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Editorial

Antimicrobial Resistance in Low-resource Settings: The Critical Role of the WHO Aware Classification

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Antimicrobial resistance (AMR) is an escalating global health crisis, ranking among the top 10 threats to public health around the world. As a silent pandemic, bacterial AMR is directly responsible for approximately 4.71 million global deaths in 2021 and contributed to an estimated 8.22 million deaths in 2050 if not addressed. It impacts low-resource healthcare systems disproportionately, where infectious diseases impose heavy burden and healthcare infrastructure is often limited [1].

The AMR is a complex, multifaceted problem that necessitates the One Health approach, integrating intersectoral collaborations across human, animal, and environmental health sectors, to achieve effective and sustainable mitigation [2]. Among the various contributing factors, inappropriate use and overprescription of antibiotics represent principal drivers in the emergence and propagation AMR [3]. Alarmingly, the rate of antibiotic prescribing is increasing, often significantly exceeding the World Health Organization's (WHO) recommended threshold of 30% [4]. Empirical evidence indicates that antibiotic prescription rates in primary healthcare in low- and middle-income countries are notably high, ranging from 52% to 90.8% over the last decade [4]. Previous limited and scattered studies across some geographical regions in Iran have revealed antibiotic prescribing rates ranging from 45% in outpatient settings to 68% in inpatient settings [5].

Following the adoption of the WHO global action plan (GAP) on AMR in 2015 to tackle AMR [6], Iran developed its national action plan of the islamic republic of iran for combating AMR (NAP-IRIAMR) in 2016 [7]. Although promoting the rational use of antimicrobials was a key objective of these plans, achieving this goal proved challenging. To address this gap, WHO introduced the aware (access, watch, reserve) classification in 2017, providing a transformative framework to advance sustainable antibiotic stewardship. Aware categorizes antibiotics into three groups based on resistance

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potential and clinical importance: Access antibiotics are the preferred first-line treatments due to their lower resistance risk and broader availability; Watch antibiotics require stringent oversight due to higher resistance potential, and reserve antibiotics are last-resort options for multidrug-resistant infections. This intuitive and evidence-based tool assists prescribers and health systems to optimize antibiotic use, reduce unnecessary broad-spectrum use, and prevent resistance development [8].

A recent in-depth review by Saleem et al. of 85 studies from LMICs employing the AWaRe system reveals both progress and persisting challenges in antibiotic stewardship. While many LMICs have adopted AWaRe for antibiotic surveillance and stewardship programs, only 14.1% of included studies met the United Nations General Assembly's 2024 recommendation that at least 70% of human antibiotic consumption consist of Access group antibiotics. Remarkably, there continues to be substantial overuse of Watch group antibiotics in 68.2% of studies, which are associated with greater risk of resistance [9]. Also, Taghizadeh-Ghehi et al. report significant increase in consumption of watch antibiotics over two decades and reaching nearly 45% of total use in 2019 in Iran, show concerning sign of inappropriate antibiotic use [10].

The growing threat of AMR requires urgent, coordinated action to preserve effective antimicrobial therapies for current and future generations. Drawing on the available evidence, I recommend the following:

It is crucial to fully integrate the WHO aware classification into national antibiotic prescribing guidelines, treatment protocols, and surveillance systems, supported by stringent regulations to ensure consistent adherence to these standards.

Ongoing education and training for healthcare professionals on the aware framework, responsible antibiotic prescribing, and best practices in antimicrobial stewardship should be enhanced to strengthen knowledge and skills. Building public awareness about the consequences of inappropriate antibiotic use and the importance of completing prescribed treatments can empower communities to support responsible antibiotic use.

Implementing stewardship strategies such as regular prescription reviews, providing constructive feedback to prescribers, and offering incentives that encourage judicious antibiotic use in both outpatient and inpatient settings.

Collaboration across sectors through the One Health approach, which brings together human health, veterinary care, and environmental stakeholders, is vital to comprehensively address antibiotic resistance. Urgent adoption of these recommendations is critical to reversing current trends in antimicrobial resistance, enhancing patient outcomes, and protecting global health security.

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