



SURGICAL ANTIMICROBIAL PROPHYLAXIS RECOMMENDATIONS

I. TABLE OF CONTENTS

Introduction & Considerations	
Introduction	Considerations
Dosing and Re-dosing Guidelines	
Patients >50 kg (Adult and Pediatric)	Patients ≤50 kg (Adult and Pediatric)
Surgical Antimicrobial Prophylaxis Guidelines by Procedure	
Breast and Axillary	Cardiothoracic
Gastrointestinal	Genitourinary
Head and Neck	Neurosurgical
Obstetrical and Gynecological	Ophthalmic
Orthopedic	Plastic Surgery
Radiology	Solid Organ Transplant
Thoracic (non-cardiac)	Vascular
Footnotes & References	
Footnotes	References

II. INTRODUCTION

The use of peri-operative antimicrobials has become an essential component of the standard of care for certain surgical procedures and can result in a reduced risk of post-operative infection when sound and appropriate principles are utilized. However, the benefit of antimicrobial prophylaxis must be weighed against the risks of toxic and allergic reactions, emergence of resistant bacteria, drug interactions, super-infection, and cost.

III. CONSIDERATIONS FOR ANTIMICROBIAL PROPHYLAXIS

Goal: Administer antimicrobial prophylaxis to achieve serum and tissue levels of antimicrobial at the time of incision and for the duration of the operation, that are in excess of the minimum inhibitory concentration (MIC) needed for organisms that may be encountered during the procedure.

- a. Antimicrobial prophylaxis should be administered if there is a risk of infection in the absence of a prophylactic agent; clean procedures rarely require prophylaxis unless high risk procedure, including implantation of prosthetic material.
 - i. Clean procedures are defined as those with no acute inflammation or transection of gastrointestinal, oropharyngeal, genitourinary, biliary, or respiratory tracts (elective cases, no technique break).
- b. The activity of the chosen prophylactic agent(s) should encompass the most common pathogens associated with the surgical procedure and consider local susceptibility data, but need not cover every likely pathogen.
- c. The prophylactic agent must be administered in a dose which provides an effective tissue concentration prior to incision / intra-operative bacterial contamination.
 - i. In most instances, a single intravenous dose of an antimicrobial agent provides adequate tissue concentrations around the time of anesthesia induction and throughout the operation.
 1. Antimicrobial agent infusion should begin 15-60 minutes before the incision with the exception of vancomycin, levofloxacin, ciprofloxacin, gentamicin, azithromycin and fluconazole. These infusions should begin 45-90 minutes before the incision and infused over 60-120 minutes as indicated for adults and pediatrics (See following tables).
 2. In adult patients, cefazolin (2 g if <120 kg, 3 g if ≥120 kg) and vancomycin (1 g if <80 kg, 1.5 g if ≥80 kg) dosing is based on weight. Adult patients <50 kg should refer to Patients <50 kg (Adult and Pediatric) Dosing recommendations for dosing. Weight-based dosing is recommended for all antibiotics in patients <50 kg.
 3. Infusion duration and time to redosing for recommended prophylactic antimicrobials are summarized for adults and pediatrics.
 4. **All prophylactic antimicrobials should be discontinued after the intra-operative period, unless otherwise specified.**
 - a. Data have not supported subsequent doses after surgical closure and may increase the risk of *Clostridium difficile* and antimicrobial resistance.
 - b. A longer duration of antimicrobials may be indicated if concomitant infection is present at the time of surgery.

BREAST AND AXILLARY PROCEDURES			
Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
Excisional biopsies	None	Not recommended	Not recommended
Wire Localized Breast Biopsy, Re-excision lumpectomy, Sentinel (SLN) alone, Lumpectomy & SLN, Axillary Lymph Node Dissection, Mastectomy (Total or Modified Radical)	<i>S. aureus</i> <i>S. epidermidis</i>	Adult: Cefazolin OR Cefuroxime	Adult: Clindamycin OR Vancomycin

CARDIOTHORACIC PROCEDURES

Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
<p>Cardiac surgery with implants</p> <ul style="list-style-type: none"> • Aortic grafts • Prosthetic valves <p>Deep Hypothermic Circulatory Arrest (DHCA)</p> <p><i>(Some procedures may be included in SCIP, and appropriate antibiotic selection is linked to hospital reimbursement)</i></p>	<p><i>S. aureus</i></p> <p><i>S. epidermidis</i></p> <p>gram-negative bacilli</p>	<p><u>Adults:</u></p> <p>Vancomycin + Cefuroxime</p> <p>Continue post-op for 24-48 hours</p> <p>Vancomycin dosing modification and duration:</p> <p>CrCl >50 mL/min regardless of weight: Vancomycin 1,000 mg IV q12h x3 doses</p> <p>CrCl ≤50 mL/min and weight ≤80 kg: Vancomycin 1,000 mg IV q24h x1 dose</p> <p>CrCl ≤50 mL/min and weight ≥80 kg: Vancomycin 1,500 mg IV q24h x1 dose</p> <p><u>Pediatrics:</u></p> <p>Cefazolin</p>	<p><u>Adults:</u></p> <p><i>Any allergy to cefuroxime OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i></p> <p>Vancomycin + Gentamicin</p> <p>Continue vancomycin post-op for 24-48 hours; Gentamicin redosing not recommended given decreased excretion following cardiopulmonary bypass</p> <p><i>Alternative if any allergy to cefuroxime OR high-risk allergy²/contraindication³ to any beta-lactam⁴ and SCr 2 mg/dL or CrCL <40 mL/min:</i></p> <p>Vancomycin + Levofloxacin</p> <p>Continue vancomycin post-op for 24-48 hours; Levofloxacin redosing not indicated given long half-life, especially with renal impairment</p> <p><i>Alternative to vancomycin if true vancomycin allergy (not Red-Man's):</i></p> <p>Daptomycin</p> <p>Continue post-op for 24-48 hours</p> <p><u>Pediatric:</u></p> <p><i>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i></p> <p>Clindamycin</p>

CARDIOTHORACIC PROCEDURES

<p>Cardiac surgery without implants</p> <ul style="list-style-type: none"> CABG alone <p><i>(Some procedures may be included in SCIP, and appropriate antibiotic selection is linked to hospital reimbursement)</i></p>	<p><i>S. aureus</i> <i>S. epidermidis</i></p>	<p><u>Adults:</u> Vancomycin + Cefuroxime</p> <p>Continue post-op for 24-48 hours</p> <p>Vancomycin dosing modification and duration: CrCl >50 mL/min regardless of weight: Vancomycin 1,000 mg IV q12h x3 doses CrCl ≤50 mL/min and weight ≤80 kg: Vancomycin 1,000 mg IV q24h x1 dose CrCl ≤50 mL/min and weight ≥80 kg: Vancomycin 1,500 mg IV q24h x1 dose</p>	<p><u>Adults:</u> Any allergy to cefuroxime OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Vancomycin + Gentamicin</p> <p>Continue vancomycin post-op for 24-48 hours; Gentamicin redosing not recommended given decreased excretion following cardiopulmonary bypass</p> <p><i>Alternative to gentamicin if SCr 2 mg/dL or CrCL <40 mL/min:</i> Vancomycin + Levofloxacin</p> <p>Levofloxacin redosing not indicated given long half-life, especially with renal impairment</p> <p><i>Alternative to vancomycin if true vancomycin allergy (not Red-Man's):</i> Daptomycin</p> <p>Continue post-op for 24-48 hours</p>
<p>Congenital heart repair procedures requiring an open sternum postoperatively</p>	<p><i>S. aureus</i> <i>S. epidermidis</i> gram-negative bacilli</p>	<p><u>Pediatric:</u> Cefazolin</p>	<p><u>Pediatric:</u> Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Clindamycin</p>

CARDIOTHORACIC PROCEDURES			
<p>Pacemaker or AICD placement or revision</p> <p><i>(Some procedures may be included in SCIP, and appropriate antibiotic selection is linked to hospital reimbursement)</i></p>	<p><i>S. aureus</i></p> <p><i>S. epidermidis</i></p>	<p><u>Adults:</u></p> <p>Cefazolin</p> <p>Continue post-op for 24 hours</p>	<p><u>Adult:</u></p> <p><i>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴ or history of MRSA infection or colonization:</i></p> <p>Vancomycin</p> <p><i>Alternative to vancomycin if true vancomycin allergy (not Red-Man's):</i></p> <p>Daptomycin</p> <p>Continue post-op for 24-48 hours</p>
		<p><u>Pediatrics:</u></p> <p>Cefazolin</p>	<p><u>Pediatric:</u></p> <p><i>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i></p> <p>Clindamycin</p>
<p>Heart transplant</p>	<p><i>S. aureus</i></p> <p><i>S. epidermidis</i></p> <p>gram-negative bacilli</p>	<p><u>Adults:</u></p> <p>Vancomycin + Cefuroxime</p> <p>Continue post-op for 48 hours. If definitive cultures are available, continue antibiotics and tailor regimen</p> <p>Vancomycin dosing modification and duration:</p> <p>CrCl >50 mL/min regardless of weight: Vancomycin 1 g IV q12h x3 doses</p> <p>CrCl ≤50 mL/min and weight ≤80 kg: Vancomycin 1 g IV q24h x1 dose</p> <p>CrCl ≤50 mL/min and weight ≥80 kg: Vancomycin 1.5 g IV q24h x1 dose</p>	<p><u>Adults:</u></p> <p><i>Any allergy to cefuroxime OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i></p> <p>Vancomycin + Levofloxacin</p> <p>Continue post-op for 48 hours. If definitive cultures are available, continue antibiotics and tailor regimen</p> <p><i>Alternative to vancomycin if true vancomycin allergy (not Red-Man's):</i></p> <p>Daptomycin</p> <p>Continue post-op for 24-48 hours</p>
		<p><u>Pediatrics:</u></p> <p>Cefazolin</p>	<p><u>Pediatric:</u></p> <p><i>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i></p> <p>Clindamycin</p>

