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Conduct a **Nursing Evaluation of ADCs**

By Christian Miller, RPh

Automated dispensing cabinet (ADC) use is ubiquitous in US hospitals in 2013, with 84% utilizing this technology and 60% using ADCs as their primary means of drug dispensing.[1] These numbers are not surprising, considering the benefits ADCs deliver, including increased nurse access to drugs in patient-care areas, improved medication security, robust medication tracking capabilities and inventory control, and fewer medication dispensing errors compared with manual systems.

Prior to 2004, Berkeley Medical Center (BMC) utilized ADCs only in the OR and ER. These areas were the first to implement cabinets to ensure efficient access to medications in these busy settings. However, after experiencing the benefits of this automation, BMC made the decision to implement ADCs hospital-wide. The hospital's Safe Medication Practice Committee—which includes representation from pharmacy, nursing (both frontline and management), and quality and risk management—invited three ADC vendors to demonstrate their cabinets at our hospital so we could evaluate the units and identify which best fit our needs. Because nurses would be the primary ADC users, they were extensively involved in the decision-making process.

Ergonomic Design

The keyboards and screen of the ADC must be positioned at an ideal height for nurses, with a drawer configuration that minimizes the need to bend down to retrieve medications.

Photo courtesy of Omnicell, Inc

ADC Evaluation Process

When evaluating which vendor to partner with, a primary consideration is ensuring nursing satisfaction with the ADCs. Thus, pharmacy invited nurses from every unit to attend the demonstrations, gain hands-on experience using each ADC, and provide feedback and opinions. A room was reserved in the hospital for one week and the demonstrations were scheduled. At the conclusion of each demonstration, nurses completed a questionnaire rating the different systems on multiple factors, including ease of use, storage capacity, and medication security. The questionnaire also included a section for respondents to indicate what they liked most and least about each ADC, as well as an area for additional comments (see **NURSING ADC EVALUATION QUESTIONNAIRE**).

Nursing ADC Evaluation Questionnaire

Evaluator _____ **Unit** _____

Did you attend all three demonstrations? Y/N

As an ultimate user of automated dispensing cabinets and a representative of your unit, your opinions are very valuable to the Safe Medication Practice Committee. Each unit has unique needs and different systems may work best for different units. It will be the Safe Medication Practice Committee's job to weigh your opinions with those of other evaluators and factor in additional variables, such as cost and customer service, to select the best system for the hospital as a whole.

Please rate each of the venders on the following areas and feel free to add any additional comments. Turn in your evaluation sheet after viewing all three demonstrations.

On a scale of 1 to 5, with 5 being the best, rate each of the ADCs on the following features. Circle the appropriate number.

	ADC 1	ADC 2	ADC 3
1. Ease of use			
a. Sign on	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
b. Number of screens needed to navigate through	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
c. Finding the medication selected	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2. Ability to view screen/keyboard	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3. Profile clear and understandable	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
4. Storage capacity	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
5. Security	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

6. What did you like best about each machine?

ADC 1 _____

ADC 2 _____

ADC 3 _____

7. What did you like least about each machine?

ADC 1 _____

ADC 2 _____

ADC 3 _____

Additional comments:

ADC 1 _____

ADC 2 _____

ADC 3 _____

The results were compiled, and the two top-rated vendors were invited back to the hospital for a second demonstration. After this second round of review, the Safe Medication Practice Committee weighed the nurses' responses to the questionnaire (see **TABLE 1**), the capabilities of each ADC, as well as cost and customer service considerations in order to identify the ADC that best fit the needs of BMC. Interestingly, the vendor chosen was not the same vendor we had used to supply ADCs in the ER and OR previously.

Thereafter, the ADCs were purchased and implemented hospital-wide. To determine the number of ADCs that would be required throughout the hospital, we considered each unit's bed size, the distance the nurse had to travel to procure medications from the units, and which medications each unit required. The ADC implementation began in November 2004 in the ER and OR, and then progressed throughout the nursing units and other hospital areas.

ADC Selection Considerations

Both of the ADCs under final consideration offered profile-driven interfaces and narcotic security measures. Therefore, our ultimate decision was based on medication security and safety, ease of use, cost-effectiveness, and the vendor's customer service. Some of the factors considered included:

- **Medication storage space.** BMC required large, refrigerator-size ADCs with both drawer and cabinet space for medications. The ADCs chosen maximized space within the cabinets most effectively, allowing ample room for storage of larger volume fluids
- **Ergonomic design.** The keyboards and screen of the ADC

must be positioned at an ideal height for nurses, with a drawer configuration that minimizes the need to bend down to retrieve medications

