































## Desensitization & The Pharmacy

### Pharmacy Role

- Supply emergency medications at the bedside:
  - Epinephrine 1 mg vial for intramuscular injection
  - Diphenhydramine 50 mg vial
  - Hydrocortisone 100 mg vial
- Prepare desensitization syringes and IV piggyback (7 total doses)
- Can assist in assessing patient (at baseline, before each dose of antibiotic, at least every 15 minutes until after the 4<sup>th</sup> dose has been administered, and at least 30 minutes after all subsequent doses)
- Order continuous infusion beta-lactam regimens to prevent lapses in therapy and subsequent reactions



University of Utah Health. Pulse Policy: Antibiotic, Aspirin, and Levothyroxine Desensitization. Updated May 2021.

57

## Managing Reactions

**Mild cutaneous reactions:** non-sedating, 2<sup>nd</sup> generation antihistamines preferred

**Systemic reactions (generalized urticaria, anaphylaxis):** stop challenge, promptly initiate anaphylaxis management including epinephrine as needed

Protocols/policies should exist to guide clinical assessment, monitoring strategies, and interventions in case of a beta-lactam allergic reaction

**Bottom Line:** update EMR with appropriate allergy label and counsel patient



Sharma S, Ben-Shoshan M, et al. Practical guide for evaluation and management of beta-lactam allergy: position statement from the Canadian Society of Allergy and Clinical Immunology. Allergy, Asthma & Clinical Immunology 2020;16(95): https://doi.org/10.1186/s13223-020-00494-2

58

## Evidence Supporting Pharmacy's Role

### Holmes et al. 2019

- Retrospective study of 418 patients
- Methods:** alert system notified pharmacy staff of any patient with a documented penicillin allergy receiving a non-penicillin antibiotic prompting an allergy assessment
- Results:** increased beta-lactam prescribing by 12.9%, decrease in days of therapy of non-penicillin antibiotic use by 123 days of therapy per 1000 patient days

### Campbell et al. 2020

- 380 patients in community hospital
- Methods:** chart review, patient interview, recommendations to provider, updating EMR
- Results:** improved use of guideline-preferred antibiotics by 13% and reduced fluoroquinolone use by 11%



Holmes AK, Bennett NT, et al. Pharmacy driven assessment of appropriate antibiotic selection in patients with reported beta-lactam allergy. J Am Coll Clin Pharm 2019;2:509-514  
Campbell S, Hauler G, et al. Pharmacist-led Penicillin Allergy Assessment in the Emergency Department Reduced Empiric Fluoroquinolone Use. Clin Infect Dis 2020;71

59

## Poll Everywhere – Pharmacist Question

Once a beta-lactam desensitization protocol is complete, what is a strategy to help prevent lapses in therapy and the development of a reaction?

- Order continuous infusion regimens
- Decrease the dosing interval by 1-2 hours
- It doesn't matter; the risk of reactions is eliminated after desensitization.



Holmes AK, Bennett NT, et al. Pharmacy driven assessment of appropriate antibiotic selection in patients with reported beta-lactam allergy. J Am Coll Clin Pharm 2019;2:509-514  
Campbell S, Hauler G, et al. Pharmacist-led Penicillin Allergy Assessment in the Emergency Department Reduced Empiric Fluoroquinolone Use. Clin Infect Dis 2020;71

60

## Poll Everywhere – Technician Question

Which of the following tasks regarding management of beta-lactam allergies can pharmacy technicians NOT participate in?

- A. Interviewing patients to gather allergy histories
- B. Updating the EMR with current allergy information
- C. Recommending alternative antibiotics for patients who are truly allergic to beta-lactams



61

## Looking Forward



62

## Final Considerations

- Understanding beta-lactam allergies is critical to making changes
- Train staff to complete beta-lactam allergy assessments and make recommendations
  - When to refer to an allergist
  - De-labeling beta-lactam allergies if appropriate and updating patient medical records accordingly
- Develop institution-specific protocols if not done already and follow them



