

NORTHWESTERN MEDICINE PALOS HOSPITAL ANTIBIOTIC SURGICAL PROPHYLAXIS GUIDELINES

General Recommendations:

- Patients should receive the prophylactic antibiotic(s) within 1 hour before surgical incision and patients who receive vancomycin or ciprofloxacin, (or other quinolone), should have the antibiotics initiated within 2 hours of surgical incision. When the use of a tourniquet is indicated, it is recommended that the antibiotic be completely infused before inflation. The duration of prophylaxis should be less than 24 hours.
- A dose of vancomycin (15mg/kg) can be given in addition to the recommended antibiotic in patients colonized with MRSA or in hospitals in which MRSA or methicillin resistant staphylococcus epidermidis are a frequent cause of post-operative wound infections.
- If an agent with a short half-life is used as surgical prophylaxis, a re-dose may be needed depending on the procedure length (refer to the re-dose table).
- Patients who are receiving scheduled anti-infective therapy *may require* an additional pre-operative surgical prophylactic dose depending on the agent received and administration time. Refer to the following tables for guidance. Antibiotic agents listed in the guideline are not all inclusive.

Antimicrobial Surgical Prophylaxis in the Setting of Empiric/Definitive Antibiotic Therapy

Surgical Prophylaxis Situation	Recommendation
Agent with appropriate coverage given within 60 minutes (120 minutes for vancomycin or fluoroquinolones) prior to the surgical incision	No additional prophylaxis dose required Intra-operative re-dose is recommended dependent on procedure length
Agent NOT given within the appropriate time frame OR agent without appropriate coverage administered	Additional prophylaxis dose required
Agent administered as extended infusion	Additional prophylaxis dose required (Note: If piperacillin/tazobactam is the desired prophylactic agent AND is being administered via extended infusion, the infusion rate should be adjusted to complete the dose within 30 minutes. Redoses, where indicated, should infuse over 30 minutes.

Recommended Surgical Prophylaxis Agents per Surgery Type		
Surgical Procedure	Recommended First Line Agent	Alternative Agent(s) due to SEVERE Penicillin Allergy
Breast		
Breast surgery	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a
Cardiac		
<ul style="list-style-type: none"> • Pacemaker / defibrillator placement • Prosthetic valve • Coronary Artery Bypass • Other cardiac surgery 	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a

Gastrointestinal		
Appendectomy, non-perforated	Cefoxitin 2 grams IV	Metronidazole 500mg IV PLUS Gentamicin 5mg/kg ^b IV
Biliary tract: Open or high risk laparoscopic procedure ^c	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV OR Cefoxitin 2 grams IV	Clindamycin 900mg IV PLUS Gentamicin 5mg/kg ^b IV OR Aztreonam 2gram OR Ciprofloxacin 400mg IV
Colorectal	Cefoxitin 2 grams IV OR Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV PLUS Metronidazole 500mg IV	Clindamycin 900mg IV PLUS Gentamicin 5mg/kg ^b
Esophageal or gastroduodenal (including PEG)	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a PLUS Gentamicin 5mg/kg ^b IV OR Aztreonam 2gram OR Ciprofloxacin 400mg IV
Hernia repair (hernioplasty and herniorrhaphy)	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a
Small intestine - nonobstructed	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV PLUS Gentamicin 5mg/kg ^b IV
Small intestine - obstructed	Cefoxitin 2 grams IV	Metronidazole 500mg IV PLUS Gentamicin 5mg/kg ^b IV
Genitourinary		
Clean <u>without</u> entry into urinary tract	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a
Clean <u>with</u> entry into urinary tract	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Ciprofloxacin 400mg IV or Gentamicin 5mg/kg ^b IV +/- Clindamycin 900mg IV
Lower tract instrumentation (includes Transrectal prostate biopsy)	Ciprofloxacin 400mg IV (or can consider 500mg PO before procedure) OR Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Gentamicin 5mg/kg ^b IV +/- Clindamycin 900mg IV

