Suggested Recommendations and Guidelines for Surgical Prophylaxis

Introduction

Postoperative wound infections are the major source of infectious morbidity in the surgical patient. The use of perioperative antibiotics has become an essential component of the standard of care in virtually all surgical procedures and has resulted in a reduced risk of postoperative infection when sound and appropriate principles of prophylaxis are applied.

I. There is probable risk of infection in the absence of a prophylactic agent.
II. There is a knowledge of the probable contaminating flora associated with the operative wound or organ site.
III. The activity of the chosen prophylactic agent should encompass the majority of pathogens likely to contaminate the wound or operative site.
IV. When more than one choice is given as a prophylactic agent, the agents or agents selected should be based on the most likely contaminating organisms.
V. The prophylactic agent must be administered in a dose which provides an effective tissue concentration prior to intraoperative bacterial contamination. Administration must occur 30 minutes prior to incision (usually with the induction of anesthesia).
VI. The effective dose should be governed by the patient's weight. For cephalosporins, patients weighing >60 kg, dosage should be doubled (i.e., ³60 kg: cefazolin 1 g IV, >60 kg: cefazolin 2 g IV).
VII. In procedures lasting 3 hour or less, a single prophylactic dose is usually sufficient. Procedures lasting greater than three hours require an additional effective dose. Procedures in which there is rapid blood loss and/or fluid administration will dictate more frequent prophylactic dosing. Under no circumstance should any prophylactic agent be given on-call because it often results in less than effective tissue levels at the time of incision. Postoperative prophylaxis is strongly discouraged except in the scenario of a bioprosthetic insertion in which case 2 or 3 additional prophylactic doses may be deemed sufficient (Warning: there are no standard rules on prophylaxis following prosthetic insertion and clinical experience strongly dictates practice).
VIII.  Vancomycin may be used for patients with severe penicillin/cephalosporin allergy.
IX. An effective and thoughtful prophylactic regimen is no substitute for exquisite surgical technique and competent postsurgical management.

I. General Surgery
a. Clean Procedures

Under most circumstances antimicrobial prophylaxis is not required when performing a clean surgical procedure. However, prophylaxis should be employed under those conditions where there is a potential intrinsic risk of infections such as in:

I. Insertion of a synthetic biomaterial device or prosthesis
II. Clean operations performed in a patients with impaired host defenses

Agents: Cefazolin or cefuroxime.

Route/Dosage/Timing: 1 gram cefazolin IV or 750 mg cefuroxime IV 30 minutes before skin incision; second dose if procedure >3 hours.

Rationale: Likely infecting organism are gram-positive cocci (S. aureus or S. epidermidis) and aerobic coliforms (E. coli).

b. Upper GI & Elective Small Bowel (Stomach, Small Bowel, Pancreas, Hepatobiliary)

Agents: Ceftizoxime OR ceftizoxime + metronidazole if anarobes suspected.

Route/Dosage/Timing: 1 gram ceftizoxime (500 mg metronidazole) IV 30 minutes before skin incision; second dose if procedure >3 hours.

Rationale: Likely contaminating organisms: Coliforms > Enterococcus > streptococci > anaerobic clostridia, peptostreptococci, Bacteroides, Prevotella or Porphyromonous (formerly oral Bacteroides).

c. Large Bowel Resections

Agents: Oral mechanical prep (Neomycin/Erythromycin) and parenteral cephalosporin (ceftizoxime or cefotetan).

Preoperative Day
• Oral sodium phosphate solution (Fleets-Phosph-Soda) with or without bisacodyl in a one or two dose regimen before giving antibiotics.
• A nasogastric tube may be required in some patients.
• Clear liquid diet only.
• Administer neomycin plus erythromycin base po at 1 PM, 2 PM and 10 PM; keep NPO after midnight (first dose given >= 20 h before surgery).

Operative Day

• Completely evacuate the bowel prior to operation.
• Parenteral drug administration 30 minutes prior to incision.

Route/Dosage/Timing: 1 gram ceftizoxime or cefotetan IV 30 minutes prior to incision; second dose if procedure lasts > 3 hours.

Rationale: Likely flora includes coliforms, Enterococcus, Bacteroides, peptostreptococci and clostridia.

d. Acute Appendectomy (Non-perforated)

Agents: Single agent: Ceftizoxime or cefotetan.
Combination therapy: Ceftizoxime plus metronidazole.

Route/Dosage/Timing: Single agent: 1 gram ceftizoxime or cefotetan IV 30 minutes before skin incision; second dose if procedure > 3 hours.
Combination therapy: 1 gram ceftizoxime IV plus 500 mg metronidazole IV 30 minutes before skin incision; second dose if procedure > 3 hours.

Rationale: Coliforms and anaerobic bacteria likely contaminants.

Note: In perforated or gangrenous cases, clinical situation becomes therapeutic and Rx is continued as clinically indicated

II. Trauma Surgery

a. Penetrating Abdominal Trauma

Agents: Single agent: Cefotetan.
Combination therapy: Ceftizoxime plus metronidazole.

Route/Dosage/Timing: 2 grams cefotetan IV or 2 grams ceftizoxime plus 500 mg metronidazole IV 30 minutes before skin incision; second dose if procedure > 3 hours.

