Is It Time to Move Away from Mupirocin for Nasal Decolonization of Staphylococcal Organisms?

Gwen Borlaug, MPH, CIC, FAPIC
Infection Prevention Consultant
Progress is slowing but success is possible.

US rates of hospital-onset MRSA infections dropped 17% each year until 2013.

MSSA may be rising in communities and progress against MRSA has recently slowed in hospitals.

By 2017, US Veterans Affairs (VA) medical centers reduced MRSA by 55% and MSSA by 12%.

The VA reduced rates of staph infections after adding steps like screening new patients.
Table 4. Estimated Numbers of Major Types of Health Care–Associated Infection in the United States in 2011.

<table>
<thead>
<tr>
<th>Type of Infection</th>
<th>Infections Identified in Survey</th>
<th>Surveyed Patients with Type of Infection</th>
<th>Estimated Infections in the United States(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All health care–associated infections</td>
<td>no.</td>
<td>% (95% CI)</td>
<td>no. (95% CI)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>110</td>
<td>24.3 (20.6–28.5)</td>
<td>157,500 (50,800–281,400)</td>
</tr>
<tr>
<td>Surgical-site infection</td>
<td>110(†)</td>
<td>24.3 (20.6–28.5)</td>
<td>157,500 (50,800–281,400)</td>
</tr>
<tr>
<td>Gastrointestinal infection</td>
<td>86</td>
<td>19.0 (15.6–22.8)</td>
<td>123,100 (38,400–225,100)</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>65</td>
<td>14.4 (11.4–17.9)</td>
<td>93,300 (28,100–176,700)</td>
</tr>
<tr>
<td>Primary bloodstream infection</td>
<td>50</td>
<td>11.1 (8.4–14.2)</td>
<td>71,900 (20,700–140,200)</td>
</tr>
<tr>
<td>Eye, ear, nose, throat, or mouth infection</td>
<td>28(‡)</td>
<td>6.2 (4.2–8.7)</td>
<td>40,200 (10,400–85,900)</td>
</tr>
<tr>
<td>Lower respiratory tract infection</td>
<td>20</td>
<td>4.4 (2.8–6.6)</td>
<td>28,500 (6900–65,200)</td>
</tr>
<tr>
<td>Skin and soft-tissue infection</td>
<td>16</td>
<td>3.5 (2.1–5.6)</td>
<td>22,700 (5200–55,300)</td>
</tr>
<tr>
<td>Cardiovascular system infection</td>
<td>6</td>
<td>1.3 (0.5–2.7)</td>
<td>8,400 (1200–26,700)</td>
</tr>
<tr>
<td>Bone and joint infection</td>
<td>5</td>
<td>1.1 (0.4–2.4)</td>
<td>7,100 (1000–23,700)</td>
</tr>
<tr>
<td>Central nervous system infection</td>
<td>4</td>
<td>0.9 (0.3–2.1)</td>
<td>5,800 (700–20,700)</td>
</tr>
<tr>
<td>Reproductive tract infection</td>
<td>3</td>
<td>0.7 (0.2–1.8)</td>
<td>4,500 (500–17,800)</td>
</tr>
<tr>
<td>Systemic infection</td>
<td>1</td>
<td>0.2 (0.01–1.1)</td>
<td>1,300 (0–10,900)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HAI Type</th>
<th>Estimated Cost per Infection</th>
<th>Percent of Total Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLABS1</td>
<td>$45,814</td>
<td>18.9</td>
</tr>
<tr>
<td>VAP</td>
<td>$40,144</td>
<td>31.6</td>
</tr>
<tr>
<td>SSI</td>
<td>$20,785</td>
<td>33.7</td>
</tr>
<tr>
<td>CDI</td>
<td>$11,285</td>
<td>15.4</td>
</tr>
<tr>
<td>CAUTI</td>
<td>$896</td>
<td>&lt; 1</td>
</tr>
</tbody>
</table>

Total annual costs $9.8 billion

Patients with SSI: hospital stay is twice as long; more likely to require an ICU stay; 6 fold increase in readmissions; twice the in-hospital mortality; direct and indirect cost of SSI annually in US = 1 to 10 billion
## Pathogens Causing SSI, Wisconsin, 2018