Surgical Procedure	Recommended First Line Agent	Alternative Agent(s) due to SEVERE Penicillin Allergy
Genitourinary		
Involving implanted prosthesis (e.g. penile prosthesis)	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV +/- Gentamicin 5mg/kg ^b IV	Clindamycin 900mg IV +/- Gentamicin 5mg/kg ^b IV OR Aztreonam 2g IV
Gynecologic, Obstetric and Urogynecologic		
Cesarean section	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV PLUS Gentamicin 5mg/kg ^b IV
Gynecologic, Obstetric and Urogynecologic		
Hysterectomy (vaginal or abdominal)	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV OR Cefoxitin 2 grams IV	Clindamycin 900mg IV PLUS Gentamicin 5mg/kg ^b IV
Pubovaginal sling	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV OR Cefoxitin 2 grams IV	Clindamycin 900mg IV PLUS Gentamicin 5mg/kg ^b IV
Head and Neck		
Incisions through oral or pharyngeal cavity	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV PLUS Gentamicin 5mg/kg ^b IV
Neurological		
Craniotomy, intrathecal pump placement	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a
Orthopedic		
Spinal procedures with and without instrumentation	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a
Total joint replacement, internal fixation, fracture repair	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a

Surgical Procedure	Recommended First Line Agent	Alternative Agent(s) due to SEVERE Penicillin Allergy
Thoracic		
Non-cardiac	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a
Video assisted thorascopic surgery (VATS)	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a
Vascular		
Arterial surgery involving the abdominal aorta, a prosthesis or a groin incision	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a
Lower extremity amputation for ischemia	Patients <120kg: Cefazolin 2 grams IV Patients ≥120kg: Cefazolin 3 grams IV	Clindamycin 900mg IV OR Vancomycin 15mg/kg ^a

Footnotes: Surgical Prophylactic Agents per Surgery Type

- a. Vancomycin should be dosed on actual body weight and rounded to standard doses as follows: <75kg: vancomycin 1000mg, 75-<90kg: vancomycin 1250mg, 90kg - <110kg: 1500mg, 110kg – 125kg: 1750mg, >125kg: 2000mg
- b. Gentamicin, when used for surgical prophylaxis, should be limited to a single preoperative dose in general. Dosing is based on ideal body weight (IBW). If the patient’s actual weight is more than 20% above IBW use the adjusted dosing weight (DW): $DW = IBW + 0.4(ABW - IBW)$.
- c. Some factors that may indicate a high risk of infectious complications in laparoscopic cholecystectomy include emergency procedures, diabetes, long procedure duration, intraoperative gallbladder rupture, age >70years, among others. It may be reasonable to give a single dose of antimicrobial prophylaxis to all patients undergoing this procedure as some risk factors are not possible to determine prior to surgical intervention

Antimicrobial infusion should be initiated within 60 minutes of incision time

Exception: Vancomycin and Fluoroquinolones should be initiated within 120 minutes of incision time^a

Antimicrobials should be redosed intraoperatively if the duration of the procedure exceeds two half-lives of the antimicrobials or if there is excessive blood loss (i.e., 1500 mL). Redosing may be warranted if there are factors that shorten the half-life of the antimicrobial agent (i.e., burns). Redosing may not be necessary in patients in whom the half-life of the antimicrobial may be prolonged (i.e., renal failure).

Recommended Dosing and Administration Duration				
Antimicrobial	Recommended Dose (IV)		Recommended Time Administered Over (mins)	
	Adults	Pediatrics ^b	Infusion	IV Push
Ampicillin-sulbactam	3 g	50 mg ampicillin/kg	30	10-15
Ampicillin	2 g	50 mg/kg	30	3-5 min for 125-500 mg
Aztreonam	2 g	30 mg/kg	30	3-5
Cefazolin	Pts <120 kg: 2 g Pts ≥ 120 kg: 3 g	30 mg/kg	30	3-5
Cefuroxime	1.5 g	50 mg/kg	15	3-5
Cefoxitin	2 g	40 mg/kg	30	3-5
Ceftriaxone	2 g ^d	50-75 mg/kg	30	N/A
Ciprofloxacin ^a	400 mg	10 mg/kg/dose	60	N/A
Clindamycin	900 mg	10 mg/kg	30 Max: 30mg/min	N/A
Ertapenem	1 g	15 mg/kg	30	N/A
Fluconazole	400 mg	6 mg/kg	120	N/A
Gentamicin	5 mg/kg dosing weight ^e	2.5 mg/kg dosing weight	60	N/A
Meropenem	1 g	20 mg/kg	30	3-5
Metronidazole	500 mg	15 mg/kg Neonates < 1200 g: single 7.5 mg/kg dose	60	N/A
Neomycin PO (not a replacement for IV)	1 g orally 19, 18, 9 hours prior to incision time ^f	15 mg/kg orally 19, 18, 9 hours prior to incision time	N/A	N/A
Piperacillin-tazobactam (If used for prophylaxis)	3.375 g Pts > 120kg: 4.5 g	2-9 mo: 80 mg/kg piperacillin >9 mo and ≤ 40 kg: 100 mg/kg piperacillin	30	N/A
Vancomycin ^{a,g,h}	15 mg/kg Max: 2 g	15 mg/kg	1 g/hr	NA

