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

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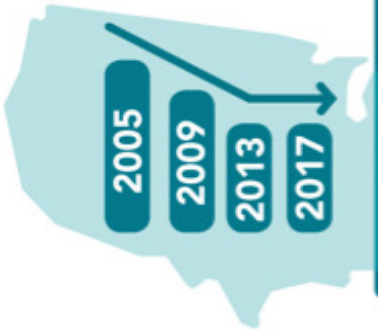
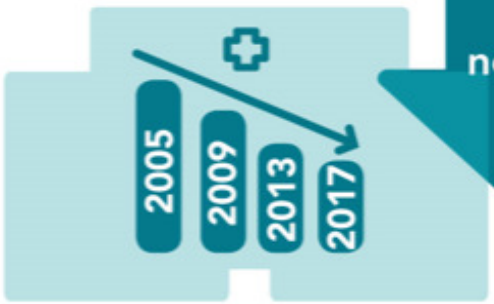
Progress is slowing but success is possible.

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.

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

Magill, S.S., et al. Multistate point-prevalence survey of health care-associated infections. *NEJM* 2014;13: 1198-1208.

HAI Type	Estimated Cost per Infection	Percent of Total Annual Cost
CLABSI	$45,814	18.9
VAP	$40,144	31.6
SSI	$20,785	33.7
CDI	$11,285	15.4
CAUTI	$896	< 1

Total annual costs **$9.8 billion**

Zimlichman, E., et al. Healthcare-associated infections: A meta-analysis of costs and financial impact on the US healthcare system. *JAMA Intern Med* 2013;22: 2039-2046.

SSI: Causative pathogens and associated outcomes

Table 2. Pathogens causing SSI over time

Organism	Overall number and proportion		Trending during study period (% of overall culture positive population)									
	n	%	Jan-Jun 03	Jul-Dec 03	Jan-Jun 04	Jul-Dec 04	Jan-Jun 05	Jul-Dec 05	Jan-Jun 06	Jul-Dec 06	Jan-Jun 07	Cochran-Armitage trending *P* value
Total No.	8302		920	1016	878	881	854	962	902	996	893	
Monomicrobial												
Aerobic bacteria												
Gram positive												
MSSA	2227	26.8	26.8	26.7	30.9	31.1	27.5	25.1	25.1	22.6	26.5	.0056
MRSA	1138	13.7	11.5	13.2	11.7	13.5	13.2	12.7	16.9	16.0	14.6	.0007
Coag-neg staphylococci	863	10.4	11.7	9.7	11.7	10.3	10.0	10.5	9.3	10.4	9.9	.2184
Streptococcus spp	293	3.5	4.3	4.2	3.2	2.4	3.3	2.8	4.8	3.2	3.5	.4692
Enterococcus spp	212	2.6	2.3	2.1	3.1	2.4	3.2	2.7	1.9	2.9	2.6	.6300
Other gram positives	37	0.4	0.4	0.6	0.5	0.7	0.2	0.3	0.1	0.6	0.6	.7596
Gram negative												
Enterobacter	120	1.4	1.5	1.6	0.8	1.5	1.8	1.2	1.0	2.1	1.5	.6064
Pseudomonas aeruginosa	174	2.1	2.6	2.4	1.3	2.2	2.2	2.9	1.9	1.9	1.5	.2730
Other gram negatives	370	4.5	3.9	5.0	4.3	3.6	5.3	3.0	5.0	5.1	4.8	.4045
Anaerobic bacteria	70	0.8	0.9	0.6	0.7	1.2	1.3	0.9	0.7	0.8	0.6	.7231
Fungi	58	0.7	0.7	0.4	0.6	0.6	1.2	0.5	1.0	0.9	0.6	.3285
Polymicrobial												
Including MRSA	451	5.4	4.6	4.9	5.2	4.2	5.4	6.4	5.9	6.1	6.0	.0229
Including *Pseudomonas* but not MRSA	369	4.4	4.0	4.1	3.5	5.7	4.0	5.6	3.3	4.7	4.9	.3383
Without MRSA or *Pseudomonas*	1920	23.1	24.7	24.5	22.6	20.7	21.5	25.3	23.3	22.6	22.6	.4348
MRSA monomicrobial or polymicrobial combined	1589	19.1	16.1	18.1	17.0	17.7	18.6	19.1	22.7	22.1	20.6	<.0001

NOTE. Number of patients: n = 8302 discharges.

