

Amr: Global threat, unified one health strategy.

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Introduction

Antimicrobial resistance (AMR) stands as a major global health threat, one that profoundly impacts morbidity, mortality, and healthcare costs. Underlying its emergence are mechanisms such as horizontal gene transfer and the widespread overuse of antibiotics. This critical situation underscores the pressing need for a unified, global strategy to effectively combat its relentless spread [1].

What this really means is that AMR carries a substantial socioeconomic burden, impacting both healthcare systems and broader economic stability. Evidence suggests significant economic costs, including those arising from prolonged hospital stays, increased treatment expenses, and considerable productivity losses [2].

Here's the thing: carbapenem-resistant Enterobacteriaceae (CRE) are a significant global public health concern, particularly alarming due to their increasing prevalence. Crucial epidemiological insights into the worldwide distribution and trends of CRE highlight an urgent need for enhanced surveillance and more robust infection control measures [3].

Let's break it down: environmental factors, particularly pollution and wastewater, play a critical and undeniable role in the emergence and subsequent spread of antimicrobial resistance. Horizontal gene transfer within these environments is a key mechanism, facilitating the rapid dissemination of resistance genes among diverse bacterial populations [4].

This article points out the clear necessity of a "One Health" approach for effective antimicrobial resistance surveillance. This strategy involves integrating data comprehensively from human, animal, and environmental sources, asserting that understanding the interconnectedness of resistance across these diverse sectors is absolutely vital for developing and implementing truly comprehensive intervention strategies [5].

Excessive antimicrobial consumption emerges as a primary driver of resistance, a problem particularly pronounced across Europe. A systematic review analyzes the intricate patterns and influencing factors of antibiotic use throughout the continent, strongly advocating for the implementation of stronger antimicrobial stewardship

programs and robust policy interventions to curb unnecessary prescribing [6].

Developing new antimicrobials is undeniably crucial in the ongoing fight against resistance, but here's the challenge: the current pipeline for novel agents remains thin. Public-private partnerships can effectively incentivize and accelerate the research and development of novel antibiotics, thereby bridging the significant gap between initial scientific discovery and ultimate clinical availability [7].

The use of antimicrobials in food animals significantly contributes to the global burden of resistance, with direct implications for human health through the food chain. This review provides a comprehensive global overview of Antimicrobial Resistance prevalence in livestock and aquaculture, unequivocally underscores the urgent need for responsible antimicrobial use in agriculture and a commitment to improved food safety practices [8].

CRISPR-Cas technology offers a promising and truly innovative approach to effectively combat antimicrobial resistance. This paper delves into the significant potential of CRISPR-Cas systems to specifically target and eliminate resistance genes in bacteria, thereby offering a novel and potent therapeutic strategy to overcome challenging and difficult-to-treat infections [9].

Antimicrobial stewardship programs are unequivocally fundamental in mitigating the persistent threat of antimicrobial resistance. This systematic review clearly demonstrates how these carefully designed programs effectively optimize antimicrobial prescribing, consistently improve patient outcomes, and crucially reduce both the development and the subsequent spread of resistant pathogens within healthcare settings [10].

Conclusion

Antimicrobial resistance (AMR) is a major global health threat, significantly impacting morbidity, mortality, and healthcare costs. Its mechanisms include horizontal gene transfer and the overuse of antibiotics, necessitating a unified global strategy. AMR also imposes a substantial socioeconomic burden, affecting healthcare systems

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and economic stability through prolonged hospital stays, increased treatment expenses, and productivity losses. Specific threats like carbapenem-resistant Enterobacteriaceae (CRE) are a growing public health concern, demanding enhanced surveillance and infection control. Environmental factors, such as pollution and wastewater, critically contribute to AMR's emergence and spread by facilitating gene transfer. Excessive antimicrobial consumption, particularly in Europe, drives resistance, calling for stronger stewardship programs and policy interventions. Similarly, antimicrobial use in food animals significantly contributes to global resistance, impacting human health via the food chain and necessitating responsible agricultural practices. An effective "One Health" approach, integrating human, animal, and environmental data, is vital for comprehensive intervention strategies. Developing new antimicrobials is crucial, with public-private partnerships key to accelerating research and development. Innovative strategies like CRISPR-Cas technology offer potential for specifically targeting and eliminating resistance genes. Antimicrobial stewardship programs are fundamental to optimizing prescribing, improving patient outcomes, and reducing the spread of resistant pathogens.

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