

INTRODUCTION

The antimicrobial surgical prophylaxis guideline establishes evidence-based standards for surgical prophylaxis in adult patients at UCSF Medical Center. The protocol has been adapted from published consensus guidelines from the American Society of Health-System Pharmacists (ASHP), Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), Centers for Disease Control and Prevention (CDC), and the Surgical Infection Society (SIS) for use at UCSF with input from the Antimicrobial Stewardship Program, the Infectious Diseases Management Program, the Department of Anesthesiology, and the surgical departments.

PRINCIPLES OF ANTIMICROBIAL SURGICAL PROPHYLAXIS

- Prophylaxis should be targeted against most likely pathogens, taking into consideration type of surgery and local epidemiology
- Administer correctly—goal is for adequate tissue concentration at the time of risk
 - Administer within 30-60 minutes before the incision
 - For vancomycin and fluoroquinolones, the ideal timing is to start the infusion 120 minutes prior to incision
- Give dose before the tourniquet goes up, if applicable
- Confirm with the surgeon at the Time-out or earlier since occasionally antibiotics need to be delayed until after culture
- In clean and clean-contaminated surgeries, discontinue antibiotics after the surgical incision is closed unless the patient has a documented or suspected infection, even if a drain is in place.

Patients with existing infections

- The appropriate antibiotic to treat the underlying infection should be chosen on a case-by-case basis
- Continue the antibiotic to treat infection
- If spectrum does not cover the usual organisms covered by routine prophylaxis for that type of case, add the routine prophylactic agent
- Ensure dose is given at appropriate time to achieve maximal tissue levels at time of incision
- Duration should be determined by the duration for the existing infection

Patients known to be colonized with methicillin-resistant *Staphylococcus aureus* (MRSA)

- Can consider addition of vancomycin to prophylaxis, especially if implant is being placed. Standard prophylaxis (e.g. cefazolin) should still be provided as this affords superior surgical site infection prevention for methicillin-sensitive *Staphylococcus aureus* (MSSA).

Patients with recent history of resistant organisms

- Data is limited
- Take into account:
 - Timing of infection
 - Location of infection
 - Prior treatment
 - Planned procedure
 - Organism

Patients with penicillin allergy

- Take an antibiotic history
 - Exact details of reaction, description of rash (if present)
 - Timing of reaction
 - Reason for antibiotic prescription
 - Other antibiotics received since then (also review the EMR to see whether the patient has received other antibiotics)
- Severe beta-lactam allergy: Do not rechallenge
 - Immediate-type hypersensitivity: Hives, angioedema, wheezing, anaphylaxis
 - Late reactions: Hemolytic anemia, thrombocytopenia, serum sickness, drug reaction with eosinophilia, Stevens Johnson syndrome (SJS)/Toxic epidermal necrolysis (TEN)
- When to re-challenge or use alternative β -lactam
 - Okay if patient had history of maculopapular rash (no hives, wheezing, anaphylaxis)
 - Okay if history of other drug intolerances like nausea

DOSING AND RE-DOSING INTERVALS

- Table 1 provides dosing and re-dosing intervals for patients over 40 KG with normal renal function. Table 2 provides this information for patients with reduced renal function and Table 3 for patients weighing less than 40 KG.
- In addition to the re-dosing intervals suggested below, consider immediate re-dosing in patients who have > 1.5 L of blood loss within a short time frame and those with severe burns.
 - Restart the re-dosing clock if this is done

