**Background**

- Earlier appropriate antibiotic treatment for bacteremia improves outcomes. While blood cultures generally become positive in 18–48 hours, full identification and antibiotic susceptibility results take an additional 30–60 hours in the laboratory.
- The FilmArray® Blood Culture Identification (BCID) Panel is a multiplex PCR test designed for use with fluid from positive blood culture bottles. The BCID can detect the presence of 24 distinct bacteria that account for 90–95% of bacteremic isolates and 3 antimicrobial resistance genes (meca, vanA/B and KPC) in about 1 hour.
- Early organism identification with the BCID could facilitate tailoring of empiric therapy and avoid delays in discharge when blood cultures grow contaminants.

- We report the preliminary results of a pre-intervention study evaluating the impact of BCID testing on antimicrobial use and length of hospital stay (LOS).

**Methods**

- Design: Pre-Post Intervention study
  - Pre-BCID Period: Jan 2012 – June 2013
  - Post-BCID Period: Sep 2013 – Dec 2013
- Inclusion Criteria
  - First positive blood culture for gram positive cocci or candida
- Exclusion Criteria
  - <18 years of age or outpatient
- BCID Procedure
  - 100 ul of fluid from a positive blood culture bottle is inoculated directly into the port of the BCID panel, that is then placed into the instrument for PCR. (See figure above)
  - The most recent 2–4 blood cultures meeting inclusion/exclusion criteria were processed on the BCID each morning.
  - BCID results were entered into the electronic medical record and emailed to Antimicrobial Stewardship Program (ASP) pharmacists. ASP pharmacists contacted treatment teams to explain the results and recommended changes in drug therapy when appropriate.

- Outcomes
  - Number and type of ASP interventions using BCID results
  - Duration of vancomycin for methicillin-sensitive S. aureus (MSSA) and time to active therapy for patients with vancomycin-resistant Enterococcus (VRE)
  - LOS (time from culture positivity to discharge) for patients with coagulase negative staphylococci (CoNS), Patients were excluded from LOS analysis if discharged <8 hr or >48 days from culture positivity.
- Statistical Analysis
  - Descriptive statistics (median, interquartile range, percentages)
  - Mann-Whitney U/test to compare BCID group and historical controls

**Results**

**Average Time from BCID Results to Organism ID and Susceptibility Results by Traditional Methods**

- Traditional Methods: 46.7 hours to Final Identification and Susceptibilities
- BCID Results EMailed to ASP: 21.7 hours to Preliminary Identification

**ASP Interventions With the BCID (N=94)**

<table>
<thead>
<tr>
<th>Organism</th>
<th>N</th>
<th>Intervention No. (%)</th>
<th>Intervention Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoNS</td>
<td>56</td>
<td>40 (71)</td>
<td>Discontinue empiric vancomycin</td>
</tr>
<tr>
<td>MSSA</td>
<td>8</td>
<td>8 (100)</td>
<td>Change empiric vancomycin to beta-lactam</td>
</tr>
<tr>
<td>MRSA</td>
<td>5</td>
<td>0 (100)</td>
<td>N/A of patients on empiric vancomycin</td>
</tr>
<tr>
<td>VSE</td>
<td>8</td>
<td>5 (63)</td>
<td>Change linezolid to vancomycin</td>
</tr>
<tr>
<td>VRE</td>
<td>6</td>
<td>4 (67)</td>
<td>Change vancomycin to linezolid</td>
</tr>
<tr>
<td>Candida spp.</td>
<td>6</td>
<td>5 (83)</td>
<td>Tailor therapy towards candida species</td>
</tr>
<tr>
<td>Streptococcus spp.</td>
<td>5</td>
<td>2 (40)</td>
<td>Change linezolid to vancomycin</td>
</tr>
</tbody>
</table>

**Duration of Vancomycin for MSSA**

- BCID Group: 14h
- Historical Control: 66h

**Hours To Active Therapy For VRE**

- BCID Group: 25h
- Historical Control: 39h

**Time to Discharge For Patients with CoNS**

- Historical Control (N=329)
  - Median LOS: 2.9 days
  - BCID Group (N=36)
  - Median LOS: 2.3 days

**Savings Associated With LOS Reduction**

- Estimated savings assuming $1000/hospital day.
- Lab costs based upon $129/BCID test.

**Discussion**

- The BCID provided microbiological information roughly 1 to 2 days earlier than standard laboratory methods. ASP interventions included streamlining therapy as well as broadening coverage when drug-resistant organisms were detected (e.g. VRE). Concomitant infections precluded early tailoring of antimicrobials based upon BCID results in some cases.
- Early identification of CoNS, a common contaminant in blood cultures, was associated with a decreased in LOS and overall net cost savings during the intervention period.
- Improved patient outcomes are expected from treatment of patients with methicillin-susceptible S. aureus with beta-lactams (as opposed to vancomycin) and from earlier treatment of VRE with linezolid, but have not been quantified yet.

**Conclusion**

- ASP intervention with the BCID facilitated rapid tailoring of antimicrobial therapy and led to earlier hospital discharge for patients with CoNS in blood cultures. The BCID was a cost-effective tool for improving patient care.

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