

# Surgical Site Infections: Strategies for Prevention

## Introduction

Surgical site infections (SSIs) often reflect the quality of hospital care since an estimated 40-60% are considered preventable.<sup>1,2</sup> Today, SSIs remain the most expensive hospital acquired infections (HAIs) in the United States (U.S.), costing up to \$29 billion each year.<sup>3</sup> Approximately one in 20 patients undergoing a surgical procedure (2-5%) will suffer from an SSI, which carries significant risk of morbidity and mortality.<sup>2,4</sup> In addition to a greater likelihood of being admitted to the intensive care unit (ICU) and longer hospital stays, patients with SSIs are up to 5 times more likely to be re-admitted to the hospital within 30 days than surgical patients without SSIs.<sup>5</sup> Readmissions due to preventable causes, such as SSIs, are a major focus in today's healthcare reform and is one measure utilized in calculating Centers for Medicare & Medicaid Services (CMS) reimbursement penalties as well as incentives.<sup>6</sup>

## Zero Tolerance: Avoiding Preventable SSIs

Due to the alarming rate of SSIs and the preventable nature of these infections, the U.S. Department of Health and Human Services (HHS) has targeted SSI prevention as a national priority over the years. As a whole, acute care hospitals failed to reach previous targets for SSI reduction.<sup>7</sup> The 2020 National Acute Care Hospital HAI Metrics released an aggressive goal for an additional 30% SSI reduction by the year 2020, using the 2015 rates as a benchmark.

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In order to achieve these goals, hospitals need to approach SSIs with zero tolerance. Zero tolerance means treating every infection as if it should never happen, investigating the root cause when necessary, and holding everyone accountable.<sup>8</sup>

## Bundling of Care for SSI Prevention

One intervention alone cannot prevent SSIs; however, evidence-based interventions grouped together into a bundle of care has been shown to be most effective to improve care. Bundles of care provide a clear, tangible set of expectations to follow and are often measurable.<sup>10,11</sup>

## Bundling of Care for SSI Prevention *(continued)*

Interventions for SSI prevention should be considered from pre-operative through post-operative periods. Kaiser's Sunnyside Medical Center bundle program, "Pathway to Zero SSI," is one example of a comprehensive bundle of care program with the goal of reducing SSIs associated with colorectal surgical procedures.<sup>14</sup> The hospital not only included Surgical Care Improvement Project (SCIP) measures, but also additional interventions in both preoperative, intraoperative, and postoperative areas. Among the interventions were:



The hospital reported a **68% reduction** in SSIs in less than two years.<sup>14</sup>

An overall colorectal SSI rate of 21.2% prior to care bundle implementation vs. 6.7% post-intervention.<sup>14</sup>

### *Pre-Operative Chlorhexidine Skin Antisepsis*

While many of the guidelines do not recommend one specific antiseptic for pre-operative bathing, there are several studies that suggest chlorhexidine gluconate (CHG) is shown to be an effective agent. The 2018 AORN guidelines include study data from Tanner et al of 60 healthy volunteers that showed that bathing with CHG was more effective than soap for reducing microbial growth immediately and at six hours after the intervention.<sup>13</sup>

Hand occlusion in surgical gloves provides a favorable environment for bacteria growth. The 2018 AORN guidelines recommend surgical hand antisepsis with a product that meets FDA requirements, that has documented persistence activity, and can demonstrate cumulative effect.<sup>13</sup> CHG products showed greater reduction in bacteria than other antiseptics. A 2011 meta-analysis of publications from 1948 -2011 by Jarral revealed that the antimicrobial effects of CHG are more profound and longer lasting than povidone-iodine.<sup>15</sup>

### *Intra-Operative Double-Gloving*

Glove perforation causes a break in aseptic technique and germs can be transferred from surgical staff to the patient and vice versa.<sup>9</sup> This, in turn, can cause an increase in SSI risk of patients. Double gloving has been proven across several studies to reduce the risk of glove perforations, thereby aiding in the protection of both healthcare workers and their patients.<sup>9,16</sup> A 2014 meta-analysis that included twelve surgical trials with 3,437 patient procedures found 17.2% of single layer gloves incurred perforations compared to 6% of inner layer of double gloves, with double gloving resulting in nearly three times lower risk of perforations.<sup>17</sup>

## Post-Operative Dressings

Occlusive dressings protect from pathogenic invasion and additional trauma to the surgical site. The ideal post-op dressing creates an environment that is conducive to healing, which is moist and warm, not saturated with wet drainage or dry. The dressing should be impermeable to microbial contamination, free from either particulate or toxic contamination, and remain in place to absorb and wick drainage from the skin. It should be easy to apply and remove without causing epidermal stripping or blistering. The ideal dressing also allows for an early bath or shower which encourages early mobilization, an important post-operative goal.

