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Letter to the Editor
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Addressing the Diagnostic Bottleneck in Antimicrobial Resistance

Ayesha Arif[1], Amna Arif[2], Fahad Mushtaq[2], Fatimah Asim[2]

[1]Amna Inayat Medical College, Lahore, Pakistan

[2]Quaid-e-Azam Medical College, Bahawalpur, Pakistan

[1]Corresponding Author: drayeshaarif129@gmail.com

Dear **Editor**,

Antimicrobial resistance (AMR) has emerged as a critical global health concern. In 2021, approximately 4.71 million deaths were attributed to drug-resistant infections, with 1.14 million directly resulting from AMR. Forecasts suggest this figure could rise to nearly 1.91 million deaths annually by 2050(1). The urgency of the situation is particularly pronounced in many low- and middle-income countries (LMICs), where resources for diagnostics are often scarce.

A major contributor to this challenge is the delay in diagnosis. Traditional processes, such as blood culture, identification of organisms, and antibiotic susceptibility testing (AST), can take anywhere from 24 to 72 hours. This necessitates that clinicians often resort to broad-spectrum empiric therapy, which may encourage resistance and prolong the search for effective treatments. On the other hand, rapid diagnostic methods can yield results within the same day, leading to quicker access to targeted therapies and improved patient outcomes.

Emerging technologies, such as surface-enhanced Raman scattering-based AST (SERS-AST), can deliver same-day minimum inhibitory concentration (MIC) results, facilitating timely and targeted antimicrobial interventions (2). The WHO's Antimicrobial Resistance Diagnostic Initiative (2023) emphasizes the importance of enhancing laboratory capabilities, guaranteeing equitable access to quality testing, and integrating diagnostics into management and monitoring strategies.(3)

We propose a Three-Step Strategy of Action:

1. Improving diagnosis: Install rapid AST systems to allow same-day MIC reporting.

Goal: Reduce median time-to-effective therapy by at least one day.

2. Stewardship via data: Generate and disseminate institutional antibiograms semi-annually, with ward-specific analysis, and align prescribing with the WHO's AWaRe framework (4).

Goal: Increase targeted therapy by Day 2 and reduce use of Watch/Reserve agents.

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3. Laboratory empowerment: Embed pathologists and microbiologists in stewardship committees to ensure real-time diagnostic insights shape prescribing behavior.

Goal: Improve compliance with guideline-concordant therapy and lower bloodstream infection rates.

Successful execution of this plan must also consider factors such as the cost of equipment, training for staff, availability of reagents and power, biosafety protocols, external quality assessments, and digital connectivity like WHONET/GLASS. A tiered approach—Tier 1 for routine cultures and antibiograms, Tier 2 for rapid AST targeted at sepsis or bloodstream infections, and Tier 3 for expanded rapid testing panels—offers a practical route for LMICs.

Pathology should take a proactive role in combating AMR and lead efforts to reform practices. Addressing diagnostic delays is essential for bolstering stewardship initiatives and avoiding a future where antibiotics are less effective.

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