Field Guide: Surgical Site Infections

Definition and Harm Impact

A surgical site infection (SSI) is an infection that occurs after surgery in the part of the body where the surgery took place. Surgical site infections can sometimes be superficial infections involving the skin only. Other SSIs are more serious and can involve tissues under the skin, organs, or implanted material. SSIs have become the most common and costly hospital-acquired infection.\(^1,2\) They occur in 2–5 percent of all inpatient surgeries done in the United States, equating to 160,000–300,000 harms each year.\(^3,4\) As many as 60 percent of SSIs are considered preventable.\(^5\) According to the Consumer Price Index, SSIs cost between $3.5 billion and $10 billion annually.\(^6,7\)

Risk factors for surgical site infections include:\(^8\)

- Surgery lasting more than two hours
- Pre-infection colonization or a current infection at another site
- Comorbidities (such as diabetes)
- Elevated patient age
- Elevated patient weight
- Having emergency surgery (after trauma, for example)
- Abdominal surgery
- Patient smoking status

Engaging Patients and Families

Patient/family education and partnership in preventing SSI and early identification of SSI are critical elements to successful reduction of harm related to SSI and sepsis prevention.

Education points:

- Ensure patient and family members understand their individualized risks for infection specific to the surgical procedure and the strategies and rationale that support prevention, such as pre-surgical bathing to reduce bacterial burden.
- Identified factors that can minimize risk of surgical infection to be addressed during the pre-surgical phase and individualized to each patient and procedure are:\(^9\)
  - Smoking cessation
  - Blood glucose control for diabetic patients
  - Weight loss
  - Bathing with specific technique and products
  - No shaving of the surgical site immediately pre-operative
- Pre-procedure: Whether pre-surgical teaching is in-person or via telephone, use easy-to-read checklists for instructions and allow time for patient and family questions. This can help increase learning retention.
- Post-procedure:
  - Validate patient and family member knowledge of actual operative procedure performed and any issues impacting post-operative recovery or risk of infection.
  - Conduct discharge wound-care teaching with plenty of time for questions and Teach-Back practice. Recommend using the actual supplies that will be available at home.
Validate patient and family member understanding of SSI symptom recognition, actions to take, and who to call if signs of infection develop upon discharge.

- Educate patients and families per a standardized handwashing program and encourage their assistance to speak up if seeing lapses in handwashing (staff members, physicians, other visitors).

Patient engagement strategies include:

- Instill a safety culture where patients/families, staff members, and physicians are invited and thanked for pointing out handwashing lapses.
- Consider addition of patient and family advisory council (PFAC) member to infection control committee or other relevant committees to provide feedback on materials, communications, and procedures.
- Ensure patient teaching processes address partnership with patients and families to invite feedback. Use Teach-Back methods and allow time to facilitate retention and learning.

### Hospital Improvement Strategies

Improvement strategies for preventing SSIs can be broken down into pre-, peri-, and post-operative processes, and vary somewhat depending on the procedure. Use of presurgical checklists and the World Health Organization (WHO) Surgical Safety Checklist have been shown to help ensure adherence to best practices.

**Standard practices to prevent SSIs include:**

- Performing pre-surgical hand hygiene.
- Performing surgical skin antiseptic (such as chlorhexidine bathing).
- Using appropriate prophylactic antibiotics (consider agent, timing, and duration).
- Avoiding shaving the operative site.
- Maintaining postoperative glucose control.
- Maintaining patient normothermia.
- Addressing surgical environment of care.

**Additional strategies:**

- Instill a safety culture where patients and families, staff members, and physicians are invited and thanked for pointing out handwashing and other safety lapses.
- Standardize patient and family member teaching by using pre/post-operative checklists and teaching materials that address accurate reading levels, multiple languages, etc.
- Ensure patient’s individualized risk factors for infection are addressed by pre-procedure and post-procedural care planning to minimize infection risk during hospitalization and to ensure that discharge plans address patient-specific risks. For example, verify that the patient can obtain appropriate post-discharge medications/antibiotics and wound care or dressing supplies.

### Measurement

SSIs are identified using the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) definitions and a combination of coding billing data, patient record review, and patient observation. SSIs are classified as superficial incisional—involving only skin or subcutaneous tissue of the incision, deep incisional primary (DIP) or secondary (DIS)—involving fascia and/or muscular layers, and
organ/space—involving any part of the body opened or manipulated during the procedure, excluding skin incision, fascia, or muscle layers. Most SSIs are identified within 30 days post-surgery (such as colon and abdominal hysterectomy). However, some (such as spinal fusion, joint replacement [hips and knees], and cardiac bypass surgeries) may result in infection up to 90 days post-operatively. These extended infection onset periods highlight the importance of patient education to identify infection and post-acute care surveillance to improve outcomes.

The goal of the Hospital Improvement Innovation Network (HIIN) is a 20 percent reduction in SSIs found in colon, abdominal hysterectomy, hip, and knee surgeries from baseline rates. For each procedure, the HIIN tracks the standardized infection ratio (SIR), which is the measurement of observed infections over predicted, based on the National Quality Forum (NQF) standards and the CDC SSI definitions in NHSN. Additionally, infection rates per 100 surgeries are tracked to identify improvement.

### Resources and Guides for Hospitals

- Association of periOperative Registered Nurses: Guidelines for Perioperative Practice: Available at: [https://www.aorn.org/guidelines](https://www.aorn.org/guidelines).
- American College of Surgeons and Surgical Infection Society—Surgical Site Infection Guidelines, 2016 Update: Available at: [https://www.journalacs.org/article/S1072-7515(16)31563-0/fulltext](https://www.journalacs.org/article/S1072-7515(16)31563-0/fulltext).

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