Silver dressing is one example of an ideal dressing that can reduce bacteria near the incision by causing the cell wall of microbes to rupture. Unlike antibiotics, resistance to silver dressings is rare. According to an International Consensus in 2015, silver dressings reduce healing time, shorten the hospital stay, reduce pain and the frequency of dressing changes and decrease the number of MRSA infections.

## Conclusion

Hospitals should strive for zero tolerance for preventable SSIs by focusing on 100% quality of care. SSIs are the second most common adverse event in hospitalized patients, totaling 1.5 million each year.<sup>1,2</sup> Gaining national attention, hospital reimbursement will continue to be dependent on ensuring quality of care, improving patient outcomes, and controlling costs. However, developing care bundles, including antiseptic skin cleansing, double-gloving, and advanced wound dressings, has been proven to aid hospitals in achieving their goals.

### References:

1. Wound Source. Surgical wound management: a guide to post-operative wound care. Wound Source. October 2018.
2. Ban KA, Minei JP, Laronga C, et al. American college of surgeons and surgical infection society: surgical site infection guidelines, 2016 update. J Am Coll Surg. 2017;224(1):59-74.
3. Sullivan E, Gupta A, Cook CH. Cost and consequences of surgical site infections: a call to arms. Surgical Infections. 2017;18(4):451-454.
4. CDC Surgical Site Infection (SSI) Event. Procedure-associated Module SSI. January 2019. <https://www.cdc.gov/nhsn/pdfs/pscmanual/9pscscsscurrent.pdf>.
5. O'Hara LM, Thom KA, Preas MA. Update to the Centers for Disease Control and Prevention and the Healthcare Infection Control Practices Advisory Committee Guideline for the Prevention of Surgical Site Infection (2017): a summary, review, and strategies for implementation. Am J Infect Control. 2018;46(6):602-609.
6. Hospital Readmissions Reduction Program. Centers for Medicare & Medicaid Services. <https://www.cms.gov/medicare/medicare-fee-for-service-payment/acuteinpatientpps/readmissions-reduction-program.html>. Accessed March 7, 2019.
7. Data summary of HALs in the US: assessing progress 2006-2016. CDC. <https://www.cdc.gov/hai/data/archive/data-summary-assessing-progress.html>. Accessed January 11, 2019.
8. Institute for Healthcare Improvement. What zero looks like: eliminating hospital-acquired infections. <http://www.ihc.org/resources/Pages/ImprovementStories/WhatZeroLooksLikeEliminatingHospitalAcquiredInfections.aspx>. Accessed January 7, 2019.
9. Guide to the Elimination of Orthopedic Surgical Site Infections. An APIC Guide 2010.
10. Septimus E, Yokoe DS, Weinstein RA, et al. Maintaining the momentum of change: the role of the 2014 updates to the compendium in preventing healthcare-associated infections. Infection Control and Hospital Epidemiology. 2014;35(S2):S6-S9.
11. Zero tolerance for infections: a winning strategy. Infection Control Today. January 24, 2008. <http://www.infectioncontrolday.com/articles/2008/01/zero-tolerance-for-infections-a-winning-strategy.aspx>. Accessed February 1, 2019.
12. Berrios-torres SI, Umscheid CA, Bratzler DW, et al. Centers for Disease Control and Prevention guideline for the prevention of surgical site infection, 2017. JAMA Surgery. 2017;152(8):784-791.
13. AORN. Guidelines for Preoperative Patient Skin Antisepsis. In: Guidelines for Perioperative Practice. Denver, CO; Association of periOperative Registered Nurses, Inc.; 2018: 51-74.
14. Stulberg JJ, Delaney CP, Neuhauser DV, et al. Adherence to surgical care improvement project measures and the association with postoperative infections. JAMA. 2010;303(24):2479-2485.
15. Jarral OA, McCormack DJ, Ibrahim S, Shipolini AR. Should surgeons scrub with chlorhexidine or iodine prior to surgery?. Interactive CardioVascular and Thoracic Surgery. 2011;12:1017-1021.
16. Childs T. Use of double gloving to reduce surgical personnel's risk of exposure to bloodborne pathogens: an integrative review. AORN. 2013;98(6):585-596.
17. Mischke C, Verbeek JH, Saarto A, et al. Gloves, extra gloves or special types of gloves for preventing percutaneous exposure injuries in healthcare personnel. Cochrane Database Syst Rev. 2014;3:CD009573.
18. Safe Care Campaign: Preventing Healthcare and Community Acquired Infections. <http://www.safecarecampaign.org/ssi.html>. Accessed January 9, 2019.
19. Preas MA, O'Hara L, Thom K. 2017 HICPAC-CDC Guideline for Prevention of Surgical Site Infection: what the infection preventionist needs to know. APIC. Fall 2017.

