

# HQIC Antibiotic Stewardship Workgroup: Penicillin Allergy Module

Questions to Ask a Patient/Family Member

*This material was prepared by the IPRO HQIC, a Hospital Quality Improvement Contractor, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services (HHS). Views expressed in this material do not necessarily reflect the official views or policy of CMS or HHS, and any reference to a specific product or entity herein does not constitute endorsement of that product or entity by CMS or HHS. Publication # 12SOW-IPRO-QIN-TA-AA-21-503.*



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# Questions to Ask Patient/Family Member

| Question                                                                                                                                                                                                                                                                                                                                     | Patient or Family Member Response |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| What medicine caused your allergic reaction?<br>(May prompt with drug names if unsure)                                                                                                                                                                                                                                                       |                                   |
| How long ago did the reaction occur?                                                                                                                                                                                                                                                                                                         |                                   |
| After how many days or doses of the medicine did the reaction occur?<br>(e.g., within hours of the first dose vs. several doses vs. near the end of treatment)                                                                                                                                                                               |                                   |
| What happened when you took this medicine? <ul style="list-style-type: none"> <li>• Did you experience shortness of breath, wheezing, throat or mouth swelling, hives, anaphylaxis?</li> <li>• If a rash occurred, please describe rash appearance and location of rash; did it involve areas like the mouth, genitals or rectum?</li> </ul> |                                   |
| Did you seek medical attention (i.e. emergency department, urgent care, physician)? <ul style="list-style-type: none"> <li>• Did they have to put a tube down your throat to help you breathe?</li> </ul>                                                                                                                                    |                                   |
| Did you take medicines to help with symptoms of the reaction? <ul style="list-style-type: none"> <li>• If so, what did you receive (e.g. steroids, antihistamines, epinephrine)?</li> </ul>                                                                                                                                                  |                                   |
| Did you discontinue the medication that caused your reaction?                                                                                                                                                                                                                                                                                |                                   |
| Were you on any other medicines at the time of the reaction? <ul style="list-style-type: none"> <li>• If so, do you recall which ones?</li> </ul>                                                                                                                                                                                            |                                   |
| How long did it take to fully resolve?                                                                                                                                                                                                                                                                                                       |                                   |
| Since your reaction, have you received another penicillin or penicillin-like antibiotic (e.g. cephalexin, cefuroxime, amoxicillin)? <ul style="list-style-type: none"> <li>• If so, did you tolerate this medicine?</li> </ul>                                                                                                               |                                   |



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# Algorithm for determining penicillin allergy de-labeling approach, if indicated

## Detailed allergy history

- Penicillin-associated symptoms occurred  $\geq$  12 months ago, and reports any 1 of the following:
  - Any benign rash
  - Gastrointestinal symptoms alone
  - Headaches
  - Other benign somatic symptoms
  - Unknown history

- Any 1 of the following:
  - Penicillin-associated symptoms occurred < 12 months ago
  - History of immediate IgE-mediated reaction, i.e. shortness of breath, anaphylaxis, angioedema
  - The patient or treating physician is wary of a direct oral challenge
  - No contraindications to PAST

Direct oral challenge

De-label penicillin allergy

Penicillin allergy skin test (PAST)

Desensitization (if penicillin indicated)

