

Debunking Penicillin Allergies: One Assessment at a Time

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CASP Learning Series



Penicillin Allergy Conundrum

TG is a 44 year old woman who presents to the emergency department after a bite to her finger from her cat. The team orders ampicillin-sulbactam and plans to discharge her on amoxicillin-clavulanic acid. You go to verify the order and are dismayed to see the following:

	Reaction	Severity	Reaction Type
Allergies			
Amoxicillin	Anaphylaxis	High	
Penicillins		Not Specified	

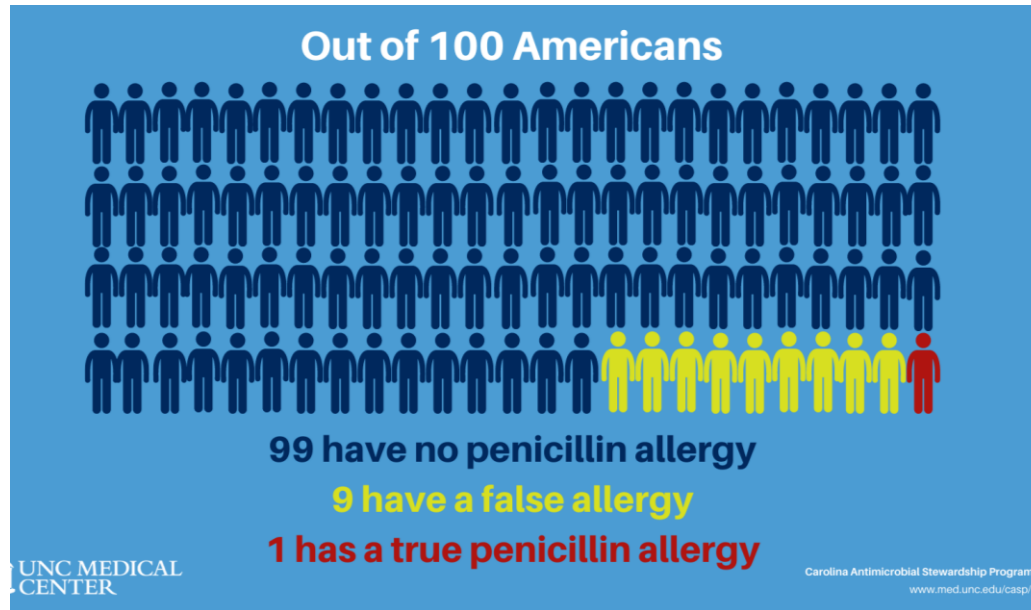
What should you do?

- A. Verify it. There is only a 1% chance the allergy is real anyway
- B. Page the team to change it to an alternative antibiotic
- C. Conduct an allergy assessment to get a better understanding of patient's past reaction
- D. I don't know. Consult Allergy for their recommendation

Objectives

- **Describe impact of penicillin allergy on patient health outcomes**
- **Discuss mechanism of penicillin allergy and cross-reactivity among beta-lactams**
- **Describe FY23 CASP initiative for implementing inpatient pharmacist-driven allergy assessments**

