Is Your Total Joint SSI Rate Acceptable?

April 8, 2016
Disclosure

• This presentation is sponsored by 3M.
Learning Objectives

• Articulate 3 elements included in the IHI Project Joints SSI Prevention Bundle.
• Identify a common endogenous arthroplasty pathogen.
• Explain the relationship between colonization and infection.
• Identify an alternative to nasal decolonization.
# Surgical Site Infection (SSI) Numbers

<table>
<thead>
<tr>
<th>Total Hip Arthroplasty</th>
<th>Total Knee Arthroplasty</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 365,000 every year</td>
<td>• 550,000 every year</td>
</tr>
<tr>
<td>• 0.67%-2.4% infection rate per 100 procedures</td>
<td>• 0.68%-1.6% infection rate per 100 procedures</td>
</tr>
<tr>
<td></td>
<td>• Estimated 3700-8800 SSIs</td>
</tr>
</tbody>
</table>

Estimated **6000-20,000** SSIs annually in hip and knee replacements

SSI Impact on the Patient

- Prolonged systemic antibiotic therapy
- Pain and impaired mobility
- Operation to remove the hardware and place an antibiotic spacer
- Operation to re-implant a joint replacement
- Physical therapy and recuperation
SSI Impact on the Hospital

- Publicly reported in some states
  - Worse that the U.S. National Benchmark
- Potential inclusion in Pay for Performance
- Secretary Burwell’s new HHS policy: 90% of all Medicare payments are somehow tied to value and quality by the end of 2018
  - Hospital Readmission Reduction
  - Value Based Purchasing
Table 2: Modifiable and Non-Modifiable Host- and Procedure-Related Orthopedic SSI Risk Factors

<table>
<thead>
<tr>
<th>Host-specific</th>
<th>Modifiable</th>
<th>Non-Modifiable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Obesity</td>
<td>Diabetes</td>
</tr>
<tr>
<td></td>
<td>Current smoking</td>
<td>Male gender</td>
</tr>
<tr>
<td></td>
<td>Hematocrit &lt; 36</td>
<td>Rheumatoid arthritis</td>
</tr>
<tr>
<td></td>
<td>Elevated preoperative or postoperative serum glucose</td>
<td>ASA score of 3 or greater</td>
</tr>
<tr>
<td></td>
<td>Nasal carriage of <em>Staphylococcus aureus</em> (as risk factor for <em>Staphylococcus aureus</em> infection)</td>
<td>Recent weight loss</td>
</tr>
<tr>
<td>Procedure-specific</td>
<td>Estimated blood loss of &gt; 1 liter*</td>
<td>Estimated blood loss of &gt; 1 liter*</td>
</tr>
<tr>
<td>Procedure-specific</td>
<td>Longer procedure time*</td>
<td>Longer procedure time*</td>
</tr>
<tr>
<td>Procedure-specific</td>
<td>Suboptimal timing of prophylactic antibiotic</td>
<td>Previous infection at site</td>
</tr>
<tr>
<td>Procedure-specific</td>
<td>Two or more surgical residents participating in procedure</td>
<td>Prolonged wound drainage*</td>
</tr>
<tr>
<td>Procedure-specific</td>
<td>Prolonged wound drainage*</td>
<td>Low volume of procedures performed at hospital</td>
</tr>
<tr>
<td>Procedure-specific</td>
<td>Spinal procedure via the posterior or the anterior/posterior approach</td>
<td>Low volume of procedures performed by surgeon</td>
</tr>
</tbody>
</table>
Where are the Pathogens?

- Pathogen source for most SSIs is endogenous flora of the patient’s skin, mucous membranes or GI tract
- 20% of the skin’s pathogens live beneath the epidermal layer in hair follicles and sebaceous glands
- Any incision can carry some of the bacteria directly to the operative site

Biofilms

• Up to 80% of human bacterial infections are biofilm associated

• *Staphylococcus epidermidis, Pseudomonas aeruginosa*, **Staphylococcus aureus**, *Enterobacteria* such as *Escherichia coli*.

