



Errors with injectable medications:

Unlabeled syringes are surprisingly common!

Research shows that the incidence of errors with injectable medications is higher than with other forms of medications.^{1,2} Studies also suggest that half of all harmful drug errors originate during the administration phase; of those errors, about two-thirds involve injectable medications.^{3,4}

Several factors⁵ increase the risk of errors and patient harm with injectable medications:

- Availability of concentrated drugs for which further dilutions are required
- Complex calculations (e.g., changing a dose from mmol to mg)
- Requiring multiple manipulations to prepare the drug (e.g., vial-to-syringe transfer, syringe-to-syringe transfer, dilution, use of a filter)
- Reconstitution of powders and drugs that require special diluents
- Use of part of/more than one vial/ampule for a single dose
- Use of medications that require non-standard handling/precautions (e.g., light protection, inline filter)
- Inadequate/inaccessible drug information
- Preparing the drug in clinical areas instead of the pharmacy, with limited or absent product labeling.

Unlabeled syringes are a significant risk associated with preparation of injectable products in clinical areas. To cite one instance, a 15-year-old teenager with a history of malignant hyperthermia received the contents of an unlabeled syringe that was thought to contain **MARCAINE** (bupivacaine) with epinephrine. The syringe actually contained 30 mL of epinephrine 1:1,000. The nurse who had drawn the medication into a syringe had intended to add it to several bags of normal saline, but she was called away unexpectedly and left the unlabeled syringe on a tray near the patient. The patient's

blood pressure increased after local injection of the epinephrine into his limb, initially leading staff to believe he was experiencing malignant hyperthermia. The error was recognized after the patient developed ventricular tachycardia and pulmonary edema. He fortunately recovered without harm.

Last June, the American Nurses Association released the results of an online survey of more than 1,000 US nurses about the challenges of labeling syringes that contain injectable medications.⁵ The survey revealed that most (97%) nurses are worried about medication errors, and more than two-thirds (68%) believe errors can be reduced with more consistent syringe labeling. Nearly half (44%) of the nurses said they inject medications via a syringe more than five times each shift, and one-third (37%) administer injectable medications at least once each shift. Just one-third (37%) of nurses reported that they *always* label the syringes they prepare, and one in four (28%) nurses admitted they *never* label syringes they prepare.

Nurses who responded to the survey reported that several factors interfere with or prevent routine labeling of syringes. They noted that labels may:

- Cover the measurement gradation on the syringe barrel (65%)
- Not be suitable for a syringe (55%)
- Impair the ability to check the dosage when comparing the medication in a syringe with the order (39%)
- Make syringes hard to handle (31%)
- Detach from the syringe (30%)
- Make it difficult to attach a syringe to a pump (24%).

To reduce risks associated with unlabeled syringes, consider the recommendations in **check it out!** in the right column.

References appear at the bottom of page 3.

check it out! ✓✓✓✓

To reduce risks associated with unlabeled syringes, consider the following:

- ✓ **Prelabeled syringes.** Have pharmacy dispense ready-to-administer injectable products in labeled syringes as prescribed for individual patients.
- ✓ **Prefilled syringes.** Use commercially available, prefilled syringes of medications, which are already labeled.
- ✓ **Commercial labels.** Use commercially available labels for syringes in all drug preparation areas (including radiology, nuclear medicine, and other areas where medications are administered). Tape is not suitable for labeling syringes.
- ✓ **Label placement standards.** Follow established guidelines regarding label placement on syringes, including specific directions on how to avoid interference with viewing gradations on the syringe barrel and the contents of the syringe, or interference with use/function of the syringe. Apply the label directly below gradation lines to ensure that the scale and name of the drug and strength/dose are visible. Labels should be oriented to facilitate viewing when a right-handed person holds the syringe.
- ✓ **Discard if unlabeled.** Discard unlabeled syringes and report the event as a hazardous condition. No syringe should leave a nurse's hand unless it is labeled.

Nurse Advise-ERR® funding for 2008

We are very pleased to announce that this newsletter will again be offered **free** to US hospitals in 2008 through educational grants from **McKesson**—our supporter for the past 3 years—as well as a new supporter, **Baxter Healthcare**. Please join us in thanking our 2008 supporters by sending a message to ismpinfo@ismp.org. We will forward all messages to appropriate company representatives.



ADC survey shows improvements, but risks still prevail

Automated dispensing cabinets (ADCs)—perhaps more accurately referred to as automated *distribution* cabinets*—were introduced in the 1980s to help with medication distribution, storage, security, and retrieval documentation. Adoption of this technology started slowly, with only about half of hospitals using ADCs in 1999. However, by 2005, close to three-quarters of acute care hospitals were using ADCs in their facilities.¹ According to more than 800 respondents to our November 2007 survey in the *ISMP Medication Safety Alert!*[®] and *Nurse Advise-ERR*[®] newsletters, 94% of readers told us they use ADCs in their facilities; of those, more than half (56%) use the technology as the primary means of drug distribution.

