

BC Provincial Antimicrobial Clinical Expert Committee (PACE)

Surgical Antibiotic Prophylaxis – Adults (General Principles)

The PACE Committee has undertaken a series of reviews of surgical antibiotic prophylaxis (for adults) in all clinical settings. This series, which begins with the General Principles section, will also be accompanied by an FAQ document, to assist and provide rationale for practitioners on the latest evidence-based guidance.

GENERAL PRINCIPLES OF SURGICAL PROPHYLAXIS

1. Antibiotic Dosing

- Cefazolin – 2 g IV x 1 dose

Additional / Alternative Antibiotics

- Ceftriaxone 1 g IV x 1 dose
- Gentamicin or tobramycin 4.5 mg/kg IV x 1 dose -based on ideal body weight (IBW); use dosing weight (DW) if body weight > 20% above IBW.
IBW (females) = 45.5 kg + [2.3 kg x each inches (2.54 cm) over 5 feet (152 cm)]
IBW (males) = 50 kg + [2.3 kg x each inches (2.54 cm) over 5 feet (152 cm)]
Malnourished: (Actual Body Weight [ABW] < IBW): use ABW
Obese: (ABW >20% above IBW or BMI ≥ 30 kg/m²): use Dosing Weight (DW): 0.4 (ABW-IBW) + IBW
- Metronidazole 500 mg IV x 1 dose
- Piperacillin-tazobactam 3.375 g IV x 1 dose
- Vancomycin 15 mg/kg IV x 1 dose- based on total body weight, rounded to the nearest 500 mg [round to nearest 250 mg dose] - Suggested dosing:
Weight less than 70 kg, vancomycin 1 g IV
Weight 71-90 kg, vancomycin 1.25 g IV
Weight 91-100 kg, vancomycin 1.5 g IV
Weight greater than 100 kg, vancomycin 15 mg/kg IV to a maximum of 2 g
Oral regimens – see specific recommendations

2. Timing of Pre-operative Antibiotic Administration

- a. Administer cefazolin, ceftriaxone, gentamicin or tobramycin within 60 minutes prior to incision or procedure
- b. Administer vancomycin within 60-120 minutes prior incision or procedure depending on dose and duration of infusion (see below)
- c. Complete all antibiotic administration(s) before incision or procedure begins.

3. Antibiotic IV Duration

Cefazolin	2 g dose: administer IV push (over 3-5 min.) OR dilute dose in a 50-100 mL minibag and infuse over 15-30 min.
<i>Additional /Alternative Agents for Surgical Prophylaxis</i>	
Ceftriaxone	1 g IV – administer IV push (over 5 min.) OR dilute dose in a 50-100 mL minibag and infuse over 15-30 min.
Gentamicin or tobramycin	4.5 mg/kg IV – Infuse over 30 minutes
Metronidazole	500 mg - infuse over 20 minutes
Piperacillin-tazobactam	3.375 g – infuse over 30 minutes
Vancomycin	1 g dose - infuse over 60 minutes >1 – 1.5 g dose – infuse over 90 minutes > 1.5 g dose – infuse over 120 minutes

4. Intraoperative Re-Dosing

- a. Intraoperative re-dosing recommended for prolonged procedures or major blood loss (> 1.5 L). For traumatic wounds, intraoperative blood loss could be assessed using packed red blood cell requirements.
- b. Intraoperative re-dosing regimens

Cefazolin	Q4H
Metronidazole	Q8H
Vancomycin	Q8H

5. Post-operative Antibiotic Prophylaxis

- a. International guidelines (American College of Surgeons and Surgical Infection Society, US Centers for Disease Control, World Health Organization) recommend AGAINST routine administration of post-operative antibiotics due to lack of evidence for their benefit and potential promotion of antimicrobial resistance. *For contaminated surgeries or surgery performed during an active infection, postoperative antibiotics represent treatment NOT prophylaxis.*
- b. If post-operative antibiotic prophylaxis is administered in selected patients, duration should not exceed 24 hours.

6. Beta-lactam antibiotic allergy

- a. Most beta-lactam antibiotic allergic patients can safely receive cefazolin. Consider pre-operative beta-lactam allergy evaluation and potential delabeling in patients reporting a beta-lactam antibiotic allergy (see PACE Beta-lactam Antibiotic Delabeling Toolkit).

