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Editorial

Antimicrobial resistance in respiratory diseases

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ABSTRACT

The rise of antimicrobial resistance (AMR) becomes a global health crisis that poses significant risks to human health. Respiratory disorders, especially those caused by bacteria, are highly susceptible to AMR's effects. An increasing prevalence of antibiotic-resistant bacteria restricts treatment options, resulting in higher morbidity, death, and medical costs. This editorial covers the current status of AMR in respiratory diseases, its consequences, and potential approaches to address this alarming challenge.

Antimicrobials (antibiotics, antivirals, antifungals, and antiparasitics) are drugs that prevent and treat infectious diseases in humans, plants, and animals.[1] Antimicrobial resistance (AMR) is when medicines that used to kill bacteria, viruses, fungi, and parasites no longer work on them.[1]

Antibiotics are boon for our health, are revolutionizing healthcare, and are saving many lives. As the saying goes, 'excess of everything is bad'; the overuse and/or misuse of these potent drugs has resulted in the emergence of antibiotic-resistant bacteria.[1] With time, these bacteria evolved, developing mechanisms that enabled them to flourish and survive in the presence of antibiotics.

While we used antibiotics to treat sinus infections a few years ago, we are unsure of their effectiveness today and frequently need to add more prescriptions. When bacteria become resistant to antibiotics, often healthcare professionals prescribe the stronger and more expensive drugs, which may have adverse side effects. In addition to this, resistant infections can spread easily among vulnerable populations (elderly, young children, and immunocompromised individuals).[2]

Antibiotic resistance affects the treatment of many respiratory infections, and diseases like pneumonia, bronchitis, and tuberculosis (TB) are particularly susceptible to antibiotic resistance, posing a significant threat to global health.[3,4] These infections frequently involve bacteria such as Streptococcus pneumoniae, Haemophilus influenzae, and Pseudomonas aeruginosa.[3] Patients with resistant infections may need long hospitalization, intensive care, and expensive treatments. In some situations, infections may become untreatable, leading to increased mortality rates. Furthermore, AMR could increase the spread of resistant bacteria in healthcare settings, putting vulnerable populations at greater risk.

The respiratory tract, with its complex anatomy and diverse microbial communities, is a perfect incubator for the development and transmission of antibiotic-resistant organisms.[3] A variety of bacteria, including both commensal and pathogenic species, may be present in the airways. Antibiotic exposure, whether from therapeutic use or environmental contamination, can facilitate the development of resistance mechanisms

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in these bacteria. Methicillin-resistant Staphylococcus aureus (MRSA), Pseudomonas aeruginosa, Klebsiella pneumoniae, and DR-TB are some examples of respiratory pathogens that have acquired resistance to commonly used antibiotics. MRSA is an aureus infection with the potential to cause pneumonia and other respiratory infections. Pseudomonas aeruginosa frequently causes pneumonia and other respiratory infections, particularly in individuals with cystic fibrosis or compromised immune systems. Klebsiella pneumoniae has acquired resistance to carbapenems, a potent antibiotic class that is employed to treat severe infections. DR-TB is resistant to a variety of antibiotics, which complicates treatment and elevates the risk of transmission.

The primary cause of antibiotic resistance in respiratory diseases is the overuse and misuse of antibiotics, frequently without appropriate medical guidance. This overuse, particularly in respiratory infections, frequently results in the selection of resistant strains, which are often self-treated or treated with antibiotics, despite being viral in origin. Inadequate infection control practices in healthcare settings, such as the improper management of contaminated equipment or the lack of hand hygiene, can increase the transmission of resistant bacteria.[4] Contaminants from the environment (water, soil, and animals) may also expose people. In low-income countries, the use of older, less effective pharmaceuticals can result in an increase in resistance due to the limited access to effective antibiotics.[5] Global travel and commerce also influence the spread of resistant pathogens across borders.

A collective approach is primal to lower the AMR. It entails encouraging the use of accountable antibiotics, implementing infection control measures, developing new antibiotics, implementing vaccinations against respiratory pathogens, and strengthening surveillance systems. Adhering to hygiene and sanitation protocols can mitigate the dissemination of antibiotic-resistant bacteria. Additionally, research and development initiatives are required to create novel antibiotics that can escape resistance mechanisms. Vaccines that protect against respiratory pathogens can decrease the necessity for antibiotic treatment. Public health education can also help to promote responsible antibiotic use.

On September 26, 2024, at the 79th United Nations General Assembly (UNGA) High-Level Meeting on AMR, world leaders adopted a political declaration promising to pursue a specific set of goals and measures, such as a 10% reduction in the estimated 4.95 million annual human deaths linked to bacterial AMR by 2030.[6]

In conclusion, antibiotic resistance in respiratory diseases represents a serious global health threat. Addressing this challenge requires a collaborative effort from healthcare providers, policymakers, researchers, and individuals. For creating awareness against AMR, an international organization called Global Antimicrobial Resistance Media Alliance (GAMA) has been constituted in the year of 2023 and Dr Surya Kant is Founder International Co-Chairman of this organization. By promoting the appropriate use of antibiotics, implementing effective infection control measures, and investing in research and development, we can combat antibiotic resistance and protect public health.

Conflict of Interest

None.

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