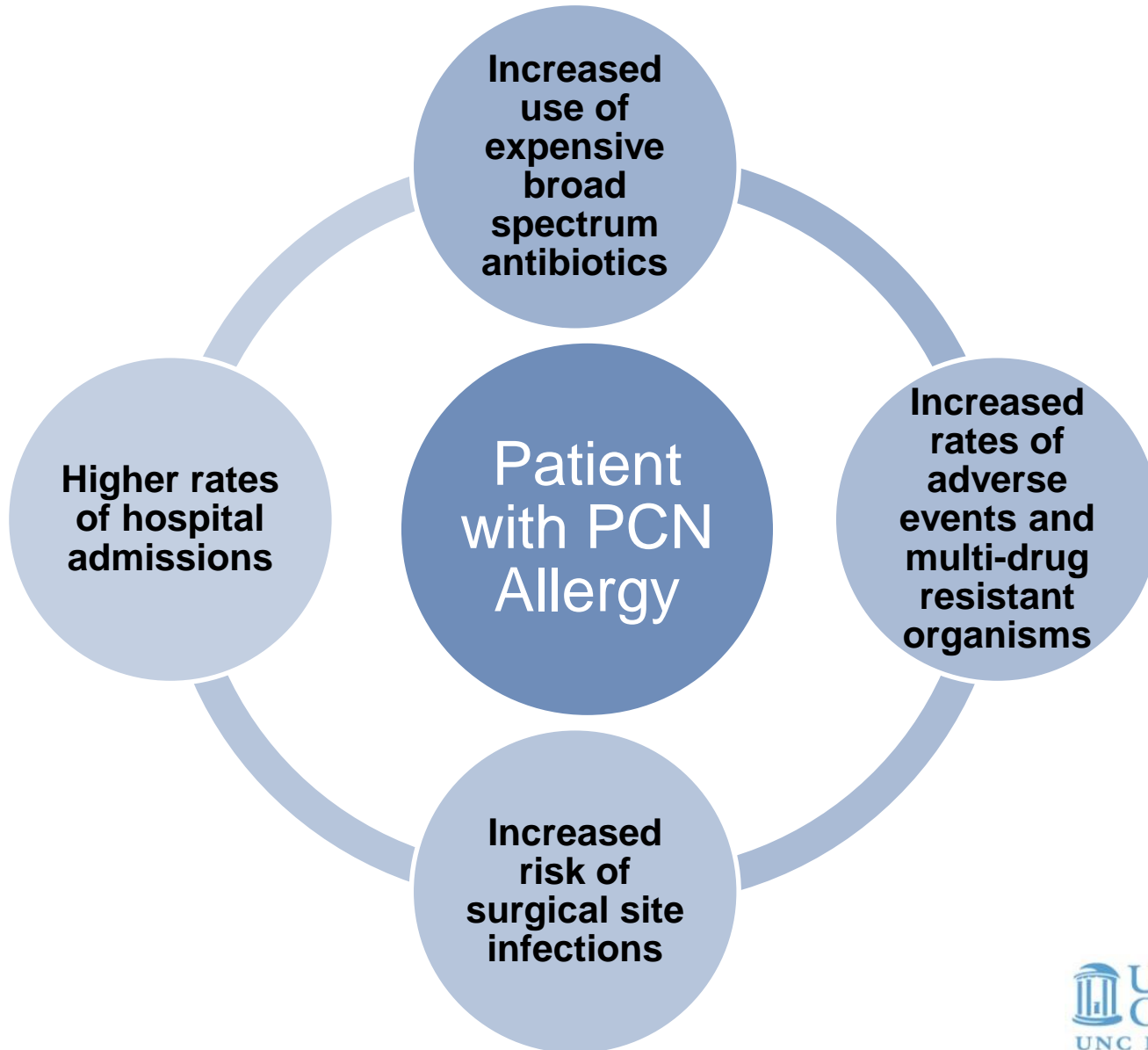
Penicillin (PCN) Drug Allergy



Why are patients not truly allergic?

- Patient recall of allergy and reaction
- Rash with concomitant viral infection
- Immunoglobulin E (IgE) mediated PCN allergy wanes with time

Negative Impact of a PCN Allergy Label



MECHANISM OF PENICILLIN ALLERGY

Gell and Coombs Hypersensitivity Reactions

Type I

- Rapidly progressive (minutes to hours), potentially fatal and becomes more severe with repeated exposure
- Mediated by IgE
- Urticarial, angioedema, wheezing, edema, hypotension, anaphylaxis

Type II

- Variable onset (hours to days)
- Mediated by IgG and complement
- Hemolytic anemia, neutropenia, thrombocytopenia

Type III

- 1 – 3 weeks post exposure
- IgG and IgM complexes form and precipitate in tissues
- Drug fever, immune-complex glomerulonephritis, serum sickness

Type IV

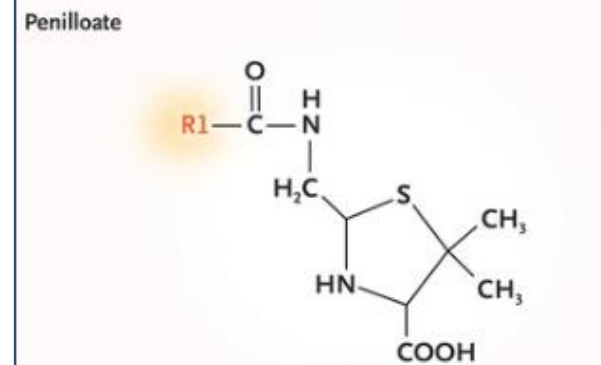
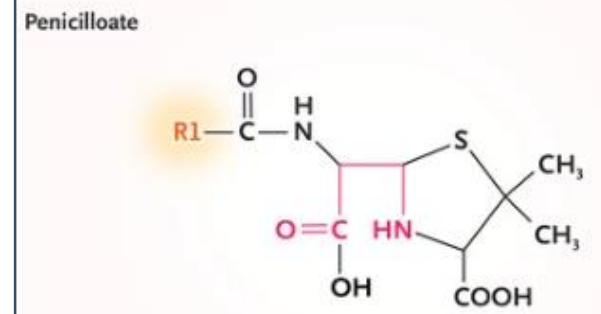
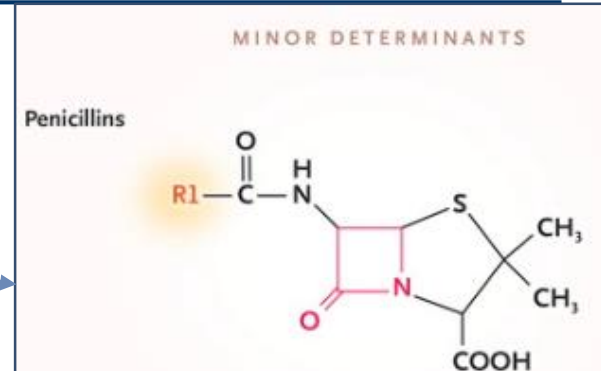
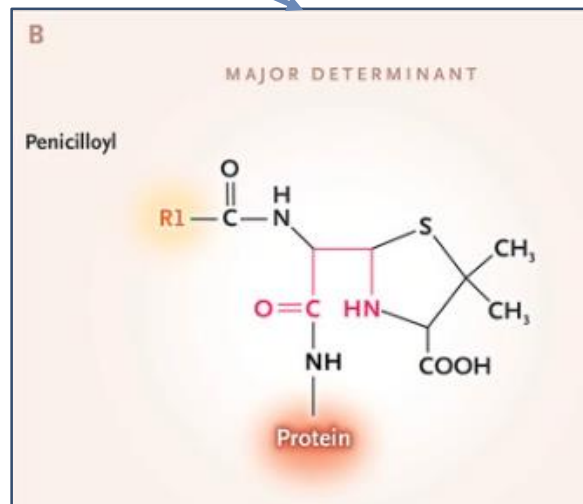
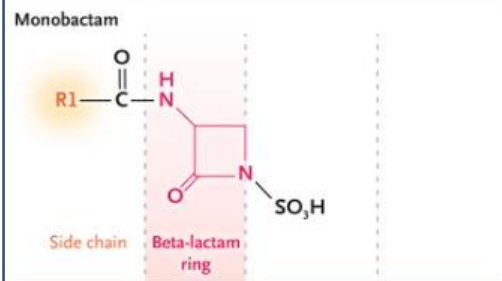
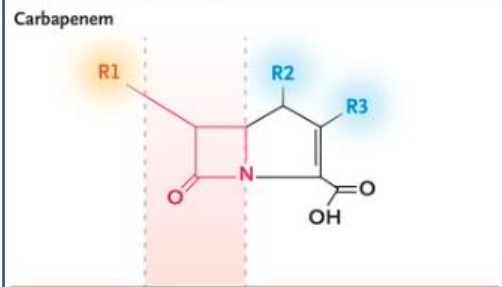
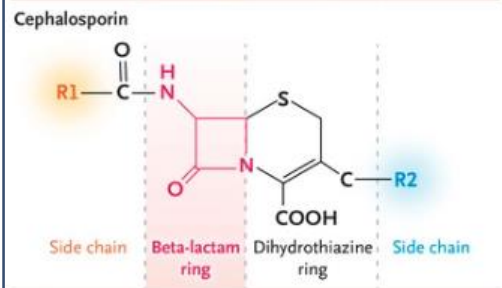
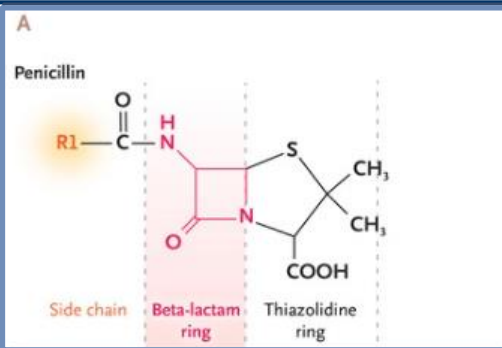
- Days to weeks
- T-cell mediated which results in delayed hypersensitivity
- Contact dermatitis, Stevens-Johnson syndrome, toxic epidermal necrolysis, eosinophilia, immune hepatitis

