# Impact of methicillin-resistant *Staphylococcus aureus* Nares Screen on Vancomycin Utilization for Respiratory Tract Infections

Ashita Debnath, PharmD[1], Esther King, PharmD, BCIDP[1], Dimple Patel, PharmD, BCPS-AQ ID, BCIDP[2], Pamela Giordano, PharmD, BCPS, BCIDP[2]
[1]Overlook Medical Center, Summit, New Jersey, [2]Morristown Medical Center, Morristown, New Jersey

Atlantic Health System

ashp Accredited

## Background

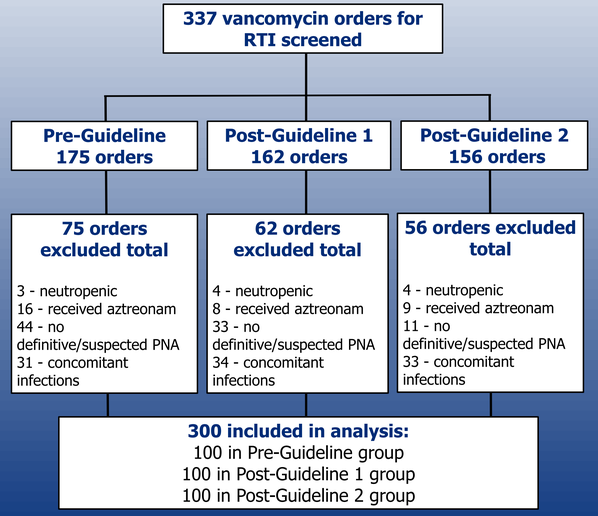
- *Staphylococcus aureus*, including methicillin-resistant *Staphylococcus aureus* (MRSA), is a common colonizer of the nares[1]
- Recent data have demonstrated that the absence of MRSA nares colonization, evidenced by a negative MRSA nares screen by PCR, can effectively rule out MRSA respiratory tract infections (RTI)[1]
- Multiple studies show that this diagnostic tool has a negative predictive value of >98%, which can significantly reduce empiric vancomycin utilization[1-3]
- The 2019 ATS/IDSA Community Acquired Pneumonia (CAP) guidelines recommend withholding or discontinuing MRSA pneumonia (PNA) therapy when the screen is negative in CAP[5]
- The objective of this study is to determine the utilization of MRSA nares screening on patients receiving vancomycin for RTIs following the addition of the MRSA nares screen to the institutional RTI management guidelines

## Methods

- **Retrospective chart review** at two community-teaching hospitals
- **Inclusion Criteria:** Hospitalized patients ≥ 18 years old who were prescribed vancomycin for the treatment of RTI prior to the RTI guideline implementation (January 2019 to February 2019) and after RTI guideline implementation (January 2020 to February 2020 and January 2021 to February 2021)
- **Exclusion Criteria**: Patients with neutropenia, concomitant infections or those receiving aztreonam due to a β-lactam allergy
- **Statistics:** Continuous data was analyzed using the student t-test and nominal data was analyzed using the chi-squared test
- **Primary Endpoint (Pre-Guideline vs. Post-Guideline)**: Percent of vancomycin orders discontinued within 24 hours of a negative MRSA nares screen after RTI guideline implementation
- **Secondary Endpoints (Pre-Guideline vs. Post-Guideline)**:
  - Percent of MRSA nares screens ordered
  - Percent of MRSA nares screens ordered in the Emergency Department, general medical/surgical floor, and ICU
  - Percent of re-initiation of vancomycin within 7 days for a RTI indication
  - Total vancomycin days of therapy per 1000 patient days (DOT/1000 PD)