CARDIOTHORACIC PROCEDURES

<p>Left Ventricular Assist Device (LVAD)</p>	<p><i>S. aureus</i> <i>S. epidermidis</i> <i>Candida</i> spp. enteric gram-negatives</p>	<p><u>Adults:</u> Vancomycin + Cefuroxime</p> <p>Vancomycin dosing modification and duration: CrCl >50 mL/min regardless of weight: Vancomycin 1 g IV q12h x3 doses CrCl ≤50 mL/min and weight ≤80 kg: Vancomycin 1 g IV q24h x1 dose CrCl ≤ 50ml/min and weight ≥80 kg: Vancomycin 1.5 g IV q24h x1 dose</p> <p>Continue vancomycin for 48-hours post-op.</p> <p>Start rifampin 600 mg PO/IV q24h, levofloxacin 500 mg PO/IV q24h and fluconazole 400 mg PO/IV q24h post-procedure and continue for 48 hours from OR or from chest closure in case of delayed chest closure.</p> <p>If definitive cultures are available, continue antibiotics and tailor regimen</p>	<p><u>Adults:</u> <i>Any allergy to cefuroxime OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Vancomycin + Levofloxacin</p> <p>Continue vancomycin for 48-hours post-op.</p> <p>Start rifampin 600 mg PO/IV q24h, levofloxacin 500 mg PO/IV q24h and fluconazole 400 mg PO/IV q24h post-procedure and continue for 48 hours from OR or from chest closure in case of delayed chest closure.</p> <p>If allergies or intolerances to vancomycin, rifampin or fluconazole, consultation with Infectious Diseases is recommended.</p> <p>If definitive cultures are available, continue antibiotics and tailor regimen</p>
		<p><u>Pediatrics:</u> Cefazolin</p>	<p><u>Pediatric:</u> <i>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin</p>

GASTROINTESTINAL PROCEDURES

Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
<p>Appendectomy (non-perforated)</p>	<p>Enteric gram-negative bacilli Enterococci anaerobes (Bacteroides spp., Clostridia) <i>S. aureus</i></p>	<p>Adults: Cefazolin + Metronidazole (Intravenous metronidazole is on backorder and currently unavailable. Please use alternative option below) OR Cefoxitin</p> <p>Pediatrics: Cefoxitin OR Piperacillin-tazobactam</p>	<p>Adults: <i>Any allergy to cefazolin or ceftioxin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin + Levofloxacin OR Clindamycin + Aztreonam <i>Reserve aminoglycoside-based regimens for patients with intolerance to alternative recommendations or history of documented multi-drug resistant pathogen. If risk factors for acute renal failure present, avoid aminoglycosides if alternative options available:</i> Clindamycin + Gentamicin</p> <p>Pediatrics: Clindamycin + Gentamicin</p>
<p>Colon and anorectal procedures NOT requiring antibiotic prophylaxis:</p> <ul style="list-style-type: none"> Evaluation under anesthesia, fulguration of warts, high resolution anoscopy, dilation of stricture, anal biopsy EUA for fistula placement of seton Fistulotomy, simple (NOT a Sargis plug or advancement flap) Transanal resection of fibroepithelial or pedunculated polyp 	<p>None</p>	<p>Prophylaxis Not Recommended</p>	<p>Prophylaxis Not Recommended</p>

GASTROINTESTINAL PROCEDURES

<p>Splenectomy</p>	<p><i>S. aureus</i> <i>S. epidermidis</i></p>	<p>Adults: Cefazolin OR Cefuroxime</p>	<p>Adults: Clindamycin OR Vancomycin</p>
<p>Colorectal Procedures Not limited to, but including the following:</p> <ul style="list-style-type: none"> • Colon & rectal resection • High, complex fistula by Surgisis plug or advancement flap • Lateral sphincterotomy for anal fissure • Hemorrhoidectomy • Transanal resection for sessile polyp, villous adenoma, possible T1 malignancy • Rectal prolapse procedure (Altmeier or abdominal rectosigmoid resection/rectopexy) <p><i>(Some procedures may be included in SCIP, and appropriate antibiotic selection is linked to hospital reimbursement)</i></p>	<p>Enteric gram-negative bacilli Enterococci anaerobes (<i>Bacteroides</i> spp., <i>Clostridia</i>) <i>S. aureus</i></p>	<p>Adults: Cefazolin + Metronidazole (Intravenous metronidazole is on backorder and currently unavailable. Please use alternative option below) OR Cefoxitin</p> <p>Optional oral regimens in combination with IV therapy: Neomycin 1,000 mg PO + Erythromycin base 1,000 mg PO; give at 19, 18, and 9h before surgery OR Neomycin 1,000 mg PO + Metronidazole 500 mg PO; give at 19, 18, and 9 h before surgery</p>	<p>Adults: <i>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin + Levofloxacin OR Clindamycin + Aztreonam</p> <p><i>Reserve aminoglycoside-based regimens for patients with intolerance to alternative recommendations or history of documented multi-drug resistant pathogen. If risk factors for acute renal failure present, avoid aminoglycosides if alternative options available:</i> Clindamycin + Gentamicin</p>

GASTROINTESTINAL PROCEDURES

		<p><u>Pediatrics:</u> Cefoxitin</p> <p>Optional oral regimens: Neomycin 20 mg/kg/dose PO + Metronidazole 10 mg/kg/dose PO</p> <p>OR</p> <p>Neomycin 20 mg/kg/dose + Erythromycin base 20 mg/kg/dose</p>	<p><u>Pediatrics:</u> Cefazolin + Metronidazole (Intravenous metronidazole is on backorder and currently unavailable. Please use alternative option below)</p> <p>OR</p> <p>Clindamycin + Gentamicin</p>
<p>Esophageal, gastric surgery, G-tube; peg tube</p> <p>(See small bowel for gastric bypass and gastrectomy)</p> <p>ADULTS - Prophylaxis recommended for high risk patients, including diabetes, morbid obesity, cancer, gastric bleeding, gastric outlet obstruction, gastroduodenal perforation, esophageal obstruction, decreased gastric acidity or gastrointestinal motility, morbid obesity</p>	<p>Upper airway flora (aerobic, anaerobic Streptococci)</p> <p><i>S. aureus</i></p> <p>more rarely aerobic gram-negative bacilli</p>	<p><u>Adults:</u> Cefazolin</p>	<p><u>Adults:</u> Clindamycin</p> <p>OR</p> <p>Vancomycin</p>
		<p><u>Pediatrics:</u> Cefazolin</p>	<p><u>Pediatrics:</u> Clindamycin</p> <p>OR</p> <p>Vancomycin</p>

GASTROINTESTINAL PROCEDURES

<p>Hepatic, biliary tract, pancreatic including cholecystectomy and gallbladder procedures, cystgastrostomy (excluding low-risk laparoscopic cholecystectomy*)</p> <p>*ADULTS – Prophylaxis recommend for high risk patients only, including age >70 years, non-functioning gall bladder, emergency procedures, diabetes, acute cholecystitis, obstructive jaundice or common duct stones</p>	<p>Enteric gram-negative bacilli (e.g., <i>E. coli</i>, <i>Klebsiella</i>)</p> <p>Enterococci</p> <p><i>S. aureus</i></p> <p>anaerobes (<i>Bacteroides</i> spp., <i>Clostridia</i>) common with stents, biliary obstruction</p>	<p><u>Adults:</u></p> <p>Cefazolin + Metronidazole (Intravenous metronidazole is on backorder and currently unavailable. Please use alternative option below)</p> <p>OR</p> <p>Cefoxitin</p> <p>Also option for Whipple Pancreaticoduodenectomy with biliary stents: Ampicillin/Sulbactam</p>	<p><u>Adults:</u></p> <p>Any allergy to cefazolin or cefoxitin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</p> <p>Clindamycin + Levofloxacin</p> <p>OR</p> <p>Clindamycin + Aztreonam</p> <p>Reserve aminoglycoside-based regimens for patients with intolerance to alternative recommendations or history of documented multi-drug resistant pathogen. If risk factors for acute renal failure present, avoid aminoglycosides if alternative options available:</p> <p>Clindamycin + Gentamicin</p>
		<p><u>Pediatrics:</u></p> <p>Cefoxitin</p> <p>OR</p> <p>Piperacillin-tazobactam (for biliary atresia repair)</p>	<p><u>Pediatrics:</u></p> <p>Clindamycin + Gentamicin</p>
<p>Small bowel, gastric bypass, gastrectomy</p>	<p>Enteric gram-negative bacilli</p> <p>Enterococci</p> <p>anaerobes (<i>Bacteroides</i> spp., <i>Clostridia</i>)</p> <p><i>S. aureus</i></p>	<p><u>Adults:</u></p> <p>Cefazolin + Metronidazole (Intravenous metronidazole is on backorder and currently unavailable. Please use alternative option below)</p> <p>OR</p> <p>Cefoxitin</p>	<p><u>Adults:</u></p> <p>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</p> <p>Clindamycin + Levofloxacin</p> <p>OR</p> <p>Clindamycin + Aztreonam</p> <p>Reserve aminoglycoside-based regimens for patients with intolerance to alternative recommendations or history of documented</p>

