Penicillin allergy cross-reactivity

- Roughly 10% of the population report allergy to penicillin
- Penicillin is a beta-lactam antibiotic and can therefore cross-react with other beta-lactam antibiotics

**Beta-Lactam Antibiotics**
- **Penicillins**
  - Amoxicillin
  - Amoxicillin/Clavulanic Acid (Augmentin)
  - Ampicillin
  - Ampicillin/sulbactam (Unasyn)
  - Penicillin (Pen G, Pen VK)
  - Piperacillin/Tazobactam (Zosyn)
  - Nafcillin
  - Methicillin
  - Cloxacillin/Dicloxacillin
  - Ticarcillin/Clavulanate potassium (Timentin)
- **Cephalosporins**
  - 1\(^{st}\) Generation
    - Cefazolin
    - Cephalexin (oral)
    - Cefadroxil (oral)
  - 2\(^{nd}\) Generation
    - Cefuroxime
    - Cefoxitin
    - Cefotetan
    - Cefaclor/Loracarbef (oral)
    - Cefprozil (oral)
    - Cefuroxime axetil (oral)
  - 3\(^{rd}/4\(^{th}\) Generation
    - Cefepime (4\(^{th}\))
    - Ceftazidime (3\(^{rd}\))
    - Ceftriaxone (3\(^{rd}\))
    - Cefotaxime (3\(^{rd}\))
    - Ceftizoxime (3\(^{rd}\))
    - Ceftobiprole (3\(^{rd}\))
    - Ceftaroline (3\(^{rd}\))
    - Cefixime (oral – 3\(^{rd}\))
    - Ceftibuten (oral – 3\(^{rd}\))
    - Cefpodoxime/Cefdinir/Cefditoren (oral – 3\(^{rd}\))
- Carbapenems
- Meropenem (Merrem)
- Imipinem/cilastatin (Primaxin)
- Ertapenem (Invanz)
- Doripenem (Doribax)
- Monobactam
  - Aztreonam

Penicillin allergy
- Among patients reporting an allergy to penicillin, approximately 85-90% will successfully tolerate a penicillin.
  - May never have had an allergy (empirically listed PCN as an allergy)
  - Reactions such as GI upset, mild rash are not considered to be a “true allergy”
  - Older patients who list an allergy to penicillin may have experienced a reaction decades ago at a time where medication contamination was not uncommon (i.e., reacted to contaminant and not penicillin itself)
  - May have been taking a concurrent medication which precipitated allergic reaction, but was falsely attributed to a penicillin

Cross-Reactivity Rates
- Cephalosporins
  - Cross-reactivity rates between cephalosporins and penicillin allergy range from 0.17 to 8.4%
- Carbapenems
  - Cross-reactivity once thought to be as high as 40%
  - Realistically, cross-reactivity is approximately 1%
- Monobactam (Aztreonam)
  - There have been no reports of cross-reactivity in patients with confirmed penicillin allergy
Recommendations for management in the Emergency Department

- Determine if the patient is “truly” allergic to penicillin, i.e., patient reports history of anaphylactic reaction
  - If yes, avoid penicillins, cephalosporins, and carbapenems
  - If no, penicillins, cephalosporins, and/or carbapenems may be administered with careful monitoring of airway

- To assist in determining the true nature of the allergy, the following questions should be answered by the patient
  - How old were you when the reaction occurred?
  - Can you describe the reaction?
  - When did the reaction occur? After the first dose? After the tenth dose?
  - How was the penicillin administered? Orally? Intravenously?
  - Were you taking any other medications at the same time?
  - When the penicillin was stopped, what happened?
  - Have you since taken a penicillin, cephalosporin, carbapenem, or monobactam?