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Agent NOT given within the appropriate time frame OR agent without appropriate coverage administered	Additional prophylaxis dose required
Agent administered as extended infusion	Additional prophylaxis dose required (Note: If piperacillin/tazobactam is the desired prophylactic agent AND is being administered via extended infusion, the infusion rate should be adjusted to complete the dose within 30 minutes. Redoses, where indicated, should infuse over 30 minutes.

Agent Half-Lives and Intra-Operative Re-dosing Recommendations

Half-Lives and Intra-Operative Redosing Recommendations for Commonly Redosed Agents					
<i>Antimicrobials should be redosed intraoperatively if the duration of the procedure exceeds two half-lives of the antimicrobials or if there is excessive blood loss (i.e., 1500 mL). Redosing may be warranted if there are factors that shorten the half-life of the antimicrobial agent (i.e., burns). Redosing may not be necessary in patients in whom the half-life of the antimicrobial may be prolonged (i.e., renal failure).</i>					
Antimicrobial	Half-life in Adults (hr)		Recommended Redosing Interval (hr) (CrCl >30mL/min)	Recommended Intra-Operative Redosing Interval per Renal Function (hr)	Maximum Number of Intra-Operative Redoses
	Normal Renal Function	End-stage Renal Disease			
Ampicillin-sulbactam	0.8-1.3	9	2	> 30 mL/min: 2 10 – 30 mL/min: 4 < 10 mL/min: 8	3
Ampicillin >50/<10	1-1.8	10-25	2		3
Cefoxitin >50/<10	0.7-1	6.5-23	2		3
Piperacillin/Tazobactam	0.7-1.2	1.4-2	2		3
Aztreonam	1.7-2.4	6 – 8	4	> 30 mL/min: 4 10 – 30 mL/min: 8 < 10 mL/min: 12	3
Cefazolin	1.8	40-70	4		3
Cefuroxime	1-2	15-22	4		3
Meropenem	1	13.7	4		3
Clindamycin	3	3.5-5	6	6	3

Half-Lives and Intra-Operative Redosing Recommendations for Agents Where Redosing May Not be Needed Based on Typical Case Length

Antimicrobials should be redosed intraoperatively if the duration of the procedure exceeds two half-lives of the antimicrobials or if there is excessive blood loss (i.e., 1500 mL). Redosing may be warranted if there are factors that shorten the half-life of the antimicrobial agent (i.e., burns). Redosing may not be necessary in patients in whom the half-life of the antimicrobial may be prolonged (i.e., renal failure).

Antimicrobial	Half-life in Adults (hr)		Recommended Intra-Operative Redosing Interval and Maximum Number of Redoses
	Normal Renal Function	End-stage Renal Disease	
Ceftriaxone	5-9	12-16	Intra-operative redoses are not typically needed based on a typical case length. For unusually longer procedures and based on the patient's renal function, redosing may be required.
Ciprofloxacin ^a	3-5	5-9	
Ertapenem	4	14.1	
Fluconazole	30	98	
Gentamicin	2	50-70	
Metronidazole	8	7-21	
Vancomycin ^{a,b,c}	4-6	7.5 days	
Neomycin PO (not a replacement for IV)	2-3	12-24	Not applicable (pre-op use only)

Footnotes: Recommended Dosing and Redosing

^aVancomycin and Fluoroquinolones should be initiated within 120 minutes of surgical incision

^bVancomycin should be dosed based on actual body weight and rounded to standard doses as follows: <75kg: vancomycin 1g, 75 – <90kg: vancomycin 1250mg, 90 – <110kg: vancomycin 1500mg, 110 – 125kg: vancomycin 1750mg, >125kg: vancomycin 2000mg

^cVancomycin is recommended to be used in patients with a known history or at high risk of MRSA and at institutions with increased risk for MRSA infections

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References:

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