Effects of Nasal MRSA PCR on Duration of Vancomycin Therapy in Patients with Community Acquired Pneumonia

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Disclosures

- The authors have no financial interests, arrangements, or affiliations with any organizations that could be perceived as a real or apparent conflict of interest in the content of this presentation

Objectives

- Evaluate the impact of nasal MRSA PCR on the duration of vancomycin therapy
- Assess appropriateness of vancomycin initiation as described by the Infectious Diseases Society of America (IDSA) guideline
- Identify areas of improvement in the implementation of current community acquired guidelines

Background

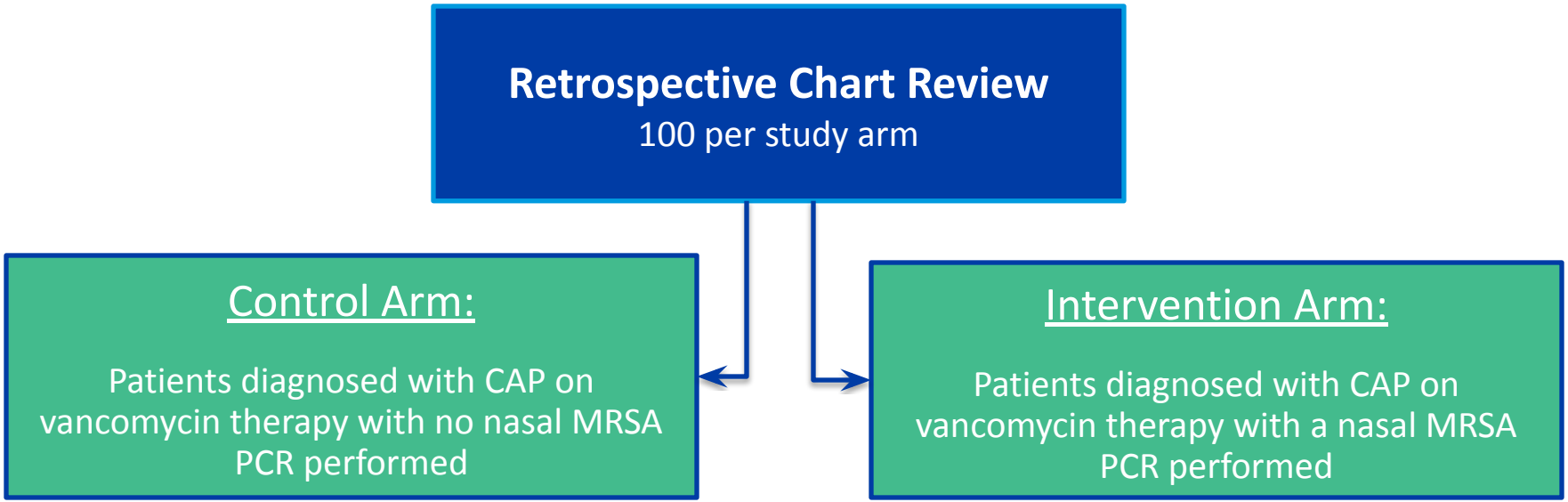
- Community acquired pneumonia (CAP): Pneumonia acquired outside the hospital or < 48 hours of admission
- Methicillin-resistant *Staphylococcus aureus* (MRSA), a multidrug resistant pathogen, is a concern in patients with defined risk factors
  - Risk factors:
    - Previous hospitalization and IV antibiotic use in the past 90 days
    - Prior confirmed MRSA isolate in sputum in the past year
  - Prefered inpatient antimicrobial coverage with vancomycin

IV: Intravenous

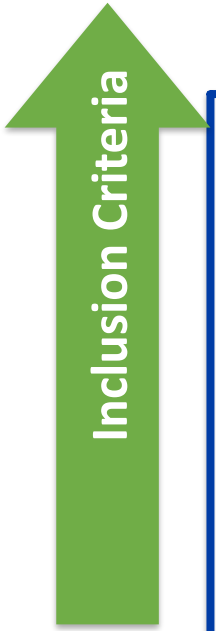
Background

- Variability in prescribing practice can result in the initiation of vancomycin without subsequent de-escalation
- The IDSA guideline advocates for the use of the MRSA nasal polymerase chain reaction test to guide de-escalation of therapy
    - Negative predictive value of 94-99.2%
- This study evaluates the impact a nasal MRSA PCR has on the duration of vancomycin therapy in patients with community acquired pneumonia

