

## What Your Emergency Department Pharmacist Wishes You Knew

### Session Overview

At the 2014 American College of Emergency Physicians Scientific Assembly, ACEP passed Resolution 44, officially recognizing Emergency Medicine Pharmacists as valuable members of the EM team. If you're working with an EM Pharmacist, chances are he/she has completed at least one year of post-graduate residency training (if not two or three) focused on direct patient care and is probably board-certified in their area of expertise. This talk will provide a brief background on the training of an EM Pharmacist, describe what an EM Pharmacist can offer on an interdisciplinary ED team, and present a few clinical pearls to help optimize care of our patients.

### Objectives

- 1) Describe the training of an Emergency Medicine Pharmacist.
- 2) List three ways an EM Pharmacist can help optimize care of ED patients.
- 3) Apply pharmacology practice pearls to care of ED patients

#### 1. Background

- a. At the 2014 American College of Emergency Physicians Scientific Assembly, ACEP passed Resolution 44, officially recognizing Emergency Medicine Pharmacists as valuable members of the EM team.

<https://www.acep.org/Clinical---Practice-Management/Clinical-Pharmacist-Services-in-the-Emergency-Department/>

- b. In 2015, AAEM expanded the Allied Health Membership category to include EM pharmacists and the first EM pharmacist of AAEM joined.

#### 2. Training (<http://www.aliem.com/training-of-em-pharmacist/>)

##### a. PRE-PHARMACY

- i. All pharmacists in the U.S. must first complete at least 2 years of undergraduate education before entering the Doctor of Pharmacy program. Specific pre-pharmacy coursework is required. Most pharmacists have a 4-year undergraduate degree before entering pharmacy school, similar to their physician colleagues.

##### b. TESTING

- i. Analogous to the MCAT, most pharmacy schools require the Pharmacy College Admission Test (PCAT).

##### c. PHARMACY SCHOOL

- i. The only degree now available for pharmacists is the Doctor of Pharmacy (PharmD). This is a four-year program similar to medical school. The first 2-3 years cover the essentials of pharmacy including pharmacology, therapeutics, and medicinal chemistry. The final year is dedicated to clinical rotations, though some schools have more than a year's worth of patient-focused clinical activity.

##### d. LICENSING



- c. Pharmacists often recommend interventions that improve the quality of medication use and adherence to evidence-based medicine and national quality standards [Abu-Ramaileh 2011].
  - d. Pharmacists improve transitions of care for ED patients by improving medication reconciliation [Okere 2015, Becerra-Camargo 2013, Ajdukovic 2007], reducing errors and outpatient antibiotic treatment failures [Cesarz 2013, Randolph 2011].
  - e. Pharmacists reduce medication errors in the ED through providing real-time consultation and order verification [Sin 2015], intercepting order entry (prescribing) errors before patient harm occurs, [Stasiak, Brown, Rothschild, Patanwala], and increase error reporting to allow for identification of trends and improve safety systems [Weant 2010].
  - f. Pharmacists improve ED cost savings through interventions mentioned above [Lada 2007, Hamblin 2012].
  - g. ED pharmacist review of post-discharge cultures improves regimen modifications while also decreasing return visits and subsequent admissions [Baker 2012, Miller 2014, Randolph 2011, Dumkow 2014, Van Devender 2014].
4. Clinical Pearls
- a. Proper vancomycin dosing  
(<http://www.aliem.com/new-years-resolution-properly-dose-vancomycin-ed/>)
    - i. **15-20 mg/kg** every 8-12 hours in patients with normal renal function
    - ii. In seriously ill patients (eg, sepsis, meningitis, infective endocarditis) with suspected MRSA infection, a loading dose of **25-30 mg/kg** may be considered
    - iii. Actual body weight should be used
    - iv. IDSA recommends a max dose of 2 gm
    - v. In adults, we round to the nearest 250 mg increment
  - b. Safe Dosing of Nebulized Lidocaine  
(<http://www.aliem.com/safe-dosing-of-nebulized-lidocaine/>)
    - i. Lidocaine plasma levels were evaluated after nebulized administration. A dose of 400 mg (5.7 mg/kg in a 70 kg patient) produced a peak of 1.1 mcg/mL, far below the 5 mcg/ml level associated with toxicity.
    - ii. Application to real-life: Using 5-mL of 4% topical lidocaine solution via nebulizer will provide a total dose of 200 mg. This is within the range of safe, studied doses, and may provide the anesthetic effect you (and the patient) desires. Even if a second or third neb is needed, lidocaine serum concentrations should remain in the safe range.
  - c. Mythbuster: Calcium Gluconate Raises Serum Calcium Levels as Quickly as Calcium Chloride  
(<http://www.aliem.com/mythbuster-calcium-gluconate-raises-serum-calcium-as-calcium-chloride/>)
    - i. Calcium gluconate does NOT require hepatic activation to exert its effect.
    - ii. As long as equivalent doses are used, calcium gluconate works as quickly (and to the same degree) as CaCl<sub>2</sub> to raise calcium concentration... without the same extravasation risk.

