Compliance with antibiotic treatment guidelines in managed care patients with community-acquired pneumonia in ambulatory settings

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Pneumonia

- Pneumonia is an inflammation of lungs caused by bacteria, viruses, or chemical irritants
- Infections are spread from person to person through droplets in the air
- It is likely to develop after flu
- The very young and very old are most susceptible
- Smoking, heavy drinking, heart failure, diabetes, or COPD increases the risk
Burden of Disease
Community Acquired Pneumonia (CAP)

- Incidence of CAP ranges from 4 to 5 million cases per year in US\textsuperscript{1}
- Over 1.3 million hospitalized patients had CAP as principle diagnosis at discharge in 2004\textsuperscript{2}
- CAP is the sixth leading cause of death\textsuperscript{3}
- Estimated annual cost of treating CAP exceeds 12 billion dollars\textsuperscript{4}

\textsuperscript{1} Niederman et al. Am J Respir Crit Care Med 2001; 163(7):1730-1754.
\textsuperscript{2} DeFrances et al. Adv Data 2004; 342:1-29.
Community Acquired Pneumonia

- Nearly 80% of treatment for CAP is provided in outpatient settings\(^1\)
- Streptococcus pneumoniae is the most common bacterial pathogen (pneumococcal pneumonia)\(^2\)
- No causative pathogens can be identified at time of diagnosis in less than 50% of cases\(^2\)
- Most therapy is empiric
- Several professional organizations have developed guidelines for empiric treatment

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Infectious Diseases Society of America (IDSA) Guideline for CAP Empiric Treatment

**Previously Healthy**

- no recent antibiotics
  - Macrolides
  - Doxycycline

**with recent antibiotics**

- Respiratory quinolones
- Advanced-generation macrolides + high dose amoxicillin (or plus clavulanate)

**with Comorbidities**

- no recent antibiotics
  - Advanced-generation macrolides
  - Respiratory quinolones
  - Advanced-generation macrolides + beta-lactam

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2. Comorbidities include COPD, diabetes, renal or congestive heart failure or malignancy
3. Recent antibiotic use was defined as receipt of any antibiotics within 90 days prior to pneumonia diagnosis.
Antibiotic Resistance

- 20-30% of all pneumococci show some level of resistance to macrolides\(^1\)
- Resistance to quinolones was > 2% in 2002, with rates increasing in the US\(^2\)
- Recent antibiotic exposure is a risk factor for antibiotic resistance
- IDSA recommends patients who received recent antibiotics should consider a different antibiotic class for CAP\(^3\)

Objectives

- Describe initial antibiotic treatment patterns among CAP patients treated in ambulatory settings in light of the IDSA guidelines
Study Population

- Patients 18 years or older with pneumonia treated with any antibiotics in ambulatory settings in 2004
- Claims data provided by Ingenix LabRx, a database of an employed, commercially insured population with dependents, with 30 million lives in geographically diverse regions of the US
Methods

- We focused on new episodes, defined by outpatient visit for pneumonia that was preceded by a 3 month period with no pneumonia related care.
- Patients with HIV, receiving kidney/liver transplant, with hematological malignancies within 12 months prior to pneumonia diagnosis were excluded.
- Individuals were divided into 4 groups per guidelines.
- Descriptive analysis was employed.
## Results

<table>
<thead>
<tr>
<th></th>
<th>Previously healthy, no recent antibiotics</th>
<th>Previously healthy, with recent antibiotics</th>
<th>With comorbidities, no recent antibiotics</th>
<th>With comorbidities, with recent antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N (%)</strong></td>
<td>18,803 (55%)</td>
<td>7,120 (21%)</td>
<td>4,841 (14%)</td>
<td>3,578 (10%)</td>
</tr>
<tr>
<td><strong>Mean age (SD)</strong></td>
<td>44.0 (12.8)</td>
<td>44.8 (12.9)</td>
<td>55.2 (13.7)</td>
<td>54.6 (13.6)</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>49.1%</td>
<td>60.6%</td>
<td>48.3%</td>
<td>56.7%</td>
</tr>
</tbody>
</table>
CAP Treatment Pattern among Patients who were Previously Healthy

A. No recent antibiotics

- Quinolones, 36%
- Macrolides, 49%
- Others, 4%
- Cepha, 3%
- Amoxicillin, 5%
- Doxycycline, 3%

Recommended Treatment, 52%

B. with recent antibiotics

- Quinolones, 48%
- Macrolides, 34%
- Others, 8%
- Cepha, 4%
- Amoxicillin, 6%

Recommended Treatment, 48%
CAP Treatment Pattern among Patients with Comorbidities

A. No recent antibiotics

- **Quinolones, 45%**
- **Macrolides, 37%**
- **Amoxicillin, 6%**
- **Cepha, 4%**
- **Doxycycline, 2%**
- **Others, 6%**

Recommended Treatment, 82%

B. with recent antibiotics

- **Quinolones, 51%**
- **Macrolides, 28%**
- **Macrolide + beta-lactam, 1%**
- **Cepha, 6%**
- **Amoxicillin, 6%**
- **Others, 8%**

Recommended Treatment, 52%
## CAP Treatment Pattern by Recent Antibiotic Therapy

<table>
<thead>
<tr>
<th>Recent Antibiotics</th>
<th>Macrolides</th>
<th>Quinolones</th>
<th>Penicillins</th>
<th>Cephalosporins</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macrolides</td>
<td>827 (29%)</td>
<td>1714 (59%)</td>
<td>188 (7%)</td>
<td>160 (5%)</td>
<td>2889</td>
</tr>
<tr>
<td>Quinolones</td>
<td>448 (34%)</td>
<td>704 (53%)</td>
<td>100 (7%)</td>
<td>79 (6%)</td>
<td>1331</td>
</tr>
<tr>
<td>Penicillins</td>
<td>750 (42%)</td>
<td>847 (47%)</td>
<td>141 (8%)</td>
<td>66 (3%)</td>
<td>1804</td>
</tr>
<tr>
<td>Cephalosporins</td>
<td>366 (40%)</td>
<td>438 (47%)</td>
<td>51 (5%)</td>
<td>72 (8%)</td>
<td>927</td>
</tr>
</tbody>
</table>
Summary

- Guideline adherence rate was around 50% for therapy of patients with no comorbidities.
- Adherence for treatment of patients with comorbidities varied dramatically (82%, 52% for pts without and with recent antibiotics, respectively).
- About 50% of patients with recent quinolones also received quinolones for CAP.
- About 30% of patients with recent macrolides also received macrolides for CAP.
Discussion

- Study findings may be used to develop intervention programs to enhance guideline adherence.
- Intervention programs may need to emphasize respiratory quinolones only for those with comorbidities or had received recent antibiotics.
- Macrolides alone are recommended only for those without comorbidities and with no recent antibiotics.
Limitations

- These data profile treatment patterns at about the time that the IDSA guidelines were introduced (within 6 months). These baseline data should be of value in future studies assessing impact of the guidelines.
- Unable to investigate antibiotics used in hospital since they are not billed separately.
- Claims databases lacks clinical details, e.g. disease severity, use of blood culture, microbial resistance patterns, reminders to reinforce guidelines.
Future Research

- Future research should identify patient, provider, and system-level barriers to improve guideline compliance.
- Findings from such studies may be useful for developing intervention programs, e.g. tailored reminder systems, and education programs.