Allergy to various beta-lactam antibiotics

December 7, 2016 by Josh Farkas

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why allergies cause harm

Over 30 million Americans carry a label of "penicillin allergy." Most of these patients (>95%) can actually tolerate penicillins. 

Concern regarding antibiotic allergy causes harm in roughly two ways:
1) reduced antibiotic efficacy

- Beta-lactam antibiotics are often the most effective (e.g. nafcillin or cefazolin are more effective against methicillin-sensitive Staph aureus than vancomycin).
- Avoiding beta-lactam antibiotics leads to treatment with less effective antibiotics (e.g. vancomycin or clindamycin).

2) increased antibiotic toxicity

- Avoidance of beta-lactam antibiotics promotes the use of unnecessarily broad-spectrum agents, which usually carry higher toxicity (e.g. selection of Clostridioides difficile or methicillin-resistant staph aureus).
- Classic examples of this phenomenon:
  - Septic patient with “penicillin allergy” is treated with a triple-antibiotic cocktail (e.g. vancomycin, metronidazole, and aztreonam) instead of being treated with a single beta-lactam (e.g. piperacillin-tazobactam).
  - Patient with pneumonia and “penicillin allergy” is treated with a fluoroquinolone.

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**good news: IgE-mediated allergy to “beta-lactam antibiotics” doesn’t exist**

Previously, it was believed that patients were allergic to the core beta-lactam ring structure. An allergy to the core beta-lactam ring would be extremely problematic, because this would imply that the patient would be allergic to all beta-lactam antibiotics.

Fortunately, allergic reactions to the core beta-lactam ring structure don’t seem to exist. Therefore, if a patient is allergic to one beta-lactam, this doesn’t mean that they will necessarily be allergic to all drugs in this class.
IgE-mediated allergies occur to R1-side chains

- Patients are actually allergic to the R1-side chain of individual beta-lactam antibiotics.
  - Beta-lactams are too small to bind to IgE. In order to be recognized by the immune system, they must stick to proteins.
  - When a beta-lactam is attached to a protein, the R1-side chain sticks out. It plays a key role in binding to antibodies, and thereby driving allergic reactions.
- This can be a bit confusing:
  - Allergy to certain antibiotics will cross-react with antibiotics which have similar R1-side chain (e.g. ampicillin is cross-allergic with some first-generation cephalosporins).
  - Some antibiotics have side-chains which are unique and not cross-allergic with other drugs (e.g. cefazolin and ceftaroline).
- The following schematic shows the risk of cross-allergic reaction between different beta-lactam antibiotics:
The key to determining cross-allergy is **structural similarity** between R1-side chains (not necessarily how a specific antibiotic is classified). For example, aztreonam and ceftazidime have identical R1 side-chains and are cross-allergic (despite belonging to different classes of beta-lactams):

The R1-side chains of many beta-lactams are shown below. This provides a structural explanation for the interactions shown in the matrix above.
Why there is no such thing as a “penicillin allergy” or “cephalosporin allergy”

Intravenous beta-lactams commonly used in critical care

**Penicillins**
- Anti-penicillen penicillin (e.g., penicillin G)
- Natural penicillins (e.g., penicillin G)
- Anti-aphthous penicillins (e.g., ampicillin, nafcillin)

**Cephalosporins**
- 1st Gen - Cefazolin
- 2nd Gen - Cefuroxime
- 3rd Gen - Ceftriaxone
- 4th Gen - Ceftazidine
- 5th Gen - Cefepime

**Monobactams** - Aztreonam

**Carbapenems** - Meropenem, imipenem, doripenem

R1 side-chain structures:

Allergies seem to be specific to the structure of the R1 side-chain of the antibiotic. Drugs with structurally similar R1 side-chains are cross-allergic (e.g., cefepime and ceftriaxone). However, structurally dissimilar drugs within the same class are not cross-allergic (e.g., cefazolin and ceftriaxone). Therefore, patients aren’t allergic to all penicillins, or all cephalosporins.
**“penicillin allergy” doesn’t exist!**