Mechanism of Penicillin Allergy

What is the major antigenic determinant of a penicillin allergy?

- A. R1 side chain
- B. Penicilloyl
- C. Penicilloate
- D. Penilloate

Metabolites in Penicillin Allergy



Recommendations for Assessing PCN Allergy

Drug Allergy: A 2022 Practice Parameter Update

- A proactive effort should be made to delabel a penicillin allergy whenever possible
- Strong efforts should be made to educate about the benefits of delabeling to patients and clinicians
- Penicillin skin testing should be reserved primarily for patients with a history of anaphylaxis or a recent reaction suspected to be IgE mediated
- For most other patients with histories of penicillin allergy that are remote and low-risk, direct amoxicillin challenge without skin testing is recommended
- For patients with histories that are inconsistent with penicillin allergy (such as headache or family history of penicillin allergy), no testing is required and the patient should be delabeled
 - In patients who are reluctant to accept the removal of a penicillin allergy after appropriate counseling, amoxicillin challenge using a single treatment dose is sufficient to rule out an allergy (and to gain acceptance of the delabeling)

Beta-Lactam Cross Reactivity

- **Cephalosporins:**
 - True cross-reactivity to PCNs is estimated 2 - 3%
 - Cephalosporin side chains constitute the major determinants of cephalosporin allergy
 - For unverified non-anaphylactic PCN allergy, a cephalosporin can be administered without testing or additional precautions
 - Similar approach for administration of PCN in the setting of unverified non-anaphylactic cephalosporin allergy
 - Patients with a history of anaphylaxis to PCN can receive a structurally dissimilar cephalosporin without skin testing

Beta-Lactam Cross Reactivity

- **Carbapenems:**

- Cross-reactivity between PCNs and carbapenems is ~ 1%
- In patients with a history of penicillin or cephalosporin allergy, a carbapenem may be given without additional precautions regardless of whether the reaction was anaphylactic or not

- **Monobactam:**

- Cross-reactivity between PCNs and monobactams is < 1%
- In patients with a PCN or cephalosporin allergy, aztreonam may be administered without prior testing unless there is a history of ceftazidime allergy

Beta-Lactams that Share Identical or Similar R1 and R2 Side Chains

	Penicillin G	Penicillin VK	Amoxicillin	Ampicillin	Nafcillin/Oxacillin	Piperacillin-Tazobactam	Cefazolin	Cephalexin	Cefadroxil	Cefuroxime	Cefoxitin	Cefdinir	Cefpodoxime	Ceftriaxone	Cefotaxime	Ceftazidime	Cefepime	Ceftaroline	Ceftolozane-Tazobactam	Aztreonam
Penicillin G		R1*																		
Penicillin VK	R1*																			
Amoxicillin				R1*				R1*	R1											
Ampicillin			R1*					R1	R1*											
Nafcillin/Oxacillin																				
Piperacillin-Tazobactam																				
Cefazolin																				
Cephalexin			R1*	R1					R1*											
Cefadroxil			R1	R1*					R1*											
Cefuroxime											R2									
Cefoxitin										R2										
Cefdinir																				
Cefpodoxime														R1						
Ceftriaxone													R1		R1		R1			
Cefotaxime														R1			R1			
Ceftazidime																				R1
Cefepime														R1	R1					
Ceftaroline																			R1	
Ceftolozane-Tazobactam																			R1	
Aztreonam																R1				

Key: R1 = identical side chain; R1* = similar side chain; R2 = identical side chain

How can a PCN Allergy be De-labeled?

