ISMP Medication Error Report Analysis

Epinephrine for Anaphylaxis

Are You Ready to Treat Anaphylaxis?

Don't Open *Pradaxa* Capsules

Control New Ropivacaine Minibags

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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.

EPINEPHRINE FOR ANAPHYLAXIS

Anaphylaxis is a medical emergency that requires immediate treatment with epinephrine injection. The condition is becoming more common outside of the hospital due to increases in food allergies and the use of contrast media, chemotherapy, and monoclonal antibodies in outpatient clinics. Cases of anaphylaxis

will likely increase with the growth in the use of monoclonal antibodies and biosimilars.

Autoinjectors

For anaphylactic reactions that occur in community settings, epinephrine autoinjectors provide patients and families with greater availability and access to the drug. Those at risk should be prescribed an autoinjector and be properly trained to use it. Autoinjectors can also be found in office practices, clinics, and other locations outside of the hospital. Some hospitals provide autoinjectors to treat anaphylaxis for inpatients, so autoinjectors can sometimes be found in the emergency department or other clinical areas in unit stock or automated dispensing cabinets (ADCs).

An intramuscular (IM) dose of 0.3 to 0.5 mg of epinephrine is recommended for anaphylaxis in adults, but no comparative trials have been conducted to determine which dose is most clinically effective. Autoinjectors of 0.3 mg are available for adult use, and repeat doses are recommended at 5- to 15-minute intervals until symptoms improve. Products are available in 2-packs in case a second dose is needed in outpatient settings before treatment is available from emergency personnel. A 0.01 mg/kg dose is recommended for infants and children. A 0.15 mg autoinjector is available, but that dose is above the recommended dose for children weighing less than 15 kg.

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Errors with Epinephrine 1 mg Ampuls or Vials

Last fall, the National Comprehensive Cancer Network (NCCN) sent a letter to member hospitals, calling for deployment of epinephrine autoinjectors as a way to avoid wrong dose and wrong route errors (intravenous [IV] instead of IM) when ampuls or vials are used for severe allergic reactions or anaphylaxis. With 1 mg ampuls or vials of epinephrine, the contents must be drawn into a syringe. Unfortunately, during a stressful emergency situation, this has sometimes led to the erroneous administration of the full 1 mg dose IV, which could prove harmful to some patients. In a review of more than 600 cases reported to the Pennsylvania Patient Safety Reporting System, wrong route errors involving IV administration instead of IM or subcutaneous injection were responsible for 25.4% of all epinephrine adverse events and 63.3% of the harmful events.¹

Errors with Epinephrine Autoinjectors

There are 3 brands of autoinjectors available in the United States, but they are not interchangeable with respect to training and the way they are used. Given that anaphylaxis may not occur very often at any one location, it can be hard to remember how to use different devices. Patients often forget how to use them within 3 months,² and many health professionals have never been trained to use them at all.

EpiPen is the most commonly used device, although it has occasionally been misused when people hold it upside down, press, and inject their thumb or when a child gains access to the device and presses the wrong end. Both situations have been reported to ISMP; most recently a thumb injection by a nurse was reported. *Auvi-Q* is another brand of autoinjector. It may be easier to use than the *EpiPen*, because it provides digital voice instructions and the needle retracts to lessen the risk of a needlestick injury. A generic autoinjector from Lineage Pharmaceuticals, which costs about 20% less than the other brands, is more difficult to use. The product will not be familiar to those who currently know how to use one of the other autoinjectors. Also, we recently informed Lineage Pharmaceuticals that its pen lacks a barcode, an issue that the company promised to address.

Needle Length and Cost of Autoinjectors

Other drawbacks have blocked the full implementation of autoinjectors in clinical areas. For one, although giving epinephrine by the IM route is most

effective, there is no consensus about available autoinjector needle length. People worry that the relatively short needle length (16.5 mm) on pens might not ensure that the drug reaches into the muscle when injected into the lateral thigh, especially in women.³ On the other hand, autoinjectors have proved effective in treating anaphylaxis, and there is at least some evidence that the pressure exerted during the forceful injection is adequate to drive epinephrine past the depth of the needle into the muscle.^{4,5}

Although we believe that safety trumps cost, it's hard not to notice that the cost of an autoinjector has doubled in 3 years and is now about \$400 for a 2-pack. This may impact a patient's accessibility to autoinjectors. Fortunately, insurance generally covers the cost of autoinjectors for consumers, but there is an associated copay.⁶

Health systems that use these devices and store them in numerous locations throughout their organization may spend hundreds of thousands of dollars annually, which can significantly affect their budget. In addition, staff training and inventory needs are considerable when determining the cost. Epinephrine autoinjectors have a shelf life of only 12 to 18 months. Thus, they may not be used prior to expiration, resulting in wasted inventory and increases in cost. For autoinjectors that are stored in ADCs, the expiration date should be closely monitored and stock rotated on a regular basis. Our attention was drawn recently to an emergency medical service in Kings County, Washington, that did away with autoinjectors due to the high cost, replacing them with an anaphylaxis kit. They reasoned that an ampul or vial of epinephrine 1 mg would cost about \$1.25. Even adding in the cost of a syringe, alcohol wipe, needle, and so on, the savings are still significant. Some hospitals have taken the same course of action.

Autoinjector or 1 mg Vial or Ampul?