- The term "penicillins" refers to *four* general groups of antibiotics, as shown above.
- "Penicillin allergy" is a misleading and sloppy term for a few reasons:
  - All penicillins are *not* cross-allergic (e.g. piperacillin doesn't seem to be cross-allergic with penicillin-G).
  - Some penicillins *are* cross-allergic with non-penicillins (e.g. amoxicillin and some first-generation cephalosporins).
- When people say "penicillin allergy" they are most commonly referring to **aminopenicillin allergy** (allergy to ampicillin, penicillin G, penicillin VK, and early-generation cephalosporins including cefaclor, cephalexin, cephradine, cephaloglycin)
  - Honestly, even "aminopenicillin allergy" may be an excessively broad term, because ampicillin and amoxicillin may not be cross-allergic. So, it's possible that there are actually two distinct types of aminopenicillin allergy. For the sake of brevity, the remainder of this chapter will use the term "aminopenicillin allergy."
- "Cephalosporin allergy" also doesn't exist, so this misleading terminology should be discouraged.

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**types of drug reaction**

Drug reactions vary greatly in severity and nature. Below is a description of the most commonly encountered reactions. This chapter focuses on IgE-mediated allergic reactions. However, patients rarely may develop severe non-IgE-mediated immune drug reactions (e.g. Steven Johnson Syndrome, acute interstitial nephritis). Such patients should *not* be re-challenged with that drug or related agents.

Allergic drug reactions are traditionally classified into four types:
**true allergic reaction (Type-I hypersensitivity, IgE-mediated)**

- Clinical presentation
  - Rapid onset (generally <1 hour, especially if IV administration; possibly up to six hours)
  - Mild form: urticaria
  - More severe: angioedema, anaphylaxis (hypotension, flushing, wheezing, nausea/vomiting, abdominal pain, stridor)
- Mechanism
  - IgE antibodies against drug cause mast cell degranulation
- Drugs that commonly cause this
  - Penicillins, cephalosporins
- Diagnosis
  - History, skin testing, drug challenge
- Treatment
  - Severe: epinephrine, antihistamines, steroid.
  - Avoid drug and cross-allergic drugs in the future.
  - If use of the drug is essential, desensitization may be performed (more on this below).

**anaphylactoid reaction**

- Clinical presentation
  - Nearly identical to a true allergic reaction (above), albeit less tendency to cause shock.
  - Occurs during drug infusion or immediately after administration (never a delayed reaction).
- Mechanism
  - Drug directly stimulates mast cells, triggering the release of inflammatory mediators.
- Drugs that commonly cause this
  - Vancomycin (red person syndrome)
  - Fluoroquinolones
- Diagnosis
  - Clinical diagnosis based on scenario
- Treatment
  - Similar treatment to management of an allergic reaction, but these reactions are overall less severe and typically require only antihistamine.
  - *Not* a contraindication to using the drug in the future! However, the drug should be administered more slowly.

**cytopenias (class II hypersensitivity reaction)**
Clinical presentation
- Hemolytic anemia or thrombocytopenia
- Typically begins in under 3 days, but can be delayed up to two weeks.

Mechanism
- IgG and complement-mediated phagocytosis or cytotoxicity

Drugs that commonly cause this
- Penicillins, cephalosporins
- Sulfonamides
- Dapsone, rifampicin

Treatment
- Steroid and/or intravenous immunoglobulin
- Avoid drug in the future, or agents from same class.

