Georgian Scientists
ქართველი მეცნიერები
Vol. 8 Issue 4(1), 2026
https://doi.org/10.52340/gs.2026.08.04(1).119



RAPID DIAGNOSTICS AND ANTIMICROBIAL STEWARDSHIP (AMS): TREAT EARLY, REFINE RAPIDLY AND AVOID UNNECESSARY ANTIBIOTICS

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Rapid diagnostic tests (RDTs) have emerged as important tools for improving infection management and strengthening antimicrobial stewardship (AMS) programmes. Their principal value lies in accelerating pathogen identification and the detection of clinically relevant resistance mechanisms, thereby enabling earlier optimisation of antimicrobial therapy. Although conventional microbiological cultures remain the diagnostic gold standard, definitive identification and susceptibility results require at least 72 hours. Consequently, clinicians frequently initiate empirical broad-spectrum antimicrobial therapy while awaiting microbiological confirmation, a practice that may contribute to antimicrobial resistance (AMR), increase drug-related toxicity, and expose patients to unnecessary or suboptimal treatment. RDTs have been developed to address these limitations by providing clinically actionable microbiological information within hours rather than days.

A broad range of rapid diagnostic platforms is now available, including multiplex polymerase chain reaction (PCR) assays, matrix-assisted laser desorption ionisation-time of flight mass spectrometry (MALDI-TOF MS), sequencing-based technologies, and rapid phenotypic antimicrobial susceptibility testing. By substantially reducing diagnostic turnaround times, these technologies facilitate earlier evidence-based therapeutic decisions and support more precise antimicrobial use.

For bloodstream infections (BSIs), there is strong evidence that RDTs can positively impact antimicrobial use. A recent large systematic review and network meta-analysis involving more than 25,000 patients demonstrated that RDTs improve outcomes only when linked to active AMS programmes, reducing time to optimal therapy and improving survival. Importantly, RDTs provided additional survival benefit even in centres with established AMS programmes. Another systematic review and meta-analysis showed that RDTs improved time to targeted treatment, hospital length of stay, and mortality when combined with active communication. Indeed, RDTs, AMS, and active communication consistently outperformed test-only approaches, highlighting

the importance of multidisciplinary collaboration, effective communication between microbiology laboratories and treating clinicians, and prompt stewardship-led intervention.

In respiratory infections, particularly hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP), syndromic multiplex PCR panels enable simultaneous detection of multiple bacterial pathogens and resistance determinants directly from respiratory specimens within a few hours. These assays can improve pathogen-directed therapy, facilitate earlier escalation or de-escalation of treatment, and reduce unnecessary antibiotic exposure. However, current panels do not encompass all pathogens or resistance mechanisms, and molecular detection cannot reliably distinguish true infection from colonisation. Interpretation therefore requires integration with the clinical presentation, local epidemiology, prior colonisation status, antimicrobial exposure, and other microbiological findings.

Overall, RDTs represent a valuable component of contemporary infection management. They are not intended as standalone tests or to replace conventional microbiology but rather to complement it. Benefits are achieved when RDTs are integrated into robust AMS programmes, supported by effective communication and informed clinical decision-making. This combined approach enables more timely and targeted antimicrobial therapy while promoting responsible antimicrobial use.

Key words: Rapid diagnostic tests; Antimicrobial stewardship; Bloodstream infections; Pneumonia.