufacturer, so scans never fail and nurses never have to delay giving a medication or administer it without the benefit of scanning because the barcode would not read.
- A handheld device that works in any clinical environment, including through plastic bags in isolation rooms, for patient safety benefits throughout the hospital.
- A system that is proven to integrate with any HIS and pharmacy system quickly and without undue complexity, either through a third-party interface or one created by the hospital's HIS vendor. Plus, look for a BPOC vendor with proven experience and partnerships in this area.

All of these features add up to a BPOC system that nurses will want to use, and that puts the industry's target goal of 96-98 percent user compliance well within reach.

Not if, but when, to adopt BPOC

The headlines unfortunately continue to tell a tragic story about the lack of success in preventing medication errors in U.S. hospitals. And as the number of incidents in the media rises, more and more patients and families are becoming educated about medication errors and aware of solutions like BPOC. As a result, the decision for hospitals is not if, but when, to adopt BPOC for medication administration. The cost in terms of lives lost and injured is too great not to explore all of the options regarding systems and integration scenarios. With careful planning and a primary focus on systems that support patient safety rather than "work around" it, U.S. hospitals will be able to make more positive news in the coming years.