**serum sickness (class III hypersensitivity reaction)**

Clinical presentation
- Rare in adults
- Fever, rash, or arthralgia
- Typically, 1-3 weeks delayed after starting drug

Mechanism
- Creation of antibody-antigen complexes

Drugs that commonly cause this
- Penicillin, amoxicillin, cefaclor
- Trimethoprim-sulfamethoxazole

Diagnosis
- May see reduced complement levels and proteinuria on urinalysis
- Skin biopsy

Treatment
- Steroids in severe cases
- Avoid drug in the future, or agents from same class.
maculopapular rash (a.k.a. benign T-cell-mediated drug reaction)

- Clinical presentation
  - Diffuse maculopapular rash, may have associated eosinophilia.
  - Appears after days to weeks of therapy (typically ~2 weeks).
- Mechanism
  - Type IV cell-mediated reaction involving eosinophils
- Drugs that commonly cause this
  - Amoxicillin
  - Sulfonamide antibiotics
- Diagnosis
  - History and physical examination alone usually determine the diagnosis.
  - Skin biopsy, in severe or confusing cases.
- Treatment
  - Antihistamines or topical steroid (systemic steroid in severe cases).
  - Generally benign, can re-challenge with same drug depending on scenario. In some cases, may even treat through this reaction, with careful monitoring for development of a more severe reaction.

acute interstitial nephritis (AIN)

- Clinical presentation
  - Acute kidney injury, sometimes with skin rash
Typically occurs between 3 days to a month after initiation of exposure

Mechanism
Type IV hypersensitivity

Drugs that commonly cause this
Semi-synthetic anti-staphylococcal penicillins (e.g. nafcillin, oxacillin)
Fluoroquinolones, rifampicin

Diagnosis
Active urinary sediment (e.g. with leukocyte casts)
Peripheral blood eosinophilia may be seen
Renal biopsy is diagnostic

Treatment
Steroid, possibly additional immunosuppressives
Avoid drug in the future, or agents from same class.

drug-induced liver injury (DILI)

Clinical presentation
Hepatitis (often with substantially elevated bilirubin)
May have rash, fever, or eosinophilia
Occurs ~1-12 weeks after initiation of exposure

Mechanism
T-cell immunity causes lysis of hepatocytes (Class IV hypersensitivity)

Drugs that commonly cause this
Amoxicillin-clavulanate, flucloxacillin
Trimethoprim-sulfamethoxazole
Nitrofurantoin, minocycline, rifampicin

Diagnosis
Laboratory evaluation for hepatitis (often diagnosis of exclusion)
Liver biopsy in severe cases

Treatment
Steroid
Avoid drug in the future, or agents from same class.

Bernadette Keefe MD
@nxtstop1

It's National Women Physicians Day
#Nationalwomenphysiciansday AND hashtag
#DressLikeAWoman >#ScienceMarch
It Was Never, No Never, A Dress!
drug reaction eosinophilia and systemic symptoms syndrome (DRESS)

- Clinical presentation
  - Begins 2-6 weeks after starting drug
  - Fever, rash
  - Peripheral eosinophilia
  - Lymphadenopathy or organ involvement (usually liver or kidney)
- Mechanism
  - T-cell mediated (Type-IV hypersensitivity)
- Drugs that commonly cause this
  - Vancomycin, all beta-lactam antibiotics
  - Sulphonamide antibiotics
- Treatment
  - Steroid in severe cases
  - Avoid drug in the future, or agents from same class.

Acute Generalized Exanthematous Pustulosis (AGEP)

- Clinical presentation
  - Begins within 48 hours of antibiotic exposure
  - Widespread pustular eruption with non-follicular sterile pustules
  - Fever, facial edema
  - 25% of patients have oral involvement
  - In severe cases can cause systemic inflammation with shock
- Mechanism
  - T-cell stimulated neutrophilic inflammation (Type IV hypersensitivity)
- Drugs that commonly cause this
  - Aminopenicillins, other beta-lactams
  - Clindamycin, vancomycin
  - Fluoroquinolones, Sulphonamides
- Diagnosis
  - History, physical diagnosis, skin biopsy.
  - Labs often show neutrophilia, mild eosinophilia.
  - After recovery, patch testing can help determine the causative agent.
- Treatment
  - Systemic steroid in severe cases.
  - Avoid drug in the future, or agents from same class.

