

PHARMACY Purchasing & Products

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Product Spotlight

By John Garofalo, PharmD

B. Braun's Outlook 400ES

The pharmacy at the University of Illinois Medical Center (UIMC), a 472-bed tertiary care, academic medical center located in Chicago, plays a key role in the ordering, dispensing, administration, and monitoring of medications. Hospital pharmacy, in collaboration with medical and nursing staff, routinely reviews and audits the entire medication-use system and has incorporated automation into the system to make it more efficient and safe.

Identifying Automation Needs

During a review of our medication-use process, we realized we had little automation dedicated to assisting our nurses at the point of drug administration. As research has shown, only 2% of the medication errors made at this step are intercepted, with 41% of the errors causing temporary or permanent harm or death to the patient. We recently had encountered some administration errors related to anticoagulants that would likely have been prevented if drug libraries were in place and used correctly.

To address this issue, UIMC released an RFI on smart pump systems and identified three vendors that fit our criteria. Each vendor was invited to demo its pump in-house to a multidisciplinary (nursing, pharmacy, and materials management) group for evaluation. In addition, calls were made to institutions currently using these pumps. The results were presented to our IV Pump Steering Committee along with overall cost information. The committee made the recommendation to purchase B. Braun's Outlook 400ES system.

Building the Drug Library

We began the process of identifying and building the smart pump drug library by meeting with key stakeholders (nursing, pharmacy, and anesthesiology) four months before the proposed go-live date. We identified the clinical areas that would be using the pumps and clinical pharmacists were assigned to develop a draft drug library for each of these areas. Nursing and physician representatives from each clinical care area then reviewed the drafts. The clinical pharmacists used existing protocols and previously established standard concentrations for medications when possible. However, new protocols for PCA, epidurals, and peripheral nerve blocks were already under consideration and

were developed along with the new infusion pumps. The initial draft of the drug library, covering 13 clinical care areas, took about six weeks to develop and involved 20 clinical pharmacists. The nursing and physician reviews, and subsequent updates took an additional four weeks.



Of the reporting features available to us through the Outlook 400ES system, the DoseGuard alert report has already helped identify potential medication errors.

Photo courtesy of B. Braun

Smart Pump Implementation

A project manager was appointed to coordinate the schedules of multiple departments (IT, clinical engineering, materials management, nursing, pharmacy, and anesthesiology) with the vendor's rollout plan. In addition to

building the drug library, critical pre-implementation functions included validating the compatibility of the pump's wireless setup with our wireless network; setting up a new server (for reporting functionality) in our IT data center; key group review of our custom drug library and of the vendor's disposables; and training for pharmacists, nurses, and anesthesiologists. For every single pump we needed to confirm the drug library was properly downloaded, and the connectivity with our reporting system was valid. This preparation culminated in the activation of each pump throughout the hospital, a process that took about 12 hours. Including our highly developed drug library and the new protocols and orders built into our EMR, we completed the entire implementation process in just four months.

UIMC is planning to begin using Outlook 400ES's wireless capabilities once the software is available from the manufacturer. We have the necessary infrastructure in place to enable wireless communication between the smart pumps and the central server. In the meantime, pharmacy is planning a manual update of the drug library based on feedback collected from users and smart pump reports over an eight-week period that took place after the go-live. Future requests for changes to the library will be sent to a pharmacy representative for initial review. A compilation of the requests will then be sent to our Medication Systems Review Committee and Pharmacy and Therapeutics Committee for approval. It is anticipated that changes to the library will revolve around formulary medication changes and will occur quarterly.