- **Get an accurate allergy history!**
- **Thorough allergy histories include:**
 - When the reaction occurred
 - Timing of reaction in relation to drug administration
 - What infection was being treated
 - Any potential confounders (underlying viral infections)
 - Symptoms experienced
 - Treatment administered, response, and duration of reaction
 - **Was the medication or similar medication taken and tolerated thereafter?**

PCN Allergy Assessment Initiatives at UNCCMC

- 1) Outpatient
- 2) Perioperative
- 3) Inpatient

Inpatient Initiative FY22

Goal

- Implement inpatient pharmacist-driven allergy assessments to improve penicillin allergy documentation in the medical record

Methods

- Create inpatient specific tools:
 - Risk stratification chart with antibiotic use
 - Dot-phrase
 - Graded challenge order panel
 - Pharmacy guideline
 - Epic report/patient column for patient identification
- Pilot assessments at UNC HBH to assess feasibility of process

Results

- 47 assessments completed
 - 25% (12/47 delabeled)
 - 17% (8/47) by assessment alone
 - 4% (2/47) by inpatient oral amoxicillin challenge
 - 1 was delabeled through Allergy and 1 received IM penicillin at ID clinic
- 10 of the delabeled patients received a PCN after assessment
 - No adverse events

Inpatient Initiative FY23

Goal

- Train inpatient pharmacists to conduct allergy assessments and improve penicillin allergy documentation in the medical record

Anticipated Strategy Outcomes

- At least 3 - 4 services conducting PCN allergy assessments by FY end
- 200 PCN assessments completed
- At least 70% of assessed patients to have allergy documentation updated in EMR

Inpatient Penicillin Allergy Guideline



UNC MEDICAL CENTER GUIDELINE

Inpatient Penicillin Allergy Assessment Guide

Being labeled with a penicillin (PCN) allergy can lead to several negative health outcomes for patients; however, improving documentation of PCN allergies in the electronic medical record can mitigate some of this risk. This guideline provides an overview of the mechanism of penicillin allergy and cross-reactivity between beta-lactams. It also provides guidance for inpatient pharmacists on how to assess, risk-stratify, document the past reaction, and provide recommendations for antibiotic use in the setting of a penicillin allergy.

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Overview of Inpatient Allergy Assessments

- 1) Patient identification via EPIC report or patient column**
- 2) Assessment completed by pharmacist or pharmacy learner and documented in consult note**
- 3) If indicated, recommendations conveyed to primary team**
- 4) Allergy history updated**
- 5) Patient education**

Patient Identification

- Patients can be identified by addition of a column that identifies patients with penicillin allergies in a patient list
 - Select properties of your patient list → Search “Rx PCN/PCN related allergy” and add as column
- Prioritize assessments for patients on concomitant antibiotic therapy where an assessment could impact the current antimicrobial plan of care
- Patients without an active need for antibiotics can also be assessed to improve documentation of listed allergy

RX PCN/PCN related allergy

Penicillin or Related Medication Allergy

Penicillin or Related Medication Allergy

Documentation of Assessment

- **Assessment will include:**
 - Patient interview
 - Review of the medical record
 - Updating the allergy record with pertinent information
- **Assessment will be documented as a consult note**
 - .PENICILLINALLERGYASSESSINPT
- **Inpatient Risk Stratification Chart can be referenced to determine risk category for allergy history**

Penicillin Allergy Assessment

Pt is a @AGE@ YO @SEX@ with undergoing assessment of listed penicillin allergy.

PATIENT REPORTED ALLERGY HISTORY:

Medication associated with reaction: {Penicillins:71596}

Route of administration: {Blank single:19197:: "oral", "intravenous", "intramuscular", "unknown"}

Indication for antibiotic: ***

Description of Reaction:

- o How long ago was the reaction? {Blank single:19197:: "< 6 months", "6 months - 5 yrs", "6-10 yrs", "> 10 yrs", "unknown"}
- o What symptoms occurred?
 - Intolerances: {Intolerances:61557}
 - Low-risk: {Low Risk Inpatient :79325}
 - Moderate-high risk: {Moderate-high risk allergy histories:61560}
 - Severe non IgE-mediated: {Severe Non IgE-Mediated Reactions:79647}
 - Other: {Blank single:19197:: "family history only", "***", "N/A"}
- o Timing/onset till symptoms: {Blank single:19197:: "Immediate (< 4 hrs)", "Intermediate (4 - 24 hrs)", "Delayed (> 24 hr)", "Unknown"}
- o Treatment: {Treatment Allergy:71597}