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Number (%) SSI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>THA (SSI = 146)</td>
</tr>
<tr>
<td><em>S. aureus</em></td>
<td>49 (34)</td>
</tr>
<tr>
<td><em>S. epidermidis</em></td>
<td>14 (10)</td>
</tr>
<tr>
<td><em>E. faecalis</em></td>
<td>8 (5)</td>
</tr>
</tbody>
</table>

Data courtesy of Wisconsin Department of Health Services Division of Public Health
Relationship between nasal colonization and subsequent infection with MSSA or MRSA

High levels of nasal carriage of *S. aureus* was the only independent risk factor for development of *S. aureus* surgical site infection (RR = 8.9) (Kalmeijer et al. ICHE, May 2000).

Genetic studies revealed 80% of strains causing bloodstream infections among carriers of *S. aureus* were a match to strains isolated from the nares (Wertheim et al. The Lancet, August 2004) (von Eiff et al. NEJM, January 2001).
Colonized patient (endogenous source: nares, skin)

Provider hands

Other providers hands

Environment

Next patient

Typical pathway of intraoperative MRSA transmission: Patients often served as a reservoir of origin for within- and between-case MRSA transmission, and the hands of attending anesthesiologists were often implicated as vectors for between-case MRSA transmission associated with provider-to-provider and provider-to-environment contamination.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mupirocin–Chlorhexidine (N = 504)</th>
<th>Placebo (N = 413)</th>
<th>Relative Risk (95% CI)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. aureus infection</td>
<td>17 (3.4)</td>
<td>32 (7.7)</td>
<td>0.42 (0.23–0.75)</td>
</tr>
<tr>
<td>Source of infection†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endogenous</td>
<td>12 (2.4)</td>
<td>25 (6.1)</td>
<td>0.39 (0.20–0.77)</td>
</tr>
<tr>
<td>Exogenous</td>
<td>4 (0.8)</td>
<td>6 (1.5)</td>
<td>0.55 (0.16–1.92)</td>
</tr>
<tr>
<td>Unknown</td>
<td>1 (0.2)</td>
<td>1 (0.2)</td>
<td></td>
</tr>
<tr>
<td>Localization of infection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep surgical site‡</td>
<td>4 (0.9)</td>
<td>16 (4.4)</td>
<td>0.21 (0.07–0.62)</td>
</tr>
<tr>
<td>Superficial surgical site‡</td>
<td>7 (1.6)</td>
<td>13 (3.5)</td>
<td>0.45 (0.18–1.11)</td>
</tr>
<tr>
<td>Lower respiratory tract</td>
<td>2 (0.4)</td>
<td>2 (0.5)</td>
<td>0.82 (0.12–5.78)</td>
</tr>
<tr>
<td>Urinary tract</td>
<td>1 (0.2)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Bacteremia</td>
<td>1 (0.2)</td>
<td>1 (0.2)</td>
<td></td>
</tr>
<tr>
<td>Soft tissue</td>
<td>2 (0.4)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
60% and 40% reduction in MRSA and MSSA SSI respectively, following preoperative staphylococcal screening and decolonization.

Study period SSI = 0.19%
Control period SSI = 0.45%
P = 0.009
Empirical treatment of all TJA surgical patients, or screen and treat strategies is a simple, safe, and cost effective intervention to reduce risk of SSI.

*S. aureus* decolonization with nasal mupirocin should be considered (Level II evidence).
## Current guideline recommendations for staphylococcal decolonization among surgical patients