• Attach to a host and form a dense extracellular matrix that protects from natural host defenses and antibiotics

Leading SSI Pathogens

Gram positive bacteria
- MRSA
- MSSA
- Coagulase negative staphylococci
- Streptococcus species
- Enterococcus species

Gram negative bacteria
- Enterobacter
- Pseudomonas aeruginosa

Other pathogens
- Anaerobic bacteria
- Fungi
- Polymicrobial

AJIC Vol 38, Issue 2, March (2010), pp. 112-120
**Staphylococcus aureus**

Colonization

- The presence of bacteria
- No signs of illness or infection
- Common sites for colonization: nostrils, belly button, underarms, groin, etc….
- Does not require treatment
**Staphylococcus aureus**

**Infection**

- Clinical signs of illness or inflammation
- Localized pain/tenderness, redness, warmth, swelling, pus, fever
- Tissue is damaged from invasion by the bacteria
- Requires treatment
The Effect of Universal Intranasal Povidone Iodine Antisepsis on Total Joint Replacement Surgical Site Infections

Lynne Brown, RN, BSN, MBA, CIC; Mark Shelly, MD; Linda Greene, RN, MPS, CIC; Ann Marie Pettis, RN, BSN, CIC; Sherry Romig, RN

METHODS

Opportunity
- Project QI/STI recommends a bundle to decrease SSI in joint arthroplasty patients. The following bundle was always in place:
  - appropriate skin prep
  - appropriate site tech
  - intravenous drape and gown (CNV and sterile)
  - Glass Iodine (70% CNV: CNV) solution swanning and 2% CNV (dil or spray) on day of incision
  - In addition to the above bundle, Project QI/STI also recommended shared surgical rounds prior to incision with minimized use of skin preps

Findings
- SSI rates decreased by 50% after implementing the bundle

Background
- Project QII/STI team conducted a number of site visits to different hospitals to evaluate different practices and obtain expert feedback

RESULTS

Arthroplasty SSI Rate (%), All Joints

<table>
<thead>
<tr>
<th></th>
<th>N=155</th>
<th>N=125</th>
<th>N=155</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neat Antiseptic</td>
<td>3.1%</td>
<td>3.9%</td>
<td>0.7%</td>
</tr>
<tr>
<td>CNV Antiseptic</td>
<td>4.9%</td>
<td>6.7%</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

Arthroplasty SSI Rate (%), Hip

<table>
<thead>
<tr>
<th></th>
<th>N=155</th>
<th>N=125</th>
<th>N=155</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neat Antiseptic</td>
<td>4.5%</td>
<td>5.7%</td>
<td>1.0%</td>
</tr>
<tr>
<td>CNV Antiseptic</td>
<td>6.3%</td>
<td>8.8%</td>
<td>1.0%</td>
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</tbody>
</table>

Arthroplasty SSI (all pathogens)

<table>
<thead>
<tr>
<th></th>
<th>N=155</th>
<th>N=125</th>
<th>N=155</th>
</tr>
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<td>4.9%</td>
<td>6.7%</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

Arthroplasty SSI (Staph aureus only)

<table>
<thead>
<tr>
<th></th>
<th>N=155</th>
<th>N=125</th>
<th>N=155</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<td>6.3%</td>
<td>8.8%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

Surveillance for SSI
- Surveillance was performed on all pts in a 26 bed bariatric utilized
- Surveillance was performed on all pts in a 26 bed Joint Replacement patient population in 5 different hospitals
- Surveillance was performed on all pts in a 26 bed Bariatric patient population in 5 different hospitals

Collection of procedure demographic data
- Procedure codes were evaluated to identify the number of hip and knee arthroplasty procedures performed. The number of procedures performed at each hospital was identified for the entire project period

Calculation of the SSI rate proportion
- The SSI rate proportion was calculated by dividing the number of SSI events by the total number of procedures performed at each hospital

- The overall rate of SSI decreased significantly following PI surgical antisepsis
- A statistically significant reduction in hip arthroplasty SSI rate was achieved
- A larger sample size is necessary to reach a statistically significant reduction in the knee arthroplasty SSI rate
- This intervention warranted further investigation as a horizontal approach to decrease arthroplasty infections
Background
IHI Project Joints Bundle

Three evidence-based interventions for preventing SSI for hip and knee arthroplasty:

1. Use an alcohol-containing antiseptic agent for preoperative skin preparation
2. Instruct patients to bathe or shower with chlorhexidine gluconate (CHG) soap for at least three days before surgery
3. Screen patients for *Staphylococcus aureus* (SA) and decolonize SA carriers with five days of intranasal mupirocin

Two applicable SCIP practices:

1. Appropriate use of prophylactic antibiotics
2. Appropriate hair removal

Why Mupirocin? It Works!