- **Enhanced narcotic security.** The ADC we selected offers a unit-dose narcotic dispensing system that provides access to one narcotic at a time, eliminating the need for manual medication counts. The automatic unit-dose dispensing system frees up time for other activities while providing robust medication security. The dispenser is compatible with various types of medications, accommodating vials, unit-dose tablets, and prefilled cartridges; each dispenser holds up to 20 doses, and the total number of medications is approximately 24 to 30
- **Reduced medication-picking errors.** The ADC we selected uses LED guiding light technology to indicate which drawer the nurse should open to receive the requested medication. This technology reduces the possibility of selecting the wrong medication while improving nurses' access to medication. (See **SIDEBAR** for more tips on ensuring ADC safety.)
- **Customization.** The ADC chosen is capable of the customization required to meet our needs. We selected two-tower units for the busier departments and one-tower units for departments with lower medication volumes. The towers house larger items, such as IV bags and liquid bottles, sparing more costly drawer space. This capability increases storage capacity while saving on storage costs. The vendor we chose offered towers as part of the standard ADC configuration, compared with other vendors that sold towers separately
- **Price.** One vendor demonstrated exceptional quality and service at a price point equal to the other vendor. When choosing between two vendors, consider negotiating for enhanced functionality once the price point has been established
- **Customer service.** One of the prime considerations when determining which ADC to purchase was the level of customer service provided by the vendor. Remember that while the ADCs must be purchased only once, customer service is ongoing for the life of the cabinets. Choosing the vendor that provides superior customer service was therefore one of our most important concerns. Ten years on, we are pleased with the customer service we receive and appreciate that this was one of our prime purchasing considerations

TABLE 1
Nurses' ADC Ratings*

	ADC 1	ADC 2	ADC 3
Ease of sign on	4.47	4.07	4.80
Number of screens needed to navigate through	4.13	4.08	4.64
Ability to find medications	4.24	4.31	4.75
Ability to view screen/keyboard	4.29	4.08	4.73
Profile clear and understandable	4.20	4.17	4.64
Storage capacity	4.33	4.08	4.80
Security	4.18	4.14	4.63
Overall rating	**4.26**	**4.13**	**4.71**

*Based on the averaged ratings from a survey of 16 nurses.

ADC Training

A comprehensive training program ensures ADC user competency. Pharmacy worked together with our ADC vendor to conduct initial training of all staff utilizing the ADCs. Thereafter, we have used a train-the-trainer approach, whereupon nurse super-users train the other nurses in their units, a method that has proven extremely successful.

Conclusion

The Safe Medication Practice Committee, pharmacy, and nursing are pleased with our ADC selection and believe that including nurses was crucial to selecting the appropriate cabinets for our hospital. Ten years on, the ADCs purchased in 2004 remain in use. Including the end user in the ADC evaluation process proved to be an essential element of the project's success. ■

Reference
1. State of Pharmacy Automation Survey: Automated Dispensing Cabinets. *Pharm Purch Prod.* 2013;10(8):64-67.

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SIDEBAR

Ensuring Safe ADC Usage

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Role of the P&T Committee

The pharmacy and therapeutics (P&T) committee at Riverside Regional Medical Center (RRMC) oversees all aspects of safe medication use throughout the hospital, which of course includes medications sourced from ADCs.

Pharmacy conducts a yearly review of all high-risk and look-alike/sound-alike drugs; the P&T committee then reviews these medications to determine what safety precautions are necessary when they are sourced from ADCs. P&T seeks input from nursing, pharmacy, and physicians prior to making recommendations. For example, due to the potential dangers of administering an incorrect dose of insulin, the P&T committee requires an alert in the ADC when insulin is selected that prompts the user to locate a witness to verify the dose. In addition, P&T provides recommendations for locating controlled substances within the cabinets to ensure they are spaced evenly throughout and are not located next to each other, where they could easily be confused.

The P&T committee also establishes and manages override criteria for ADCs by unit; more overrides are permitted for an ADC in the ER than those in other areas due to the emergent nature of patients treated in the ER. Moreover, critical care areas typically have more medications available by override—for example, vasopressors—compared with general medical/surgical units. Similarly, the labor and delivery unit's unique needs require additional medications to be available through the override function, such as drugs used to treat postpartum hemorrhage. Furthermore, the P&T committee helps determine what alerts are important to include in ADCs in various patient care areas.

Leveraging ADC Technology to Prevent Drug Diversion

Biometric fingerprint identification is widely available, and this technology is preferable to password identification. Biometric fingerprint identification should be the default setting for all ADC users. While some staff may have experienced difficulty scanning their fingerprints in the past, newer versions of this technology have largely eliminated this challenge. It is important to ensure that all users—including temporary employees and float pool nurses—are set up to access the ADC using fingerprint identification. Because passwords can be stolen or shared, fingerprint identification provides superior ADC security.

At RRMC, we use diversion-tracking software to identify ADC users who access controlled substances at a higher rate than their peers who treat patients of similar acuity. The software allows us to track ADC usage data, and also provides proactive diversion reports that identify users in specific nursing units, as well as any employees wasting medications with the same witness more often than average. These reports are run on a monthly basis and reviewed by pharmacy and nurse managers; if a specific user is identified as a potential diverter, pharmacy works with the nurse manager of the relevant unit to perform a more focused audit.

Tracking cancelled transactions is another key tool for identifying potential diverters, as employees who divert typically log more cancelled transactions than other employees.