Negative

Negative

Positive

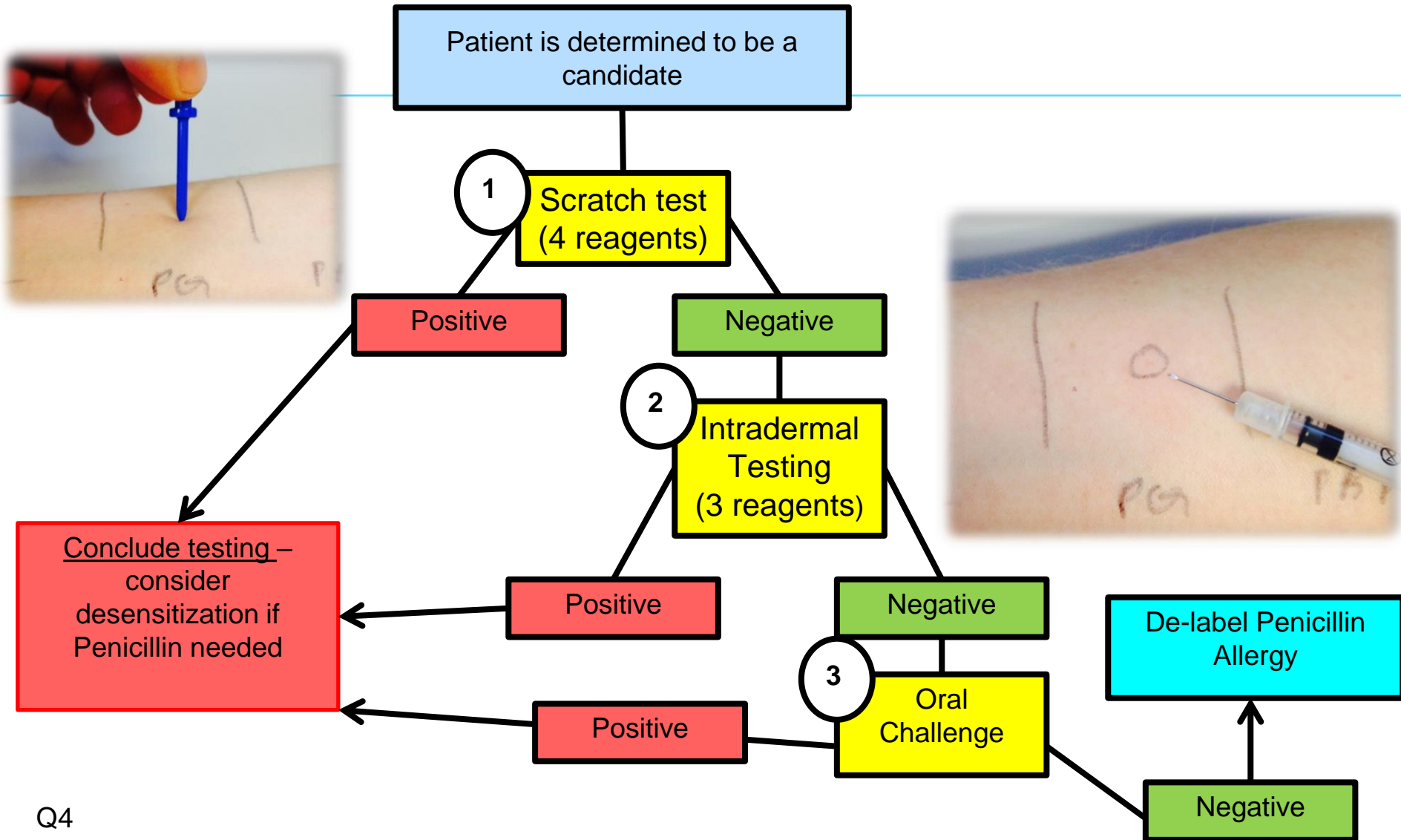
Positive

Q4

Macy E, Vyles D. Ann Allergy Asthma Immunol. 2018 Nov;121(5):523-529.

*\*May not represent all clinical scenarios. Clinical judgement should prevail*

# PAST Process



Q4

Pictures taken by Nicholas Torney, Pharm.D.

