

## Upstairs Care Downstairs

ACEP News  
March 2010

By Scott D. Weingart, M.D.

Welcome to the debut of "Upstairs Care Downstairs." The goal of this column is to bring intensive care unit level care down to the emergency department. It makes no sense that a patient's care should be based on geography in the hospital. If it is the right thing to do in the unit, we should be doing it the moment the patient hits the door. This column will try to translate techniques from critical care, anesthesia, and surgery to the ED bedside.

### Case 1

Paramedics bring in a 68-year-old man with palpitations and chest pain. His heart rate is 170, and the 12-lead shows atrial fibrillation. The patient is diaphoretic, and his blood pressure is 72/50. You give the patient a small dose of etomidate and administer a synchronized shock, but the rhythm doesn't budge.

What now?

### Case 2

A hypotensive septic patient is brought into your resuscitation area. Her blood pressure is 60/40, she is experiencing severe dyspnea, and her mental status is slipping. You know she needs intubation immediately, but are worried that this might cause a significant BP drop.

What are you going to do?



Mixing epinephrine, step 1: Take a syringe with 9 mL of saline and draw up 1 mL of epinephrine 1:10,000. Shake well. All photos courtesy Dr. Scott D. Weingart

Intravenous push-pressors and inotropes have been used by the anesthesiologists for decades, but they have not penetrated into standard emergency medicine practice. I'm not sure why. These medications are the perfect solution to short-lived hypotension, e.g., post intubation or during procedural sedation. They also can act as a bridge to infusion vasopressors, while the latter are being mixed or while a central line is being placed.

The standard push-pressors in the anesthesia armamentarium are phenylephrine and ephedrine.

While phenylephrine is a perfect drug for the ED because of its short half-life and easy dosing, ephedrine is not ideal. Ephedrine has a long half-life and, when misdosed, has been associated with cardiac complications.



**Mixing epinephrine, step 2:** You now have 10 mL of epinephrine 10 mcg/mL.

In the ED, we can use epinephrine rather than ephedrine. It is a great medication for our environment, as it is readily available, short lived, and easy to mix.

Phenylephrine is a pure vasoconstrictor, so its use makes sense in tachycardic patients, because it will not increase the heart rate and may even decrease it by reflex parasympathetic response. Epinephrine is an inopressor; in

addition to vasoconstriction, it will increase heart rate and inotropy.

Both drugs are safe to use in peripheral lines. Phenylephrine is approved for use intramuscularly or subcutaneously, so obviously extravasation from an IV should not be concerning. The epinephrine concentration we use for push-dosing is the same as that contained in lidocaine with epinephrine (1:100,000). So, unless your IV is located in those rare areas where local anesthetics with epinephrine are a problem (i.e., tip of nose, penis, toes), there are no extravasation worries.

### Phenylephrine

Phenylephrine as a push dose is just the best! It is clean, quick, and rarely causes trouble. It is a pure alpha agent, so there is no intrinsic inotropy, but the increase in heart perfusion from normalizing the MAP can improve cardiac output.

- Onset: 1 minute.
- Duration: 20 minutes.



### Mixing instructions:

- Take a 3-mL syringe and draw up 1 mL of phenylephrine from the vial of phenylephrine 10 mg/mL.
- Inject this into a 100-mL bag of normal saline.
- Now you have 100 mL of phenylephrine with a concentration of 100 mcg/mL.
- Draw up some into a syringe; each milliliter in the syringe is 100 mcg.

**Mixing phenylephrine, step 1:** Draw up 1 mL of phenylephrine 10 mg/mL.



### Dose:

- PI0.5-2 mL every 2-5 minutes (50-200 mcg). No extravasation worries!

### Epinephrine

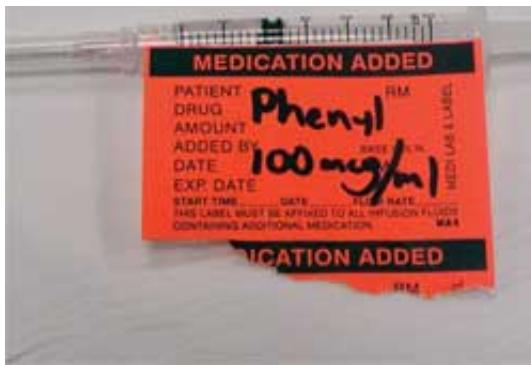
Do not give cardiac arrest doses (1 mg) to patients with a pulse. Epinephrine has alpha and beta-1/2 effects, so it is an inopressor.

- Onset: 1 minute.
- Duration: 5-10 minutes.

### Mixing instructions:

**Mixing phenylephrine, step 2:** Add to a 100-mL bag of normal saline. Mix well. You now have a bag of phenylephrine 100 mcg/mL.

- Take a 10-mL syringe filled with 9 mL of normal saline.
- Into this syringe, draw up 1 mL of epinephrine from the cardiac epinephrine amp (cardiac amp contains 10 mL of epinephrine concentration 100 mcg/mL or 1:10,000). Shake well.
- Now you have 10 mL of epinephrine 10 mcg/mL (1:100,000).



**Dose:**

- 0.5-2 mL every 2-5 minutes (5-20 mcg). No extravasation worries!
- Mixing phenylephrine, step 3: Draw some into a syringe.**

**Case I Continued**

After the first and second shocks fail, you raise the patient's blood pressure with two pushes of phenyl-ephrine 100 mcg. The patient's blood pressure comes up to 118/74, so you feel safe to drip in diltiazem 15 mg over ~10 minutes. This lowers the patient's heart rate to 92 and soon your heart rate comes down as well.

**Case II Continued**

As the nurse is drawing up the intubation meds, you start pressure-bagging in fluids and give epinephrine 10 mcg. The patient's blood pressure pre-intubation is now 110/58. What could have been a deadly intubation can now be performed much more safely.

When the patient is started on mechanical ventilation, she requires a second epinephrine push. One more dose is given while the central line is going in. Soon, the patient is volume loaded and started on a norepinephrine drip.

*DR. WEINGART is an emergency intensivist from Mount Sinai School of Medicine and Elmhurst Hospital Center in New York. You can find Dr. Weingart's ED critical care podcast at <http://thecentralline.org>.*