

# Reducing Errors with Injectable Medications

## Unlabeled Syringes Are Surprisingly Common

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**PROBLEM:** The incidence of errors associated with injectable medications is higher than with other formulations.<sup>1,2</sup> Studies also suggest that half of all harmful medication errors originate during drug administration; of those errors, about two-thirds involve injectables.<sup>3,4</sup> Several factors can increase the risk of errors and patient harm with injectable drugs, for example:<sup>5</sup>

- drugs having a narrow therapeutic index.
- concentrated formulations that need to be diluted further.
- multiple manipulations required to prepare the medication (e.g., vial-to-syringe transfer, syringe-to-syringe transfer, dilution, or use of a filter).
- reconstitution of powders for which special diluents are required.
- use of part of a vial or an ampule or the need for more than one vial or ampule for a single dose.
- nonstandard handling or special precautions that might be necessary, such as light protection, an inline filter, or drug incompatibilities.
- preparation of the drug in a clinical area (e.g., the nursing unit) instead of in a pharmacy; in such instances, labeling of the product is more likely to be limited or absent.

Unlabeled syringes pose a significant risk when injectable products are prepared in clinical areas, as described in the following scenario:<sup>6</sup>

A 15-year-old boy with a history of malignant hyperthermia received the contents of an unlabeled syringe that a surgeon thought contained bupivacaine (Marcaine)

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.

After a local injection of epinephrine into his limb, the patient's blood pressure increased, initially leading the staff to believe that he was experiencing malignant hyperthermia. However, the error was recognized after ventricular tachycardia and pulmonary edema developed. He was sent to the intensive-care unit and fortunately recovered without permanent harm.<sup>6</sup>

Unlabeled syringes can also be problematic outside of surgical areas. Despite the Joint Commission's Medication Management Standards, which call for all drugs to be labeled, staff consultants at the Institute for Safe Medication Practices (ISMP), during their frequent visits to health care facilities, have confirmed that unlabeled syringes were observed in every patient care area, from typical nursing stations to diagnostic testing rooms. In another case, the following error was reported.

Just before a dipyridamole (Persantine) stress test, a nurse prepared a syringe of aminophylline 75 mg from a multiple-dose vial but did not label the syringe. Aminophylline, which is usually used for emergency reversal of the effects of dipyridamole, was not needed, and the unlabeled syringe was then 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 intravenous (IV) dose of thallium. Because the unlabeled syringe had been placed where saline flushes were usually kept, the technician assumed that the syringe contained 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 moni-

tored but experienced no serious adverse effects.

A few years ago, the American Nurses Association released the results of an online survey about the challenges of labeling syringes that contain injectable medications.<sup>7</sup> The 2007 survey, which included more than 1,000 nurses across the U.S., revealed that an overwhelming majority (97%) were worried about medication errors and more than two-thirds (68%) believed that these errors could be reduced with more consistent labeling of syringes. Nearly half of the nurses (44%) responded that they injected medications via a syringe more than five times each shift, and one-third (37%) administered injectable drugs at least one time per shift. However, only one-third of the nurses (37%) reported that they always labeled the syringes. Equally concerning, the study suggested that more than one in four nurses (28%) never labeled the syringes when they administered medications.

Then nurses reported several factors that interfered with or prevented routine syringe labeling:

- The label sometimes covered the measurement gradation (mL) on the syringe barrel (65%).
- A suitable label was unavailable (55%).
- The label impaired their ability to accurately check the dosage when comparing it with the order (39%).
- The label had become detached from the syringe (30%).

**SAFE PRACTICE RECOMMENDATIONS:** To reduce risks associated with unlabeled syringes, readers might consider the following strategies:

1. Pharmacies should dispense ready-to-administer or ready-to-use injectable products in labeled syringes as prescribed for individual patients.

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2. Commercially available, prefilled syringes of medications that are already labeled should be used when possible.

3. Commercially available labels for syringes should be provided and should be routinely restocked in all drug-preparation areas (e.g., radiology, nuclear medicine). Nurses should be offered the opportunity to assess several label formats and to select one standard format that best meets their needs. Tape is not suitable for labeling syringes.

4. Guidelines should be established for placing the labels on the syringes. Specific directions should be included on how to avoid obstructing the view of gradations on the syringe barrel and contents and how to avoid interfering with the syringe's use or function. The label should be applied directly below the gradation lines so that the scale, name, strength, and dose of the drug remain visible during administration.

5. Syringes that offer inherent safety features should be purchased. For example, for extemporaneous use in certain clinical areas, the staff might use syringes that offer a write-on stripe (e.g., InviroSTRIFE, Inviro Medical). This technique allows employees to use typical writing instruments to annotate critical information that can be recorded directly onto the syringe barrel.

6. Staff members should not assume that they know what is contained in an unlabeled syringe. All unlabeled syringes should be discarded, and the event should be reported as a hazardous condition. No syringe should leave the practitioner's hand unless it is labeled.

7. The staff should reinforce and monitor compliance and should institute a policy mandating that all syringes containing injectable medications be properly labeled.

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*The reports described in this column were received through the ISMP Medication Errors Reporting Program (MERP). Errors, close calls, or hazardous conditions may be reported on the ISMP Web site ([www.ismp.org](http://www.ismp.org)) or communicated directly to ISMP by calling 1-800-FAIL-SAFE or via e-mail at [ismpinfo@ismp.org](mailto:ismpinfo@ismp.org). ■*