

Reducing Antimicrobial Resistance: The Role of Local and Regional Antibiotic Prescribing Guidelines

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Introduction

Antimicrobial resistance (AMR) is one of the most pressing global health threats, posing significant risks to human health, food security, and economic development. The World Health Organisation (WHO) estimates that by 2050, AMR could cause 10 million deaths annually, surpassing cancer-related deaths(1). The overuse and misuse of antibiotics in healthcare and agriculture have accelerated the development of resistant pathogens, rendering once-effective treatments obsolete. In light of this, a crucial strategy to combat AMR is the introduction of local and regional antibiotic prescribing guidelines tailored to specific community needs and resistance patterns.



The Scope of the AMR Problem

AMR occurs when bacteria, viruses, fungi, and parasites evolve mechanisms to withstand the drugs designed to remove them. The proliferation of multi-drug resistant organisms (MDROs) complicates the treatment of common infections, leading to longer hospital stays, higher medical costs, and increased mortality rates. In low- and middle-income countries (LMICs), where access to healthcare and medications is often limited, the effects of AMR are particularly devastating.

Antibiotics are overprescribed globally—either unnecessarily for viral infections or prescribed without considering the appropriate dosage or duration. In many regions, access to antibiotics without prescription exacerbates the problem, as patients may self-medicate without the guidance of a healthcare professional. This unchecked use of antibiotics accelerates the emergence of resistant strains, undermining efforts to control infections.



The Scale of AMR

AMR has escalated into a global crisis, undermining decades of medical progress and threatening the future of modern healthcare. The widespread misuse and overuse of antibiotics in both human and veterinary medicine have led to the proliferation of drug-resistant pathogens. This phenomenon has reached alarming proportions, affecting all regions of the world.

In terms of economic impact, the consequences of AMR are staggering. It is estimated that by 2050, the global economy could lose up to USD100 trillion due to AMR, as prolonged illness, increased healthcare costs, and reduced productivity take their toll(1). These financial losses will disproportionately affect low- and middle-income countries (LMICs), where healthcare systems are often under-resourced and ill-equipped to cope with resistant infections. Already, these nations are seeing the brunt of the problem, with higher mortality rates from resistant infections, fewer available treatment options, and significant financial burdens on both patients and health systems.

AMR is not just a future threat, it is a present and escalating danger. For instance, common infections such as urinary tract infections (UTIs), bloodstream infections, and pneumonia are increasingly difficult to treat as bacteria become resistant to once-effective antibiotics. In Europe alone, over 670,000 infections are caused annually by resistant bacteria, leading to an estimated 33,000 deaths(2). Similarly, in the United States, the Centres for Disease Control and Prevention (CDC) estimates that at least 2.8 million people are infected by antibiotic-resistant bacteria each year, resulting in over 35,000 deaths(3).

The rise of multi-drug resistant organisms (MDROs) such as Methicillin-resistant *Staphylococcus aureus* (MRSA) and Carbapenem-resistant Enterobacteriaceae (CRE) has rendered even last-resort antibiotics, such as carbapenems, ineffective in many cases. These ‘superbugs’ are not only spreading within hospitals and healthcare facilities, but are also

increasingly being found in community settings. The lack of new antibiotics in the pharmaceutical pipeline exacerbates the problem. This leaves us with a dwindling arsenal of effective treatments.

In addition to the healthcare impacts, AMR has profound implications for food security and agriculture. Antibiotics are widely used in farming to prevent infections and promote growth in livestock, contributing to the emergence of resistant bacteria that can be transmitted to humans through the food chain or direct contact. In many countries, the use of antibiotics in agriculture far exceeds that in human medicine, further amplifying the scale of the resistance problem.

AMR is a global challenge that requires urgent, coordinated action. The introduction of local and regional antibiotic prescribing guidelines, adapted to the specific needs and resistance patterns of communities, is a vital step in addressing the scale of this issue. Without immediate intervention, the world risks returning to a pre-antibiotic era, where even minor infections and routine surgeries could become life-threatening.

The Role of Local and Regional Prescribing Guidelines

One of the most effective strategies to address AMR is the development and implementation of local and regional antibiotic prescribing guidelines. Unlike national or global frameworks, these guidelines are tailored to reflect local epidemiological trends, cultural practices, and healthcare capacities. They can provide healthcare providers with evidence-based protocols on when and how to prescribe antibiotics, helping to ensure appropriate use.



Key Benefits of Local and Regional Guidelines

1. **Targeted approach to local resistance patterns:** Resistance patterns vary significantly between regions, even within the same country. For instance, in some areas, certain bacterial strains may be more resistant to commonly used antibiotics, while in others, they remain susceptible. Local guidelines allow healthcare professionals to prescribe antibiotics based on the specific resistance patterns in their region, reducing the chances of prescribing ineffective drugs and curbing the spread of resistant pathogens.
2. **Tailoring to local healthcare capacities:** The availability of antibiotics, diagnostic tools, and trained healthcare personnel differs from region to region. In rural or resource-poor settings, prescribing guidelines can be adapted to recommend first-line antibiotics that

are readily available and affordable, while reserving more potent antibiotics for severe cases diagnosed in tertiary healthcare centres.

