

## SHC Antimicrobial Prophylaxis in Surgery Recommendations

**Table 1. Antibiotic Recommendations for Surgical Prophylaxis**

Surgical Procedure Type	Preferred Antibiotic(s) <sup>1</sup> (Includes patients with Type 1 PCN Allergy <sup>2</sup> )	Type 1 Cephalosporin Allergy <sup>1-2</sup>
<b>Cardiac, vascular, thoracic</b>	Cefazolin <sup>3</sup>	Vancomycin
<b>Cardiac, LVAD</b>	Cefepime + Daptomycin	Aztreonam + Daptomycin
<b>GI, gastroduodenal, biliary tract, non-obstructed small bowel</b>	Cefazolin (prophylaxis) or Ceftriaxone (acute infection <sup>4</sup> or gross contamination)	Vancomycin + Tobramycin
<b>GI, appendectomy, colorectal<sup>5</sup>, obstructed small bowel</b>	Cefazolin + Metronidazole (prophylaxis) or Ceftriaxone + Metronidazole (acute infection <sup>4</sup> or gross contamination)	Levofloxacin + Metronidazole Clindamycin + Tobramycin ± Metronidazole <sup>6</sup> (OB/GYN patients)
<b>Gynecologic, cesarean section, hysterectomy</b>	Cefazolin	Clindamycin + Tobramycin
<b>Gynecologic, cancer procedures</b>	Cefazolin ± Metronidazole <sup>6</sup>	Clindamycin + Tobramycin ± Metronidazole <sup>6</sup>
<b>Head &amp; Neck</b> • Non-mucosal (skin/ear/sinonasal) • Through mucous membranes	• Cefazolin • Cefazolin + Metronidazole	• Clindamycin • Clindamycin
<b>Neurosurgery</b>	Cefazolin (add Vanco if MRSA +)	Vancomycin
<b>Orthopedic</b>	Cefazolin (add Vanco if MRSA +)	Vancomycin
<b>Spinal</b>	Cefazolin (add Vanco if MRSA +)	Vancomycin ± Tobramycin <sup>7</sup>
<b>Urologic<sup>8-9</sup></b> <b>e.g. Pubovaginal sling procedures, nephrectomy</b> Note: For urologic procedures such as prostatic biopsy, TURP, <b>a preoperative urine culture</b> is recommended and prophylaxis is based on culture results	Cefazolin • <u>Involving bowel:</u> Add Metronidazole • <u>Involving prosthesis:</u> Add Tobramycin	Vancomycin + Tobramycin • <u>Involving bowel:</u> Levofloxacin + Metronidazole • <u>Involving prosthesis:</u> Vancomycin + Tobramycin
<b>Other General Surgery</b> e.g. hernia repair, plastic surgery (e.g. breast procedures without reconstruction) • With reconstruction involving implant or tissue expander	Cefazolin • <u>With reconstruction involving implant or tissue expander consider adding tobramycin</u> +/- Tobramycin	Vancomycin • <u>With reconstruction involving implant or tissue expander consider adding tobramycin:</u> +/- Tobramycin

1. **Consider the addition of a single pre-op dose of Vancomycin for all patients with known MRSA colonization.** Per P&P#30097.99, MRSA nasal swab routinely done for patients undergoing neurosurgical, orthopedic, and spinal procedures.
2. **Type 1 Allergy:** Signs and symptoms include anaphylaxis, difficulty swallowing or breathing, facial swelling/angioedema, and immediate hives within 60 minutes of medication administration. **Note: delayed hives, rash is not an indication for using alternative agents. CEFAZOLIN is a SAFE alternative in Type 1 PCN Allergy.**
3. In cardiac surgeries where surveillance data show MSSA as a cause of surgical-site infections despite cefazolin prophylaxis, cefuroxime may be considered as an alternative.
4. Ceftriaxone + Metronidazole is the preferred treatment for community-acquired intra-abdominal infection. Refer to the SHC Disease State Guidelines for more information.
5. For most patients, a mechanical bowel preparation combined with oral neomycin sulfate + oral erythromycin base or oral neomycin sulfate + oral metronidazole should be given in addition to IV prophylaxis.
6. Add metronidazole to Cefazolin or Clindamycin + Tobramycin (Cephalosporin allergy) when expanded anaerobic coverage needed (i.e. bowel/colon involvement, bowel/vaginal contamination, fecal spillage, cytoreductive surgery).
7. Consider addition of Tobramycin if involving lower lumbar and sacral spine or if surveillance data shows gram-negative organisms are a cause of surgical-site infections.
8. **These are empiric recommendations in the absence of pre-operative urine cultures or when cultures are negative.**
9. **Fluoroquinolones, e.g. Ciprofloxacin or Levofloxacin, are generally not recommended due to reduced susceptibilities to *E. Coli* isolates at SHC.**

