Supporting Bedside Verification with **Centralized Medication Distribution**

Serving central Pennsylvania, PinnacleHealth is an integrated system offering comprehensive health care services and programs to three acute-care hospitals comprising more than 600 beds. To support the health system's plan to improve quality and patient safety, we piloted a bedside medication verification system in November 2005, with full system-wide implementation by January 2006. This system was supported by a centralized, bar coded distribution system that was implemented at the same time. Currently, all inpatient units and most ancillary units are live on the system. There are still a few units that do not use the bedside verification system, including the operating rooms and the radiology department; however, these units are considering adopting the system in the future.

The Foundation of Our System

The major elements of our medication management solution were determined years ago based on long-standing, positive vendor relationships. We decided to maintain our relationships with the vendors of our pharmacy information system, automated dispensing cabinets (ADCs), and pharmacy wholesaler. We were already distributing 90% of our non-intravenous medications via a "profile" ADC system and planned to continue to do so. We also knew the essence of a successful bedside scanning system was the availability of accurately bar coded medications, which could be reliably scanned at the patient's bedside. Our philosophy for bar coding was this: safety and accuracy first, followed by economy and practicality.

As in 2005, we continue to purchase unit dose medications with accurately readable manufacturers' NDC bar codes when possible, and fill in the gaps with centralized internal packaging. The difference is that there are many more medications available with readable bar codes now than there were in 2005. To support the systems we had in place, we sought an integrated solution that functioned off of one database and included a carousel, high-speed packager, and labeling software. For select medications with allergenic or biohazard qualities, we use a manual packaging system, which also serves as a backup in case the high-speed packager fails or a product is unavailable from the manufacturer. Since implementation, we have expanded the database in our manual packaging system from just those medications that we package routinely via this method to a full database of all oral solids. For injectables and irregularly shaped items, such as ampoules, vials, and eye drops, we continue to use our labeling software and printers, which pro-

Photos courtesy of Talyst

In the central pharmacy, the carousel/packager and its accompanying software enable a distribution solution that verifies bar codes as medications are stocked and again as they are distributed.

duce both circular labels and a transferable flag label designed specifically for vials of injectables. Compounded sterile products are bar coded using labels from the pharmacy information system.

Ensuring Bedside Verification

To ensure our bedside verification initiative provided meaningful safety assurances, we started with the expectation that greater than 90% of medication doses would be delivered to the patient with pre-tested, machine-readable bar codes. We quickly realized that units live on the system were successfully scanning 92% of their doses at the bedside. With these results, we decided to pursue 100% readability to make the system a true safety net. We went to great lengths to assure 100% of our doses had a pre-tested, easily readable bar code. We began scanning one dose in every lot of every medication received, daily. As a result, we were successfully scanning 98% of doses by early 2007 and 99% by early 2008 on live units. We have stayed above 99% for almost two years.

It was important that solid infrastructure be in place when we initiated the bedside scanning and verification program. We knew we would not have time to go

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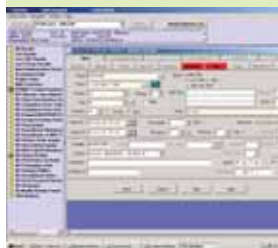
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Bedside Medication Verification

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back and make major changes so we wanted to build in some flexibility that would allow us to enhance the system as opportunities arose.

Taking a Collaborative Approach

The success of our program was accomplished through a collaboration of internal departments and our selected vendors. This collaborative approach allowed us to centralize bar coding and supply chain functions in one location, serving three acute-care hospitals. The program today is very close to the initial version. However, we are aware that a system cannot maintain itself. It requires diligent attention and a true commitment to continued improvement. It also requires that we challenge our vendors and ourselves to continually improve the systems.

In our hospitals, interdisciplinary collaboration made all the difference in finding a proper scanning solution. By engaging administration, nursing, and IT as crucial partners from the outset, we succeeded in having all parties jointly own the process along with pharmacy. Using this team approach we determined such practical applications as how the label should read, where bar code labels should be

placed on each medication, and how to properly use the laptop-style computers-on-wheels with corresponding drawers to transfer medications from automated dispensing cabinets to the beside for medication administration and charting. The interdisciplinary team remains together today, five years after inception, with an advisory role on these, as well as other medication-related issues.

