



# Establishing a Culture of Safety: USING A 7 S BUNDLE APPROACH FOR THE PREVENTION OF SSI

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## Purpose of Project:

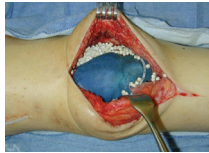
To develop a systematic approach to preventing surgical site infections (SSIs) in the pre-operative, intraoperative and postoperative period.

**Methodology:** In 2012, a corporate team with the Value Analysis Director, Surgical Director and Infection Preventionist developed a bundled approach for the reduction of SSIs. The team collected research on prevention measures suggested by national organizations. A seven-step approach was designed and included:

- 1) Safe operating room
- 2) Screen for risk factors and MRSA/MSSA
- 3) Showers with chlorhexidine
- 4) Skin prep with alcohol based antiseptics
- 5) Sutures with an antimicrobial
- 6) Solution to irrigate with chlorhexidine
- 7) Skin adhesive or antimicrobial dressings to protect incision.

**Results:** Since implementation there has been a statistically significant reduction in SSIs documented by calculating standardized infection ratio (SIR) for total knee, colon, abdominal hysterectomy and coronary artery bypass graft surgery.

**Perioperative Nursing Implications:** A reduction in SSIs leads to higher patient quality and safety, lower costs, fewer readmissions and reduced isolation precautions during the surgical experience.



## #1 SAFE OPERATING ROOM

- Traffic control, number of staff in room
- Air handling systems, filtration, grills
- SCIP: hair clipping, body warmers, oxygenation

- Surgical prophylaxis, foley catheter removal within 48 hrs
- Between case room turnover and daily terminal cleaning
- Surgical technique and handling of tissues, use of wound protector/retractor to prevent field contamination
- Instrument cleaning/sterilization process, biological indicators
- Storage of supplies, clean supply bins, carts, tables, stationary equipment



## #2 SCREENING FOR MRSA AND MSSA

Patients who carry Staph aureus and MRSA in their nares or on their skin are more likely to develop Staph aureus SSIs.

- Short-term nasal mupirocin (4-7 days) is an effective method for Staph aureus eradication
- 90% success at one week
- 1% develop mupirocin resistance



## #3 SHOWER PRE-OP

Studies show that repeated use of CHG soap enhances the ability of CHG to reduce bacterial counts on the skin before surgery. Patients should be instructed to cleanse the body the night before and morning of surgery with either CHG solution or CHG wash cloths.

## #4 SKIN PREP – DUAL COMBINED ANTISEPTICS

Two types of preoperative skin preparations that combine alcohol (which has an immediate and dramatic killing effect on skin bacteria) with long-acting antimicrobial agents appear to be more effective at preventing SSI than povidone-iodine (an iodophor) alone:

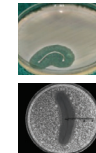
- Chlorhexidine plus alcohol
- Iodophor plus alcohol



## #5 SUTURES – ANTIMICROBIAL

Like all foreign bodies, sutures can be colonized by bacteria:

- Implants provide nidus for attachment of bacteria
- Bacterial colonization can lead to biofilm formation
- Biofilm formation increases the difficulty of treating an infection



*On an implant, such as a suture, it takes only 100 staphylococci per gram of tissue for an SSI to develop.*

## #6 SOLUTION TO POLLUTION IS DILUTION

New CHG surgical irrigant - meets American College of Emergency Physicians (ACEP) guidelines for wound irrigation volume and pressure.

Proprietary SplatterGuard protects healthcare workers, patients and the environment from biohazard contamination. Chlorhexidine Gluconate at a low concentration of 0.05% has demonstrated antimicrobial efficacy and persistence in laboratory testing.

The mechanical action effectively loosens and removes wound debris in compound fractures and tissues.

Safe for mucous membranes – approved by FDA.

## #7 SKIN ADHESIVE OR ANTIMICROBIAL GAUZE DRESSINGS

Wounds are most vulnerable to infection in the **first 48-72 hours**.<sup>1</sup> Until the epithelial barrier is complete (usually within 48 hours), wounds are solely dependent on the wound closure device to maintain integrity.<sup>1</sup>

The extent of microbial protection depends on barrier integrity.<sup>1</sup>

Effective barriers must maintain their integrity for the first 48 hours.

Incisional adhesive provides a **strong microbial barrier** that prevents bacteria from entering the incision site.<sup>2</sup>



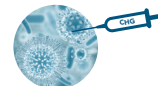
## • Seven days of wound healing strength in less than one minute of application

- Shower immediately
- Outstanding cosmesis
- Reduced follow-up
- Less pain and anxiety



## Antimicrobial dressings

Antimicrobial dressings are wound covers that deliver the effects of agents, such as silver and polyhexamethylene biguanide (PHMB), to maintain efficacy against common infectious bacteria. Indicated to help reduce the risk of infection in partial and full-thickness wounds, over percutaneous line sites and surgical incisions.



CHG is applied directly to the surgical wound bed to cleanse and remove debris from the area.

