Utilization of methicillin-sensitive/resistant *Staphylococcus aureus* nares screen to decrease vancomycin and linezolid use in hospitalized patients with respiratory infections

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BACKGROUND

- Vancomycin and linezolid can be used for empiric gram-positive therapy due to their broad-spectrum activity against *Streptococcus*, *Enterococcus*, and *Staphylococcus* species, including methicillin-resistant *Staphylococcus aureus* (MRSA)[1]
- Current Infectious Diseases Society of America (IDSA) guidelines recommend rapid initiation of empiric therapy and subsequent de-escalation once microbiological cultures become available with improved clinical response[2]
- Due to conventional culture methods requiring up to 96 hours to obtain the result, clinicians may be hesitant to de-escalate empiric antimicrobial coverage without concrete microbiological data[3]
- MRSA nares polymerase chain reaction (PCR) provides rapid molecular surveillance and detection of MRSA, which commonly colonizes the nares[3]
- Data has shown efficacy of the MRSA nares screen due to its very high negative predictive value ranging from 95.2% to 99.2%, which allows for de-escalation of empiric gram-positive coverage in patients with a negative nares screen[3]
- Pharmacist-driven MRSA nares screening protocols have shown decreases in duration of vancomycin therapy and incidence of acute kidney injury (AKI)[4]

PURPOSE

- **Enhance antimicrobial stewardship practices**
  - Decrease duration of empiric antimicrobial coverage
  - Decrease risk of resistance and adverse effects
- **Overutilization of empiric gram-positive coverage is associated with several concerns**
  - Potential for development of resistance
  - Adverse effects such as nephrotoxicity and thrombocytopenia
  - Selective pressure on *Enterococcus* species

OBJECTIVES

- To assess the impact of a pharmacist-driven MRSA nares screening protocol on duration of vancomycin and linezolid therapy

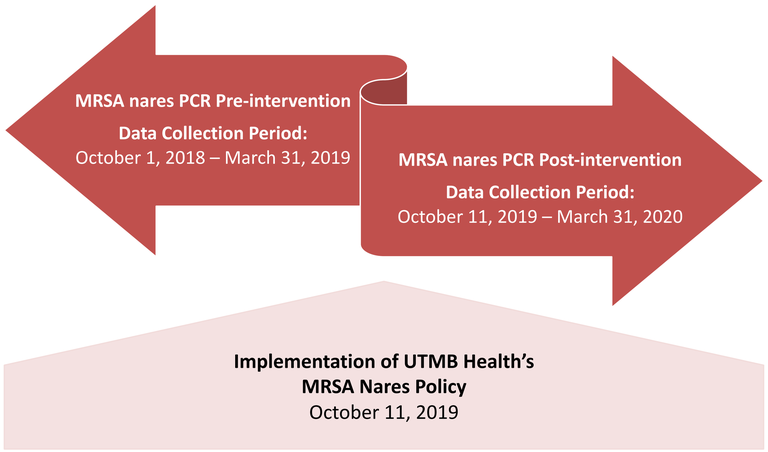
Table 1. Primary and Secondary Objective Data Collection Points

Primary objective	• Duration of vancomycin and linezolid therapy in hours
Secondary objectives	• 30-day all-cause mortality • 30-day readmission rate • Hospital length of stay (LOS) • Intensive care unit (ICU) LOS • Number of vancomycin levels • Incidence of AKI • Direct medication cost

METHODS

Table 2. Study Overview

Study Design	• Retrospective and prospective chart review
Data Collection	• October 1, 2018 – March 31, 2020
Study Period	• Pre-intervention group: October 1, 2018 – March 31, 2019 • Post-intervention group: October 11, 2019 – March 31, 2020
Post-Intervention Group	• Pharmacist recommendation to de-escalate empiric gram-positive coverage in patients with a respiratory infection and negative MRSA nares screen, if clinically appropriate
Inclusion Criteria	• All patients 18 years of age or older admitted to Jennie or John Sealy hospitals • Medication orders for empiric vancomycin or linezolid for respiratory indication(s) • Resulted negative MRSA nasal PCR screen
Exclusion Criteria	• Patients with medication orders for extrapulmonary indications • Incarcerated patients of the Texas Department of Criminal Justice



