By William Pong, PharmD

Adapting Pharmacy Workflow **for Bar Coded Medication Administration**

Photo courtesy of McKesson

Ensuring consistently readable bar codes at the point of care is an important step in eliminating workarounds and overrides.

Wheaton Franciscan is one of the largest integrated delivery systems in Wisconsin, with seven acute care hospitals in Wisconsin, three in northeast Iowa and a wide range of outpatient centers, clinics and other services in the region.

Elmbrook Memorial Hospital, an acute care hopital located in Brookfield, Wisconsin with 100+ beds, went live with bar coding and an electronic medication administration record (EMAR) system in April 2008. Two of our hopitals in Milwaukee, Wisconsin were slated to follow. St. Francis, with 150 beds, was next in early October 2008 and St. Joseph, with more than 350 beds, is scheduled to go live in November 2008.

We chose to take a closed-loop approach to medication delivery in order to improve safety processes throughout the entire medication delivery system, from physician ordering through medication administration. Within our aggressive timeline for introducing these technologies, we have emphasized bar coded medication administration (BCMA) as it drives a critical component of the medication delivery system and is of special importance because it is closest to the patient. Our approach to BCMA at Wheaton Franciscan includes an electronic medication administration record (EMAR) system and the infrastructure for generating bar codes in the pharmacy as well as reading them with a scanner at the bedside.

> We recommend conducting training sessions as close to the **go-live date** as possible to increase nursing's retention of the new procedures.

Process Change and Quality Control

Drawing on our experience at Elmbrook Memorial Hospital, we can share a range of observations about the quality control requirements, workflow adjustments and process adaptations necessary to make the most of BCMA.

To succeed, the hospital must be committed to discouraging practitioners from overriding the system or improvising workarounds. When nurses and clinicians override or avoid using BCMA, it defeats its purpose: patient safety. At Elmbrook, Wheaton Franciscan staff enacted a range of measures to promote compliance, many of which focused on ensuring that medication bar codes would be readable at the point of care.

Verify incoming bar codes

The pharmacies began bar code scanning in the pharmacy six months prior to deployment. This schedule allowed the pharmacy to streamline its workflow as much as possible in advance and prepare the inventory for a smooth transition to BCMA.

At a minimum, every unit dose of medication must be readable or scannable using the manufacturer's bar code or a bar code label that is generated in the pharmacy using a thermal printer. When new shipments arrive, we scan each product to ensure that its bar code reads correctly. This minimizes time-consuming complications that could arise should a bar code fail to scan at the point of care.

A pharmacy technician spends roughly 60 minutes each day verifying every item in a shipment to ensure that these medications can be easily scanned at the

bedside. This process includes opening packages to test bar codes at the unit-dose level, which we estimate takes approximately 15 seconds per drug.

This is an important step because occasionally a bar code will not scan. For example, we use three different sizes of one type of inhaler, and we have found that one of the sizes has an unreadable barcode. So testing every single product, at the unit of use level, is critical not just prior to go-live, but also on an ongoing basis, before the drugs are sent to the nursing floor or medication cabinet.

Label printing in the pharmacy

In recent years, as the number of hospitals implementing BCMA continues to increase, drug manufacturers have likewise increased the number of medications available with bar code labels. However, we still need to create bar code labels on-site for a variety of products, such as repackaged bulk medications, mixtures and solutions, injectables, containers with irregular sizes or shapes, and some ordinary drugs. We print bar code labels on-demand using thermal bar code printers in these instances.

In order to select our bar code label printers, we created an extensive list of evaluation criteria, including:

- Resolution for highly-readable symbols
- Reliability of the hardware
- Reasonable cost
- Adequate software support

These factors led us to select the Zebra model 105SL thermal printer and the Zebra model TLP 3842 for "tadpole" labels. These complement our model 1362-2008 bulk packager from McKesson. For reading bar codes at the bedside, we chose Hand Held Products IT4600 scanners.

