



Nurse Advise-ERR®

Educating the healthcare community about safe medication practices

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Fatal outcome after inadvertent injection of topical EPINEPHrine

A patient in Canada died after receiving an injection of EPINEPHrine 1:1,000 (1 mg/mL) from a syringe that a surgical nurse and surgeon thought contained a local anesthetic. Staff at the hospital where the event happened worked collaboratively with ISMP Canada to issue a country-wide bulletin to draw attention to the tragic event and encourage a call to action for all hospitals to prevent similar errors. ISMP Canada has allowed us to share the information (www.ismp-canada.org/ISMPCSafetyBulletins.htm) with US hospitals, because a similar event could happen here.

Description of the Event

During a procedure, a surgeon requested lidocaine 1% (10 mg/mL) with EPINEPHrine 1:100,000 (0.01 mg/mL) for injection as a local anesthetic and was handed a syringe containing what he thought was the requested medication. The surgeon

injected the medication into the surgical site. Immediately afterward, the patient experienced a cardiac arrhythmia leading to cardiac arrest. Despite full resuscitation measures, the patient died. Information gathered after the event indicated that the syringe contained EPINEPH-

rine 1 mg/mL (1:1,000) intended for topical use.

Similar Prior Event

A similar event occurred more than a decade ago in the US in which a 7-year-old boy died during a tympanomastoidectomy after receiving a fatal dose of EPINEPHrine (ISMP Medication Safety Alert! Case update: EPINEPHrine death. December 4, 1996 available at: www.ismp.org/Newsletters/acutecare/articles/19961204.asp).

In the 1996 case, EPINEPHrine 1:1,000 was accidentally poured into a cup on the sterile field labeled "lidocaine with EPINEPHrine." This cup should have been used for soaking pledgets (type of sterile gauze packing) with EPINEPHrine, but the pledgets were never placed into the cup. The surgical technician drew 3 mL into a syringe from the cup labeled "lidocaine with EPINEPHrine," but because the cup actually held EPINEPHrine 1 mg/mL, the syringe contained 3 mg of EPINEPHrine. That syringe was used to infiltrate the ear, causing the child's cardiac arrest.

Contributing Factors

The event in Canada differs from the event described in our December 4, 1996 newsletter. In the earlier case, EPINEPHrine had been poured into a bowl labeled "lidocaine with EPINEPHrine." In the recent event, EPINEPHrine had been drawn into a syringe and mistaken as the local anesthetic to be injected.

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Figure 1. A vial of topical EPINEPHrine looks very similar to EPINEPHrine injection.



Figure 2. EPINEPHrine injection ferrule (left) looks similar to a topical EPINEPHrine (right) peel-off ferrule.



check it out! ✓✓✓✓

To prevent inadvertent parenteral administration of topical EPINEPHrine, consider the following:

✓ **Differentiate.** Use topical EPINEPHrine supplied in a pour-bottle (vial with peel-off cap). If unavailable, ask pharmacy to prepare doses for topical administration in ready-to-use pour-bottles or topical syringes, and to communicate the expected change to frontline staff.

✓ **Provide label clarity.** Properly identify the medication and ensure the word "TOPICAL" appears on the label of any container used to hold a solution intended for topical application, along with the name and concentration of the solution.

✓ **Separate drugs and processes.** Store and prepare medications intended for topical use in separate areas from those intended for injection.

✓ **Prepare safely.** Medications for topical application should not be drawn into a parenteral syringe, and medications for injection (e.g., local anesthetic) should not be placed into an open container.

✓ **Withdraw additional local anesthetic doses from vial.** Surgeons may inject the surgical site with a local anesthetic before scrubbing and gowning. If additional doses are needed, withdraw the medicine directly from the vial.

✓ **Verification.** Keep local anesthetics for injection in their original vials, and withdraw the medication into a syringe (and label it) immediately before use or when handing it off to another practitioner, allowing them to verify by comparing the vial and syringe label.

✓ **Simplify.** Prepare presoaked EPINEPHrine pledgets in advance or consider using oxymetazoline spray to eliminate

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In this event, EPINEPHrine 1 mg/mL for topical use, which is used to stop bleeding, was on backorder in the pharmacy, so EPINEPHrine 1 mg/mL for injection was provided for use in the operating room (OR). As a result, the nurse used a needle and syringe to withdraw the contents from the vial, rather than directly pouring the EPINEPHrine from the manufacturer's container into the sterile open container with the pledgets. The syringe containing EPI-NEPHrine 1 mg/mL was not labeled.