Study Design

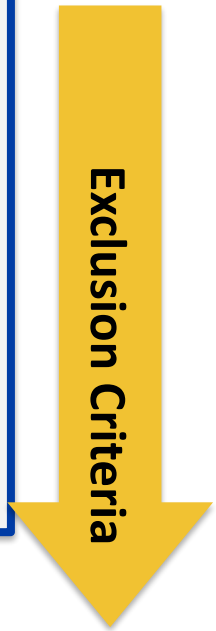


Criteria for Inclusion & Exclusion



- Age ≥ 18 years old
- Received vancomycin therapy for at least 24 hours
- A diagnosis of CAP
- Admitted from January 1, 2019 to December 31, 2019 admitted to South Shore University Hospital

- Concomitant secondary infection during the same admission
- On dialysis or had acute kidney injury (AKI) at the time of vancomycin initiation
- Definitive MRSA infection as defined by blood and sputum cultures
- Utilization of vancomycin as a sole agent for gram-positive coverage



Primary and Secondary Outcomes

Primary Outcome: Duration of vancomycin therapy (days)

Secondary Outcomes:

- Rates of acute kidney injury (AKI) defined by the Kidney Disease Improving Global Outcomes (KDIGO) Guidelines
- Time to discontinuation of vancomycin therapy from negative nasal PCR result (hours)
- Compliance with 2019 IDSA guidelines, Diagnosis and Treatment of Adults with Community-acquired Pneumonia
    - Appropriateness of vancomycin initiation, as defined by
        - Recent hospitalization and administration of parenteral antibiotics in the past 90 days
        - Prior respiratory isolation of MRSA within the past year
    - Utilization of blood/sputum cultures
- Length of stay (days)
- Rate of readmission for CAP within 30 days of discharge

Statistical Analysis

- Two-tailed nonparametric Wilcoxon test was performed to compare the duration between exposed and unexposed groups
- Multiple linear regression was performed to see the association of duration of vancomycin therapy for the two groups controlled for gender, BMI and ICU status
- All categorical outcomes were analyzed with Chi-square test or Fisher's exact test to compare exposed and unexposed groups
    - Analyzation of categorical outcome in the exposed group, binomial proportion with 95% exact binomial confidence interval was reported.
- To analyze continuous outcomes, a two-sided Wilcoxon test for two sample was performed to compare exposed and unexposed groups
- Results were considered as statistically significant if corresponding p-value < 0.05

Baseline Characteristics

	Control Arm	Intervention Arm	P-value
Gender, n(%)			
Female	43%	56%	0.066
Male	57%	44%	
Location, n(%)			
ICU	5%	5%	1
Non-ICU	95%	95%	
Age, median (range)	66.0 (53 - 80)	71.0 (61 - 79)	0.168
BMI, median (range)	25.4 (22.1 - 30.3)	26.15 (22.1 - 29)	0.946

Primary Outcome: Duration of Vancomycin Therapy

Control Arm:

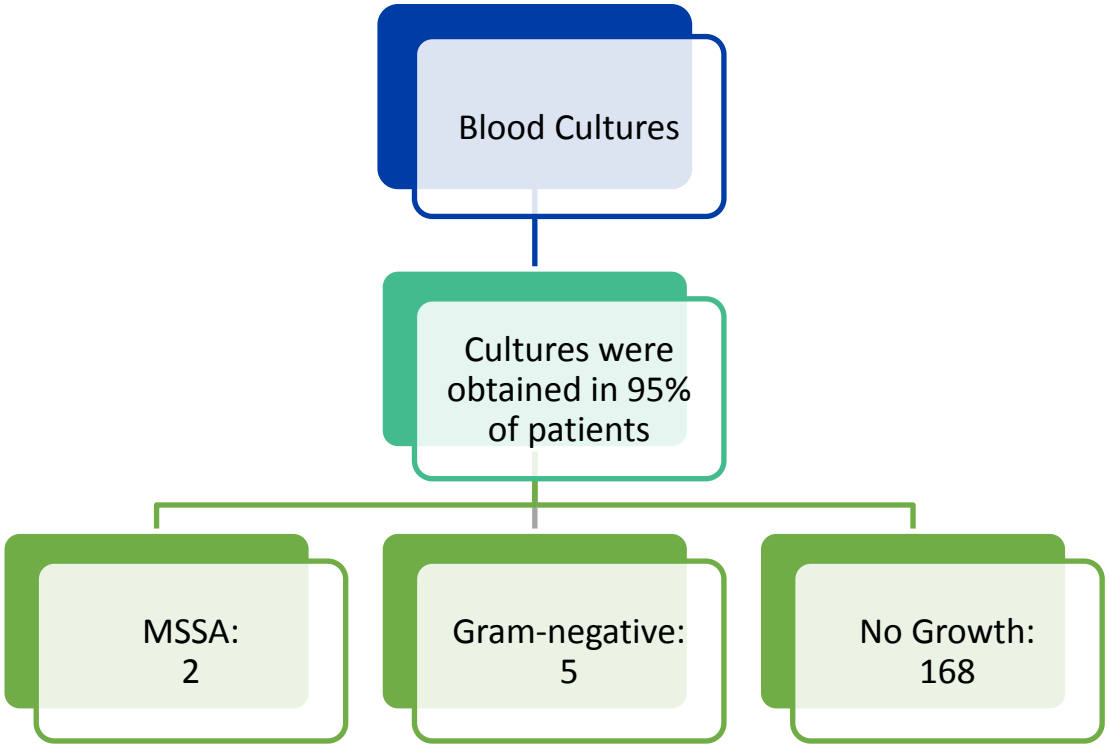
Median (range)
2.8 days (1.2 - 10.3)