# MMC PAST Results

- 90 patients initiated skin testing
- 85/90 completed (3 lacked histamine response, 2 had an ambiguous scratch test)
- All 85 patients who completed PAST had a negative result (85/90 = 94.4%)
- NPV= 98.8%. 1 patient developed a rash within 24 hours after initiating zosyn after a negative PAST and was switched back to cefepime without any further complication.
- **76/90 (84.4%) of skin test tested patients transitioned to a preferred beta-lactam**
- 44/90 (48.9%) involved a pharmacy resident. No pharmacy students conducted a PAST, but shadowed the process in the patient's room.
- 11/85 (12.9%) of patients with a negative PAST had their penicillin allergy re-labeled when analyzed 30 days after the 90<sup>th</sup> PAST completed



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# Dates of Alternative Antibiotics Avoided

**Table 3:** Days of alternative antibiotics avoided in patients who underwent PAST

|                         | Total antibiotic duration, median days (IQR) | Days of alternative antibiotic avoided*, median days (IQR) | Inpatient days of alternative antibiotic avoided*, median days (IQR) | Outpatient days of alternative antibiotic avoided*, median days (IQR) | Total days of alternative antibiotic avoided |
|-------------------------|----------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------|
| All patients (n=90)     | 14 (10 – 28)                                 | 11 (6 – 18)                                                | 3 (1 – 5)                                                            | 8 (0 – 12.25)                                                         | 1568                                         |
| Bacteremia (n=22)       | 16                                           | 12                                                         | 3                                                                    | 9                                                                     | 380                                          |
| SSTI (n=14)             | 14.5                                         | 11                                                         | 3.5                                                                  | 9                                                                     | 298                                          |
| Intra-abdominal (n=13)  | 15.5                                         | 12.5                                                       | 6                                                                    | 7                                                                     | 156                                          |
| Bone/Joint (n=11)       | 42                                           | 38                                                         | 3                                                                    | 32                                                                    | 439                                          |
| Dental Abscess (n=10)   | 12                                           | 11                                                         | 1                                                                    | 9                                                                     | 146                                          |
| Pneumonia (n=7)         | 8                                            | 2                                                          | 2                                                                    | 0                                                                     | 27                                           |
| UTI (n=6)               | 10                                           | 0                                                          | 0                                                                    | 0                                                                     | 14                                           |
| Endocarditis (n=3)      | 42                                           | 35                                                         | 5                                                                    | 30                                                                    | 82                                           |
| Neutropenic fever (n=3) | 16                                           | 13                                                         | 13                                                                   | 0                                                                     | 28                                           |
| Empyema (n=1)           | 43                                           | 5                                                          | 5                                                                    | 0                                                                     | 5                                            |

\*Days of alternative antibiotic avoided: number of days after a PAST where an alternative antibiotic was replaced by a preferred beta-lactam.