For some very small bottles, inhalers, tubes, suppositories, nebulizers and other medications that are difficult to label, we use the "tadpole" approach. This involves printing the

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Thermal Printers

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Tadpole Label Printers

Zebra Model TLP 3842

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When a patient-specific medication order changes the bar code must be updated.

bar code on a strip that will wrap around the container with the label sticking out. Tadpoles are commonly used when repackaging bulk medications or when we have multiple doses in one box. Because the process of applying tadpole labels can be cumbersome and labor intensive, we prefer to purchase products in bar coded, unit of use, when possible.

Thermal bar code printers produce high-quality symbols with sharp resolution, so we have not experienced any challenges with the durability of the bar code labels themselves. The printers and print media we selected are also designed to withstand the typical hospital environment.

Medication order changes

When a patient-specific medication order changes – the dosage or frequency of an IV piggyback solution, for example – the bar code must be updated because it will no longer scan correctly. In this case, the pharmacy may create a new, properly labeled medication to replace the old one or retrieve the old preparation and re-label it accurately.

NDC maintenance

Ensuring that NDC numbers are up-to-date and properly mapped in the pharmacy information system is a key step in the move toward automating medication administration. We handle part of this process when checking incoming inventory, but we must also assign staff to delete old NDC numbers periodically. On a monthly basis, each facility spends about 3.5 hours of pharmacy technician time maintaining primary NDCs.

Telephone call volumes

At Elmbrook Memorial, we anticipated higher incoming call volumes to the pharmacy from practitioners with questions following the rollout of the bedside scanning process. We were able to mitigate this impact somewhat through comprehensive training on the procedures to follow when nurses encounter a drug that will not scan. In the pharmacy, we successfully assigned the task of triaging the incoming calls to one pharmacy technician who served

Photo courtesy of Omnicell

Identify in advance, the steps nurses should take when a drug order needs clarification.

as a single point of contact and effectively reinforced the process. Since the initial go-live, the volume of calls dropped. However, we are still experiencing many nursing calls to pharmacy with questions on how to use the electronic documentation software.

Zero orders

It is unavoidable in some cases, primarily emergencies, that clinicians will administer drugs without a corresponding order in the patient's profile. Our pharmacists generally spend about two minutes reviewing these occurrences to reconcile them in the chart. When additional effort is required to distinguish between, say, a stat order and a possible medication error, the investigation can take 10 minutes or more.

Pharmacy staffing

Though additional work has been required to achieve these patient safety benefits, Wheaton Franciscan has not yet hired additional staff. We are still determining the scope of the changes and investigating ways to streamline the new workflow requirements. We are currently developing a list of post-go-live tasks with assigned metrics. Our next step is to measure that volume and determine resource requirements.

Lessons Learned

Based on our work implementing this BCMA program, we noted some key measures that we believe simplified our transition.

One key to success is devoting a pharmacist at each site to focus on the process. This person should oversee preparation of the drug formulary, for example. On a related note, we suggest identifying several, capable pharmacy technicians at an early stage, to be part of the transition. These technicians can then handle tasks such as mapping NDC numbers in the pharmacy information and packaging systems.

Based on our experience, we recommend conducting training sessions as close to the go-live date as possible. This way, nurses are more likely to remember the new procedures – such as, when to attempt substitution with another dose, and when to override – and put them into practice.

When preparing for system go-live, do as much integrated testing as possible in advance. At Elmbrook Memorial, we addressed a large number of issues through design sessions that brought together pharmacy, nursing and IT representatives to make decisions and set priorities. Run by our IT department, these were periodic, multiple-day sessions in which we resolved everything from how notes should appear in the EMAR to what steps nurses should take when they need clarification on a drug order.

Worth the Effort

Since our implementation, we are generating medication administration reports that reveal on-time rates, missed dose rates, frequency of overrides, percent of compliance with scanning, etc. These performance metrics will help us identify improvement opportunities in bar coding, additional staff education, and reasons for overrides, as well as potential and actual medication errors. It also helps us realize the medication administration errors that were not caught in the pre-BCMA era, such as administering the wrong drug to a patient, which may have gone unnoticed in our previous system, but are now caught in time. All parties at Wheaton Franciscan agree that BCMA is effectively providing a greater degree of safety for our patients. ■

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