Dosing in normal renal function

Antibiotic	Dose	Half-life, h	Re-dose, h	When to start standard dosing intervals	Administration issues	Okay to push over 3-5 min?
Ampicillin-sulbactam	3 g	0.8-1.3	2	After 3 doses		N
Cefazolin	2 g 3 g if ≥ 120 KG	1.2-2.2	4	After 3 doses		Y
Cefoxitin	2 g	0.5-1.1	2	After 3 doses		Y
Ceftriaxone	2 g	5.4-10.9	12	After 2 doses	Ca++ containing solutions (incl LR) → possible precipitation 1. No Y-site 2. Flush line with normal saline 3. Or use alt solution	Y
Ciprofloxacin	400 mg	3-7	12	Already standard	Propofol → free oil formation 1. No Y-site 2. Flush line with normal saline	N
Clindamycin	900 mg	2-4	6	After 3 doses		N
Ertapenem	1 g	3-5	12	After 2 doses		N
Gentamicin	5 mg/kg (ideal body weight, max dose = 400 mg)		No re-dosing	Already standard	Propofol → Δ emulsion integrity 1. No Y-site 2. Flush line with normal saline	N
Levofloxacin	500 mg	6-8	12	Already standard	Propofol → free oil formation 1. No Y-site 2. Flush line with normal saline	N
Metronidazole	500 mg	6-8	8	Already standard	Propofol → Δ fat globule size 1. No Y-site 2. Flush line with normal saline	N
Piperacillin-tazobactam	3.375 g (standard dosing) 4.5 g (anti-Pseudomonal dosing)	0.7-1.2	2	After 3 doses	Vecuronium → precipitation 1. No Y-site 2. Flush line with normal saline	N
Vancomycin	15 mg/kg	4-8	12	Already standard	Infusion rate should not exceed 1g in 60 minutes or 17mg/ml/min (1.7ml/min)	N

Table 1. Recommended dosing with re-dosing intervals, normal renal function

Dosing in reduced renal function

- See Table 1 for incompatibilities and administration details

<i>Antimicrobial</i>	<i>Dose Administered</i>	<i>Re-dose based on CrCl, h</i>	<i>When to start standard dosing</i>
Ampicillin–sulbactam	3 g	CrCl (>30): 2 CrCl (15-30): 4 CrCl (<15): 8	After 3 doses
Cefazolin	2 g 3 g if ≥120 kg	CrCl (>35): 4 CrCl (10-35): 6 CrCl (<10): 8	After 3 doses
Cefoxitin	2 g	CrCl (>50): 2 CrCl (30-50): 4 CrCl (< 30): 8	After 3 doses
Ceftriaxone	2 g	12	After 2 doses
Ciprofloxacin	400 mg	No re-dosing	Already standard
Clindamycin	900 mg	6	After 3 doses
Ertapenem	1 g	12	After 2 doses
Gentamicin	5 mg/kg (ideal body weight, max dose = 400 mg)	No re-dosing	Already standard
Levofloxacin	500 mg	No re-dosing	Already standard
Metronidazole	500 mg	8	Already standard
Piperacillin–tazobactam (standard dosing)	3.375 g	CrCl (>50): 2 CrCl (10-50): 4 CrCl (<10): 8	After 3 doses
Piperacillin-tazobactam (anti-Pseudomonal dosing)	4.5 g	CrCl (>50): 2 CrCl (10-50): 4 CrCl (<10): 8	After 3 doses
Vancomycin	15 mg/kg	No re-dosing	NA

TABLE 2. Recommended dosing and re-dosing intervals, reduced renal function**Dosing in patients < 40 kg**

- Based on pediatric dosing, cap at maximal adult dose
- Same re-dosing intervals as Table 1

<i>Antimicrobial</i>	<i>< 40 kg adult</i>	<i>Max/dose</i>
Ampicillin–sulbactam	50 mg/kg of the ampicillin component	3 g
Cefazolin	30 mg/kg	2 g
Cefoxitin	40 mg/kg	2g
Ceftriaxone	50 mg/kg	2 g
Ciprofloxacin	10 mg/kg	400 mg
Clindamycin	10 mg/kg	900 mg
Ertapenem	15 mg/kg	1 g
Gentamicin	2.5mg/kg	100mg
Levofloxacin	10 mg/kg	500 mg
Metronidazole	15 mg/kg	500 mg
Piperacillin–tazobactam	100 mg/kg of the piperacillin component	3.375 g
Vancomycin	15 mg/kg	2 g

Table 3. Dosing in patients < 40 KG.

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