



## RISING TRENDS IN ANTIBIOTIC RESISTANCE

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**KEYWORDS :**

Antibiotics are medications that are used to prevent and manage infections caused by bacteria. Antibiotic resistance arises when bacteria mutate in response to antimicrobial therapy.

Although antibiotic resistance develops in bacteria it infects both humans and animals, and their infections are more difficult to treat than non-resistant bacteria.

Antibiotic therapy of serious illnesses and the performance of medical and surgical procedures under the protection of antibiotics are two primary ways that contemporary medicine saves lives. However, we have not kept up with the microorganism's potential to build resistance to the antibiotics we developed.

The excess consumption and misuse of antibiotics, as well as a lack of new drug research due to limited economic incentives and difficult regulatory requirements, have all attributed to the antibiotic resistance issue. Antibiotics that are inappropriately given have unclear therapeutic potential and subject patients to possible side effects.

Antimicrobial usage, no matter how reasonable or justifiable, contributes to the development of resistance, but widespread, unneeded, and excessive use exacerbates the problem. The availability of antimicrobial drugs over the counter, without a prescription, and through unregulated supply networks facilitates their misuse in developing countries. Antimicrobial noncompliance has numerous consequences for resistance while some patients miss doses, either by accident or on purpose, particularly when clinical signs begin to fade after an initial successful treatment response.

Long before people began to manufacture antibiotics in vast numbers to fight and prevent infectious diseases many bacterial species had already developed the capacity to tolerate them. The constant fight for resources among microbes, which includes the natural synthesis of bioactive molecules which are identical to many of the antibiotics currently used now as medications, is likely to be a significant driver of the primordial and continuous emergence of resistance mechanisms.

**Antibiotic Resistance: An Unforeseen Danger**

The reason for antibiotic resistance carrying such notoriety is similar to an iceberg. Although we see a small shard protruding from the surface from afar, the real danger lurks underwater which is only imminent when you are close enough to collide with the iceberg. Until we treat a patient, we are unaware that antibiotic resistance has occurred. The antibiotic that had been shown to be effective in the past

abruptly loses its effectiveness leaving us with little to nothing to do if a strategy hasn't already put into motion. While you wait to comprehend what is going on, your condition worsens. An infection that was previously manageable at home may require hospitalisation. Often times patients find themselves with no alternatives and fatality is quite common in severe resistant cases.

**Emergence of Antibiotic Resistant Strains**

Antibiotic concentrations that are subinhibitory and subtherapeutic can enable genetic changes that lead to the emergence of antibiotic resistance. Microbes cultivate antibiotic resistance by various mechanisms including alterations in HGT, mutagenesis, and gene expression. Increased mutagenesis and HGT encourage the spread of antibiotic resistance, while changes in drug-induced gene expression can boost pathogenicity. It has been demonstrated that low concentrations of antibiotics encourage the emergence of new strains in bacteria like *Pseudomonas aeruginosa*, *Clostridium difficile*. It has also been demonstrated that *Bacteroides fragilis* exhibits widespread proteome changes in response to subtherapeutic doses of piperacillin and/or tazobactam.

**Superbugs**

Different bacterial strains have evolved over time to become resistant to the drugs that normally kill them. They have the ability to combat the medications. These germs, known as superbugs, continue to spread and infect people despite being treated with numerous drugs. It's possible that no antibiotic will be effective.

In every region of the world, antibiotic resistance is increasing to dangerously high levels. Our ability to cure widespread infectious diseases is being threatened by the emergence and global dissemination of new resistance mechanisms. As antibiotics lose their effectiveness, a rising number of infections, including gonorrhoea, blood poisoning, pneumonia, and tuberculosis, are becoming difficult to cure and occasionally evolving into an incurable form of their former self.

**Antibiotic Resistance and Antibiotic Availability**

The establishment and spread of resistance are accelerated in situations where antibiotics are available for purchase without a prescription for human or animal usage. Similar to this, in nations lacking standardised treatment recommendations and protocols, doctors and veterinarians frequently overprescribe antibiotics and the general population frequently tends to overuse them.

Without immediate action, we risk entering a post-antibiotic

world in which typical infections and minor wounds can again be fatal.

### Regulatory Mechanisms

Experts in infectious diseases and microbiology have cautioned against overusing antibiotics due to their concern about fostering drug resistance. To avoid developing antibiotic resistance, doctors frequently reserve new antibiotics for use in the most severe instances rather than immediately prescribing them. Instead, they continue to use older antibiotics that have demonstrated equivalent efficacy. New antibiotics are therefore frequently used as "last-line" treatments to treat severe illnesses. This technique results in a decreased return on investment and a decrease in the use of new antibiotics.

### Suggested methods to curb antibiotic resistance

#### Initiatives for Doctors

- The following are the key strategies for preventing antibiotic resistance:
- Reduce the over and needless prescribing of antibiotics. This happens when patients request antibiotic prescriptions for viral illnesses when they are not necessary (antibiotics do not treat viruses), or when antibiotics are prescribed for diseases that do not call for them.
- Any prescribed antibiotic should be finished completely in order for it to be entirely effective and prevent the development of resistance.
- Wash your hands frequently and follow the right infection control methods.

#### Initiatives for Hospital Administrates and Policy Makers

- Policymakers may do the following to stop and slow the spread of antibiotic resistance:
- Make sure there is a strong domestic action plan in place to combat antibiotic resistance.
- Boost the monitoring of illnesses with antibiotic resistance.
- Increase the effectiveness of infection prevention and control policies, procedures, and implementation.
- Promote and regulate the proper use and disposal of effective medications.
- Make information about the effects of antibiotic resistance available.

### Conclusion

The tremendous improvements in health that have been made possible by antibiotics are at jeopardy due to rapidly growing resistant microorganisms. Because of the widespread abuse of these prescription medications and the lack of new antimicrobials being developed by pharmaceutical companies to address the issue, the crisis is global. Infections that are resistant to antibiotics have a significant negative impact on the population's health and the economy. Implementing new regulations, reviving research projects, and pursuing crisis management strategies all require coordinated efforts. Antibiotic resistance is a problem that will continue growing, but developments in these disciplines and the creation of new antibiotics for bacterial infections will help combat it.

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