

ISMP Medication Safety Alert!® Acute Care

ERRORS WITH INJECTABLE MEDICATIONS: UNLABELED SYRINGES ARE SURPRISINGLY COMMON!

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Problem: 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 medication errors originate during the drug administration phase; of those errors, about two-thirds involve injectable medications.³⁻⁴

Several factors, such as those listed below, can increase the risk of errors and patient harm with injectable medications:⁵

- Narrow therapeutic index drugs
- Availability of concentrates, where further dilutions are required
- The need for complex calculations, such as converting a dose from mmol to mg
- Multiple manipulations required to prepare the drug (e.g., vial-to-syringe transfer, syringe-to-syringe transfer, dilution, use of a filter)
- Reconstitution of powders often requiring special diluents
- Use of part of a vial/ampul or more than one vial/ampul for a single dose
- Non-standard handling/special precautions (e.g., light protection, inline filter, incompatibilities) required
- Inadequate and/or inaccessible drug information
- Preparation of the drug in clinical areas instead of the pharmacy, with limited or sometimes absent labeling of the product.

Unlabeled syringes are a significant risk associated with preparation of injectable products in clinical areas. In our March 20, 2002 newsletter, we wrote about a 15-year-old boy with a history of malignant hyperthermia who received the contents of an unlabeled syringe that a surgeon thought contained **MARCAINE** (bupivacaine) with epinephrine. The syringe actually contained 30 mL of epinephrine 1:1,000, which a nurse had drawn into a syringe. She had planned to add the drug 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. But the error was recognized after the patient developed ventricular tachycardia and pulmonary edema. He was sent to ICU and fortunately recovered without permanent harm.

Unlabeled syringes are problematic outside of surgical areas, too. Despite Joint Commission Medication Management Standard MM.4.30, which requires the labeling of all medications, ISMP staff consultants frequently visit healthcare facilities and confirm that unlabeled syringes are observed in every patient care area, from typical nursing areas to diagnostic testing areas, as in the reported error that follows. Just before a **PERSANTINE** (dipyridamole) stress test, a nurse prepared a syringe of aminophylline 75 mg from a multiple-dose vial, but did not label the syringe. The aminophylline (used for emergency reversal of the effects of dipyridamole) was not needed, and the unlabeled syringe was left in the room with the patient. The nurse stepped out of the room as a nuclear medicine technician stepped into the room to administer an IV dose of thallium. Since the unlabeled syringe had been placed where saline flushes were usually kept, the technician assumed that it was saline and used it to flush the patient's IV access port. The nurse returned to the room just as the technician finished giving the aminophylline. The patient was monitored but experienced no serious adverse effects.

A few months ago, the American Nurses Association released the results of an online survey about the challenges of labeling syringes that contain injectable medications.⁶ The 2007 survey of more than 1,000 nurses across the US revealed that an overwhelming majority (97%) are worried about medication errors, and that more than two-thirds (68%) believe medication errors could 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 one time per shift. However, only one-third (37%) of nurses surveyed report that they always label syringes. Equally concerning, the study suggests that more than one in four (28%) nurses never label the syringes when administering medications.

Nurses who responded to the survey report the following factors interfere with or prevent routine syringe labeling:

- Labels may cover the measurement gradation on the syringe barrel (65%)
- Lack of a suitable label (55%)
- Labels may impair the ability to accurately check the dosage when comparing the order (39%)
- Labels may make syringes hard to handle (31%)
- Labels detach from the syringe (30%)
- Labels sometimes make it difficult to attach the syringe to a pump (24%).

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

Pharmacy dispensing. Have pharmacy dispense ready-to-administer or ready-to-use injectable

products in labeled syringes as prescribed for individual patients.

Use prefilled syringes. When possible, use commercially available, prefilled syringes of medications, which are already labeled.

Provide labels. Commercially available labels for syringes should be provided and regularly restocked in all drug preparation areas (including radiology, nuclear medicine, and other areas where medications are administered). Offer nurses the opportunity to assess several label formats and select one standard format that best meets their needs. Tape is not suitable for labeling syringes.

Define label placement. Establish guidelines regarding the placement of labels 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. The label should be applied directly below gradation lines so that the scale, name, and strength/dose of the drug remains visible during administration. The label should also be oriented in a manner that facilitates viewing when a right-handed person holds the syringe.

Syringe safety features. Promote the procurement of syringes that offer inherent safety features. For example, for extemporaneous use in certain clinical areas, explore the possibility of using commercially available syringes that offer a write-on stripe (e.g., InviroSTRIPE) that allows annotation of critical information to be recorded directly onto the syringe barrel using typical writing instruments.

Discard unlabeled syringes. Don't assume that you know what is contained in an unlabeled syringe. Discard any unlabeled syringes and report the event as a hazardous condition. No syringe should leave the practitioner's hand unless it is labeled.

Monitor labeling practices. Reinforce and monitor compliance with a policy that requires all syringes containing injectable medications to be properly labeled.

References:

- 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, Sabatier B, Begue D, 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, Spell N, Cullen DJ, 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 National Patient Safety Agency (NPSA). Risk assessment tool for injectable medicines. National Health Services: NPSA. March 2007. Accessed at: www.npsa.nhs.uk/site/media/documents/2475_Inject_Risk_assess.doc.

6 American Nurses Association. Medication errors and syringe safety are top concerns for nurses according to a new national study. Press release: June 18, 2007. [Click Here](#)