MEDICATION ERRORS

Reducing Medication Errors Associated with Intravenous Insulin Infusions

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PROBLEM In 1998, a study reported by the Institute for Safe Medication Practices (ISMP) revealed that 11% of serious medication errors involved the administration of insulin.1 A report from the United States Pharmacopeia (USP), based on MedMARX 2001 data, also indicated that insulin remains the drug most commonly involved in harmful medication errors.2 For example, insulin has been mistakenly administered in place of other medications or has been given as an overdose. The ISMP has received reports of both types of errors.

Two reports involved misinterpretation of the dose when the abbreviation “u” was used for “units.” In one report, a pharmacist preparing total parental nutrition (TPN) misinterpreted the dose as 100 units when a dietitian wrote an order to add “10U of regular insulin to each TPN bag.” In a similar case, a new pharmacy technician who was entering orders misinterpreted a sliding scale when insulin was ordered and the letter “u” was used for units. Although the pharmacist who checked the technician’s order entry did not detect the error, a nurse intercepted the 10-fold overdose while reviewing the computer-generated medication administration record (MAR).

The other two errors occurred when the staff experienced a mental lapse and confused insulin with other products. In the first case, a nurse incorrectly transcribed a verbal order to “resume an insulin drip” as “resume heparin drip.” A pharmacy technician entered the order and labeled a premixed heparin solution. The pharmacist caught the error when he noticed a flow rate of 1.5 units/hour and recognized the patient’s name from a recent call for help that involved calculating an insulin flow rate.

The other error resulted in significant patient harm when a double concentration of a critical-care drug was ordered for a cardiac patient in the intensive-care unit (ICU). A nurse called the pharmacy and inadvertently requested a double concentration of insulin. During order entry, the pharmacist did not notice that diabetes mellitus was not listed as a patient diagnosis. Then, without seeing a copy of the order, he prepared and delivered the insulin infusion. Further, while in the ICU, he did not obtain a copy of the order or review the patient’s chart to verify hyperglycemia. When the nurse hung the insulin, a second nurse did not independently verify the drug, concentration, infusion rate, or line attachment. No prominent cautionary labeling was present on the infusion to alert staff that it contained insulin. The double concentration of insulin was administered at the rate intended for the critical-care drug. The patient experienced permanent central nervous system impairment.

SAFE PRACTICE RECOMMENDATION

Insulin is a high-alert medication that carries a risk of causing serious injury. As such, special safety considerations are essential when it is being used. The first two errors described earlier are clear examples of the need to educate all practitioners—including dietitians and others who communicate drug information—to always write out the word “units.”

The last two errors demonstrate the human tendency toward mental confusion and mixing up products that are used routinely, especially if two or more drugs are measured in units, as is the case with heparin and insulin. Thus, measures must be implemented to make these errors visible before they affect patients.

Verbal orders should not be accepted for intravenous (IV) insulin. Instead, orders should be sent by fax when the prescriber is off-site. If no alternative exists, a second person should be on hand to listen and to accept emergency telephone orders, transcribing the order directly onto an order form and repeating it back for clarification.

As another contributing factor to the last error described in the article, the standard insulin concentration (0.25 units/ml) used in this hospital was quite low. Using a concentration of 1 unit/ml can eliminate the need for most double concentrations, making such orders unusual and subject to scrutiny.

The following precautions are advised:

- Ensure that all insulin infusions are prepared in the pharmacy.
- Never dispense or administer insulin without an independent check using the actual order and verifying that the patient needs insulin or has hyperglycemia.
- Make special auxiliary labeling, such as “contains insulin,” available to alert the staff to the presence of insulin in IV solutions.
- Educate patients and include them in a double-check system to detect any errors.

REFERENCES


ISMP, a nonprofit organization located in Huntingdon Valley, Pennsylvania, provides independent practitioner review of medication errors submitted to the national MER program, operated by the U.S. Pharmacopeial (USP) Convention, Inc., of Rockville, Maryland, in cooperation with ISMP. ISMP also reports on progress made in correcting medication errors and problems.

Call ISMP at 215-947-7797 or at 800-FAIL-SAF(E). Visit www.ismp.org, or write to us at ismpinfo@ismp.org.