Intervention Arm:

Median (range)
2.6 days (1 - 19.4)

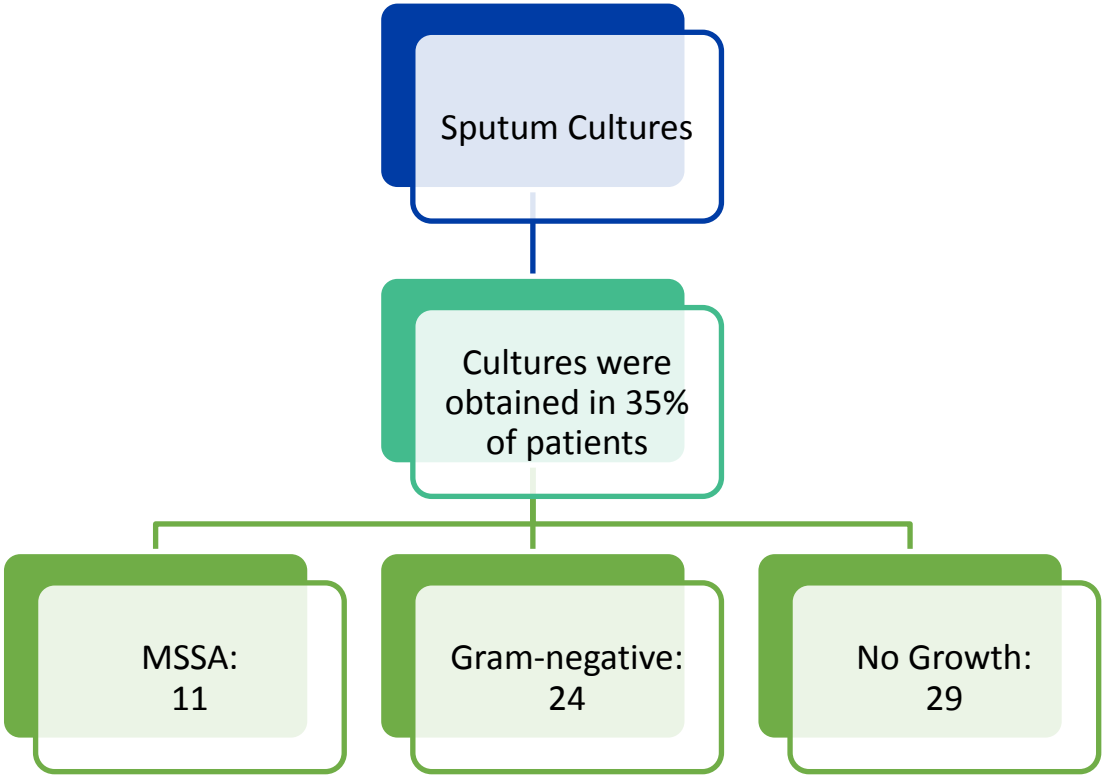
P-value < 0.0752

Secondary Outcomes: Culture Results, n = 200



MSSA: Methicillin-susceptible *Staphylococcus aureus*

Secondary Outcomes: Culture Results, n = 200



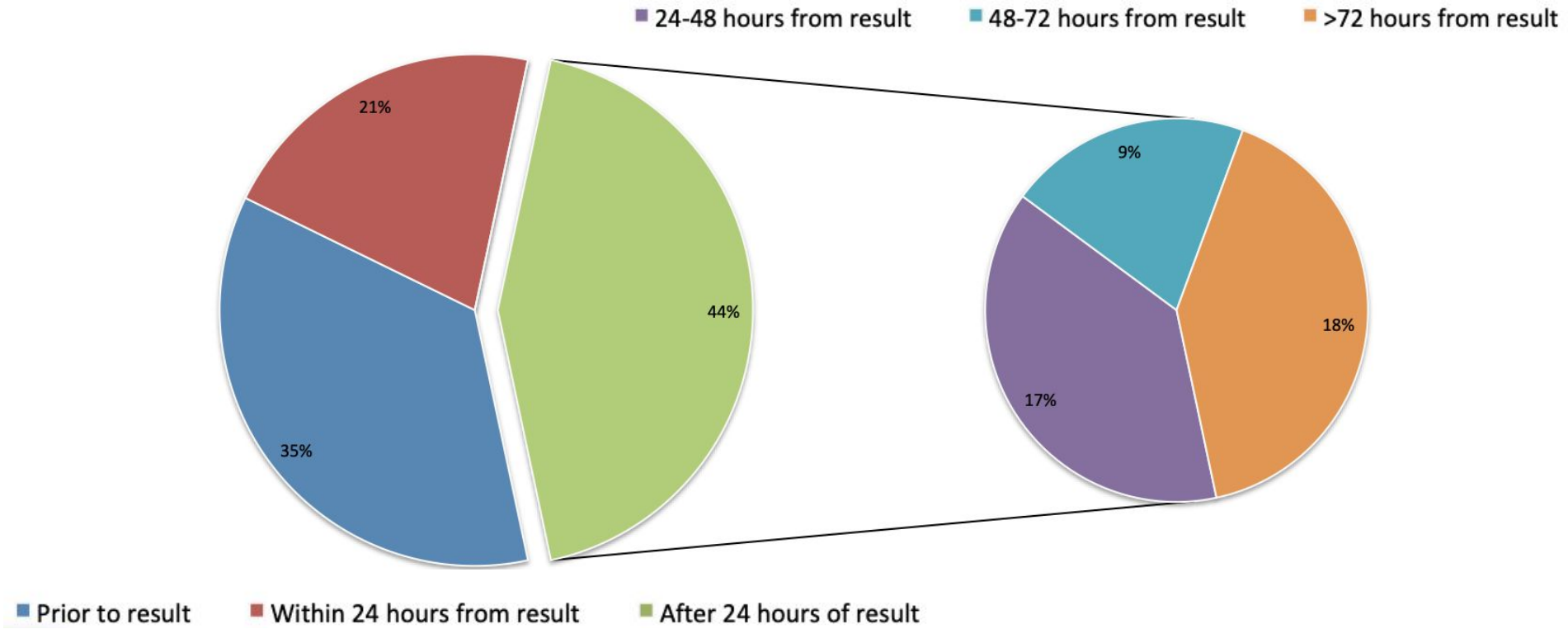
Secondary Outcomes: Appropriate Initiation of Vancomycin Therapy

	Control Arm	Intervention Arm	P-value
Percent of patients appropriately initiated on vancomycin therapy	27%	36%	0.142
Prior respiratory isolation of MRSA within the past year	3%	4%	
Recent hospitalization and administration of IV antibiotics in the past 90 days	26%	36%	

Secondary Outcomes

	Control Arm	Intervention Arm	P-value
Readmission within 30 days	14%	5%	0.03
Length of stay, median (range)	7 days (2 - 40)	10.5 days (2 - 52)	0.0073
Incidence of AKI	9%	16%	0.1345
Median vancomycin trough	13.8	15	
Time (hours) to PCR order from vancomycin initiation, median (range)		33.8 (0 - 161.9)	
Time (hours) to discontinuation from PCR result, median (range)		41.35 (0.6 - 325.2)	

Secondary Outcomes: Time to Vancomycin Discontinuation from Negative MRSA PCR, n = 90



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Conclusion

- No strong correlation between MRSA PCR results and discontinuation of vancomycin therapy
  - Majority of providers did not discontinue within 24 hours of negative result
- Supports accuracy of negative MRSA PCR result
- 31.5% of total patients were deemed appropriate for vancomycin initiation
- Majority of providers were adherent to guideline in regards to utilization of blood culture but not with sputum cultures

Limitations

- Retrospective chart review
  - Difficult to determine severity of illness
  - Readmissions and past antibiotic use are limited to the Northwell Health System and electronic medical record
- Small sample size
- Sputum cultures ordered but unable to obtain sample
- Confounding variables such as the impact of Infectious Diseases consultation

Future Action & Areas of Education

Review indication for empiric vancomycin therapy

Determine eligibility for nasal MRSA PCR

Understand the utilization of nasal MRSA PCR results

Conduct additional studies to include ICU patients

Self Assessment Question

Which of the following is/are appropriate risk factors for MRSA infection that warrant empiric initiation of vancomycin therapy?

A. Recent hospitalization and administration of parenteral antibiotics in the past 90 days
B. Prior respiratory isolation of MRSA within the past year
C. Patients who reside in long-term care facilities
D. A and B
E. A, B and C

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