Coag-neg, coagulase-negative; *monomicrobial*, a single pathogen was isolated on culture; *MRSA*, methicillin-resistant *S aureus*; *MSSA*, methicillin-sensitive *S aureus*; *polymicrobial*, 2 or more pathogens were isolated on culture; *SSI*, surgical site infection.

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

Weigelt et al. AJIC March 2010.

Pathogens Causing SSI, Wisconsin, 2018

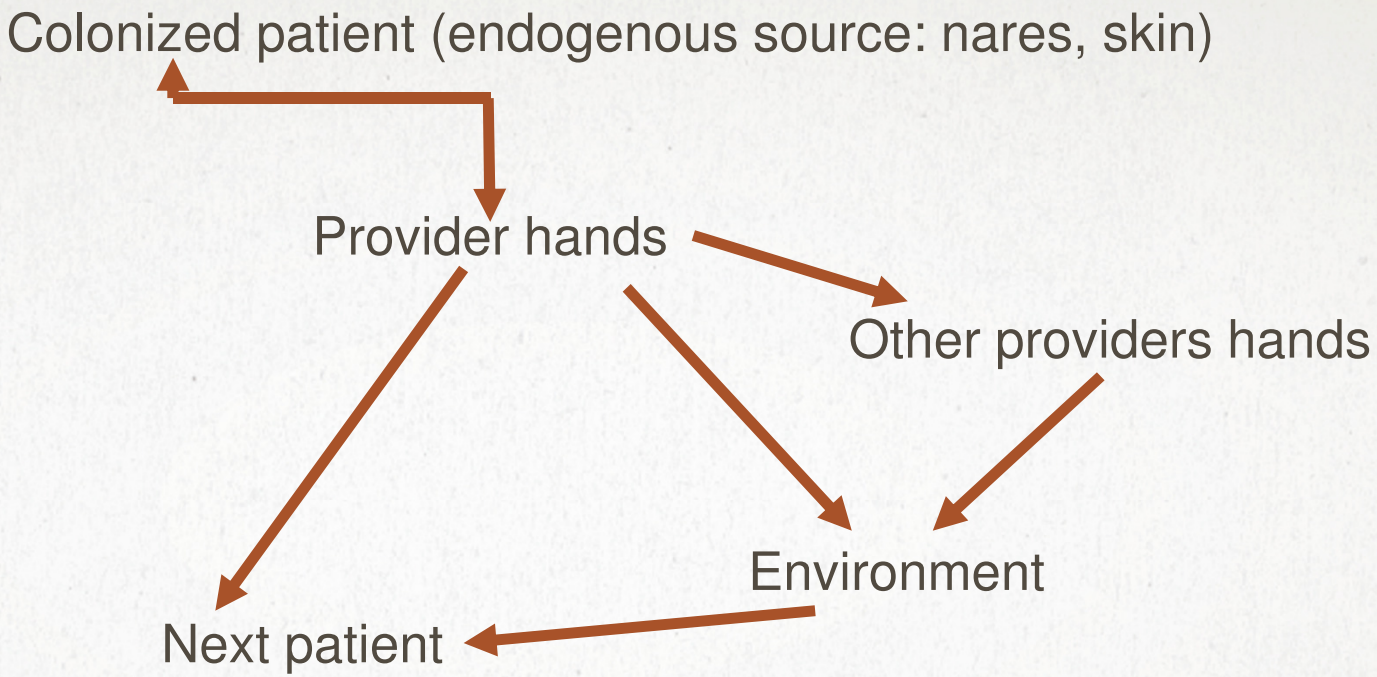
Pathogen	Number (%) SSI		
	THA Number SSI = 146	TKA Number SSI = 96	CBGB/CBGC Number SSI = 74
S. aureus	49 (34)	39 (41)	22 (30)
S. epidermidis	14 (10)	10 (10)	3 (4)
E. faecalis	8 (5)	5 (5)	1 (1)

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).



