A Multi-center Evaluation of the US Prevalence and Regional Variation in Macrolide-resistant Streptococcus pneumoniae from Blood or Respiratory Cultures Among Adult Patients

INTRODUCTION & PURPOSE

- S. pneumoniae is the most common etiology for community-acquired bacterial pneumonia (CAPB).
- The macrolides are the treatment of choice for S. pneumoniae pneumonia in the United States.
- Macrolides have long been an important component of empiric CABP therapy; but increasing resistance has diminished effectiveness and prompted a change in the 2019 American Thoracic Society (ATS)/Infectious Diseases Society of America (IDSA) guidelines for CAPB treatment.

METHODS

This retrospective cohort study included microbiological results from adult patients (≥18 years of age) with positive respiratory or blood cultures. Isolates from each source were considered separately.

- The study dataset was approved as a limited, de-identified dataset for retrospective analysis and was exempted from patient consent by the New England Institutional Review Board (Wellesley, Massachusetts).

- We used microbiological laboratory data from a large US hospital database to determine the prevalence of macrolide-resistant S. pneumoniae in hospitalized and ambulatory patients throughout the US.

RESULTS

Table 1. Macrolide Resistance rates among S. pneumoniae across the USA

<table>
<thead>
<tr>
<th>Setting</th>
<th>Number of Facilities</th>
<th>% Macrolide Resistant (All isolates)</th>
<th>% Blood isolates</th>
<th>% Respiratory isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>523</td>
<td>39.8 (135,184)</td>
<td>37.0 (42,044)</td>
<td>41.3 (133,140)</td>
</tr>
<tr>
<td>Inpatient</td>
<td>313</td>
<td>28.2 (1,211)</td>
<td>45.2 (1,578)</td>
<td>37.8 (2,978)*</td>
</tr>
<tr>
<td>Ambulatory</td>
<td>210</td>
<td>33.5 (386)</td>
<td>54.6 (448)</td>
<td>45.3 (2,289)</td>
</tr>
</tbody>
</table>

*Resistant by p-values: p < 0.001

- The overall rate of macrolide resistance in S. pneumoniae isolates was 39.5%.
- The rate of macrolide resistance in respiratory isolates (47.2%) was significantly higher than the rate in blood isolates (29.8%; P < 0.001).
- Isolates obtained from ambulatory encounters had a significantly higher rate of macrolide resistance compared with isolates from inpatients (45.3% vs. 37.8%; P < 0.001).

- Regions with overall S. pneumoniae macrolide resistance rates <25% were Mountain (13.9%), West South Central (18.3%), and East South Central (13.9%). Resistance rates were highest in the West North Central region (54.2%), followed by the South Atlantic (46.0%).

- Macrolide resistance rates were compared by use of the chi-square test with 95% confidence intervals. All analyses were conducted using SAS version 9.4 (SAS Institute, Cary, NC).

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FIGURE 1. Geographic distribution of S. pneumoniae macrolide resistance rates by zip code.

CONCLUSIONS

- Macrolide resistance among S. pneumoniae obtained in the ambulatory setting was higher than those obtained in the inpatient setting.
- Macrolide resistance rates in S. pneumoniae across all census regions ranged from 25–60.8%, and were higher than those observed in blood isolates.
- Given the 2019 macrolide resistance threshold proposed in the ATS/IDSA clinical treatment guidelines, our data suggest alternative antibiotics, other than macrolide monotherapy, should be considered for empiric CAPB therapy in the US.

REFERENCES


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