RESULTS

Table 3. Baseline Characteristics

	Pre-MRSA nasal PCR (n = 50)	Post-MRSA nasal PCR (n = 57)	P-value
Age – years ± SD[1]	65 ± 14.6	62.6 ± 16.4	0.5915
Male sex – no. (%)	34 (68)	30 (53)	0.1057
Charlson Comorbidity Index, no. (IQR)[2]	4 [2-6]	4 [2-6]	0.8667
ICU – no. (%)	12 (24)	49 (86)	< 0.0001

[1]Expressed as mean [2]Expressed as median

RESULTS (cont.)

Table 4. Primary and Secondary Outcomes

No. (IQR)	Pre-MRSA nasal PCR (n = 50)	Post-MRSA nasal PCR (n = 57)	P-value
Duration of therapy (DT) – hours[2]	38.2 [24-73]	30.9 [23.3-60.15]	0.601
Number of vancomycin levels[2]	1 [0-1]	1 [0-1]	0.8488
Total amount of vancomycin received (mg)[2]	4250 [1875-7000]	2750 [1750-5000]	0.1217
AKI – no. (%)	10 (20)	8 (14)	0.4105
ID consulted – no. (%)	10 (20)	5 (8.8)	0.0951
LOS – days[2]	6 [4-7]	12 [9-18]	< 0.0001
ICU LOS – days[2]	3 [2-4]	7 [4-11]	0.0019
30-day Readmission – no. (%)	19 (38)	10 (18)	0.0175
30-day all-cause mortality – no. (%)	3 (6)	16 (28)	0.0029
Inpatient order cost (dollars)[2]	78.2 [31.4-125.5]	33.4 [16.3-67.8]	0.0031

[2]Expressed as median

Table 5. Subgroup Analysis – Accepted and Rejected Recommendations

No. (IQR)	Pre-MRSA nasal PCR (n = 50)	Post-MRSA PCR Recommendation Accepted (n = 47)	Post-MRSA PCR Recommendation Rejected (n = 10)	P-value
Duration of therapy (hours)[2]	38.2 [24-73]	24.8 [21.4-46.5]	116.4 [85.7-133.2]	< 0.0001
Number of vancomycin levels[2]	1 [0-1]	1 [0-1]	2 [1.75-3]	0.0008
Total amount of vancomycin received (mg)[2]	4250 [1875-7000]	2250 [1500-4250]	6000 [4500-10625]	0.0012
Inpatient order cost (dollars)[2]	78.2 [31.4-125.5]	31.4 (15.6-56.8)	60 [26.2-160.7]	0.0025

[2]Expressed as median

CONCLUSION

- A pharmacist-driven MRSA nares screening policy did not affect duration of gram-positive therapy, incidence of nephrotoxicity, or total amount of vancomycin/linezolid received overall
- When pharmacist-driven de-escalation recommendations were accepted, duration of therapy and total amount of vancomycin received significantly decreased compared to the pre-intervention period

REFERENCES

1. Burnell J, Valetin-Torres M, Smith SM, Eng RHK. *Antimicrobial Agents and Chemotherapy.*2017;61(4).
2. American Thoracic Society, Infectious Diseases Society of America. *AM J Respir Crit Care Med.*20065;171:388-416.
3. Willis C, Allen B, Tucker C, Rottman K, Epps K. *American Journal of Health-System Pharmacy.*2017;74(21):1765-1773.
4. Baby N, Faust AC, Smith T, Sheperd LA, Knoll L, Goodman. *Antimicrobial Agents and Chemotherapy.*2017;61(4).

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