GASTROINTESTINAL PROCEDURES

			<p><i>multi-drug resistant pathogen. If risk factors for acute renal failure present, avoid aminoglycosides if alternative options available:</i></p> <p>Clindamycin + Gentamicin</p>
		<p><u>Pediatrics:</u> Cefoxitin OR Piperacillin-tazobactam (for biliary atresia repair)</p>	<p><u>Pediatrics:</u> Clindamycin + Gentamicin</p>
<p>Hernia repair (hernioplasty-prosthetic mesh repair of hernia; herniorrhaphy-suture repair of hernia)</p>	<p><i>S. aureus</i> <i>S. epidermidis</i></p>	<p><u>Adults:</u> Cefazolin</p>	<p><u>Adults:</u> Clindamycin OR Vancomycin</p>
		<p><u>Pediatrics:</u> Cefazolin</p>	<p><u>Pediatrics:</u> Clindamycin OR Vancomycin</p>

GENITOURINARY PROCEDURES

Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
<p>Urinary Tract Instrumentation*</p> <p>Consider Prophylaxis <u>ONLY</u> in patients with risk factors: Cystography, urodynamic study, simple cystourethroscopy, shock wave lithotripsy</p> <p>Risk Factors Include</p> <ul style="list-style-type: none"> • Poor functional status/frailty • anatomic anomalies of urinary tract • chronic steroid use • immunocompromising condition or recent systemic chemotherapy 	<p>Enteric gram-negative bacilli</p>	<p><u>Adults:</u> TMP-SMX (Bactrim®) 1 DS PO, ideally 1-4 hrs prior</p> <p>OR</p> <p>Amoxicillin-clavulanate 875 mg PO, ideally 2-4 hrs prior</p> <p>OR</p> <p>Cefazolin</p>	<p><u>Adults:</u> Gentamicin 5 mg/kg IV x1 OR 120 mg IM</p> <p>OR</p> <p>Ciprofloxacin 500 mg PO 1-2 hrs prior or 400 mg IV</p>
<p>Prophylaxis recommended for: Ureteroscopy +/-stent placement Cystourethroscopy with manipulation including:</p> <ul style="list-style-type: none"> • transurethral resection of bladder tumor and prostate, • any biopsy, resection, fulguration, foreign body removal, urethral dilation or urethrotomy • any ureteral instrumentation including catheterization or stent placement/removal • submucosal injection (e.g., Botulinum toxin) <p>*The following procedures do not require infusion of IV antibiotics timed for 15-30 min prior, but can be given directly before the procedure, as they are intended for prevention for post-procedural UTI: bladder biopsy; botox injection; cystolitholapaxy; cystoscopy with fulguration, microplastique, bladder neck incision or retrograde pyelogram; hydrodistention; ureteral stent placement and removal; ureteroscopy.</p>	<p><i>E. coli</i></p> <p><i>Proteus spp.</i></p> <p><i>Klebsiella spp.</i></p>	<p><u>Adults:</u> Cefazolin 2,000 mg IV/IM; 3,000 mg IV/IM if ≥120 kg</p>	<p><u>Adults:</u> Gentamicin 5 mg/kg IV x1 OR 120 mg IM</p> <p>OR</p> <p>TMP-SMX (Bactrim®) 1 DS PO x1</p> <p>OR</p> <p>Ciprofloxacin 500 mg PO or 400 mg IV</p> <p><u>Pediatrics:</u> Cefoxitin</p> <p>OR</p> <p>Gentamicin ± Ampicillin</p> <p>OR</p> <p>TMP-SMX (Bactrim®)</p>

GENITOURINARY PROCEDURES

<p>Percutaneous nephrolithotomy (PCNL)</p> <p>High risk features include:</p> <ul style="list-style-type: none"> • Positive urine culture within 2-4 weeks • Residual stone with prior positive stone culture • Current indwelling ureteral stent or nephrostomy tube • Severe hydronephrosis • Continuous intermittent catheterization • Renal transplant or other severe immunocompromising condition • Neurogenic bladder (with or without urinary diversion) • Urinary Diversion • Chronic indwelling catheters (Foley or SP tube) 	<p><i>S. aureus</i></p> <p><i>S. epidermidis</i></p> <p>enteric gram-negative bacilli</p> <p><i>Anaerobes</i></p>	<p><u>Adults w/o high risk features</u></p> <p>No antibiotics in days preceding PCNL</p> <p>Ampicillin-sulbactam prior to procedure</p> <p>Antibiotics should not be continued >24 hours unless there is concern for post-procedural sepsis</p> <p><u>Adults w/high risk features:</u></p> <p>Recommend early ID consultation in anticipation of PCNL</p> <p>Tailored oral antibiotics 3-5 days prior to PCNL, discuss w/ID if no oral option available</p> <p>Tailored IV antibiotic prophylaxis directly prior to procedure</p> <p>Antibiotics only to continue >24 hrs after procedure for sepsis/complicated UTI due to residual infected stone</p>	<p><u>Adults:</u></p> <p>Any allergy to penicillins OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</p> <p>Vancomycin + Gentamicin</p> <p>OR</p> <p>Clindamycin ± Gentamicin</p> <p>If patient allergic to gentamicin or has SCr >1.5 mg/mL, use Aztreonam instead of gentamicin</p>
		<p><u>Pediatrics:</u></p> <p>Ampicillin-sulbactam</p>	<p><u>Pediatrics :</u></p> <p>Clindamycin + Gentamicin</p>

GENITOURINARY PROCEDURES

PROSTATE BIOPSY			
Prostate brachytherapy	<p><i>S. aureus</i></p> <p><i>S. epidermidis</i></p> <p><i>Streptococci spp.</i></p>	<p>Adults:</p> <p>Cefazolin</p>	<p>Adults:</p> <p>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</p> <p>Vancomycin</p> <p>OR</p> <p>Clindamycin</p>
Transperineal prostate biopsy	None	Prophylaxis Not Recommended	Prophylaxis Not Recommended
Transrectal prostate biopsy	<p><i>E. coli</i></p> <p><i>Proteus spp.</i></p> <p><i>Klebsiella spp.</i></p>	<p>Adults:</p> <p>Rectal Swab Performed:</p> <p><i>Ciprofloxacin sensitive:</i></p> <p>Ciprofloxacin 500 mg PO 1 hour prior to procedure and 500 mg PO 12 hours after the first dose</p> <p>OR</p> <p>Levofloxacin 750 mg PO 1 hour prior to procedure</p> <p><i>TMP-SMX (Bactrim™) sensitive:</i></p> <p>TMP-SMX 1 DS PO 1 hour before procedure and 1 DS 12 hours after the first dose</p> <p><i>Ciprofloxacin resistant and TMP-SMX resistant:</i></p> <p>Cefazolin 2,000 mg IM; 3,000 mg IM if ≥120 kg</p> <p><i>Ciprofloxacin, TMP-SMX, and cefazolin resistant:</i></p> <p>Ceftriaxone 1,000 mg IM</p> <p>No Rectal Swab Performed:</p> <p>Gentamicin 120 mg IM</p> <p>+ Ciprofloxacin 500 mg PO 1 hour prior to procedure and 500 mg PO 12 hours after the first dose</p> <p>OR</p> <p>Gentamicin 120 mg IM</p> <p>+ Levofloxacin 750 mg PO 1 hour prior to procedure</p>	<p>Adults:</p> <p>Rectal Swab Performed:</p> <p>Allergic or resistant to ceftriaxone, cefazolin, ciprofloxacin, & TMP-SMX:</p> <p>Gentamicin 120 mg IM or 5 mg/kg IV x1 (ideal body weight)</p> <p>If isolated pathogen is resistant to ciprofloxacin, gentamicin, cefazolin, and ceftriaxone then antimicrobials should be chosen based on organism susceptibilities</p> <p>No Rectal Swab Performed:</p> <p>Cefazolin 2,000 mg IM; 3,000 mg IM if ≥120 kg</p> <p>+ Ciprofloxacin 500 mg PO 1 hour prior to procedure and 500 mg PO 12 hours after the first dose</p> <p>OR</p> <p>Cefazolin 2,000 mg IM; 3,000 mg IM if ≥120 kg</p> <p>+ Levofloxacin 750 mg PO 1 hour prior to procedure</p>

