Limiting the Drug Inventory to Minimize Automated Dispensing Equipment Errors

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PROBLEM: Many hospitals have replaced medication carts and open-floor stock systems with automated dispensing cabinets. These devices can streamline the distribution process, improve first dose turn-around time, and aid in securing drugs. More and more, however, we are finding that access to a wide assortment of medications has the potential to increase the risk of errors because the usual system of double checks is being bypassed. Orders might not be screened appropriately for allergies, duplicated therapies, drug interactions, or maximum doses before drugs are administered. If cabinets contain large quantities of specific medications, it is possible that staff members, unaware of the maximum doses, might administer overdoses.

We were recently reminded how simply minimizing the quantity and dosages of drugs stored in the cabinet might avert a potential drug overdose. In the first incident, a physician ordered 2 grams of magnesium sulfate to be infused over four hours. He soon changed his mind, slashed out the “2” and wrote a “5” before it. The nurse reading the order thought that he had written 51 grams. She mixed the solution using 10-gram vials that she had obtained from an automated dispensing module. After the infusion had run for about an hour, the patient experienced a feeling of paralysis in her legs and arms and screamed that she was blacking out. A nearby nurse quickly responded, and the patient recovered. Her serum magnesium level was 16.7 mEq/liter (normal serum Mg = 1.5–3).

In another case, after the pharmacy in a small hospital was closed, an order was written for “1 gram calcium gluconate IV.” The nurse misread the label and believed that each 10-ml vial contained only 98 mg. Thus, she thought that she needed 10 vials when each milliliter actually contained 98 mg, or 1 gram per 10-ml vial. A 10-fold overdose was avoided because the cabinet contained only six vials of calcium gluconate, not 10. The error was detected when the nurse contacted a pharmacist at home to obtain additional vials.

Other errors have been reported when staff members filled cabinets without a double-check system or when nurses removed more medications than ordered and returned unused doses to the dispensing cabinet. Errors are more likely if medications are accidentally stocked in or returned to the wrong location.

SAFE PRACTICE RECOMMENDATION: To prevent errors, the following procedural safeguards should be considered for use with automated dispensing cabinets in patient-care areas:

- Consider using automated dispensing systems that require pharmacy order entry before nurses can remove drugs from the cabinet. Nurses should not be allowed to override this feature. Although we highly recommend zero overrides, if policy allows, develop a list of drugs or drug categories (e.g., antibiotics) that should not be removed without pharmacy notification and clearance first. Because the safety feature of a patient-profiling system depends on timely and accurate pharmacy order entry, be sure to give these functions priority.
- Consider using a system that has bar-coding capability for drug stocking, retrieval, and administration.
- Carefully select the drugs that will be stocked in cabinets. Consider the needs of each patient-care unit, the staff’s expertise and familiarity with specific drugs, and the age and diagnoses of the patients being treated.
- Limit the drug supply, and stock drugs in the smallest doses possible and in the smallest containers available.
- Establish maximum dose ranges for “high alert” medications. Place this list on the automated dispensing cabinet for reference.
- Educate the staff to remove only a single dose of the medication ordered. If the drug is not used, return it to the pharmacy for replacement in the automated dispensing cabinet. The staff should never return drugs to the cabinet.
- Develop a checking system to ensure accurate stocking of the cabinet. The checking task can be accomplished by pharmacy staff members or by staff members on patient-care units if they are supplied with a daily list of items that have been added to the cabinet for verification. Make time for this important activity.
- Place allergy reminders for specific drugs (e.g., antibiotics, opiates, and nonsteroidal anti-inflammatory drugs) in appropriate drug-storage pockets or drawers.