



SURGICAL ANTIMICROBIAL PROPHYLAXIS RECOMMENDATIONS

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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 ^a | Alternative regimen ^a |
|---|---|--|--|
| 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> | <u>Adult:</u> Cefazolin OR Cefuroxime | <u>Adult:</u> Clindamycin OR Vancomycin |

CARDIOTHORACIC PROCEDURES

| Nature of operation | Likely pathogens | Recommended regimen ^a | Alternative regimen ^a |
|---|---|--|---|
| <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 allergy³/contraindication⁴ to any beta-lactam⁵:</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 allergy³/contraindication⁴ to any beta-lactam⁵:</i></p> <p>and SCr 2 mg/dL or CrCl <40 mL/min:</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 allergy³/contraindication⁴ to any beta-lactam⁵:</i></p> <p>Clindamycin</p> |

CARDIOTHORACIC PROCEDURES

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|---|---|---|---|
| <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 allergy³/contraindication⁴ to any beta-lactam⁵: 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>Pediatrics:</u> Cefazolin</p> | <p><u>Pediatric:</u> Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵: Clindamycin</p> |

| CARDIOTHORACIC PROCEDURES | | | |
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| <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 allergy³/contraindication⁴ to any beta-lactam⁵ 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 allergy³/contraindication⁴ to any beta-lactam⁵:</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 allergy³/contraindication⁴ to any beta-lactam⁵:</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 allergy³/contraindication⁴ to any beta-lactam⁵:</i></p> <p>Clindamycin</p> |

CARDIOTHORACIC PROCEDURES

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| <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 allergy³/contraindication⁴ to any beta-lactam⁵:</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 allergy³/contraindication⁴ to any beta-lactam⁵:</i> Clindamycin</p> |

GASTROINTESTINAL PROCEDURES

| Nature of operation | Likely pathogens | Recommended regimen ^a | Alternative regimen ^a |
|--|--|---|--|
| <p>Appendectomy (non-perforated)</p> | <p>Enteric gram-negative bacilli Enterococci anaerobes (<i>Bacteroides</i> spp., <i>Clostridia</i>) <i>S. aureus</i></p> | <p>Adults: Cefazolin + Metronidazole</p> <p>OR</p> <p>Cefoxitin</p> | <p>Adults: <i>Any allergy to cefazolin or cefoxitin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</i> Clindamycin + Levofloxacin</p> <p>OR</p> <p>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> |
| <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 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 allergy³/contraindication⁴ to any beta-lactam⁵:</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> |
| | | <p>Pediatrics: Cefoxitin</p> <p>Optional oral regimens: Neomycin 20 mg/kg/dose PO + Metronidazole 10 mg/kg/dose PO OR Neomycin 20 mg/kg/dose + Erythromycin base 20 mg/kg/dose</p> | <p>Pediatrics: Cefazolin + Metronidazole OR Clindamycin + Gentamicin</p> |

GASTROINTESTINAL PROCEDURES

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| <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>Adults:</p> <p>Cefazolin</p> | <p>Adults:</p> <p>Clindamycin</p> <p>OR</p> <p>Vancomycin</p> |
| <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 spp.</i>, <i>Clostridia</i>) common with stents, biliary obstruction</p> | <p>Adults:</p> <p>Cefazolin + Metronidazole</p> <p>OR</p> <p>Cefoxitin</p> <p>Also option for Whipple Pancreaticoduodenectomy with biliary stents: Ampicillin/Sulbactam</p> | <p>Adults:</p> <p>Any allergy to cefazolin or cefoxitin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</p> <p>Clindamycin + Levofloxacin</p> <p>OR</p> <p>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></p> <p>Clindamycin + Gentamicin</p> |
| | | <p>Pediatrics:</p> <p>Cefoxitin</p> <p>OR</p> <p>Piperacillin-tazobactam (for biliary atresia repair)</p> | <p>Pediatrics:</p> <p>Clindamycin + Gentamicin</p> |

