

Addressing the Ineffectiveness of Antimicrobial Drugs: A Global Challenge

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Abstract

The ineffectiveness of antimicrobial drugs, especially antibiotics, represents one of the most pressing challenges for global health. In 2019, 1.27 million people died from common bacterial infections that had become antibiotic-resistant, underscoring the need for a global response. This article examines the dimensions of the problem, identifies challenges in pharmaceutical innovation, emphasizes the importance of financial incentives, and highlights the crucial role of global health authorities in combating antimicrobial drug ineffectiveness.

Keywords: Antimicrobial drug ineffectiveness; Antibiotic resistance; Global health; Pharmaceutical innovation; Financial incentives

Introduction

The ineffectiveness of antimicrobial drugs, particularly antibiotics, stands as one of the most pressing challenges for global public health [1]. According to the Global Research on Antimicrobial Resistance published in The Lancet 2, 1.27 million people succumbed to common bacterial infections that had become antibiotic-resistant in 2019. This escalating antimicrobial resistance poses a global threat to human health, necessitating a coordinated and worldwide response. The European Union (EU) and the European Economic Area (EEA) are particularly affected by this crisis, losing over 1 million life-years annually due to the ineffectiveness of antimicrobial drugs [4]. This devastating impact translates into costs amounting to approximately 1.1 billion euros per year for healthcare systems [4,5]. These alarming figures underscore the urgent need for targeted interventions to address this growing crisis (Table 1) [4].

Bacteria	Antibiotic	Average Resistance Percentage
<i>Escherichia coli</i>	Third generation cephalosporins	22%
<i>Klebsiella pneumoniae</i>	Third generation cephalosporins	32.20%
<i>Staphylococcus aureus</i>	Methicillin	29.20%
<i>Streptococcus pneumoniae</i>	Penicillin	15.10%
<i>Pseudomonas aeruginosa</i>	Carbapenems	25.20%
<i>Acinetobacter baumannii</i>	Carbapenems	35.70%

Table 1: Percentage of resistance to major antibiotics worldwide (2021). Source: ECDC (European Centre for Disease Prevention and Control). The State of Antimicrobial Resistance in Europe 2022. Stockholm: ECDC; 2022.

The situation is expected to worsen over time if not addressed urgently. Therefore, it is crucial to focus on innovation in the field of antimicrobial drugs. However, there are significant obstacles hindering the development of new drugs with innovative features [6]. These obstacles encompass scientific, economic, structural, and regulatory challenges [6]. For example, most major pharmaceutical companies have abandoned antimicrobial drug research due to the high risk of failure and lower profitability [7]. This has led small and medium-sized enterprises, which now lead the research, to struggle to secure funding for studies and face significant economic risks[7].

To revitalize the pipeline of antimicrobial drugs, a comprehensive approach with adequate incentives is necessary [8]. Financial incentives, such as direct funding, can help reduce research and development costs [8]. However, it is essential for these incentives to be sufficiently substantial to be effective [8]. For instance, financial rewards tied to research outcomes and reimbursement reforms could increase revenue and create vital markets for antimicrobial drugs [8]. Alignment of incentives is crucial, taking into account public health factors, market dynamics, and operational feasibility (Figure 1) [8].

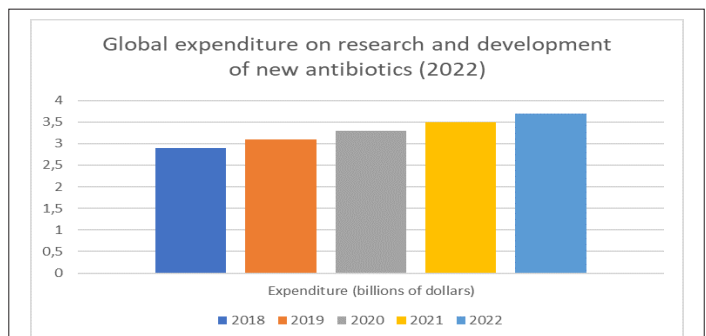


Figure 1: Global expenditure on research and development of new antibiotics (2022). Source: World Health Organization (WHO). Antimicrobial resistance: Global report on surveillance 2022. Geneva: WHO; 2022.

As it can be seen from the table, expenditures for research and development of new antibiotics have been increasing in recent years. However, expenditures are still relatively low compared to other pharmaceutical sectors, such as oncology drugs or drugs for chronic diseases.

Furthermore, ensuring timely access to both new and existing antimicrobial drugs is essential. Limited access poses a risk to patients and contributes to treatment ineffectiveness [9]. Access to new antimicrobial drugs is often restricted to larger markets, while access to existing ones is compromised by supply chain issues [9]. To improve access to effective antimicrobial drugs, short-term and long-term measures are required [9]. These include streamlining administrative procedures, adopting good procurement practices, and enhancing production capacity [9].

Health authorities in more developed countries play a crucial role in addressing antimicrobial drug ineffectiveness (AMR) [10]. They can and must support antimicrobial drug research and development, participate in international initiatives, and use their global influence [10]. Only through international cooperation and strong leadership is it possible to successfully address the threat of antimicrobial drug ineffectiveness and promote global solutions [10-15].

In conclusion, antimicrobial drug ineffectiveness is a global challenge that requires immediate and coordinated actions worldwide. Research and innovation are essential to address this growing threat. The World Health Organization (WHO) and national health authorities have a crucial role to play in promoting effective global solutions, including the use of precision medicine.

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