<table>
<thead>
<tr>
<th>Guideline</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS/SIS SSI Guidelines, 2016 Update</td>
<td>Decision about whether or not to implement global Staphylococcus aureus screening and decolonization protocols should depend on baseline SSI and MRSA rates. MRSA bundles (screening, decolonization, contact precautions, hand hygiene) are highly effective if adhered to, otherwise there is no benefit.</td>
</tr>
<tr>
<td>WHO Global Guidelines for SSI Prevention, 2016</td>
<td>The panel recommends that patients undergoing cardiothoracic and orthopedic surgery with known nasal carriage of <em>S. aureus</em> should receive perioperative intranasal applications of mupirocin 2% ointment with or without a combination of CHG body wash. (Strong recommendation, moderate quality of evidence).</td>
</tr>
<tr>
<td>ASHP Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery, 2013</td>
<td>For cardiac and orthopedic procedures with implants: Mupirocin should be given intranasally to all patients with documented <em>S. aureus</em> colonization. (Strength of evidence for prophylaxis = A).</td>
</tr>
<tr>
<td>WDPH Supplemental Guidance for Prevention of SSI, 2017</td>
<td>In the case of targeted screening, preoperative suppression may be considered for MSSA and MRSA colonized patients undergoing “at risk” surgical procedures, such as cardiovascular and vascular procedures with implantation of prosthetic grafts and orthopedic total joint procedures. The benefit of targeted screening and preoperative suppression in other device-related surgical procedures (i.e., implantation of neurosurgical hardware, hernia repair with mesh, etc.) is unknown and currently not supported by data.</td>
</tr>
<tr>
<td>CDC Guideline for the Prevention of SSI, 2017</td>
<td>Not addressed</td>
</tr>
</tbody>
</table>
### Wisconsin Division of Public Health  
**Survey of Selected Inpatient Surgical Site Infection Prevention Practices**  
March 2017  
**Number (%) Responding “Yes”**

<table>
<thead>
<tr>
<th>Practice</th>
<th>Colorectal n = 97</th>
<th>Abdominal Hysterectomy n = 91</th>
<th>Joint (hip, knee) Replacement n = 99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight-based dosing of prophylactic antibiotics</td>
<td>90 (93)</td>
<td>84 (93)</td>
<td>96 (97)</td>
</tr>
<tr>
<td>Re-dosing of prophylactic antibiotics</td>
<td>83 (86)</td>
<td>80 (88)</td>
<td>90 (91)</td>
</tr>
<tr>
<td>Oral antibiotics in mechanical bowel prep</td>
<td>65 (67)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Normothermia</td>
<td>88 (91)</td>
<td>83 (91)</td>
<td>89 (90)</td>
</tr>
<tr>
<td>CHG with 70% alcohol skin prep</td>
<td>88 (91)</td>
<td>79 (87)</td>
<td>84 (85)</td>
</tr>
<tr>
<td>CHG preoperative shower or cloth treatment</td>
<td>59 (61)</td>
<td>56 (62)</td>
<td>93 (94)</td>
</tr>
<tr>
<td>Use of Triclosan coated sutures</td>
<td>16 (16)</td>
<td>15 (16)</td>
<td>24 (24)</td>
</tr>
<tr>
<td>Staph decolonization</td>
<td>N/A</td>
<td>N/A</td>
<td>75 (76)</td>
</tr>
</tbody>
</table>
**NEBH STAPH AUREUS AND MRSA ERADICATION PROGRAM**

**PREScreenING UNIT (PASU)**

Patient is screened for Staph aureus and Methicillin-resistant Staph aureus (MRSA)

- **Staph aureus**
  - Treated with 2% mupirocin (Bactroban) for five days and five days of body bathing with chlorhexidine (eg Hibiclens)
  - No further screens or precautions are necessary

- **MRSA +**
  - Flagged in Meditech as MRSA-SCR
  - Placed on the MRSA list on N Drive
  - Treated with 2% mupirocin (Bactroban) for five days and five days of body bathing with chlorhexidine (eg Hibiclens)
  - Second nasal screen obtained before surgery

**MRSA –**

- MRSA-SCR flag is removed from Meditech
- Vancomycin administered as surgical prophylaxis – prepared in Bond Center one hour before surgery
- No precautions or additional nasal screens are necessary

**MRSA +**

- MRSA-SCR flag changed to MRSA
- Vancomycin administered as surgical prophylaxis – prepared in Bond Center one hour before surgery
- Contact Precautions are implemented and used throughout the hospitalization
- Three negative cultures required to be removed from precaution list

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Limitations of Staphylococcal screening and decolonization using antibiotic agents
Mupirocin resistance

• Mupirocin resistance can be plasmid-mediated.