- Significantly reduced MSSA
  - Screened for MRSA and MSSA 1-6 weeks prior to surgery
  - If positive for MRSA or MSSA, then treated with 2% intranasal mupirocin and daily CHG baths for 5 days
  - Rescreened on day of surgery
- 6 patients were negative for MSSA at first screening, but positive on day of surgery

Bundled Approach – Is the Whole Greater Than the Sum of Its Parts?

The Bundled Approach to MRSA Surgical Site Infection Prevention

Is the Whole Greater Than the Sum of Its Parts?

Surgical site infections (SSIs) can significantly impact postoperative recovery and outcomes. Bundled interventions, which are the most common way to combat SSIs, have been shown to decrease the incidence of infections.
JAMA Article Bundled Approach

- 20 Hospitals in 9 states
- Are evidence based bundles effective in patients undergoing hip or knee arthroplasty and Cardiac Surgery?
- Screened patients for both MRSA and MSSA
- Positive patients (either MRSA or MSSA) received CHG bath for 5 days pre-op and nasal mupirocin
- Pre – intervention complex SSI 101/ 28,218 cases
- Intervention SSI 29/ 14,316
- Mean per 10,000 surgeries 36 vs. 21 Infections
- Compliance to bundle 83%
- Statistically significant decrease
Barriers to Screening for MRSA & Mupirocin

- Increased time required (need an additional preoperative appointment to get screening results and mupirocin treatment)
- Potential for Mupirocin resistance
- Increased cost
- Highland decided to explore other options.
Annual Rates of Mupirocin Resistance in MRSA from Canadian Hospitals.

Benefits to Intranasal Povidone Iodine (PI) Intranasal Antisepsis

- Universal/horizontal approach for all patients and all pathogens
- Does not contribute to antibiotic resistance
- Less costly
- Less time required (do not need an additional preoperative appointment)
Approaches for Preventing Healthcare-Associated Infections: Go Long or Go Wide?

Edward Septimus, MD; Robert A. Weinstein, MD; Trish M. Perl, MD, MSc; Donald A. Goldmann, MD; Deborah S. Yokoe, MD, MPH

In this issue, the continuing "A Compendium of Strategies to Prevent Healthcare-Associated Infections in Acute Care Hospitals: 2014 Updates" series presents updated recommendations for preventing central line-associated bloodstream infections and preventing transmission and infection due to methicillin-resistant Staphylococcus aureus. During revision of these articles, several reviewers raised a critical question: What is the relative effectiveness (and cost-effectiveness) of vertical versus horizontal approaches to infection prevention? As multidrug-resistant organisms such as extended-spectrum β-lactamase–producing and carbapenem-resistant Enterobacteriaceae emerge and spread, it will become increasingly important to understand the relative benefits and costs of pathogen-specific screening and intervention strategies compared with reliable application of more "generic" methods to mitigate transmission and infection.

Over the last decade, the general approaches to healthcare-associated infection (HAI) prevention have taken two conceptually different paths: (1) vertical approaches that aim to reduce colonization, infection, and transmission of specific pathogens, largely through use of active surveillance testing cause HAIAs and the constrained resources available for infection prevention efforts. When informed by local knowledge of microbial epidemiology and ecology and supported by a strong quality improvement program, this strategy allows healthcare facilities to focus on approaches that target all rather than selected organisms in the absence of an organism-specific epidemic.

In addition to comparing the strength of evidence supporting each approach, it is also important to take into account financial costs and potential consequences associated with various infection prevention strategies, including the impact on hospital personnel effort and on aspects of patient care; for example, placing patients on isolation precautions may lead to fewer healthcare provider visits. These comparisons are difficult to make because of conflicting study results, at least partly reflecting the heterogeneity of study designs and settings (i.e., where the prevalence of the target pathogen ranges from rare to endemic to epidemic) and the paucity of high-quality cost-effectiveness analyses that are needed to estimate the economic impact of specific HAI prevention interventions.
Horizontal versus Vertical Approaches

| **Table 1. Preventing Healthcare-Associated Infections: Examples of Vertical and Horizontal Approaches** |
|**Vertical approaches** reduce risk of infections due to specific pathogens: |
| • Active surveillance testing to identify asymptomatic carriers |
| • Contact precautions for patients colonized or infected with specific organisms |
| • Decolonization of patients colonized or infected with specific organisms |
|**Horizontal approaches** reduce risk of a broad range of infections and are not pathogen specific: |
| • Standard precautions (eg, hand hygiene) |
| • Universal use of gloves or gloves and gowns |
| **• Universal decolonization (eg, chlorhexidine gluconate bathing)** |
| • Antimicrobial stewardship |
| • Environmental cleaning and disinfection |