Stevens-Johnson Syndrome (SJS) & Toxic Epidermal Necrolysis (TEN)

- Clinical presentation
  - Occurs 4 days to a month after antibiotic initiation.
  - Desquamating rash with mucosal involvement
  - SJS refers to more limited forms; TEN refers to patients with greater area of desquarnated skin.
- Mechanism
  - CD8 T-cells stimulate keratinocyte death (Type IV hypersensitivity)
- Drugs that commonly cause this
  - Sulphonamide antimicrobials
  - Macrolides, fluoroquinolones

https://emcrit.org/ibcc/penicillin/
A thoughtful allergy history is an essential step to determining a "pretest probability" regarding whether the patient has a clinically significant allergy. Critical components are as follows:

- **nature of the reaction**
  - Signs & symptoms?
  - Time delay from exposure to reaction?
    - An IgE-mediated allergic reaction should occur within minutes or a few hours.
  - Treatments required to manage the drug reaction?
  - Other drugs or illnesses present at the time of the reaction?
    - For example, mononucleosis treated with ampicillin often leads to a rash which *isn’t* a true allergy.

- **timing & patterning of drug reaction**.
  - Allergies resolve with time. Over a decade, 80% of patients with a positive skin-test reaction to penicillin will become unreactive.\(^1\)
    - A childhood history of "penicillin allergy" is less worrisome some decades later.
    - *Recurrent* reactions which reproducibly occur in the near-past are most worrisome.

- **antibiotics that the patient has been able to tolerate**
  - Ask the patient (and/or interrogate the chart) to determine which antibiotic(s) the patient *has* been able to tolerate.
  - If the patient has recently tolerated an antibiotic, this is powerful evidence that the same antibiotic (or a related agent) would be tolerated again.
    - Often patients are able to tolerate penicillins, but the "penicillin allergy" remains on the electronic medical record.
• Skin testing is sensitive for an allergy (absence of a skin response carries 97-99% predictive value that penicillin can be tolerated).
• Institution-wide initiatives involving broad use of skin testing can improve antibiotic stewardship.
  • Negative skin test result refutes a “penicillin allergy,” allowing this label to be removed without causing further confusion.

**drawbacks of skin testing**

• Skin tests are clinically validated only for *penicillin* allergy (not for other antibiotics).
  • A negative penicillin allergy *doesn’t* exclude allergies to structurally unrelated beta-lactams (e.g. piperacillin).³
• Necessary materials are unavailable at many hospitals.
• Causes a time delay and requires trained staff (who may not be available in the wee hours).
• Specificity of a positive result is *unclear* (because patients who test positive aren’t challenged with penicillin).
  • Among patients with a positive result, as many as 50% may actually be able to tolerate penicillin!⁴

**bottom line?**

• Skin testing isn’t a logistically viable solution for most critically ill patients with acute infection.
• Penicillin skin testing is increasingly *irrelevant*, as we begin to realize that aminopenicillins are actually cross-allergic with relatively few antibiotics (i.e. “penicillin allergy” doesn’t exist).
  • For example, pre-operative skin testing has been touted as a way to allow patients to receive cefazolin for peri-operative prophylaxis.⁵ But cefazolin isn’t cross-allergic with penicillin! So you don’t need a skin test — you can just give cefazolin (more on this below).
  • There seem to be few situations within the critical care arena where aminopenicillin allergy is truly a barrier to optimal care (one example might be listeria meningitis where ampicillin is the definitive therapy).

* Once you understand how beta-lactam allergies work, you generally won’t need a penicillin skin test at all.