GASTROINTESTINAL PROCEDURES

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| Small bowel, gastric bypass, gastrectomy | Enteric gram-negative bacilli Enterococci anaerobes (Bacteroides spp., Clostridia) <i>S. aureus</i> | Adults: Cefazolin + Metronidazole OR Cefoxitin | Adults: Any allergy to cefazolin OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : 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 |
| | | Pediatrics: Cefoxitin OR Piperacillin-tazobactam (for biliary atresia repair) | Pediatrics: Clindamycin + Gentamicin |
| Hernia repair (hernioplasty-prosthetic mesh repair of hernia; herniorrhaphy-suture repair of hernia) | <i>S. aureus</i> <i>S. epidermidis</i> | Adults: Cefazolin | Adults: Clindamycin OR Vancomycin |
| | | Pediatrics: Cefazolin | Pediatrics: Clindamycin OR Vancomycin |

GENITOURINARY PROCEDURES

| Nature of operation | Likely pathogens | Recommended regimen ^a | Alternative regimen ^a |
|--|--------------------------------------|--|--|
| Urinary Tract Instrumentation* | | | |
| <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><u>Pediatrics:</u> Cefazolin</p> | <p><u>Pediatrics:</u> Cefoxitin</p> <p>OR</p> <p>Gentamicin ± Ampicillin</p> <p>OR</p> <p>TMP-SMX (Bactrim®)</p> |

| GENITOURINARY PROCEDURES | | | |
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| <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><small>*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.</small></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>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> 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> 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> <i>Any allergy to penicillins OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</i></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> Cefazolin</p> | <p><u>Pediatrics:</u> Cefoxitin</p> <p>OR</p> <p>Gentamicin ± Ampicillin</p> <p>OR</p> <p>TMP-SMX (Bactrim®)</p> |
| | | <p><u>Pediatrics:</u> Ampicillin-sulbactam</p> | <p><u>Pediatrics :</u> Clindamycin + Gentamicin</p> |

GENITOURINARY PROCEDURES

PROSTATE BIOPSY

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| <p>Prostate brachytherapy</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 allergy³/contraindication⁴ to any beta-lactam⁵: Vancomycin OR Clindamycin</p> |
| <p>Transperineal prostate biopsy</p> | <p>None</p> | <p>Prophylaxis Not Recommended</p> | <p>Prophylaxis Not Recommended</p> |
| <p>Transrectal prostate biopsy</p> | <p><i>E. coli</i> <i>Proteus spp.</i> <i>Klebsiella spp.</i></p> | <p><u>Adults:</u> Rectal Swab Performed: <i>Ciprofloxacin sensitive:</i> Ciprofloxacin 500 mg PO 1 hour prior to procedure and 500 mg PO 12 hours after the first dose OR Levofloxacin 750 mg PO 1 hour prior to procedure <i>TMP-SMX (Bactrim™) sensitive:</i> TMP-SMX 1 DS PO 1 hour before procedure and 1 DS 12 hours after the first dose <i>Ciprofloxacin resistant and TMP-SMX resistant:</i> Cefazolin 2,000 mg IM; 3,000 mg IM if ≥120 kg <i>Ciprofloxacin, TMP-SMX, and cefazolin resistant:</i> Ceftriaxone 1,000 mg IM No Rectal Swab Performed: Gentamicin 120 mg IM + Ciprofloxacin 500 mg PO 1 hour prior to procedure and 500 mg PO 12 hours after the first dose OR Gentamicin 120 mg IM + Levofloxacin 750 mg PO 1 hour prior to procedure</p> | <p><u>Adults:</u> Rectal Swab Performed: Allergic or resistant to ceftriaxone, cefazolin, ciprofloxacin, & TMP-SMX: Gentamicin 120 mg IM or 5 mg/kg IV x1 (ideal body weight) If isolated pathogen is resistant to ciprofloxacin, gentamicin, cefazolin, and ceftriaxone then antimicrobials should be chosen based on organism susceptibilities No Rectal Swab Performed: Cefazolin 2,000 mg IM; 3,000 mg IM if ≥120 kg + Ciprofloxacin 500 mg PO 1 hour prior to procedure and 500 mg PO 12 hours after the first dose OR Cefazolin 2,000 mg IM; 3,000 mg IM if ≥120 kg + Levofloxacin 750 mg PO 1 hour prior to procedure</p> |

