



# Penicillin Allergy 101 For Nurses

## **Nurses Take Antibiotic Stewardship Action Initiative**

This material was supported in part by a U.S. Centers for Disease Control and Prevention (CDC) contract to Johns Hopkins University.

The Department of Antimicrobial Stewardship, The Johns Hopkins Hospital:

- Valeria Fabre, MD
- Sara E. Cosgrove, MD, MS
- Lauren Rosales, BA, BSN-RN

The Office of Antibiotic Stewardship, Centers for Disease Control and Prevention:

- Arjun Srinivasan, MD
- Lauri Hicks, DO
- Melinda Neuhausser, PharmD



**JOHNS HOPKINS**  
M E D I C I N E

Disclaimer: The conclusions in this presentation are those of the JHU authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.



# Important Points About Penicillin Allergies

- About 10% of the US population reports a penicillin (PCN) allergy
  - Most PCN allergies are not true allergies (>95%)
  - The most common reaction is a delayed-type rash that does not preclude subsequent receipt of PCN or other antibiotics in the PCN family
  - Anaphylaxis is extremely rare (0.001%)
- Patients with a penicillin allergy label (whether true or not) have worse clinical outcomes
  - Increased risk of developing surgical site infections
  - Increased risk of failing therapy for an infection
  - Increased length of stay



# Common Reasons For Incorrect PCN Allergy

- Viral rash occurring at the same time antibiotics are taken (e.g., amoxicillin and viral infectious mononucleosis)
- Patients have a family member with a PCN allergy and feel they may have it as well
- Adverse events related to antibiotics:
  - Isolated headaches, nausea, vomiting or diarrhea
  - Itching without rash
  - Vaginal burning



# How Can Nurses Help Ensure Patients Are Not Incorrectly Labeled With A PCN allergy and Receive Optimal Antibiotic Therapy?

- Document antibiotic allergies accurately
  - **When** did it happened?
  - **What** happened? *And How soon* after the antibiotic?
  - **What** antibiotic?
- Learn the differences between hives and a delayed maculopapular rash
- Educate patients about PCN allergy



# Hives

- Itchy, red bumps with white centers (“mosquito bite” appearance)
- **Usually occurs within 6 hours of antibiotic administration**
- Bumps disappear after a few hours and new ones may appear
- Predicted by skin test
- Allergy evaluation required before use of same drug or closely related antibiotic





# Maculopapular rash

- This is the most common rash patients experience with PCN, amoxicillin, ampicillin, cephalosporins
- **Usually occurs after  $\geq 72$  hours of antibiotic exposure**
- NOT predicted by skin tests
- Feels rough to touch
- Most often the reaction will not recur, and patient may receive same antibiotic again if needed





# Anaphylaxis

- Immediate allergic reaction
  - Within few hours of antibiotic administration
- Presents with laryngeal edema, facial swelling, urticaria, wheezing/shortness of breath, hypotension
- Can be predicted by skin tests
  - If skin test is negative, the patient is not at risk for anaphylaxis
- People can overcome this type of allergy over time
  - 80% of patients will no longer be allergic after 10 years, so important to have an evaluation by Allergy to determine status





# Late Severe Reactions Involving The Skin

- Includes: Stevens-Johnson syndrome (SJS), Toxic Epidermal Necrolysis (TEN), Drug Rash with Eosinophilia and Systemic Symptoms (DRESS)
- SJS/TEN: Exfoliative (skin peeling) dermatitis with mucous membrane involvement (mouth, eyes, genitals) usually occurring after a patient has been on antibiotics for ~7 days
- DRESS: Fever, rash, eosinophilia that develops 2-6 weeks into an antibiotic course
- NOT predicted by skin tests
- Patients are ill and require hospitalization







# Other Severe Reactions

- Inflammation of the liver, kidneys or lungs (hepatitis/nephritis/pneumonitis)
- Hemolytic anemia/cytopenias
- Tendon rupture



# Key Elements For Accurate Documentation Of PCN Allergy

- **Document precise reaction** (e.g., if the reaction was a rash, distinguish hives from maculopapular rash from late blistering rash with lesions in the mouth)
- **Document when the reaction occurred**
  - Age of patient at time of reaction
  - Timing of reaction in relation to antibiotic administration (e.g., within 3 hours vs. after 72 hours of antibiotic administration)
- **Ask the patient and/or check in the electronic health record what antibiotics** the patient has received since the reported reaction, and document this





# Does My Patient Have a Penicillin (PCN) Allergy?

Developed by The Johns Hopkins Hospital Department of Antimicrobial Stewardship



START HERE →

Have you ever had a reaction to PCN or PCN derivatives (e.g., amoxicillin, ampicillin, amoxicillin-clavulanate)?

YES

Did the reaction involve at least two of the following within 24 hours of first dose of antibiotic?

- Face swelling (throat, tongue, lips, eyes bilaterally)
- Wheezing and/or severe difficulty breathing
- Urticaria (hives): Raised itchy bumps (red or skin-colored); the center of a red hive turns white upon pressure
- Low blood pressure

YES

NO/UNKNOWN

Did you have a PCN skin test or a PCN/amoxicillin challenge, and were you told you were no longer allergic?

YES

NO

Remove/  
do not enter  
PCN allergy  
or  
communicate  
with  
prescriber

Document  
patient reports  
anaphylaxis, not  
confirmed (if  
applicable),  
communicate to  
prescriber

Request Allergy &  
Immunology  
Consult if  
antibiotic needed

Other reactions

Does not recall  
the reaction

Rash described as peeling/blistering AND associated with inflammation/blistering in the mouth, eyes or genitals

YES

Document Stevens-Johnson-like syndrome

Isolated nausea, vomiting, diarrhea, headaches, dizziness or fatigue

YES

Remove/do not enter PCN allergy or communicate with prescriber

Maculopapular rash that appeared ≥ 2 days after antibiotic administration

YES

Document non-urticarial rash

Have you taken amoxicillin or amoxicillin-clavulanate (augmentin)? If patient unsure, search in EMR for prior treatment.

NO

YES

Reaction was a non-urticarial rash, document non-urticarial rash

No reaction occurred, remove/do not enter allergy or communicate with prescriber

Reaction was hives, document hives

Have you taken cephalexin (keflex), cefuroxime (ceftin), or cefazolin? If patient unsure, search in EMR for prior treatment.

NO

YES

No reaction occurred, document historical reaction to PCN, patient able to take cephalosporins, and document any cephalosporins given



# References

- Blumenthal et al. The Impact of a Reported Penicillin Allergy on Surgical Site Infection Risk. *CID* 2018 Jan 18;66(3).
- Jeffres et al. Consequences of avoiding  $\beta$ -lactams in patients with  $\beta$ -lactam allergies. *J Allergy Clin Immunol* 2016 Apr;137(4).
- McDanel et al. Comparative effectiveness of beta-lactams versus vancomycin for treatment of methicillin-susceptible *Staphylococcus aureus* bloodstream infections among 122 hospitals. *CID* 2015 Aug 1;61(3).
- Desai, Shilpa H et al. "Morbidity in Pregnant Women Associated with Unverified Penicillin Allergies, Antibiotic Use, and Group B Streptococcus Infections." *The Permanente journal* vol. 21 (2017): 16-080. doi:10.7812/TPP/16-080.
- Shenoy E. et al. Evaluation and Management of Penicillin Allergy, A Review. *JAMA*. 2019;321(2):188-199.