**Table 2. Antibiotic Dosing and Re-dosing Recommendations**

Antibiotic	Initial Dose	Repeat Pre-op Dose If Dosed >1 hr prior to incision	Re-dosing: For longer procedures <sup>a</sup> <u>or</u> blood loss > 1.5 L
Aztreonam	2 g	1 g	4 hrs: 2 g
Cefazolin	2 g 3 g (if >120 kg)	1 g	4 hrs: 2 g
Cefepime	2 g	1 g	4 hrs: 2g
Cefoxitin	2 g	1 g	2 hrs: 2 g
Ceftriaxone	2 g	NA	NA
Cefuroxime	1.5 g	750 mg	4 hrs: 1.5 g
Clindamycin	900 mg	300 mg	6 hrs: 900 mg
Daptomycin	6 mg/kg	NA	NA
Tobramycin <sup>b</sup>	7mg/kg (CrCl > 30) 2 mg/kg (CrCl < 30)	NA	NA
Levofloxacin <sup>c</sup>	500 - 750 mg	NA	12 hrs: 500 mg
Metronidazole <sup>c</sup>	500 mg	NA	8 hrs: 500 mg
Piperacillin-tazobactam (Zosyn)	4.5 g	4.5 g	2 hrs: 4.5 g
Vancomycin <sup>c</sup>	20 mg/kg (max 2 g)	NA	NA
<b><i>Oral antibiotics for colorectal surgery prophylaxis (used in conjunction with mechanical bowel preparation)</i></b>			
Erythromycin base	1 g	NA	NA
Metronidazole	1 g	NA	NA
Neomycin	1 g	NA	NA

<sup>a</sup> The time of the first dose of the prophylactic antimicrobial agent determines the timing of the repeat dose.

<sup>b</sup> High-dose tobramycin prophylaxis (7 mg/kg) only needs to be given once pre-operatively. This approach exploits the concentration-dependent killing and post-antibiotic effect of aminoglycosides, and is as efficacious as traditional dosing with less nephrotoxicity.

<sup>c</sup> Vancomycin, levofloxacin, & metronidazole administration should begin within 60-120 minutes of incision.

**General Principles:**

- Antibiotic Selection:** Please refer to Table 1 for recommended antibiotic choices according to surgical procedure. The recommendations take into account current guidelines, as well as local susceptibility patterns. *Consider the addition of Vancomycin for all patients with known colonization with MRSA.*
- Antibiotic Dose:** Please refer to Table 2 for recommendations on dosing and re-dosing. If there is excessive intra-operative blood loss (i.e. >1500 mL), re-dosing earlier than specified may be warranted (with the exception of Vancomycin and aminoglycosides).
- Antibiotic Timing:** Pre-operative antibiotics should be administered within 60 minutes prior to incision. For antibiotics requiring prolonged infusions (e.g. Vancomycin, fluoroquinolones, & metronidazole), we recommend starting the infusion 60-120 minutes prior to incision.
- Post-op Antibiotic Prophylaxis:** Antibiotic prophylaxis should not exceed 24 hours after the end of procedure (with the exception of cardiothoracic procedures where up to 48 hours may be acceptable). In many procedures, no doses after incision closure are necessary. For vancomycin specifically if 24h of prophylaxis is desired, administer second dose 12h after first pre-op dose for CrCL≥40. For CrCL<40 no additional doses are needed.

*The above guidelines are recommendations based on available literature and are not intended to replace clinical judgement.*

References:

1. Berrios-Torres SI, Umscheid CA, Bratzler DW, et al. Centers for Disease Control and Prevention Guidelines for the Prevention of Surgical Site Infection, 2017. *JAMA Surg.* 2017; 152(8):784-791.
2. Bratzler DW, Dellinger EP, Olsen KM, et al. Clinical practice guidelines for antimicrobial prophylaxis in surgery. *AM J Health-Syst Pharm.* 2013; 70:195-283.
3. Pichichero M, Zagursky R. Penicillin and Cephalosporin Allergy. *Ann Allergy Asthma Immunol.* 2014; 112: 404-412.
4. The American Society of Breast Surgeons. Consensus Guideline on Preoperative Antibiotics and Surgical Site Infection in Breast Surgery. 2014
5. Edwards FH, Engelman RM, Houck P, et al. The Society of Thoracic Surgeons Practice Guideline Series: Antibiotic Prophylaxis in Cardiac Surgery, Part I: Duration. *Ann Thorac Surg* 2006; 81: 397-404