**Source.** Modified from Wenzel and Edmond.³
Horizontal versus Vertical Intervention

- Gram positive bacteria
- Gram negative bacteria
- Other pathogens

Mupurocin approach
Povidone iodine approach
Implementation of PI Intranasal Antisepsis

- PI added to the orthopedic order set as a medication order
- Recorded as a single dose on the medication administration record
- PI intranasal antisepsis performed by nurses on day of surgery in the pre-anesthesia area
Implementation of PI Intranasal Antisepsis

- Nurses trained on proper PI intranasal antisepsis technique
- Educational posters in each pre-anesthesia room
- Nurses educate patients prior to administration
Surveillance

- Infection Prevention monitored PI antisepsis administration along with conducting routine surgical site infection surveillance.
- Case ascertainment was determined by reviewing microbiology, readmission, and reoperation data.
- Superficial as well as deep and organ space SSIs were included in the rates.
- All pathogen SSI rate calculated for pre and post intervention periods.
- Fisher’s Exact Two Tailed Test used for analysis.
All Pathogen Surgical Site Infections

All Joints

Hips

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## Arthroplasty SSI (all pathogens)

<table>
<thead>
<tr>
<th>Joint</th>
<th>Before</th>
<th>After</th>
<th>Infections</th>
<th>26</th>
<th>7</th>
<th>P = 0.0074</th>
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</thead>
<tbody>
<tr>
<td>Hip</td>
<td>7/2009 to 3/2012</td>
<td>5/2012 to 6/2014</td>
<td>Cases</td>
<td>2130</td>
<td>1741</td>
<td>1.22%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rate</td>
<td>1.22%</td>
<td>0.40%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(95% Confidence Interval)</td>
<td>(0.80 to 1.78)</td>
<td>(0.16 to 0.83)</td>
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</tr>
<tr>
<td>Knee</td>
<td>7/2009 to 3/2012</td>
<td>5/2012 to 6/2014</td>
<td>Infections</td>
<td>18</td>
<td>9</td>
<td>P = 0.3316</td>
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<tr>
<td></td>
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<td></td>
<td>Cases</td>
<td>2236</td>
<td>1767</td>
<td>0.81%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rate</td>
<td>0.81%</td>
<td>0.51%</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(95% Confidence Interval)</td>
<td>(0.48 to 1.27)</td>
<td>(0.23 to 0.96)</td>
<td></td>
</tr>
<tr>
<td>Hips &amp; Knees</td>
<td>7/2009 to 3/2012</td>
<td>5/2012 to 6/2014</td>
<td>Infections</td>
<td>44</td>
<td>16</td>
<td>P = 0.0058</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Cases</td>
<td>4366</td>
<td>3508</td>
<td>1.01%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rate</td>
<td>1.01%</td>
<td>0.46%</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(95% Confidence Interval)</td>
<td>(0.73 to 1.35)</td>
<td>(0.26 to 0.74)</td>
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</table>
## Arthroplasty SSI (Staphylococcus aureus only)

<table>
<thead>
<tr>
<th>Joint</th>
<th>Before</th>
<th>After</th>
<th>Infections</th>
<th>Cases</th>
<th>Rate</th>
<th>(95% Confidence Interval)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip</td>
<td>7/2009 to 3/2012</td>
<td>5/2012 to 6/2014</td>
<td>13</td>
<td>2130</td>
<td>0.61%</td>
<td>(0.33 to 1.04)</td>
<td>0.0427</td>
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<tr>
<td></td>
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<td></td>
<td>3</td>
<td>1741</td>
<td>0.17%</td>
<td>(0.04 to 0.50)</td>
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<tr>
<td>Knee</td>
<td>7/2009 to 3/2012</td>
<td>5/2012 to 6/2014</td>
<td>6</td>
<td>2236</td>
<td>0.27%</td>
<td>(0.10 to 0.58)</td>
<td>1.0000</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>1767</td>
<td>0.28%</td>
<td>(0.09 to 0.66)</td>
<td></td>
</tr>
<tr>
<td>Hips &amp; Knees</td>
<td>7/2009 to 3/2012</td>
<td>5/2012 to 6/2014</td>
<td>19</td>
<td>4366</td>
<td>0.44%</td>
<td>(0.26 to 0.68)</td>
<td>0.1257</td>
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<td></td>
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<td>8</td>
<td>3508</td>
<td>0.23%</td>
<td>(0.10 to 0.45)</td>
<td></td>
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</tbody>
</table>
Conclusions