## Results

### Figure 1. Study Profile




### Table 1. Patient Characteristics

| | Pre-Guideline (n=100) | Post-Guideline 1 (n=100) | Post-Guideline 2 (n=100) |
|---|---|---|---|
| Age, years (mean ± SD) | 70.03 ± 16.2 | 70.92 ± 17.5 | 69.21 ± 16.5 |
| Male | 65 | 59 | 56 |
| Length of stay, days (mean ± SD) | 11.19 ± 10.4 | 9.55 ± 7.23 | **15.58 ± 12.28*** |
| Pneumonia | | | |
| Community-Acquired | 75 | 76 | **62*** |
| Hospital-Acquired | 6 | 11 | **16*** |
| Ventilator-Associated | 0 | 0 | **9*** |
| Aspiration | 19 | 13 | 13 |
| Previous history of MRSA | 8 | 3 | **2*** |
| History of hospitalization and IV antibiotic use in the past 90 days | 24 | 25 | 21 |
| Cavitary or necrotizing pneumonia found on imaging | 11 | 4 | **0*** |
| MRSA isolated in culture during admission** | 3 | 2 | 2 |

** 3 did not have MRSA nares screen performed, 1 had a negative screen, and 3 had a positive screen

### Table 2. Endpoints

| | Pre-Guideline | Post-Guideline 1 | Post-Guideline 2 |
|---|---|---|---|
| MRSA nares screen ordered | 48/100 (48%) | **63/100 (63%)*** | **74/100 (74%)*** |
| Emergency department | 17/48 (35.4%) | 26/63 (41.3%) | 16/74 (21.6%) |
| General medical/surgical floor | 22/48 (45.8%) | 28/63 (44.4%) | 38/74 (51.4%) |
| Intensive care unit | 9/48 (18.8%) | 9/63 (14.3%) | 20/74 (27%) |
| MRSA nares screens with a negative result | 44/48 (92%) | 53/63 (84%) | 69/74 (93.2%) |
| **Vancomycin orders discontinued within 24 hours of negative MRSA nares screen** | 26/44 (59.1%) | 36/53 (67.9%) | **55/69 (79.7%)*** |
| Re-initiation of vancomycin within 7 days for a RTI indication | 5/26 (19.2%) | 7/36 (19.4%) | 8/55 (14.5%) |
| Total inpatient vancomycin utilization, DOT/1000PD | 66 | **63*** | **60*** |
| Vancomycin treatment duration, days (mean ± SD) | 3.45 ± 3.9 | 2.67 ± 2.2 | 2.73 ± 2.3 |

* $p \leq 0.05$ relative to Pre-Guideline group; Data represented as n (%) unless otherwise noted

## Discussion

- There was a higher incidence of hospital-acquired and ventilator-associated PNA between the Pre-Guideline and Post-Guideline 2 groups
- There was a statistically significant increase in utilization of the MRSA nares screen after the implementation of the MRSA nares screen into the institutional RTI management guidelines
- There was a statistically significant increase of 20% in the vancomycin discontinuation rate from Pre-Guideline to Post-Guideline 2
- Vancomycin DOT/1000PD significantly decreased in the Post-Guideline groups

**Limitations**

- Small sample size (number of orders and time period) prevents adequate analysis of results
- The rate of re-initiation of an anti-MRSA agent in both groups is higher than previously published data and warrants further review
- Unknown impact of COVID-19 in Post-Guideline 2 study period

## Conclusion

- The addition of the MRSA nares screen to the institutional RTI guidelines increased utilization of the test and demonstrated a decrease in vancomycin utilization
- With an increase in education, prospective audit and feedback, and prescriber comfort with the use of the MRSA nares screen, there was significant improvement in MRSA nares screen utilization, vancomycin discontinuation after a negative screen, and vancomycin utilization

## References

1. Parente DM. *Clin Infect Dis*. 2018;67(1):1-7.
2. Giancola SE. *Diagn Microbiol Infect Dis*. 2016;86(3):307-10.
3. Dangerfield B. *Antimicrob Agents Chemother*. 2014;58:859-64.
4. Robicsek A. *J Clin Microbiol*. 2008;46(2):588-92.
5. Metlay JP. *Am J Respir Crit Care Med*. 2019;200(7):e45-67.

## Disclosures

All authors have nothing to disclose