Background: AmpC beta-lactamas are an inducible type of resistance not readily detected by rapid diagnostics. Carbapenems and cefepime are considered the standard of care antibiotics for these organisms likely to harbor the AmpC gene. However, data on the efficacy of piperacillin-tazobactam is lacking. The objective of this study is to compare clinical outcomes between piperacillin-tazobactam (PTZ) versus cefepime (FEP) or a carbapenem (CAR) for pneumonia or bacteremia caused by Serratia, Citrobacter, or Enterobacter species.

Methods: This single-center retrospective cohort study evaluated adult patients admitted between January 2007 and June 2017 who had a respiratory or blood culture positive for either Serratia, Citrobacter, or Enterobacter species and treated with at least 72 hours of either PTZ, FEP, or CAR. Patients were excluded if they were treated with an antibiotic without activity against the pathogen, given combination therapy greater than 72 hours, or discharged or expired within 48 hours of admission. Clinical data was extracted from our institution’s microbiology laboratory and the Center for Clinical and Translational Science Enterprise Data Trust. Study was conducted after IRB approval was obtained.

Results: Of 1,922 patients evaluated, a total of 355 were identified and included in our analysis with 187 receiving FEP or a CAR (52.7%) and 168 receiving PTZ (47.3%). The majority of the patient population were Caucasian (91.3%) and male (72.4%). Most infections were caused by Enterobacter cloacae (18%). Demographics were similar between the two groups, although patients treated with PTZ had more hypertension (77.4% vs 67.4%, p = 0.0295) and ICU admissions (60.7% vs 49.2%, p = 0.0295). A majority of the bacteremias were patients treated with FEP or CAR (55.6% vs 41.7%, p = 0.0087). Duration of therapy for FEP or CAR group was longer (11 days vs 8 days, p = 0.0001), but these patients tended to have more complications infected (13.5% vs 6.6%, p = 0.0335). The difference in incidence of in-hospital mortality was statistically insignificant between treatments even with multivariate analysis (10.2% vs 8.3%, p = 0.5539).

Conclusion: Compared to FEP/CAR, patients with Serratia, Citrobacter, or Enterobacter blood or lung infections treated with PTZ did not show a significant difference in terms of in-hospital mortality.

Methods

- **FEP or CAR**
  - Patients treated with an antibiotic without activity against the pathogen, given combination therapy for greater than 72 hours, or discharged or expired within 48 hours of admission
- **PTZ**
  - Duration of therapy for FEP or CAR group was longer (11 days vs 8 days, p = 0.0001), but these patients tended to have more complications infected (13.5% vs 6.6%, p = 0.0335).
  - The difference in incidence of in-hospital mortality was statistically insignificant between treatments even with multivariate analysis (10.2% vs 8.3%, p = 0.5539).

Conclusion: Compared to FEP/CAR, patients with Serratia, Citrobacter, or Enterobacter blood or lung infections treated with PTZ did not show a significant difference in terms of in-hospital mortality.