ISMP Medication Safety Alert!®

A federally certified Patient Safety Organization

Nurse Advise-ERR®

Educating the healthcare community about safe medication practices

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Oral syringes: A crucial and economical risk-reduction strategy that has not been fully utilized

ISMP has often stressed the importance of never using parenteral syringes to prepare or administer oral liquid products; instead, an oral syringe should always be used. Sound familiar? Over the years, this important advice has appeared in more than 60 issues of our acute care and nursing newsletters, including our inaugural *Nurse Advise-ERR* issue in April 2003. Yet, we continue to visit organizations where this simple but critical safety measure is not followed.

Using parenteral syringes (with a Luer lock connection or connector that can be attached to a needleless IV system) to administer oral/enteral liquids is dangerous. After filling a parenteral syringe with an oral/enteral medication, it takes only a momentary mental lapse to connect it to an IV line or attach a needle and inject it.[1] To prevent this, oral syringes have specially designed hubs that do not easily or securely connect to standard IV lines or accommodate a needle attachment. While some practitioners may believe this type of error would never happen to them, most events occur when knowledgeable staff, intending to administer the product orally/enterally, inadvertently administers it via the wrong route or access port. Staff may also mistake the contents of a syringe, often unlabeled, as a parenteral product. Unfortunately, such errors occur far too often.

Two recent errors involving the misuse of parenteral syringes were reported. One involved a newborn infant and another involved an adult medical patient. The first error claimed the life of a baby born to a woman who died from the swine flu. The premature infant was delivered via Cesarean section 1 day before his 20-year-old mother died. A week later, the infant died after an intermittent feeding prepared in a parenteral syringe was administered IV instead of through a nasogastric tube. In the second case, a new graduate nurse prepared yogurt in a parenteral syringe for administration via an enteral tube to treat diarrhea. She accidentally administered it IV through a PICC line. The nurse then flushed the line with water. The distal ends of the enteral and PICC lines, all unlabeled, looked very similar. The outcome was not reported.

In previous newsletters, we wrote about similar errors that were reported to us. A few examples follow.

A pharmacy dispensed niMODipine capsules to clinical areas, unaware they were being used for patients who couldn't swallow. In one instance, a nurse softened the gelatin capsule in hot water and withdrew the medication into a parenteral syringe. In the chaos of the moment, the dose was administered IV instead of via a feeding tube. The nurse immediately noticed the error and tried unsuccessfully to withdraw the drug from the IV tubing. Unfortunately, the patient died. A boxed warning has now been added to the niMODipine labeling to caution about this type of administration error with the product.

VERSED (midazolam) syrup (15 mg) and TYLENOL (acetaminophen) liquid (650 mg) were drawn into a parenteral syringe and administered IV to an 11-year-old child being prepared for surgery. A nurse and fourth-year student nurse had prepared the doses, but the nurse was called away momentarily. While she was gone, the student nurse administered the drugs IV, believing

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nicecatch

Look-alike antibiotics. ADD-Vantage System vials of ampicillin 2 g and nafcillin 2 g look nearly identical (Figure 1). A nurse discovered a dispensing error while she was hanging a minibag of what she thought was ampicillin but turned out to be nafcillin. ADD-Vantage System vials are attached to minibags of diluent, and the antibiotic is mixed with the diluent, or activated, immediately before use. If you use ADD-Vantage System antibiotics in your hospital, ask pharmacists to highlight the drug name on the container to draw attention to it. We've received complaints about similarities with other Sandoz products and have suggested label redesign to the company.

Figure 1. Ampicillin 2 g and nafcillin 2 g ADD-Vantage vials look similar.

safetywires

Wrong insulin concentration. A new nurse in the emergency department (ED) helped a colleague by preparing an insulin infusion in a 5 units/mL concentration, carefully following instructions in the drug reference book attached to the automated dispensing cabinet. As per the monograph, she prepared the infusion by placing 500 units of regular insulin in a 100 mL bag of normal saline. Being new, the nurse did not know the hospital's standard concentration for insulin infusions was 1 unit/mL. This information was buried in an outdated insulin policy on a shelf outside the medication room. Although the infusion bag was properly labeled, the concentration was not reviewed during handoff to the receiving nurse. The standard concentration for insulin infusions

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the child was NPO before surgery. The child remained unconscious for 50 minutes and required several days of antibiotics, but he recovered fully.

Some may believe they have sufficiently reduced the risk of administering an oral liquid medication by the IV route by having pharmacy dispense doses in either an oral syringe or a commercially available unit-dose cup. But some nurses have withdrawn a portion or all of the liquid from a unit-dose cup into a parenteral syringe in order to administer the dose. Not every nurse is familiar with oral syringes and some may mistake a liquid medication in an oral syringe as a parenteral product. As the following errors show, all patient care units and procedure areas should be supplied with oral syringes—even if the need for using them is infrequent—to reduce the risk of administering oral liquids by the IV route. All nurses need to know oral syringes are available and understand the safety features and the importance of using them.

