

Surgical Site Infection (SSI)

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SSI are defined by the Centers for Disease Control and Prevention (CDC) as infections related to an operative procedure that occur within 30 days of the procedure, or within 90 days if prosthetic material is implanted at surgery. SSIs remain a significant cause of morbidity and mortality, responsible for up to 20% of hospital-acquired infections and a 2- to 11-fold increased risk of mortality.¹ SSI is the costliest hospital-acquired infection with an estimated extended length of stay of 9.7 days and adding \$3.3 billion annually to the cost of US health care.²

The CDC requires surveillance for SSI following at least one National Healthcare Safety Network (NHSN) operative procedure category (using the associated NHSN operative procedure codes) as indicated in the Patient Safety Monthly Reporting Plan (CDC 57.106). The NHSN provides extensive guidelines on the data to report which can be found at <https://www.cdc.gov/nhsn/psc/ssi/index.html>. The CDC also categorizes SSIs into different spaces. The spaces include superficial incisional, deep incisional and organ/space. Please see the <https://www.cdc.gov/nhsn/pdfs/pscmanual/9pscscsicurrent.pdf> for individual space criteria for surgical site infections. Appropriate documentation of findings at the time of surgery and postoperatively is important to help mitigate misclassification of infections. It is important to know that Infections present at time of surgery are excluded from the SSI baseline.

Patient risk factors for SSI include advanced age, malnutrition, obesity, steroid use, diabetes, use of immunosuppressive agents, smoking, and coexisting infections at a remote site. Procedural risk factors include preoperative shaving, inadequate skin preparation, longer surgical time, hypothermia, hematoma/seroma formation, use of foreign materials such as drains, and longer hospital stays.²

Once the data for each procedure are collected and entered into NHSN, the Standardized Infection Ratio (SIR) can be calculated. The SIR is calculated by dividing the number of observed infections by the number of predicted infections. The number of predicted infections is calculated using SSI probabilities estimated from multivariate logistic regression models constructed from NHSN risk factor data during a baseline time period, which represents a standard population's SSI experience. A SIR >1 means that more infections were observed than predicted, <1 means fewer infections were observed than predicted and SIR = 1 means there

was no difference from the national baseline. For more information visit <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf>.

The SIR is the primary summary measure used by the NHSN to track healthcare associated infections (HAIs). SIR permits comparisons between infection rates experienced by facilities, groups, or states and the predicted rates.

Strategies for improvement in SSI include standardized surgical safety checklists, careful documentation and safety bundles. Examples include the The Council on Patient Safety in Women's Health Care's Consensus Bundle on Prevention of Surgical Site Infections after Major Gynecologic Surgery.³ The NHSN and the National Surgical Quality Improvement Program (NSQIP) are both widely used for quality improvement and research.

Example:

Your institution reviews all SSI at your hospital location. There appears to have been an increase in superficial SSI over the last 4 months. After completion of a review, it is noted that appropriate antibiotics were not utilized. Therefore, the site implements the Consensus Bundle on Prevention of Surgical Site Infections which includes a preoperative Time Out to ensure appropriate preoperative prophylactic antibiotic dosage and timing.

Reference Materials

1. Berríos-Torres, SI. et al., Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection. *JAMA Surg*, 152(8): (2017):784-91.
2. National Healthcare Safety Network, Centers for Disease Control and Prevention. Surgical site infection (SSI) event. <http://www.cdc.gov/nhsn/pdfs/pscmanual/9pscscssicurrent.pdf>. Published January 2017. Accessed 5.19.24.
3. Pellegrini JE, Toledo P, Soper DE, et al. Consensus bundle on prevention of surgical site infections after major gynecologic surgery. *Obstet Gynecol*. 2017;129(1):50-61. doi: 10.1097/AOG.0000000000001751 Erratum in National Partnership for Maternal Safety Consensus Bundles: correction. *Obstet Gynecol*. 2019;133(6):1287. doi: 10.1097/AOG.0000000000003292