| GENITOURINARY PROCEDURES | | | |
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| OPEN, LAPAROSCOPIC, ROBOTIC SURGERY | | | |
| Adrenalectomy, Retroperitoneal/pelvic lymphadenectomy without entering the urinary tract | <i>S. aureus</i> <i>S. epidermidis</i> <i>Streptococci spp.</i> | <u>Adults:</u> Cefazolin | <u>Adults:</u> Any allergy to cefazolin OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Vancomycin |
| Circumcision | Staphylococci | <u>Adults:</u> None unless diabetes mellitus or other risk factors; then Cefazolin | <u>Adults:</u> Any allergy to cefazolin OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Vancomycin |
| | | <u>Pediatrics:</u> No antibiotic prophylaxis in healthy neonates; otherwise: Cefazolin or Amoxicillin | <u>Pediatrics:</u> Any allergy to cefazolin OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Clindamycin |
| Genitourinary procedures involving small or large intestine Including urinary diversions, cystectomy with small bowel conduit, uretero-pelvic junction repair, colon conduits, etc | <i>S. aureus</i> <i>S. epidermidis</i> Streptococci Enteric gram-negative bacilli | <u>Adults:</u> Cefazolin 2,000 mg IV/IM; 3,000 mg if ≥120 kg + Metronidazole 500 mg IV OR Cefoxitin Optional oral antimicrobials in combination with above prophylaxis recommendations: neomycin sulfate + erythromycin base OR neomycin sulfate + metronidazole | <u>Adults:</u> Any allergy to cefazolin OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Levofloxacin 500 mg IV/PO + Metronidazole If history of MRSA infection or colonization: Vancomycin + Gentamicin Optional oral antimicrobials in combination with above prophylaxis recommendations: neomycin sulfate + erythromycin base OR neomycin sulfate + metronidazole |
| | | <u>Pediatrics:</u> Cefoxitin | <u>Pediatrics:</u> Ampicillin-sulbactam OR Clindamycin + Gentamicin |

| GENITOURINARY PROCEDURES | | | |
|--|--|---|---|
| <p>Penile prosthesis insertion, removal, & revision</p> | <p><i>Staphylococci spp.</i> Enteric gram-negative bacilli</p> | <p>Adults: Cefazolin + Gentamicin + Fluconazole</p> <p>OR</p> <p>Vancomycin + Gentamicin + Fluconazole</p> <p>Antibiotics should not be continued >24 hours post-operatively unless there is concern for sepsis</p> | <p>Adults: <i>Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵ or if history of MRSA infection or colonization AND SCr >1.5 mg/dL:</i> Vancomycin + Aztreonam + Fluconazole</p> |
| <p>Testicular implants</p> | <p><i>Staphylococci spp.</i> Enteric gram-negative bacilli</p> | <p>Adults: Cefazolin + Gentamicin</p> <p>OR</p> <p>Vancomycin + Gentamicin</p> | <p>Adults: <i>Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵ or if history of MRSA infection or colonization AND SCr >1.5 mg/dL:</i> Vancomycin + Aztreonam</p> |
| <p>Implanted prosthetic devices Artificial urinary sphincter and sacral nerve stimulators</p> | <p>Staphylococci enteric gram-negative bacilli</p> | <p>Adults: Cefazolin + Gentamicin</p> <p>OR</p> <p>Vancomycin + Gentamicin</p> <hr/> <p>Pediatrics: Cefazolin + Gentamicin</p> | <p>Adults: Vancomycin + Aztreonam</p> <hr/> <p>Pediatrics: Cefoxitin OR Ampicillin-sulbactam</p> <p><i>Any allergy to cefoxitin or penicillins OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</i> Vancomycin + Gentamicin</p> |

