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MICROBIOLOGICAL MONITORING OF ACUTE BLOODSTREAM INFECTIONS

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Bloodstream infection (BSI) is a critical global health concern, frequently leading to sepsis and carrying a high mortality rate directly proportional to delays in appropriate antimicrobial treatment. While conventional blood culture (BC) remains the microbiological gold standard, its protracted turnaround time (TAT) — often requiring 24 to 48 hours for organism identification (ID) and definitive antimicrobial susceptibility testing (AST) — necessitates broad-spectrum empirical therapy, contributing to antibiotic resistance.

Recent advancements in clinical microbiology have focused on expediting this diagnostic process. Key culture-based enhancements include Matrix-Assisted Laser Desorption/Ionization-Time of Flight Mass Spectrometry (MALDI-TOF MS) for rapid ID from positive BC bottles, and the implementation of automated phenotypic systems like the Accelerate PhenoTest for faster AST results (within 7 hours). Complementing these are molecular diagnostic platforms, such as multiplex Polymerase Chain Reaction (PCR) panels (e.g., FilmArray, Verigene), which rapidly identify common bacterial and fungal pathogens and crucial antimicrobial resistance determinants (*e.g.,* mecA*,* vanA/B*)* directly from positive cultures in under two hours.

Further pushing the diagnostic timeline are culture-independent methods, including T2 magnetic resonance and metagenomic Next-Generation Sequencing (mNGS) performed directly on whole blood, which promise comprehensive pathogen detection in less than 8 hours, even in culture-negative sepsis cases.

The integration of these rapid diagnostic technologies into laboratory workflows is vital for implementing effective antimicrobial stewardship programs. By providing earlier, actionable results, these methods enable targeted therapy de-escalation, ultimately leading to improved patient prognosis and a more effective public health response to multidrug-resistant organisms.

Keywords: Sepsis, antimicrobial treatment, bloodstream infection, blood culture.