• Some evidence exists to suggest that widespread use in the community to treat and prevent community-associated infections increases mupirocin resistance.

• High level mupirocin resistance is associated with decolonization failure.
  • University of Toronto study--risk of decolonization failure was 9 times higher among patients with mupirocin-resistant organisms (Simor et al. CID 2007; 44 (2);178-185.)

• Authors predicted that as more U. S. hospitals implement mupirocin for widespread and routine staphylococcal decolonization, mupirocin resistance will increase.
Emerging elevated mupirocin resistance rates among staphylococcal isolates in the SENTRY Antimicrobial Surveillance Program (2000): correlations of results from disk diffusion, Etest and reference dilution methods

“As mupirocin resistance can be plasmid-mediated, the prudent and appropriate use of this topical agent is important to minimize the ongoing development of resistance. Local surveillance for emerging mupirocin resistance appears warranted particularly in the United States and Canada...”
Current recommendations for mupirocin use in routine decolonization regimens

- 2013 Huang study: If this practice (universal decolonization) is widely implemented, vigilance for emerging resistance will be required.

- 2006 CDC Guidelines for Managing Patients with MDRO: Routine decolonization is not recommended, however, when decolonization does occur, mupirocin antibiotic susceptibility testing should be performed each time patients undergo mupirocin decolonization to avoid treatment failures.

- 2009 CID mupirocin resistance article: A strategy for monitoring the prevalence of resistance should be developed and implemented whenever mupirocin is to be routinely used.

- 2013 ASHP guidelines: When decolonization therapy (e.g., mupirocin) is used as an adjunctive measure to prevent S. aureus SSI, surveillance of susceptibility of S. aureus isolated from SSIs to mupirocin is recommended.
Limitations of screening for staphylococcal carriage

20 percent persistent carriers  60 percent intermittent carriers  20 percent almost never carriers
Patient compliance with mupirocin

Patient Compliance with Total Joint Arthroplasty Preoperative Instructions

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Kelvin Kim BSc

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Abstract

Background: Compliance with preoperative guidelines such as medications and body washes are actions a patient can participate in so as to improve outcomes and decrease the risk of adverse events after total joint arthroplasty. The aim of this study was to assess our patients' compliance with preoperative instructions and guidelines. Proper preoperative compliance might lead to better outcomes in patient safety, care, and overall clinical outcomes of total joint arthroplasty.

Methods: In a prospective observational study, we analyzed patient compliance to a protocolized preoperative regimen that included preoperative warfarin, celecoxib, mupirocin, chlorhexidine body washes, surgical site shaving, and surgical site marking. Consecutive patients undergoing total joint arthroplasty were included. Patients filled out a questionnaire the day of
Antiseptic agents for use in perioperative decolonization regimens
NEBH STAPH AUREUS AND MRSA ERADICATION PROGRAM

PRESCREENING UNIT (PASU)

Patient is screened for Staph aureus and Methicillin-resistant Staph aureus (MRSA)

Staph aureus

Treated with 2% mupirocin (Bactroban) for five days and five days of body bathing with chlorhexidine (eg Hibiclen)

No further screens or precautions are necessary

MRSA +

Flagged in Meditech as MRSA-SCR
Placed on the MRSA list on N Drive

Treated with 2% mupirocin (Bactroban) for five days and five days of body bathing with chlorhexidine (eg Hibiclen)

Second nasal screen obtained before surgery

MRSA –

MRSA-SCR flag is removed from Meditech

Vancomycin administered as surgical prophylaxis – prepared in Bond Center one hour before surgery

No precautions or additional nasal screens are necessary

60% reduction in MRSA Infections
40% reduction in MSSA infection

p<0.001

MRSA +

MRSA-SCR flag changed to MRSA

Vancomycin administered as surgical prophylaxis – prepared in Bond Center one hour before surgery

Contact Precautions are implemented and used throughout at hospitalization

Three negative cultures required to be removed from precaution list

Monitoring mupirocin resistance

pre and post op PVI or alcohol nasal antiseptic for all orthopedic and cardiac surgical patients
Reduction of nasal *Staphylococcus aureus* carriage in health care professionals by treatment with a nonantibiotic, alcohol-based nasal antiseptic.