Have you taken and tolerated any penicillin-class antibiotics since this reaction? {Blank single:19197:: "Yes, patient has taken ***", "No", "Unsure"}

Documentation of patient receiving penicillin-class antibiotic in the medical record: {PCN ALLERGY CHART REVIEW:71602}

Documentation of patient receiving a cephalosporin in the medical record: {PCN ALLERGY CHART REVIEW:71602}

Documentation of patient receiving a carbapenem in the medical record: {PCN ALLERGY CHART REVIEW:71602}

ASSESSMENT/PLAN:

- Based on allergy and medication history, would classify patient's penicillin allergy as {Blank single:19197:: "an intolerance and allergy updated to reflect intolerance.", "inaccurately labeled as patient has received and tolerated a penicillin class antibiotic after initial reaction.", "low-risk.", "moderate-high risk IgE-mediated allergy.", "a severe non IgE-mediated allergy."}
- {Inpatient PCN Plan:79327}

Time Spent: {Time Spent:79561}

Inpatient Risk Stratification Chart

Recommendations for antibiotic use in patients with a penicillin (PCN) allergy

Patient Not Allergic:

Documented evidence of receiving and tolerating a penicillin class antibiotic since initial reaction

Family History only

Listed allergy was intolerance (GI upset, nausea/vomiting, diarrhea)

Recommendation:

De-label PCN allergy or update reaction to intolerance

OK to use penicillin class antibiotics

Ok to use cephalosporin or carbapenem if no listed allergy

Low Risk:

Non-severe delayed cutaneous rash

Rash in childhood without IgE-mediated symptoms

Itching only

Unknown remote (>10 year) reaction

Recommendation:

Oral amoxicillin challenge
OR

Use PCN by **Graded Challenge**²
OR

Use full dose cephalosporin or carbapenem*
OR

Use alternative agents based on infection and microbial etiology

**Moderate-High Risk :
(IgE-mediated)**

Anaphylaxis¹

Angioedema

Urticarial rash/hives

Bronchospasm/Wheezing

Chest tightness

Hypotension

Recommendation:

Use cefazolin³/3rd/4th/5th generation cephalosporin by **Graded Challenge**².
Can proceed with full dose if tolerated previously
OR

Use full dose carbapenem or Aztreonam*
OR

Use alternative agents based on infection and microbial etiology

**Severe:
(non IgE-mediated)**

Steven-Johnson Syndrome (SJS)

Toxic Epidermal Necrolysis (TEN)

Drug Rash Eosinophilia with Systemic Symptoms (DRESS)

Serum Sickness, Hemolytic Anemia, and Acute Interstitial Nephritis⁴

Recommendation:

Avoid use of PCNs, cephalosporins, carbapenems

Cephalosporin/carbapenem use can be considered if patient has tolerated previously⁴

Use alternative agents based on infection and microbial etiology

¹ Anaphylaxis requires signs/symptoms in at least 2 of the following systems: skin, respiratory, cardiovascular, gastrointestinal

² **Graded Challenge:** 10% of the total antibiotic dose as a slow administration. Observe for 30 minutes and obtain vitals prior to administration of remaining dose.

³ Cefazolin does not share a similar side group chain with any other penicillin or cephalosporin and risk of cross-reactivity is low. **Use of cephalexin and other 2nd generation cephalosporins is not recommended** due side chain similarities to aminopenicillins.

⁴ There is very limited information about cross-reactivity amongst beta-lactams for reactions such as serum sickness-like reactions, hemolytic anemia, acute interstitial nephritis and avoidance of cephalosporins and carbapenems may not be indicated. If an antibiotic from these classes is utilized, close monitoring of laboratory parameters and patient clinical status is recommended.

*Full dose indicated only if patient has not experienced a previous allergic reaction to antibiotic in class

Oral Amoxicillin Graded Challenge

- **Criteria for oral amoxicillin challenge (LOW-RISK):**
 - Non-severe delayed cutaneous rash
 - Rash in childhood without IgE-mediated symptoms
 - Itching only
 - Unknown remote reaction
- An oral amoxicillin challenge can be administered on all inpatient units, step-down units, and/or intensive care units
- Recommendation for oral challenge will be conveyed by the pharmacist to the primary team, but obtaining consent from patient/caregiver and ordering will be up to the primary team
- **When would you recommend this?**
 - Antibiotic use isn't indicated but patient is interested in undergoing challenge
 - Antibiotic use is indicated (e.g. team would like to discharge on amoxicillin)