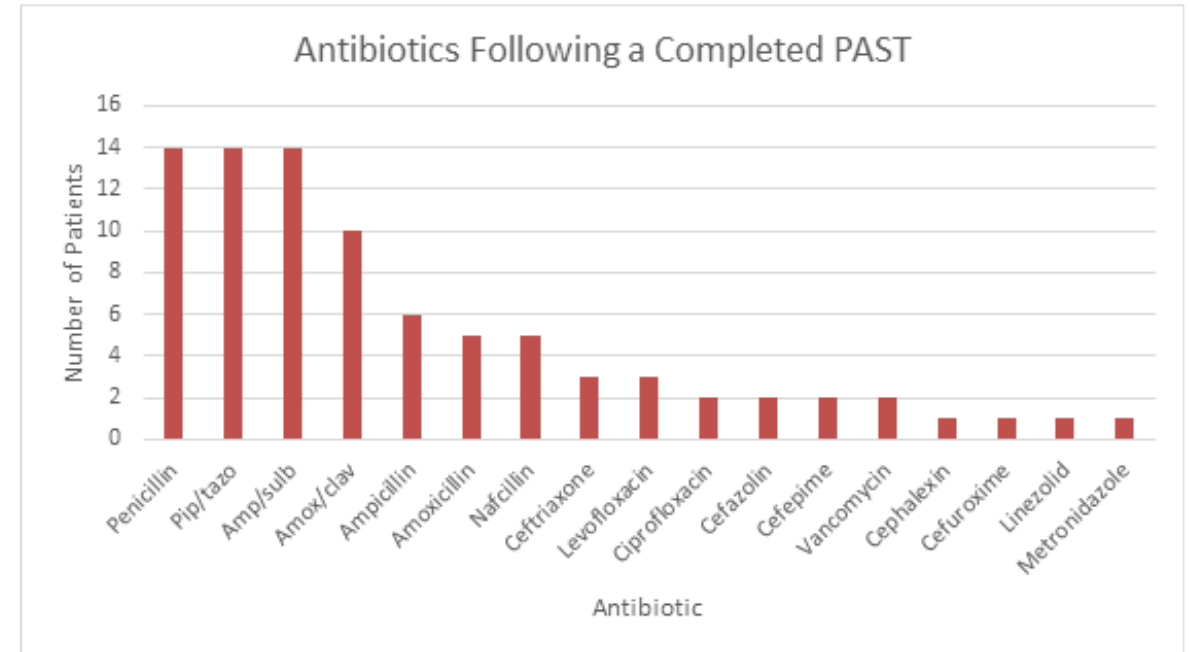
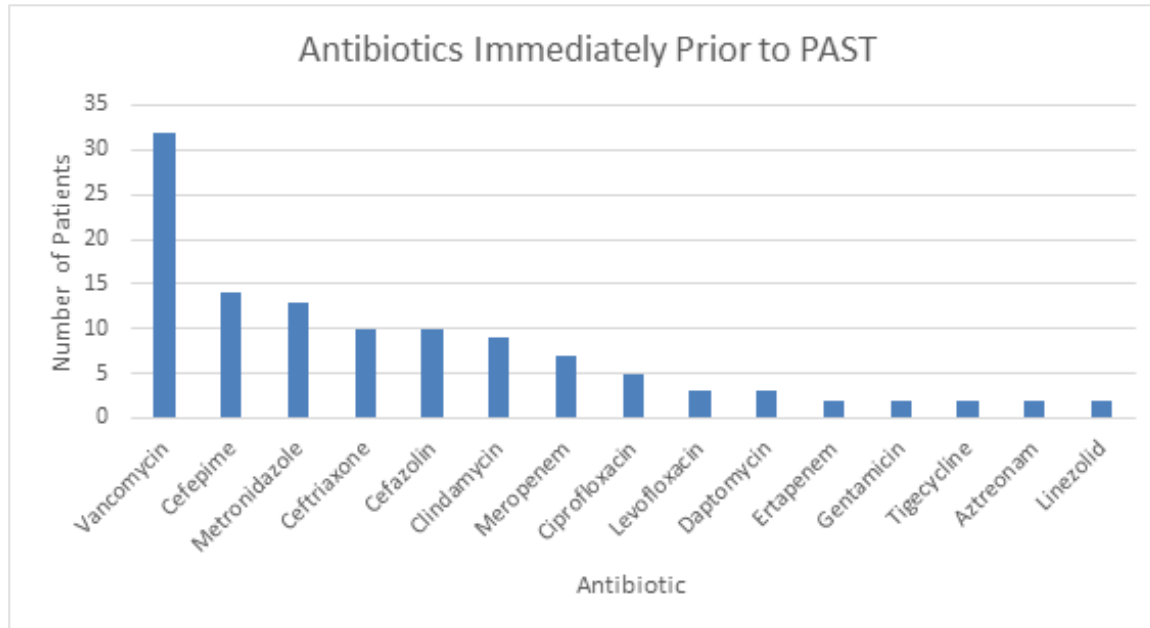


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# Antibiotics Before and After Penicillin Skin Test

## Oct 2015 – Dec 2019



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Direct oral challenge

De-label  
penicillin allergy

Penicillin allergy  
skin test (PAST)

Desensitization  
(if penicillin indicated)

Negative

Negative

Positive

Positive

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Clinical judgement should prevail*



# Penicillin Allergy Assessment and Skin Testing (PAAST) Certificate Program

- Continuing Education accredited program
  - Intended for any healthcare provider involved in antibiotic administration, prescribing, and/or decision-making
  - 11 hours home study/enduring material
    - 10 modules performed by nation's experts in penicillin allergy assessment and skin testing
  - 4 hours of live instruction and assessment check-off
- Schedule a PAAST Certificate Program in your area:
  - [PAAST@cop.sc.edu](mailto:PAAST@cop.sc.edu)