Steed LL¹, Costello J², Lobia S², Jones T², Spannhake FW³, Nguyen S⁴.

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4. Department of Otolaryngology, Head and Neck Surgery, Medical University of South Carolina, Charleston, SC. Electronic address: nguyensh@musc.edu.

Abstract

**BACKGROUND:** Antibiotics used to reduce nasal colonization by *Staphylococcus aureus* in patients before admission are inappropriate for carriage reduction on a regular basis within a hospital community. Effective nonantibiotic alternatives for daily use in the nares will allow reduction of this bacterial source to be addressed.

**METHODS:** Our study tested the effectiveness of a nonantibiotic, alcohol-based antiseptic in reducing nasal bacterial carriage in health care professionals (HCPs) at an urban hospital center. HCPs testing positive for vestibular *S aureus* colonization were treated 3 times during the day with topical antiseptic or control preparations. Nasal *S aureus* and total bacterial colonization levels were determined before and at the end of a 10-hour workday.

**RESULTS:** Seventy-eight of 387 HCPs screened (20.2%) tested positive for *S aureus* infection. Of 39 subjects who tested positive for *S aureus* infection who completed the study, 20 received antiseptic and 19 received placebo treatment. Antiseptic treatment reduced *S aureus* colony forming units from baseline by 99% (median) and 82% (mean) ($P < .001$). Total bacterial colony forming units were reduced by 91% (median) and 71% (mean) ($P < .001$).

**CONCLUSIONS:** Nasal application of a nonantibiotic, alcohol-based antiseptic was effective in reducing *S aureus* and total bacterial carriage, suggesting the usefulness of this approach as a safe, effective, and convenient alternative to antibiotic treatment.
Preventing Surgical Site Infections: A Randomized, Open-Label Trial of Nasal Mupirocin Ointment and Nasal Povidone-Iodine Solution

Michael Phillips, Andrew Rosenberg, Bo Shopsin, Germaine Cuff

DOI: https://doi.org/10.1086/676872  Published online by Cambridge University Press: 10 May 2016

Extract

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 763 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.

*S. aureus* deep SSI mupirocin group = 0.6%
*S. aureus* deep SSI PVI group = 0% (\(p = 0.03\))
**Impacts of Coordinated, Hospital-wide Use of Alcohol-based Nasal Decolonization on Infection Rates, Patient Care and Cost Savings**

Kathryn Landis-Bogush, RN, BSN, PCCN, HACP Infection Control Practitioner  
Anusha Belani, MD, Hospital Epidemiologist, Infectious Disease Consultant  
Frederick Memorial Hospital, Frederick Regional Healthcare System, Frederick, MD

**ABSTRACT**

**Background:** To optimize infection rate reduction and increase safety and quality of care in our patients, in April 2016 we initiated a two-phase process to shift infection prevention (IP) protocols involving nasal decolonization across our 315-bed community hospital. Phase I: pre-operative alcohol-based nasal decolonization (CP) was implemented in April 2016; in the second phase, begun in April 2017, alcohol-based nasal decolonization of all adult inpatients was added. Methods: In this year prior to the trial, surgical IP included pre- and postoperative chlorhexidine gluconate (CHG) bathing and pre-operative nasal decolonization with povidone iodine. By June 2017, surgical protocols were enhanced, in which pre-operative CP was replaced by pre- and postoperative alcohol-based nasal decolonization. Starting in April 2017, all adult patients and newborns received daily nasal decolonization and armadillo handwashing (AH) for methicillin-resistant Staphylococcus aureus (MRSA) colonization was monitored through the pre-CP CHG and AH protocols. Results: In the 12 months following implementation of pre- and post-operative alcohol-based nasal decolonization, from April 2017 to March 2018, MRSA rates decreased by 52.7% from 0.143/1000 to 0.074/1000 (p < 0.05), compared to the one-year pre-replacement period, in the IP program, with no other risk factors. In May 2017 and January 2018, hospital rates were 9.4% and 9.7%, respectively. Additionally, by the end of 2018, no MRSA isolates were identified. Costs were estimated from CP, screening and SS costs reduction. RESULTS:

