HSHS St. John's Hospital

Evaluating the Outcomes of Infectious Diseases Consultation on Methicillin Susceptible *Staphylococcus aureus* Bacteremia

Alina Viteri, PharmD, Sara Barnstable, PharmD, BCPS (AQ-ID), BCIDP, Beth Cady, PharmD, BCPS, Natalie Tucker, PharmD, BCPS, BCIDP
HSHS St. John's Hospital, Springfield, IL

Background

Successful treatment of *Staphylococcus aureus* bacteremia (SAB) is heavily reliant on susceptibility patterns. Studies have shown an added clinical benefit associated with Infectious Diseases (ID) consultation in the setting of both MRSA and MSSA bacteremia.

Eleven observational studies have reported improved mortality rates in patients with SAB that received an ID consultation. This data supports the suggestion that ID consultation should be the standard of care in cases of SAB.

In 2014, a previous institutional project was completed assessing outcomes of beta-lactams versus vancomycin in patients with MSSA bacteremia. The findings of this research led to the development and implementation of a new standard of care for SAB using a bundle set that included mandatory ID consultation.

Purpose

To evaluate the impact ID consultation has had on patient outcomes since implementation of a *Staphylococcus aureus* bacteremia bundle set

Outcomes

Primary Outcome

- Inpatient mortality in the setting of methicillin susceptible *Staphylococcus aureus* bacteremia with and without an ID consultation

Secondary Outcome

- Time to bacterial clearance (negative blood culture)
- Time to ID consultation and mortality

Methods

Data Collection

Age	Cultures
Sex	Source
ID consult	Imaging
Length of stay	Allergy & Reaction
ICU admission	Antibiotic Therapy
Charlson Comorbidity Index	Inpatient mortality

Methods Continued

Inclusion Criteria	• Inpatient • Adults ≥ 18 years of age • At least 1 positive MSSA blood culture
Exclusion Criteria	• Patients with polymicrobial bacteremia • Patients that expired within 48 hours of admission
Study Design	• Single-center, quasi-experimental study of patients with MSSA bacteremia from April 1, 2018 – August 31, 2021, compared to patients from January 1, 2010 – November 30, 2014
Data Collection	• Reports generated by the pharmacy clinical decision support software followed by manual chart review

Results

Variable	Pre-Bundle Set (n= 150)	Post-Bundle Set (n= 175)	P-value
Mean age, years (SD)	61 (± 18)	62 (± 17)	---
Female, n (%)	58 (38)	61 (35)	---
Charlson Comorbidity Index, mean (SD)	---	3.88 (± 2.6)	---
Admit to ICU, n (%)	---	86 (49)	---
Echocardiogram performed, n (%)	---	156 (89)	---
Infection source identified, n (%)	---	122 (70)	---
ID consult, n (%)	**94 (62.7)**	**159 (91)**	**< 0.001**
Treated with beta-lactam, n (%)	**63 (42)**	**151 (86)**	**< 0.001**
Treated with vancomycin, n (%)	**68 (45)**	**27 (15)**	**< 0.001**

Top 3 sources identified in the post-bundle set group:
1. Cellulitis 2. Septic joint 3. Endocarditis

Results Continued

Primary Outcome:

10% decrease in all-cause mortality

18% in pre-bundle set vs. 8% in post –bundle set group
p = 0.01

Variable	Pre-Bundle Set (n= 150)	Post-Bundle Set (n= 175)	P-value
Inpatient all-cause mortality, n (%)	**27 (18)**	**15 (8)**	**0.01**
Mean time to bacterial clearance, days (SD)	3.3 (±3)	3.4 (±2)	0.96
Mean time to ID consult, days (SD)	---	0.8 (± 0.9)	---
Mean time to inpatient mortality, days (SD)	9.5 (±11)	13 (±15)	0.73

Discussion/Conclusion

Since implementation of a SAB bundle set requiring ID consultation, our institution has increased use of targeted MSSA therapy with beta-lactams and significantly improved patient outcomes.

This study is limited by its own design as a single center, retrospective chart review. Other limitations include differences in the pre- and post-bundle data sets and the implementation of stewardship initiatives (ie, multiplex PCR and penicillin skin testing) that occurred between these two study periods.

Despite its limitations, the findings of this study are supported by several other studies assessing similar variables in the setting of SAB that achieved the same outcome of decreased mortality.

References

1. Auwaerter, Paul G. "Staphylococcus Aureus." *Johns Hopkins ABX Guide*, The Johns Hopkins University, 2019. *Johns Hopkins Guide*, www.hopkinsguides.com/hopkins/view/Johns_Hopkins_ABX_Guide/540518/all/Staphylococcus_aureus.
2. Holland TL, Arnold C, Fowler VG Jr. Clinical management of Staphylococcus aureus bacteremia: a review. JAMA 2014; 312:1330.
3. G. Ralph Corey, *Staphylococcus aureus* Bloodstream Infections: Definitions and Treatment, *Clinical Infectious Diseases*, Volume 48, Issue Supplement_4, May 2009, Pages S254–S259, https://doi.org/10.1086/598186
4. Pragman AA, Kuskowski MA, Abraham JM, Filice GA. Infectious Disease Consultation for Staphylococcus aureus Bacteremia Improves Patient Management and Outcomes. *Infect Dis Clin Pract (Baltim Md)*. 2012;20(4):261-267. doi:10.1097/IPC.0b013e318255d67c
5. Jones S, Schmittling S, et al. Comparison of outcomes in patients receiving a beta-lactam versus vancomycin for methicillin-susceptible *Staphylococcus aureus* bacteremia. Internal data, 2014.