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 2. Relative Risk of Hospital-Acquired *Staphylococcus aureus* Infection and Characteristics of Infections (Intention-to-Treat Analysis).

Variable	Mupirocin–Chlorhexidine (N=504)	Placebo (N=413)	Relative Risk (95% CI)*
	no. (%)		
S. aureus infection	17 (3.4)	32 (7.7)	0.42 (0.23–0.75)
Source of infection†			
Endogenous	12 (2.4)	25 (6.1)	0.39 (0.20–0.77)
Exogenous	4 (0.8)	6 (1.5)	0.55 (0.16–1.92)
Unknown	1 (0.2)	1 (0.2)	
Localization of infection			
Deep surgical site‡	4 (0.9)	16 (4.4)	0.21 (0.07–0.62)
Superficial surgical site‡	7 (1.6)	13 (3.5)	0.45 (0.18–1.11)
Lower respiratory tract	2 (0.4)	2 (0.5)	0.82 (0.12–5.78)
Urinary tract	1 (0.2)	0	
Bacteremia	1 (0.2)	1 (0.2)	
Soft tissue	2 (0.4)	0	

Institutional Prescreening for Detection and Eradication of Methicillin-Resistant *Staphylococcus aureus* in Patients Undergoing Elective Orthopaedic Surgery

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Scientific Articles

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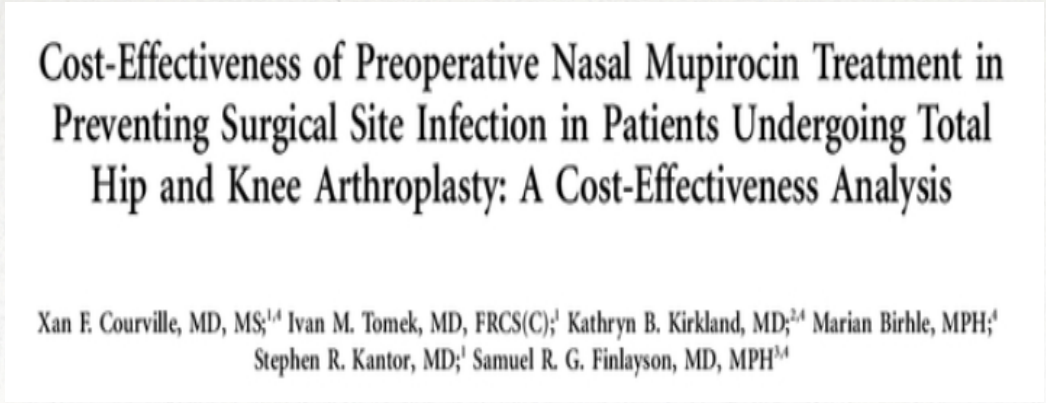
Abstract | Author Information | Article Metrics

Background: Surgical site infection has been identified as one of the most important preventable sources of morbidity and mortality associated with medical treatment. The purpose of the present study was to evaluate the feasibility and efficacy of an institutional prescreening program for the preoperative detection and eradication of both methicillin-resistant and methicillin-sensitive *Staphylococcus aureus* in patients undergoing elective orthopaedic surgery.

Study period SSI = 0.19%
Control period SSI = 0.45%
P = 0.009

60% and 40% reduction in MRSA and MSSA SSI respectively, following preoperative staphylococcal screening and decolonization



Cost-Effectiveness of Preoperative Nasal Mupirocin Treatment in Preventing Surgical Site Infection in Patients Undergoing Total Hip and Knee Arthroplasty: A Cost-Effectiveness Analysis

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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.

