Optimizing the Use of Automated Dispensing Cabinets

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INTRODUCTION

According to the *Hospital Pharmacy in Canada* annual report for 2005/2006,[1] 32% of respondents to a survey of Canadian hospitals with at least 100 beds reported use of automated dispensing cabinets, an increase from only 20% in a similar survey conducted 2 years earlier.[2] The automated dispensing cabinet is one of many technologies that may be implemented as hospitals and other health care organizations work toward computerization and automation of medication-use systems. These units can be simple to operate, but a full understanding of the potential risks associated with their use is crucial to avoiding unforeseen sources of error. Implementation and management of automated dispensing cabinets requires an interdisciplinary approach, and pharmacists' contributions to the team are key. Those responsibilities include implementing, as part of the pharmaceutical care process, various practices to ensure safe outcomes, as well as medication distribution and related operational procedures. Guidance on the appropriate use of automated dispensing cabinets is available through a variety of sources, including the Institute for Safe Medication Practices (ISMP) in the United States[3] and the American Society of Health-System Pharmacists.[4] The current article, much of which is excerpted, with permission, from a recent issue of the *ISMP Canada Safety Bulletin*,[5] highlights commonly encountered challenges and provides strategies for optimizing the use of automated dispensing cabinets.

REVIEW OF MEDICATION ORDERS BY A PHARMACIST

Review of medication orders by a pharmacist before the administration of any medication is fundamental to the safety of a hospital's medication system. With automated dispensing cabinets, such a review can be ensured by establishing a real-time interface between the pharmacy information system and the dispensing cabinet and by allowing access to medications only through the pharmacist-reviewed patient profile of the unit. In Canada, where 24-h availability of pharmacy services is relatively rare, it can be difficult to provide timely review of medication orders that are generated when the pharmacy is closed. Ensuring a quick turnaround on such reviews can also be a challenge in the early morning and during other high-volume periods for processing of medication orders. Some facilities provide full access to the entire stock of the automated dispensing cabinet during hours when the pharmacy is closed (an approach known as "critical override"). Accessing medications through the override function bypasses the safeguards associated with pharmacist review; instead, safety depends entirely on the personal diligence of staff retrieving the medication to assess the order and select the appropriate drug and dosage form. In addition, access to certain medications without a pharmacist's review is sometimes provided through predefined lists of medications that can be accessed by nursing staff at any time (similar to ward stock in non-automated systems). Here, it is important to focus not only on the particular medications on such

a list, but also on the urgency of situations in which those medications will be used.

ISMP Canada recommendations:

- Ensure that all automated dispensing cabinets have an interface with the pharmacy information system, and establish the expectation that a pharmacist will review each medication order before the medication can be retrieved from the cabinet.
- Restrict or eliminate use of the "critical override" function, except during system downtime. Explore innovative options to allow pharmacist review of medication orders during evenings, nights, and early morning periods (e.g., off-site review of orders, possibly by sharing services between hospitals).
- Establish clear guidelines and a multidisciplinary review and approval process for medications that can be accessed without pharmacist review. Such medications should be limited to those that have an acceptable risk profile and that are likely to be required on an urgent basis.
- Establish a requirement for an independent double check of selected items removed through the override function (e.g., high-alert drugs).
- Ensure that all orders for medications removed using the override function are reviewed by a pharmacist as soon as possible.
- Establish indicators and targets for use of the override function, and audit these indicators and targets regularly (e.g., monthly).
- Establish clear guidelines related to the manual override of automated dispensing cabinets with keys (most units can be opened with some sort of lock-and-key system in the event of a power failure or system failure).

HIGH-ALERT MEDICATIONS

Use of automated dispensing cabinets can enhance the safety of administration of high-alert medications and can assist hospitals to achieve the Canadian Council on Health Services Accreditation patient safety goal of ensuring "the safe use of high risk medications".[6] If automated dispensing cabinets are used inappropriately, however, the risks associated with placing high-alert medications in these devices can be similar to those associated with traditional ward stock systems.

ISMP Canada recommendations:

- Place high-alert drugs in single-product drawers and, if possible, require that these drugs be dispensed on a unit-dose basis. Avoid placing high-alert medications in "matrix" type drawers that accommodate multiple products.
- Program the automated dispensing cabinet to generate appropriate screen alerts for high-alert medications.
- Consider the use of a "witness to override" if access to certain high-alert drugs through override is required for critical patient care reasons.

