An Interprofessional Team Approach to Decreasing Surgical Site Infection After Coronary Artery Bypass Graft Surgery

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KEYWORDS

- Coronary artery bypass • Surgical wound infection (prevention and control)
- Surgical site infection prevention strategies

KEY POINTS

- Surgical site infection (SSI) after coronary artery bypass graft (CABG) surgery has profound effects on patient outcomes, including mortality, cost, readmissions, and length of stay.
- Approximately 60% of SSIs are preventable through use of evidence-based strategies.
- A highly collaborative interprofessional team facilitates evaluation and implementation of recommended and novel strategies.
- Many strategies can be hardwired for clinicians to prevent SSI.

INCIDENCE OF SURGICAL SITE INFECTION AND IMPACT ON OUTCOMES

The incidence of SSIs has a significant negative impact on health care. SSIs are associated with increased mortality, cost, readmissions, and prolonged length of stay.[1] SSIs account for 31% of all hospital-acquired infections, making them one of the most costly and most common hospital-acquired infections.[2,3] The incidence of SSIs in the United States is approximately 160,000 to 300,000 annually, and SSIs occur in 2% to 5% of inpatient surgeries.[3] Although recent data show a 17% decrease in the incidence of SSIs among acute care hospitals in the United States, mortality related to SSIs remains clinically significant.[4] SSIs have a mortality rate of 3%.[2] Patients who develop an SSI have up to an 11 times higher risk of death compared with surgical

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patients who do not develop an SSI.[3] Of the 700,000 cardiac surgeries performed in the United States each year, more than 67% are CABG surgeries.[5] Mediastinitis occurs in 5% of all cardiac surgeries and is associated with a 40% risk of mortality.[5]

SSIs add an estimated $38,000 to the cost of an admission,[6] which adds $3 billion to $10 billion in US health care costs each year.[3] This increase in cost is related to the additional care required to treat these infections, including prolonged acute care and critical care hospital stays.[7] Seven to eleven additional hospital days have been associated with every SSI.[7] Hospital readmissions related to SSIs can have a significant financial impact on health care organizations. The rate of SSI readmission is between 11% and 16.5%[8,9] and costs 3 times as much as readmissions unrelated to major infections.[6] Due to the significant impact SSIs have on the outcomes of patients, the US Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network has established the goal of 30% reduction in SSI admission and readmission by 2020.[10]

DEFINITION OF SURGICAL SITE INFECTION

The CDC provides extensive instructions to infection preventionists to aid in the reporting of SSIs. These infections are classified according to the degree of tissue involvement and can range from superficial to organ/space involvement. The CDC's full SSI classification criteria can be accessed at http://www.cdc.gov/nhsn/PDFs/pscManual/9pscSSIcurrent.pdf.

An overview of the criteria to classify an SSI are as follows[2]:

1. Superficial incisional SSI—infection occurs within 30 days after the operative procedure and involves only the skin and subcutaneous tissue of the incision and at least 1 of the following:
   a. Purulent drainage from the superficial incision
   b. Organisms identified from an aseptically obtained specimen from the superficial incision or subcutaneous tissue
   c. Superficial incision that is deliberately opened by a physician, organism identified by culture, and at least 1 of the following signs or symptoms: pain or tenderness, localized swelling, erythema, or heat, unless the culture is negative
   d. Diagnosis of a superficial incisional SSI by the surgeon, attending physician, or designee
2. Deep incisional SSI—infection occurs within 90 days after the operative procedure and involves the deep soft tissues of the incision and at least one of the following:
   a. Purulent drainage from the deep incision
   b. A deep incision spontaneously dehisces or is deliberately opened or aspirated by a physician or designee and identified by culture and the patient has at least 1 of the following signs or symptoms: fever (>100.4°F), localized pain, or tenderness, unless the culture is negative
   c. An abscess or other evidence of infection involving the deep incision that is detected on gross anatomic or histopathologic examination or imaging test
3. Organ/space SSI—infection occurs within 90 days after the operative procedure and involves any part of the body deeper than the fascial/muscle layers that is opened or manipulated during the operative procedure and at least 1 of the following:
   a. Purulent drainage from a drain that is placed into the organ/space
   b. Organisms are identified from an aseptically obtained fluid or tissue in the organ/space by culture
   c. An abscess or other evidence of infection involving the organ/space that is detected on gross anatomic or histopathologic examination or imaging test