Retrospective Study of the Management of *Staphylococcus aureus* bacteremia

Presented by: Lauren Lees, PharmD
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**Learning Objectives**

- List the components of a *Staphylococcus aureus* (S. aureus) bacteremia care bundle
- Recall the duration of therapy for complicated and uncomplicated *S. aureus* bacteremia

**Oklahoma State University Medical Center (OSUMC)**

- Located in Tulsa, OK
- Academic institution affiliated with Oklahoma State University Health Sciences Center
- Demographics:
  - 195 bed facility

**Introduction**

- *S. aureus* is a virulent gram-positive pathogen and is a leading cause of bacteremia
- *S. aureus* bacteremia is associated with a 20-30% increased rate in morbidity, health care costs, and mortality
- The management of *S. aureus* bacteremia is greatly improved with adherence to performance measures and implementation of care bundles

**Disclosure**

- Lauren Lees
- Potential conflicts of interest: none
- Sponsorship: none
- Proprietary information or results of ongoing research may be subject to different interpretations
- Speaker’s presentation is educational in nature and indicates agreement to abide by the non-commercialism guidelines provided

**Learning Objectives**

- *S. aureus* Clinical Practice Guidelines for MRSA bacteremia
- Minimum treatment duration of 2 weeks for uncomplicated bacteremia
- Treatment duration of 4-6 weeks for complicated bacteremia
- Identification and elimination of source of infection
- Repeat blood cultures 2-4 days after initial positive cultures until documented clearance
- Echocardiography recommended in all patients with bacteremia
- Vancomycin or daptomycin for MRSA bacteremia, beta-lactam antibiotics for MSSA
Antimicrobial Stewardship and Adherence to Care Bundles

- Impact of implementation of a S. aureus bacteremia care bundle managed by an antibiotic stewardship team:
  - Complete bundle adherence to performance measures improved from 56.1% to 84.1%
  - Readmission within 30 days decreased from 11% to 1.1%

- Mandatory infectious disease consult in all patients with S. aureus bacteremia
- Evaluated improved adherence to bundle measures, with improvement in individual measures:
  - Transesophageal echocardiography
  - Follow-up blood cultures
  - Appropriate antibiotic therapy selection
  - Decreased in-hospital mortality from 43.59% to 10%

Objectives

- Primary objective:
  - Evaluate adherence to various performance measures/care bundle for the management of S. aureus bacteremia at our institution
- Secondary objective:
  - Identify impact on adherence to performance measures/care bundle in patients with infectious disease (ID) consultation

Methods

- Retrospective chart review
- Inclusion criteria:
  - Admitted between August 2016 and July 2017
  - Eighteen years of age or older
  - One positive blood culture with S. aureus
  - Received antimicrobial therapy
- Exclusion criteria:
  - Discharged against medical advice
  - Transferred from outlying facility after receiving treatment for S. aureus bacteremia
  - Transferred to outlying facility for elevated level of care

Performance Measures

- Initiation of appropriate empiric antibiotics within 24 hours of gram stain results
- Beta-lactam therapy for MSSA bacteremia
- Blood cultures repeated every 48 hours until documented clearance
- Echocardiography (TTE or TEE) obtained
- Removal/debridement of foci when possible
- Appropriate duration of therapy
- Therapeutic vancomycin trough obtained when applicable
- Overall adherence to care bundle

Baseline Characteristics

<table>
<thead>
<tr>
<th></th>
<th>MSSA N = 25 (%)</th>
<th>MRSA N = 25 (%)</th>
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</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-30</td>
<td>5 (20)</td>
<td>1 (4)</td>
</tr>
<tr>
<td>31-50</td>
<td>5 (20)</td>
<td>9 (36)</td>
</tr>
<tr>
<td>51-70</td>
<td>12 (48)</td>
<td>12 (48)</td>
</tr>
<tr>
<td>≥ 71</td>
<td>3 (12)</td>
<td>3 (12)</td>
</tr>
<tr>
<td>History of IV Drug Use</td>
<td>7 (28)</td>
<td>8 (32)</td>
</tr>
</tbody>
</table>
Results

Source of Infection

- Pneumonia: 12%
- Central Venous Catheter: 10%
- IVDU: 10%
- Urine: 8%
- Endocarditis: 6%
- Other: 5%
- Unknown: 4%

Clinical Outcomes

<table>
<thead>
<tr>
<th></th>
<th>MSSA N=25</th>
<th>MRSA N=25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Length of Stay (days, range)</td>
<td>13 (5-27)</td>
<td>15 (2-51)</td>
</tr>
<tr>
<td>30 day Readmission (with recurrent bacteremia)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>30 Day All Cause Mortality (%)</td>
<td>1 (4)</td>
<td>4 (16)</td>
</tr>
</tbody>
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Conclusions

- Results demonstrate that we do not consistently adhere to evidence-based performance measures for the treatment of S. aureus bacteremia
- ID consultation had limited impact on adherence compared to those without ID consultation
- Implementation of a S. aureus bacteremia care bundle at our institution could improve adherence and patient outcomes

Results

- A total of 25 patients had an ID consultation
  - 15 MSSA, 10 MRSA
- Sixteen patients met 100% adherence to all performance measures
  - 9 MSSA, 7 MRSA
- 64% of patients with ID consultation met all performance measures compared to 59% without consultation

Self-Assessment Questions

- What is the duration of antibiotic therapy for uncomplicated S. aureus bacteremia?
  a. 1 week total
  b. 2 weeks from negative culture
  c. 4 weeks total
  d. Until cultures are negative
Self-Assessment Questions

• What imaging is recommended in a patient with bacteremia?
  a. Chest X-ray
  b. Transthoracic echocardiography (TTE)
  c. Transesophageal echocardiography (TEE)
  d. B and C

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