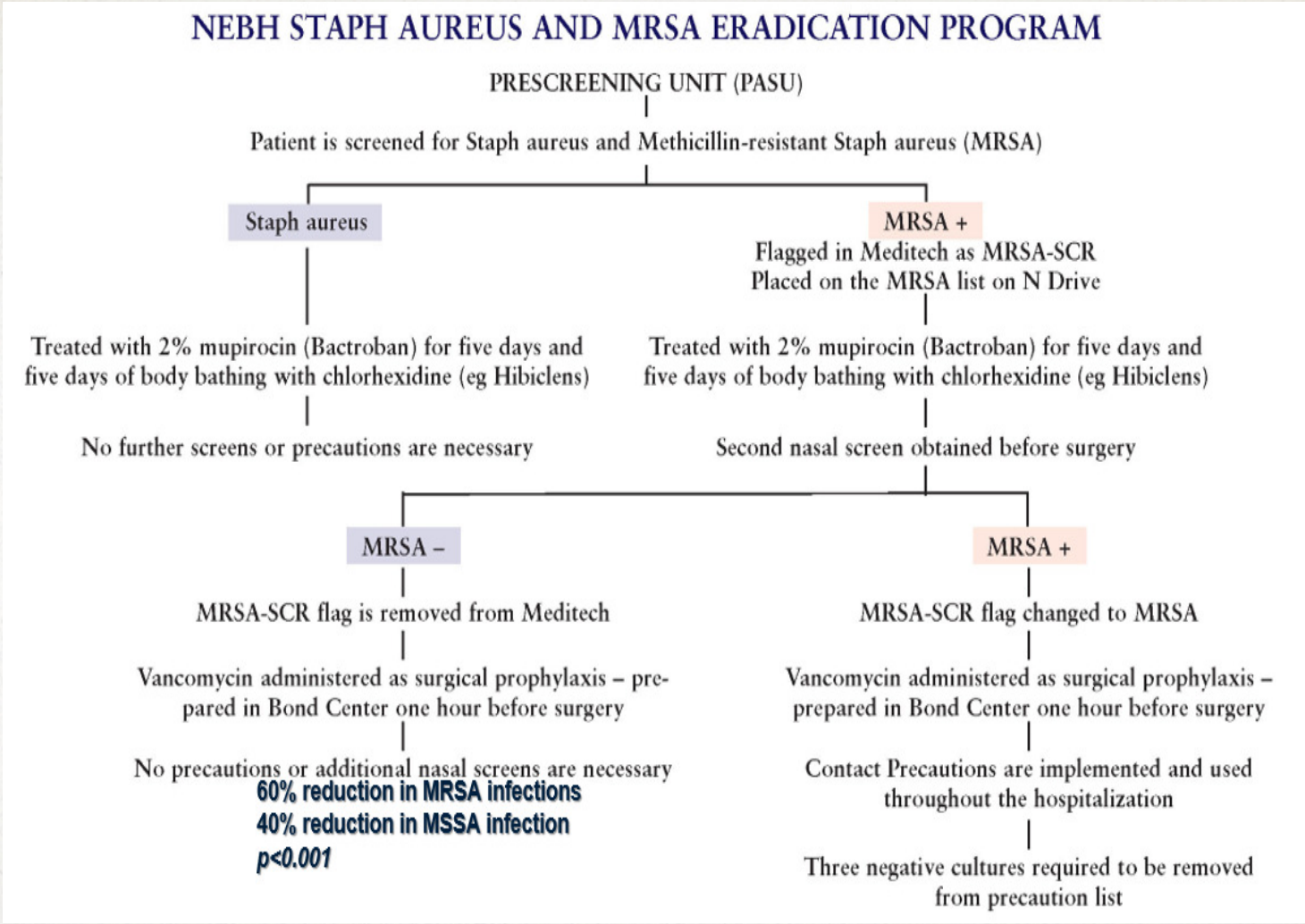
S. aureus decolonization with nasal mupirocin should be considered (Level II evidence).

