Cefaroline Activity Tested against Bacterial Isolates from Pediatric Patients: Results from the Assessing Worldwide Antimicrobial Resistance and Evaluation (AWARE) Program for the United States (2011-2012)

Helio S. Sader, MD, PhD
JMI Laboratories, North Liberty, Iowa, USA

Introduction

Antimicrobial resistance has been the subject of increasing concern to pediatricians, pediatriatricians, and infectious disease specialists alike. While recent data suggest a decline in antibiotic resistance rates among non-pediatric patients, trends in pediatric patients are unknown. This study compared cefaroline activity against community-acquired bacteria from pediatric patients with cefaroline activity against comparator agents. The Surveillance Program for the Assessment of Worldwide Antimicrobial Resistance (AWARE) Program was used to collect isolates from pediatric patients with community-acquired infections at participating centers across the United States from 2011-2012. The objective of this study was to determine the activity of cefaroline fosamil versus ceftriaxone in community-acquired infections in children, especially those caused by MRSA and MSSA, as well as other gram-positive (GP) and gram-negative (GN) pathogens.

Methods

Cefaroline activity was evaluated against bacterial isolates from pediatric patients enrolled in the AWARE Program for the United States from 2011-2012. Isolates were collected from 157 USA medical centers as part of the AWARE Program in 2011-2012; patients were 0-17 years old. Isolates were collected from all ages (≤1 year old, 1-4, 5-11, 12-15, >15 years old), but included those from patients 1-4 and 5-11 years old, which were slightly lower in isolates from patients 1-4 compared to other age groups (67.6%) compared to other age groups (74.0-76.7%). Differences in S rates were observed across patient age groups, regardless of patient age. Differences in S rates varied across age groups, with children ≤1 years old being less susceptible to the comparator agents when tested against bacterial isolates from pediatric patients compared to comparator agents according to patient age group.

Results

Cefaroline was 8-fold more active than ceftriaxone (MIC50, 0.12 µg/mL; gentamicin, 0.03 µg/mL vs. ≤0.015/0.12 µg/mL; amoxicillin/clavulanate, ≤0.06/0.5 µg/mL; ceftriaxone, ≤0.06/1 µg/mL) and 2-fold more active than levofloxacin (MIC50, 0.5 µg/mL; gentamicin, 0.03 µg/mL vs. ≤0.015/0.12 µg/mL; amoxicillin/clavulanate, ≤0.06/0.5 µg/mL; ceftriaxone, ≤0.06/1 µg/mL), but less active against ESBL-producing strains. Cefaroline was 16-fold more active than penicillin against non-ESBL-phenotype strains of S. pneumoniae (MIC50, 0.12 µg/mL; 2 µg/mL; 20.5% susceptibility), amoxicillin/clavulanate (MIC50, 0.03 µg/mL; 0.06-0.12 µg/mL; 0-0.05% susceptible), levofloxacin (MIC50, 0.03 µg/mL; 0-0.05% susceptible), and clindamycin (MIC50, 0.03 µg/mL; 100% susceptibility), whereas susceptibility to clindamycin was 100% for ESBL-producing strains.

Conclusions

Cefaroline demonstrated potent in vitro activity against S. aureus, S. pneumoniae, and other beta-lactam (MSSA, MRSA, ESBL-antibiotics) and (pneumococcal) streptococci isolated from pediatric patients. Differences in susceptibility rates to β-lactam and β-lactamase-inhibitor combinations were observed among the β-lactam and β-lactamase-inhibitor agents. These results support the clinical development of cefaroline for the treatment of severe infections caused by beta-lactam-resistant pathogens, especially those caused by MRSA and MSSA, as well as other gram-positive (GP) and gram-negative (GN) pathogens, including penicillin-resistant and non-susceptible S. pneumoniae strains, and non-extended-spectrum beta-lactamase-producing strains of H. influenzae. This study provides support for the clinical development of cefaroline for the treatment of severe infections caused by beta-lactam-resistant pathogens, especially those caused by MRSA and MSSA, as well as other gram-positive (GP) and gram-negative (GN) pathogens, including penicillin-resistant and non-susceptible S. pneumoniae strains, and non-extended-spectrum beta-lactamase-producing strains of H. influenzae.