### graded challenge

#### general concept

• Used in situations where an anaphylactic reaction is possible, but seems less likely.
• The patient is first exposed to a small dose of the drug and, if this is tolerated, escalating doses are administered.
• Unlike penicillin skin testing, this can be performed with *any* intravenous antibiotic.
• ED or ICU admission represents an opportunity to perform a graded challenge, since the patient is being intensely monitored.
  • An intubated patient is theoretically the *safest* context for performing graded challenge, because the patient already has a secured airway. It’s not worth intubating a patient solely to perform the graded challenge, but if the patient is intubated for another reason this may enhance safety.

#### how to perform a graded challenge

• No consensus exists about exactly how to accomplish this.
• One strategy is as follows: infuse 10-25% of the dose slowly over ~60 minutes, with close observation. If this is tolerated, the remainder of the dose is given at the usual rate.¹
  • This is easy to do with any antibiotic infused via a mini-bag (as most antibiotics are, in critical illness). You’re essentially starting the antibiotic at a very low infusion rate and carefully watching the patient. If nothing happens after an hour, then increase the infusion to a normal rate.
  • This costs nothing (no additional materials are required).
The only drawback is that this will delay administration of antibiotic by about an hour.

**desensitization**

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**what is desensitization?**

- Patient with a known allergy (or highly suspected allergy) is gradually exposed to escalating doses of drug.
- An allergic reaction occurs and is managed medically. After controlling the allergic reaction, *more drug is given!*
  - Desensitization: Intentionally provoke an allergic reaction and *treat through it.*
  - Graded challenge: Test for allergic reaction and *stop* drug administration if a reaction occurs.
- Eventually IgE antibodies against the drug are depleted and the reaction subsides. Now the patient is able to tolerate the drug.
  - However, the drug must be continually administered to the patient in order for desensitization to work. If the patient stops being exposed for a long period of time, re-exposure may cause anaphylaxis.

**how to perform desensitization**

- Rigorous, validated protocols must be followed carefully.
- Initially a very tiny antibiotic dose is administered, and this is gradually increased over time (e.g. over a period of 6-12 hours).
- If allergic reactions occur, antibiotic administration is temporary held and the reaction is treated. Once the reaction subsides, additional antibiotic is administered.
- Must be performed only in an ICU or ED with the capacity to immediately treat anaphylaxis or angioedema.

**role of desensitization**

- Occasionally used in situations where a specific antibiotic is uniquely useful.
- With increasing understanding about the *lack* of cross-reactivity between most antibiotics, this is *rarely* required currently.

**Low-allergenicity drugs**

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Some drugs are simply more likely to cause allergic reactions than others (for example, allergy to amoxicillin is common, whereas allergy to haloperidol [https://emcrit.org/pulmcrit/what-does-it-mean-if-a-patient-is-allergic-to-haloperidol/] doesn't seem to exist). In situations involving uncertainty, it may be a bit safer to use lower-risk antibiotics. Two drugs deserve honorable mention here: meropenem, and nafcillin.

**meropenem**

- Meropenem basically doesn't cause anaphylaxis (searching PubMed reveals no case reports).
- Structurally, meropenem has a stubby and nearly nonexistent R1 side-chain (image above). This explains why it doesn't cause allergy.
- Evidence supports the use of meropenem in patients with a history of *anaphylaxis* to aminopenicillins.5–9
- For a patient with septic shock and history of severe anaphylaxis to penicillin, meropenem is a safe option.
There are notably few reports of anaphylaxis to nafcillin (perhaps only one).

Structurally, the R1 side-chain of nafcillin is rather unique, and unlike other beta-lactams (figure above).

Cefazolin is generally better tolerated than nafcillin, making cefazolin potentially superior in most methicillin-sensitive staph aureus infections.

However, cefazolin has poor CNS penetration, so nafcillin is definitive therapy for infections involving the CNS (e.g. endocarditis with septic embolization to the brain).

Nafcillin

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Is it safe to use cephalosporins without cross-reacting R side-chains?