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# PAAST Certificate Program Live Session, Traverse City, MI



September 2019



September 2020




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# Munson Medical Center Beta-Lactam Cross-Reactivity Chart

Munson Medical Center  $\beta$ -Lactam Cross-Reactivity Chart

|  |                | PEN            |           |             |            |              | 1 <sup>st</sup> GEN |           | 2 <sup>nd</sup> GEN |           |            | 3 <sup>rd</sup> GEN |             |             |             | 4 <sup>th</sup> | 6 <sup>th</sup> GEN |             | MONO      | CARB      |           |
|-----------------------------------------------------------------------------------|----------------|----------------|-----------|-------------|------------|--------------|---------------------|-----------|---------------------|-----------|------------|---------------------|-------------|-------------|-------------|-----------------|---------------------|-------------|-----------|-----------|-----------|
|                                                                                   |                | Penicillin G/V | Oxacillin | Amoxicillin | Ampicillin | Piperacillin | Cephalexin          | Cefazolin | Cefaclor            | Cefprozil | Cefuroxime | Cefdinir            | Cefpodoxime | Ceftriaxone | Ceftazidime | Cefepime        | Ceftaroline         | Ceftolozane | Aztreonam | Meropenem | Ertapenem |
| PEN                                                                               | Penicillin G/V | ■              | ▲         | ●           | ●          | ●            | ✓                   | ●         | ●                   | ✓         | ✓          | ✓                   | ✓           | ✓           | ✓           | ✓               | ✓                   | ✓           | ✓         | ✓         | ✓         |
|                                                                                   | Oxacillin      | ▲              | ■         | ▲           | ▲          | ▲            | ✓                   | ▲         | ▲                   | ▲         | ✓          | ✓                   | ▲           | ✓           | ▲           | ✓               | ✓                   | ✓           | ✓         | ✓         | ✓         |
|                                                                                   | Amoxicillin    | ●              | ▲         | ■           | ●          | ●            | ✓                   | ●         | ✘                   | ✓         | ✓          | ✓                   | ✓           | ✓           | ✓           | ✓               | ✓                   | ✓           | ✓         | ✓         | ✓         |
|                                                                                   | Ampicillin     | ●              | ▲         | ●           | ■          | ●            | ✘                   | ✘         | ●                   | ✓         | ✓          | ✓                   | ✓           | ✓           | ✓           | ✓               | ✓                   | ✓           | ✓         | ✓         | ✓         |
|                                                                                   | Piperacillin   | ●              | ▲         | ●           | ●          | ■            | ●                   | ✓         | ●                   | ✓         | ✓          | ✓                   | ✓           | ✓           | ✓           | ✓               | ✓                   | ✓           | ✓         | ✓         | ✓         |
| 1 <sup>st</sup> GEN                                                               | Cephalexin     | ●              | ▲         | ●           | ✘          | ●            | ■                   | ✘         | ✘                   | ✓         | ✓          | ✓                   | ✓           | ✓           | ✓           | ✓               | ✓                   | ✓           | ✓         | ✓         | ✓         |
|                                                                                   | Cefazolin      | ✓              | ✓         | ✓           | ✓          | ✓            | ■                   | ✓         | ✓                   | ✓         | ✓          | ✓                   | ✓           | ✓           | ✓           | ✓               | ✓                   | ✓           | ✓         | ✓         | ✓         |
| 2 <sup>nd</sup> GEN                                                               | Cefaclor       | ●              | ▲         | ●           | ✘          | ●            | ✘                   | ■         | ●                   | ✓         | ✓          | ✓                   | ✓           | ✓           | ✓           | ✓               | ✓                   | ✓           | ✓         | ✓         | ✓         |
|                                                                                   | Cefprozil      | ●              | ▲         | ✘           | ●          | ●            | ✘                   | ■         | ■                   | ✓         | ✓          | ✓                   | ✓           | ✓           | ✓           | ✓               | ✓                   | ✓           | ✓         | ✓         | ✓         |
