

BH Guidelines for Surgical Antibiotic prophylaxis guidelines- Adults

Background and Guideline Statements

Surgical antimicrobial prophylaxis is an accepted part of surgical practice in some procedures to prevent infections at the surgical site and optimize postoperative recovery.

The following Surgical antibiotic prophylaxis guide has been developed in 2019 as a partnership between Surgery, Anesthesia, Ortho, Women's Health, Infectious Disease, and Pharmacy and Therapeutics Clinical Consensus Group (CCG) to set clinical standards, provide system support and drive clinical outcomes through evidence-based practice. The CCGs define expected clinical practices to ensure patient safety & quality as well as reduce clinical variation across the enterprise.

The goal of antibiotic surgical prophylaxis is to ensure adequate serum and tissue levels of the drug at the time of incision, and for the duration of surgery. Antibiotic regimen should include agent(s) that are safe, active against the most likely infecting organisms as well as being cost effective. Optimal dosing, timing of the first dose, and redosing are all elements to preoperative antibiotic dosing to maintain adequate levels during the procedure.

Practice guidelines

- Reference the surgical antimicrobial prophylaxis grid to administer the appropriate antibiotic per type of surgical procedure.
- Utilize the care sets within the electronic medical record to appropriately select the preoperative antibiotics for the procedure. List below includes Cerner powerplans that have been updated with Surgical Antibiotic prophylaxis recommendations and have the SCIP pre-op Antimicrobial Prophylaxis [sub-p] embedded within these powerplans.
 - Bariatric Surgery Preop [pp]
 - BMDA Onc Surgery Preop [pp]
 - Cardiac Surgery Preoperative IP [pp]
 - Colorectal Surgery Preop [pp]
 - GYN Surgery preop [pp]
 - OB Cesarean Delivery Surgery [pp]
 - Observation Emergency General Surgery Preop [pp]
 - Ortho Surgery admission [pp]
 - Ortho Surgery preop [pp]
 - Ortho Total Shoulder Arthroplasty-Preop [pp]
 - Surgery preop [pp]
 - Thoracic Surgery Preop [pp]
 - Urology Surgery Preop [pp]
 - Vascular Surgery Preoperative [pp]

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- Antibiotic prophylaxis for surgery is given within one hour (< 60mins) prior to surgical incision except for vancomycin, ciprofloxacin, and levofloxacin which are given within two hours prior to surgical incision. Since vancomycin and fluoroquinolones require a prolonged infusion time to avoid intolerance, especially at higher doses, guidelines recommend that vancomycin infusion may begin 60- 120 minutes prior to incision.
- The surgical antibiotic prophylaxis dose must be started prior to surgical incision but may be completed after skin incision.

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Postoperative continuation of antibiotics

CDC Guidelines recommend that prophylactic antibiotics be discontinued at 24 hours after surgery. Unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen accordingly to clinical condition and microbiological results.

Dosing in patients with obesity

- **Cefazolin:** Provide increased dose of cefazolin (3g) for adult patients weighing more than 120kg. For patients that are 25 kg – 39.9 kg, 1 gm of cefazolin is an acceptable surgical prophylactic dose.
- **Gentamicin:** For adult patients with a body mass index 30 kg/m² or more, use adjusted body weight (up to a maximum of 100kg) to calculate the gentamicin dose. Dosing based on patient's actual body weight (ABW). If ABW is more than 25% above ideal body weight (IBW), the dosing weight (DW) can be determined by $DW = IBW + 0.4(ABW - IBW)$.
- **Vancomycin:** Follow surgical grid to allow for appropriate weight-based dosing for patients 75 -100 kg and >100 kg

Redosing

A single pre-operative dose is sufficient for most procedures; however, repeat intra-operative doses may be needed for:

- Prolonged surgery that exceeds two half-lives of the drug to maintain adequate serum and tissue concentrations. Refer to chart for redosing intervals.
- If major blood loss occurs (e.g. more than 1500mL in adults or > 15-20% of blood volume in children), following fluid resuscitation.
 - May consider redosing at 8 hours for patients that undergo cardiopulmonary bypass.

When measuring the time to a second intraoperative dose, the interval from the time of the first preoperative dose rather than the surgical incision time.

Surgical Preoperative prophylaxis for patients already on antibiotics prior to surgery

Patients on antibiotics prior to surgery should be given antimicrobial prophylaxis before surgery to ensure adequate serum and tissue levels of antimicrobials with activity against likely pathogens for the duration of the operation.

