Incidence and Organism Specific Mortality Associated with Healthcare Associated Pneumonia over a 6 year period

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Abstract

Background
Healthcare-associated pneumonia (HCAP) is a common and potentially life threatening illness. Pneumonia is one of the most common causes of healthcare associated infections. The purpose of our study was to investigate in a large multicenter cohort over a several year period, the association of specific organisms with inpatient mortality in HCAP patients.

Methods
This is a retrospective multicenter analysis of patients over 18 years of age hospitalized with HCAP over a 6-year period from 2008-2013 from 4 large healthcare institutions. Patients were identified by electronic medical record review. HCAP was defined by inclusion of patients with a discharge diagnosis of pneumonia by ICD-9 code plus associated antibiotic use in the initial 24 hours. Patients were considered to have HCAP if initial antimicrobial use included one of the following: cefepime, doripenem, meropenem, imipenem, or piperacillin-tazobactam. In combination with vancomycin or linezolid.

Results
There were 16884 patients. Staphylococcus aureus was the most common organism isolated in 368 patients and had 15.9% mortality at 30 days. Pseudomonas aeruginosa was isolated in 359 patients and had 24.2% mortality. Acinetobacter baumannii was isolated in 201 patients, and accounted for 34.0% mortality. Escherichia coli was isolated in 89 patients with 24.7% mortality. Klebsiella pneumoniae was isolated in 99 patients with 27.3% mortality. Commensal bacteria were isolated or positive cultures with no specification occurred in 5214 of patients with 22.8% mortality. The remaining patients did not have organisms identified in the blood or sputum.

Conclusion
Most patients with HCAP did not have an organism identified. Mortality rate in these patients was generally similar to patients in whom an organism was identified except for S. aureus and A. baumannii. In patients from whom organisms were identified, S. aureus was most common and E. coli was the least common. Thirty-day mortality in A. baumannii, and lowest with S. aureus. The lower mortality in patients with S. aureus is potentially related to early effective therapy. The high percentage of deaths due to A. baumannii is potentially related to both severe underlying disease and multidrug resistance limiting therapy options.

Introduction
• Pneumonia is one of the most common causes of healthcare associated infection.
• HCAP was added as a pneumonia category in the 2005 ATS/IDSA guidelines in order to identify patients at increased risk for multidrug-resistant (MDR) pathogens coming from community settings; these individuals would previously have been classified as having community-acquired pneumonia (1).
• Healthcare associated pneumonia (HCAP) is a serious illness with mortality rates cited at 20% despite improved supportive care, and antimicrobial therapy (2).
• It is important to identify patients at highest risk of mortality to better determine management.

Study Purpose
• The purpose of our study was to investigate in a large multicenter cohort, over a several year period, the association of specific organisms with inpatient mortality in HCAP patients.

Materials & Methods
• The multi-site electronic data infectious diseases consortium (MEDIC) study chose four large health care institutions from North, East, South and Midwest of America.
• A database of real-world clinical data was built to answer clinically relevant research questions.

Results
• 85,689 patients were diagnosed with pneumonia.
• 16,084 patients were classified as HCAP.
• Staphylococcus aureus was the most common organism identified (33%).
• Acinetobacter baumannii was associated with the highest mortality (34%).
• Most patients had no organism identified, or had an organism which was felt to be non-pathogenic.

Figure 1. The location and basic information of four participated healthcare institutions

Table 1. Organism species with associated number of isolates

<table>
<thead>
<tr>
<th>Organism</th>
<th>Number Isolated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus aureus</td>
<td>753 (4.7%)</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>741 (4.6%)</td>
</tr>
<tr>
<td>Acinetobacter baumannii</td>
<td>431 (2.7%)</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>179 (1.1%)</td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>199 (1.2%)</td>
</tr>
<tr>
<td>Other Bacteria</td>
<td>6368 (39.6%)</td>
</tr>
<tr>
<td>Unspecified Species</td>
<td>5069 (31.5%)</td>
</tr>
<tr>
<td>No Culture</td>
<td>2344 (14.6%)</td>
</tr>
</tbody>
</table>

Figure 2. Percent of organisms isolated of five most common organisms

Figure 3. Thirty day mortality with associated isolated organisms

Conclusion
• The five most common organisms identified in HCAP are Staphylococcus aureus, Pseudomonas aeruginosa, Acinetobacter baumannii, Escherichia coli, and Klebsiella pneumoniae.
• Despite current diagnostic tests, no pathogen was detected in the majority of patients.
• Mortality rate in patients with no identified organism was similar to those in which an organism was identified.
• In those with identified organisms, S. aureus was the most common to be identified. E. coli was the least common.
• Thirty day mortality was highest in A. baumannii, and was lowest in S. aureus.
• The lower mortality in patients with S. aureus is potentially related to early effective therapy.
• The high mortality secondary to A. baumannii is potentially related to both severe underlying disease as well as multidrug resistance leading to limited therapy options.

References