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## Addressing the conundrum of excessive antibiotic use in respiratory infections: Exploring potential interventions

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### Abstract

Respiratory infections represent a significant global health burden, often prompting the widespread prescription of antibiotics. However, the escalating concern of antibiotic resistance necessitates a critical review of current practices. Paediatric upper respiratory tract infections (URTIs) are among the common medical issue in general practice (GP). Despite the rarity of complications associated with URTIs and the limited or negligible benefit of antibiotics in uncomplicated cases, there has been a recent surge in antibiotic prescriptions subsequent to a decline that began in the late 1990s. This article examines potential causes for the rise and evaluates the evidence regarding antibiotic withholding. The review highlights the need for a paradigm shift in treatment approaches and emphasizes the importance of implementing evidence-based strategies to reduce unnecessary antibiotic consumption.

**Keywords:** Antibiotics, respiratory infections, antibiotic resistance, judicious prescribing, intervention strategies

### Introduction

Respiratory infections, including acute rhinitis, acute otitis media, acute pharyngitis and sinusitis, are commonly encountered in clinical practice. However, the overuse of antibiotics in these cases contributes significantly to the emergence of antibiotic-resistant strains, threatening the efficacy of these crucial drugs. This review aims to critically examine the extent of excessive antibiotic use in the management of respiratory infections and explore potential interventions to promote judicious prescribing practices.

Although antibiotics are a valuable resource, the potential risk to both the patient and society must be considered when weighing the benefits of their use <sup>[1, 2]</sup>. When deciding whether or not to use antibacterials to treat acute respiratory tract infections (ARIs), a number of factors must be considered <sup>[3]</sup>. The first is the microbiology, given that the infection may be fungal, viral, bacterial, parasitic, or a combination thereof <sup>[4]</sup>. The second is the necessity for antibacterials, given that the majority of these conditions resolve on their own <sup>[5]</sup>.

Acute respiratory tract infections (ARIs) are typically caused by viruses and do not necessitate the use of antibacterials <sup>[6]</sup>, particularly in children younger than five years. Nevertheless, research has indicated that antibacterials are frequently employed in an inappropriate manner to address these conditions <sup>[7-9]</sup>. According to a study conducted in Kampala, Uganda, the prevalence of antibacterial use in treating infants under the age of five with symptoms of ARIs was 43% <sup>[7]</sup>. The significant amount of antibacterial usage is a critical issue in public health due to its potential to foster the development of bacterial resistance, adverse clinical effects, higher mortality rates, and unnecessary expenditure of financial funds <sup>[10]</sup>.

Unsuitable antibacterial use in children below the age of five is influenced by a variety of factors, including self-medication, financial constraints, limited access to medical care, the absence of diagnostic tools, non-compliance with treatment guidelines, healthcare workers' workload, prescribing in accordance with patient expectations, and inadequate regulatory frameworks <sup>[10, 11]</sup>. A study conducted to identify the variables that affect antibacterial medication for ARIs in primary care clinics found that patient expectations, workload-induced time constraints, and clinical uncertainty have a significant impact on the of antibacterials <sup>[10]</sup>.

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According to a study conducted in Kampala, Uganda, availability of antibacterials, household location, child care provider education level, confidence in self-diagnosing ARIs, and treatment seeking behaviour all predict kids under the age of five with signs and symptoms of ARIs to self-medicate with antibacterials [7].

### Factors contributing to excessive antibiotic use

With an emphasis on antibiotic prescribers and dispensers, policymakers, health organisations, and research institutions have advocated for more influence over the provision and use of antibiotics in society [12]. Antibiotic usage appears to be increasing [13] despite decades-long efforts to promote the "rational use of drugs," including the International Network for the Rational Use of Drugs programme of the World Health Organisation. Five primary objectives resulted from the collaborative endeavour of the World Health Organisation, the Food and Agriculture Organisation, and the World Organisation for Animal Health (WOAH) to develop a Global Action Plan (GAP). Prioritising awareness-raising regarding antimicrobial resistance (AMR) was the first objective, while optimising antimicrobial use in both humans and animals constituted the fourth [12].

Antibiotics are frequently prescribed medications in the treatment of paediatric patients across the globe. Antibiotic overuse is critical in the development of antimicrobial resistance [14] and constitutes a significant public health concern. In addition to the emergence of resistance, excessive antibiotic use during childhood has been linked to microbiome modification. As a result of microbiome studies and the realisation of the critical importance of microbiota to human health, the adverse effects of antibiotic use, especially in infancy, have become more apparent. It has been demonstrated that antibiotic use alters the microbiome of both adults and infants, such that a brief course of antibiotics can have a lasting effect of six months on the composition of microbiota [15]. Prolonged microbial imbalances have the potential to induce severe adverse effects on health, including malnutrition, metabolic disorders, and autoimmune diseases [16]. Furthermore, concerns have been raised regarding the potential misuse of broad-spectrum antibiotics, including Amoxicillin/clavulanate, even in cases where their application may be warranted [17].

URIs, which affect the upper respiratory tract, are among the most prevalent causes of morbidity in children. Moreover, this condition frequently compels children to seek medical attention in outpatient contexts, thereby placing a tremendous strain on both society and the healthcare system. As a result, investigating prescriptions for paediatric URIs in order to assess the rationale of antibiotic use is a widely accepted method.

### Factors contributing

**Patient Expectations:** Investigating the role of patient expectations and demand for antibiotics in driving unnecessary prescriptions.

**Diagnostic Challenges:** Discussing the difficulties in distinguishing between bacterial and viral respiratory infections, leading to a reliance on empirical antibiotic treatment.

**Provider Factors:** Analyzing physician prescribing behaviors, including knowledge gaps, fear of complications,

and time constraints, that contribute to excessive antibiotic use.

### Potential interventions

- **Education and Communication:** Exploring the effectiveness of educational campaigns targeting both healthcare providers and the general public to improve awareness about the consequences of antibiotic overuse.
- **Implementation of Point-of-Care Testing:** Evaluating the role of rapid diagnostic tests in differentiating between bacterial and viral infections, facilitating more targeted antibiotic prescribing.
- **Enhanced Guidelines and Decision Support:** Discussing the implementation of updated and evidence-based guidelines, coupled with decision support tools, to guide clinicians in appropriate antibiotic prescribing.
- **Alternative Therapeutic Approaches:** Investigating the potential of non-antibiotic interventions, such as symptom management, supportive care, and antiviral medications, as alternatives to antibiotic treatment in certain cases.

### Barriers to implementation

- **Resistance to Change:** Addressing the challenges and resistance encountered in adopting new practices and guidelines within healthcare systems.
- **Resource Constraints:** Considering the financial and logistical barriers associated with implementing interventions, especially in resource-limited settings.

### Conclusion

Summarizing the key findings and proposing a holistic approach to address the complex issue of excessive antibiotic use in respiratory infections. Advocating for collaborative efforts among healthcare professionals, policymakers, and the public to implement and sustain effective interventions.

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