Current guideline recommendations for staphylococcal decolonization among surgical patients

Guideline	Recommendation
ACS/SIS SSI Guidelines, 2016 Update	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.
WHO Global Guidelines for SSI Prevention, 2016	The panel recommends that patients undergoing cardiothoracic and orthopedic surgery with known nasal carriage of *S. aureus* should receive perioperative intranasal applications of mupirocin 2% ointment with or without a combination of CHG body wash. (Strong recommendation, moderate quality of evidence).
ASHP Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery, 2013	For cardiac and orthopedic procedures with implants: Mupirocin should be given intranasally to all patients with documented *S. aureus* colonization. (Strength of evidence for prophylaxis = A).
WDPH Supplemental Guidance for Prevention of SSI, 2017	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.
CDC Guideline for the Prevention of SSI, 2017	Not addressed

Wisconsin Division of Public Health
Survey of Selected Inpatient Surgical Site Infection Prevention Practices
March 2017
Number (%) Responding "Yes"

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



Kim DH, Spencer M, Davidson SM, et al. J Bone Joint Surg Am 2010;92:1820-1826

Limitations of Staphylococcal screening and decolonization using antibiotic agents

Mupirocin resistance

- Mupirocin resistance can be plasmid-mediated.
- Some evidence exits 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.

Diagnostic Microbiology and Infectious Disease

Volume 42, Issue 4, April 2002, Pages 283-290

Surveillance

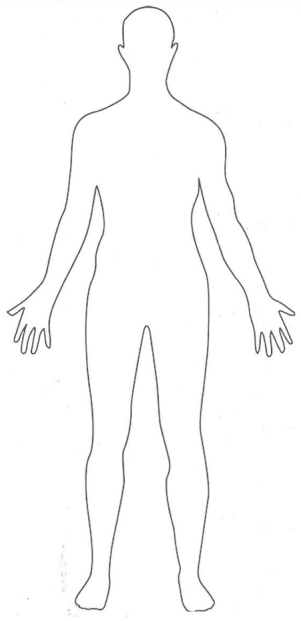
Emerging elevated mupirocin resistance rates among staphylococcal isolates in the SENTRY Antimicrobial Surveillance Program (2000): correlations of results from disk diffusion, Etest and reference dilution methods

"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… "

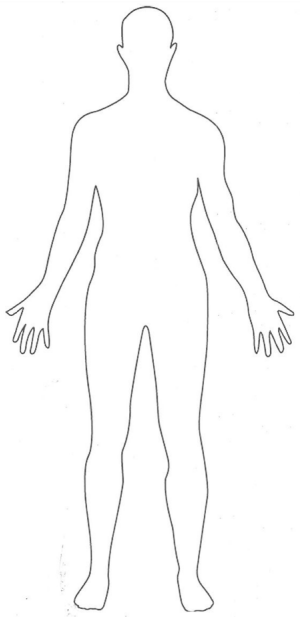
Current recommendations for mupirocin use in routine decolonization regimens

- 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.

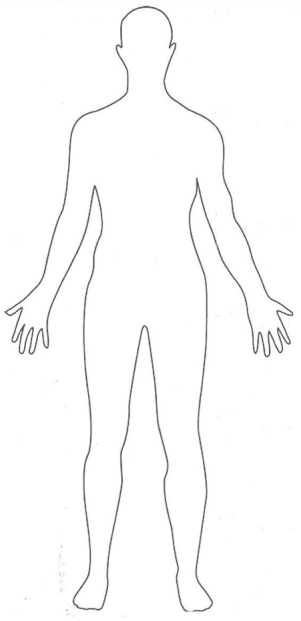
Limitations of screening for staphylococcal carriage