| GENITOURINARY PROCEDURES | | | |
|--|--|---|--|
| <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><u>Adults:</u> Cefazolin</p> | <p><u>Adults:</u> Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵: Levofloxacin 500 mg IV/PO</p> <p>If history of MRSA infection or colonization: Vancomycin + Aztreonam</p> |
| | | <p><u>Pediatrics:</u> Cefazolin</p> | <p><u>Pediatrics:</u> Cefoxitin</p> <p>OR</p> <p>Ciprofloxacin</p> |
| <p>Vasectomy</p> | <p><i>Staphylococci spp.</i></p> <p>Enteric gram-negative bacilli</p> | <p><u>NOTE:</u> 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><u>Adults:</u> Cefazolin</p> | <p><u>Adults:</u> Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵ or if history of MRSA infection or colonization: Vancomycin + Aztreonam</p> |
| <p>Inguinal and scrotal cases Including radical orchiectomy, reversals, varicolectomy, hydrocelectomy</p> | <p><i>Staphylococci spp.</i></p> <p>Enteric gram-negative bacilli</p> | <p><u>Adults:</u> Cefazolin</p> | <p><u>Adults:</u> Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵ or if history of MRSA infection or colonization: Vancomycin + Aztreonam</p> |
| | | <p><u>Pediatrics:</u> Cefazolin</p> | <p><u>Pediatrics:</u> Clindamycin</p> |

GENITOURINARY PROCEDURES

| | | | |
|-----------------------|---|---|---|
| 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 ^a | Alternative regimen ^a |
| 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 allergy³/contraindication⁴ to any beta-lactam⁵:</i> Not in Labor: <i>GBS screen negative or GBS screen positive and clindamycin sensitive:</i> Clindamycin + Gentamicin 5 mg/kg IV x 1 (adjusted body weight) <i>GBS screen positive and clindamycin resistant:</i> Vancomycin + Gentamicin 5 mg/kg IV x 1 (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 x 1 (adjusted body weight) <i>GBS screen positive and clindamycin resistant:</i> Vancomycin + Azithromycin 500 mg IV + Gentamicin 5 mg/kg IV x 1 (adjusted body weight)</p> |
| Vaginal hysterectomy Abdominal hysterectomy Laparoscopic 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</p> | <p><u>Adult:</u></p> <p><i>Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</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 | | | |
|---|---|---|--|
| 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) | Chlamydia | <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 | |
| MVA Suction D&C procedures D&E procedures | Anaerobes | <u>Adult:</u> Doxycycline 100 mg PO one hour before procedure OR Azithromycin 1 g prior to procedure | |
| Cerclage | Enteric gram-negative bacilli Anaerobes Group B Streptococci Enterococci | <u>Planned:</u> Prophylaxis Not Recommended <u>Emergent:</u> Ampicillin-sulbactam | <i>Low/medium-risk² penicillin allergy:</i> <i>Emergent:</i> Cefazolin <i>Any allergy to penicillins and cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</i> <i>Emergent:</i> Clindamycin + Gentamicin 5 mg/kg IV x 1 (if pregnant, use adjusted body weight; otherwise, use ideal body weight) OR Clindamycin + Aztreonam |
| 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 | None | Prophylaxis Not Recommended | Prophylaxis Not Recommended |

HEAD AND NECK PROCEDURES

| Nature of operation | Likely pathogens | Recommended regimen ^a | Alternative regimen ^a |
|---|---|---|---|
| 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) | 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 Any allergy to penicillins and cefazolin OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Levofloxacin + Metronidazole |
| | | 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> <i>S. pneumoniae</i> | Adults: Cefuroxime OR Ampicillin-sulbactam | Adults: Clindamycin |
| | | Pediatrics: Cefuroxime | Pediatrics: Clindamycin |