Oral Amoxicillin Challenge

Antibiotic Graded Challenge Panel - NOT for Desensitization ✔ Accept

- Monitoring and Rescue Meds for Antibiotic Graded Challenge**
 - Insert peripheral IV**
Routine, Continuous, Starting today at 1031, Until Specified
If patent IV not already present
 - Misc nursing order (specify)**
Routine, Until discontinued, Starting today at 1031, Until Specified
Ensure epinephrine and IV diphenhydramine are available in Pyxis (or other ADS machine) prior to starting graded challenge.
 - EPINEPHrine (EPIPEN) injection 0.3 mg (\$\$\$)**
Intramuscular, Every 5 min PRN, anaphylaxis, Starting today at 1030, For 2 doses
Routine
 - diphenhydrAMINE (BENADRYL) injection (\$)**
50 mg, Intravenous, Every 4 hours PRN, other, allergic reaction: rash, urticaria, pruritus, anaphylaxis, Starting today at 1030
PROTECT FROM LIGHT
Routine
- AMOXICILLIN ORAL SUSPENSION GRADED CHALLENGE**
 - amoxicillin (AMOXIL) oral suspension (\$) Remove
50 mg, Oral, Once, today at 1100, For 1 dose
Graded challenge, dose 1 of 2. Monitor vital signs (HR, BP, RR, SpO2) at baseline and 30 minutes after 1st dose, then proceed to 2nd dose.
Notify MD if HR < 60 or > 100, RR < 12 or > 18, SpO2 < 90%, or SBP < 90. DO NOT proceed to 2nd dose if patient exhibits symptoms of allergic reaction (shortness of breath, wheezing, hives, or facial swelling).
Give With Food
Routine, Indications: Other (specify in comments), graded challenge
 - Followed By
 - amoxicillin (AMOXIL) oral suspension (\$) Remove
450 mg, Oral, Once, today at 1200, For 1 dose
Graded challenge, dose 2 of 2. Monitor vital signs (HR, BP, RR, SpO2) prior to and at 30 minutes after second dose.
Notify MD if HR < 60 or > 100, RR < 12 or > 18, SpO2 < 90%, or SBP < 90. Stop infusion if patient exhibits symptoms of allergic reaction (shortness of breath, wheezing, hives, or facial swelling).
Give With Food
Routine, Indications: Other (specify in comments), graded challenge

Intravenous PCN Graded Challenge

- **Criteria for graded challenge for IV PCN class antibiotic (LOW-RISK):**
 - Non-severe delayed cutaneous rash
 - Rash in childhood without IgE-mediated symptoms
 - Itching only
 - Unknown remote reaction
- Graded (10% of full dose, followed by full dose) challenges can be administered on all inpatient units, step-down units, and/or intensive care units
- Recommendation for graded challenge will be conveyed by the pharmacist to the primary team, but obtaining consent from patient/caregiver and ordering is the responsibility of the primary team
- **When would you recommend this?**
 - Antibiotic use is indicated and an IV penicillin class antibiotic is the preferred treatment for the infection

Inpatient Risk Stratification Chart

Recommendations for antibiotic use in patients with a penicillin (PCN) allergy

Patient Not Allergic:

Documented evidence of receiving and tolerating a penicillin class antibiotic since initial reaction

Family History only

Listed allergy was intolerance (GI upset, nausea/vomiting, diarrhea)

Recommendation:

De-label PCN allergy or update reaction to intolerance

OK to use penicillin class antibiotics

Ok to use cephalosporin or carbapenem if no listed allergy

Low Risk:

Non-severe delayed cutaneous rash

Rash in childhood without IgE-mediated symptoms

Itching only

Unknown remote (>10 year) reaction

Recommendation:

Oral amoxicillin challenge
OR
Use PCN by **Graded Challenge**²
OR
Use full dose cephalosporin or carbapenem*
OR
Use alternative agents based on infection and microbial etiology

Moderate-High Risk : (IgE-mediated)

Anaphylaxis¹

Angioedema

Urticarial rash/hives

Bronchospasm/Wheezing

Chest tightness

Hypotension

Recommendation:

Use cefazolin³/3rd/4th/5th generation cephalosporin by **Graded Challenge**².
Can proceed with full dose if tolerated previously
OR
Use full dose carbapenem or Aztreonam*
OR
Use alternative agents based on infection and microbial etiology

Severe: (non IgE-mediated)

Steven-Johnson Syndrome (SJS)

Toxic Epidermal Necrolysis (TEN)

Drug Rash Eosinophilia with Systemic Symptoms (DRESS)

Serum Sickness, Hemolytic Anemia, and Acute Interstitial Nephritis⁴

Recommendation:

Avoid use of PCNs, cephalosporins, carbapenems

Cephalosporin/carbapenem use can be considered if patient has tolerated previously⁴

Use alternative agents based on infection and microbial etiology

¹ Anaphylaxis requires signs/symptoms in at least 2 of the following systems: skin, respiratory, cardiovascular, gastrointestinal

² Graded Challenge: 10% of the total antibiotic dose as a slow administration. Observe for 30 minutes and obtain vitals prior to administration of remaining dose.

³ Cefazolin does not share a similar side group chain with any other penicillin or cephalosporin and risk of cross-reactivity is low. Use of cephalexin and other 2nd generation cephalosporins is not recommended due side chain similarities to aminopenicillins.

⁴ There is very limited information about cross-reactivity amongst beta-lactams for reactions such as serum sickness-like reactions, hemolytic anemia, acute interstitial nephritis and avoidance of cephalosporins and carbapenems may not be indicated. If an antibiotic from these classes is utilized, close monitoring of laboratory parameters and patient clinical status is recommended.

