Bacterial Pneumonia in the cART Era

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Bacterial Pneumonia in HIV-Infected Subjects

• High burden of disease in developed and developing world.

• >10x more common in HIV infected subjects compared to age matched groups

• Most often caused by *S. pneumoniae*, most often bacteremic (50%); 25-60% no etiology identified.

• High rate of recurrence (10-25% for *S. pneumo*)

• Associated with increased morbidity and mort.

• Potentially preventable
Rates of Bacterial Pneumonia and Invasive Pneumococcal Disease in the USA and Africa

Hospitalization for Pneumonia among Individuals with and without HIV Infection, 1995-2007
A Danish Population-Based, Nationwide Cohort Study

Incidence of first-time pneumonia hospitalization: IDU, low current CD4, nadir CD4, increasing age, and no current HAART increased risk

Unadjusted incidence rate per 1,000 PY in VC in cART era

- COPD: p<0.001
- Asthma: p=0.7
- Bacterial pneumonia: p<0.001
- PCP: p<0.001

Comparison of incidence rates between HIV+ and HIV- groups.
Bacterial pneumonia

- HIV Infection
  - CD4 count, Viral load
  - cART
  - Prophylactic antibiotics
- Comorbidities
- Smoking
  - Alcohol, Drug use
- Demographics
- Vaccination
  - PV/PCV
  - Influenza

Outcome
- Recurrence
- Mortality
- Sequelae
INHALE
Investigations into HIV Associated Lung Events

Pneumonia Work Group

Objectives:

1. Validate administrative diagnoses of pneumonia compared to the gold standard of chart review:
   Develop chart review tools for obtaining data relevant to existing and future pneumonia-related projects
Chart Review Validation of Bacterial Pneumonia Codes

- Cases identified by ICD9 codes: →
- Chart review:
  1. Confirm “Pneumonia” as diagnosis that lead to admission:
    - Community acquired pneumonia (CAP) and Health Care Associated Pneumonia (HCAP)
    - Excludes hospital acquired pneumonias: Pneumonia >48-72 hours after admission
  2. Establish etiology: Microbiologic diagnosis:
    - Bacterial vs. other
    - Suspected, presumed, or definitive
Characterization of Hospital Course and Post-Discharge Outcome
Supplemental Data Abstraction Form Completion at West Haven

- Patient’s status at admission: Comorbidities, VS, Lab, immunization history (influenza, pneumococcal)
- Radiology: Admission and within 6 mo f/up
- Bronchoscopy
- ICU admission: APACHE, Intubation, CPAP, BIPAP, tracheostomy
- Discharge status: Home, NH, hospice, etc.
- Outcome: At 30 days
# Results from Initial CAP Screening

(Performed by Mona Duggal and Cyndi Frank)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Number of charts N=486*</th>
<th>Medical record available N=413</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Medical record available</td>
<td>413</td>
<td>73</td>
</tr>
<tr>
<td>Imaging within 48 h of admission</td>
<td>367</td>
<td>119</td>
</tr>
<tr>
<td>Antibiotics within 48 h of admission</td>
<td>347</td>
<td>139</td>
</tr>
</tbody>
</table>

*HIV+ N=390 (80%);  HIV- N=96
Radiographic Findings

<table>
<thead>
<tr>
<th>Category</th>
<th>N=367</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total findings in 6 defined categories</td>
<td>542</td>
<td>100</td>
</tr>
<tr>
<td>Infiltrate/opacity</td>
<td>369</td>
<td>68</td>
</tr>
<tr>
<td>Pulmonary edema/vascular congestion</td>
<td>38</td>
<td>7</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>60</td>
<td>11</td>
</tr>
<tr>
<td>Abscess/cavitary or cystic lesion</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Nodules or masses</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>Clear lungs</td>
<td>47</td>
<td>9</td>
</tr>
</tbody>
</table>
### Results from PI Site Validation

Data from Atlanta, Bronx, and LA

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Total</th>
<th>HIV+</th>
<th>HIV-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia ICD9 code</td>
<td>146</td>
<td>123</td>
<td>23</td>
</tr>
<tr>
<td><strong>Pneumonia</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAP</td>
<td>75</td>
<td>64</td>
<td>11</td>
</tr>
<tr>
<td>HCAP</td>
<td>25</td>
<td>22</td>
<td>3</td>
</tr>
<tr>
<td>HAP</td>
<td>10</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Other diagnosis§</td>
<td>36</td>
<td>31</td>
<td>5</td>
</tr>
</tbody>
</table>

§ 22-25% of total; 9 with no pneumonia, rest 1 each of 27 different diagnosis
Next Steps

1. Completion of validation by five remaining sites

2. Inclusion of pharmacy data for antibiotics within 48 hours of admission (to assess for improved specificity in excluding HAP and other diagnosis)

3. Re-analysis and development of best algorithm
In summary

• For hospitalized patients, ICD9 codes appear as a promising tool to identify CAP/HCAP.
• Validation of bacterial pneumonia diagnosis and ways of characterizing disease in VC will allow to assess impact of HIV and comorbidities on risk for disease, disease process, and its outcomes.
Current approved proposals waiting for validation data

- Health Outcomes for Pneumonia Requiring Hospitalization in HIV-1-Infected Older Adults (Lydia Barakat)
- Alcohol and Risk for Incidence and Severity of Community Acquired Pneumonia (Kristina Crothers)
- Impact of COPD on Risk for Pneumonia (Kristina Crothers)
Thanks

Pneumonia Work Group

Kristina Crothers, Kathleen Akgun, Sheldon T. Brown, Adeel Butt, Mona Duggal, David Fiellin, Michael Fine, Cyndi Frank, Matthew Freiberg, Cynthia Gibert, Matthew Goetz, Joseph Goulet, Christopher Graber, Laurence Huang, Joon Kim, Woody Levin, Kathleen McGinnis, Margaret Pisani, Bindu Raju, David Rimland, Maria Rodriguez-Barradas, Shahida Shahrir, Guy Soohoo

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