- The overall rate of arthroplasty SSI decreased significantly following PI intranasal antisepsis.
- A statistically significant reduction in hip arthroplasty SSI rate was achieved.
- A larger sample size is necessary to reach a statistically significant reduction in the knee arthroplasty SSI rate.
- This intervention warrants further investigation as a horizontal approach to decrease arthroplasty infections.
ORIGINAL ARTICLE

Preventing Surgical Site Infections: A Randomized, Open-Label Trial of Nasal Mupirocin Ointment and Nasal Povidone-Iodine Solution

Michael Phillips, MD; Andrew Rosenberg, MD; Bo Shopsin, MD, PhD; Germaine Cuff, RN, PhD; Faith Skeete, RN; Alycia Foti, BA; Kandy Kraemer, RN; Kenneth Inghma, MS; Robert Press, MD, PhD; Joseph Bosco, MD

BACKGROUND. Treatment of Staphylococcus aureus colonization before surgery reduces risk of surgical site infection (SSI). The regimen of nasal mupirocin ointment and topical chlorhexidine gluconate is effective, but cost and patient compliance may be a barrier. Nasal povidone-iodine solution may provide an alternative to mupirocin.

METHODS. We conducted an investigator-initiated, open-label, randomized trial comparing SSI after arthroplasty or spine fusion in patients receiving topical chlorhexidine wipes in combination with either twice daily application of nasal mupirocin ointment during the 5 days before surgery or 2 applications of povidone-iodine solution into each nostril within 2 hours of surgical incision. The primary study end point was deep SSI within the 3 months after surgery.

RESULTS. In the modified intent-to-treat analysis, a deep SSI developed after 14 of 855 surgical procedures in the mupirocin group and 6 of 842 surgical procedures in the povidone-iodine group (P = .1); S. aureus deep SSI developed after 5 surgical procedures in the mupirocin group and 1 surgical procedure in the povidone-iodine group (P = .2). In the per protocol analysis, S. aureus deep SSI developed in 5 of 765 surgical procedures in the mupirocin group and 0 of 776 surgical procedures in the povidone-iodine group (P = .03).

CONCLUSIONS. Nasal povidone-iodine may be considered as an alternative to mupirocin in a multifaceted approach to reduce SSI.

TRIAL REGISTRATION. ClinicalTrials.gov identifier: NCT01313182.

Infect Control Hosp Epidemiol 2014;35(7):826-832
Background

Prescribed nasal mupirocin BID for 5 days before surgery and CHG bathing the night before surgery

Anonymous survey:
- 94% compliant with CHG bathing
- 86% compliant with nasal mupirocin
- 8% found mupirocin hard to purchase due to cost
Search for Alternatives

• Survey results

• Mupirocin resistance

• Povidone-iodine solution broad spectrum suitable for nasal suppression of *S. aureus* in nasal secretions

• Believed that one-time application of PI would work as well as mupirocin BID X 5 days
Study Methods

• Prospective
• Open label
• Randomized to mupirocin or povidone iodine
• All patients used CHG cloths the evening before and morning of surgery
Endpoint

• Deep SSI within the 3 months after surgery
• Cases identified through lab reports, readmissions, reports from other hospitals and Infection Prevention Rounds
• CDC NHSN definitions used to classify infections
Baseline

- SSI Rate 1.5 cases per 100 procedures
- *Staphylococcus aureus* in 37% of cases
Study subjects

1874 Enrolled
- 963 Mupirocin
  - 855 Intent to Treat
  - 763 Completed Protocol
- 911 Povidone iodine
  - 842 Intent to Treat
  - 776 Completed Protocol

