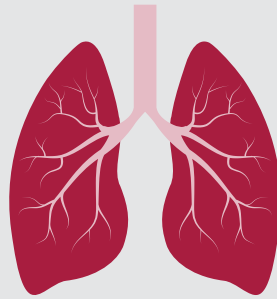


Rapid Diagnostics for Infectious Diseases in the ICU

Traditional cultures are the gold standard for diagnosing infection but are limited by sensitivity and can require days to give results. Newer molecular methods may be able to identify pathogens and drug resistance more rapidly.

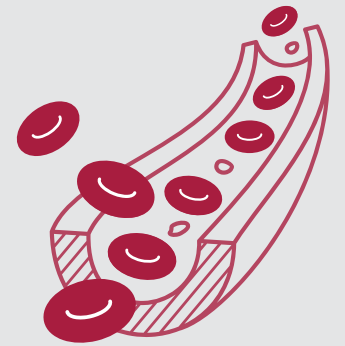
MULTIPLEX PCR PANELS

- Commercially available assays used to diagnose CNS, lower and upper respiratory infections
- Provide semiquantitative
- detection of multiple viral and bacterial pathogens
- Detect some common genetic markers for antibiotic resistance (eg, beta-lactams)
- 60%-75% detection rates vs 44% for standard culture



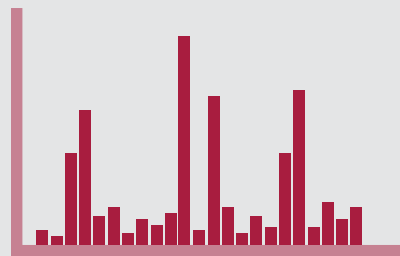
RAPID BLOOD CULTURE IDENTIFICATION SYSTEMS

- Faster results than conventional blood cultures, which need 48-72 hours
- Used to detect key genes from positive blood cultures
- Unlike PCR, lacks an amplification step, so a threshold quantity of bacteria is needed
- Detects some common beta-lactam resistance genes



MALDI-TOF

- Uses mass spectrometry to provide rapid species identification of positive cultures
- Results 24-28 hours faster than traditional biochemical methods
- Currently cannot provide antibiotic susceptibility results
- Some “species” cannot be differentiated (eg, *E coli* and *Shigella*)



NEXT-GENERATION SEQUENCING (NGS)

- Measurement of circulating pathogen cell-free DNA from human plasma
- Potentially yields very rapid results
- Not pathogen-specific, unlike PCR
- Observational study in Germany
- found 72% of patients with septic shock had positive NGS results vs 33% with positive cultures → 53% of findings could lead to changes in therapy! (Grumaz, et al. *Crit Care Med.* 2019.)

