Rationale

- Non-fermenting Gram-negative bacteria, especially *Pseudomonas* and *Acinetobacter*, are a major cause of pneumonia but can be difficult to treat due to their highly resistant phenotypes.
- Carbapenem resistance is one of the most clinically important resistance patterns, with various causative genes including *kpc*, *vim*, *oxa-24* and *ndm*.
- Multiplex Polymerase Chain Reaction (mPCR) offers the potential for early detection of pathogens and antibiotic resistance but clinical implications of results are poorly understood.
- We reviewed clinical data to determine the rate of detection of important resistance genes and to observe clinical outcomes in patients with discrepant results between culture and a rapid sample-to-answer mPCR platform.

Methods

- The Unyvero lower respiratory tract (LRT) Panel was used for this study.
- This platform detects 20 microorganisms and 19 antibiotic resistance markers in bronchoalveolar lavage (BAL) samples, with a turnaround time of less than 5 hours.
- A validation study of the Unyvero system compared to culture was performed prospectively on BAL samples from patients with suspected pneumonia.
- Discrepant results were resolved by performing two independent PCRs and sequencing for the organisms on the Unyvero panel.

Results

<table>
<thead>
<tr>
<th>Total BAL samples reviewed</th>
<th>64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concordance between BAL culture and Unyvero</td>
<td>49 (77%)</td>
</tr>
<tr>
<td>Discrepant organism (missed by culture)</td>
<td>8 (13%)</td>
</tr>
<tr>
<td>Discrepant organism (missed by Unyvero)</td>
<td>8 (13%)</td>
</tr>
<tr>
<td>Concordant organism, discrepant resistance</td>
<td>12 (18%)</td>
</tr>
</tbody>
</table>

Table 1. Results of the BAL samples reviewed. Concordance is defined as agreement between culture and a bacterial species that LRT can detect. The discordant cultures may include some organisms that the LRT panel does not detect.

"% Mortality in patients with discordant culture vs Unyvero results"

- The 8 organisms missed by culture included 1 *Pseudomonas*, Staph, Klebsiella, Haemophilus and 4 *Acinetobacter* sp.
- All 4 missed *Acinetobacter* cases had a subsequent culture grow *Acinetobacter*, with antibiotic treatment initiated at that time.

Conclusions

- 75% of carbapenem resistance was detected by the LRT platform within 5 hours of testing, potentially minimizing inappropriate antibiotic duration.
- Non-fermenters detected by LRT but not grown on culture may be causative and are associated with high mortality.
- The LRT panel appears to complement standard culture for detection of important pathogens and resistance genes.