



# Implementing a Hybrid Medication Distribution System

**L**ehigh Valley Hospital and Health Network (LVHHN) includes three community hospitals in Pennsylvania: Lehigh Valley Hospital-Cedar Crest and Lehigh Valley Hospital-17th and Chew in Allentown, and Lehigh Valley Hospital-Muhlenberg in Bethlehem. Recognized by *US News & World Report* as one of America's best hospitals, and named among *Fortune's* 2008 list of the "100 Best Companies to Work For," LVHHN is licensed for a total of 950 beds and has fully implemented bar coded medication administration (BCMA), EMAR, and CPOE. In our efforts to increase the accuracy of medication dispensing and improve patient safety, we have implemented a variety of technologies to create a so-called hybrid medication distribution system that effectively supports scanning at the bedside.

## What Is a Hybrid Medication Distribution System?

The term "hybrid medication distribution system" can be defined in many ways, but for the majority of hospitals employing such a system, medication inventory is neither completely centralized nor decentralized; rather, hospitals use a variety of methods to store and dispense medication inventory for patient administration. For LVHHN, it means robot-filled medications, dispensed from med servers at the patient's bedside, with ancillary dispensing from unit-based automated dispensing cabinets (ADCs). For others, a hybrid model could involve an ADC-based system, with medications dispensed at the bedside from decentralized medication carts. The examples of hybrid medication distribution systems are as varied as the hospitals that employ them.

## Medication Distribution at LVHHN

LVHHN decided to implement a hybrid medication distribution system for several reasons. First, we wanted to accurately dispense bar coded, unit dose medications from the pharmacy, with a significant amount of inventory control. Secondly, we wanted to provide our nurses with bedside access to patient medications. In addition, we believed such a system would effectively support our health system's predicted growth.

We have developed very accurate systems for dispensing medications from our pharmacies. At Lehigh Valley Hospital-Muhlenberg, we employ Swisslog's PillPick robot, and our Cedar Crest campus currently utilizes McKesson's ROBOT-Rx. Both robots package our medications in unit dose, labeling them with high-quality bar codes, and provide us with improved inventory management and control within the pharmacy. These robots perform the dispensing of cart fills and first doses for all of the acute care inpatients in our health system.

To transport medications from the pharmacy to the nursing units, we use a

variety of exchange carts, which have proven affordable and effective for our health system. We typically store about 30 beds' on one cart. At Cedar Crest, the robot cart-fill begins at 8:30<sub>PM</sub>, ends at 4:00<sub>AM</sub>, and updates at 5:00<sub>AM</sub>, and cart exchange, which begins at 6:30<sub>AM</sub>, is completed by nine technicians in 30 to 60 minutes. The ADCs in our ED unit are filled two times a day, and the ADCs on the critical care and medical surgical units are filled once daily. At Muhlenberg, cart-fill begins at 7:00<sub>AM</sub>, with cassette exchanges occurring twice daily – at 11:00<sub>AM</sub> for a contracted long-term acute care hospital on the campus, and at 2:00<sub>PM</sub> for all other inpatients. The earlier cassette exchange is performed by one technician in about 15 to 30 minutes, and the later exchange takes four technicians 15 to 30 minutes each. The Muhlenberg-based robot also fills the medications for our 17th and Chew site three times per week, and they are delivered to this hospital via courier. Each of our hospitals utilizes a pneumatic tube system to send first doses and STAT orders to the nursing units on a 24-hour basis.

Many of our health system's patient rooms are now private, enabling us to effectively dispense the majority of each patient's medications at the bedside in secured drawers for medication storage – what we refer to as in-room med servers. The nurses appreciate the convenience of bedside access to medications, as well as the opportunity to spend more time in the patient rooms. Refrigerated medications and narcotics are stored in refrigerators and pharmacy-profiled Pyxis automated dispensing cabinets (ADCs), respectively, in the nursing units' medication rooms. Our nurses use

Rubbermaid COWs (computers on wheels) equipped with laptops and bar code scanners to document their medication administration activities at the bedside.

In tandem with our BCMA, EMAR, and CPOE implementations, the hybrid distribution model has resulted in significant improvements in patient safety.

## Med Server Security

At the Muhlenberg campus, we have outfitted our med servers with spring-loaded key locks that automatically relock when the drawer is closed. Each nurse has his or her own key. At Cedar Crest, our newer med servers use proximity card locks; nurses and pharmacy personnel wave their ID badges in front of the lock to gain access to the medication drawer. These locks sound an alarm if left unlocked for more than five minutes and will automatically relock once the drawer is closed. In addition, the locks maintain a user-access audit log, thereby improving staff accountability and medication control.