GENITOURINARY PROCEDURES			
OPEN, LAPAROSCOPIC, ROBOTIC SURGERY			
<p>Adrenalectomy, Retroperitoneal/pelvic lymphadenectomy without entering the urinary tract</p>	<p><i>S. aureus</i> <i>S. epidermidis</i> <i>Streptococci spp.</i></p>	<p><u>Adults:</u> Cefazolin</p>	<p><u>Adults:</u> Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Vancomycin</p>
<p>Circumcision</p>	<p>Staphylococci</p>	<p><u>Adults:</u> None unless diabetes mellitus or other risk factors; then Cefazolin</p>	<p><u>Adults:</u> Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Vancomycin</p>
		<p><u>Pediatrics:</u> No antibiotic prophylaxis in healthy neonates; otherwise: Cefazolin or Amoxicillin</p>	<p><u>Pediatrics:</u> Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵: Clindamycin</p>
<p>Genitourinary procedures involving small or large intestine Including urinary diversions, cystectomy with small bowel conduit, uretero-pelvic junction repair, colon conduits, etc.</p>	<p><i>S. aureus</i> <i>S. epidermidis</i> Streptococci Enteric gram-negative bacilli</p>	<p><u>Adults:</u> Cefazolin 2,000 mg IV/IM; 3,000 mg if ≥120 kg + Metronidazole 500 mg IV (Intravenous metronidazole is on backorder and currently unavailable. Please use alternative option below)</p> <p>OR</p> <p>Cefoxitin</p> <p>Optional oral antimicrobials in combination with above prophylaxis recommendations: neomycin sulfate + erythromycin base OR neomycin sulfate + metronidazole</p>	<p><u>Adults:</u> Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Levofloxacin 500 mg IV/PO + Metronidazole (Intravenous metronidazole is on backorder and currently unavailable. Please use alternative option below)</p> <p>If history of MRSA infection or colonization: Vancomycin + Gentamicin +Clindamycin</p> <p>Optional oral antimicrobials in combination with above prophylaxis recommendations: neomycin sulfate + erythromycin base OR neomycin sulfate + metronidazole</p>

GENITOURINARY PROCEDURES			
		Pediatrics: Cefoxitin	Pediatrics: Ampicillin-sulbactam OR Clindamycin + Gentamicin
Penile prosthesis insertion, removal, & revision	<i>Staphylococci spp.</i> Enteric gram-negative bacilli	Adults: Cefazolin + Gentamicin + Fluconazole OR Vancomycin + Gentamicin + Fluconazole Antibiotics should not be continued >24 hours post-operatively unless there is concern for sepsis	Adults: Any allergy to cefazolin OR high-risk allergy ² /contraindication ³ to any beta- lactam ⁴ or if history of MRSA infection or colonization AND SCr >1.5 mg/dL: Vancomycin + Aztreonam + Fluconazole
Testicular implants	<i>Staphylococci spp.</i> <i>Enteric gram-negative bacilli</i>	Adults: Cefazolin + Gentamicin OR Vancomycin + Gentamicin	Adults: Any allergy to cefazolin OR high-risk allergy ² /contraindication ³ to any beta- lactam ⁴ or if history of MRSA infection or colonization AND SCr >1.5 mg/dL: Vancomycin + Aztreonam
Implanted prosthetic devices Artificial urinary sphincter and sacral nerve stimulators	Staphylococci enteric gram-negative bacilli	Adults: Cefazolin + Gentamicin OR Vancomycin + Gentamicin	Adults: Vancomycin + Aztreonam
		Pediatrics: Cefoxitin + Gentamicin	Pediatrics: Cefoxitin OR Ampicillin-sulbactam

GENITOURINARY PROCEDURES			
			<p>Any allergy to cefoxitin or penicillins OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</p> <p style="text-align: center;">Vancomycin + Gentamicin</p>
<p>Vaginal urologic surgery Including urethral sling, fistulae repair, urethral diverticulectomy, urethropexy</p> <p>Open or laparoscopic procedure involving entry into the urinary tract Including urethroplasty; stricture repair including urethrectomy. Nephrectomy, partial or otherwise, urethrectomy, pyeloplasty, radical prostatectomy, partial cystectomy</p>	<p><i>Enterococci spp.</i></p> <p>Enteric gram-negative bacilli.</p> <p><i>S. aureus</i></p> <p><i>S. epidermidis</i></p> <p><i>Streptococci spp.</i> (vaginal surgery mostly)</p>	<p>Adults:</p> <p style="text-align: center;">Cefazolin</p>	<p>Adults:</p> <p>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</p> <p style="text-align: center;">Levofloxacin 500 mg IV/PO</p> <p>If history of MRSA infection or colonization:</p> <p style="text-align: center;">Vancomycin + Aztreonam</p>
		<p>Pediatrics:</p> <p style="text-align: center;">Cefazolin</p>	<p>Pediatrics:</p> <p style="text-align: center;">Cefoxitin</p> <p style="text-align: center;">OR</p> <p style="text-align: center;">Ciprofloxacin</p>
<p>Vasectomy</p>	<p><i>Staphylococci spp.</i></p> <p>Enteric gram-negative bacilli</p>	<p>NOTE: Some experts do not recommend prophylaxis for all vasectomy cases. Prophylaxis may be considered based on complexity of procedure and comorbidities of patient.</p> <p>Adults:</p> <p style="text-align: center;">Cefazolin</p>	<p>Adults:</p> <p>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴ or if history of MRSA infection or colonization:</p> <p style="text-align: center;">Vancomycin + Aztreonam</p>
<p>Inguinal and scrotal cases Including radical orchiectomy, reversals, varicoelectomy, hydrocelectomy</p>	<p><i>Staphylococci spp.</i></p> <p>Enteric gram-negative bacilli</p>	<p>Adults:</p> <p style="text-align: center;">Cefazolin</p>	<p>Adults:</p> <p>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴ or if history of MRSA infection or colonization:</p> <p style="text-align: center;">Vancomycin + Aztreonam</p>

GENITOURINARY PROCEDURES			
		<u>Pediatrics:</u> Cefazolin	<u>Pediatrics:</u> Clindamycin
Medoidioplasty	<i>S.aureus</i> <i>Streptococcus</i>	<u>Adults:</u> Cefazolin	<u>Adults:</u> Clindamycin

OBSTETRICAL AND GYNECOLOGICAL PROCEDURES			
Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
Cesarean section	Enteric gram-negative bacilli Anaerobes Group B Streptococci Enterococci	<p><u>Adult:</u></p> <p>Not in Labor: Cefazolin</p> <p>In Labor (contractions with cervical dilation or membrane rupture): Cefazolin + Azithromycin 500 mg IV</p>	<p><i>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Not in Labor: <i>GBS screen negative or GBS screen positive and clindamycin sensitive:</i> Clindamycin + Gentamicin 5 mg/kg IV x1 (adjusted body weight) <i>GBS screen positive and clindamycin resistant:</i> Vancomycin + Gentamicin 5 mg/kg IV x1 (adjusted body weight)</p> <p>In Labor (contractions with cervical dilation or membrane rupture): <i>GBS screen negative, or GBS screen positive and clindamycin sensitive, or GBS unknown:</i> Clindamycin + Azithromycin 500 mg IV + Gentamicin 5 mg/kg IV x1 (adjusted body weight) <i>GBS screen positive and clindamycin resistant:</i> Vancomycin + Azithromycin 500 mg IV + Gentamicin 5 mg/kg IV x1 (adjusted body weight)</p>
Vaginal hysterectomy Abdominal hysterectomy Laposcopic or robotic hysterectomy (including supracervical hysterectomy) Urogynecology procedures including those involving mesh Enterocoele repair	Enteric gram-negative bacilli Anaerobes Group B Streptococci Enterococci	<p><u>Adult:</u></p> <p>Cefazolin + Metronidazole (Intravenous metronidazole is on backorder and currently unavailable. Please use alternative option below)</p> <p>Cefoxitin</p>	<p><u>Adult:</u></p> <p><i>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin + Gentamicin 5 mg/kg IV x1 (if pregnant, use adjusted body weight; otherwise, use ideal body weight) OR Clindamycin + Aztreonam</p>

OBSTETRICAL AND GYNECOLOGICAL PROCEDURES

<p>Hysterosalpingogram or Chromotubation (In patients with no history of PID, HSG can be performed without prophylactic antibiotics. If HSG shows dilated fallopian tubes, antibiotic prophylaxis should be given)</p>	<p>Chlamydia</p>	<p><u>No history of PID:</u> No antibiotics <u>History of PID:</u> Doxycycline 100 mg PO x1 <u>Dilated fallopian tubes:</u> Doxycycline 100 mg PO BID x5 days</p>	
<p>MVA Suction D&C procedures D&E procedures</p>	<p>Anaerobes</p>	<p><u>Adult:</u> Doxycycline 100 mg PO one hour before procedure OR Azithromycin 1 g prior to procedure</p>	
<p>Cerclage</p>	<p>Enteric gram-negative bacilli Anaerobes Group B Streptococci Enterococci</p>	<p><u>Planned:</u> Prophylaxis Not Recommended <u>Emergent:</u> Ampicillin-sulbactam</p>	<p><i>Low/medium-risk⁵ penicillin allergy:</i> <i>Emergent:</i> Cefazolin <i>Any allergy to penicillins and cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> <i>Emergent:</i> Clindamycin + Gentamicin 5 mg/kg IV x1 (if pregnant, use adjusted body weight; otherwise, use ideal body weight) OR Clindamycin + Aztreonam</p>
<p>Laparoscopy or laparotomy that is not accompanied by hysterectomy Conization of cervix Vulvectomy (simple) Laser treatment to vulva or perineum Cystocele and rectocele repair Perineorrhaphy WITHOUT mesh</p>	<p>None</p>	<p>Prophylaxis Not Recommended</p>	<p>Prophylaxis Not Recommended</p>