- d. What's the Code Dose of tPA? (<http://www.aliem.com/whats-code-dose-of-tpa/>)
- i. The dose of tPA in cardiac arrest is somewhere between 50-100 mg given as a bolus +/- infusion.
  - ii. According to the [2010 AHA Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care](#), "Ongoing CPR is not an absolute contraindication for fibrinolysis."
  - iii. Some studies suggest allowing 15 minutes of CPR for drug to work.
  - iv. Evidence is 'best' for PE; data does not support for undifferentiated cardiac arrest.
  - v. Anticoagulants, such as heparin, were used in most studies along with the fibrinolytic.
- e. Rapid Oral Phenytoin Loading in the ED
- i. Drug references say that an oral loading dose (15-20 mg/kg) of phenytoin should be administered in 3 divided doses given every 2 hours to decrease GI adverse effects and to ensure complete oral absorption. For a 1 gm dose, that would be 400 mg, then 300 mg, then 300 mg administered every 2 hours (4 hour total administration time). Who has time for three doses spanned over 4+ hours in a busy ED?
  - ii. Trick of the Trade: Give the oral phenytoin load as a single dose. (Osborn HH, et al. *Ann Emerg Med* 1987;16:407-12) (Evens RP, et al. *Am J Hosp Pharm* 1980;37:232-5.) (Ratanakorn D, et al. *J Neurol Sci* 1997;147:89-92.)
    1. Oral phenytoin loading can be achieved in a single dose, obviating the need for an IV while still achieving quick administration, adequate serum levels, and minimal side effects.
    2. Both the immediate release (suspension or chewable tablet) and extended release (phenytoin sodium ER capsule) products have been used successfully.
    3. IV loading does achieve quicker therapeutic level (3 hours), so there may still be a risk of seizure for a short time after oral loading.
  - iii. Further reading:  
<http://www.aliem.com/trick-of-trade-rapid-oral-phenytoin-loading/>
- f. Proper Syringe Labeling in the ED
- i. When preparing syringes at the bedside, the literature supports two commonalities about what information is absolutely needed on the label: drug name and concentration. (Kothari D, et al. *Br J Anaesth* 2013;110(6):1056-8.)
    1. Drug Name: This one is obvious, though generic names should be used preferentially rather than brand names.
    2. Concentration: It's easy to simply write a dose on the label. Using ketamine as an example, let's imagine that the label says Ketamine 100 mg. If 50 mg of the drug were administered and the syringe is placed back down, the next person to grab that syringe might still assume there is 100 mg left. However, if the concentration is written

on the label, there will never be a question as to how much drug remains in the syringe.

- ii. Further reading: <http://www.aliem.com/art-of-syringe-labeling-in-the-ed/>