Exploring procalcitonin levels in Gram-negative Bloodstream Infections to differentiate carbapenemase genes

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Background. Rapid diagnosis of bloodstream infections and sepsis remains a challenge due to the time required for blood culture results. Procalcitonin (PCT) has emerged as a promising biomarker for bacterial infections, as its levels rise in response to bacterial inflammation while being suppressed in viral infections. Notably, PCT levels tend to be higher in Gram-negative infections, but its correlation with antimicrobial resistance remains unclear. **Objective.** This study aims to evaluate PCT levels in bloodstream infections caused by carbapenem-susceptible and carbapenem-resistant Gram-negative bacilli to assess its potential as a predictive biomarker. **Methods**. Patients over 18 with bloodstream infections by Gram-negative bacilli (Enterobacterales, Acinetobacter baumanni, P. aeruginosa) had serum samples collected within 12 hours of blood culture (January 2023–August 2024). Patients were classified into carbapenem-sensitive (Group S) and resistant (Group R). Bacterial identification was performed using MALDI-TOF and susceptibility testing by EUCAST. Resistant isolates were analyzed by HRM-qPCR. PCT levels were measured by CMIA immunoassay on the Alinity i system. **Results.** Among the 256 patients included, *K. pneumoniae* was the most prevalent pathogen (37.5%), followed by E.coli (25.8%). In Group R, *K. pneumoniae* was the predominant pathogen (50%), whereas in Group S, E. coli was the most frequent (45.6%). PCT levels were elevated across all bacterial species and resistance profiles, with an overall median of 2.43 ng/mL. The minor variations in PCT levels observed among patients with bloodstream infections in the two main groups analyzed did not reach statistical significance (p=0.55). However, among carbapenemase-producing bacteria, infections caused by blaNDM-positive isolates exhibited significantly higher PCT levels compared to those caused by blaKPC-positive isolates (median 3.56 ng/mL vs. 1.30 ng/mL; p = 0.010). Furthermore, greater variation in PCT levels was observed in infections caused by carbapenem-resistant Pseudomonas aeruginosa compared to susceptible strains, while in A. baumannii infections, PCT values remained consistently low regardless of resistance profile. **Conclusion.** These findings highlight the potential utility of PCT in differentiating bloodstream infections caused by carbapenem-resistant bacteria, underscoring the need for further studies to assess its role in guiding antimicrobial management.