Introduction

Community-acquired pneumonia (CAP) is a frequent cause of patient morbidity and mortality worldwide. Typical bacterial pathogens causing CAP include Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis. Bacterial pharyngitis is most commonly attributed to Streptococcus pyogenes, a β-hemolytic streptococci (BHS). Ceftaroline fosamil, the produg of ceftaroline is approved for the treatment of community-acquired bacterial pneumonia caused by S. pneumoniae, H. influenzae, and other susceptible Gram-positive and Gram-negative bacteria. Ongoing surveillance to determine rates of resistance to frequently prescribed empiric antimicrobial agents at local, regional, national, and global levels remains a priority.

The Assessing Worldwide Antimicrobial Resistance Evaluation (AWARE) program is a worldwide ceftaroline surveillance study that summarizes the in vitro activities of ceftaroline and comparator agents against common pathogens isolated from patients with respiratory tract infections and other infection types.

Materials & Methods

Clinical isolates of S. pneumoniae, S. pyogenes, S. aureus, H. influenzae, and M. catarrhalis were cultured in medical laboratories in the Asia/Pacific region (6 countries; 1,422 isolates), from samples provided by patients with community-acquired respiratory tract infections in 2015–2017 as part of the AWARE program. Isolates came from Australia (n=341); Japan (n=194); South Korea (n=211); the Philippines (n=202); Taiwan (n=237); and Thailand (n=237). All isolates were shipped to IHMA, Inc. (Schaumburg, IL) where their identities were confirmed by MALDI-TOF mass spectrometry. MIC values were determined by broth microdilution according to CLSI guidelines [1] and percent susceptibility (%) interpreted using the CLSI breakpoints where available [2], and the FDA breakpoint for S. pyogenes [3].

Results

Results Summary

- Ceftaroline was 8-fold more potent than ceftaxime and >8-fold more potent than penicillin against penicillin-susceptible S. pneumoniae (ceftaroline MIC <0.12 µg/mL; Table 1, Figure 1) and >8-fold more potent against penicillin non-susceptible S. pneumoniae (ceftaroline MIC <0.5 µg/mL; Table 1, Figure 2).
- Ceftaroline (MIC<0.015 µg/mL) was 2-fold more potent than ceftaxime against S. pyogenes (Table 1, Figure 3).
- 100% of MSSA from the Asia/South Pacific region were susceptible to ceftaroline.
- Activity against MRSA varied by country, with MIC<0.06 µg/mL ranging from 1 to 2 µg/mL in all countries but Thailand (MIC<0.06 µg/mL). Activity was decreased in South Korea (81.6% susceptible) and Thailand (32.8% susceptible) with 15.6% and 37.3%, respectively, of MRSA isolates from these countries in the intermediate category (MIC<2 µg/mL).
- Ceftaroline was 10-fold more potent as ceftaxime against Haemophilus spp. (ceftaroline MIC<0.12 µg/mL; Table 1, Figure 5) and 4-fold more potent against M. catarrhalis (ceftaroline MIC<0.25 µg/mL; Table 1).
- Against a collection of Gram-positive and Gram-negative bacterial pathogens commonly associated with community-acquired respiratory tract infections collected in the Asia/South Pacific region, ceftaroline demonstrated in vitro potency greater than or equivalent to ceftaxime and other recommended antibiotic agents.

References


Disclosures

This study was sponsored by AstaZemes (AZ). AZ’s rights to ceftaroline fosamil were acquired by Pfizer in December 2016. IHMA received financial support from AZ in connection with the study and from Pfizer for the development of this poster. M. Hackel and D. Sahn are employees of IHMA. G. Stone, an employee of and shareholder in AZ at the time of the study, is currently an employee of Pfizer.

Table 1. In vitro Activity of Ceftaroline and Comparator Agents against Isolates from Community-Acquired Respiratory Tract Infections for the Asia/South Pacific Region, 2015–2017

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Ceftriaxone</th>
<th>Ceftaroline</th>
<th>Levofloxacin</th>
<th>Gentamicin</th>
<th>Linezolid</th>
<th>Daptomycin</th>
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</thead>
<tbody>
<tr>
<td>S. pneumoniae</td>
<td>≤0.015</td>
<td>≤0.015</td>
<td>1–2</td>
<td>≤0.015</td>
<td>1–2</td>
<td>≤0.25</td>
</tr>
<tr>
<td>S. aureus</td>
<td>≤0.015</td>
<td>≤0.03</td>
<td>≤0.5</td>
<td>≤0.12</td>
<td>≤0.12</td>
<td>≤0.25</td>
</tr>
<tr>
<td>M. catarrhalis</td>
<td>≤0.015</td>
<td>≤0.015</td>
<td>≤0.12</td>
<td>≤0.12</td>
<td>≤0.12</td>
<td>≤0.25</td>
</tr>
<tr>
<td>S. pyogenes</td>
<td>≤0.015</td>
<td>≤0.03</td>
<td>≤0.5</td>
<td>≤0.12</td>
<td>≤0.12</td>
<td>≤0.25</td>
</tr>
</tbody>
</table>

Figure 1. Ceftaroline and Ceftriaxone MIC Distributions for 558 Penicillin-Susceptible Streptococcus pneumoniae

Figure 2. Ceftaroline and Ceftriaxone MIC Distributions for 72 Penicillin-Non-Susceptible Streptococcus pneumoniae

Figure 3. Ceftaroline and Ceftriaxone MIC Distributions for 50 Streptococcus pyogenes

Figure 4. Ceftaroline MIC Distributions for 488 Staphylococcus aureus

Figure 5. Ceftaroline and Ceftriaxone MIC Distributions for 224 Neisseria influenzae

Figure 6. Ceftaroline and Amoxicillin-clavulanic acid MIC Distribution for 30 Moraxella catarrhalis

Conclusion

Against a collection of Gram-positive and Gram-negative bacterial pathogens commonly associated with community-acquired respiratory tract infections collected in the Asia/South Pacific region, ceftaroline demonstrated in vitro potency greater than or equivalent to ceftaxime and other recommended antibiotic agents.