



Prevent Surgical Site Infections

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Goal

PREVENT SURGICAL SITE INFECTION (SSI) AND DEATHS BY RELIABLY IMPLEMENTING IDEAL PERIOPERATIVE CARE FOR ALL SURGICAL PATIENTS.

Background

- Surgical site infection is the most common healthcare associated infection among surgical patients, with 77% of patient deaths reported to be related to infection¹.
- Infected surgical patients are twice as likely to die, spend 60% more time in the intensive care unit, and are five times more likely to be readmitted to hospital after initial discharge². Such infections result in 3.7 million excess hospital days and us \$1.6-3 billion in excess hospital costs per year³.
- Results from the Surgical Care Improvement Project (SCIP) are promising, but show that there is still room for improvement. The SCIP reported the following US national averages for the fourth quarter of 2007. Antibiotics are given on average within 1 hour of surgery 89.5% of the time; correct antibiotics are given on average 95.2% of the time; and antibiotics are discontinued on average within 24 hours of the end of surgery 86.2% of the time⁴.
- An estimated 47 to 84% of SSIs occur after discharge; most of these are managed entirely in the outpatient setting. These patients required significantly more outpatient visits, emergency room visits, radiology services, readmissions, and home health aid services than did controls⁵.

Intervention

Four Key components of reliable perioperative care:

1. Antimicrobial coverage perioperatively
 - a. Appropriate use of prophylactic antibiotics⁶
 - b. Antiseptic prophylaxis⁷
2. Appropriate hair removal⁸
3. Maintenance of perioperative glucose control⁹
4. Perioperative normothermia¹⁰

Measures

1. Percent of surgical patients with timely prophylactic antibiotic administration
2. Percent of surgical patients with appropriate prophylactic antibiotic discontinuation
3. Percent of clean surgery patients with surgical infection
4. Percent of surgical patients with appropriate hair removal

¹ Mangram, Horan, Pearson, Silver, Jarvis. Infect Control Hosp Epidemiol 1999;20:247-80

² Kirkland, Briggs, Trivette, Wilkinson, Sexton. Infect Control Hosp Epidemiol 1999;20:725-30.

³ Martone, Nichols. Clinical Infectious Diseases 2001;33:S67-8.

⁴ Galway, Parker, Borkowski. International Anesthesiology Clinics 2009;47:37-53.

⁵ Bratzler. Arch Surg. 2005; 140: 174-182

⁶ Please see references numbered 6-16, and 18-27 in the reference list of the Surgical Site Infection Getting Started Kit, September 2010.

⁷ Please see references numbered 57-68, 70, and 73 in the reference list of the Surgical Site Infection Getting Started Kit, September 2010.

⁸ WHO. The WHO Guidelines for Safe Surgery. In: WHO, ed. 1st ed. Geneva: WHO; 2008. AORN. Recommended practices for peroperative patient skin antisepsis. Denver, CO: AORN; 2008

⁹ Presutti, Millo. Crit Care Nurs Q 2006;29:123-31. Umplierrez, Isaacs, Bazargan, You, Thaler, Kitabchi. J Clin Endocrinol Metab 2002;87:978-82. Moghissi, Korytkowski, DiNardo, et al. Endocrine Practice 2009;15:1-17

¹⁰ Mellinger, Ali, Scott, Leaper. Lancet 2001;358:876-80. Forbes, Eskicioglu, Nathens, et al. American College of Surgeons 2009;209:492-503

5. Percent of surgical patients (including major cardiac) with controlled postoperative serum glucose
6. Percent of all surgical patients (including colorectal and open abdominal) with postoperative normothermia
7. (Optional measure) Percentage of surgical patients with appropriate selection of prophylactic antibiotic

Success Stories

1. In 2009, William Osler Health System, Ontario identified that compliance with prophylactic antibiotics administration and documentation for total joint arthroplasty surgeries was 27%. In response, they implemented the following process: (1) pre-printed antibiotic order set used; (2) day surgery starts IV and hangs the antibiotic (but doesn't infuse); (3) all antibiotics started in the OR by the anesthesiologist, with the exception of vancomycin which is started in Day Surgery; (4) antibiotic administration (type & timing) verified as part of the Surgical Safety Checklist that is conducted prior to all surgeries; (5) anesthesiologist to start the antibiotic prior to incision; and (6) antibiotic documented in both electronic record and paper copy (anesthesia record). The data were aggregated bimonthly by the Infection Prevention and Control Department. The results were posted on the external website, were disseminated and were tracked at monthly Quality Information Network meetings. After seven months, antibiotic prophylaxis was administered and documented correctly 95% of the time.
2. The Cardiac Surgery Program at the Foothills Medical Centre in Calgary, Alberta observed SSI rates up to 3% during 4 years of surveillance, despite optimal antibiotic prophylaxis and povidone-iodine surgical site antisepsis. Subsequent implementation of a care bundle resulted in both a decrease in sternal deep organ space infection rates from 3.1% to 0.8% ($p = 0.0002$), and in donor site infection rates (zero infections in the last quarter of 2010).

The care bundle includes the following: (1) audit of the clinical environment; (2) adoption of protocol using a 2% chlorhexidine gluconate impregnated no-rinse disposable cloth pre-operatively; (3) administration of chlorhexidine based mouthwash pre-operatively and post-operatively twice daily until extubated; (4) change to 2% chlorhexidine gluconate/70% IPA tincture surgical skin prep; (5) change to post-operative patient bathing with Comfort Bath (chlorhexidine based body wash) while in CVICU, on the ward a clean basin each day, or a low level disinfected sink; and (6) wound care practice changes including daily dressing change using aseptic technique until all invasive lines are out, and wound is healed. These findings reinforce that multiple small practice changes (a bundle approach) can have a positive impact on surgical outcomes.

Other Resources and Guidelines

AORN. Recommended practices for perioperative patient skin antisepsis. Denver, CO: AORN; 2008.

Scottish Intercollegiate Guidelines Network. Antibiotic Prophylaxis in Surgery: A National Clinical Guideline. Edinburgh: Scottish Intercollegiate Guideline Network; 2008.

WHO. The WHO Guidelines for Safe Surgery. In: WHO, ed. 1st ed. Geneva: WHO; 2008.

Mangram A, Horan T, Pearson M, Silver L, Jarvis W. The Hospital Infection Control Practices Advisory Committee: Guidelines for prevention of surgical site infection. *Infect Control Hosp Epidemiol* 1999;20:247-80.

Anderson D, Kaye K, Classen D, et al. SHEA/IDSA Practice Recommendations: Strategies to prevent surgical site infections in acute care hospitals. *Infection Control and Hospital Epidemiology* 2008;29:S51-S61.

NICE. National Collaborating Centre for Women's and Children's Health - NHS/NICE Guideline. Surgical site infection: Prevention and treatment of surgical site infection. In: NICE; 2008.