[www.7sbundle.com](http://www.7sbundle.com)

## REFERENCES:

### #1 Safe OR

1. Environmental Cleaning in the Perioperative Setting. In: AORN, 2012: 237-250
2. High Level Disinfection. AORN, 2008:303-309
3. Surgical attire AORN, 2011,p. 57-72
4. Sterilization in the Perioperative Setting. AORN, 2008:575-284

### #2 Screening for MRSA and MSSA

1. van Rijen M, Bonten M, Wenzel R, Kluytmans J. Mupirocin ointment for preventing Staphylococcus aureus infections in nasal carriers. *Cochrane Database Syst Rev*. 2008(4):CD006216.
2. Wilcox MH, Hall J, Pike H, et al. Use of perioperative mupirocin to prevent methicillin resistant Staphylococcus aureus (MRSA) orthopaedic surgical site infections. *J Hosp Infect*. 2003;54(3):196-201
3. Nicholson MR, Huesman LA. Controlling the usage of intranasal mupirocin does impact the rate of Staphylococcus aureus deep sternal wound infections in cardiac surgery patients. *Am J Infect Control*. 2006;34(1):44-48.
4. Walsh EE, Greene L, Kirshner R. Sustained reduction in methicillin-resistant Staphylococcus aureus wound infections after cardiothoracic surgery. *Arch Intern Med*. 2011;171(1): 68-73

5. Kim D, Spencer M, et al. Institutional Prescreening for Detection and Elimination of Methicillin Resistant Staphylococcus aureus in Patients Undergoing Elective Orthopaedic Surgery. *J Bone Joint Surg Am* 2010;92:1820-1826

### #3 Shower pre-op with CHG

1. Johnson AJ, Kapadia BH, Daley JA, Molina CB, Mont MA. Chlorhexidine Reduces Infections in Knee Arthroplasty. *J Knee Surg*. 2012 Nov 12.
2. Kapadia BH, Johnson AJ, Daley JA, Issa K, Mont MA. Pre-admission Cutaneous Chlorhexidine Preparation Reduces Surgical Site Infections In Total Hip Arthroplasty. *J Arthroplasty*. 2012 Oct 29. pii: S0883-5403(12)00542-6.
3. Karki S, Cheng AC. Impact of non-rinse skin cleansing with chlorhexidine gluconate on prevention of healthcare-associated infections and colonization with multi-resistant organisms: a systematic review. *J Hosp Infect*. 2012
4. Edmiston CE Jr, Krepel CJ, Seabrook GR, Lewis BD, Brown KR, Towne JB. Preoperative shower revisited: can high topical antiseptic levels be achieved on the skin surface before surgical admission? *J Am Coll Surg* 2008;207(2):233-9.
5. Edmiston CE Jr, Seabrook GR, Johnson CP, Paulson DS, Beausoleil CM. Comparative of a new and innovative 2% chlorhexidine gluconate-impregnated cloth with 4% chlorhexidine gluconate as topical antiseptic for preparation of the skin prior to surgery. *Am J Infect Control* 2007;35(2):89-96. Oct;82(2):71-84.

### #4 Skin prep – dual combined antiseptics

1. Darouiche RO, Wall MJ, Jr, Itani KM, et al. Chlorhexidine-alcohol versus povidone-iodine for surgical-site antisepsis. *The New England Journal of Medicine*. Jan 7 2010;362(1):18-26. Bibbo C, Patel DV, Gehrmann RM, Lin SS. Chlorhexidine provides superior skin decontamination in foot and ankle surgery: a prospective randomized study. *Clinical Orthopaedics & Related Research*. Sep 2005;438:204-208.
3. Johnson AJ, Kapadia BH, Daley JA, Molina CB, Mont MA. Chlorhexidine Reduces Infections in Knee Arthroplasty. *J Knee Sur*. 2012 Nov 12. Kapadia BH, Johnson AJ Daley JA, Issa K, Mont MA. Pre-admission Cutaneous Chlorhexidine Preparation Reduces Surgical Site Infections In Total Hip Arthroplasty. *J Arthroplasty* 2012 Oct 29. pii: S0883-5403(12)00542-6.

### #5 Sutures – antimicrobial

1. Edmiston C, et al. Is there an evidence based argument for embracing an antimicrobial (triclosan) suture technology to reduce the risk of SSI?: a meta-analysis. *Surgery* 2013;154:89-100
2. Wang Z et al. Systematic review and meta analysis of triclosan coated sutures for the reduction of SSI. *British Journal of Surgery*, 2013

### #6 Solution to pollution is dilution

1. Fletcher N, et al: Prevention of perioperative infections. *J Bone Joint Surg Am*. 2007;89:1605-1618
2. Edmiston C, et al. Reducing the risk of SSI: does CHG provide a risk reduction benefit? *AJIC* 2013. 40:49-55

### #7 Skin incision – antimicrobial dressing

1. Eberlein T, Haemmerle G, Signer M, Gruber Moeseneder U, Traber J, Mittelboeck M, Abel M, Strohal R. Comparison of PHMB-containing dressing and silver dressings in patients with critically colonised or locally infected wounds. *J Wound Care*. 2012 Jan;21(1):12, 14-6, 18-20.
2. Martin-Trapero C, Martin-Torrijos M, Fernández-Conde L, Torrijos-Torrijos M, Manzano-Martin E, Pacheco-Del Cerro JL, Diez-Valladares LI. "Surgical site infections. Effectiveness of polyhexamethylene biguanide wound dressings." *Enferm Clin*. 2013 Mar 22. pii: S1130-8621(13)00036-3.
3. Rigo C, Ferroni L, Tocco I, Roman M, Munivrana I, Gardin C, Cairns WR, Vindigni V, Azzena B Barbante C, Zavan B. Active silver nanoparticles for wound healing. *Int J Mol Sci*. 2013 Mar 1;14(3):4817-40.