A physician wrote an order for ***TUSSIONEX*** *(****HYDRO****codone and chlorpheniramine) suspension but did not specify the oral route of administration. A unit dose of Tussionex suspension was dispensed in an oral syringe, but the pharmacy label covered the manufacturer's warning on the syringe, "For oral use only." A nurse who was not familiar with oral syringes transferred the drug into a parenteral syringe, diluted it with saline, and administered it IV. The error was quickly recognized; the IV catheter was removed, and no harm occurred.*

An uncooperative patient was sedated for an MRI with 500 mg of chloral hydrate syrup. The patient would not drink from the pharmacy-dispensed unit-dose cup, so a nurse withdrew the medication into a parenteral syringe and administered it orally. A physician accompanied the patient to the radiology department. Once there, the patient required additional sedation, so the physician called the nurse to send another dose of chloral hydrate to radiology. Again, the nurse withdrew the dose into a parenteral syringe. She felt uncomfortable sending it to radiology in a parenteral syringe, but oral syringes were not available. So, she left the syringe uncapped (and without a needle), and included the tear-off label from the unit-dose cup for reference. The physician never noticed the label and began to administer the medication IV. When the patient started yelling, drug administration was halted. Luckily, the patient received very little of the medication and was not injured.

According to a 2009 analysis of paid liability claims from 1997-2007, CNA Insurance Companies and the Nurses Service Organization—the largest insurer of US professional nurses—found that claims alleging wrong medication route, similar to those described above, had the highest average paid indemnity—$214,240 per case—of all medication error claims.[2] One claim involved a nurse who floated to the neurology floor, where she was instructed to give a 19-year-old man recovering from a frontal craniotomy a dose of **DILANTIN** (phenytoin) oral elixir through a feeding tube. The nurse mistakenly gave the drug through the patient's triple lumen catheter. The patient coded within seconds, resulting in a severe, non-recoverable, anoxic brain injury.

The consistent use of oral syringes for preparation and administration of all small volume oral/enteral liquids is an effective and economical risk-reduction strategy that should be employed in all healthcare settings. Table 1 on page 3 summarizes key actions to ensure widespread and consistent use of oral syringes. Patients are subjected to a substantial and unjustifiable risk of harm when oral/enteral products are prepared and administered in parenteral syringes. It's time to make the use of oral syringes a standard of practice in every healthcare organization.

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was well known to the more experienced nurse, who administered a separately prepared bolus dose of 10 units of regular insulin as ordered and then started the insulin infusion at 2 mL/hour on the infusion pump. She believed the pump was delivering 2 units/hour, but it was actually delivering 10 units/hour. The error was identified after the patient became symptomatic. Ideally, pharmacies should prepare infusions that are not commercially available. When 24-hour pharmacy coverage is not an option, or under conditions that warrant immediate use, hospital-approved drug guidelines for IV admixtures prepared by nurses should be readily available, and nurses should be educated about the procedures during orientation and when new admixtures are added to the guidelines. Nurse-prepared infusions, especially with high-alert drugs, should be independently checked after preparation and during handoffs. Unfortunately, even use of a "smart" infusion pump may not prevent an error like this unless the nurse hanging the infusion reads the label and recognizes the erroneous concentration.

The lot number is where? After a patient was readmitted to the hospital with cellulitis at an injection site of **PNEUMOVAX 23** (pneumococcal polysaccharide vaccine [polyvalent]), staff began investigating if any other adverse events had occurred with the same lot of a vaccine. Their investigation revealed that the lot number and expira-

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References:
1) Hurst M. Oral medication dispensers in clinical research. *J Clin Res Best Prac* September 2006.
2) CNA Insurance Companies and Nurses Service Organization. CNA Healthpro nurse claims study: an analysis of claims with risk management recommendations 1997-2007. CNA Financial Corporation, 2009. Available at: www.nso.com/pdfs/db/rnclaimstudy.pdf?fileName=rnclaimstudy.pdf&folder=pdfs/db&isLiveStr=Y&refID=rnclaim.
3) National Patient Safety Agency (NPSA). Promoting safer measurement and administration of liquid medicines via oral and other enteral routes. *Patient Safety Alert* March 28, 2007;19:1-12. Available at: www.nrls.npsa.nhs.uk/resources/?entryid45=59808&p=5.
4) Green AE, Banks S, Jay M, et al. Stability of nimodipine solution in oral syringes. *Am J Health-Syst Pharm* 2004; 61:1493-6.

