

**Rapid diagnosis of sepsis and other severe infections**

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The incidence of sepsis and the number of sepsis-related deaths are increasing, making sepsis the leading cause of death in critically ill patients in many countries. Bloodstream infections account for 30–40% of all cases of severe sepsis and septic shock, and are major causes of morbidity and mortality. Diagnosis of bloodstream infections must be performed promptly so that adequate antimicrobial therapy can be started and patient outcome improved. Delayed recognition of BSI and other severe infections and inappropriate initial antibiotic therapy are associated with an increase in mortality and morbidity. Rapid and accurate identification of sepsis and its causative organisms are a prerequisite for successful therapy. An ideal diagnostic technology would identify the infecting organism(s) and their determinants of antibiotic resistance, in a timely manner, so that appropriate pathogen-driven therapy could begin promptly.

The current gold standard for the diagnosis of sepsis is culture of blood and other body fluids or tissues. However, blood culture largely fails in this purpose because time is lost waiting for bacterial or fungal growth. Several efforts have been made to optimize the performance of blood culture, such as the development of technologies to obtain rapid detection of microorganism(s) directly in blood samples or in a positive blood culture. Meanwhile, novel laboratory methods for the diagnosis of sepsis, such as multiplex real-time polymerase chain reaction (PCR), matrixassisted laser desorption ionisation (MALDI) time-of-flight (TOF) mass spectrometry (MS) (MALDI-TOF MS) and calorimetry, have been developed and evaluated.

The ideal molecular method would analyse a patient's blood sample and provide all the information needed to immediately direct optimal antimicrobial therapy for bacterial or fungal infections. Furthermore, it would provide data to assess the effectiveness of the therapy by measuring the clearance of microbial nucleic acids from the blood over time. The principal

advantages and limitations of some traditional and molecular methods to help the microbiologist and the clinician in the management of bloodstream infections and other severe infections will be discussed in this topic.