HEAD AND NECK PROCEDURES

| | | | |
|---|---|--|--|
| <p>Skull base, anterior approach including transphenoidal surgery for pituitary tumors</p> | <p><i>S. aureus</i> <i>S. epidermidis</i> gram-negative bacilli</p> | <p><u>Adults:</u> Ampicillin-sulbactam</p> <p>If history of MRSA infection or colonization: + Vancomycin</p> | <p><u>Adults:</u> <i>Low/medium-risk² penicillin allergy:</i> Ceftriaxone + Metronidazole</p> <p><i>If history of MRSA infection or colonization:</i> + Vancomycin</p> <p><i>Any allergy to penicillins and cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</i> Vancomycin + Aztreonam + Metronidazole</p> |
| | | <p><u>Pediatrics:</u> Clindamycin + Cefuroxime</p> | <p><u>Pediatrics:</u> Vancomycin</p> |

| 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 allergy³/contraindication⁴ to any beta-lactam⁵:</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 <i>If history of MRSA infection or colonization:</i> + Vancomycin | Adults: <i>Low/medium-risk² penicillin allergy:</i> Ceftriaxone + Metronidazole <i>If history of MRSA infection or colonization:</i> + Vancomycin <i>Any allergy to penicillins and ceftriaxone/cefotaxime/cefepime/cefepime OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</i> Vancomycin + Aztreonam + Metronidazole |
| | | Pediatrics: Clindamycin + Cefuroxime | Pediatrics: Vancomycin |

NEUROSURGICAL PROCEDURES

| | | | |
|---|---|--|--|
| Skull base, lateral or posterior approach procedures | <i>S. aureus</i> <i>S. epidermidis</i> | <u>Adults:</u> Ampicillin-sulbactam OR Cefuroxime | <u>Adults:</u> Clindamycin |
| | | <u>Pediatrics:</u> Clindamycin + Cefuroxime | <u>Pediatrics:</u> Vancomycin |

OPHTHALMIC PROCEDURES

| Nature of operation | Likely pathogens | Recommended regimen ^a | Alternative regimen ^a |
|-------------------------------------|--|--|--|
| <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 ^a | Alternative regimen ^a |
|---|--|---|--|
| <p>Total joint replacement (Arthroplasty)</p> <p>Implantation of prosthetic material (e.g., intramedullary nails, screw, plates, wires)</p> <p>Hip fracture repair</p> | <p><i>S. aureus</i></p> <p><i>S. epidermidis</i></p> | <p><u>Adults:</u></p> <p><i>S. aureus</i> nasal screen:</p> <ul style="list-style-type: none"> - Negative for MRSA - Positive for MSSA - Not performed and in the absence of history of MRSA carriage or infection <p>Cefazolin</p> <p><i>S. aureus</i> nasal screen:</p> <ul style="list-style-type: none"> - Positive for MRSA - Not performed, but patient has history of MRSA carriage or infection <p>Vancomycin + Cefazolin</p> <p>Antibiotic prophylaxis should be discontinued within 24 hours following surgery</p> <p><u>Pediatrics:</u></p> <p>Cefazolin</p> <p>History of MRSA carriage or infection: Vancomycin + Cefazolin</p> | <p><u>Adults:</u></p> <p>Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵: Vancomycin</p> <p>Alternative to vancomycin if true vancomycin allergy (not Red-Man's): Daptomycin</p> <p><u>Pediatrics:</u></p> <p>History of MRSA carriage or infection AND any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵: Vancomycin</p> <p>Allergy as above without history of MRSA carriage or infection: Clindamycin</p> |

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</p> <p><i>Grade III open fracture:</i> Ceftriaxone Extensive soil exposure (e.g., farming accident) + Metronidazole</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 allergy³/contraindication⁴ to any beta-lactam⁵:</i> Clindamycin</p> <p><i>Grade III open fracture with any allergy to ceftriaxone/cefotaxime/cefpodoxime/cefepime OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</i> Clindamycin + Aztreonam</p> <p>Antibiotic prophylaxis should be discontinued within 48 hours</p> |
| | | <p><u>Pediatrics:</u> <i>Grade I or II open fracture:</i> Cefazolin Extensive soil exposure (e.g., farming accident) + Metronidazole</p> <p><i>Grade III open fracture:</i> Ceftriaxone Extensive soil exposure (e.g., farming accident) + Metronidazole</p> <p>Antibiotic prophylaxis should be discontinued within 48 hours</p> | <p><u>Pediatrics:</u> <i>Grade I or II open fracture with any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</i> Clindamycin</p> <p><i>Grade III open fracture with any allergy to ceftriaxone/cefotaxime/cefpodoxime/cefepime OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</i> Clindamycin + Aztreonam</p> <p>Antibiotic prophylaxis should be discontinued within 48 hours</p> |