63

## References

1. Apter A, Scheleman H, Walker A, et al. Clinical and genetic risk factors of self-reported penicillin allergy. *J Allergy Clin Immunol* 2008;122:152–158
2. Bradley N, Lee Y, Weinstein D. Overview of Beta-Lactam Allergy and the Role of the Pharmacist in Management. *Allergies* 2021;1:129-139
3. BrainKart.com. Type III Hypersensitivity Reactions. Available at: [https://www.brainkart.com/article/Type-III-\(Immune-Complex\)-Hypersensitivity-Use\\_17876/](https://www.brainkart.com/article/Type-III-(Immune-Complex)-Hypersensitivity-Use_17876/)
4. Campbell S, Hauler G, et al. Pharmacist-led Penicillin Allergy Assessment in the Emergency Department Reduced Empiric Fluoroquinolone Use. *Clin Infect Dis* 2020;71
5. Chitic AM, Vasconcelos MJ, et al. To challenge or not to challenge: literature data on the positive predictive value of skin tests to beta-lactams. *J Allergy Clin Immunol Pract* 2019;7(7):2404–8
6. Cooper L, Harbour J, Snelston J, et al. Safety and efficacy of de-labeling penicillin allergy in adults using direct oral challenge: a systematic review. *JAC-Antimicrobial Resistance* 2021;3(1):dlaa12
7. Gadde J, Spence M, Wheeler B, et al. Clinical experience with penicillin skin testing in a large inner-city STD clinic. *JAM*. 1993;270(20):2456–63
8. Holmes AK, Bennett NT, et al. Pharmacy driven assessment of appropriate antibiotic selection in patients with reported beta-lactam allergy. *J Am Coll Clin Pharm* 2019;2:509–514
9. Jemly S, Ben-Shoshan M, et al. Practical guide for evaluation and management of beta-lactam allergy: position statement from the Canadian Society of Allergy and Clinical Immunology. *Allergy, Asthma & Clinical Immunology* 2020;16(95): <https://doi.org/10.1186/s13223-020-00494-2>
10. Kulkar P, Li J. Cephalosporin allergy. *N Engl J Med* 2001;345:804-809
11. Labpedia.net. Chapter 12: Type II Hypersensitivity Reaction and ADCC (Cytotoxic reaction). Available at: <https://labpedia.net/elementary-immunology/chapter-12-type-ii-hypersensitivity-reaction/>
12. Maggio E. Polysorbates, Biotherapeutics, and Anaphylaxis: A Review. *BioProcess International*. Published September 2017. Available at: <https://bioprocessintl.com/manufacturing/formulation/polysorbates-biotherapeutics-and-anaphylaxis-a-review/>
13. Mill C, Pirmess MN, Medoff E, Lejtenyi C, O'Keefe A, Netchiporouk E, et al. Assessing the diagnostic properties of a graded oral provocation challenge for the diagnosis of immediate and nonimmediate reactions to amoxicillin in children. *JAMA Pediatr*. 2016;170(6):e160033
14. Moussa Y, Shuster J, et al. De-labeling of  $\beta$ -lactam allergy reduces intraoperative time and optimizes choice in antibiotic prophylaxis. *Surgery* 2018;164(1):117-123
15. NDM-1: Metallo-beta-lactamases (MBLs) and Antibiotic Resistance. Published September 2009. Available at: <https://chem.libretexts.org/@go/page/97959#https://aacjournal.biomedcentral.com/articles/10.1186/s13223-020-00494-2>
16. Niccietti P, Carr D, et al. Beta-lactam-induced immediate hypersensitivity reactions: A genome-wide association study of a deeply phenotyped cohort. *J Allergy Clin Immunol* 2021;147:1830–1837.e15
17. Olsech S, Jones L, et al. Type IV Hypersensitivity Reaction. Updated September 2020. Available at: <https://www.lecturio.com/concepts/type-iv-hypersensitivity-reaction/>
18. Pandey N, Casella M. Beta Lactam Antibiotics. StatPearls. Updated September 2021. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK545311/>
19. Park M, Matesic D, et al. Female sex as a risk factor for penicillin allergy. *Ann Allergy Asthma Immunol* 2007;99:54-58
20. Ramsey A, Cauden J, et al. Risk Stratification and Prediction in Beta-Lactam Allergic Patients. *J Allergy Clin Immunol Pract* 2019;7:2182-4
21. Sabalo V, Gaeta F, et al. Urticaria: The 1-1-1 Criterion for Optimized Risk Stratification in  $\beta$ -Lactam Allergy Detabling. *J Allergy Clin Immunol Pract* 2021;9(1):3697-3704
22. Smith N. Beta-Lactam Allergy: Benefits of De-labeling Can Be Achieved Safely. *BCPharmacists.org*. Published February 2020. Available at: <https://www.bcpharmacists.org/readlinks/guest-post-beta-lactam-allergy-benefits-de-labeling-can-be-achieved-safely>
23. Sobrino-Garcia M, Moreno E, et al. Analysis of the Costs Associated With the Elective Evaluation of Patients Labelled as Allergic to Beta-Lactams or Nonsteroidal Antiinflammatory Agents. *Front Pharmacol* 2020;11:1-8
24. Turner N, Wienn R, Sarubi C, et al. Evaluation of a Pharmacist-Led Penicillin Allergy Assessment Program and Allergy Detabling in a Tertiary Care Hospital. *Jama Netw Open* 2021;4(5):e219820
25. U.S. Pharmacist. Pharmacist Interviews Help Clarify Which Patients Have Beta-Lactam Allergies. Published November 2016. Available at: <https://www.uspharmacist.com/article/pharmacist-interviews-help-clarify-which-patients-have-beta-lactam-allergies>
26. University of Utah Health. Pulse Policy. Antibiotic, Aspirin, and Levodopa Desensitization. Updated May 2021.
27. Wong T, Atkinson A, et al. Beta-lactam allergy in the paediatric population. *Paediatr Child Health* 2020;25(1):62



64