**Background:** The average person touches their nose more than 100 times per day. The nose is a known reservoir of pathogens, including Staphylococcus aureus (S. aureus). S. aureus is the major cause of infections in both the inpatient and outpatient setting. Methicillin-resistant S. aureus (MRSA) contributes to 80% of all S. aureus infections and 90% of these infections can be transmitted by this bacteria in the patient's own nose. Nasal colonization with methicillin-resistant S. aureus (MSSA) and MRSA is a predominant risk factor for hospital-wide infections, including those of the bloodstream, surgical sites, and skin and soft tissues. Frederick Memorial Hospital (FMH) is a 107-bed community hospital with a 26-bed Intensive Care Unit (ICU) and 40-bed medical/surgical units.

Prior to instituting our Infection Prevention and Control (IPC) program, MRSA colonized patients were placed under in contact isolation (CI) to prevent transmission. The literature documents that CP can be harmful to these restricted patients, delaying early mobility efforts and increasing the risk for deep vein thrombosis and pulmonary embolism, as well as creating isolation stress coupled with delayed staff response times. Overuse of CP centering staff fatigue and multiple diverting patient nurses increases costs of care and waste disposal.

**METHODS**

**Nasal Decolonization Taskforce:** A multidisciplinary team of stakeholders and champions included leadership, nurses, physicians, and other professional staff. Multiple meetings and subgroups contributed to the success of nasal decolonization initiation and hospital-wide implementation. The policy and guideline changes were approved by the Infection Control and Medical Care Committees and endorsed by the IPC Committee. With the adoption of universal nasal decolonization upon admission, the screening of asymptomatic high-risk patients for MRSA colonization was no longer necessary and significantly reduced the use of CP.

**Education and Training:** The nursing champion and IPC led the education and training of the staff. A computer-based learning PowerPoint with an embedded test was required of all nursing staff. In addition, hands-on demonstration of the alcohol-based nasal product application and patient and staff education materials were provided by the manufacturer and preprinted protocols.

**Policy:** The IPC team developed the new policies and protocols utilizing product mapping and development of Inclusive Annual Safety Assessment for all adult inpatient and observation units, which was integrated into the Guideline for Isolation Precautions. On patient admission, patients without contraindications trigger the nursing worklist order in the EMR for alcohol-based nasal decolonization which is initiated at that time and is continued on a twice-daily basis while in-house. If the patient is postoperative, the treatment begins preoperatively and, if admitted to an inpatient unit after surgery, is continued until discharge. Discharge instructions for high-risk patients include best practices for home use of the nasal antiseptic.

**Nasal Decolonization Compliance:** Audits of nasal antiseptic applications were obtained from the EMR worklist during hospital-wide usage. Approximately 14,800 charts were reviewed in May–June 2017 (compliance 95.6%) and in January 2018 follow-up (compliance 97.4%). The pre-surgical checklist documented nasal antiseptic use.

**Calculation of CI savings:** Costs of CP utilized beds and gowns, nasal screening and the estimated treatment costs of S. aureus infections before and after the IPC changes were tallied and annualized and presented minus the cost of nasal antiseptic.

**Determination of Infection Rates:** Monthly reports of SSI meeting the National Healthcare Safety Network definitions during the 30 and 90 day post-surgical surveillance periods were tallied for the delineated phases of the implementation. Infection rates per 100 surgical cases were calculated monthly.

**RESULTS**

**Days of CP Isolation:** Following the start of the universal alcohol-based nasal decolonization protocol in April of 2017, notably reduced during a period in which...

**SUMMARY**

1. A Patient Safety initiative was phased in from a pilot program to a house-wide adult medical-surgical nasal decolonization protocol utilizing an alcohol-based antiseptic.
2. The adoption of a robust approach to include nasal decolonization in conjunction with CHG bathing in our goal to reduce bioburden resulted in a significant decrease in S. aureus SSI and with a decrease in CP while maintaining low incidence of MRSA bacteremia.
3. Annualized savings of $223,150, net of decolonization costs, were estimated from CP, screening and SS cost reductions.