20 percent persistent carriers



60 percent intermittent carriers



20 percent almost never carriers

Kluytmans et al. Clinical Microbiology Reviews. July 1997

Patient compliance with mupirocin

Patient Compliance with Total Joint Arthroplasty Preoperative Instructions

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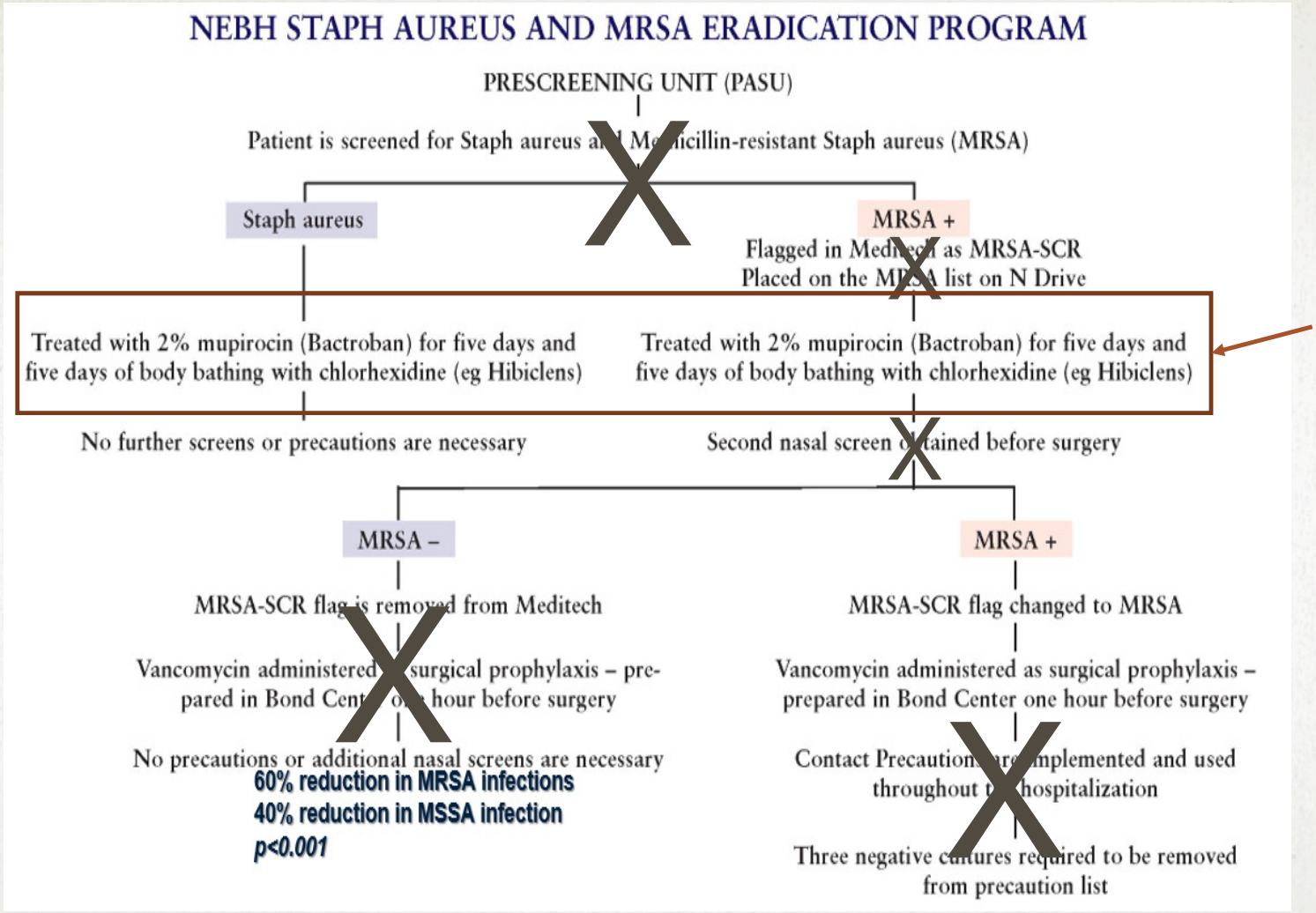
Abstract

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

84% mupirocin compliance
98% CHG bathing compliance

Antiseptic agents for use in perioperative decolonization regimens



pre and post op PVI or alcohol nasal antiseptic for all orthopedic and cardiac surgical patients

Monitoring mupirocin resistance

Am J Infect Control. 2014 Aug;42(8):841-6. doi: 10.1016/j.ajic.2014.04.008. Epub 2014 Jun 2.

