

Prophylactic Antibiotics and Prevention of Surgical Site Infections



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KEYWORDS

• Surgical site infection • Prophylactic antibiotics • Perioperative infection control

KEY POINTS

- Surgical site infections (SSIs) are the most common type of healthcare-associated infection in the United States, affecting more than 500,000 patients annually. Studies suggest that 40% to 60% of these infections may be preventable.
- Patients diagnosed with SSI face a 2 to 11 times increase in mortality along with prolonged hospital stays, treatment-associated risks, and potential long-term sequelae.
- Nationwide efforts to improve SSI rates include monitoring compliance with preventive guidelines via the Surgical Care Improvement Program (SCIP) along with reporting of risk-adjusted infection rates via the National Healthcare Safety Network (NHSN) and the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP).
- Preoperative prophylaxis with appropriately selected procedure-specific antibiotics administered 1 hour before skin incision is a mainstay of SSI prevention; excess prophylactic antibiotic use either through poor selection or continuation postoperatively is a major driver of increased multidrug-resistant organism isolates.
- Adjunctive measures, such as surgical safety checklists, minimally invasive surgical techniques, and maintenance of perioperative homeostasis, can help further reduce the burden of SSI.

INTRODUCTION

Healthcare-associated infections (HAIs) present a significant source of preventable morbidity and mortality. More than 30% of all HAIs are represented by surgical site infections (SSIs), making them the most common subtype.^{1,2} Between 1.9% and

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2.7% of all surgical patients, more than 500,000 per year, are diagnosed with an SSI leading to an estimated 8000 annual deaths.^{3–6}

Studies suggest that 40% to 60% of these infections are preventable.⁷ Despite this, many hospitals have yet to implement evidence-based best practices.^{3,8} This article reviews the impact of SSIs, describes their measurement and reporting, and most importantly provides perioperative strategies for their prevention with a focus on the appropriate use of prophylactic antibiotics.

SURGICAL SITE INFECTION METRICS

Clinical and Social Costs

SSIs represent a significant clinical and financial burden. Those diagnosed with an SSI face a 2 to 11 times increase in mortality.^{9,10} Although most survive their infection, prolonged hospital stays and secondary risks associated with treatment are common.¹¹ Even when patients recover, many find their overall quality of life is significantly impacted over the long term.¹² In addition to these clinical concerns, associated costs can range from \$400 for superficial SSI to upward of \$30,000 for organ/space SSIs leading to system-wide excess costs of more than \$7 billion per year.^{13,14}

Scope of the Problem

- 500,000 SSIs per year
- 8000 annual deaths
- 40%–60% preventable
- \$7 billion in excess cost

Tracking Surgical Site Infections: Outcomes

The impact of SSIs and their preventability have spurred national efforts to measure and reduce their incidence. The Centers for Disease Control and Prevention (CDC) has made hospital infections a priority, establishing the National Nosocomial Infections Surveillance system in the 1970s to monitor US acute care hospital infection rates.¹⁵ This system, known today as the National Healthcare Safety Network (NHSN), is still the most widely used HAI tracking mechanism. More than 12,000 medical facilities including acute-care hospitals, long-term acute-care hospitals, and ambulatory surgery centers report SSIs and other HAIs to the NHSN.¹⁶

More recently, the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) and the Veterans Affairs Surgical Quality Improvement Program that preceded it have also made strides in SSI tracking at participating acute-care hospitals nationwide.

Tracking Surgical Site Infections: Process Measures

Initiated by the Centers for Medicare and Medicaid Services and the CDC, the Surgical Care Improvement Project (SCIP) is a multistakeholder partnership to reduce surgical complications including SSI. Since 2005, several process metrics around SSI have been developed, implemented, and revised with hospital performance being publically reported and sometimes tied to reimbursement (**Table 1**). Despite their widespread use, adherence to SCIP measures has not been convincingly linked to a reduction in SSI rates.⁷

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