Comparison of Rapid Multiplex PCR-based Blood Pathogen Identification Panel (BCID2) to a Conventional Blood Culture Method

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Background: Sepsis is a leading cause of mortality in hospitalized patients emphasizing the critical need for prompt pathogen identification to enhance patient outcomes and improve antimicrobial stewardship. The BioFire® FilmArray® Blood Culture Identification (BCID2) Panel used in this study is a rapid multiplex polymerase chain reaction (PCR)-based method designed for use on positive blood cultures to identify 43 targets: 11 Gram-positive, 15 Gram-negative, 7 yeast, and 10 resistance genes. This study compared accuracy of detection and turnaround time of the rapid multiplex PCR-based BCID2 panel compared to a standard of care conventional automated blood culture method. The standard blood culture system in this study consisted of BacT/Alert® 3D blood culture system (bioMérieux) for detection of positive blood culture bottles, followed by Gram stain/plate culture and bacterial identification and susceptibility testing using the automated Vitek® 2 system (bioMérieux). The turnaround time for each system was compared with the limitation of result reporting occurring during day-shift hours, 7:00am to 5:00pm.

Methods: A retrospective analysis was performed on 106 de-identified blood culture results from 106 patients from January 2023 to December 2023. Data from the BCID2 and conventional culture methods were collected from the Epic Beaker® laboratory computer system and entered into Microsoft Excel® spreadsheets. The turnaround time was defined as the interval from blood culture positivity to reporting of BCID2 panel and culture results.

Results: The 106 positive blood cultures included 77 Gram-positive, 5 Gram-negative, 5 organism not detected, and 19 polymicrobial results. The BCID2 total agreement/sensitivity for mono-microbial blood cultures was 98.9% (86/87). Conventional blood cultures failed to detect 4/19 (21.1%) of polymicrobial results detected by BCID2. The mean turnaround time for all blood cultures including polymicrobial were 7.02 hours for PCR and 54.17 hours for conventional blood culture results. This represented an improvement of 87.0% for BCID2 in turnaround time.

Conclusion: The PCR-based BioFire BCID2 panel provided a rapid and accurate identification of bacterial pathogens causing blood stream infections compared to a conventional culture method using automated identification. The reduced turnaround time to result reporting (7h vs 54h) could lead to a quicker time to correct antimicrobial use, potentiating a decrease in drug resistance and prevention of medication-related adverse events, increase in cost savings and reduction of antimicrobial and hospitalization days for patients.