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>Antibiotic prophylaxis should be discontinued within 24 hours following sugery</p> | <p><u>Adults:</u> Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵: 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 allergy³/contraindication⁴ to any beta-lactam⁵: 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 allergy³/contraindication⁴ to any beta-lactam⁵: Clindamycin OR Vancomycin</p> |
| | | <p><u>Pediatrics:</u> Cefazolin</p> | <p><u>Pediatrics:</u> Any allergy to cefazolin OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵: 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.](#)

| PLASTIC SURGERY PROCEDURES | | | |
|--|---|--|---|
| Nature of operation | Likely pathogens | Recommended regimen ^a | Alternative regimen ^a |
| Breast reconstruction (without implants), cosmetic procedures (excluding blepharoplasty), large hand dissections* , phalloplasty, vaginoplasty, and general reconstructive procedures involving medium/large flaps or tissue expanders *Open fractures: see Orthopedic Surgery guidelines | <i>S. aureus</i> <i>S. epidermidis</i> | Adults: Cefazolin | Adults: Any allergy to cefazolin OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Clindamycin |
| | | Pediatrics: Cefazolin | Pediatrics: Any allergy to cefazolin OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Clindamycin |
| Breast procedures with implants | <i>S. aureus</i> <i>S. epidermidis</i> | Adults: Cefazolin If history of MRSA infection or colonization: + Vancomycin | Adults: Any allergy to cefazolin OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Vancomycin |
| | | Pediatrics: Cefazolin | Pediatrics: Any allergy to cefazolin OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Clindamycin |
| Cleft lip and palate repair, or facial procedures that transect oral, nasal (see rhinoplasty below), or pharyngeal mucosa | 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 Low/medium-risk ² penicillin allergy PLUS cefazolin allergy, OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Levofloxacin + Metronidazole |
| | | Pediatrics: Ampicillin-sulbactam | Pediatrics: Any allergy to penicillins OR high-risk allergy ³ /contraindication ⁴ to any beta-lactam ⁵ : Clindamycin |

PLASTIC SURGERY PROCEDURES

| Nature of operation | Likely pathogens | Recommended regimen ^a | Alternative regimen ^a |
|--|---|--|---|
| <p>Rhinoplasty/Septorhinoplasty</p> | <p><i>S. aureus</i> <i>S. epidermidis</i> <i>C. acnes</i></p> | <p>NOTE: 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-risk² penicillin allergy PLUS cefazolin allergy, OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</i> Clindamycin</p> |
| | | <p>Pediatrics: Ampicillin-sulbactam OR Cefazolin</p> | <p>Pediatrics: <i>Any allergy to penicillins OR high-risk allergy³/contraindication⁴ to any beta-lactam⁵:</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 allergy³/contraindication⁴ to any beta-lactam⁵:</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 allergy³/contraindication⁴ to any beta-lactam⁵:</i> Clindamycin</p> |

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

| VASCULAR PROCEDURES | | | |
|---|---|---|---|
| Nature of operation | Likely pathogens | Recommended regimen ^a | Alternative regimen ^a |
| 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 Phlebectomy of varicose veins, stripping of varicose veins, ligation of varicose veins (e.g., Saphenous Vein stripping or ligation) | <i>S. aureus</i> <i>S. epidermidis</i> enteric gram-negative bacilli <i>Clostridia</i> spp. | Adults: Cefazolin | Adults: Clindamycin OR Vancomycin |
| | | Pediatrics: Cefazolin | Pediatrics: Clindamycin OR Vancomycin |
| Thromboendarterectomy without bypass Arterial bypass with vein 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 OR Vancomycin |
| | | Pediatrics: Cefazolin | Pediatrics: Clindamycin OR Vancomycin |

