

Antibiotic Resistance in the Healthcare System: A Call to Action

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Key points:

- Introduction to Antibiotic Resistance in the Healthcare System
- Prevalence of Antibiotic Resistance in Pakistan and Globally
- Causes of Antibiotic Resistance
- Consequences of Antibiotic Resistance
- Current and future strategies to combat Antibiotic Resistance

Introduction

Antimicrobial resistance (AMR) is one of the top global public health and development threats. AMR is a natural process that happens over time through genetic changes in pathogens.¹ Its emergence and spread are accelerated by human activity, mainly the misuse and overuse of antimicrobials to treat, prevent or control infections in humans, animals and plants.

Prevalence

Pakistan is a developing country of the South-Asia, rich in antibiotic resistance, a significant global and regional threat. Both the multi-drug resistant and extensively drug-resistant bacteria are identified in Pakistan in the last few years. The number of AMR deaths in Pakistan is higher than deaths from neoplasms, respiratory infections and tuberculosis, enteric infections, diabetes and

kidney diseases, and chronic respiratory diseases. Both the multi-drug resistant (MDR) and extensively drug resistant (XDR) bacteria are identified in Pakistan in the last few years. In the last decade from Pakistan, resistance against quinolones has increased for Enterobacteriaceae.¹ In 2016, the outbreak of XDR Salmonella was one of its examples that show even 100% resistance to fluoroquinolones.² Globally, it's estimated that at least two-thirds of antibiotics are used

for livestock. However, overuse can lead to the evolution and spread of antibiotic-resistant bacteria, threatening both animal and human health. Resistant pathogens can spread through contaminated meat and dairy, making some diseases harder to treat.

Causes

Microbes, such as bacteria, viruses, fungi, and parasites, are living organisms that evolve over time. Their primary function is to reproduce, thrive, and spread quickly and efficiently. Therefore, microbes adapt to their environment and change in ways that ensure their survival. If something stops their ability to grow, such as antimicrobial, genetic changes can occur that enable the microbe to survive. In many other countries, antibiotics are unregulated and available over the counter without a prescription. This lack of regulation results in antibiotics that are easily accessible, plentiful, and cheap, which promotes overuse.³

Consequences of Antibiotic Resistance

In May 2014, the World Health Organization (WHO) stated that the AMR crisis is becoming dire. The rise of AMR in current human society will mean that on an individual level, increasing use of older less effective techniques in controlling infections will be required. Such techniques, including debridement, disinfection,

amputation, and isolation will mean that the process of treating infections will take longer, be far more invasive, and will be less successful. A recent WHO report made a clear case that resistance of common bacteria to antibiotics has reached alarming levels in many parts of the world. In Europe, for example, there is an increase of the resistance to major antibiotics of common bacteria such as *Escherichia coli* which causes, among others, urinary tract infections, and also *Staphylococcus aureus*. The dogma that antibiotics are safe for humans has been dominant for many decades, and only recently has it started to be challenged. Antibiotics are recommended to humans based on rigorous clinical trials, examining antibiotics use against microorganisms, and their efficacy and safety.⁴

Current and Future Strategies

Current strategies have been carried out to combat AMR. In 2001, WHO and the Council of the European Union issued global strategies and guidelines to help countries set up systems to monitor antibiotic resistance and to implement efficient actions, including public awareness campaigns. Nowadays, the most immediate and urgent concerns relate to antibiotic resistance in common bacteria.⁴ To address AMR globally, countries adopted the Global Action Plan (GAP) on AMR during the 2015 World Health Assembly and committed to the development and implementation of multisectoral national action plans with a One Health approach to tackle AMR. It is

necessary to focus on implementing future strategies to combat AMR. It recognizes that the health of humans, domestic and wild animals, plants and the wider environment are closely linked and inter-dependent. The One Health approach to preventing and controlling AMR brings together stakeholders from relevant sectors to communicate and work together in the design, implementation and monitoring of programs, policies, legislation and research to mitigate AMR and attain better health and economic outcomes. It is necessary that improved antibiotic stewardship, strengthening national surveillance efforts for resistant bacteria, preventing and responding to infections and outbreaks with antibiotic-resistant organisms, promoting new and next generation antibiotics and diagnostics, and international cooperation.⁵

References

1. World Health Organization. Antimicrobial resistance. WHO; 2023 Nov 21
2. Bilal H, Khan MN, Rehman T, Hameed MF, Yang X. Antibiotic resistance in Pakistan: a systematic review of past decade. *BMC infectious diseases*. 2021 Dec; 21:1-9.
3. Ventola CL. The antibiotic resistance crisis: part 1: causes and threats. *Pharmacy and therapeutics*. 2015 Apr;40(4):277.
4. Kumar SB, Arnipalli SR, Ziouzenkova O. Antibiotics in food chain: The consequences for antibiotic resistance. *Antibiotics*. 2020 Oct 13;9(10):688.
5. Inoue H. Strategic approach for combating antimicrobial resistance (AMR). *Global Health & Medicine*. 2019 Dec 31;1(2):61-4.