- This remains somewhat debatable (for a nice pro-con debate, see Macy E et al.). However, consensus in the literature seems to be emerging that this is safe.
  - Please note that cephalosporin anaphylaxis can happen to anyone so it's impossible to ever be 100% certain that this won't occur.
  - Rates of cephalosporin anaphylaxis seem to be similar in patients with a history of penicillin allergy and patients without any such history.
- A reasonable compromise may be that non-cross-reacting cephalosporins can be used, with the following qualifiers:
  - Patients should be monitored, with the ability to immediately treat an allergic reaction (e.g. in an ICU or ED).
  - In patients with a history of anaphylaxis to penicillins, safety might be enhanced by providing the first dose of cephalosporin as a graded challenge.

Is it safe to use anti-staphylococcal penicillins (nafcillin) or anti-pseudomonal penicillins (piperacillin)?
Structurally, nafcillin and piperacillin are quite distinct from aminopenicillins or cephalosporins (figure above). This would predict a lack of cross-allergy with aminopenicillins.

Little evidence exists on this topic.

- Piperacillin: One case report of a patient with anaphylaxis to piperacillin found that the patient didn’t react to a penicillin skin test, supporting the concept that these drugs aren’t cross-allergic.\(^3\)

- Nafcillin: Overall nafcillin causes anaphylaxis only extremely rarely, so it seems to be a generally safe agent (discussed a bit more above).

Depending on the clinical context, piperacillin or nafcillin administration via graded challenge may be reasonable (especially for patients with methicillin-sensitive staph aureus infection that involves the brain, for whom nafcillin is a mission-critical antibiotic).

**Algorithm for aminopenicillin allergy**

**Approach to “penicillin allergy” in the critically ill patient with active infection**

**Allergy history**
- Nature of reaction (clinical effects, time delay to reaction & treatment required)
- Time elapsed since reaction
- Antibiotics able to tolerate

**Type II-IV hypersensitivity reaction**
- Steven-Johnson syndrome
- Acute interstitial nephritis
- Drug rash eosinophilia
- Systemic symptoms (DRESS)
- Hemolytic anemia
- Drug fever
- Serum sickness

**Possible type-I (IgE-mediated) hypersensitivity reaction**
**Higher risk**
- Anaphylaxis or angioedema (wheeze, hypotension, syncope, stridor, etc.)
- Solid documentation (e.g. repeated events, documented skin test-positive)
- Aggressive medical stabilization required

**Intermediate risk**
- Urticaria without anaphylaxis/angioedema
- Reaction of unknown nature

**Lower risk**
- Minor rash not involving hives
- Isolated pruritus without a rash

**Avoid any beta-lactam (including penicillins, cephalosporin, or even carbapenem).**

**Possible treatments**
- Cefazolin\(^*\)
- Third/Fourth/Fifth generation cephalosporin (especially cefepime)\(^*\)
- Nafcillin or piperacillin\(^*\)
- Carbapenem (especially meropenem)\(^**\)
- Aztreonam\(^**\)
- Non-beta-lactam antibiotics\(^**\)

\(^*\)Probably doesn’t cross-react with penicillin. However, may consider graded challenge with first dose if history of severe reaction to penicillin.

\(^**\)Safe regardless of how scary the penicillin allergy is.
approach to patient with a cephalosporin allergy

(basics of cephalosporin allergies)

