STAMFORD HEALTH

Mupirocin Susceptibility of Staphylococci, 2022: Is It Time for a Change in MRSA Decolonization Protocols?

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Sonia Shah, MT-M, Sophie Labrecque, RN, CIC, Diedre Fergus, MT-M, Michael F. Parry, MD.
Departments of Microbiology, Infection Prevention and Infectious Diseases, Stamford Health

For more information, contact:
Michael Parry, MD
Infectious Diseases Department
Stamford Health
One Hospital Plaza
Stamford, CT 06902
Tel.: 203-276-7487
E-mail: mparry@stamhealth.org

Abstract

Background. Nasal decolonization with mupirocin has been a common strategy for the prevention of surgical site infections (SSIs) and recurrent skin and soft tissue infections due to *Staphylococcus aureus* (SA). We recently noted an increase in SSIs due to SA, including a case of post-operative mupirocin-resistant methicillin-resistant SA (MRSA) infection despite attempted preoperative decolonization with mupirocin. We therefore evaluated the mupirocin susceptibility of SA at our hospital to determine the optimal regimen for decolonization.

Methods. SA isolates were recovered from clinical and screening samples received in the microbiology laboratory. Mupirocin susceptibility was determined using e-tests and were categorized as susceptible or resistant, with a breakpoint MIC value of 4mcg/ml.

Results. 223 unique SA isolates from 218 patients were tested. Twenty-four SA isolates (10.8%) were resistant to mupirocin (20 MRSA and 4 MSSA). MRSA strains were more likely to be resistant to mupirocin than MSSA strains (22.5% versus 3.0%, p<0.001).

Conclusions. Decolonization with mupirocin nasal ointment has been a common preoperative strategy to prevent SSI in patients colonized with MRSA or MSSA. However, the emergence of resistance has rendered this strategy suboptimal. In our study, less than 80% of MRSA strains were mupirocin susceptible. In patients colonized with MRSA at high risk for infection (e.g., total joint replacement), other regimens such as intranasal povidone iodine may be preferrable to mupirocin for patient decolonization.

Background

SSI contribute significantly to overall healthcare-associated infection rates, and SA is a leading cause of these. Nasal decolonization with mupirocin has been a common strategy for the prevention of SSIs. Concerns have been raised in recent years about the emergence of mupirocin-resistance, compromising the effectiveness of SA decolonization regimens. Some studies have suggested that intranasal povidone-iodine may be more effective.

Objectives

The purpose of this study was to assess the prevalence of mupirocin-resistant *S. aureus* in our community and to determine if we needed to revise our decolonization protocols. We felt that mupirocin resistance rates over 20% would dictate the need for a change.

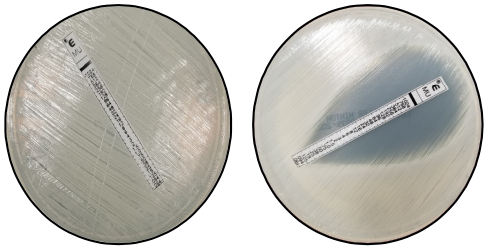
Case Report

- A 65-year-old male underwent a two-level lumbar laminectomy, medial facetectomy and foraminotomy.
- A preoperative nasal screening swab was positive for methicillin-resistant SA (MRSA) by PCR. Perioperative parenteral antibiotics and intranasal mupirocin were initiated per protocol. Operative skin prep was with chlorhexidine. Surgery was uneventful..
- Ten days later, he returned to hospital with surgical wound erythema and purulent drainage. Culture was positive for MRSA.. The surgical wound was explored and debrided confirming a deep wound infection with exposed bone.
- The original MRSA isolate was later tested and found to be highly resistant to mupirocin (MIC >1024 mcg/ml).

