



Patient safety calls for reexamination of multiple-dose vial use

One cost-saving measure that warrants further scrutiny is the use of multiple-dose vials (MDVs). Any potential savings can be quickly consumed if contamination of the MDV results in an outbreak of infections. Faulty aseptic technique is often the primary cause of vial contamination, especially with products that may require more than one entry into the vial for a single patient (e.g., saline, heparin, local anesthetics such as lidocaine). Cross contamination occurs when you need “just a little more” lidocaine, for instance, or another saline flush, and forget to use a new needle and syringe when reentering the vial.

To cite a few examples, The Centers for Disease Control and Prevention reported that a contaminated 20 mL MDV of saline, used to flush IV lines, was the likely source of transmitting hepatitis C to at least three patients.¹ More recently, an outbreak of *Staphylococcus aureus* infections was reported.² A physician had performed intra-articular injections of lidocaine on ten patients; five were subsequently hospitalized for *S. aureus* infections at the injection site. A contaminated MDV of lidocaine was the likely source. Investigators also noted that refrigeration of the lidocaine vial after use might have played a role. Although it sounds counterintuitive, refrigeration of open lidocaine MDVs is not recommended! A study of *S. aureus* in MDVs of lidocaine showed prolonged survival at refrigerator temperatures.²

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The use of MDVs has also been linked to harmful medication errors. In a recent example, vecuronium, a neuromuscular blocking agent that causes paralysis, was administered to a 3-year-old child who was not on a ventilator. Prefilled saline syringes were not available, so nurses drew up a daily supply of saline flushes from MDVs, labeled the syringes by hand, and placed them in a container. Prior to the child's admission, syringes containing vecuronium had been prepared for another patient. An unused vecuronium syringe, hand-labeled similarly to the saline syringes, somehow found its way into the saline flush supplies.

As a result, the vecuronium syringe was mistakenly used to flush the child's IV line. The child became flaccid, and all respiratory efforts ceased. Fortunately, she was quickly intubated and ventilated. Requiring the use of brightly colored auxiliary labels that state “Caution: Paralyzing Agent” on all vials and prepared syringes of neuromuscular blocking agents could have prevented this error; so could the use of commercially available prefilled saline syringes.

See **Check it out!** (to the right) for suggestions on how to reduce the risk of errors and contamination with MDVs.

References: (1). Multidose vial linked to nosocomial HCV outbreak. *Hosp Infect Control*, May 2000:68-69. (2) Kirschke D, et al. Outbreak of joint and soft-tissue infections associated with injections from a multiple-dose medication vial. *Clin Infect Dis* 2003;36:1369-1373.

check it out! ✓✓✓✓

To prevent errors and cross contamination associated with MDVs:

✓ **Use prefilled syringes** (commercially available or pharmacy prepared), especially for heparin, saline, and bacteriostatic water. Use single-dose vials of local anesthetics.

✓ **Do not reuse single-dose vials.** These vials contain no preservatives to prevent contamination.

✓ **Sequester MDVs.** If using MDVs of heparin, saline, bacteriostatic water, or local anesthetics, ask pharmacy to dispense individual vials labeled for patients with a blood-borne pathogen. Keep the vials with the patient's medications and discard upon discharge.

✓ **Use safe technique.** If MDVs are used, before *each* entry into the vial:

- check the expiration date
- visually inspect the solution for signs of contamination (cloudy)
- decontaminate the vial membrane
- use a new sterile syringe and needle
- properly label the syringe.

✓ **Be alert to contamination.** MDVs contain preservatives to inactivate bacteria (not viruses), but there's a vulnerable window of time (2 hours) in which bacteria may remain viable. The frequency of entering the vial and the environmental air injected into the vial are also factors that can influence the risk of contamination.

✓ **Store safely.** Note and follow the manufacturer recommended storage conditions for MDVs.

✓ **Discard expired MDVs** according to policy set by your hospital's infection control committee. Also discard any used but undated MDVs.

