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Review article

Antibiotic Utilization in Low- and Middle-Income Countries: Challenges and Opportunities for Improvement: Review

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Abstract:
Antibiotic resistance is a global health crisis, exacerbated by inappropriate antibiotic utilization, particularly in low- and middle-income countries (LMICs). Our review highlights the challenges faced in antibiotic utilization in LMICs and explores opportunities for improvement. Key challenges include inadequate access to antibiotics, poor quality of available antibiotics, limited surveillance systems, and cultural and behavioral factors. Opportunities for improvement include strengthening healthcare systems, promoting antimicrobial stewardship programs, enhancing surveillance mechanisms, fostering intersectoral collaboration, and implementing educational interventions. Addressing these challenges and seizing opportunities for improvement is crucial to mitigate the threat of antibiotic resistance in LMICs and safeguard global health. Addressing antibiotic utilization practices and regulations in India requires a multifaceted approach that encompasses regulatory enforcement, healthcare provider education, public awareness campaigns, and strengthening healthcare infrastructure. By implementing evidence-based interventions and fostering collaboration across sectors, India can mitigate the threat of antibiotic resistance and ensure the continued efficacy of antibiotics for future generation
Keywords: Antibiotic Resistance, Low- and Middle-Income Countries (LMICs), Antimicrobial Stewardship

Introduction:
Antibiotics are indispensable in modern medicine for treating bacterial infections and preventing their spread. However, the overuse, misuse, and inappropriate prescribing of antibiotics have led to the emergence and spread of antibiotic-resistant bacteria, posing a significant threat to public health worldwide.(1,2) While antibiotic resistance is a global concern, low- and middle-income countries (LMICs) face unique challenges in antibiotic utilization, exacerbating the problem.(3)Our review aims to analyse the challenges and opportunities for improving antibiotic utilization in LMICs to combat antibiotic resistance effectively.

Challenges in Antibiotic Utilization in LMICs:

1. **Limited Access to Antibiotics:**

Many LMICs face challenges in ensuring universal access to essential antibiotics due to factors such as inadequate healthcare infrastructure, supply chain inefficiencies, and financial constraints.(4)
Rural and remote areas often have limited access to healthcare facilities and face difficulties in obtaining timely and appropriate antibiotics, leading to delayed treatment and increased morbidity and mortality.(5)

2. **Poor Quality of Available Antibiotics:**

Substandard and counterfeit antibiotics are prevalent in LMICs, compromising their efficacy and safety.
Inadequate regulation and enforcement mechanisms contribute to the proliferation of substandard antibiotics, exposing patients to ineffective treatments and contributing to antibiotic resistance.(6,7)

3. **Limited Surveillance Systems:**

Many LMICs lack robust surveillance systems to monitor antibiotic resistance patterns and antibiotic utilization, hindering the timely detection and response to emerging threats.
Insufficient data on antibiotic consumption and resistance make it challenging to develop evidence-based policies and interventions to address the problem effectively.(5,6,7)

4. **Cultural and Behavioural Factors:**

Cultural beliefs and practices influence antibiotic utilization behaviors in LMICs, leading to

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inappropriate prescribing, self-medication, and non-adherence to treatment regimens.

Patient demand for antibiotics, fueled by misconceptions about their efficacy and the influence of social networks, contributes to overuse and misuse.

Opportunities for Improvement: (8,9,10)

1. **Strengthening Healthcare Systems:**

Investing in healthcare infrastructure, including primary care facilities and diagnostic capabilities, can improve access to appropriate antibiotics and ensure effective treatment.

Training healthcare providers in rational prescribing practices and fostering interdisciplinary collaboration can enhance the quality of antibiotic use.

2. **Promoting Antimicrobial Stewardship Programs:**

Implementing antimicrobial stewardship programs in healthcare facilities can optimize antibiotic use, reduce inappropriate prescribing, and mitigate the emergence and spread of antibiotic resistance.

These programs involve strategies such as antibiotic stewardship committees, guidelines for empiric therapy, and antimicrobial utilization review.

3. **Enhancing Surveillance Mechanisms:**

Strengthening surveillance systems for antibiotic resistance and antibiotic consumption is essential for monitoring trends, detecting outbreaks, and guiding policy decisions.

Investing in laboratory capacity for antimicrobial susceptibility testing and establishing networks for data sharing and collaboration can improve surveillance efforts.

4. **Fostering Intersectoral Collaboration:**

Addressing antibiotic resistance requires collaboration across sectors, including healthcare, agriculture, veterinary medicine, and environmental health.

Coordinated action to reduce antibiotic use in agriculture, promote infection prevention and control in healthcare settings, and mitigate environmental contamination with antibiotics can help combat antibiotic resistance comprehensively.

5. **Implementing-Educational Interventions:**

Public awareness campaigns and educational interventions targeting healthcare providers, patients, and the general population can promote rational antibiotic use and behavior change.

Emphasizing the importance of completing prescribed antibiotic courses, discouraging self-medication, and debunking myths about antibiotics can empower individuals to make informed decisions.

Antibiotic utilization – India:

In India, antibiotic utilization practices and regulations play a critical role in addressing the challenges of antibiotic resistance and ensuring the effective treatment of bacterial infections.(11) However, the country faces unique dynamics shaped by factors such as healthcare infrastructure, socioeconomic disparities, cultural influences etc.(12)

Antibiotic utilization practices in India are influenced by a variety of factors. Firstly, there is widespread availability of antibiotics over-the-counter without prescription, contributing to self-medication and inappropriate use. This practice is fuelled by factors such as limited access to healthcare facilities, cost concerns, and cultural beliefs regarding the efficacy of antibiotics. Additionally, patient demand for antibiotics often leads to pressure on healthcare providers to prescribe them, even when not clinically indicated. Furthermore, the lack of awareness among both healthcare professionals and the general public about the importance of rational antibiotic use contributes to misuse and overuse.(13,14,15)

Regulations governing antibiotic use in India aim to address these challenges and promote responsible prescribing practices. The Drugs and Cosmetics Act, 1940, and the Drugs and Cosmetics Rules, 1945, regulate the manufacturing, sale, and distribution of drugs, including antibiotics. However, enforcement of these regulations faces challenges such as inadequate monitoring and surveillance mechanisms, limited resources, and the presence of unregistered or unregulated pharmacies.(16,17)

Indian government has introduced the National Action Plan on Antimicrobial Resistance (NAP-AMR) to address the growing threat of antibiotic resistance comprehensively. The NAP-AMR emphasizes the importance of multisectoral collaboration, surveillance, antimicrobial stewardship, infection prevention and control, research, and public awareness.(18)

Thus addressing antibiotic utilization practices and regulations in India requires a multifaceted approach that encompasses regulatory enforcement, healthcare provider education, public

awareness campaigns, and strengthening healthcare infrastructure. By implementing evidence-based interventions and fostering collaboration across sectors, India can mitigate the threat of antibiotic resistance and ensure the continued efficacy of antibiotics for future generation.

Conclusion:

Antibiotic resistance is a complex and multifaceted problem that requires concerted efforts at the global, national, and local levels to address effectively. In LMICs, where challenges in antibiotic utilization are particularly pronounced, seizing opportunities for improvement is crucial to safeguard public health and mitigate the threat of antibiotic resistance. By strengthening healthcare systems, promoting antimicrobial stewardship, enhancing surveillance mechanisms, fostering collaboration across sectors, and implementing educational interventions, LMICs can contribute to global efforts to combat antibiotic resistance and ensure the continued efficacy of these life-saving medications.

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