**CONCLUSIONS**

Nasal application of non-antibiotic, alcohol-based antiseptics addresses the hidden unaddressed reservoir effectively with collateral benefits in reducing CP and in providing and improving safe patient care. “Doing less can be better.”
Brief Report

Perioperative participation of orthopedic patients and surgical staff in a nasal decolonization intervention to reduce Staphylococcus spp surgical site infections

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Spine surgery
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Anterior nares
Staff nasal decolonization

With the goal of reducing rates of surgical site infections in our spine patients, we initiated a trial to investigate the impact of adding perisurgical nasal decolonization involving patients and surgical and nursing staff. We combined immediate presurgical application of a nonantibiotic alcohol-based nasal antiseptic with existing chlorhexidine bath or wipes in a comprehensive pre- and postoperative decolonization protocol. Mean infection rates were significantly decreased by 81% from 1.76 to 0.32 per 100 surgeries during the 15-month trial, when compared with the prior 9-month baseline.

© 2017 Association for Professionals in Infection Control and Epidemiology, Inc. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
Is Preoperative Nasal Povidone-Iodine as Efficient and Cost-Effective as Standard Methicillin-Resistant Staphylococcus aureus Screening Protocol in Total Joint Arthroplasty?


Torres EG; Lindmair-Snell JM; Langan JW; Burnikel BG

The purpose of this study was to compare nasal povidone-iodine swab for total joint arthroplasty patients to methicillin-resistant Staphylococcus aureus (MRSA) screening on the incidence of 90-day postoperative surgical site infections in total knee and hip arthroplasties as well as the cost-effectiveness. This is a single-center retrospective review of primary or revision total knee or hip arthroplasty patients. There were 849 patients screened for MRSA and 1004 patients in the nasal swab groups, both with an infection rate of 0.8%. The mean cost for the nasal swab was $27.21 (SD, 0), significantly different (P ≤ .01) than the mean cost for MRSA screens, $121.16 (SD, 26.18). There were significant cost savings with no difference in infection rates; therefore, nasal povidone-iodine swab antiseptic is financially and clinically successful.
Use of a nasal antiseptic decolonization agent instead of an antibiotic agent...

eliminates the need to perform pre-operative screening of selected surgical patients,
covers intermittent carriers testing negative for staphylococcal nasal colonization at the time of screening,
allows for day-of-surgery decolonization by healthcare personnel, reducing reliance on patient compliance,
eliminates the need to monitor mupirocin resistance or conduct antibiotic susceptibility testing, and
widespread use does not promote antibiotic resistance, therefore aligns with sound antibiotic stewardship practices.
### Organization recommendations for prevention of healthcare-onset S. aureus infections

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<tr>
<th>Source</th>
<th>Recommendations</th>
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<td>Health Research and Educational Trust, 2018 <a href="http://www.hret-hiin.org/Resources/ssi/18/surgical-site-infections-change-package.pdf">Link</a></td>
<td>Integrate CHG bathing and intranasal decolonization with mupirocin, povidone iodine nasal antiseptic, or alcohol-based nasal therapy into the decolonization protocol.</td>
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<td>Centers for Disease Control and Prevention, 2019 <a href="https://www.cdc.gov/hai/prevent/staph-prevention-strategies.html">Link</a></td>
<td>For all patients undergoing high risk surgeries (e.g., cardiothoracic, orthopedic, and neurosurgery), unless known to be S. aureus negative, use an intranasal anti-staphylococcal antibiotic/antiseptic and CHG wash or wipes prior to surgery.</td>
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<td>ICU: Decolonize all patients with intranasal staphylococcal antibiotic/antiseptic plus topical CHG (core strategy).</td>
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<td>Non-ICU: Decolonize patients with CVC or midline catheter with intranasal staphylococcal antibiotic/antiseptic plus topical CHG (supplemental strategy).</td>
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In summary...universal decolonization of orthopedic, neurosurgery, and cardiac surgical patients using a nasal antiseptic agent and CHG skin decolonization is an evidence-based, practical and cost-effective regimen for reducing MSSA and MRSA surgical site infections.