Data Driven Improvements

After the system was fully implemented, we found the ability to access data indicating exact dates and times of administration of individual medications to be very useful. The interdisciplinary team brainstormed potential applications of this data, including a controlled substance surveillance plan. We wrote an internal report comparing the dates and times controlled substances were vended from automated dispensing cabinets against the dates and times they were charted on the system. We were surprised to find how far off they were, with some doses never being charted at all. Using this data, we were able to rectify our documentation practices, and a year and a half later, our charting is now quite precise.

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Some other examples of reports we were able to generate using scanning data include scan overrides, armband overrides, early PRN administrations, and dose omissions. A group of pharmacists and nurses now meet monthly to trend and analyze these reports, and most important, recommend changes to improve safety.

Continually Enhancing Centralized Pharmacy

In the central pharmacy, the carousel/packager and its accompanying software enable a distribution solution that verifies bar codes as medications are stocked and again as they are distributed. The label produced for each medication is used to scan medications into the ADCs. The software also plays a key role in our interaction with our wholesaler by automatically generating a daily electronic order based on preset par levels. Since our implementation, and after being inspired by an article written by our colleagues at Brigham and Women's in 2006, we have placed a strong emphasis on assuring that as many medications as possible are scanned upon distribution to the units, either to be loaded into the ADCs or for patient-specific doses. We are constantly surprised how often the bar code reader picks up a potential error. We currently scan medications before distribution/dispensing from the carousel, when remote stocking, when using the high-speed packager or manual packaging system, and for first doses. Although we scan medications upon distribution, there was still concern over medications being mixed in holding bins. Since the software is programmed to scan only one dose in a group of exact medications for each pull, the possibility exists that look-alike medications can be mixed up. We requested that this list be user defined and easily changeable. We are pleased that this enhancement has been in place since December 2008. For this select group of medications, the software forces a scan on every dose.

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Photo courtesy of AmeriSourceBergen

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Another enhancement we made post implementation is the addition of information labels. We again challenged our carousel vendor to create a way for us to add specific labels to certain medications. Examples of labels include "protect from light," "caution chemotherapy," "caution paralytic," "dilute before using," and "look-alike sound-alike." After collaborating with our vendor and brainstorming among our interdisciplinary group, we came up with a workable solution. Though we were able to gain use of a "user" field, we were limited by the number of characters we could input. As a result, we enter a label number and have a corresponding stock of labels. Though not a perfect solution, it has proven effective.

Bringing a System Together

Syncing databases proved to be a major challenge from the start. Recognizing that using multiple vendors can result in wide variation in the data stream, we created a process using our pharmacy information system as our master system to govern the entire medication delivery system. From here we populate like data fields in both the ADC and carousel/packager databases. This process ensures that information for fields like trade and generic name, dose, route, and dosage form appears consistently across all systems. When changes in the master file occur, they are sent to the downstream databases and are "trapped" for final review and release by a pharmacist system administrator. We are confident that this consistency of the medication description in electronic, paper, and label formats throughout the system contributes significantly to patient safety.

Conclusion

Building a successful bedside verification system requires substantial preparation and input from a variety of sources. Constant attention is also necessary to maintain and enhance the system. Asking our vendors to be creative, flexible, and open-minded has helped us achieve our goals. Our vendors have often had to work together to develop the best possible solution for the circumstances. Even in this collaborative environment, it would be unrealistic to expect vendors to build our systems for us. The process requires a lot of shared brainpower as these systems are mere templates and must be molded to meet each individual health system's goals. If you want to see enhancements, as the user, it is your responsibility to suggest and test new ideas. If you have the right resources, offering to beta test systems, while occasionally frustrating, can be a very gratifying experience. We have to continue to challenge our vendors and ourselves to improve the safety of our systems. Our patients deserve it. ∎

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