

Commentary

Antimicrobial Resistance: Understanding the Different Types and Implications for Global Health

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DESCRIPTION

Antimicrobial resistance (AMR) is a growing public health threat worldwide. AMR occurs when microorganisms, such as bacteria, viruses, fungi, and parasites, become resistant to antimicrobial agents, such as antibiotics, antivirals, and antifungals, that were once effective in treating infections. This resistance can make it difficult or even impossible to treat infections, leading to longer hospital stays, higher healthcare costs, and increased mortality rates.

Causes of antimicrobial resistance

The causes of antimicrobial resistance are multifactorial and include the overuse and misuse of antimicrobial agents in both humans and animals, poor infection prevention and control practices, and inadequate sanitation and hygiene.

Inappropriate prescribing of antibiotics is a significant contributor to antimicrobial resistance, as it can lead to the selection of resistant bacteria. Patients who receive unnecessary antibiotics or are prescribed the wrong antibiotic for their infection may develop resistance to that antibiotic or even cross-resistance to other antibiotics.

To address the antimicrobial resistance crisis, a multi-faceted approach is needed. This includes improving infection prevention and control practices, promoting appropriate use of antimicrobial agents, increasing awareness of Antimicrobial resistance among healthcare providers and the public, and investing in research and development of new antimicrobial agents. In addition, collaboration and coordination across sectors and countries are essential to tackling this global health threat.

The World Health Organization (WHO) has developed a global action plan on AMR that includes five strategic objectives: improving awareness and understanding of Antimicrobial resistance, strengthening surveillance and research, reducing the incidence of infection, optimizing the use of antimicrobial agents, and ensuring sustainable investment in new antimicrobial agents. The plan emphasizes the importance of a one health approach, which recognizes the interconnectedness of human, animal, and environmental health, and the need for collaborative action across sectors.

Types of antimicrobial resistance

Natural resistance: This type of resistance occurs when microorganisms are naturally resistant to certain antimicrobial agents. For example, some bacteria are naturally resistant to certain classes of antibiotics, such as penicillins and cephalosporins.

Acquired resistance: This type of resistance occurs when microorganisms acquire resistance to antimicrobial agents through genetic mutations or by acquiring resistance genes from other microorganisms. Acquired resistance is the main cause of antimicrobial resistance.

Antibiotic-resistant bacteria: This type of resistance refers to bacteria that are resistant to one or more classes of antibiotics. For example, methicillin-resistant *Staphylococcus aureus* (MRSA) is a type of bacteria that is resistant to the antibiotic methicillin and other beta-lactam antibiotics.

Antiviral resistance: This type of resistance occurs when viruses develop resistance to antiviral drugs. For example, some strains of the influenza virus have developed resistance to the antiviral drug oseltamivir.

Antifungal resistance: This type of resistance occurs when fungi develop resistance to antifungal drugs. For example, some strains of candida species have developed resistance to azoles, a class of antifungal drugs.

Antiparasitic resistance: This type of resistance occurs when parasites develop resistance to antiparasitic drugs. For example, *Plasmodium falciparum*, the parasite that causes malaria, has developed resistance to several antimalarial drugs, such as chloroquine and sulfadoxine-pyrimethamine. Antimicrobial resistance is a growing public health threat that requires urgent action. The consequences of inaction are dire, with millions of lives and trillions of dollars at stake. We must work together to promote appropriate use of antimicrobial agents, improve infection prevention and control practices, and invest in research and development of new antimicrobial agents. By taking a one health approach and collaborating across sectors and countries, we can mitigate the impact of antimicrobial resistance and safeguard the health of future generations.

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