Reduction of nasal Staphylococcus aureus carriage in health care professionals by treatment with a nonantibiotic, alcohol-based nasal antiseptic.

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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

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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)

603374

Impacts of Coordinated, Hospital-wide Use of Alcohol-based Nasal Decolonization on Infection Rates, Patient Care and Cost Savings

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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 unify Infection Prevention (IP) protocols involving nasal decolonization across our 311-bed Community Hospital. Trial of an alcohol-based nasal decolonizing antiseptic in orthopedic, spine, and breast surgeries transitioned to its use in all surgeries by June 2017. In the second phase, begun in April 2017, alcohol-based nasal decolonization of all adult in-patients was initiated.

Methods: In the year prior to the trial, surgical IP included pre-/post-operative chlorhexidine gluconate (CHG) bathing and pre-operative nasal decolonization with povidone iodine. By June 2017, surgical protocol changes were completed, in which pre-operative iodine was replaced by pre-/post-operative alcohol-based nasal decolonization. Starting in April 2017, all adult inpatients and new admissions received daily nasal decolonization and contact precautions (CP) for methicillin-resistant *Staphylococcus aureus* (MRSA)-colonized patients were discontinued. Decolonization compliance was monitored through the pre-op checklist and daily worklist.

Results: In the 17 months following replacement of pre-operative iodine with pre- and post-operative alcohol-based antiseptic starting in June 2017, *Staphylococcus aureus* surgical site infection (SSI) rates decreased by 50.7% from 0.148/100 to 0.073/100 (P = 0.08), compared to the one-year pre-replacement baseline. In the 19 months following hospital-wide in-patient nasal decolonization, CP use decreased by 39%, while maintaining low rates of MRSA bacteremia. Worklist audits of nasal antiseptic compliance in May-June 2017 and January 2018 showed rates of 96% and 97%, respectively. Annualized savings of $223,150, net of decolonization costs, were estimated from CP, screening and SSI cost reductions.

Conclusions: Hospital-wide use of the alcohol-based nasal decolonizing agent to reduce the risk of nasal carriage-associated infections resulted in SSI rate reduction beyond the prior iodine-based protocol and improved nursing-care patient accessibility and cost-savings through reduction in CP use.

BACKGROUND

The average person touches their nose more than 100 times per day. The nose is a known reservoir of pathogenic bacteria, including *Staphylococcus aureus (Staph a.)*. *Staph a.* is the major cause of infections in both the inpatient and outpatient setting. Methicillin resistant *Staph a.* (MRSA) contributes to 40% of all *Staph a.* infections and 80% of those infections can be traced genetically to this bacteria in the patient's own nose. Nasal colonization with methicillin-susceptible *Staph a.* (MSSA) and MRSA are predominant risk factors for hospital-wide infections, including those of the bloodstream, surgical sites, and skin and soft tissues.

Frederick Memorial Hospital (FMH) is a 300+ bed community hospital with a 26-bed Orthopedic/Spine unit and 40-bed medical/surgical units.

Prior to instituting changes in our Infection Prevention and Control (IPC) program, MRSA colonized patients were place under in contact isolation (CP) to prevent transmission. The literature documents that CP can be harmful to these restricted patients, delaying early mobility efforts and increasing the risks for deep vein thrombus and pulmonary embolus, as well as creating isolation stress coupled with delayed staff response times. Over-use of CP can cause staff fatigue and multiple entries into patient rooms increases costs of PPE and waste disposal.

Prior to the adoption of alcohol-based nasal decolonization in our surgical units, surgical IPC protocols included pre-operative nasal decolonization with povidone iodine and pre- and post-operative chlorhexidine gluconate (CHG) bathing.

FMH began its nasal decolonization initiative by piloting an alcohol-based nasal antiseptic on two of the medical/surgical units, which was then expanded to nasal decolonization of all adult in-patients during their hospital stay.

