ABSTRACT

Background: Appropriate empirical antimicrobial therapy is associated with improved survival in patients with bloodstream infections (BSI).

Methods: Hospitalized adults with gram-negative BSI from 2011-2012 at Palmetto Health Richland and Baptist Hospitals in Columbia, SC, USA were evaluated. Multivariable logistic regression was used to identify patients with risk factors for BSI due to gram-negative bacilli that harbor antimicrobial resistance genes (Pseudomonas aeruginosa, Enterobacteriaceae, Citrobacter and Serratia species). Antimicrobial susceptibility rates of bloodstream isolates to non-restricted antibiotics were stratified by risk of antimicrobial resistance and acute severity of illness. Retained antibiotics had predefined susceptibility rates ≥ 98% for good predicted prognosis (Bloodstream Infection Mortality Risk Score [BISIMS] < 5) and ≥ 95% for patients with guarded prognosis (BISIMS ≥ 5).

Results: Among 390 patients with gram-negative BSI, healthcare-associated (HCA) [odds ratio (OR) 3.01, 95% confidence intervals (CI) 1.52-6.32] and hospital-acquired (HA) sites of acquisition [OR 3.68, 95% CI 1.64-8.44] were identified as risk factors for BSI due to P. aeruginosa or Amp-C-producing Enterobacteriaceae as compared to community-acquired (CA) BSI (referred). Based on stratified bloodstream antibiotic, ceftazidime was recommended for empirical therapy of CA BSI in non-critically ill patients; and cefepime or piperacillin-tazobactam for HCA, HA and critically ill patients with BSI.

Conclusions: Incorporation of risk factors for antimicrobial resistance, local antimicrobial susceptibility rates and acute severity of illness into institutional management guidelines provides an evidence-based approach for optimizing empirical antimicrobial therapy for BSI.

INTRODUCTION

• Bloodstream infections (BSI) are the seventh leading cause of death in the USA.
• Appropriate empirical antimicrobial therapy has been associated with improved survival and shorter duration of hospitalization following BSI.
• Local guidelines for management of BSI may be an effective tool to improve empirical antimicrobial therapy and hence outcome of patients with BSI.

OBJECTIVES

• Development of evidence-based guidelines for management of Gram-negative BSI with empirical antimicrobial therapy based on:
  - Risk factors for BSI due to Pseudomonas aeruginosa or chromosomally mediated Amp-C-producing Enterobacteriaceae (CAE)
  - Local bloodstream antibiotic data
  - Predicted prognosis at initial presentation as estimated by the Bloodstream Infection Mortality Risk Score (BISIMS) [Table 1]
• Prospective monitoring of patients with BSI by antimicrobial stewardship and support team for optimization of empirical antimicrobial therapy with subsequent de-escalation.

METHODS

• Nested case-control study of gram-negative BSI in Palmetto Health Richland and Baptist hospitals in Columbia, SC, USA, 2011-2012.
• Logistic regression was used to identify risk factors for BSI due to P. aeruginosa or CAE, including Enterobacter, Citrobacter and Serratia species.
• Examination of antimicrobial susceptibility rates of bloodstream isolates in patients at high and low risk of BSI due to P. aeruginosa or CAE after stratification by predicted prognosis at initial presentation using BISIMS.
• Retained antibiotics should have susceptibility rates:
  - ≥ 98% for patients with good predicted prognosis (BISIMS < 5)
  - ≥ 95% for patients with guarded prognosis (BISIMS ≥ 5)

Table 1: Bloodstream Infection Mortality Risk Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Point allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause</td>
<td>3</td>
</tr>
<tr>
<td>Palmetto</td>
<td>4</td>
</tr>
<tr>
<td>High source infections</td>
<td>4</td>
</tr>
<tr>
<td>Ventriculitis</td>
<td>0</td>
</tr>
<tr>
<td>2-3</td>
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</tr>
<tr>
<td>≥ 4</td>
<td>5</td>
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