3. **Improved healthcare provider compliance:** Regional guidelines are more likely to be followed by healthcare providers than broader national or international recommendations. This is because local guidelines are often perceived as more relevant to the specific challenges and capacities faced by clinicians in a particular region. By engaging local stakeholders, such as health ministries, professional associations, and healthcare providers, in developing these guidelines, adherence is more easily achieved.
4. **Enhanced patient outcomes and public trust:** Patients are more likely to experience successful treatment outcomes when antibiotics are prescribed appropriately. Local guidelines can reduce unnecessary antibiotic prescriptions, limit exposure to ineffective drugs, and mitigate side effects. This strengthens public trust in healthcare systems, as patients see improved outcomes and fewer complications from inappropriate treatment.
5. **Facilitating monitoring and evaluation:** The introduction of regional prescribing guidelines allows for more effective monitoring and evaluation of antibiotic use and resistance trends. Regional health authorities can track compliance with guidelines, assess changes in resistance patterns over time, and adjust recommendations accordingly. This feedback loop is crucial for ensuring that guidelines remain relevant and effective in the face of evolving resistance dynamics.

Recommendations for Implementing Local and Regional Guidelines

To successfully reduce AMR through the implementation of local and regional antibiotic prescribing guidelines, several key actions are required:

1. **Establish regional surveillance systems:** Effective guidelines must be based on accurate, up-to-date information on local resistance patterns. Governments and health authorities should invest in regional surveillance systems that collect data on antibiotic use and resistance. Data should be made available to healthcare providers to inform their prescribing decisions.
2. **Develop evidence-based guidelines:** Regional health departments, in collaboration with national public health institutions and international organisations, should develop evidence-based prescribing guidelines. These guidelines should reflect local resistance patterns, resource availability, and healthcare infrastructure. Engaging local healthcare providers in the development process ensures that the guidelines are practical and relevant to on-the-ground realities.
3. **Provide training and support for healthcare providers:** Ensuring that healthcare providers are well-informed and trained on the new prescribing guidelines is critical for their success. Continuous medical education programs, workshops, and access to digital resources can help clinicians stay informed on best practices for antibiotic prescribing. Additionally, healthcare institutions should foster a culture of stewardship, where the prudent use of antibiotics is prioritised.
4. **Strengthen regulatory frameworks:** Governments must enforce stricter regulations on the sale and distribution of antibiotics. Over-the-counter access to antibiotics should be restricted, and prescriptions should only be issued by licensed healthcare providers following evidence-based guidelines. Regulatory bodies should work closely with local pharmacies and healthcare institutions to ensure compliance.

5. **Engage the public in awareness campaigns:** Public awareness of the risks of AMR and the importance of adhering to prescribed antibiotic treatments is crucial. Local campaigns can educate communities on the dangers of self-medication and the benefits of following healthcare provider recommendations. These campaigns can be tailored to address cultural beliefs and misconceptions about antibiotics.
6. **Foster collaboration between sectors:** AMR is a multifaceted issue that requires collaboration between the healthcare, agricultural, and environmental sectors. In many regions, the misuse of antibiotics in agriculture contributes significantly to resistance. Local prescribing guidelines should be part of a broader One Health approach, addressing antibiotic use in both human and animal populations and ensuring cross-sectoral co-operation.



The Economic Benefits of Reducing AMR

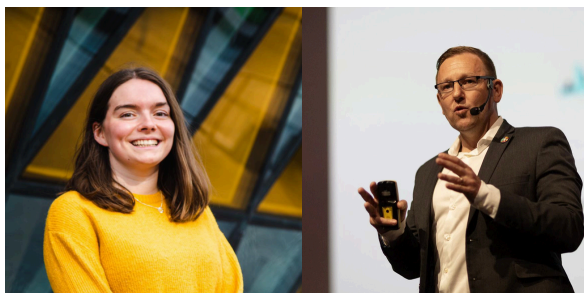
Implementing local and regional antibiotic prescribing guidelines can lead to significant cost savings by optimising antibiotic use and reducing the burden of AMR on healthcare systems. Studies have shown that better antibiotic stewardship can reduce healthcare costs by up to 30% in some settings. Studies have shown that the United States could save an average of USD 435,000 per hospital annually by improving antibiotic prescribing practices(4). Similarly, in Europe, reducing resistant infections could prevent healthcare costs associated with AMR from ballooning by €1.5 billion annually(5). These savings come from avoiding unnecessary hospital admissions, reducing the need for expensive last-resort treatments, and limiting prolonged hospital stays, often required for resistant infections. Furthermore, effective prescribing reduces reliance on costly second- and third-line antibiotics, which are typically more expensive and less available. By preventing resistant infections and improving healthcare efficiency, regional prescribing guidelines can mitigate the long-term economic impact of AMR, resulting in substantial savings for governments and healthcare systems globally.

Conclusion

AMR is a complex, global challenge that requires localised solutions. By introducing local and regional antibiotic prescribing guidelines, governments and healthcare authorities can significantly reduce inappropriate antibiotic use, slow the emergence of resistant pathogens, and protect public health. Tailoring guidelines to local resistance patterns, healthcare

capacities, and cultural contexts ensures their relevance and effectiveness, making them a powerful tool in the fight against AMR.

To make these guidelines a reality, sustained investment in regional surveillance, healthcare provider training, public awareness, and cross-sector collaboration is essential. Only through coordinated efforts can we begin to mitigate the devastating impact of AMR and safeguard the effectiveness of antibiotics for future generations.



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