Distribution of Nurse Advise-ERR™ in 2005

Since April 2003, **Nurse Advise-ERR™** has been provided free to subscribers through an educational grant from Eli Lilly and Company. Unfortunately, the Lilly foundation will not be funding the newsletter in 2005. While we are seeking another funding source, we must also anticipate the possibility of charging a small subscription fee in the future. Look for additional information and updates in the remaining 2004 issues of **Nurse Advise-ERR™**. We welcome your comments at: ntuohy@ismp.org.

What's up with *tall man* letters?



Why does the typestyle used for the drug names on these bottles look somewhat unusual, with some letters capitalized?



The unusual typestyle is called *tall man* lettering. To help differentiate two look-alike drug names, ISMP has long suggested capitalizing part or all of the non-similar letters to draw attention to the name differences. Hydralazine and hydroxyzine have been the subject of numerous ISMP error reports. Since hydralazine is an anti-hypertensive agent and vasodilator, and hydroxyzine is an antihistamine,

mix-ups could potentially harm patients. Thus, the drug manufacturer is now using *tall man* letters on the labels to help prevent confusion. You, too, can apply this safety strategy to differentiate look-alike drug names on pharmacy labels, medication administration records, drug storage shelves and bins, and computer screens (e.g., automated dispensing cabinets).

Just recently, the Joint Commission posted a list of the most problematic look- and sound-alike drug name pairs in each healthcare setting (see **Double Trouble** to the right for a list applicable to hospitals). Accompanying this list are instructions for addressing the new 2005 Joint Commission National Patient Safety Goal (NPSG) which, at a minimum, require organizations to annually review a list of look- and sound-alike drugs, and take action to prevent mix-ups (visit <http://www.jcaho.org/accredited+organizations/patient+safety/05+npsg/lasa.pdf> for details). Specific safety strategies for each name pair are provided along with general recommendations for preventing mix-ups, one of which includes changing the appearance of look-alike product names through bold face, color, and/or *tall man* letters, to call attention to the parts of the names that are different. Talk to your pharmacy and nursing leaders about how to make these kinds of changes in your institution.

safetywire



Blue dye toxicity. Have you ever added blue dye to enteral tube feedings to help detect pulmonary aspiration of fluid? Recently, FDA reported several cases of toxicity possibly associated with FD&C Blue No. 1 (Blue 1) when used for this purpose. In some cases, serious complications resulted, such as refractory hypotension, metabolic acidosis, and even death. Toxicity is manifested by blue discoloration of the skin, urine, feces, or serum. Seriously ill patients, particularly those with increased intestinal permeability (e.g., patients with sepsis, burns, surgical interventions, inflammatory bowel disease) may be at greater risk for complications. Blue 1 is widely used in food products and may even be present in some commercially prepared enteral nutrition products. There have been no reports of toxicity associated with this use, but FDA is aware of 20 cases of adverse events, including 12 deaths, associated the use of blue dye in tube feedings. Other blue dyes, such as methylene blue and FD&C Blue No. 2, may have similar toxicity potential and would not be appropriate replacements. Preventing aspiration is still the best approach. Validation of tube placement, monitoring of gastric residuals, and elevation of the head of the bed remain as the critical safety strategies to employ.

Double Trouble

In 2005, the Joint Commission will be requiring hospitals to select at least ten look- and sound-alike drug name pairs, and to initiate effective safety strategies to prevent accidental mix-ups with these drugs. For hospitals, at least five of the name pairs must be selected from a hospital-specific list (see below). The remaining name pairs may be selected from a supplementary list, or from lists applicable to other health-care settings (all lists available on the JCAHO website).

Look-alike drug name pairs (for hospitals)

- ✓ cisplatin and carboplatin
- ✓ concentrated and conventional liquid morphine products
- ✓ ephedrine and epinephrine
- ✓ fentanyl and sufentanil
- ✓ hydromorphone and morphine
- ✓ insulin products (e.g., Lantus and Lente, Humulin and Humalog, Novolin and Novolog, Novolin 70/30 and Novolog Mix 70/30)
- ✓ lipid-based and conventional forms of daunorubicin, doxorubicin, amphotericin
- ✓ Taxol and Taxotere
- ✓ vinblastine and vincristine

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