HEAD AND NECK PROCEDURES			
Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
Clean, non-contaminated procedures (i.e., thyroidectomy, lymph node excision)	None	Not recommended	Not recommended
Clean contaminated head and neck surgery (incision through oral, pharyngeal, or nasal mucosa) ⁶	Oral anaerobes enteric gram-negative bacilli <i>S. aureus</i> <i>S. epidermidis</i> viridans streptococci	Adults: Ampicillin-sulbactam	Adults: Low/medium-risk ² penicillin allergy: Cefazolin + Metronidazole-Clindamycin (Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure) Any allergy to penicillins and cefazolin OR high-risk allergy ² /contraindication ³ to any beta-lactam ⁴ : Levofloxacin + Metronidazole-Clindamycin (Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure)
		Pediatrics: Ampicillin-sulbactam	Pediatrics: Clindamycin
Clean procedure with insertion of a prosthesis (including BAHA hearing device)	<i>S. aureus</i> <i>S. epidermidis</i>	Adults: Cefazolin	Adults: Clindamycin OR Vancomycin
		Pediatrics: Cefazolin	Pediatrics: Clindamycin OR Vancomycin
Skull base, lateral or posterior approach procedures (including cochlear implants)	<i>S. aureus</i> <i>S. epidermidis</i>	Adults: Cefuroxime	Adults: Clindamycin

HEAD AND NECK PROCEDURES			
	<i>S. pneumoniae</i>	OR Ampicillin-sulbactam	
		<u>Pediatrics:</u> Cefuroxime	<u>Pediatrics:</u> Clindamycin
Skull base, anterior approach including transphenoidal surgery for pituitary tumors	<i>S. aureus</i> <i>S. epidermidis</i> gram-negative bacilli	<u>Adults:</u> Ampicillin-sulbactam If history of MRSA infection or colonization: + Vancomycin	<u>Adults:</u> <i>Low/medium-risk² penicillin allergy:</i> Ceftriaxone + Metronidazole-Clindamycin (Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure) <i>If history of MRSA infection or colonization:</i> + Vancomycin <i>Any allergy to penicillins and cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Vancomycin + Aztreonam + Metronidazole-Clindamycin (Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure)

HEAD AND NECK PROCEDURES

Pediatrics:
[Clindamycin](#)
+ [Cefuroxime](#)

Pediatrics:
[Vancomycin](#)

NEUROSURGICAL PROCEDURES			
Nature of operation	Likely pathogens	Recommended regimen ^a	Alternative regimen ^a
Craniotomy VP shunts & other prosthetic material Spine implantable devices <i>(Some procedures may be included in SCIP, and appropriate antibiotic selection is linked to hospital reimbursement)</i>	<i>S. aureus</i> <i>S. epidermidis</i>	Adults: Cefazolin	Adults: Vancomycin
		Pediatrics: TMP-SMX (Bactrim™)	Pediatrics: Cefazolin OR Vancomycin
Discography <i>(Intradiscal antimicrobial prophylaxis is not endorsed by the UMHS Pharmacy and Therapeutics Committee and should not be used.)</i>	<i>S. aureus</i> <i>S. epidermidis</i>	Adults: Cefazolin	Adults: <i>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin <i>If history of MRSA infection or colonization:</i> Vancomycin
		Pediatrics: Cefazolin	Pediatrics: Clindamycin OR Vancomycin
Skull base, anterior approach including transphenoidal surgery for pituitary tumors	<i>S. aureus</i> <i>S. epidermidis</i> gram-negative bacilli	Adults: Ampicillin-sulbactam If history of MRSA infection or colonization: + Vancomycin	Adults: <i>Low/medium-risk⁵ penicillin allergy:</i> Ceftriaxone + Metronidazole Clindamycin <i>(Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure)</i> If history of MRSA infection or colonization: + Vancomycin <i>Any allergy to penicillins and ceftriaxone/cefotaxime/cefepime OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Vancomycin + Aztreonam + Metronidazole Clindamycin

NEUROSURGICAL PROCEDURES			
			(Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure)
		Pediatrics: Clindamycin + Cefuroxime	Pediatrics: Vancomycin
Skull base, lateral or posterior approach procedures	<i>S. aureus</i> <i>S. epidermidis</i>	Adults: Ampicillin-sulbactam OR Cefuroxime	Adults: Clindamycin
		Pediatrics: Clindamycin + Cefuroxime	Pediatrics: Vancomycin

OPHTHALMIC PROCEDURES

Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
<p>Ophthalmic procedures</p>	<p><i>S. aureus</i> <i>S. epidermidis</i> Streptococci enteric gram-negative bacilli <i>Pseudomonas</i> spp.</p>	<p>Minimal evidence supporting routine use of prophylactic antibiotics for ophthalmic surgery. Discretion advised regarding drug choice, duration, or route of administration.</p>	<p>Gentamicin OR Tobramycin OR Ciprofloxacin OR Gatifloxacin OR Levofloxacin OR Neomycin-Gramicidin-Polymixin B Administer multiple drops topically over 2-72 hrs</p>

ORTHOPEDIC PROCEDURES			
Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
Total joint replacement (Arthroplasty) Implantation of prosthetic material (e.g., intramedullary nails, screw, plates, wires) Hip fracture repair	<i>S. aureus</i> <i>S. epidermidis</i>	Adults: <i>S. aureus</i> nasal screen: - Negative for MRSA - Positive for MSSA - Not performed and in the absence of history of MRSA carriage or infection Cefazolin <i>S. aureus</i> nasal screen: - Positive for MRSA - Not performed, but patient has history of MRSA carriage or infection Vancomycin + Cefazolin Antibiotic prophylaxis should be discontinued within 24 hours following surgery	Adults: Any allergy to cefazolin OR high-risk allergy ² /contraindication ³ to any beta-lactam ⁴ : Vancomycin Alternative to vancomycin if true vancomycin allergy (not Red-Man's): Daptomycin
		Pediatrics: Cefazolin History of MRSA carriage or infection: Vancomycin + Cefazolin	Pediatrics: History of MRSA carriage or infection AND any allergy to cefazolin OR high-risk allergy ² /contraindication ³ to any beta-lactam ⁴ : Vancomycin Allergy as above without history of MRSA carriage or infection: Clindamycin

ORTHOPEDIC PROCEDURES

<p>Open Fracture Repair (Includes upper and lower extremity open fractures)</p>	<p><i>S. aureus</i> <i>Streptococcus</i> <i>gram-negative rods</i></p>	<p><u>Adults:</u> <i>Grade I or II open fracture:</i> Cefazolin Extensive soil exposure (e.g., farming accident) + Metronidazole-Clindamycin (Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure)</p> <p><i>Grade III open fracture:</i> Ceftriaxone Extensive soil exposure (e.g., farming accident) + Metronidazole-Clindamycin (Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure)</p> <p>Antibiotic prophylaxis should be discontinued within 48 hours</p> <hr/> <p><u>Pediatrics:</u> <i>Grade I or II open fracture:</i> Cefazolin Extensive soil exposure (e.g., farming accident) + Metronidazole-Clindamycin (Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure)</p> <p><i>Grade III open fracture:</i> Ceftriaxone Extensive soil exposure (e.g., farming accident) + Metronidazole-Clindamycin (Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure)</p> <p>Antibiotic prophylaxis should be discontinued within 48 hours</p>	<p><u>Adults:</u> <i>Grade I or II open fracture with any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin</p> <p><i>Grade III open fracture with any allergy to ceftriaxone/cefotaxime/cefpodoxime/cefepime OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin + Aztreonam</p> <p>Antibiotic prophylaxis should be discontinued within 48 hours</p> <hr/> <p><u>Pediatrics:</u> <i>Grade I or II open fracture with any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin</p> <p><i>Grade III open fracture with any allergy to ceftriaxone/cefotaxime/cefpodoxime/cefepime OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin + Aztreonam</p> <p>Antibiotic prophylaxis should be discontinued within 48 hours</p>
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ORTHOPEDIC PROCEDURES			
<p>Spinal procedure, with or without instrumentation</p>	<p><i>S. aureus</i> <i>Coagulase negative staphylococci</i> <i>Gram negative bacilli</i></p>	<p><u>Adults:</u> <i>S. aureus</i> nasal screen: - Negative for MRSA - Positive for MSSA - Not performed and in the absence of history of MRSA carriage or infection Cefazolin</p> <p><i>S. aureus</i> nasal screen: - Positive for MRSA - Not performed, but patient has history of MRSA carriage or infection Vancomycin + Cefazolin</p> <p>Patients <i>without</i> instrumentation or drains: Post-operative antibiotics are unnecessary</p> <p>Patients <i>with</i> instrumentation or drains: Antibiotics should be discontinued within 24 hours of surgery</p>	<p><u>Adults:</u> Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Vancomycin</p> <p>Alternative to vancomycin if true vancomycin allergy (not Red-Man's): Daptomycin</p>
		<p><u>Pediatrics:</u> Cefazolin</p> <p>History of MRSA carriage or infection: Vancomycin + Cefazolin</p>	<p><u>Pediatrics:</u> History of MRSA carriage or infection AND any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Vancomycin</p> <p>Allergy as above without history of MRSA carriage or infection: Clindamycin</p>
<p>Sports Medicine (Orthopaedic Surgeries)</p> <p>Implantation of interference screws, suture anchors, permanent sutures, etc.</p>	<p><i>S. aureus</i> <i>Streptococcus</i></p>	<p><u>Adults:</u> Cefazolin</p> <p>History of MRSA infection or colonization: + Vancomycin</p>	<p><u>Adults:</u> Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Clindamycin OR Vancomycin</p>
		<p><u>Pediatrics:</u> Cefazolin</p>	<p><u>Pediatrics:</u> Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Clindamycin OR Vancomycin</p>