Rationale: Coliform and anaerobic bacteria (gram-positive & gram-negative) present in peritoneal cavity follow bowel injury.
III. Obstetrics and Gynecology

a. Vaginal or Abdominal Hysterectomy (Including Radical)

Agents: Cefazolin or ceftizoxime or cefotetan.

Route/Dosage/Timing: 1 gram cefazolin, ceftizoxime, or cefotetan IV 30 minutes before skin incision; second dose if procedure > 3 hours.

Rationale: Coliforms, Enterococcus, Streptococcus, clostridia and Bacteroides are potential infecting organisms.

b. Cesarean Section/Hysterectomy

Agents: Cefazolin or ceftizoxime.

Route/Dosage/Timing: 1 gram cefazolin or ceftizoxime IV 30 minutes before skin incision; in high risk patients, may use 2 grams cefazolin or ceftizoxime IV after clamping and cutting of umbilical cord.

Rationale: Coliforms, Enterococcus, Streptococcus, clostridia and Bacteroides potential contaminants.

IV. Urology

a. Prostatectomy

Agents: Cefazolin or ciprofloxacin.

Route/Dosage/Timing: 1 gram cefazolin IV OR 400 mg ciprofloxacin IV 30 minutes before skin incision; second dose of either cefazolin or ciprofloxacin after procedure.

Rationale: Coliforms and staphylococci are major contaminant, pseudomonads occasional pathogen.
V. Transplant Surgery

a. Kidney Transplantation

Agents: Cefazolin or cefuroxime.

Route/Dosage/Timing: 1 gram cefazolin IV or 750 mg cefuroxime IV 30 minutes before skin incision; second dose if procedure > 3 hours.

Rationale: Staphylococci are the predominant contaminants.

b. Liver Transplantation

Agents: Beta-lactam with beta-lactamases inhibitor (ampicillin/sulbactam).

Route/Dosage/Timing: 3 grams ampicillin/sulbactam IV 30 minutes before skin incision; second dose if procedure > 3 hours.

Rationale: Coliforms, enterococci and staphylococci potential contaminating organisms.

c. Pancreas or Kidney/Pancreas

Agents: Ampicillin/sulbactam with fluconazole.

Route/Dosage/Timing: 3 grams ampicillin/sulbactam IV plus 400 mg fluconazole IV 30 minutes before skin incision.

Rationale: Donor duodenum is often colonized with gram positive organisms such as Staphylococcus epidermis, enterococcus, and yeast.

VI. Head and Neck Surgery

a. Clean Procedures (skin excision, neck dissections)

Agents: Cefazolin or penicillin G.

Route/Dosage/Timing: 1 gram cefazolin IV or 2-4 MU penicillin G IV 30 minutes before skin incision; second dose if procedure > 3 hours.
**Rationale:** Coverage against staphylococcal flora.

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**b. Laryngectomy & Other Head and Neck Cancer Operations**

**Agents:** Cefazolin or ceftriaxone plus metronidazole.

**Route/Dosage/Timing:** 1 gram cefazolin or ceftizoxime IV and 500 mg metronidazole IV 30 minutes before skin incision; second dose if procedure > 3 hours.

**Rationale:** Coverage against skin staphylococci plus oral anaerobic bacteria.

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**c. Mandibular Fractures**

**Agents:** Penicillin.

**Route/Dosage/Timing:** 2 MU penicillin (>60 kg use 4 MU) IV 30 minutes before skin incision; second dose if procedure > 3 hours.

**Rationale:** Coverage for oral flora.

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**VII. Orthopaedic Surgery**

**a. Total Joint Replacement**

**Agents:** Cefazolin or cefuroxime.

**Route/Dosage/Timing:** 1 gram cefazolin or 750 mg cefuroxime IV 30 minutes before skin incision; second dose if procedure > 3 hours.

**Rationale:** Staphylococci are major infecting organism in joint replacement surgery.

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**b. Traumatic Open Fractures**
Agents: Cefazolin (grade I & II fractures); ceftizoxime (grade III fractures).

Route/Dosage/Timing: 2 gram cefazolin or ceftizoxime IV 30 minutes before incision; second dose if procedure > 3 hours.

Rationale: Staphylococcal skin flora common contaminant in grade I and II fractures, coliforms often infect the serious grade III fractures.

VIII. Vascular Surgery

a. Peripheral Vascular Procedures

Agents: Cefazolin.

Route/Dosage/Timing: 1 gram cefazolin IV 30 minutes before skin incision; second dose if procedure > 3 hours.

Rationale: Staphylococci major contaminant.

IX. Cardiothoracic Surgery, Coronary Bypass Surgery, and Pulmonary Resection

Agents: Cefazolin or cefuroxime.
Route/Dosage/Timing: 1 gram cefazolin or 750 mg cefuroxime IV 30 minutes before skin incision; second dose if procedure > 3 hours.

Rationale: Staphylococci most common contaminating organism.

X. Neurosurgery

Agents: Cefazolin.

Route/Dosage/Timing: 1 gram cefazolin IV 30 minutes before skin incision; second dose if procedure > 3 hours.

Rationale: Staphylococci are the predominant isolates from neurosurgical wound infections.

References

Introduction


General Surgery


Trauma Surgery


Obstetrics and Gynecology


Urology

Head and Neck Surgery


Orthopaedic Surgery


Vascular Surgery


Cardiothoracic Surgery


Neurosurgery