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Major Article

Universal staphylococcal decolonization for elective surgeries: The patient perspective



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Background: Staphylococcal decolonization decreases the risk of *Staphylococcus aureus* surgical site infection. This study evaluates patient perceptions and barriers to a universal Staphylococcal decolonization (USD) protocol.

Methods: In October 2013, a protocol for the decolonization of *Staphylococcal aureus* in elective orthopedic, neurosurgical, and cardiac surgeries was implemented in an effort to further decrease post-operative infections rates. We surveyed patients undergoing these procedures between November 2014 and April 2015 using an anonymous, voluntary, Likert-scale survey; survey questions targeted compliance with the protocol as well as barriers to protocol completion.

Results: A sample of 546 patients (n=1289, 42%) undergoing elective neurosurgical and orthopedic surgeries completed surveys. Respondents had 85% compliance with USD. Insufficient time prior to the procedure to complete the protocol was the largest barrier to USD completion.

Conclusions: This study provides evidence that USD is acceptable to patients, and that the biggest barriers are logistical.

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Recently, infection control practices, such as hand hygiene, contact precautions, admission screenings, and decolonization with chlorhexidine and mupirocin, have led to dramatic reductions in healthcare-associated methicillin-resistant *Staphylococcus aureus* (MRSA) infection rates in European countries.¹ Despite the significant decline, MRSA continues to be a major cause of morbidity and mortality in hospital settings.¹ In particular, MRSA is largely implicated in postoperative surgical site infections (SSIs), which are associated with adverse outcomes, such as increases in length of hospital stays, mortality rates, hospital readmission rates, and healthcare costs.^{2,3}

The carriage of MRSA plays an integral role in the development of a staphylococcal (staph) infection, and its eradication via decolonization can reduce the risk of infection. A 2008 Cochrane review demonstrated that intranasal mupirocin resulted in a significant reduction of *S aureus* infection rate, particularly for surgical and dialysis

patients.⁴ Large randomized controlled trials have revealed that intranasal mupirocin and chlorhexidine skin washes significantly reduce both length of hospital stay and infection rates in patients who screen positive for *S aureus* on hospital admission.⁵ Additional studies have indicated that preoperative screening and selective decolonization in patients undergoing elective surgeries have been associated with fewer SSIs.^{6–8}

In October 2013, the Virginia Commonwealth University Health System implemented a new protocol for the decolonization of *S aureus* in elective orthopedic, neurosurgical, and cardiac surgeries to further decrease postoperative infection rates. The previous protocol involved selective decolonization, which included intranasal mupirocin and chlorhexidine wash for 5 days before surgery in patients who screened positive for MRSA carrier status. The new protocol involves universal staphylococcal decolonization (USD) for all patients prior to elective surgeries and targets both MRSA and methicillin-susceptible *S aureus*. It is anticipated that the USD protocol will decrease *S aureus* SSIs and their associated costs. The goal of our study is to evaluate patient compliance, perceptions, and potential barriers to the new USD protocol.

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Table 1
Patient perceptions and understanding of the USD kit

Statement	Surgery	Agree (%)	Disagree (%)	Neutral (%)	Total (%)
Patients undergoing elective surgery are at risk of staph infection (N = 497)	Neurosurgery (n = 203)	30.8	1.4	4.2	36.4
	Orthopedics (n = 214)	37.2	1.4	2.4	41.0
	Unidentified (n = 129)	19.5	1.0	2.0	22.5
	Total	87.5	3.8	8.7	100.0
Given instructions on how to use kit (N = 544)	Neurosurgery (n = 203)	36.9	0.2	0.0	37.1
	Orthopedics (n = 214)	38.4	0.2	0.7	39.3
	Unidentified (n = 129)	23.2	0.4	0.0	23.5
	Total	98.5	0.7	0.7	100.0
Instructions were easy to understand (N = 542)	Neurosurgery (n = 203)	36.5	0.2	0.4	37.1
	Orthopedics (n = 214)	38.2	0.4	0.7	39.3
	Unidentified (n = 129)	23.2	0.4	0.0	23.6
	Total	98.0	0.9	1.1	100.0
Using kit will decrease risk of developing staph infection (N = 540)	Neurosurgery (n = 203)	35.4	0.4	1.3	37.0
	Orthopedics (n = 214)	37.2	0.7	1.5	39.4
	Unidentified (n = 129)	22.2	0.2	1.1	23.5
	Total	94.8	1.3	3.9	100.0
Given decolonization kit at PACE visit (N = 540)	Yes (n = 532)			98.5	
	No (n = 8)			1.5	
Decolonization kit completion per each component (5–6 days)	Nasal ointment (n = 472, N = 533)			88.6	
	Mouthwash (n = 464, N = 532)			87.2	
	Skin wipes (n = 451, N = 528)			85.4	
	Total				
Significant barrier for not completing all components of USD kit (N = 546)	Time/inconvenience (n = 41)				7.5
	Did not feel it was beneficial/necessary (n = 11)				2.0
	Did not like using the products (n = 7)				1.3
	Instructions were not clear (n = 1)				0.2
	I did not receive all parts of the kit (n = 11)				2.0
	Other (n = 29)				5.3
	Additional response: allergic reaction (n = 10)				1.8
	No response (n = 436)				79.9

PACE, Preoperative Assessment, Communication, and Education; *staph*, staphylococcal; USD, universal staphylococcal decolonization.