- If the agents used therapeutically are appropriate for prophylaxis, administering an extra dose within 60 minutes before surgical incisions is sufficient.
- For patients on vancomycin and dose not due within 60 minutes of surgery start time, recommendations are to give a preoperative dose of cefazolin for surgical antimicrobial prophylaxis.

Patients with a High Risk of MRSA

- For patients with a documented high risk of MRSA – consider using Vancomycin.
- Documented high MRSA risk reasons include known MRSA colonization, high risk for MRSA due to acute inpatient hospitalization, nursing home, or extended care facility setting within the 90 days, or receiving dialysis.

Classification of surgical wounds

Surgical procedures can be classified according to the level of microbial contamination routinely associated with that procedure and can be used to determine the need and choice of, antibiotic prophylaxis according to the table below. In general, antibiotic prophylaxis is indicated in all procedures in the categories of “clean-contaminated”, “contaminated” or “dirty”. Prophylaxis for “clean” procedures is not generally indicated unless specific risk factors or circumstances that are associated with greater risk or consequence of infectious complications exist.

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Table 1

Surgical Wound Classification Grades (I–IV) as Defined by the CDC

CDC Surgical Wound Classification Definitions

Class I/Clean: An uninfected operative wound in which no inflammation is encountered, and the respiratory, alimentary, genital, or uninfected urinary tract is not entered. In addition, clean wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow no penetrating (blunt) trauma should be included in this category if they meet the criteria.

Class II/Clean-Contaminated: An operative wound in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in a sterile technique is encountered.

Class III/Contaminated: Open, fresh, accidental wounds. In addition, operations with major breaks in a sterile technique (eg, open cardiac massage) or gross spillage from the gastrointestinal tract, and incisions in which acute or no purulent inflammation is encountered are included in this category.

Class IV/Dirty-Infected: Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation.

CDC = Centers for Disease Control and Prevention.

Pediatric surgical antimicrobial prophylaxis guidelines

The surgical preoperative prophylaxis guidelines below are specific to adults, however, the recommended preoperative prophylactic antibiotics for pediatric patients can be located [Peds SCIP antimicrobial prophylaxis FINAL 2023.pdf](#). These guidelines were developed and vetted through various clinical consensus groups (CCGs) and surgeon groups.

Monitoring of Preoperative Antimicrobial Prophylaxis for surgery

The surgical preoperative prophylaxis compliance is monitored for best practice through the Surgical Site Infection Clinical Practice. Data on compliance measures can be found on the [QlikView Surgical Site Infection Prevention Bundle Dashboard](#). (requested access only)