Usually, the topical EPINEPHrine and local anesthetic for injection were prepared before the start of the procedure. But the OR nurse was interrupted after drawing the EPINEPHrine 1 mg/mL into a syringe, so she placed it on the back table. Later, when the surgeon requested the local anesthetic for injection, the nurse placed the EPINEPHrine (1 mg/mL) syringe on the stand beside the OR table, believing it contained the injectable anesthetic.

Although not directly related to the most recent fatality, practitioners in the US and Canada have often expressed concerns about similarities between the pour-bottles of topical EPINEPHrine and vials of injectable medication (see Figures 1 and 2 on page 1). The pour-bottles have a rubber stopper held in place by a metal ferrule and a tab which, when pulled, removes the metal ferrule, yielding a

“pour-bottle” format. However, the rubber stopper and metal ferrule give the pour-bottle an appearance very similar to a vial of injectable medication. The similarities have led to mix-ups between local anesthetics with EPINEPHrine and vials of topical EPINEPHrine. The rubber stopper has also encouraged some practitioners to use a parenteral needle and syringe to withdraw the topical EPINEPHrine. ISMP and ISMP Canada have alerted the manufacturers to the potential risks associated with the packaging of the pour-bottles of topical EPINEPHrine.

The best recommendations to avoid an error like the most recent event are to always label syringes and containers, discard unlabeled products, and eliminate interruptions when preparing medications for a procedure. However, the event that occurred more than a decade ago involved a substitution error in which the topical EPINEPHrine was poured into a container labeled as lidocaine and EPINEPHrine. Thus, all facilities that perform procedures requiring the use of EPI-NEPHrine 1 mg/mL (1:1,000) for topical application should consider the list of recommendations in the **checkitout!** column starting on page 1 to avoid inadvertent parenteral administration of topical EPINEPHrine.

ISMP thanks ISMP Canada and the involved hospital for sharing this story with readers of this newsletter.

► Special Announcements


ISMP Webinar: Join us for our webinar “Measuring up to medication safety: Where do you stand?” on **March 23, 2010**. Measuring the level of safety is fundamental to improvement, yet, it has long been a challenge. Learn about methods you can use to measure medication safety within your organization and how to determine if your improvement efforts are successful. For details and to register, go to: www.ismp.org/educational/webinars.asp.

Patient Safety Awareness Week (March 7-13). If you are planning events for patients, community groups, or area businesses, consider showing *Patients Play a Vital Role in Patient Safety*, a video distributed by ISMP. The program is just 20 minutes long, but it covers realistic scenarios of risks, and practical, expert advice to help patients become active participants in their own care and safety. Hospitals are also encouraged to show this video on their patient education channel. To order a copy, visit: <http://onlinestore.ismp.org/shop/item.aspx?itemid=146>.

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the use of topical EPINEPHrine.

✓ **Limit access.** Do not stock 30 mL multiple-dose vials of injectable EPI-NEPHrine 1 mg/mL in the OR, which look similar to the 30 mL vials of topical EPINEPHrine.

safetywires

 **UD means what?** A serious medication error resulted when a nurse misunderstood “UD” after a pharmacist added it to directions on an electronic medication administration record (eMAR). The rate of infusion for an IV diltiazem solution was not yet known, so the pharmacist entered “UD” (ut dictum or “as directed”) in the rate field. Pharmacists may understand the meaning of this abbreviation, and some continue to use it regularly when referring to the directions for use with complex regimens and titrated drugs. However, many nurses are unfamiliar with this old abbreviation and may misinterpret it to mean “Unit Dose,” as was the case here. When the inexperienced nurse went to start the diltiazem infusion, she reviewed the eMAR and saw 125 mg UD in the dose/rate field and programmed the infusion pump to deliver 125 mg/hour instead of 5 mg/hour as was intended. After 1 hour the infusion was complete, and the nurse obtained another bag of diltiazem from the pharmacy and hung it at the same incorrect rate. Pharmacy staff did not question why another bag was needed so soon, nor did they contact the prescriber to learn the intended rate of infusion. Unfortunately, the patient died. Using unfamiliar abbreviations should be avoided; this is one for your facility to add to its **DO NOT USE** list of error-prone abbreviations. Pharmacists should type out the words “as directed.” Nurses who encounter unfamiliar abbreviations should always verify their meaning with the person who used the abbreviation. Further, nurses who administer diltiazem infusions should be aware of, or have easy access to, safe dose administration guidelines including typical dose ranges and maximum dose

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Free customized medication safety alerts for consumers and caregivers. Details at: www.consumermedsafety.org.

