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ISMP Medication Error Report Analysis

Is Glacial Acetic Acid Really Needed at Your Hospital?

Providing Patients With Unused Medications at Discharge

Is It Insulin or Heparin?

Warning! Do Not Use Unrefrigerated *Avastin* and *Lucentis*

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These medication errors have occurred in health care facilities at least once. They will happen again—perhaps where you work. Through education and alertness of personnel and procedural safeguards, they can be avoided. You should consider publishing accounts of errors in your newsletters and/or presenting them at your inservice training programs.
Your assistance is required to continue this feature. The reports described here were received through the Institute for Safe Medication Practices (ISMP) Medication Errors Reporting Program. Any reports published by ISMP will be anonymous. Comments are also invited; the writers' names will be published if desired. ISMP may be contacted at the address shown below.
Errors, close calls, or hazardous conditions may be reported directly to ISMP through the ISMP Web site (www.ismp.org), by calling 800-FAIL-SAFE, or via e-mail at ismpinfo@ismp.org. ISMP guarantees the confidentiality and security of the information received and respects reporters' wishes as to the level of detail included in publications.

IS GLACIAL ACETIC ACID REALLY NEEDED AT YOUR HOSPITAL?

A patient sustained severe burns and permanent scarring after glacial acetic acid (99.5%) instead of a 5% acetic acid solution was applied to her skin during a surgical procedure. The operating room (OR) pharmacy had received a verbal order to dispense a 5% solution of acetic acid.

The pharmacy stocked a 500 mL bottle of acetic acid USP (glacial) packaged by Letco Medical (see **Figure 1**). The solution had been purchased to prepare 0.25% acetic acid solutions, but it had not been used in the pharmacy for several years. The pharmacist was initially uncertain whether to dispense a solution from the bottle on hand in the pharmacy, given that the label stated "Acetic Acid USP (Glacial)." The strength of the solution was not readily seen on the label, and the pharmacist did not know what "glacial" meant or that the product was not pre-diluted by the manufacturer.

Finding no other acetic acid available in the pharmacy, he dispensed a quantity of the undiluted solution to the OR. The error was later recognized by a nurse anesthetist after the solution already had been used. The patient required a consult with a plastic surgeon after the procedure.

The word "glacial" (ice-like) refers to the fact that, at its freezing point of 17°C (62.6°F), pure acetic acid forms crystals and "freezes," looking like a glacier. Diluted forms of acetic acid are sometimes used to identify dysplasia (cervix, rectal), to treat certain outer ear infections, or for bladder or wound irrigations,

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Figure 1. Acetic acid, USP (glacial).

although much scrutiny surrounds its usefulness for infections or wound healing (www.ncbi.nlm.nih.gov/pmc/articles/PMC1785201/).

Three years ago, we received a similar error report in which a nurse received glacial acetic acid from a pharmacy technician and poured the undiluted solution into a bowl on the sterile field in the OR. The surgeon was using acetic acid to identify rectal condyloma. He soaked a gauze pad and placed it in the patient's rectum. The patient required extensive treatment and prolonged hospitalization due to tissue damage caused by the undiluted solution.

We have also received other error reports involving glacial acetic acid, one of which resulted in amputation of a limb. In one case, a nurse called the pharmacy for "acetic acid for irrigation" for a 31-year-old patient with paraplegia, osteomyelitis, and bilateral greater trochanter wounds. An experienced pharmacist who was new to the institution placed glacial acetic acid at the window for pickup. This was used for 2 days instead of an appropriate diluted form. The undiluted solution resulted in burns to the extent that the wounds would not heal, necessitating disarticulation at the hips.

In other cases, glacial acetic acid was used for a patient instead of a 5% acetic acid solution during a colposcopy. The patient experienced immediate vaginal bleeding and blistering and severe pain when she awoke from sedation causing an extended recovery. Also, a patient undergoing a surgical procedure sustained first- and second-degree skin burns from the glacial acetic acid solution that was thought to be a 3% acetic acid solution.

The precautions that can help prevent this particularly painful and harmful event are as follows:

- **Remove from stock.** Wherever possible, remove and discard glacial acetic acid from the pharmacy and replace it with vinegar (5% solution) or commercially available medicinal diluted acetic acid products. (Also remove any chemicals from the pharmacy that have not been used in the past 6 months to 1 year.) Some pharmacies have outsourced acetic acid solution orders to a trusted community pharmacy so they no longer need to stock the chemical in the hospital pharmacy. These hospitals require orders at least 1 day before the product is needed.
- **Ensure the correct strength is ordered.** When ordering acetic acid, verify that the correct strength has been requested from the vendor and received in the pharmacy. Accidental purchase of the glacial acetic acid instead of the intended diluted solution can result in a dispensing error and harm as described in the above cases.
- **Educate staff.** Ensure that all medical (physicians), pharmacy, and nursing staff are aware of the differences between glacial acetic acid and diluted forms of acetic acid.
- **Use precautions.** If glacial acetic acid remains in use for pharmacy dilution of acetic acid, take these precautions:
    1. Require a prescriber's order for the solution, including the desired dilution (eg, "5% acetic acid" not "diluted glacial acetic acid").
    2. Develop and follow a standard procedure (formula) for dilution in the pharmacy for the compounding of low-concentration (eg, 5%) acetic acid.
    3. If possible, dilute the product to the needed concentration as soon as the glacial acetic acid arrives in the pharmacy, and label the container accordingly.
    4. If the product is not diluted immediately, affix prominent warning labels on the product about the concentration and the need for dilution prior to dispensing. Keep in mind that this product is packaged and labeled as a commercial chemical, so the strength may not be clearly visible on the label and the manufacturer's

warnings may be overlooked. Store the chemical in a locked, flame-proof cabinet in a sequestered section of the pharmacy.