*Full dose indicated only if patient has not experienced a previous allergic reaction to antibiotic in class

Intravenous Cephalosporin Graded Challenge

- **Criteria for graded challenge for cephalosporins (MOD-HIGH RISK):**
 - Past history of IgE-mediated allergy to a PCN class antibiotic
 - No previous documentation of receiving a cephalosporin
 - Administration of Cefazolin/3rd/4th/5th generation cephalosporin by 10% of dose followed by full dose if no reaction occurs
- Graded challenges can be administered on all inpatient units, step-down units, and/or intensive care units
- Recommendation for graded challenge will be conveyed by the pharmacist to the primary team, but obtaining consent from patient/caregiver and ordering is the responsibility of the primary team
- **When would you recommend this?**
 - Antibiotic use is indicated, patient has no previous documented cephalosporin use, and current infection would be appropriately treated by a cephalosporin

Graded Challenge Order Panel

Antibiotic Graded Challenge Panel - NOT for Desensitization

✓ Accept

Monitoring and Rescue Meds for Antibiotic Graded Challenge

Insert peripheral IV

Routine, Continuous, Starting today at 1037, Until Specified
If patent IV not already present

Misc nursing order (specify)

Routine, Until discontinued, Starting today at 1037, Until Specified
Ensure epinephrine and IV diphenhydramine are available in Pyxis (or other ADS machine) prior to starting graded challenge.

EPINEPHrine (EPIPEN) injection 0.3 mg (\$\$\$)

Intramuscular, Every 5 min PRN, anaphylaxis, Starting today at 1036, For 2 doses
Routine

diphenhydrAMINE (BENADRYL) injection (\$)

50 mg, Intravenous, Every 4 hours PRN, other, allergic reaction: rash, urticaria, pruritus, anaphylaxis, Starting today at 1036
PROTECT FROM LIGHT
Routine

AMOXICILLIN ORAL SUSPENSION GRADED CHALLENGE

AMPICILLIN ANTIBIOTIC GRADED CHALLENGE

ampicillin-sulbactam ANTIBIOTIC GRADED CHALLENGE

cefazolin ANTIBIOTIC GRADED CHALLENGE

ceFAZolin (ANCEF) 200 mg in sodium chloride (NS) 0.9 % 50 mL IVPB

200 mg, Intravenous, Administer over 15 Minutes, Once, today at 1100, For 1 dose

Graded challenge, dose 1 of 2. Monitor vital signs (HR, BP, RR, SpO2) at baseline and 30 minutes after end of 1st dose, then proceed to 2nd dose.

Notify MD if HR < 60 or > 100, RR < 12 or > 18, SpO2 < 90%, or SBP < 90. Stop infusion and DO NOT proceed to 2nd dose if patient exhibits symptoms of allergic reaction (shortness of breath, wheezing, hives, or facial swelling).

Routine, Indications: bloodstream

Remove

Followed By

ceFAZolin (ANCEF) 2 g in sodium chloride (NS) 0.9 % 100 mL IVPB (\$)

2 g, Intravenous, Administer over 30 Minutes, Once, today at 1200, For 1 dose

Graded challenge, dose 2 of 2. Monitor vital signs (HR, BP, RR, SpO2) prior to and 30 minutes after end of second dose.

Notify MD if HR < 60 or > 100, RR < 12 or > 18, SpO2 < 90%, or SBP < 90. Stop infusion if patient exhibits symptoms of allergic reaction (shortness of breath, wheezing, hives, or facial swelling).

Routine, Indications: bloodstream

Remove

Inpatient Risk Stratification Chart

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Family History only

Listed allergy was intolerance (GI upset, nausea/vomiting, diarrhea)

Recommendation:

De-label PCN allergy or update reaction to intolerance

OK to use penicillin class antibiotics

Ok to use cephalosporin or carbapenem if no listed allergy

Low Risk:

Non-severe delayed cutaneous rash

Rash in childhood without IgE-mediated symptoms

Itching only

Unknown remote (>10 year) reaction

Recommendation:

Oral amoxicillin challenge
OR
Use PCN by **Graded Challenge**²
OR
Use full dose cephalosporin or carbapenem*
OR
Use alternative agents based on infection and microbial etiology

Moderate-High Risk : (IgE-mediated)

Anaphylaxis¹

Angioedema

Urticarial rash/hives

Bronchospasm/Wheezing

Chest tightness

Hypotension

Recommendation:

Use cefazolin³/3rd/4th/5th generation cephalosporin by **Graded Challenge**².
Can proceed with full dose if tolerated previously
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Use alternative agents based on infection and microbial etiology

Severe: (non IgE-mediated)

Steven-Johnson Syndrome (SJS)

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Drug Rash Eosinophilia with Systemic Symptoms (DRESS)

Serum Sickness, Hemolytic Anemia, and Acute Interstitial Nephritis⁴

Recommendation:

Avoid use of PCNs, cephalosporins, carbapenems

Cephalosporin/carbapenem use can be considered if patient has tolerated previously⁴

Use alternative agents based on infection and microbial etiology

¹ Anaphylaxis requires signs/symptoms in at least 2 of the following systems: skin, respiratory, cardiovascular, gastrointestinal

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³ Cefazolin does not share a similar side group chain with any other penicillin or cephalosporin and risk of cross-reactivity is low. Use of cephalexin and other 2nd generation cephalosporins is not recommended due side chain similarities to aminopenicillins.

⁴ There is very limited information about cross-reactivity amongst beta-lactams for reactions such as serum sickness-like reactions, hemolytic anemia, acute interstitial nephritis and avoidance of cephalosporins and carbapenems may not be indicated. If an antibiotic from these classes is utilized, close monitoring of laboratory parameters and patient clinical status is recommended.