- b. For further guidance on management of beta-lactam allergic patients, refer to Appendix 1- Safety of Cefazolin for Surgical Prophylaxis in Beta-lactam Allergic Patient and Appendix 2 - Beta-Lactam Antibiotic Cross Allergy Chart.
- c. **Note:** If documented allergy to cefazolin or severe non-IgE- mediated reaction to any beta-lactam antibiotic (interstitial nephritis, hepatitis, hemolytic anemia, serum sickness, severe cutaneous allergic reactions [e.g. Stevens-Johnson syndrome (SJS), toxic epidermal necrolysis (TEN), drug rash with eosinophilia & systemic symptoms (DRESS)]), use alternative agents:
 - vancomycin for Gram positive coverage
 - gentamicin for Gram negative coverage(GI/GU procedures)
 - metronidazole for anaerobic coverage(GI procedures)

7. Previous methicillin-resistant *Staphylococcus aureus* (MRSA) infection or colonization

For patients with previous MRSA infection or colonization, it is reasonable to add vancomycin to cefazolin prophylaxis, for some procedure especially in cardiac or orthopedic surgeries or surgeries involving medical devices. *Note: Vancomycin alone is less effective than cefazolin for preventing surgical site infections due to methicillin susceptible S. aureus (MSSA).*

- 8.** There is **NO** benefit of continuing prophylactic antimicrobials until all drains/catheters (intravascular/urinary) are removed.

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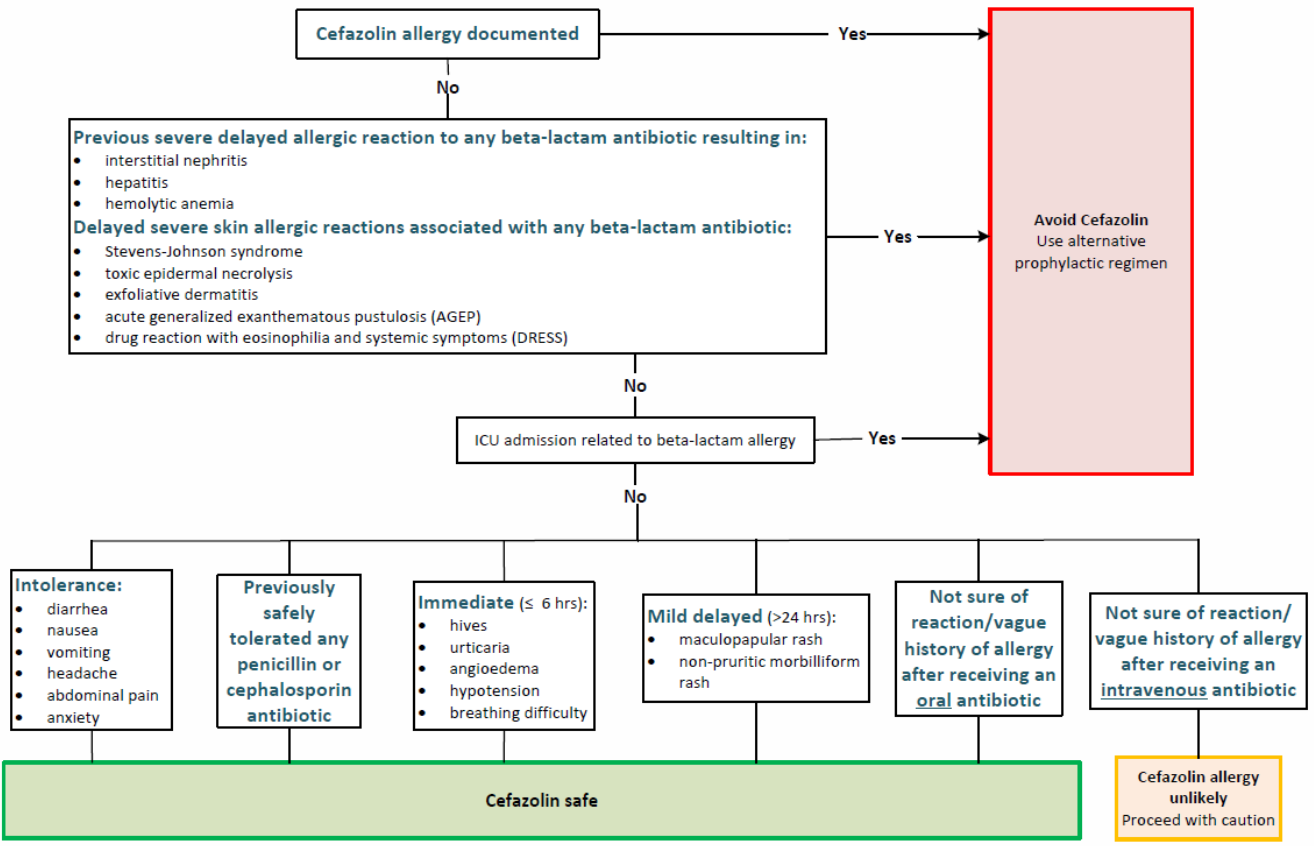
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Appendix 1. Safety of Cefazolin in Beta-lactam Antibiotic Allergy