5. Require an independent double check of all materials, calculations, measurements, and labeling of compounded acetic acid solution dispensed from the pharmacy no matter who prepared the solution. Keep logs of dilutions with each step in the procedure including signatures of those who prepared and checked the product.

PROVIDING PATIENTS WITH UNUSED MEDICATIONS AT DISCHARGE

Upon discharge, patients sometimes ask to take home leftover medications in bulk packages administered during their hospital stay (eg, insulin pens, inhalers, eye drops, topical products). Sometimes, this can lead to errors.

Recently, a diabetic patient who was taking the long-acting insulin *Lantus* (insulin glargine [rDNA origin] injection) also received the short-acting insulin *Novolog* (insulin aspart [rDNA origin] injection) during his hospitalization. At discharge, orders were written for the patient to return to his previous *Lantus* regimen, but the *Novolog* was not continued. The nurse reviewed the orders with the patient along with other discharge prescriptions and instructions.

Later, when packing up the patient's belongings, another nurse gave the patient both the *Novolog* and *Lantus* insulin pens used for his care since "the patient did pay for them." The next evening, the patient's wife called 911 after she was unable to awaken her husband, who was sweating. The paramedics obtained a blood glucose level of 20 mg/dL upon arrival, which they quickly treated. The patient confused the 2 insulin pens and gave himself *Novolog* instead of *Lantus*, even though the nurse had reviewed and given him a copy of the discharge instructions.

The hospital now has a policy prohibiting nurses from sending leftover medications home with patients if they are not properly labeled for use outside of the hospital. An American Society of Health-System Pharmacists Web site (www.multidose.org/) provides guidelines and tools for safe dispensing of multidose medications for patients upon discharge.

IS IT INSULIN OR HEPARIN?

How can injectable heparin wind up in an insulin syringe? Your first thought may be a vial mix-up in which a nurse, pharmacist, or pharmacy technician accidentally drew heparin into an insulin syringe, believing it was insulin. But what if we told you it was no accident?

We recently learned about an at-risk behavior in which nurses were intentionally drawing heparin into an insulin syringe, because they did not have a syringe with a 25-gauge needle to use for subcutaneous heparin injections. The primary risk with this practice is that an insulin syringe with heparin could easily be mistaken as an insulin syringe with insulin. Even if the insulin syringe is clearly labeled as containing heparin, nurses may associate the orange-capped syringe with insulin, not heparin.

This scenario can lead to disastrous results due to inattentional blindness. When reading a label, most of the visual processing occurs outside of conscious awareness. To combat information overload, the brain scans and sweeps until something sticks out to capture its attention. Unfortunately, the brain is a master at filling in gaps and making do, compiling a cohesive portrait of reality based on just a flickering view. In this case, the orange color of the syringe cap could capture the nurse's attention, and anything lying outside the initial capture of attention—such as the actual drug name on the label—will get short shrift. Nurses in this facility engage in the at-risk behavior, because the syringes/needles they require are not available. Over time, the perception of risk associated with this practice has been lost, particularly given that using an insulin syringe was the only way to administer subcutaneous heparin in that institution.

Until syringes with a 25-gauge needle are readily available, this dangerous workaround will continue. A safer option is to provide commercially available prefilled syringes of heparin and 25-gauge needles to attach. Be sure you have all the necessary medication-related supplies in all your patient care units, including parenteral and oral syringes (small-volume oral syringes in neonatal/pediatric units), infusion pumps, infusion tubing, port caps, and so on. Do not employ policies that force staff to engage in workarounds in order to provide care to their patients.

WARNING! DO NOT USE UNREFRIGERATED AVASTIN AND LUCENTIS

ISMP recently became aware of a situation in which multiple intraocular injections of bevacizumab (*Avastin*) may have been used after they were accidentally left at room temperature for at least 2 days. Avastin was being used off-label for intravitreal injection in the treatment of patients with wet macular degeneration. Ranibizumab injection (*Lucentis*), which is approved for this indication, was also unrefrigerated for at least 2 days and was possibly used. According to Genentech, the manufacturer of these products, *Avastin* should be refrigerated after reconstitution but is stable

for up to 24 hours at room temperature (9°C–25°C [48.2°F–77°F]). *Lucentis* is also stable for 24 hours at room temperature. Beyond that, the company does not recommend usage and cannot provide data for storage in syringes at room temperature.

Using syringes that have been stored for prolonged periods at room temperature is risky, because product stability may be compromised. Also, in the absence of testing to confirm sterility, any inadvertent contamination will only worsen at room temperature, increasing the risk of serious eye infections such as those noted in a US Food and Drug Administration alert in August 2011 (www.fda.gov/Drugs/Drugsafety/ucm270296.htm). Incidents resulting in serious eye infections in 3 states were also published in the media in 2011 (www.ismp.org/sc?id=109 and www.ismp.org/sc?id=105). ■

(Continued from page 5)

supplements, HCPs are reminded that their role is essential in the identification of adverse events related to these products with subsequent reporting to the FDA's MedWatch program.

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