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SURGICAL PROCEDURE CATEGORY	RECOMMENDED ANTIMICROBIAL	ADULT DOSE	REDOSE INTERVAL	ANTIMICROBIAL PROPHYLAXIS FOR CEPHALOSPORIN ALLERGIES ^A	ADULT DOSE	REDOSE INTERVAL
CARDIAC	Cefazolin OR	2 gm (< 120 kg) 3 gm (≥ 120 kg)	4 hrs	Vancomycin	< 75 kg – 1000 mg 75 -100 kg – 1500 mg >100 kg – 2000 mg	NA
	Cefuroxime	1.5 gm	4 hrs			
THORACIC, VASCULAR, ORTHOPEDIC, AND PLASTIC SURGERY	Cefazolin	2 gm (< 120 kg) 3 gm (≥ 120 kg)	4 hrs	Vancomycin	< 75 kg – 1000 mg 75 -100 kg – 1500 mg >100 kg – 2000 mg	NA
GASTRODUODENAL, BILIARY TRACT AND NON-OBSTRUCTIVE SMALL INTESTINE PROCEDURES	Cefazolin	2 gm (< 120 kg) 3 gm (> 120 kg)	4 hrs	Ciprofloxacin or Levofloxacin + Clindamycin	400 mg/500 mg 900 mg	NA 6 hrs
DISTAL PANCREATODUODENECTOMY IN PATIENTS WITHOUT STENTS OR PREVIOUS BILIARY TRACT PROCEDURES	Cefazolin + Metronidazole OR	2 gm (< 120 kg) 3 gm (> 120 kg) 500 mg	4 hrs	Ciprofloxacin OR Levofloxacin + Metronidazole	400 mg 500 mg 500 mg	NA NA NA
	Cefoxitin ^B	2 gm	2 hrs			
PANCREATODUODENECTOMY IN PATIENTS WITH STENTS OR PREVIOUS BILIARY TRACT PROCEDURES PRIOR TO SURGERY	Piperacillin/ Tazobactam ^C	4.5gm	2 hrs	Ciprofloxacin OR Levofloxacin + Metronidazole	400 mg 500 mg 500 mg	NA NA NA
HERNIA REPAIR PROCEDURES	Cefazolin	2 gm (< 120 kg) 3 gm (≥ 120 kg)	4 hrs	Vancomycin	< 75 kg – 1000 mg 75 -100 kg – 1500 mg >100 kg – 2000 mg	NA
COLORECTAL PROCEDURES, APPENDECTOMY, OBSTRUCTIVE SMALL INTESTINE PROCEDURES	Cefazolin + Metronidazole OR	2 gm (< 120 kg) 3 gm (≥ 120 kg) 500 mg	4 hrs NA	Ciprofloxacin OR Levofloxacin + Metronidazole	400 mg 500 mg 500 mg	NA NA NA
	Cefoxitin ^B	2 gm	2 hrs			
HEAD AND NECK: CLEAN WITH PLACEMENT OF PROSTHESIS	Cefazolin	2 gm (< 120 kg) 3 gm (> 120 kg)	4 hrs	Clindamycin +/- Gentamicin	900 mg 5mg/kg	6 hrs NA
HEAD AND NECK: CLEAN-CONTAMINATED PROCEDURES	Cefazolin +	2 gm (< 120 kg) 3 gm (≥ 120 kg)	4 hrs	Clindamycin +/- Gentamicin	900 mg 5mg/kg	6 hrs NA
	Metronidazole	500 mg	NA			
CESAREAN DELIVERY PROCEDURES	Cefazolin	2 gm (< 120 kg) 3 gm (≥ 120kg)	4 hrs	Clindamycin + Gentamicin +/- Azithromycin ^D	900 mg 5mg/kg 500 mg	6 hrs NA NA
	+/- Azithromycin ^D	500 mg	NA			
HYSTERECTOMY PROCEDURES	Cefazolin + Metronidazole	2 gm (< 120 kg) 3 gm (≥ 120kg) 500 mg	4 hrs NA	Levofloxacin + Metronidazole	500 mg 500 mg	NA NA
NEUROSURGICAL PROCEDURES – ELECTIVE CRANIOTOMY, CSF SHUNTING PROCEDURES, IMPLANTATION OF INTRATHECAL PUMPS	Cefazolin	2 gm (< 120 kg) 3 gm (≥ 120 kg)	4 hrs	Vancomycin	< 75 kg – 1000 mg 75 -100 kg – 1500 mg >100 kg – 2000 mg	NA

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REFERENCE:

- Bratzler DW, Patchen Dellinger E, Olsen KM, et al. Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery. AJHP. Feb. 1, 2013; 70:195-283.
 - Enzler MJ, Berbari E, Osmon DR. Antimicrobial prophylaxis in adults. Mayo Clin Proc. 2011 Jul;86(7):686-701.
 - Anderson DJ, Kaye KS, Classen D, et al. Strategies to prevent surgical site infections in acute care hospitals. Infect Control Hosp Epidemiol 2008; 29: S51–61
- A. For patients with cephalosporin allergy, refer to this column. For patients with IgE mediated penicillin allergy (including anaphylaxis), cefazolin, cefuroxime, or cefoxitin may be given. For patients with severe cutaneous adverse reactions (SCAR's) like drug reaction with eosinophilia and system symptoms (DRESS), toxic epidermal necrolysis (TEN), Steven Johnson syndrome (SJS), acute generalized exanthematous pustulosis (AGEP), or delayed reactions with organ involvement (e.g. nephritis or hepatitis) avoid use.
- B. Cefoxitin may have some cross reactivity with ticarcillin. In case of a prior reaction with ticarcillin, use cefazolin in these patients.
- C. May use ciprofloxacin OR Levofloxacin + Metronidazole if these patients have a cephalosporin allergy. Can consider using cefoxitin in low-risk penicillin allergic patients.
- D. Azithromycin may be added as an adjunct to standard regimen for antibiotic prophylaxis as the efficacy of such prophylaxis was due to coverage for ureaplasma species, which are commonly associated with infections after C-sections.