Surgical Site Infection Prevention

Surgical site infections (SSIs) are one of the most common and costly healthcare-associated infections in the United States (Smith & Dahlen, 2013). Approximately 50% of all SSIs are preventable based on current evidence-based strategies. In addition, the Centers for Medicare and Medicaid (CMS) does not pay for expenses resulting from SSIs in certain procedures such as mediastinitis following coronary artery bypass graft, bariatric surgery, spine, neck, elbow, or shoulder procedures (Smith, 2015). It is important that the entire perioperative team have knowledge of the following strategies to prevent SSIs.

Patient Preparation

- Prior to elective surgeries, identify and treat any existing infections; postpone elective procedures until current infections are resolved.
- Only remove hair at or around the intended incision site if it will interfere with the procedure; when necessary, remove it immediately prior to the operation, using clippers.
- Advise patients to stop using tobacco at least 30 days prior to elective surgery.
- Ensure that skin at or near the incision site is free of gross contamination prior to applying antiseptic skin preparations.
- Instruct patients to shower or bathe their full body with soap (antimicrobial or non-antimicrobial) or with an antiseptic agent the night before surgery. (Note: Optimal timing of bath/shower, the number of soap/antiseptic agents to apply, or the use of chlorhexidine gluconate washcloths to prevent SSIs have not been established).

Surgical Team

- Perform antisepsis of hands and forearms immediately prior to the procedure, in accordance with manufacturer’s recommendation for the specific product in use.
- Adhere to 2002 Guidelines for Hand Hygiene in the Healthcare settings.
- Ensure all staff wear a surgical mask that fully covers the mouth and nose when they are present in the operating room, at any time when sterile instruments are exposed, when surgery is about to begin or in progress, and for the duration of the procedure.
- Wear a new, disposable, or hospital-laundered head covering for each case and ensure it fully encases all hair on the head and all facial hair not covered by a surgical mask.
- Every member of the scrubbed surgical team should wear sterile gloves, donned after the sterile gown is in place.
- Use only surgical gowns and drapes that are water resistant.
- Change scrub suits if they become visibly soiled, contaminated, or are penetrated by blood or other infectious materials.
Operating Room & Surgical Instruments

- Maintain positive pressure ventilation in the operating room and adjoining spaces.
- Sterilize all surgical instruments according to published guidelines and manufacturer’s recommendations.
- Reserve flashing, or immediate-use steam, for patient care items that will be used immediately in emergency situations when no other options are available.

Sterile and Surgical Technique

- Adhere to principles of sterile technique for all invasive surgical procedures.
- If a drain is required, a separate incision (remote from the surgical site) should be used to place a closed-suction drain. This drain should be removed as soon as possible.
- Protect primary incisions with a sterile dressing for 24-48 hours postoperatively.
- Perform intraoperative skin preparation with an alcohol-based antiseptic agent, unless contraindicated.
- Aqueous iodophor solution may be considered for intraoperative irrigation of deep or subcutaneous tissues. Intra-peritoneal lavage with aqueous iodophor solution in contaminated or dirty abdominal procedures is not necessary.
- The following strategies are not required to prevent SSIs:
  - Use of plastic adhesive drapes (with or without antimicrobial properties)
  - Application of a microbial sealant immediately following intraoperative skin preparation
- Research is inconclusive to support the following:
  - Soaking prosthetic devices in antisepsis solutions prior to implantation
  - Repeat application of antiseptic agents to the surgical site prior to closure

Antimicrobial Prophylaxis

- Parenteral
  - Administer preoperative antimicrobial agents only to cases that fit criteria established by published clinical practice guidelines.
  - If prophylactic antibiotics are recommended, time the administration so that therapeutic levels are reached when the incision is made.
  - For cesarean sections, administer antibiotic prophylaxis before the incision is made.
  - For clean and clean-contaminated surgical sites, do not re-dose prophylactic antibiotics after the surgical incision is closed, even if a drain is present. This standard applies to all patients, even prosthetic joint arthroplasty patients receiving immunosuppressive therapy or systemic steroids.
  - Weight-based adjustments of parenteral doses of antimicrobial agents are not recommended.
• Nonparenteral
  o Unless contraindicated, use alcohol-based skin preparations used in the 
    operating room.
  o Do not apply antimicrobial agents (i.e. ointments, solutions, or powders) to the 
    surgical incision for the prevention of SSIs.
  o Triclosan-coated sutures may be considered to prevent SSI.
  o There is weak or no evidence to support the following:
    ▪ Antimicrobial irrigation solutions
    ▪ Soaking prosthetic devices in antimicrobial solutions prior to implantation
    ▪ Application of ointment, solutions, or powders to cover incisions
    ▪ Use of autologous platelet-rich plasma
    ▪ Use of antimicrobial dressings after primary surgical site closure

Glycemic Control
• In patients with and without a diagnosis of diabetes mellitus, maintain perioperative 
  glycemic control with a target glucose level < 200 mg/dL.
• There is weak or no evidence to support:
  o A lower blood glucose target
  o A narrower target range
  o Time-frame for optimal perioperative blood glucose management
• There is no established optimal hemoglobin A1C target for patients with and without 
  diabetes mellitus, for prevention of SSIs.

Normothermia
• Maintain normal body temperature in all patients during surgery.
• There are no specific standards for timing or duration of perioperative temperature 
  management or lower limit of normothermia.

Oxygenation
• For patients with normal pulmonary function undergoing general anesthesia, with 
  endotracheal intubation, administer an increased fraction of inspired oxygen during 
  surgery, after extubation, and in the immediate postoperative period.
• To optimize oxygen delivery to the tissues, maintain normothermia, tissue perfusion, 
  and adequate volume replacement.
• Supplemental oxygen via facemask has not been established as beneficial in SSI 
  prevention for patients receiving general anesthesia without endotracheal intubation or 
  neuraxial anesthesia (i.e. spinal, epidural, or local nerve blocks).
• Optimal duration, delivery method, or target level of supplemental oxygen 
  administration has not been established.
Prosthetic Joint Arthroplasty Considerations

- Do not withhold blood transfusions from patients to decrease SSIs.
- There are no clear recommendations regarding the use of the following to reduce SSIs in prosthetic joint arthroplasty:
  - Systemic corticosteroid or other immunosuppressive therapy
    - Note: For prosthetic joint arthroplasty patients on systemic corticosteroid or other immunosuppressive therapy (in clean and clean-contaminated procedures), do not administer additional prophylactic antimicrobials after the surgical incision is closed in the operating room, even in the presence of a drain.
  - Pre-procedure intra-articular corticosteroid injection
  - Anticoagulation or use of venous thromboembolism prophylaxis
  - Orthopedic surgical space suite
  - Strategies to prevent biofilm
    - Antimicrobial/modified joint cement
    - Modified prosthetic joints
    - Vaccinations to prevent biofilm
    - Biofilm control agents (biofilm dispersants, quorum-sensing inhibitors, or novel antimicrobial agents)
References:

