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 EPINEPHrine 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.
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 pledges. The syringe containing EPINEPHrine 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 and metal ferrule giving 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 EPINEPHrine 1 mg/mL (1:1,000) for topical application should consider the list of recommendations in the check it out! 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.
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.

“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 insulin 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 API-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).