METHODS

Nasal Decolonization Taskforce: A multidisciplinary team of key stakeholders and champions included leadership, nurses and physicians and other professional staff. Multiple meetings and subgroups contributed to success of the nasal decolonization initiation and house-wide implementation. The Policy and Guideline changes were approved FMH Quality Coordination and Medical Executive Councils and instituted 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 power-point 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 information materials were provided by the manufacturer's representative.

Policy: The IPC team developed the new policies and protocols utilizing process mapping and development of Inpatient Admit Safety Assessment for all adult inpatient and observation units, which was integrated into the Guideline for Isolation Precautions. On in-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 pre-surgical, the application begins pre-operatively and, if admitted to an in-patient unit after surgery is continued until discharge. Discharge instructions for high risk groups include best practice and instructions for home use of the nasal antiseptic.

Nasal Decolonization Compliance: Audits of nasal antiseptic applications were obtained from the EMR worklist during house-wide usage. Approximately 4000 charts were reviewed in May-June 2017 (compliance 96%) and in a January 2018 follow-up (compliance 97%). The pre-surgical checklist documented nasal antiseptic use.

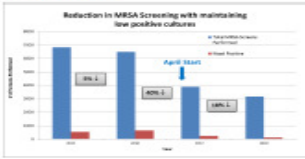
Calculation of net savings: Costs of CP-utilized gowns and gloves, nasal screening and the estimated treatment costs of Staph aureus infections before and after the IPC changes were tallied and annualized and presented minus the cost of nasal antiseptic.

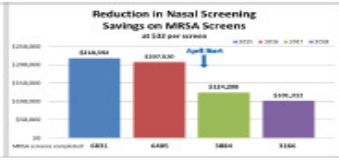
Determination of Infection Rates: Monthly reports of SSIs meeting the National Healthcare Safety Network definition during the 30 and 90 day post-surgical surveillance periods were tallied for the delineated phases of the implementation. Infection rates per 100 surgeries were calculated monthly.

RESULTS

Days of CP Isolation, following the start of the universal alcohol–based nasal decolonization protocol in April of 2017, were markedly reduced during a period in which

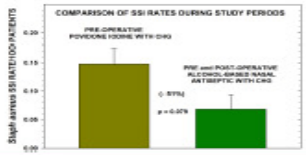
RESULTS





Universal nasal decolonization led to a 40-58% decrease in screening while maintaining MRSA bacteremia ≤2/yr.

Savings for the reduction of the "Screen and Isolate" protocols were substantial.



When both were bundled with daily body bath, pre and post-operative nasal decolonization using the alcohol-based nasal antiseptic reduced *Staph a.* SSI by 51% beyond that achieved using pre-operative Povidone Iodine.

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* SSIs 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 SSI cost reductions.

CONCLUSIONS

Nasal application of non-antibiotic, alcohol based antiseptic 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"

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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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Key Words:
Spine surgery
Perioperative nasal decolonization
Alcohol-based nasal antiseptic
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 0.33 per 100 surgeries during the 15-month trial, when compared with the prior 9-month baseline.

Is Preoperative Nasal Povidone-Iodine as Efficient and Cost-Effective as Standard Methicillin-Resistant Staphylococcus aureus Screening Protocol in Total Joint Arthroplasty?

J Arthroplasty. 2016; 31(1):215-8 (ISSN: 1532-8406)

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 \leq .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

Health Research and Educational Trust, 2018 http://www.hret-hiin.org/Resources/ssi/18/surgical-site-infections-change-package.pdf Accessed September 2019.	Integrate CHG bathing and intranasal decolonization with mupirocin, povidone iodine nasal antiseptic, or alcohol-based nasal therapy into the decolonization protocol.
Centers for Disease Control and Prevention, 2019 https://www.cdc.gov/hai/prevent/staph-prevention-strategies.html. Accessed September 2019.	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. ICU: Decolonize all patients with intranasal staphylococcal antibiotic/antiseptic plus topical CHG (core strategy). Non-ICU: Decolonize patients with CVC or midline catheter with intranasal staphylococcal antibiotic/antiseptic plus topical CHG (supplemental strategy).

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.