Water, Water, Everywhere, but Please Don’t Give IV

Matthew Grissinger, RPh, FASCP

**Problem:** The treatment of severe hypernatremia can be challenging, especially in patients with pre-existing conditions that may seem to limit therapeutic options. Such a situation resulted in an ill-conceived decision to give sterile water for an intravenous (IV) injection to an elderly patient who had been admitted to the intensive-care unit (ICU) with pneumonia, congestive heart failure (CHF), respiratory failure, and severe hypernatremia. The physician did not want the patient to receive any further infusions containing sodium, but the patient also was severely hyperglycemic. The physician’s concern about giving sodium or dextrose to a patient with CHF and a high blood glucose level led to an order to change the patient’s peripheral IV infusion to “free water” at 100 ml/hour.

Free water is not associated with organic or inorganic ions. Because hypernatremia usually results from a deficit of free water, it is likely that the physician intended to replace this loss when he wrote the order. Although water can be replaced orally, it should never be given via the IV route without additives to normalize tonicity, or hemolysis can occur.

Just before writing the order, the physician had contacted a pharmacist to ask whether large bags of Sterile Water for Injection, USP were available (Figure 1). (Sterile water is used for compounding parenteral nutrition solutions.) The pharmacist checked the computer and told the physician that it was. When the pharmacist received the order, he entered it into the computer and printed a label for a 2,000-ml bag of the solution. A pharmacy intern retrieved a bag from the sterile compounding area, placed the label on the back of the bag, and dispensed it to the ICU.

A nurse began the infusion without question because she was aware of the patient’s hypernatremia and had overheard the physician ask the pharmacist whether bags of sterile water were available. She did not see a red warning on the bag stating “Pharmacy Bulk Package, Not For Direct Infusion,” because the pharmacy label was on the opposite side of the bag.

Another nurse later noticed the statement on the bag, and the infusion was stopped—but not before 550 ml had been infused. The patient experienced a hemolytic reaction and acute renal failure and died.

**Safe Practice Recommendation:** Here are suggestions for avoiding errors in patients with hypernatremia:

- **Practitioners should be educated about the danger of infusing sterile water without appropriate additives.**
- **Clinicians should understand the physiology behind infusing hypotonic, isotonic, and hypertonic solutions in context of a patient’s electrolyte levels.**
- **Clinicians should recognize that treating severe hypernatremia generally consists of infusions that contain sodium to reduce blood levels slowly.** Correcting hypernatremia too rapidly may lead to cerebral edema, seizures, and possibly death.
- **Protocols should be developed to guide the safe and effective treatment of hypernatremia.**
- **If there are concerns about using dextrose solutions, elevated blood glucose levels can be treated with insulin.**
- **If fluid volume is a concern, patients can be given diuretics.**
- **If an order for sterile water is received, it should trigger an immediate call to the physician and a referral to the facility’s peer review process.**
- **In the pharmacy, IV compounding products should never be allowed to leave the sterile compounding area. These solutions should be segregated and stored with warnings that they should never leave the pharmacy.**
- **The pharmacy computer should flash an alert, “Use Only as a Diluent,” when these products are entered, and Sterile Water for Injection, USP should never appear as a choice in prescriber order-entry systems.**
- **Labels should be placed on the front of IV bags in such a way that they do not obscure important information.**

Although the error cited in this article was not avoided, the use of sterile water in 2-liter (or larger) containers for IV compounding might facilitate alerting staff members as to its intended use. The difference in size also reduces the risk of confusing it with other 1-liter IV solutions. The hospital involved in this error has asked the manufacturers of Sterile Water for Injection, USP to place a warning label on both sides of the container.

The Institute for Safe Medication Practices (ISMP) has also found that the current labeling for sterile water products is inconsistent among the various manufacturers. Some containers boldly state,
“Pharmacy bulk package. Not for direct infusion” within a red border; others simply state, “For drug diluent use only.”

The U.S. Pharmacopeia also requires a warning stating that these products are suitable for intravascular injection only after they are first made approximately isotonic by the addition of a suitable solute. However, this warning blends in with other label text and is not easily noticed (see Figure 1).

We are aware of additional cases of direct injection of sterile water and have therefore asked the Food and Drug Administration and manufacturers to place stronger, more visible warnings on all large-volume parenteral containers of this product.

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 on 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.

ISMP ANNOUNCEMENT

A number of medications bear a heightened risk of causing significant patient harm when they are used in error. We call these drugs “high-alert medications” to draw attention to this characteristic so that everyone involved in their use will implement additional safeguards when prescribing, dispensing, and administering them. Although errors are not necessarily more common with these drugs, the consequences of their errors may be devastating.

In order to develop a list for community/ambulatory practitioners, we would appreciate your input by completing the short survey at www.ismp.org/survey/newsletter/comsurvey200606.asp by August 20, 2006. Based on the survey results, data from the USP–ISMP Medication Errors Reporting Program, and input from medication safety experts, we will compile a list of high-alert medications for community/ambulatory practice. For ISMP’s list of high-alert medications in the acute-care setting, go to www.ismp.org/Tools/highalertmedications.pdf.