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Results

<table>
<thead>
<tr>
<th>Analysis</th>
<th>No. of subjects</th>
<th>No. of cases</th>
<th>Rate, cases per 100 subjects</th>
<th>P*</th>
<th>No. of cases</th>
<th>Rate, cases per 100 subjects</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intent to treat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mupirocin</td>
<td>855</td>
<td>14</td>
<td>1.6</td>
<td>.1</td>
<td>5</td>
<td>0.6</td>
<td>.2</td>
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<tr>
<td>Povidone-iodine</td>
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<td>6</td>
<td>0.7</td>
<td>.1</td>
<td>1</td>
<td>0.1</td>
<td>.1</td>
</tr>
<tr>
<td>Per protocol</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mupirocin</td>
<td>763</td>
<td>13</td>
<td>1.7</td>
<td>.06</td>
<td>5</td>
<td>0.7</td>
<td>.03</td>
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<tr>
<td>Povidone-iodine</td>
<td>776</td>
<td>5</td>
<td>0.6</td>
<td>.06</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

* By χ² test.
Original Investigation | ASSOCIATION OF VA SURGEONS

Effect of a Preoperative Decontamination Protocol on Surgical Site Infections in Patients Undergoing Elective Orthopedic Surgery With Hardware Implantation

Serge P. Bebko, MD, David M. Green, MD, Samir S. Awad, MD, MPH

IMPORTANCE Surgical site infections (SSIs), commonly caused by methicillin-resistant Staphylococcus aureus (MRSA), are associated with significant morbidity and mortality, specifically when hardware is implanted in the patient. Previously, we have demonstrated that a preoperative decontamination protocol using chlorhexidine gluconate washcloths and intranasal antiseptic ointment is effective in eradicating MRSA in the nose and on the skin of patients.

OBJECTIVE To examine the effect of a decontamination protocol on SSIs in patients undergoing elective orthopedic surgery with hardware implantation.

DESIGN, SETTING, AND PARTICIPANTS A prospective database of patients undergoing elective orthopedic surgery with hardware implantation at the Michael E. DeBakey Veterans Affairs Medical Center in Houston, Texas, was analyzed from October 1, 2012, to December 31, 2013. Cohort groups before and after the intervention were compared.

INTERVENTIONS Starting in May 2013, during their preoperative visit, all of the patients watched an educational video about MRSA decontamination and were given chlorhexidine washcloths and oral rinse and nasal povidone-iodine solution to be used the night before and the morning of scheduled surgery.

MAIN OUTCOMES AND MEASURES Thirty-day SSI rates were collected according to the definitions of the Centers for Disease Control and Prevention National Nosocomial Infections Surveillance. Data on demographics, comorbidities such as chronic obstructive pulmonary disease and coronary artery disease, tobacco use, alcohol use, and body mass index were also collected. Univariate analysis was performed between the 2 groups of patients. Multivariate
## Results: Significant Reduction in SSIs

<table>
<thead>
<tr>
<th>Control Group</th>
<th>Study Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Prior to implementation of Decontamination Protocol</td>
<td>Decontamination Protocol</td>
</tr>
<tr>
<td>• SSI within 30 days 3.8%</td>
<td>• CHG washcloths + CHG oral rinse night before and DOS</td>
</tr>
<tr>
<td></td>
<td>• PI intranasal antisepsis DOS</td>
</tr>
<tr>
<td></td>
<td>• SSI within 30 days 1.1%</td>
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</tbody>
</table>

Study group had a significantly lower SSI Rate (P= 0.02)  
MRSA decontamination was an independent predictor of NOT developing as SSI (adjusted odds ratio, 0.24 [95% CI, 0.08-0.77]; P=0.02)
Saint Thomas Center for Spinal Surgery
Nashville, Tennessee

- No trend in infection rate prior to intervention (p-value 0.18)
- Infection rate for any month pre-intervention was 1.04 times infection rate of the previous month (95% CI, 0.98 to 1.10)
- Statistically significant decrease in infection rate following experimental intervention (p-value 0.0029)
Newest Recommendations

CDC/HICPAC Draft Guideline for Prevention of Surgical Site Infection 2016

Strategies to Prevent Surgical Site Infections In Acute Care Hospitals; ICHE May 2014
NPSG.07.05.01: SSI Prevention

National Patient Safety Goals (NPSG), Hospital, 2010
SSI Patient Safety Goals

- Educate personnel
- Educate patients
- Implement policies aimed at reducing risk of infection
- Conduct periodic risk assessments
- SSI rates – 30 days and 90 days if implantable
- Prophylaxis according to evidence based standards
- Use clippers for hair removal
Now you can clip hair and clean it up - all in one step.

