Assessing the clinical impact of rapid pathogen identification and antimicrobial susceptibility testing provided by the Accelerate Pheno™ System at Hampshire Hospitals NHS Trust

**Background**
Rapid identification (ID) and antimicrobial susceptibility testing (AST) of microorganisms cultured from blood is essential for optimising management of patients with sepsis. Clinical outcomes are influenced by timeliness of appropriate antimicrobials and investigations for source control. Timely de-escalation and targeted therapy are a vital component of antimicrobial stewardship.

**Materials/Methods**
A prospective study was designed to investigate the clinical impact of the rapid ID and AST generated by the Accelerate Pheno™ System versus our standard of care (SoC) of direct disc susceptibility and VITEK2. We processed signal positive blood cultures from 172 septic patients in ITU and on admission to ED and determined the clinical impact of these early interventions. 170 eligible assays were reported totalling 179 isolates (9 dual infections). AST testing from both the US and European panels PhenoTest™ were performed, only the more relevant new European panel is reported here.

**Results**

<table>
<thead>
<tr>
<th>Performance vs SoC (n=179)</th>
<th>Gram-negative</th>
<th>Gram-positive</th>
<th>Yeast</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>96.3% [93.1-99.5%]</td>
<td>87.2% [76.7-97.7%]</td>
<td>100% [100-100%]</td>
<td><strong>94.3% [90.8-97.7%]</strong></td>
</tr>
<tr>
<td>Specificity</td>
<td>99.8% [99.6-100%]</td>
<td>99.9% [99.7-100%]</td>
<td>100% [100-100%]</td>
<td><strong>99.9% [99.8-100%]</strong></td>
</tr>
</tbody>
</table>

**PhenoTest™ BC (European Abx Panel) performance vs SoC (n=55)**

<table>
<thead>
<tr>
<th>Essential Agreement (MIC)</th>
<th>Categorical Agreement (S, I, R)</th>
<th>Very Major Error (VME)*</th>
<th>Major Error (ME)</th>
<th>Minor Error (MiE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>97% [95.5-98.6%]</td>
<td>95.4% [93.5-97.3%]</td>
<td>5.3%</td>
<td>1.1%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

- **Clinical action 1.57 days earlier than SoC.**
- **Lower sensitivity for Gram-positives reported due to favouring Gram-negatives in this study meaning less were assayed.**
- **VME due to Meropenem, 2x Tobramycin and 2x Cefuroxime (4x E. coli and P. aeruginosa).**

**Conclusion**
The Accelerate Pheno™ System represents an exciting innovative platform with potential for significantly decreasing the interval to antimicrobial optimisation in blood stream infection. The potential clinical impact is greatest in pathogens with unpredictable antibiograms like those we encounter locally in our Gram-negatives.

These demonstrable rapid clinical interventions can deliver significant benefits for individual patients and healthcare organisations in terms of quality of care, patient safety, antimicrobial stewardship and infection prevention measures, notwithstanding the potential associated financial savings.

**Clinical Impact**

- Optimisation of treatment: 31
- Reduction of overall antibiotic use: 19
- Narrowing of antibiotic spectrum: 16
- IV to oral switch: 9
- Infection control: 12

**Analysis on-going**

**Table:**

- **Min Outlier**
- **Max Outlier**

**Graph:**

- Mean time to result/h
  - Accelerate ID = 1.35
  - Accelerate MIC = 6.65
  - Final SoC ID/MIC = 44.26

**Annualised projections for our Trust**

- ~5,500 doses saved/annum of Tazocin
- ~2,500 doses saved/annum of total antibiotic usage
- 1278 patient exposure days to multidrug resistant organisms saved

Clinical actions a mean of 1.57 days earlier compared to SoC

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