Training and Challenges

We held training sessions for clinical pharmacists early on to help them

UIMC's Key Criteria for Smart Pump Selection

- A drug delivery dosing alert log separate from the key press. Log data available for download to computer-based software and capable of aggregating with data from all devices in the facility for analysis.
- A customizable drug library with a minimum capacity of 300 drugs.
- Software capable of maintaining a minimum of eight patient-care-area specific profiles with customizable pump performance settings and sets of at least 75 drugs/concentrations, each with minimum and maximum limits and methods of drug dose calculation.
- Pump units have separate anesthesia capabilities with performance characteristics that enable specific customization for alarms, air-in-line detection, drug dosing parameters (including options for bolus dosing), and indefinite standby mode.
- Upon start up, pump units require user to confirm whether it will be used on a new patient, and identify in which care area it will be used.
- A customizable, on-board drug library with drug dosing information that can be used as a data set by the pump to limit how medications can be programmed, and sets limits on the rates, volumes, and doses appropriate to a given patient care area. Limits are unique to the institution and can be changed by the institution as desired.
- Pump units must have upper dose limits with soft and hard stops and maximum infusion rates. If a dose is programmed outside of established limits or clinical parameters, the pump halts or provides an alert informing the clinician that the dose is outside the recommended range. Soft dose limits can be overridden, hard limits cannot. All warning messages and caregiver responses are tracked by the software's event tracking system, and this information is readily available for quality review to identify opportunities for process improvement.
- All data transmissions to and from the unit must meet HIPAA requirements.
- Manufacturer must have a minimum installed base of greater than 10,000 channels in the device.

understand what information would be required to build the drug library. As primary users of the pumps, we waited to train the nurses and anesthesiologists until one week prior to go-live date, to avoid a lengthy gap between training and actual use. Our training process included a formal presentation combined with hands-on demonstrations. It was difficult to train the different users on all aspects of the new pumps and the drug library in a concentrated time period. Additionally, changing to different disposables raised concerns, particularly in the OR. These issues arose during the drug library validation phase, and in retrospect should have been discussed during the early pump demonstrations.

Report Data and Practice Response

Of the reporting features available to us through the Outlook 400ES system, the DoseGuard alert report already has helped identify potential medication

errors. This report also has helped identify potential changes needed to the minimum and maximum limits we have set up. While the report data we have gathered has yet to lead to any practice changes, we are evaluating the possibility of standardizing the dosing units in all care areas for vasopressor agents (e.g., mcg/min vs. mcg/kg/min for epinephrine and norepinephrine) and sedative medications (e.g., mcg/kg/hr vs. mcg/kg/min for fentanyl/midazolam infusions).

Staff Acceptance

The pharmacy staff was quick to embrace the potential safety advantages of the drug library. The drug library is quite comprehensive, containing 130 DoseGuard and 50 RateGuard items. The nursing staff was equally excited about the safety potential and are beginning to use the functionality more often as their familiarity and comfort with programming the pumps increases.

We conducted an audit three weeks after the go-live to determine if the drug library was being accessed and used appropriately. We sampled patients on non-ICU wards, as we had already observed near 100% compliance with use of the drug library in the ICU areas. Of the nearly 500 patients observed, we found that items were correctly selected from the DoseGuard or RateGuard library about 24% of the time. The top items being infused using the DoseGuard library were heparin, argatroban, esomeprazole, and nitroglycerin. We realized the biggest obstacle was ensuring the nursing staff knew which agents were available in the DoseGuard or RateGuard library. While that information was available on the medication label, it was being missed due to small font type or poor location on the label. Re-education on the drug library is planned as part of our nurses' annual competency assessments.

Lessons Learned

There are a few important steps that should be stressed when considering such a system. Well before your go-live date, plan to establish the drug library and have as many stakeholders review the library as possible. Once you have begun the process of bringing the pumps on board, avoid introducing new drug protocols or medication administration practices at the same time. In addition, every pump brought into the hospital should be validated. Finally, do not underestimate the amount of time needed to train front-line staff. Not only do they need to learn how to operate a new infusion device, but also when to use the drug library and how to react to alerts related to the drug library. UIMC personnel working in areas where medications in the drug library are used commonly (e.g., critical care, OR) quickly adapted to looking for drugs in the library. Personnel working in areas where medications are not as commonly available in the library tended to forget to access the drug library. Ultimately, the entire process needs to be reviewed and understood at all phases of implementation in order to ensure proper patient safety. ■



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