ClipVac, the newest addition to our line of market-leading surgical clippers, vacuum captures an average of 98.5 percent of hair and airborne contaminants at the source, eliminating the need for extra cleanup with messy tape or mitts and helping reduce the risk of complications for patients.

Make pre-surgical hair removal a clean sweep.
What is included?

• Core Section
  • Antimicrobial prophylaxis (parenteral and non-parenteral)
  • Glycemic control
  • Normothermia
  • Oxygenation
  • Antiseptic prophylaxis
What is included?

• Arthroplasty section
  • Transfusion
  • Immunosuppressive therapy
  • Anticoagulation
  • Ortho exhaust suits
  • Antimicrobial prophylaxis duration with drains
  • Biofilms
What isn’t included?

- SSI surveillance
- Public reporting
- Infection Prevention in OR staff
- OR environment
- Surgical Attire
- Sterilization and disinfection

Many unresolved issues
What defines a Category I Recommendation?

- **CDC/HICPAC**
  - Randomized Controlled Trials published in peer reviewed journals
  - Meta-analyses published in peer reviewed journals

- **SHEA**
  - Above
  - Availability of wide range of studies, with little variation in results
Pre-op Bathing/Showering

- CDC/HICPAC – Advise patients to shower or bathe with either soap (antimicrobial or non-microbial) or and antiseptic agent on at least the night before the operative day. (1B)
- AORN – Patients undergoing open Class 1 surgical procedures below the chin should have two preoperative showers with chlorhexidine gluconate (CHG) before surgery, when appropriate.
Skin Prep: Pre-op

- Alcohol based skin prep unless contraindicated (e.g. mucous membranes, known sensitivity, etc.)
  CDCD/HICPAC IA, SHEA 1A
- No recommendation about which specific prep to choose (e.g. Duraprep vs Cloroprep)*
- Barriers:
  - identification of clear contraindications
  - Prep must be allowed to air dry
*Darouche; NEJM 2010 Swensen; ICHE 2009
• Provide ongoing feedback of SSI rates to surgical and perioperative personnel and leadership.*
• Do not remove hair at the operative site unless it will interfere with the surgical procedure.

*Jamtvedt; Cochrane database syst. Rev. (2);2006
Dear Dr. [redacted],

The following case meets the surveillance definition for a surgical infection:

**Name, Patient**

<table>
<thead>
<tr>
<th>MRN</th>
<th>DOB</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>right humerus ORIF</td>
</tr>
</tbody>
</table>

In reviewing this case, we look for common factors associated with infection.

**Perioperative Antibiotics**

Did not meet expectations

Cefazolin was given 40 minutes before incision, and continued. More than 24h Post-Op. Antibiotics should be given within 1 hour before the incision and continued no more than 24 hours after the surgery.

**Surgical Skin Antisepsis**

Met expectations

Skin prep was performed using CHG Chloroprep (CHG & Aic). Unless contraindicated, an alcohol containing prep such as Duraprep or Chloroprep should be used.

**Perioperative Normothermia**

Met expectations

The minimum core temperature was 36.1. Ideally the temperature should stay at or above 36.0 C.

**Postoperative Hyperglycemia**

Did not meet expectations

The maximum postoperative glucose was 245. Blood glucose over 180 mg/dl are associated with increased risk of infection.

Highland Hospital and Medical Staff are committed to maintaining the safest patient environment and the best outcomes. If you have any questions or suggestions, please contact the Infection Prevention Team at 341-8853.
Normothermia

CDC/HICPAC draft

- Maintain perioperative normothermia (1A)
  - No lower limit or when to measure was identified

SHEA

- 35.5

No recommendations on best strategies to maintain normothermia
Lessons Learned: High Reliability Organization

- The right process will produce the right result
- Standardization
  - Every patient
  - Every time
  - Horizontal versus vertical approach
- Hardwire the intervention into a system
  - Include with provider order sets
  - Include in the SSI Prevention Bundles/Guidelines
  - Document on the medical record
  - Provide periodic feedback to the team
Questions ?