STOCKING AND RESTOCKING

When accurately stocked with unit-of-use medications, automated dispensing cabinets can reduce opportunities for selection errors during the medication administration process. However, errors can occur during the stocking and restocking process, and incorrect placement of a product within the cabinet increases the likelihood that a patient will receive an incorrect medication. Decisions about the quantities of stocked medications and their placement are of key importance to the safety of an automated dispensing cabinet system. Placing look-alike products within the same multiple-product drawer may increase the risk of product selection errors. Placing excessive quantities of drugs in multiple-product drawers may lead to doses being "flipped" between compartments. Providing excessive quantities of medications can also enable the administration of overdoses. For example, the Institute for Safe Medication Practices (US) reported a near-miss in which a 10-fold dosing error was averted because the automated dispensing cabinet contained an insufficient quantity of medication to administer the erroneous dose.[3] Use of multiple-dose containers is a concern with automated dispensing cabinets, as it is in any drug distribution system. The need for refrigeration, which can present an additional challenge, must be considered.

ISMP Canada recommendations:

- Establish independent double-check processes for stocking and restocking medications in drawers. Use barcode verification if possible.
- Establish a clear expectation that all unused doses will be returned to the pharmacy, e.g., by means of a locked return bin.
- Limit the quantities of medications stocked in automated dispensing cabinets, and restock cabinets at frequent intervals.
- Carefully consider the selection and placement of medications within automated dispensing cabinets. Avoid placing look-alike products within the same multiple-product drawer. If override lists are used, ensure that drugs available on such lists are not stocked in multiple-product drawers along with products that are not available through override.[7]
- Avoid stocking multiple-dose containers in automated dispensing cabinets.
- Do not stock in an automated dispensing cabinet any medications that require compounding, excessive numbers of calculations, or dilutions. Drugs requiring this extent of manipulation should be prepared only by pharmacy staff.
- Look for automated dispensing cabinets that either contain a refrigerator within the cabinet or can remotely link to (and activate a lock on) a refrigerator outside the cabinet. Both types force the user to

retrieve refrigerated medications through the auto-mated dispensing cabinet.

PROCESS FOR RETRIEVING MEDICATIONS

The safety of medication use involving automated dispensing cabinets is maximized when medications are retrieved for only one patient at a time, as close as possible to the time of administration. However, through discussions with practitioners at Canadian sites, ISMP Canada has become aware that the retrieval of medications for more than one patient and/or for more than one medication administration time during a single session at the automated dispensing cabinet is relatively common. Retrieving medications well in advance of scheduled administration times has also been reported to ISMP Canada staff. Unfortunately, these practices can introduce significant opportunities for error. Pharmacists can assist with the safe use of automated dispensing cabinets by working with nursing staff to develop policies and procedures that will address nursing workload and workflow concerns without compromising patient safety.

ISMP Canada recommendations:

- Retrieve medications from the automated dispensing cabinet for one patient at a time, and administer them promptly.
- Examine the use of standard medication administration times to ensure that the degree of consolidation of times is appropriate. (Consolidating medication administration times can reduce the number of trips to and from the cabinet, but excessive consolidation can also increase the likelihood of queues at the cabinet during peak medication administration periods.)
- Ensure that the number, size, and placement of automated dispensing cabinets in patient-care areas are appropriate for patient numbers and for the layout of patient care areas.
- Provide practitioners with appropriate containers for carrying medications for one administration time for one patient from the cabinet to the bedside.

EDUCATION

It is essential that staff be fully trained in the safe use of these machines and associated medication processes. Staff must receive education about the potential outcomes of unsafe practices such as removing doses in advance or removing doses for multiple patients, as well as the need to report problems such as look-alike drug name pairs on the drug selection screens.

LEARNING FROM REPORTS

As with any new technology, there is much to be learned from examining information on medication incidents and near misses associated with the use of automated dispensing cabinets. We encourage you to report any incidents related to the use of this technology through the ISMP Canada Web site at www.ismp-canada.org or by telephoning 1-866-54-ISMPC (1-866-544-7672).

CONCLUSIONS

Automated dispensing cabinets, when implemented in concert with unit-dose packaging, pharmacist review of medication orders, and an interface with a pharmacy information system, can improve the safety of the medication system while making required medications readily accessible in patient care areas. As with any new technology, however, there are potential pitfalls associated with these devices, which, if not properly managed, can jeopardize patient safety. Pharmacists have a key role to play in ensuring that automated dispensing cabinets are used in a way that enhances safe medication use.

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