*Full dose indicated only if patient has not experienced a previous allergic reaction to antibiotic in class

Knowledge Check

TG is a 44 year old woman who presents to the emergency department after a bite to her finger from her cat. The team orders ampicillin-sulbactam and hopes to discharge her on amoxicillin-clavulanic acid, but her allergies have complicated the plan. You decide to conduct an allergy assessment and obtain the following information from the patient:

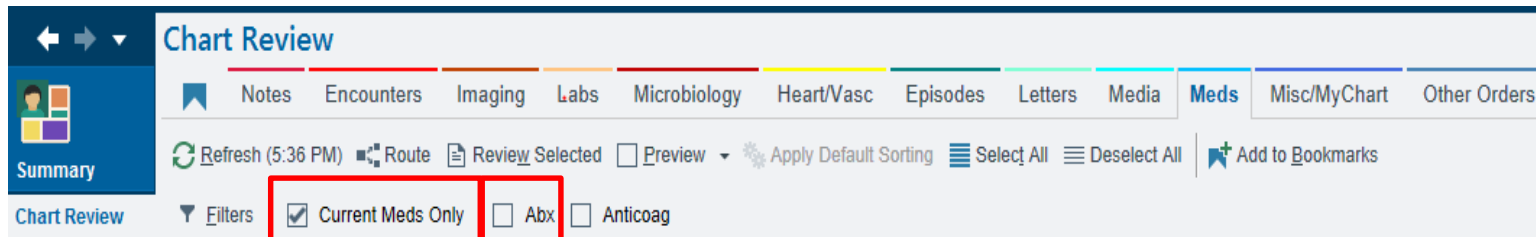
- She took amoxicillin as a child and was told by her mother she had a full body rash
 - Onset of the rash unknown
 - She did not need medical treatment and the rash resolved without treatment
 - She did not have shortness of breath or any signs of anaphylaxis
 - To her knowledge, she has not taken any penicillin class antibiotics since this reaction

What do you recommend?

- A. Avoid penicillins completely and recommend a beta-lactam alternative
- B. Recommend ampicillin-sulbactam at full dose.
- C. Recommend a graded challenge of ampicillin-sulbactam
- D. Refer to allergy

Chart Review Tips

- **Searching the chart for administration of penicillin class antibiotic**
 - Chart review → Meds Tab



- Unclick “Current Meds Only”
- Select “Abx” → scroll through listed inpatient and outpatient orders
 - **Inpatient order:** can verify administration
 - **Outpatient:** inquire if patient remembers taking
- **Search in Search box for “Penicillin” or antibiotic from index reaction**

Updating the Allergy Section

- If penicillin allergy cannot be delabeled, the reaction should be updated with pertinent information
- If patient has tolerated and received other beta-lactams, this information should be added to the comments section
 - .PENICILLINALLERGYUPDATE
 - Assessment completed @EDTODAYDATE@ by @AUTHORNAME@. Patient {Blank single:19197:: "has received and tolerated cephalosporins including ****", "has not received any documented cephalosporins"}. Patient {Blank single:19197:: "has received and tolerated carbapenems including ****" , "has not received any documented carbapenems"}.

Reaction	Severity	Reaction Type	Noted
Allergies			
Amoxicillin	Other (See Comments)	Low	Adverse Reaction (Not otherwise classified) 10/28/2014
Assessment completed October 3rd, 2022 by Renae Ann Boerneke, CPP. Patient has received and tolerated cephalosporins including ceftriaxone. Patient has not received any documented carbapenems.			

Updating the Allergy Section

- 1) If symptoms are listed as an allergy but are actually an intolerance:
 - Click into the allergy and choose “Intolerance” for reaction type

The screenshot shows a medical record interface for an allergy entry. The main form is titled "AMOXICILLIN" and contains the following fields:

- Agent: AMOXICILLIN
- Reactions: Nausea And Vomiti
- Severity: Low
- Noted: 10/1/2019
- Reaction type: [Dropdown menu]

The "Reaction type" dropdown menu is open, showing the following options:

- Adverse Reaction (Not otherwise classified)
- Allergy
- Contraindication
- Intolerance

The "Intolerance" option is highlighted in blue, indicating it is the selected option.

- 2) Delabeling the penicillin allergy
 - Select “Delete”
 - Choose the most applicable option for de-labeling reason:
 - Entry determined to be clinically insignificant
 - Entry miscategorized as an allergy
 - Erroneous Entry
 - Wrong allergy selected

Allergic Reactions to Specific Penicillins

What if your patient has a past reaction to piperacillin, nafcillin, or amoxicillin but can tolerate penicillin?

- It is possible that patient's allergic reaction is due to the side chain of the specific penicillin
- Do not remove the allergy to the specific penicillin unless patient has tolerated it since the original reaction
- Update allergy history to include all pertinent details in addition to what penicillin class antibiotics patient has tolerated

Patient Education

- If a patient is de-labeled, patient education is key!
- The patient should not consider themselves allergic to penicillin and should no longer claim it as an allergy
- Encourage patient to update allergy history at pharmacy and outside health entities to avoid re-labeling

Next Steps

- Ongoing education of nursing and medical residents/interns
- Spread to additional service lines
- Review and feedback for first 10 assessments done by the pharmacist
- Ongoing review and tracking of assessments

Summary

- **A penicillin allergy is not a benign finding**
- **Efforts to delabel patients when appropriate should be made in all healthcare areas**
- **Patient assessments/chart review can lead to delabeling a significant amount of patients without risk of reaction**

Questions?

Want to get involved?

Please email Renaeb.Boerneke@unchealth.unc.edu

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