Antimicrobial Prophylaxis in the Surgical Patient

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Outline

• Definitions – surgical site infection (SSI)
• Risk factors
• Wound classification
• Microbiology of SSIs
• Strategies for prevention of SSIs
• Preoperative antibiotics
Surgical Site Infection (SSI)

- Definition: infection present in any location along the surgical tract after a surgical procedure

- Can occur at any level (superficial or deep)
  - Incisional superficial (skin and soft tissue)
  - Incisional deep (fascial plane and muscle)
  - Organ/space related (i.e. abdominal abscess, empyema, mediastinitis)
Surgical Site Infection (SSI)

- By definition, must occur within 30 days of the procedure, or within 1 year of implantation of foreign material (i.e., vascular graft, mesh)

- Most frequent nosocomial infection in surgical patients: constitutes 38% of infections

- Incisional SSIs account for 60-80% of SSIs, but organ space SSIs account for 93% of SSI-related mortalities
Risk Factors for SSIs

- MICROORGANISM-RELATED
  - Remote infection
  - Long-term care facility
  - Recent hospitalization
  - Duration of procedure
  - Wound class (C, CC, Cont, Dirty)
  - ICU patient
  - Previous antibiotics therapy
  - Preoperative shaving
  - Bacterial number, virulence, and resistance
Risk Factors for SSIs

- LOCAL WOUND
  - Surgical technique
  - Hematoma/seroma
  - Necrosis
  - Sutures
  - Drains
  - Foreign bodies
Risk Factors for SSIs

• PATIENT-RELATED
  – Age
  – Immunosuppression
  – Steroids
  – Malignancy
  – Obesity
  – Diabetes
  – Malnutrition
  – Multiple comorbidities
  – Blood transfusions
  – Cigarette smoking
  – Oxygen
  – Temperature
  – Glycemic control
Wound Classification

CLEAN

Uninfected wound in which no inflammation is encountered and the respiratory, alimentary, biliary, genital, or urinary tract is not entered.
Wound Classification

CLEAN CONTAMINATED

Wound in which the respiratory, alimentary, genital, or urinary tract is entered under controlled conditions and without unusual contamination
Wound Classification

CONTAMINATED

Open, fresh, accidental wounds. Operations with major breaks in sterile technique or gross spillage from the gastrointestinal tract. Incisions in which acute, nonpurulent inflammation is encountered.
Wound Classification

DIRTY

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.
Wound Infection Rates

• Clean: 1-5%
• Clean-contaminated: 3-11%
• Contaminated: 10-17%
• Dirty: >27%
WOUND CLASSIFICATION QUIZ!!!!!!!
Microbiology of SSI

- **Exogenous bacteria**
  - SSI from exogenous bacteria come from OR team or OR environment

- **Endogenous bacteria**
  - SSI from endogenous bacteria come from colonization at surgical site or from different location (i.e., remote site infection, nasal colonization)
  - Skin preparation reduces local endogenous bacterial colony count
Prevention of SSI

• Preoperative
  – Shorten preoperative stay
  – Antiseptic shower preoperatively
  – Appropriate or no hair removal
  – Appropriately treat remote infections preoperatively or delay surgery
  – Antimicrobial prophylaxis
  – Adequate antimicrobial skin preparation preoperatively
  – Optimize nutrition
  – Preoperative warming
  – Tight glucose control
  – Smoking cessation
Prevention of SSI

• Intraoperative
  – Asepsis and antisepsis
  – Avoid GI spillage
  – Surgical technique (avoid hematoma/seroma, complete debridement, ensure good tissue perfusion, avoid dead spaces, appropriate drain use, limit use of suture/foreign bodies)
  – Supplemental O2
  – Intraoperative normothermia
  – Adequate fluid resuscitation
  – Tight glucose control
  – Appropriate initial dosing and redosing of antibiotics
Prevention of SSI

• Postoperative
  – Protect incision for 48 hours
  – Remove drains as soon as possible
  – Avoid postoperative bacteremia
  – Early enteral nutrition
  – Supplemental O2 as necessary
  – Tight glucose control
Use of Preoperative Antibiotics

• Abx are not indicated for patient undergoing low-risk clean operations without obvious bacterial contamination or insertion of a foreign body

• Prophylactic preoperative antibiotics are justified in operative scenarios when a period of contamination by organisms can be predicted with reasonable accuracy
Important Considerations

• Initiate preoperatively <1 hour before incision
• Achieve adequate dosing and increase dosing for obese/morbidly obese
• Readminister at intervals of 1-2 half-lives of the chosen agent in order to achieve therapeutic blood levels throughout the operation
• Do not continue for >24 hours postoperatively
Choice of Antibiotic

- Uncomplicated skin, soft tissue, vascular, biliary, respiratory tract procedures (no anaerobes)
  - $\Rightarrow$ cefazolin 1 g IV

If PCN allergic, may use clindamycin 600-900 mg IV or vancomycin 1 g IV

For patients with risk factors for or suspected/documentated MRSA, use vancomycin 1 g IV
Choice of Antibiotic

- Distal ileum, colorectal procedures, appendectomy (anaerobes and gram(-) rods)
  - cefoxitin 2 g IV or
  - ertapenem 1 g IV or
  - levaquin 500 mg IV + flagyl 500 mg IV

If PCN allergic, may use aminoglycoside or fluoroquinolone plus clindamycin or metronidazole
But, every attending has individual preferences...
Ancef 1 g IV x 3 doses
Flagyl 500 mg IV
Zosyn IV Q8h x 1 week
No antibiotic