Purple is not an official standard for either enteral feeding equipment or PICC lines

An epileptic patient who was supposed to receive oral KEPPRA (levetiracetam) liquid via his PEG (percutaneous endoscopic gastrostomy) tube instead received it intravenously (IV) via a **Bard PowerPICC** (peripherally inserted central catheter) line. This catheter is indicated for short- or long-term peripheral access to the central venous system for IV therapy, power injection of contrast media, central venous pressure monitoring, and blood sampling. An oral Baxa amber syringe that held the levetiracetam did not connect properly to the hub of the PICC line, however, it was easily held against the catheter opening for the injection. The patient was closely monitored by his medical team and, fortunately, did not experience an adverse outcome.

Of note is the fact that the experienced nurse who gave the drug IV incorrectly may have been confused by a purple color system available from **Covidien** for enteral feeding equipment. The color is identical to the purple coloring used for the patient's Bard PowerPICC line (see Figure 1). Purple is not an official standard color for either enteral products or PICC lines in the US (although it is the official color of enteral products in the United Kingdom). The concern is that the identical color for both enteral and vascular lines may increase the risk of wrong connections. Even though the enteral connectors don't easily fit into a vascular catheter's Luer tip, it is possible that a determined individual will make it work, as happened here (see example in Figure 2). Even more confusing is that some enteral products utilize orange as the color for some enteral feeding equipment and some PICC line tubing is also orange. Other

manufacturers may also offer purple PICC lines. Likewise, other purple enteral products may become available.

Avoid using the same color for each type of access device. Also, adding a stronger auxiliary label—**For Oral Use Only**—might help. The syringe used above has the words “oral use only” imprinted in very small font that is easily missed. The syringe label from pharmacy also had very small type stating, “oral use only,” but neither warning was seen by the nurse. The hospital is now applying special tamper-proof labels that say “**ORAL**” (see Figure 3) in large print, which they use to cover the top of the syringe with the label so it is more visible to the nurse. Make sure any new products are reviewed by your hospitals' product selection team, which should include representatives from both nursing and pharmacy. It would be helpful if FDA stepped in to standardize the

colors used for these products.

Figure 2. Purple connector for enteral use.



Figure 1. (below) PowerPICC vascular catheters.

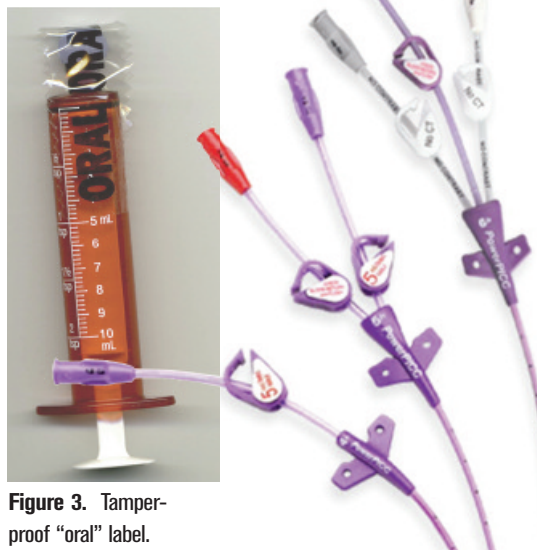


Figure 3. Tamper-proof “oral” label.

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limits. Smart pumps with functional dose-checking software also could have warned the nurse the infusion rate she set exceeded the maximum safe dose.

⚡ “Flag” insulin pen labels. We have mentioned it before, but once again, we heard about an insulin mix-up that happened when patient-labeled caps on insulin pens were accidentally switched. As a result, one patient received another patient's insulin before the error was detected. Given that short-acting and basal insulin analogs, as well as mixtures of intermediate- and short-acting analogs, are available in pen devices with caps, mix-ups among these products could be harmful. The most recent report of a mix-up involved **Novo Nordisk** insulins in **FLEXPEN** devices, which have caps. The reporter was unable to tell us which Novo insulin was given incorrectly. Novo manufactures **LEVEMIR** (insulin detemir), **NOVOLOG** (insulin aspart), and **NOVOLOG MIX 70/30** (insulin aspart and insulin aspart protamine), which are all available in pens with caps. Other manufacturers also provide insulin pens with caps. For example, **LANTUS** (insulin glargine) basal insulin and the short-acting insulin **APID-RA** (insulin glulisine) are available in similar capped **SOLOSTAR** pens. To prevent errors, do not place labels on the caps. Although it's difficult to label the body of the pen, it can be done using a “flag” method (wrapping the label around the pen and folding the sticky ends together so the label looks like a flag on the pen).

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