METHODS

Patients were instructed to perform chlorhexidine gargles 3 times a day, intranasal mupirocin application twice daily, and chlorhexidine 2% washes daily for 5 days prior to surgery. The USD kits and education about the protocol were distributed by nurses in the preoperative clinics. A 9-item, voluntary, anonymous, Likert scale survey (institutional review board approved) was distributed to Virginia Commonwealth University Health System patients over 18 years of age who were undergoing elective neurosurgical and orthopedic surgical procedures between November 2014 and April 2015. Patients were asked to complete surveys after use of USD kits and immediately before surgery. The survey was designed to evaluate self-reported adherence to self-administering the USD protocol and assess perceptions of and barriers to the protocol. (Survey and patient decolonization self-tracking reports are available upon the reader's request.)

RESULTS

A total of 546 patient surveys were collected (N = 1289, 42%), and 743 (58%) patients declined to participate. The majority (532, 98.5%) received a complete USD antimicrobial kit consisting of intranasal mupirocin, chlorhexidine mouthwash, and chlorhexidine 2% soap. No statistically significant differences were observed between orthopedic surgery and neurosurgery patients in compliance, perceptions, and barriers to USD (Table 1). Eighty-eight percent of patients believed that undergoing elective surgery harbored a risk of staph infection (434/496), and 95% (512/540) of patients believed the USD kit would decrease the risk of developing a postoperative staph infection. Ninety-eight percent (531/542) of patients were given clear instructions on how to use the contents

of the USD kit and found the instructions easy to understand. Overall compliance with the USD kit (and successful use) was 85% (1385/1591). Compliance with use of nasal ointment was 89% (471/532), with chlorhexidine mouthwash it was 87%, (464/532), and with chlorhexidine soap it was 85% (450/527).

Insufficient time (< 5 days) prior to surgery was cited as the most common reason for failing to successfully self-administer the USD kit (38%, 42/110). Failing to receive all parts of the kit and feeling that the kit was not beneficial were other reasons patients did not complete the protocol. Additional comments regarding barriers included taste of mouthwash, irritation of chlorhexidine wash and mupirocin ointment, and inability to take showers.

DISCUSSION

Our results demonstrate that the majority of patients undergoing elective orthopedic and neurosurgical procedures believed that USD was beneficial for SSI risk reduction, which in turn resulted in relatively high self-reported compliance with the bundle elements. Although some perceived inconveniences of the USD kit cannot be avoided (taste of mouthwash, skin irritation, etc), we should continue to focus on modifiable factors to facilitate and ultimately improve patient compliance with the USD protocol, such as clearly communicating the potential benefits of decolonization, providing easy-to-follow instructions on how to use the kit, and ensuring the distribution of complete kits in a timely fashion to achieve an adequate number of days of preoperative USD administration. Ongoing assessment of USD compliance and barriers and the provision of feedback to primary services are required for attaining maximal implementation and benefits of USD.

The study may not be generalizable to other institutions, as it was conducted at a single academic, medical center. Although our patient response rate was strong at 42%, characteristics of this subset could

be distinct from the overall patient population. In addition, compliance with the USD kits was self-reported, allowing for reporting and recall bias. Continuing to trend postoperative infection rates after USD implementation would also be valuable for objectively demonstrating the benefits of USD, thereby increasing adherence to USD protocol. In an age of increasingly shared decision-making, this is particularly relevant for increasing patient empowerment, knowledge, and ability to make informed healthcare decisions and is substantiated by evidence-based medicine. Prospective randomized trials may be helpful in clarifying the benefits of a USD protocol. It is important to note some studies have indicated that combined low-level mupirocin and chlorhexidine resistance significantly increases the risk of persistent MRSA carriage after decolonization therapy.⁹ However, this may be due to widespread empirical use of mupirocin. Therefore, these agents should be continually monitored for resistance and loss of clinical effectiveness.

CONCLUSIONS

USD is an evidence-based horizontal approach to preventing SSIs that promotes collaboration between healthcare providers and patients. We document that an active role in infection prevention via USD participation is acceptable to patients, and that the biggest barriers are logistical. Effective implementation of USD protocols is critical to ensuring patients are not only medically optimized prior to elective surgical procedures but are also optimized from an infection prevention perspective.

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