It is difficult to choose between the autoinjector or 1 mg vial or ampul. Some hospitals have decided that autoinjector manufacturers have priced themselves out of the market, making it difficult for the hospitals to allow autoinjector use in all areas. Instead, they have decided to stock 1 mg ampuls or vials, or, for safety, they have prepared kits containing a 1 mg epinephrine ampul or vial along with a syringe, needle, and a label with proper dose for IM injection, a warning not to administer the entire vial, and any other essential components. Still, we agree with NCCN that

the presence of a vial or ampul of epinephrine can invite accidental IV injection when the patient has an IV line established. So, an epinephrine autoinjector is appealing as a properly labeled unit dose that can be employed within seconds to treat the emergency and that cannot be administered IV.

To us, it certainly makes sense to use an autoinjector in outpatient clinics and office practices. Examples would include outpatient areas where chemotherapy or contrast media is administered. If more than one ADC is available, the autoinjectors should be stocked in only one of them with visual aids available on the others to guide staff to the correct ADC when epinephrine is needed. Among the autoinjectors, we favor the *Auvi-Q* device because it provides digital voice instructions to “talk” users through the injection process and is easy to use, even for those not completely familiar with it. However, staff training as well as periodic retraining about proper use of the autoinjector is still necessary.

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ARE YOU READY TO TREAT ANAPHYLAXIS?

Can you say for sure that health care professionals in your organization are always prepared to treat an anaphylactic reaction? A 51-year-old man died after he was not properly monitored or treated for an anaphylactic reaction that occurred when he was given a dose of *INFeD* (iron dextran injection). Although the *INFeD* package insert states that

epinephrine should be immediately available in the event of an acute hypersensitivity reaction, the epinephrine was not near the bedside. The patient’s nurse called a rapid response team, but she did not believe she was permitted to obtain epinephrine from a nearby crash cart before the team arrived because its administration would require a physician’s order. The requirement of a specific physician’s order to administer lifesaving epinephrine in the event of anaphylaxis has been observed at other hospitals, as well.

Please review your policies, procedures, and/or protocols for treating anaphylaxis. When the risk of anaphylaxis is high, be sure epinephrine is immediately available. Make sure that all clinicians are aware of the proper use of epinephrine kits or autoinjectors. Be explicit in a medical staff-approved protocol about the conditions under which qualified professionals, including nurses, may administer a lifesaving epinephrine dose. In the absence of a protocol or order, as in the case above, a qualified clinician might still administer a dose of epinephrine using an available single-dose autoinjector, considering administration without an order as the lesser of 2 evils if the patient’s life is hanging in the balance. Health care leaders should not put staff in a position where such a decision might be necessary. Be sure you are ready for anaphylaxis!

DON'T OPEN PRADAXA CAPSULES

Nurses and others may not be aware that the dabigatran package insert states, “The oral bioavailability of dabigatran etexilate (PRADAXA) increases by 75% when the pellets are taken without the capsule shell compared to the intact capsule formulation. Dabigatran capsules should therefore not be broken, chewed, or opened before administration.” Pharmacokinetic studies have shown that the absorption increases significantly if administered this way, which increases patients’ risk for severe bleeding.

A hospital notified us recently that a patient brought to its emergency department (ED) from an outside care facility was admitted for hematemesis. It is believed that some nurses at the care facility may have been opening the dabigatran capsule and sprinkling the contents on the patient’s food. The hospital wanted to alert others about this situation, so staff training and other measures can be provided to avoid adverse events with dabigatran. The medication administration record (MAR) listing for dabigatran at the reporting hospital states, “Do NOT break, chew, or open capsules.” Other hospitals and

health care facilities should consider adding this statement to their MARs as well. *Pradaxa* is included on the Do Not Crush list on the ISMP Web site and the *Hospital Pharmacy* wall chart (www.ismp.org/Tools/DoNotCrush.pdf; www.hpjwallcharts.com).

CONTROL NEW ROPIVACAINE MINIBAGS

In January, Fresenius-Kabi launched ropivacaine (*Naropin*) 0.2% in 100 and 200 mL premixed polyolefin bags (Figure 1). The new dosage form is for patients who require continuous epidural infusions or local infiltration. The drug is available in vials and plastic ampuls, and it has also been available in 100 and 200 mL glass bottles. However, ropivacaine should never be given IV because of the risk of severe adverse cardiac effects. We want to caution hospitals that purchase the new minibag product about its similarity to minibags that hold medications intended for IV infusion.

The *Naropin* label includes a statement about its infiltration and epidural use; the product will also have an overwrap with messaging about its intended use. A sticker will be included in the packaging to affix to the bag. There is a port on the new bag that allows medications to be added to the ropivacaine, such as fentanyl or morphine. If this is done, relabeling must be ensured. If the new minibags are purchased, we highly recommend pharmacy oversight and distribution. For added safety, the bags should be dispensed with a special “EPIDURAL OR INFILTRATION USE” admixture label along with suitable warnings about the proper route of administration. Hospitals may find it helpful to have pharmacy provide

epidural tubing with the product when dispensing it. We hope that we will soon begin to see all premixed products for epidural or infiltration use in bags with special connectors that won't allow attachment to an IV administration set. ■

Figure 1. Minibags of *Naropin* for infiltration and epidural use only.