REFERENCES

1. Bratzler DW, et al. [Am J Health-Syst Pharm 2013; 70:195-283.](#)
2. Schweizer ML et al. [JAMA 2015; 313:2162-2171.](#)
3. Rodriguez L et al. [J Trauma Acute Care Surg 2013;77:400-408.](#)



SURGICAL ANTIMICROBIAL PROPHYLAXIS RECOMMENDATIONS

PLASTIC SURGERY PROCEDURES

Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
<p>Breast reconstruction (without implants), cosmetic procedures (excluding blepharoplasty), large hand dissections*, phalloplasty, vaginoplasty, and general reconstructive procedures involving medium/large flaps or tissue expanders</p> <p>*Open fractures: see Orthopedic Surgery guidelines</p>	<p><i>S. aureus</i> <i>S. epidermidis</i></p>	<p>Adults: Cefazolin</p> <p>Pediatrics: Cefazolin</p>	<p>Adults: Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Clindamycin</p> <p>Pediatrics: Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Clindamycin</p>
<p>Breast procedures with implants</p>	<p><i>S. aureus</i> <i>S. epidermidis</i></p>	<p>Adults: Cefazolin</p> <p>If history of MRSA infection or colonization: + Vancomycin</p> <p>Pediatrics: Cefazolin</p>	<p>Adults: Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Vancomycin</p> <p>Pediatrics: Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Clindamycin</p>

PLASTIC SURGERY PROCEDURES			
Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
<p>Cleft lip and palate repair, or facial procedures that transect oral, nasal (see rhinoplasty below), or pharyngeal mucosa</p>	<p>Oral anaerobes enteric gram-negative bacilli <i>S. aureus</i> <i>S. epidermidis</i> viridans streptococci</p>	<p><u>Adults:</u> Ampicillin-sulbactam</p>	<p><u>Adults:</u> Low/medium-risk² penicillin allergy: Cefazolin + Metronidazole-Clindamycin (Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure)</p> <p>Low/medium-risk² penicillin allergy PLUS cefazolin allergy, OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Levofloxacin + Metronidazole-Clindamycin (Intravenous metronidazole is on backorder and currently unavailable. Please use clindamycin for this procedure)</p>
		<p><u>Pediatrics:</u> Ampicillin-sulbactam</p>	<p><u>Pediatrics:</u> Any allergy to penicillins OR high-risk allergy²/contraindication³ to any beta-lactam⁴: Clindamycin</p>

PLASTIC SURGERY PROCEDURES

Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
<p>Rhinoplasty/Septorhinoplasty</p>	<p><i>S. aureus</i> <i>S. epidermidis</i> <i>C. acnes</i></p>	<p><u>NOTE</u>: Some experts do not recommend prophylaxis for all procedures. Prophylaxis may be considered based on complexity of procedure and comorbidities of patient.</p> <p>Adults: Ampicillin-sulbactam OR Cefazolin</p>	<p>Adults: <i>Low/medium-risk⁵ penicillin allergy PLUS cefazolin allergy, OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin</p>
		<p>Pediatrics: Ampicillin-sulbactam OR Cefazolin</p>	<p>Pediatrics: <i>Any allergy to penicillins OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin</p>
<p>Open cranial vault reconstruction</p>	<p><i>S. aureus</i> <i>S. epidermidis</i> Oral flora <i>P. aeruginosa</i></p>	<p>Pediatrics: Pre-operative: Piperacillin-tazobactam Post-operative: Ampicillin-sulbactam</p>	<p>Pediatrics: <i>Any allergy to penicillins OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Pre-operative: Clindamycin + Gentamicin Post-operative: Clindamycin</p>
<p>Endoscopic craniofacial procedures and strip craniectomy</p>	<p><i>S. aureus</i> <i>S. epidermidis</i></p>	<p>Pediatrics: Cefazolin</p>	<p>Pediatrics: <i>Any allergy to cefazolin OR high-risk allergy²/contraindication³ to any beta-lactam⁴:</i> Clindamycin</p>

RADIOLOGY PROCEDURES			
Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
T-tube cholangiogram, Diagnostic PTC, PTC tube placement/check/change, TIPS	<i>S. aureus</i> <i>S. epidermidis</i> enteric gram-negative bacilli	Adults: Ceftriaxone OR Ampicillin-sulbactam	Adults: Clindamycin ± Gentamicin If the patient allergic to gentamicin or has SCr >1.5 mg/dL: Clindamycin + Aztreonam
		Pediatrics: Ampicillin-sulbactam	Pediatrics: Clindamycin + Gentamicin
Percutaneous nephrostomy tube change/check/placement	<i>S. aureus</i> <i>S. epidermidis</i> enteric gram-negative bacilli anaerobes (<i>Bacteroides</i> spp., <i>Clostridia</i> spp.)	Adults: Ampicillin-sulbactam	Adults: Clindamycin ± Gentamicin If the patient allergic to gentamicin or has SCr >1.5 mg/dL: Clindamycin + Aztreonam
		Pediatrics: Ampicillin-sulbactam	Pediatrics: Clindamycin + Gentamicin

SOLID ORGAN TRANSPLANT PROCEDURES

Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
Kidney transplant	<i>S. aureus</i>	Adults: Cefazolin	Adults: Vancomycin + Aztreonam
	<i>S. epidermidis</i> enteric gram-negative bacilli	Pediatrics: Cefazolin	Pediatrics: Vancomycin + Aztreonam
Liver transplant	Enteric gram-negative bacilli (e.g., <i>E. coli</i> , <i>Klebsiella</i>)	Adults: Piperacillin-tazobactam	Adults: Vancomycin + Aztreonam
	Enterococci <i>S. aureus</i> anaerobes (<i>Bacteroides</i> , <i>Clostridia</i>)	Pediatrics: Piperacillin-tazobactam	Pediatrics: Vancomycin + Aztreonam
Pancreas transplant and Pancreas-Kidney Transplant	Enteric gram-negative bacilli (e.g., <i>E. coli</i> , <i>Klebsiella</i>) <i>S. aureus</i> anaerobes (<i>Bacteroides</i> , <i>Clostridia</i>)	Adults: Cefoxitin + Fluconazole	Adults: Vancomycin + Aztreonam
Laparoscopic Living Donor Nephrectomy	Staphylococci enteric gram-negative bacilli	Adults: Cefazolin 2,000 mg IV/IM; 3,000 mg if ≥120 kg	Adults: Vancomycin + Aztreonam
Living Donor Liver	Enteric gram-negative bacilli (e.g., <i>E. coli</i> , <i>Klebsiella</i>) Enterococci <i>S. aureus</i> anaerobes (<i>Bacteroides</i> , <i>Clostridia</i>) common with stents, biliary obstruction	Adults: Cefoxitin	Adults: Clindamycin + Aztreonam
For Heart Transplant see Cardiothoracic guideline			
For Lung Transplant see Thoracic (non-cardiac) guideline			

THORACIC (NON-CARDIAC) PROCEDURES

Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
Esophagectomy	<i>S. aureus</i> <i>S. epidermidis</i>	<p>Adults: Cefazolin</p> <p>Pediatrics: Cefazolin</p>	<p>Adults: Vancomycin</p> <p>Pediatrics: Clindamycin</p> <p>OR</p> <p>Vancomycin</p>
Lung transplant	<i>S. aureus</i> aerobic gram-negative bacilli	<p>Adults: Vancomycin + Cefepime</p> <p>All antimicrobials should be discontinued 48 hours post-operatively or until cultures are available</p>	<p>Adults: Vancomycin + Aztreonam</p> <p>All antimicrobials should be discontinued 48 hours post-operatively or until cultures are available</p>
Misc. thoracic procedures	<i>S. aureus</i> <i>S. epidermidis</i>	<p>Adults: Cefazolin</p> <p>Pediatrics: Cefazolin</p>	<p>Adults: Vancomycin</p> <p>Pediatrics: Clindamycin</p> <p>OR</p> <p>Vancomycin</p>