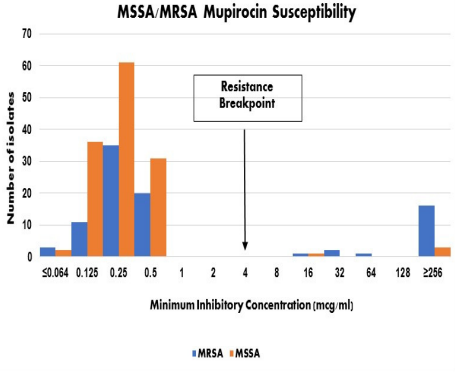
Methods

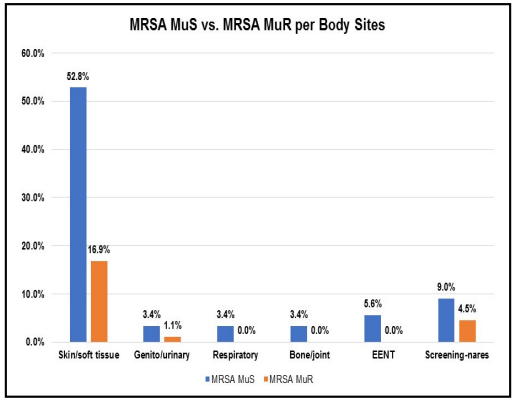
SA isolates were recovered from random clinical and screening samples received in the microbiology laboratory from 8/1/2020 to 2/28/2022. Most samples had been frozen and were subcultured prior to testing. Mupirocin susceptibility was determined using e-tests and a standardized inoculum on Mueller-Hinton agar. Isolates were categorized as "susceptible" (MuS) with minimum inhibitory concentrations (MIC) ≤4 mcg/ml or resistant (MuR) with MIC values ≥8mcg/ml. Resistant strains were further divided into low-level resistance, with MIC values from 8 to 256 mcg/ml, and high-level resistance, with MIC values >256 mcg/ml. SA isolates were identified, and methicillin susceptibility or resistance was determined, by usual Clinical Laboratory Standards Institute (CLSI) criteria.

Left: Mueller Hinton plate with a resistant mupirocin E-test®
Right: Mueller Hinton plate with a susceptible mupirocin E-test®



Results





Results cont'd

- 223 unique SA isolates from 218 patients were tested.
- Twenty-four SA isolates (10.8%) were resistant to mupirocin (20 MRSA and 4 MSSA).
- Of the 24 MuR strains, 19 (79.2%) isolates demonstrated high-level resistance.
- MRSA strains were more likely to be resistant (22.5% were MuR) than MSSA strains (3.0% were MuR) (p<0.001).

Isolate Characteristics
MSSA vs. MRSA and Mupirocin Resistance

	Mupirocin susceptible	Mupirocin resistant	P-value
MSSA	130 (97%)	4 (3%)	p<0.001
MRSA	69 (77.5%)	20 (22.5%)	

Discussion

- In this retrospective study, 10.8% of the SA isolates were mupirocin resistant.
- The majority of these were MRSA.
- Less than 78% of MRSA isolates were mupirocin-susceptible and three-quarters of these were highly resistant to mupirocin (MIC values >256mcg/ml).
- Soft/tissue and screening/nares MRSA isolates were the most likely to be mupirocin resistant. This a concern because our decolonization protocol for high-risk surgical procedures in patients colonized with MRSA, has been based on mupirocin.

Conclusion

Preventing surgical site infections is challenging. Preoperative optimization includes an appropriate history and screening for MRSA/MSSA colonization when prosthetic material is to be used. Decolonization with mupirocin nasal ointment has been a common component of this strategy. However, the emergence of resistance would render mupirocin suboptimal and other regimens might be preferred. In our study, 97% of MSSA strains were MuS but only 78% of MRSA strains were MuS. These findings are concerning and have led us to reevaluate our current decolonization strategy. In patients colonized with MRSA at high risk for infection (e.g., total joint replacement), intranasal povidone iodine is preferrable to mupirocin for patient decolonization.

References

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