Table 1. Strategies that promote consistent use of oral syringes
Strategy 1. Use parenteral and enteral devices that are incompatible
Examine connection ports on nasogastric, enteral, and parenteral tubing and catheters to determine which type of connectors they accommodate. Some needleless IV system connection ports unfortunately may accommodate oral syringes (with some manipulation), thereby allowing oral solutions to be injected IV. While some enteral tubes have a port compatible with parenteral syringes, others are available with a port that only accommodates oral syringes.
Strategy 2. Supply all clinical areas with oral syringes
Leadership should be accountable for supplying all clinical areas with appropriately sized (e.g., ½ mL, 1 mL, 3 mL, 5 mL, 10 mL) oral syringes. If possible, use oral syringes that have a different appearance from parenteral syringes. Judicious use of color and design can help staff distinguish between oral/enteral and parenteral syringes.[3] Warn staff to avoid associating a particular color with the oral/enteral route of administration as no standard exists among different manufacturer's products. Although some facilities use amber oral syringes to differentiate them from parenteral syringes, amber syringes hide the color of liquids and make the volume harder to see. Some facilities use them only when the product is light sensitive.
Strategy 3. Dispense oral liquid medications from pharmacy in oral syringes when possible
Require pharmacy to dispense all oral liquid medications in patient-specific or unit-of-use oral syringes or commercially available dose cups. When appropriate, batch supplies can be prepared and used to stock automated dispensing cabinets. (Even niMODipine liquid can be extracted from capsules, stored in amber oral syringes and placed in light-protected bags, and stocked for up to 31 days.[4])
Strategy 4. Notify pharmacy if liquid medications are required
Have nurses or physicians notify pharmacy if patients cannot swallow solid medications so that liquid doses can be provided in oral syringes or dosing cups.
Strategy 5: Reduce tolerance of risk
Communicate the potential danger of inadvertent intravenous injection of oral/enteral liquids prepared in parenteral syringes. Include case examples of external (and internal) errors that have happened, even if they did not reach the patient, and promote the belief that the error could happen to anyone. Help staff recognize this is an "at risk" behavior if oral syringes are available and not used. The risks of wrong route errors with oral/enteral liquids should also be identified in medication and enteral feeding policies and procedures.
Strategy 6. Require staff to use oral syringes when preparing and administering small volume oral/enteral liquids
Require staff to prepare and administer all small volume oral/enteral solutions in oral syringes, and to avoid placing any non-parenteral products in parenteral syringes. Also, avoid placing topical products in oral syringes. Include a warning on medication administration records (MARs) for liquid medications that states "Use oral syringe only."
Strategy 7. Apply auxiliary labels
Label oral syringes dispensed from the pharmacy with an "Oral Only" label on the tip of the plunger so that the label must be removed prior to administration. Don't cover the manufacturer's label warning.
Strategy 8. Label all access lines
Consider placing labels (indicating what the port/line is being used for) on all distal ports and tubing of access lines, including peripheral and central intravenous lines and feeding tubes.
Strategy 9. Improve awareness
Ensure that all healthcare professionals involved in medication prescribing, dispensing, and administration are thoroughly familiar with the design and purpose of oral syringes and their important safety features, particularly their inability to be connected to intravenous (or other male Luer) ports or parenteral needles. The importance of using oral syringes should be consistently emphasized. A simple poster stating "Only use oral syringes for liquids" in each medication room can help with this.
Strategy 10. Establish training programs[3]
All orientation and training programs for staff who administer oral liquid medicines and use enteral feeding systems should include information about the availability and the proper use of oral syringes. Senior staff should supervise new staff to ensure oral syringes are used consistently. Provide additional training for staff when changes are made to tubing, catheters, or oral syringes used at your facility.

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tion date on the vial label of Pneumovax 23 had caused confusion. The product label has two numbers on it (see Figure 1) that resemble lot numbers, which resulted in documentation errors. The number 9722106 located above the words "Lot & Exp" is a product identification number that is the same on all vials of Pneumovax 23. The top number with-

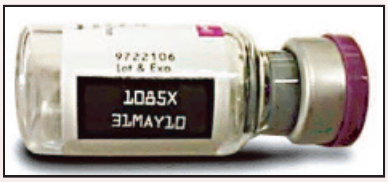

Figure 1. Which number is the lot number?

in the black box is the actual lot number, identifying where and when the product was manufactured. Documentation errors happened with more than one nurse. If you use this product and require documentation of lot number and expiration date, you may want to let nurses who administer the vaccine know which number is the lot number. We've notified Merck about the confusion.

ISMP errata. In our March 2010 issue, we mentioned that the analysis of a fatal error conducted by ISMP appeared in the March 2010 issue of *The Joint Commission Journal on Quality and Patient Safety.* Actually, the article is in the **April 2010** issue. We thank readers for alerting us to this mistake. We have since learned that full text of the article is available **free** at: http://psnet.ahrq.gov/resource.aspx?resourceID=17785&sourceID=1&emailID=19328.

ISMP Medication Safety Alert! Nurse Advise-ERR (ISSN 1550-6304) **Editors:** Judy Smetzer, RN, BSN, FISMP; Ann Shastay, RN, MSN, AOCN; Michael R. Cohen, RPh, MS, ScD; Russell Jenkins, MD. **ISMP, 200 Lakeside Drive, Suite 200, Horsham, PA 19044-2321.** Tel.: 215-947-7797; Fax: 215-914-1492; EMAIL: nursing@ismp.org.

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