Appendix 2. Beta-lactam Antibiotic Cross-Allergy

Beta-lactam Antibiotic Cross-Allergy Chart																			
Beta-lactams	AMOXICILLIN*	AMPICILLIN	CLOXACILLIN	PENICILLIN	PIPERACILLIN*	CEFADROXIL	CEFAZOLIN	CEPHELEXIN	CEFOXITIN	CEFPROZIL	CEFUROXIME	CEFIXIME	CEFOTAXIME	CEFTAZIDIME	CEFTRIAXONE	CEFEPIME	ERTAPENEM	IMPENEM	MEROPENEM
AMOXICILLIN*	Black	X ¹	X ⁵	X ⁴	X ³	X ¹	✓	X ¹	✓	X ²	✓	✓	✓	✓	✓	✓	✓	✓	✓
AMPICILLIN	X ¹	Black	X ⁵	X ⁴	X ³	X ²	✓	X ²	✓	X ²	✓	✓	✓	✓	✓	✓	✓	✓	✓
CLOXACILLIN	X ⁵	X ⁵	Black	X ⁵	X ⁵	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PENICILLIN	X ⁴	X ⁴	X ⁵	Black	X ⁵	✓	✓	✓	X ³	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PIPERACILLIN*	X ³	X ³	X ⁵	X ⁵	Black	X ³	✓	X ³	✓	X ³	✓	✓	✓	✓	✓	✓	✓	✓	✓
CEFADROXIL	X ¹	X ²	✓	✓	X ³	Black	✓	X ¹	✓	X ²	✓	✓	✓	✓	✓	✓	✓	✓	✓
CEFAZOLIN	✓	✓	✓	✓	✓	Black	Black	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CEPHELEXIN	X ¹	X ²	✓	✓	X ³	X ¹	Black	Black	✓	X ²	✓	✓	✓	✓	✓	✓	✓	✓	✓
CEFOXITIN	✓	✓	✓	X ³	✓	✓	Black	Black	✓	✓	X ²	✓	✓	✓	✓	✓	✓	✓	✓
CEFPROZIL	X ²	X ²	✓	✓	X ³	X ²	✓	X ²	✓	Black	✓	✓	✓	✓	✓	✓	✓	✓	✓
CEFUROXIME	✓	✓	✓	✓	✓	✓	✓	✓	X ²	✓	Black	X ³	X ¹	X ³	X ¹	X ²	✓	✓	✓
CEFIXIME	✓	✓	✓	✓	✓	✓	✓	✓	✓	X ³	Black	Black	X ³	X ³	X ³	✓	✓	✓	✓
CEFOTAXIME	✓	✓	✓	✓	✓	✓	✓	✓	✓	X ¹	X ³	Black	Black	X ³	X ¹	X ¹	✓	✓	✓
CEFTAZIDIME	✓	✓	✓	✓	✓	✓	✓	✓	✓	X ³	X ³	X ³	Black	Black	X ³	X ³	✓	✓	✓
CEFTRIAXONE	✓	✓	✓	✓	✓	✓	✓	✓	✓	X ¹	X ³	X ¹	X ³	Black	Black	X ¹	✓	✓	✓
CEFEPIME	✓	✓	✓	✓	✓	✓	✓	✓	✓	X ²	X ³	X ¹	X ³	X ¹	Black	Black	✓	✓	✓
ERTAPENEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Black	X ⁵	X ⁵
IMPENEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Black	Black	X ⁵
MEROPENEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Black	Black	Black

* Also applies to beta-lactamase inhibitor combinations (amoxicillin-clavulanate and piperacillin-tazobactam)

- AVOID ALL beta-lactam antibiotics if:**
- ICU admission related to allergy
 - Delayed beta-lactam antibiotic allergy causing:
 - interstitial nephritis
 - hepatitis
 - hemolytic anemia
 - Delayed severe skin allergic reactions:
 - Stevens-Johnson syndrome
 - toxic epidermal necrolysis
 - exfoliative dermatitis
 - acute generalized exanthematous pustulosis (AGEP)
 - drug reaction with eosinophilia and systemic symptoms (DRESS)

LEGEND:	
Penicillins	
1st Generation Cephalosporins	
2nd Generation Cephalosporins	
3rd Generation Cephalosporins	
4th Generation Cephalosporins	
Carbapenems	
✓	Different structure. CONSIDERED SAFE TO PRESCRIBE
Reaction likely based on side chain:	
X ¹	Same side chain - clinical evidence of cross reaction. DO NOT PRESCRIBE
X ²	Same side chain - Theoretical risk of cross reaction, no clinical studies. DO NOT PRESCRIBE
X ³	Similar side chain - Potential for cross reaction. DO NOT PRESCRIBE
Reaction likely based on Beta-lactam ring	
X ⁴	Clinical evidence of cross reaction. DO NOT PRESCRIBE
X ⁵	Theoretical risk of cross reaction, no clinical studies. DO NOT PRESCRIBE

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Note: This best practice recommendation was adapted from the 2021 Interior Health, Pre-operative Regimens for Surgical Prophylaxis guidelines (with permission)