|                                                                                   | Cefuroxime     | ✓              | ▲         | ✓           | ✓          | ✓            | ✓                   | ✓         | ✓                   | ■         | ✓          | ●                   | ●           | ✓           | ●           | ●               | ✓                   | ✓           | ✓         | ✓         | ✓         |
| 3 <sup>rd</sup> GEN                                                               | Cefdinir       | ✓              | ✓         | ✓           | ✓          | ✓            | ✓                   | ✓         | ✓                   | ■         | ●          | ●                   | ●           | ●           | ●           | ●               | ●                   | ●           | ●         | ✓         | ✓         |
|                                                                                   | Cefpodoxime    | ✓              | ✓         | ✓           | ✓          | ✓            | ✓                   | ✓         | ✓                   | ●         | ●          | ■                   | ✘           | ●           | ✘           | ●               | ●                   | ●           | ✓         | ✓         | ✓         |
|                                                                                   | Ceftriaxone    | ✓              | ▲         | ✓           | ✓          | ✓            | ✓                   | ✓         | ✓                   | ●         | ●          | ✘                   | ■           | ●           | ✘           | ●               | ●                   | ●           | ✓         | ✓         | ✓         |
|                                                                                   | Ceftazidime    | ✓              | ✓         | ✓           | ✓          | ✓            | ✓                   | ✓         | ✓                   | ●         | ●          | ●                   | ■           | ●           | ●           | ●               | ●                   | ✘           | ✓         | ✓         | ✓         |
| 4 <sup>th</sup>                                                                   | Cefepime       | ✓              | ▲         | ✓           | ✓          | ✓            | ✓                   | ✓         | ●                   | ●         | ✘          | ✘                   | ●           | ■           | ●           | ●               | ●                   | ●           | ✓         | ✓         |           |
| 5 <sup>th</sup> Gen                                                               | Ceftaroline    | ✓              | ✓         | ✓           | ✓          | ✓            | ✓                   | ✓         | ✓                   | ●         | ●          | ●                   | ●           | ●           | ●           | ■               | ●                   | ●           | ✓         | ✓         | ✓         |
|                                                                                   | Ceftolozane    | ✓              | ✓         | ✓           | ✓          | ✓            | ✓                   | ✓         | ✓                   | ●         | ●          | ●                   | ●           | ●           | ●           | ■               | ●                   | ●           | ✓         | ✓         | ✓         |
| MONO                                                                              | Aztreonam      | ✓              | ✓         | ✓           | ✓          | ✓            | ✓                   | ✓         | ✓                   | ●         | ●          | ●                   | ✘           | ●           | ●           | ●               | ■                   | ■           | ✓         | ✓         | ✓         |
| CARB                                                                              | Meropenem      | ✓              | ✓         | ✓           | ✓          | ✓            | ✓                   | ✓         | ✓                   | ✓         | ✓          | ✓                   | ✓           | ✓           | ✓           | ✓               | ✓                   | ✓           | ■         | ▲         | ■         |
|                                                                                   | Ertapenem      | ✓              | ✓         | ✓           | ✓          | ✓            | ✓                   | ✓         | ✓                   | ✓         | ✓          | ✓                   | ✓           | ✓           | ✓           | ✓               | ✓                   | ✓           | ▲         | ■         | ■         |

Last updated (7/2021)

✘ = AVOID  
Cross-reaction likely  
Identical R1 or R2 side chain

● = AVOID IF ALTERNATIVES  
Cross-reaction not as likely  
Similar side-chains

▲ = CAUTION  
Theoretical cross-reactivity  
Dissimilar side-chains

✓ = PROCEED  
Unlikely to cross-react  
Proceed for any reaction other than  
IgE (e.g., anaphylaxis, angioedema)



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