ADCs can decrease the amount of time before a medication is available on patient care units for administration, ensure greater security of medications, and capture drug charges more efficiently and accurately. ADCs can also reduce the risk of medication errors, but only when specific safeguards are consistently in place. When compared to data from our 1999 survey on ADCs, it appears that more organizations are currently employing these important safeguards. Yet, as the highlighted findings below demonstrate, the improvements are incremental and not as widespread as needed to maximize the safety benefits that ADC technology offers.

Checking processes. The requirement for a pharmacist to check ADC stock medications *before* they leave the pharmacy increased from 65% in 1999 to 75% in 2007. No improvement was seen between 1999 and 2007 regarding verification processes *after* restocking the ADCs; in both years, just 18% of respondents reported that another person verifies drug placement in the ADC. Requiring another nurse to double-check a drug removed from an ADC via override (before pharmacy review) only increased from 10% in 1999 to 29% in 2007. These checking

processes are important to prevent potentially serious stocking and/or drug retrieval errors. While these checks could be performed with bar-coding, just a quarter (25%) of hospitals reported using this technology.

Pharmacist review and overrides.

Profiled ADC systems are one of the most important safety enhancements that has evolved in ADCs. This safety feature provides a direct interface between the pharmacy computer and ADCs so pharmacists can screen all newly prescribed medications for safety *before* they are removed from the cabinet for administration. This screening process helps ensure that serious drug interactions, dosing problems, cross allergies, or duplicate therapy are detected before the medication is available to the nurse for administration. Some of these potentially life-threatening conditions may not be picked up without the support of sophisticated software programs that are used in the pharmacy. Further, requiring a pharmacist to review the safety of a newly prescribed medication *before* it is administered to a patient ensures an independent double-check of the medication by two highly trained practitioners—a nurse who knows important information about the patient that might not be known by the pharmacist, and a pharmacist who knows important information about the drug that might not be known by the nurse.


In 1999, only 28% of respondents reported that a pharmacist must verify orders before drugs can be removed from ADCs; but in 2007, 64% of respondents reported adopting this practice. Interestingly, fewer (56%) frontline nurses reported that pharmacy verification always or frequently occurs before removing medications from ADCs, compared to 72% of other healthcare professionals, particularly pharmacists. Further, just 59% of 2007 respondents reported that all ADCs in their facilities are capable of profiling.

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safetywires

Easily misread abbreviation.

The abbreviations "q am" and "q pm" can be mistaken as 9 am and 9 pm and should be avoided. Instead, precede "am" or "pm" with "daily" (e.g., daily am, daily pm). If "q am and q pm" are used together, implying the drug should be given twice daily, it would be safest to use "BID am and pm" instead of "daily am and pm," since "daily" may imply once-a-day dosing. Incidentally, an analysis of 30,000 medication errors in USP's MedMarx database showed that the most common abbreviation resulting in a medication error was "qd" for "once daily," accounting for 43.1% of all abbreviation-related errors. Other abbreviations commonly resulting in medication errors were "U" for units, "cc" for mL, "MSO4" or "MS" for morphine sulfate, and decimal errors. All but "cc" are on The Joint Commission's DO NOT USE list for National Patient Safety Goal 2B, but "cc" is slated as an abbreviation for future inclusion.

 **Duragesic-12, not 12.5.** A 64-year-old female patient with breast cancer received a prescription for fentanyl patches 12.5 mcg/hour every 72 hours. The prescription was faxed to the pharmacy, but due to illegible handwriting and a fax transmission, the pharmacist missed the decimal point and read the prescription as 125 mcg. The medication was dispensed as separate 100 mcg and 25 mcg patches, both of which were applied to the patient's chest. The next day, a different pharmacist recognized the error and contacted the physician before the patient was harmed. **DURAGESIC-12** is the brand name of the only fentanyl patch available in a 12.5 mcg/hour strength. The intent of the "12" in the drug name is to help prevent ten-fold dosing errors since confusion between a 12.5 mcg and a 125 mcg per hour dose could be fatal. Medical staff should be reminded to use the number "12," not "12.5," when ordering the lower strength Duragesic patch. Nurses should be suspicious of initial doses higher than 25 mcg/hour unless the patient is known to be opiate tolerant.

ADC survey continued from page 2
Cabinet design. Just 50% of respondents noted that individual compartments for each drug are always or frequently available in the ADC cabinets.