VASCULAR PROCEDURES			
Nature of operation	Likely pathogens	Recommended regimen ¹	Alternative regimen ¹
Open, aortic aneurysm repair Aortic and peripheral aneurysm repair with endovascular stent graft Arterial bypass with prosthetic graft	<i>S. aureus</i> <i>S. epidermidis</i>	Adults: Cefazolin If history of MRSA infection or colonization or if severe β -lactam allergy: Vancomycin	Adults: Clindamycin
		Pediatrics: Cefazolin	Pediatrics: Clindamycin OR Vancomycin
AV grafts (with prosthetic) & fistulas (no prosthetic) with skin flap for vein transposition	<i>S. aureus</i> <i>S. epidermidis</i>	Adults: Cefazolin If history of MRSA infection or colonization or if severe β -lactam allergy: Vancomycin	Adults: Clindamycin
		Pediatrics: Cefazolin	Pediatrics: Clindamycin OR Vancomycin
Carotid endarterectomy with prosthesis or patch	<i>Staph. aureus, Staph. epidermidis</i>	Adults: Cefazolin If history of MRSA infection or colonization: Vancomycin	Adults: Clindamycin OR Vancomycin
		Pediatrics: Cefazolin	Pediatrics: Clindamycin OR Vancomycin
Carotid endarterectomy without prosthesis or patch	None	Not recommended	Not recommended

VASCULAR PROCEDURES

Fistulas (no prosthetic) without skin flaps for vein transposition			
Varicose vein ablation (laser or radio frequency)	None	Not recommended	Not recommended
Vena cava filter placement			
Lower extremity amputation for ischemia	<i>S. aureus</i>	Adults: Cefazolin	Adults: Clindamycin OR Vancomycin
Phlebectomy of varicose veins, stripping of varicose veins, ligation of varicose veins (e.g., Saphenous Vein stripping or ligation)	<i>S. epidermidis</i> enteric gram-negative bacilli <i>Clostridia</i> spp.	Pediatrics: Cefazolin	Pediatrics: Clindamycin OR Vancomycin
Thromboendarterectomy without bypass	<i>S. aureus</i>	Adults: Cefazolin If history of MRSA infection or colonization or if severe β -lactam allergy: Vancomycin	Adults: Clindamycin OR Vancomycin
Arterial bypass with vein graft	<i>S. epidermidis</i>	Pediatrics: Cefazolin	Pediatrics: Clindamycin OR Vancomycin

PATIENTS >50 kg (ADULT AND PEDIATRIC) PRE-OP AND INTRAOPERATIVE ANTIBIOTIC DOSING RECOMMENDATIONS^{7,8,9}				
Antimicrobial	Pre-operative dose¹⁰ Pre-operative dose does not require adjustment for renal dysfunction	Intraoperative re-dosing¹¹ Omit second re-dose in those with CrCl <50 ml/min or on hemodialysis	IV push	Infusion
Ampicillin	2 g	2 g every 2 hours for 2 re-doses	3-5 min ¹²	30 min ¹³
Ampicillin/sulbactam	3 g	3 g every 2 hours for 2 re-doses	3-5 min ¹²	30 min ¹³
Aztreonam	2 g	2 g every 4 hours for 2 re-doses	3-5 min ¹²	30 min ¹³
Cefazolin	2 g if <120 kg, 3 g if ≥120 kg	2 g (3 g if ≥120 kg) every 4 hours for 2 re-doses	3-5 min ¹²	30 min ¹³
Cefuroxime	1.5 g	1.5 g every 4 hours for 2 re-doses	3-5 min ¹²	30 min ¹³
Cefoxitin	2 g	2 g every 2 hours for 2 re-doses	3-5 min ¹²	30 min ¹³
Cefepime	2 g	2 g every 4 hours for 2 re-doses	3-5 min ¹²	30 min ¹³
Clindamycin	900 mg	900 mg every 6 hours for 2 re-doses	Not Recommended	30 min ¹³
Daptomycin	6 mg/kg ¹⁴	Not Recommended	2 min	30 min ¹³
Piperacillin/tazobactam	4.5 g	4.5 g every 2 hours for 2 re-doses	Not Recommended	30 min ¹³
Metronidazole	500 mg	Not Recommended	Not Recommended	30 min ¹³
Ceftriaxone	2 g	Not Recommended	3-5 min ¹²	30 min ¹³
Gentamicin	5 mg/kg ¹⁵ (ideal body weight)	Not Recommended	Not Recommended	30 min - 60 min
Vancomycin	1 g if <80 kg, 1.5 g if ≥80 kg	1 g (1.5 g if ≥80 kg) every 8 hours for 2 doses	Not Recommended	60 – 120 min
Levofloxacin	500 mg	Not Recommended	Not Recommended	60 min ¹³
Ciprofloxacin	400 mg	Not Recommended	Not Recommended	60 min ¹³
Fluconazole	400 mg	Not Recommended	Not Recommended	120 min ¹³

PATIENTS ≤50 kg (ADULT AND PEDIATRIC) PRE-OP AND INTRAOPERATIVE ANTIBIOTIC DOSING RECOMMENDATIONS^{8,9}

Antibiotic Dose	Recommended Concentration	Infusion Time	Patient Weight in kg												Intraoperative Redosing Interval		
			<2.5	2.5-4.9	5-7.49	7.5-9.9	10-14.9	15-19.9	20-24.9	25-29.9	30-34.9	35-39.9	40-44.9	45-50		>50	
Ampicillin 50 mg/kg (Ampicillin/Sulbactam dosed on ampicillin) max: 2000 mg	1 g/10 mL	Maximum of 200 mg/min	USE TRADITIONAL MG/KG DOSING		250 mg	375 mg	500 mg	750 mg	1000 mg	1250 mg	1500 mg	1750 mg	2000 mg	2000 mg	2000 mg	REFER TO >50 kg DOSING RECOMMENDATIONS	q2h x2 redoses
Aztreonam 30 mg/kg max: 2000 mg	1 g/10 mL	IVP 3-5 minutes			150 mg	225 mg	300 mg	450 mg	600 mg	750 mg	750 mg	1000 mg	1000 mg	1000 mg	1500 mg		q4h x2 redoses
Cefazolin (non-cardiac/redoses) 30 mg/kg max: 2000 mg	1 g/10 mL	IVP 3-5 minutes			150 mg	225 mg	300 mg	450 mg	600 mg	750 mg	750 mg	1000 mg	1000 mg	1000 mg	1500 mg		q4h x2 redoses
Cefazolin ¹¹ (cardiac/SBE ¹⁶) 50 mg/kg max: 2000 mg	1 g/10 mL	IVP 3-5 minutes			250 mg	375 mg	500 mg	750 mg	1000 mg	1250 mg	1500 mg	1750 mg	2000 mg	2000 mg	2000 mg		q4h x2 redoses w/non-cardiac redose value (30 mg/kg)
Cefepime 50 mg/kg max: 2000 mg	1 g/10 mL	3-5 minutes			250 mg	375 mg	500 mg	750 mg	1000 mg	1250 mg	1500 mg	1750 mg	2000 mg	2000 mg	2000 mg		q4h x2 redoses
Cefotaxime 50 mg/kg max: 2000 mg	1 g/10 mL	3-5 minutes			250 mg	375 mg	500 mg	750 mg	1000 mg	1250 mg	1500 mg	1750 mg	2000 mg	2000 mg	2000 mg		q3h x2 redoses
Cefoxitin 40 mg/kg max: 2000 mg	1 g/10 mL	3-5 minutes			200 mg	300 mg	400 mg	600 mg	800 mg	1000 mg	1250 mg	1500 mg	1500 mg	2000 mg	2000 mg		q2 x2 redoses
Ceftriaxone 50 mg/kg max: 2000 mg	40 mg/mL	3-5 minutes			250 mg	375 mg	500 mg	750 mg	1000 mg	1250 mg	1500 mg	1750 mg	2000 mg	2000 mg	2000 mg		None
Cefuroxime 50 mg/kg max: 1500 mg	1 g/10 mL	3-5 minutes			250 mg	375 mg	500 mg	750 mg	1000 mg	1500 mg	1500 mg	1500 mg	1500 mg	1500 mg	1500 mg		q4h x2 redoses
Ciprofloxacin 10 mg/kg max: 400 mg	2 mg/mL	Minimum of 60 minutes			50 mg	75 mg	100 mg	150 mg	200 mg	250 mg	300 mg	350 mg	400 mg	400 mg	400 mg		None
Clindamycin (non-cardiac/redoses) 10 mg/kg max: 900 mg	20 mg/mL	Maximum of 30 mg/min		50 mg	75 mg	100 mg	150 mg	200 mg	250 mg	300 mg	350 mg	400 mg	450 mg	500 mg	q6h x2 redoses		

