Independent review team versus standard infection preventionist (IP) for Central Line-Associated Bloodstream Infection (CLABSI) diagnosis: a systematic review of diagnostic error

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Disclosures

• No funding was received in support of this review.

• Nothing to disclose.
Why Surveillance?

- Monitoring trends over time
- Measuring effectiveness of CLABSI reduction strategies
- Evaluating outcomes of research projects (eg. RCTs)
- Benchmarking between facilities
NHSN Guidelines


• Recent updates (2013 + updates through to Jan 2016)
• Translocation of gastro-intestinal organisms
• Introduction of Mucosal Barrier Injury-related BSI (MBI-LCBI)
The Question

1. How does the application of the Centers for Disease Control (CDC) Central Line-Associated Bloodstream Infection (CLABSI) definitions vary between hospital infection control teams/preventionists and expert adjudicators?

2. How is the variation in adjudication of CLABSI events likely to affect reported statistics of Hospital Acquired Infections (HAIs)?
Included Studies

Included:

• Studies which explored diagnostic validity of historical bacteraemia episodes using CDC/NHSN definitions.
  • Standard Infection Preventionist / other responsible clinician
  • Vs. Independent Reviewer Team (additional education, time, resources.)

Excluded:

• Studies which used either a program or algorithm to conduct the diagnosis validation were excluded.
• Studies which used vignettes/example situations for cross-comparison between clinicians.
• Registered with PROSPERO
• Databases: MEDLINE (Ovid), CINAHL (EbscoHost), PubMed (NCBI), and Scopus (Elsevier). Reference lists also hand-searched for other potential studies.
• 87 studies were identified in the initial search, and 8 papers including 6754 patient records met the eligibility criteria.
Findings

Validation of central line—associated bloodstream infection data in a voluntary reporting state: New Mexico

Deborah L. Thompson MD, MSPH, FACPM*, Monear Makvandi MPH, Joan Baumbach MD, MPH, MS

Validation of Statewide Surveillance System Data on Central Line–Associated Bloodstream Infection in Intensive Care Units in Australia

Emma S. McBryde, MBBS, FRACP, PhD; Judy Brett, BN; Philip L. Russo, MCLinEpid; Leon J. Worth, MBBS, FRACP; Ann L. Bull, PhD; Michael J. Richards, MBBS, FRACP, MD

Evaluation of the Reporting Validity of Central Line—Bloodstream Infection Data to a Provincial Surveillar

Karen L. Rich MEd, BSN, RN, CICa*, Sara M. Reese PhDa, Kirk A. Bol MSPHb, Heather M. Gilmartin MSN, RN, FNP-BC, CICb, Tara Janosz MPHa

Patricia S. Fontela, Isabelle Rocher, Robert W. Platt, Madhukar Pai, David L. Buckridge, Charles Frenette, Marc Dionne and Caroline Quach
Sensitivity (95% CI) ranged from 0.42 (0.15, 0.72) to 0.88 (0.77, 0.95) and specificity (95% CI) from 0.70 (0.58, 0.81) to 0.99 (0.99, 1.0).
### Sensitivity / Specificity

<table>
<thead>
<tr>
<th>Study</th>
<th>TP</th>
<th>FP</th>
<th>FN</th>
<th>TN</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
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<tbody>
<tr>
<td>Backman 2010</td>
<td>23</td>
<td>4</td>
<td>25</td>
<td>424</td>
<td>0.48 [0.33, 0.63]</td>
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<td>Fontela 2013</td>
<td>53</td>
<td>4</td>
<td>7</td>
<td>45</td>
<td>0.88 [0.77, 0.95]</td>
<td>0.92 [0.80, 0.98]</td>
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<tr>
<td>Hazarny 2013</td>
<td>463</td>
<td>74</td>
<td>187</td>
<td>2380</td>
<td>0.71 [0.68, 0.75]</td>
<td>0.97 [0.96, 0.98]</td>
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<tr>
<td>Lopez-Pueyo 2013</td>
<td>17</td>
<td>10</td>
<td>5</td>
<td>1454</td>
<td>0.77 [0.55, 0.92]</td>
<td>0.99 [0.99, 1.00]</td>
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<td>McBryde 2009</td>
<td>27</td>
<td>19</td>
<td>17</td>
<td>45</td>
<td>0.61 [0.45, 0.76]</td>
<td>0.70 [0.58, 0.81]</td>
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<td>Oh 2012</td>
<td>70</td>
<td>6</td>
<td>16</td>
<td>725</td>
<td>0.81 [0.72, 0.89]</td>
<td>0.99 [0.98, 1.00]</td>
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<tr>
<td>Rich 2013</td>
<td>43</td>
<td>4</td>
<td>19</td>
<td>465</td>
<td>0.69 [0.56, 0.80]</td>
<td>0.99 [0.98, 1.00]</td>
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<tr>
<td>Thompson 2013</td>
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<td>3</td>
<td>7</td>
<td>108</td>
<td>0.42 [0.15, 0.72]</td>
<td>0.97 [0.92, 0.99]</td>
</tr>
</tbody>
</table>

One of these studies is not like the other ....
The Perfect ROC
Receiver Operating Characteristic

Sensitivity

1 - Specificity (false positive rate)
Our ROC Curve
## Risk of Bias

- **QUADAS 2 tool**

<table>
<thead>
<tr>
<th>First Author</th>
<th>Year</th>
<th>Risk of Bias</th>
<th>Applicability Concerns</th>
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<tr>
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<td>Hazamy</td>
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<tr>
<td>Lopez-Pueyo</td>
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<td>2013</td>
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</tbody>
</table>
Limitations

• Only 1 study looked at the exact area of classification error – priority for the future to target education.

• Limited number of studies – spread internationally.
Implications

• Important to consider diagnostic error when introducing strategies to reduce CLABSIs within your institution.

• Maintain quality, consistent education among IPs.

• Consider validating your local data.

• Standardise the denominators (occupied bed days, central-line days and neutropenic days)
References


Questions?