## Nursing's Role in Medication Distribution

At LVHHN, the nursing staff takes an active role in our medication distribution system, accepting responsibility for returning meds to the pharmacy upon discontinuation or patient discharge. Also, in between exchange times, our pharmacies use



## Case Study

Below are some of the medication distribution systems in use at LVHHN. For more information on the products listed below, circle their corresponding numbers on the free reader service card bound in this issue on page 1.

### The Systems Scoop

#### Pharmacy Dispensing Technology



McKesson's ROBOT-Rx

Circle Reader Service #57

#### Automated Dispensing Cabinets



Cardinal Health's Pyxis MedStation

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#### Med Server Locks



Hafele America Co.'s Dialock

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#### Pharmacy Dispensing Technology



Swisslog's PillPick

Circle Reader Service #58

#### Pneumatic Tube System



Swisslog Translogic

Circle Reader Service #62

#### Computers on Wheels



Rubbermaid Medical's M39 Mobile Medication Cart

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pneumatic tube systems to deliver medications to the nursing units. It falls upon the nurses to retrieve medications from the tube and deliver them to the med servers. So our nurses play an integral role in ensuring medications are delivered safely and effectively.

#### The Challenges of a Hybrid Model

A hybrid medication distribution system is not without its challenges. As with any medication distribution system, we still have to be mindful of missing medications (i.e., those that get "lost" in the pneumatic tube system) and vigilant in preventing errors during manual picking processes. We must also enforce nursing policies for medication administration to prevent technology workarounds and the practice of "borrowing" medications from med servers in other patient rooms.

Furthermore, in-room med servers can present challenges when working with critical care patients. However, LVHHN has been able to serve our critical care patients by installing med servers directly outside of the patient room. It is also wise

to consult the infection control department in developing your system for distributing medications to isolation patients. Infection control personnel can train your technicians on airborne and contact precautions to take when performing cart exchange in these environments. In addition, med servers may pose problems on behavioral health units. On Muhlenberg's 65-bed behavioral health unit, we use a more centralized approach, dispensing patient medications from a single unit-based med server and dispensing narcotics and floor stock from an ADC.

#### Results

Our hybrid medication distribution system, in conjunction with CPOE, has led to consistently fast medication order turnaround times – 30 to 45 minutes for scheduled orders and 15 minutes for STAT orders, which are entered by physicians, verified by a pharmacist, picked by our robot, and quickly sent to the appropriate nursing unit via pneumatic tube. Furthermore, in tandem with our BCMA, EMAR, and CPOE implementations, the hybrid distribution model has resulted in significant

improvements in patient safety through reduced medication administration and dispensing errors. We have also witnessed a high level of bar code scanning compliance on the part of our nurses with this system.

### Conclusion

To best prepare for the transition to a hybrid medication distribution system, involve all of your hospital's key stakeholders – pharmacy, nursing, and information services, as well as infection control and risk management – to fully evaluate the options available. Upon opening our new Lehigh Valley Hospital-Muhlenberg in 2005, we were able to build a medication distribution system from scratch. In determining which system would best meet our goals of medication safety, security, and patient/staff satisfaction, we made site visits to other hospitals. We needed to determine whether we should take a traditional cart-fill approach (pharmacy fills cassettes and delivers them to a centralized dispensing area on each nursing unit), a full ADC approach, or develop a system to provide medications at the bedside. After visiting a hospital that had successfully implemented the latter distribution model, we decided to develop a similar model in our new hospital.

So what should come first – BCMA or a change in medication distribution? A hybrid medication distribution system, like the one in place at LVHVN, lends itself well to BCMA, but hospitals must consider multiple components to determine their next best steps. I recommend outlining both implementation plans simultaneously to determine how a hybrid medication distribution system can best support scanning at the bedside. Each hospital has different needs and varying degrees of financial resources to lend to these projects, so carefully consider your costs, available space for dispensing technology, IT concerns, and needs for medication control and security before embarking on the journey to a hybrid medication distribution system. ■



*Robert Begliomini, PharmD, has served as the administrator of pharmacy services for Lehigh Valley Hospital and Health Network for three years. He received both his BS and his doctorate from the University of the Sciences in Philadelphia.*



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