Ephedrine and Epinephrine: An Easy Opportunity for Confusion

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PROBLEM: The accidental administration of concentrated epinephrine is quite common. Many errors can be traced to confusion in expressing the concentration of epinephrine as a ratio strength rather than a metric weight per volume. However, confusion between ephedrine and epinephrine can also lead to errors. Not only are these drug names similar; their use as vasopressors or vasoconstrictors also makes them likely to be stored near each other. In addition, both products are often packaged in 1-ml ampules or vials.

At the Institute for Safe Medication Practices, we learned about a healthy young woman in the labor-and-delivery unit who became hypotensive after receiving epidural anesthesia. A nurse immediately called the obstetrics resident to inform him of the patient’s condition. The resident, who had been known to be difficult at times, became angry and snapped at the nurse as he ordered ephedrine 10 mg to be given by a slow intravenous (IV) push. When processing the order, the nurse, who was anxious because of the physician’s behavior, made a mental slip and thought of epinephrine.

Because only a few ampules of epinephrine 1 mg were available, the nurse decided to borrow more from the nursery. She found a 30-ml vial of epinephrine 1:1,000 (1 mg/ml) and withdrew 10 ml. She then returned to administer that dose. A pharmacist immediately reviewed a copy of the order in which the physician had clearly prescribed ephedrine 5 mg IV. If enough epinephrine had been in stock, the 5-mg dose might have been given.

In another hospital, epinephrine was used to compound an epinephrine infusion. And in yet another situation, a patient received an irrigation solution during an orthopedic procedure. Epinephrine, not ephedrine, was added to a 3-liter container.

SAFE PRACTICE RECOMMENDATION: The Food and Drug Administration (FDA) now requires manufacturers to use “tall man” lettering on container labels for 16 look-alike generic drug name pairs (e.g., EPinephrine, ePHEDrine). However, because these two drugs were introduced into the market before the 1938 Food, Drug and Cosmetic Act, they do not fall under current FDA labeling standards.

Here are some suggestions for preventing confusion between epinephrine and ephedrine:

- changing the appearance of look-alike product names by highlighting them, using bold face letters, applying different colors for each name, circling the drug’s name, or using tall letters for the parts of the drug names that vary from each other
- differentiating the look-alike products on computer screens, shelf labels and bins in the pharmacy and nursing unit, automated dispensing units, pharmacy product labels, and medication administration records
- marking the drug containers themselves to help differentiate the products
- storing the two drugs separately, never side by side
- using “tall man” letters when writing orders (EPinephrine, ePHEDrine)
- using prefilled syringes with the intended product
- limiting the storage of concentrated epinephrine to crash carts (except in the emergency department or operating room) to reduce the risk of dilution errors or of administering the wrong product
- providing an alert on the computer screen that states: “Ephedrine has been entered. Is this what you want? Yes or No.”
- having the pharmacy prepare all infusions and bolus doses for epinephrine and ephedrine in order to ensure an independent double-check system

Epinephrine 1:1,000, when available in 30-ml vials for systemic use, represents a potential danger. At a minimum, it should not be accessible in nurseries. In fact, it might not be needed in most units; the use of high-dose epinephrine during cardiopulmonary resuscitation (CPR) is no longer supported because of the potential for harm and its lack of efficacy in improving survival in cardiac arrest.1

REFERENCE

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