PATIENTS >50 kg (ADULT AND PEDIATRIC) PRE-OP AND INTRAOPERATIVE ANTIBIOTIC DOSING RECOMMENDATIONS ^{π,ξ,ζ}

| Antimicrobial | Pre-operative dose ^λ Pre-operative dose does not require adjustment for renal dysfunction | Intraoperative re-dosing* 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 ^ν | 30 min ^δ |
| Ampicillin/sulbactam | 3 g | 3 g every 2 hours for 2 re-doses | 3-5 min ^ν | 30 min ^δ |
| Aztreonam | 2 g | 2 g every 4 hours for 2 re-doses | 3-5 min ^ν | 30 min ^δ |
| 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 ^ν | 30 min ^δ |
| Cefuroxime | 1.5 g | 1.5 g every 4 hours for 2 re-doses | 3-5 min ^ν | 30 min ^δ |
| Cefoxitin | 2 g | 2 g every 2 hours for 2 re-doses | 3-5 min ^ν | 30 min ^δ |
| Cefepime | 2 g | 2 g every 4 hours for 2 re-doses | 3-5 min ^ν | 30 min ^δ |
| Clindamycin | 900 mg | 900 mg every 6 hours for 2 re-doses | Not Recommended | 30 min ^δ |
| Daptomycin | 6 mg/kg ^ζ | Not Recommended | 2 min | 30 min ^δ |
| Piperacillin/tazobactam | 4.5 g | 4.5 g every 2 hours for 2 re-doses ^μ | Not Recommended | 30 min ^δ |
| Metronidazole | 500 mg | Not Recommended | Not Recommended | 30 min ^δ |
| Ceftriaxone | 2 g | Not Recommended | 3-5 min ^ν | 30 min ^δ |
| Gentamicin | 5 mg/kg ^ε (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 ^δ |
| Ciprofloxacin | 400 mg | Not Recommended | Not Recommended | 60 min ^δ |
| Fluconazole | 400 mg | Not Recommended | Not Recommended | 120 min ^δ |

PATIENTS ≤50 kg (ADULT AND PEDIATRIC) PRE-OP AND INTRAOPERATIVE ANTIBIOTIC DOSING RECOMMENDATIONS ^{5,6}

| 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 (cardiac/SBE**) 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 ^{5,6}

| 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 (cardiac/SBE** 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 | Q6h x2 redoses w/non-cardiac redose value (10 mg/kg) |
| 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 | | Q6h x2 |
| 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 | | None |
| 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 | | Q8h x2 redoses |
| 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 | | None |
| 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 | | None |
| 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 | | Q2h x2 redoses |
| 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 | | Q12h x2 redoses |
| 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 | Q8h x2 redoses | | |

IV. FOOTNOTES

- ² 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.
- ³ 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.
- ⁴ 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.
- ⁵ Beta-lactam antibiotics include the following antibiotic classes: penicillins, cephalosporins, carbapenems, aztreonam
- α 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
- * Redosing should occur with the same initial dose, with the exception of cefazolin and clindamycin when used in cardiac/SBE prophylaxis
- ** SBE prophylaxis, ACC/AHA 2008 guideline update on valvular heart disease
- π Adapted from [Clinical Infectious Diseases 2004;38:1706-15](#) and [Am J Health-Syst Pharm 2013;70](#).
- γ Reconstituted dose injected directly into vein or via running IV fluids (only if IV piggyback not available).
- δ Intermittent IV infusion.
- ε 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.
- ζ 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.
- λ 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.
- μ Re-dose every 4 hours for liver transplant recipients
- ξ 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.
- Σ 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.

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.](#)
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- 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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| Revision History: 08/2020: Revised OB/GYN section 10/2020: Revised Urology section 11/2020: Revised Gastrointestinal section 03/2021: Revised allergy wording, Orthopedic, Plastics, and Cardiothoracic sections. 04/2021: Adjusted rhinoplasty/septorhinoplasty and vasectomy recommendations. | |

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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