KPC-Producing Enterobacteriaceae Species Producing KPC Enzymes

M CASTANHEIRA, RE MENDES, RN JONES, HS SADER
JMI Laboratories, North Liberty, Iowa, USA

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Abstract

Background: KPC enzymes are usually detected in K. pneumoniae and K. oxytoca. However, other Enterobacteriaceae species (ENTS) often carry these carbapenemases. We evaluated the activity of carbapenem-avibactam (CAZ- AVI) and comparators tested against KPC-producing ENTs belonging to 11 bacterial species.

Methods: 662 KPC-producing ENT clinical isolates collected worldwide from 2009-2014 were tested. Resistance profiles were interpreted according to CLSI and EUCAST guidelines for K. pneumoniae and K. oxytoca. For other ENT species, interpreted categories were those found in CLSI document M100-S26. Carbapenemase production was determined by CLSI document M100-S12 using the modified Hodge test (MHT) and chromogenic cephalosporin (CCEP) disc test.

Results: Overall, CAZ-AVI inhibited 99.3% of the isolates at the breakpoint recently established by the US FDA. Among other ENT species, K. tsutsugamushi (94%), K. variicola (94%), K. cloacae (91%), and K. rhinoscleromatis (91%) were resistant to all comparators tested against CAZ-AVI. All (100%) of the KPC-producing ENT isolates were inhibited by CAZ-AVI when tested against 662 KPC-producing Enterobacteriaceae species; however, K. aerogenes was the only non-Enterobacteriaceae species that were inhibited by CAZ-AVI. Antibiotic susceptibility testing was performed against all isolates by broth microdilution methods using CAZ-AVI (AVI at fixed 4 µg/ml) and comparator antimicrobial agents as described in CLSI (Clinical and Laboratory Standards Institute) document M100-S12. Categorical interpretations were those found in CLSI document M100-S26.

Conclusions: CAZ-AVI was very active against this large collection of KPC-producing Enterobacteriaceae species, inhibiting ≥97.0% of the isolates at the US FDA breakpoint. CAZ-AVI was active against all isolates belonging to other ENT species (97.0% S). CAZ-AVI was active against all isolates belonging to other ENT species (97.0% S).

References


Table 1. MIC distributions for ceftazidime-avibactam and comparator antimicrobial agents against 662 KPC-Producing Enterobacteriaceae species collected from 2009 to 2014 worldwide. All (n=662) • K. pneumoniae isolates were inhibited by ceftazidime-avibactam (CAZ-AVI) and comparators tested against KPC. K. pneumoniae isolates belonging to other Enterobacteriaceae species were inhibited by CAZ-AVI (97.0% S) except for K. aerogenes which was inhibited by CAZ-AVI (91% S).

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