PATIENTS ≤50 kg (ADULT AND PEDIATRIC) PRE-OP AND INTRAOPERATIVE ANTIBIOTIC DOSING RECOMMENDATIONS^{8,9}

Antibiotic Dose	Recommended Concentration	Infusion Time	Patient Weight in kg												Intraoperative Redosing Interval	
			<2.5	2.5-4.9	5-7.49	7.5-9.9	10-14.9	15-19.9	20-24.9	25-29.9	30-34.9	35-39.9	40-44.9	45-50		>50
Clindamycin ¹¹ (cardiac/SBE ¹⁶ in PCN allergy) 20 mg/kg max: 900 mg	20 mg/mL	Maximum of 30 mg/min	USE TRADITIONAL MG/KG DOSING	100 mg	150 mg	200 mg	300 mg	400 mg	500 mg	600 mg	700 mg	800 mg	900 mg	900 mg	REFER TO >50 kg DOSING RECOMMENDATIONS	<i>Q6h x2 redoses w/non-cardiac redose value (10 mg/kg)</i>
Co-trimoxazole 5 mg/kg TMP Not in infants <2 months max: 160 mg TMP	80 mg SMX: 16 mg TMP/mL 5 ml vial Maximum conc. 1:10	Minimum of 30 minutes		25 mg	37.5 mg	50 mg	75 mg	100 mg	125 mg	150 mg	160 mg	160 mg	160 mg	160 mg		<i>Q6h x2</i>
Fluconazole 6 mg/kg max: 400 mg	2 mg/mL	Maximum of 200 mg/hour		25 mg	40 mg	50 mg	75 mg	100 mg	135 mg	165 mg	200 mg	225 mg	250 mg	285 mg		<i>None</i>
Gentamicin/ Tobramycin 2.5 mg/kg max: 100 mg	10 mg/mL	Minimum of 30 minutes		12.5 mg	20 mg	25 mg	40 mg	50 mg	60 mg	75 mg	90 mg	100 mg	100 mg	100 mg		<i>Q8h x2 redoses</i>
Levofloxacin 10 mg/kg max: 750 mg	5 mg/mL	Minimum of 60 minutes		50 mg	75 mg	100 mg	150 mg	200 mg	250 mg	300 mg	350 mg	400 mg	450 mg	500 mg		<i>None</i>
Metronidazole 15 mg/kg (dosing rounded to be divisible by 5) max: 500 mg	5 mg/mL	Minimum of 30 minutes		75 mg	100 mg	150 mg	200 mg	300 mg	375 mg	450 mg	500 mg	500 mg	500 mg	500 mg		<i>None</i>
Piperacillin/ Tazobactam 100 mg/kg based on Piperacillin max: 3000 mg	100 mg/mL	Minimum of 30 minutes		500 mg	750 mg	1000 mg	1500 mg	2000 mg	2500 mg	3000 mg	3000 mg	3000 mg	3000 mg	3000 mg		<i>Q2h x2 redoses</i>
Vancomycin (cardiac) 10 mg/kg max: 1000 mg	1 g/100 mL	Minimum of 60 minutes		50 mg	75 mg	100 mg	150 mg	200 mg	250 mg	300 mg	350 mg	400 mg	450 mg	500 mg		<i>Q12h x2 redoses</i>
Vancomycin (non-cardiac) 15 mg/kg max: 1000 mg	1 g/100 mL	Minimum of 60 minutes	75 mg	100 mg	150 mg	225 mg	300 mg	375 mg	450 mg	500 mg	500 mg	750 mg	750 mg	<i>Q8h x2 redoses</i>		

IV. FOOTNOTES

- ¹ Refer to Pre-op and Intraoperative Antibiotic Dosing Recommendations Guidelines
 - Guideline includes infusion duration and time to intra-operative redosing
 - All prophylactic antimicrobials should be discontinued after the intra-operative period, unless otherwise specified
 - Adult patients <50 kg should receive antibiotic dosing based on ≤50 kg guideline
 - Pediatrics patients >50 kg should receive antibiotic dosing based on >50 kg guideline
 - Patients <2.5 kg, use traditional mg/kg dosing
 - SIP operative pediatrics procedures include: cardiac, ventriculoperitoneal shunts, and spinal surgery
- ² High-risk allergies include: respiratory symptoms (chest tightness, bronchospasm, wheezing, cough), angioedema (swelling, throat tightness), cardiovascular symptoms (hypotension, dizzy/lightheadedness, syncope/passing out, arrhythmia), anaphylaxis. If a patient has a high-risk allergy to penicillins, cephalosporins, or carbapenems, the only beta-lactam antibiotic that can be safely used without Allergy consult is aztreonam (**if the allergy is to ceftazidime or aztreonam, aztreonam should be avoided as well**). See [β-lactam allergy evaluation and empiric guidance](#) for further information.
- ³ Previous reactions that are contraindications to further beta-lactam use (**except aztreonam, which can be used unless the reaction was to ceftazidime or aztreonam**) unless approved by Allergy: organ damage (kidney, liver), drug-induced immune-mediated anemia/thrombocytopenia/leukopenia, rash with mucosal lesions (Stevens Johnson Syndrome/Toxic Epidermal Necrosis), rash with pustules (acute generalized exanthematous pustulosis), rash with eosinophils and organ injury (DRESS – drug rash eosinophilia and systemic symptoms), rash with joint pain, fever, and myalgia (Serum Sickness). See [β-lactam allergy evaluation and empiric guidance](#) for further information.
- ⁴ Beta-lactam antibiotics include the following antibiotic classes: penicillins, cephalosporins, carbapenems, aztreonam
- ⁵ Low-risk allergies include: pruritus without rash, remote (>10 years) unknown reaction, patient denies allergy but is on record, mild rash with no other symptoms (mild rash: non-urticarial rash that resolves without medical intervention). Medium-risk allergies include: urticaria/hives with no other symptoms, severe rash with no other symptoms (severe rash: requires medical intervention [corticosteroids, anti-histamines] and/or ER visit or hospitalization). See [β-lactam allergy evaluation and empiric guidance](#) for further information.
- ⁶ Deviations may be appropriate for staged procedures. For example, in TMJ replacement cases, ampicillin-sulbactam prior to the oral portion of the procedure followed by cefazolin prior to the neck incision.
- ⁷ Adapted from [Clinical Infectious Diseases 2004;38:1706-15](#) and [Am J Health-Syst Pharm 2013;70](#).
- ⁸ Patients receiving systemic antibiotics prior to procedure should still receive the standard pre-operative antimicrobial prophylaxis with appropriate timing of administration as outlined in the UMHS surgical antimicrobial prophylaxis guidelines. Given the risk of nephrotoxicity, in patients receiving vancomycin or aminoglycosides prior to procedure who need these agents for pre-operative antimicrobial prophylaxis, please consult pharmacy to see if treatment doses can be rescheduled such that administration begins 45-90 minutes prior to incision.
- ⁹ In patients with known colonization or infection with drug-resistant pathogens, the standard pre-operative antimicrobial prophylaxis should generally still be administered unless otherwise specified in procedure-specific guidelines. Please contact the ID approval pager (adults: 30780; pediatrics: 36149) to discuss the case if concerned about: history of a multidrug-resistant organism (e.g., ESBL-producing organism, carbapenem-resistant Enterobacteriaceae, etc.) at the site of the procedure in the previous year OR history of MRSA colonization in the previous year.
- ¹⁰ Infusion Timing:
 - Infusions should begin 15-60 minutes prior to incision for all antimicrobial agents unless listed below:
 - Levofloxacin, ciprofloxacin, vancomycin, gentamicin, azithromycin, and fluconazole, which should begin 45-90 minutes prior to incision.
 - If pre-operative antibiotics have already been administered but incision has been delayed more than 60 minutes beyond the maximum dosing window (i.e., beta-lactam antibiotics started >2 hours prior to incision), consider pre-operative re-dosing for all antibiotics except vancomycin and aminoglycosides. For vancomycin and aminoglycosides, please contact pharmacy to determine if re-dosing is appropriate.
- ¹¹ Redosing should occur with the same initial dose, with the exception of cefazolin and clindamycin when used in cardiac/SBE prophylaxis
- ¹² Reconstituted dose injected directly into vein or via running IV fluids (only if IV piggyback not available).
- ¹³ Intermittent IV infusion
- ¹⁴ Daptomycin should be dosed on actual body weight except in patients with BMI ≥35 kg/m², in which case adjusted body weight should be used.
- ¹⁵ Gentamicin dose should be based on ideal body weight unless actual body weight is less than ideal body weight. Consult pharmacy if patient has severe renal dysfunction.
- ¹⁶ SBE prophylaxis, ACC/AHA 2008 guideline update on valvular heart disease

V. ADDITIONAL REFERENCES

- Milstone A. et al. Timing of Preoperative Antibiotic Prophylaxis: A modifiable risk factor for deep surgical site infections after pediatric spinal fusion. [Pediatr Infect Dis J. 2008 Aug;27\(8\):704-8.](#)
- Kids’ Campaign 2007 Pediatric Webcast Series: Reduce Surgical Complications and Prevent Surgical Site Infections. 5 Million lives Campaign.
- Bratzler DW., Houch PM. Antimicrobial Prophylaxis for Surgery: An Advisory Statement from the National Surgical Infection Prevention Project. [Am J Surg. 2005 Apr;189\(4\):395-404.](#)
- American Academy of Pediatrics: Antimicrobial Prophylaxis in Pediatric Surgical Patients. [Pediatrics. 1984 Sep;74\(3\):437-9.](#)
- Bratzler DW, et al. Clinical practice guidelines for antimicrobial prophylaxis in surgery. [Am J Health Syst Pharm. 2013 Feb 1;70\(3\):195-283.](#)

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The recommendations in this guide are meant to serve as treatment guidelines for use at Michigan Medicine facilities. If you are an individual experiencing a medical emergency, call 911 immediately. These guidelines should not replace a provider’s professional medical advice based on clinical judgment, or be used in lieu of an Infectious Diseases consultation when necessary. As a result of ongoing research, practice guidelines may from time to time change. The authors of these guidelines have made all attempts to ensure the accuracy based on current information, however, due to ongoing research, users of these guidelines are strongly encouraged to confirm the information contained within them through an independent source.

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