- Cephalosporins overall are less likely to cause allergies than penicillins.
  - Due to their molecular structure, cephalosporins are less likely to break apart and stick to proteins (a step involved in IgE-mediated allergic reactions due to beta-lactams).
  - The incidence of anaphylaxis due to cephalosporins is about 10-times less than for penicillins.\(^5\)
  - Cephalosporins are associated with an extremely low rate of severe cutaneous adverse reactions (e.g. Steven Johnson Syndrome).\(^{13}\)
- Patients with a history of reaction to one cephalosporin can generally tolerate a different cephalosporin with a dissimilar side-chain (see matrix above).\(^{13,14}\)
- Skin testing to cephalosporins isn't well validated or widely available.
- Aztreonam is classically considered safe in penicillin allergies, but aztreonam is cross-allergic with some cephalosporins (especially ceftazidime).
- Nafcillin or piperacillin are probably safe (see above discussion regarding the use of nafcillin or piperacillin in patients with aminopenicillin allergy).
**Allergy history**
- Nature of reaction (description & treatment required)
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**Possible treatments**
- **Different cephalosporin** with non-cross-reacting R-chain (see matrix)*
- **Aminopenicillin** probably safe if no cross-reacting R-chain? (see matrix)**
- **Nafcillin or piperacillin** should be safe
- **Carbapenem** (especially meropenem)**
- **Non-beta-lactam antibiotics****

*Generally considered to be safe. However, may consider graded challenge with first dose if history of severe reaction (e.g. anaphylaxis).
**Safe regardless of how scary the original allergic reaction is.
***Little data on this; consider graded challenge or penicillin skin testing if severe reaction.

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**algorithms**

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Internet Book of Critical Care by @FujiCrit
**Beta-lactam cross-reactivity matrix.** Colored boxes indicate a similar (grey) or identical (red) side chains, which carries risk of an allergic reaction. Empty boxes indicate a lack of side-chain similarity and decreased risk of allergic reaction. Blumenthal KG et al. 2017 PMID 28483315

**approach to “penicillin allergy” in the critically ill patient with active infection**

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Allergy to various beta-lactam antibiotics - EMCrit Project

approach to a critically ill patient with an allergy to a cephalosporin

Allergy history
- Nature of reaction (description & treatment required)
- Time from drug exposure to reaction
- Time elapsed since reaction
- Antibiotics able to tolerate

Type II-IV hypersensitivity reaction
- Stevens-Johnson syndrome
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Possible type-I (IgE-mediated) hypersensitivity reaction

Higher risk
- Anaphylaxis or angioedema (wheezing, hypotension, syncope, stinctor, etc.)
- Solid organ dysfunction (e.g. repeated events, documented skin test-positive)
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Possible treatments
- Different cephalosporin with non-cross-reacting R-chain (see matrix)*
- Aminopenicillin probably safe if no cross-reacting R-chain? (see matrix)**
- Nafcillin or piperacillin should be safe
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  *Generally considered to be safe. However, may consider graded challenge with first dose if history of severe reaction (e.g. anaphylaxis).
  **Safe regardless of how scary the original allergic reaction is.

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questions & discussion


To keep this page small and fast, questions & discussion about this post can be found on another page here (https://emcrit.org/pulmcrit/penicillin/).
Allergy to various beta-lactam antibiotics - EMCrit Project

- Being misled by the terms “penicillin allergy” and “cephalosporin allergy,” which should be eliminated.
- Failure to obtain a thorough allergy history that documents the exact nature of the drug reaction.
- Failure to realize that for patients with allergy to one beta-lactam, a non-cross-allergic beta-lactam can usually be used safely.
- Under-utilization of graded challenge to disprove allergic reactions. The best time to perform a graded challenge is when the patient is being intensively monitored in an ICU or ED.

Going further:

- Cephalosporins in PCN allergy
  - Cephalosporins and penicillin cross-reactivity (http://rebelem.com/january-2015-rebelcast/)(Rebel EM)
  - Cephalosporins can be used in PCN allergy (http://www.emlitofnote.com/?p=965)(EM Literature of Note)
- Low utility of fluoroquinolones in critical care (https://emcrit.org/pulmcrit/fluoroquinolone-critical-illness/)(Pulmcrit)
- Ranking antibiotics in order of allergenicity (https://emcrit.org/pulmcrit/ranking-antibiotics/)(Pulmcrit)

References


The Internet Book of Critical Care is an online textbook written by Josh Farkas (@PulmCrit), an associate professor of Pulmonary and Critical Care Medicine at the University of Vermont.

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