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2005. Frequency of Cefazolin Inoculum Effect Among Bacteremic Methicillin-Susceptible *Staphylococcus Aureus*, is it a Cause for Concern?

June 10, 2022, 10:00 AM - 5:00 PM | Exhibit and Poster Hall

Authors

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Disclosures

E. Cercenado Mansilla: None.

Abstract

Background: Recent studies suggest that cefazolin (Cz) has clinical efficacy similar to isoxazolyl penicillins for the treatment of methicillin-susceptible *Staphylococcus aureus* (MSSA) bacteremia with a lower rate of adverse events and greater ease of administration. However, the Cz inoculum effect (CzIE), mediated by staphylococcal beta-lactamases, could limit the therapeutic efficacy of Cz. In this study the presence of CzIE was analyzed in 55 bloodstream MSSA isolates recovered consecutively from 55 patients in a Spanish hospital during 2020-2021.
Methods: The identification of the isolates was performed by MALDI-TOF. Cz MICs were determined at standard (10^5 CFU/mL) and high (10^7 CFU/mL) inoculum by broth microdilution. The CzIE was defined as an increase of MIC to ≥16 mg/L when tested at high inoculum. *S. aureus* ATCC 29213, a producer of BlaZ type A beta-lactamase lacking the CzIE, was used as control strain.The characterization of the *blaZ* gene was performed in all isolates by PCR (using new designed primers to amplify the complete gene) and sequencing; BlaZ variants and allotypes were stablished according to Carvajal et al (AAC 2020; 64:e02511-19).
Results: The Cz MIC_{90} for all isolates when tested at standard inoculum was 1 mg/L. The overall prevalence of the CzIE was 20% (11/55). Among the 55 BlaZ sequences, type B was the most predominant beta-lactamase (n=32; 58%), followed by type A (n=11; 25%), and type C (n=9; 16%). Most isolates with type A (10/14; 71.4%) showed CzIE; however, none of the type B isolates, and only one isolate with type C beta-lactamase showed CzIE. We found 10 allotypes in BlaZ, being BlaZ-1, -2, -3 and -7 predominants (83%). A single allotype, designated BlaZ-2, was present in 72.7% (8/11) of isolates showing CzIE. All BlaZ-2 isolates presented three critical amino acid substitutions (A9V, E112A, and G145E). Two other allotypes (BlaZ-3 and BlaZ-7) were associated with a lack of the CzIE.
Conclusion: Among recent bloodstream MSSA isolates, the prevalence of the CzIE was 20% and was mostly associated with type A beta-lactamase. The presence of type A beta-lactamase could predict the CzIE among MSSA clinical isolates.