ADC stock. In both 1999 and 2007, 35% of respondents reported that they always or frequently encounter multiple concentrations of medications in ADCs. In 2007, respondents, particularly nurses, also reported that they encounter *fewer* ready-to-administer medications in ADCs than reported in 1999. Almost a quarter (23%) of 2007 respondents reported that non-medications are now being stored in ADCs, an increase from 15% in 1999.

Workflow and practice habits. In 2007, additional assessment items were added to the ADC survey related to workflow and practice habits. Almost a third (30%) of frontline nurses reported that they always or frequently wait in line to access the ADC, and almost half (48%) reported that the ADCs are not located in areas free from distractions. Only two-thirds (69%) of frontline nurses reported that they always or frequently remove just one patient's medications at a time, implying that multiple patients' medications are removed a third of the time—a practice that is known to lead to drug administration errors. When

compared with responses from other healthcare professionals who completed the survey, frontline nurses reported less satisfaction with ADC workflow and reported using more workarounds to compensate for workflow problems.

Despite the growing popularity of ADCs and the benefits this technology offers, few resources exist to guide healthcare organizations toward best practices and safest use of this technology. To address this deficit, ISMP convened a group of stakeholders in the spring of 2007 to develop ADC practice guidelines. These guidelines (draft) are currently posted on the ISMP website at: www.ismp.org/Tools/guidelines/labeFormats/comments/default.asp. The guidelines contain 12 core processes associated with safe ADC use (see **Table 1** below). Please be sure to review these core processes and make plans to employ as many as possible in 2008 to reduce the risk of serious errors associated with ADC use.

*Professional licensing boards have suggested calling ADCs automated *distribution* cabinets since pharmacists, not nurses, dispense medications.

Reference: 1. Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: dispensing and administration. *AM J Health Syst Pharm.* 2006; 63:327-45.

Table 1: Twelve Core Processes Associated with ADC Use

1. Provide ideal environmental conditions for the use of ADCs
2. Ensure ADC system security
3. Use pharmacy-profiled ADCs
4. Identify information that should appear on the ADC screen
5. Select and maintain proper ADC inventory
6. Select appropriate ADC configuration (e.g., lidded compartments vs. matrix drawers)
7. Define and implement safe ADC restocking processes
8. Develop procedures to ensure the accurate withdrawal of medications from the ADC
9. Establish strict criteria for ADC system overrides
10. Standardize processes for transporting medications from the ADC to the patient's bedside
11. Eliminate the process for returning medications directly to their original ADC location
12. Provide staff education and competency validation

Full results of the survey can be found at: www.ismp.org/Newsletters/acute/acute/articles/adctablech.pdf.

► Special Announcements

Free webinar. Please join us on **January 25** for the first webinar based on the 2007 *Nursing Leadership Congress: Leadership Competencies for Effecting Change*. Dale Beatty, RN, MS, Vice President of Northwest Community Hospital in IL, and Mary Beth Navarra-Sirio, RN, MBA, Patient Safety Officer for McKesson, will be discussing leadership core competencies, effective learning mechanisms, management of time constraints, and improving patient safety through shared governance. For information, visit: <http://nursingleadershipcongress.com/webinars.asp>.

ISMP teleconference. Please join us for our first 2008 teleconference, **Safe Use of ADCs: Choosing Safety Over Convenience**, to be held on **January 30** from 1:30-3:00 pm ET. The speakers will address common errors associated with the use of automated dispensing cabinets (ADCs) and present new consensus recommendations designed to improve formulary management, drawer configuration, restocking procedures, system overrides, and medication withdrawal and transport. To register, visit: www.ismp.org/educational/teleconferences.asp.

Free CE Credit. One hour of continuing education (CE) credit is now available for the July-December 2007 issues of **Nurse Advise-ERR®** at: www.ismp.org/Newsletters/nursing/newsletterCE/default.asp.

References from page 1: 1) Taxis K, Barber N. Ethnographic study of the incidence and severity of intravenous medicine errors. *Br Med J.* 2003;326:684-7. 2) Cousins DH, et al. Medication errors in intravenous medicine preparation and administration: a multicentre audit in the UK, Germany and France. *Qual Saf Health Care.* 2005;14:190-5. 3) Bates D, et al. The cost of adverse events in hospitalized patients. *JAMA.* 1997;277:307-11. 4) Bates DW, Cullen DJ, Laird N. Incidence of adverse drug events and potential adverse drug events: implications for prevention. *JAMA.* 1995;274(1):29-34. 5) American Nurses Association. Medication errors and syringe safety are top concerns for nurses according to a new national study. Press release: June 18, 2007. Accessed at: www.nursingworld.org/FunctionalMenuCategories/MediaResources/PressReleases/2007/SyringeSafetyStudy.aspx

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Report medication errors to ISMP at 1-800-FAIL-SAF(E).