



## **RATIONAL USE OF ANTIBIOTICS**

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**Abstract:** This article discusses the importance of the rational use of antibiotics and their role in modern medicine. Antibiotics are widely used to treat bacterial infections; however, their misuse and overuse have become a serious global health problem. The paper analyzes the main causes of improper antibiotic use, including self-medication, incorrect dosage, and unnecessary prescriptions. Special attention is given to the consequences of antibiotic misuse, particularly the development of antibiotic resistance, which reduces the effectiveness of treatment and increases the risk of complications and mortality. The article also highlights the importance of following medical guidelines, completing prescribed courses, and avoiding the use of antibiotics without professional consultation.

Furthermore, effective strategies for the rational use of antibiotics are discussed, such as public awareness, proper diagnosis, and adherence to clinical protocols. This article is intended for medical students and general readers, emphasizing the importance of responsible antibiotic use in protecting public health.

**Keywords:** antibiotics, rational use, antibiotic resistance, bacterial infections, self-medication, dosage, public awareness, healthcare guidelines, treatment adherence, microbial resistance.

### **Introduction**

Antibiotics are one of the most important discoveries in modern medicine, playing a crucial role in the treatment of bacterial infections and saving millions of lives worldwide. Since their introduction, antibiotics have significantly reduced morbidity and mortality caused by infectious diseases. However, their widespread availability and improper use have led to serious global health challenges.

In recent years, the misuse and overuse of antibiotics have become a major concern. Many people use antibiotics without medical prescription, do not follow the correct dosage, or stop treatment prematurely. Such practices contribute to the development of antibiotic resistance, a condition in which bacteria become resistant to the effects of medications, making infections harder to treat.

Additionally, the lack of public awareness, insufficient regulation, and inappropriate prescribing practices further worsen the situation. Antibiotic resistance not only affects individual patients but also poses a significant threat to public health worldwide.

Therefore, the rational use of antibiotics, adherence to medical guidelines, and increased awareness are essential to ensure their effectiveness for future generations. The aim of this article is to analyze the principles of proper antibiotic use, identify common problems, and highlight strategies to prevent antibiotic resistance.

### **Main part: Principles of rational antibiotic use**

The rational use of antibiotics is a cornerstone of effective healthcare and plays a crucial role in preserving the efficacy of these life-saving drugs. Antibiotics should only be used when



there is clear clinical and laboratory evidence of a bacterial infection. Their use in viral diseases, such as influenza, the common cold, or most sore throats, is inappropriate and contributes significantly to the global problem of antibiotic resistance. Therefore, accurate diagnosis based on patient history, physical examination, and, when necessary, laboratory investigations is essential before initiating antibiotic therapy.

Another fundamental principle is the appropriate selection of antibiotics. The choice of an antibiotic should be guided by several factors, including the site and severity of the infection, the most likely causative microorganisms, local resistance patterns, and the patient's individual characteristics such as age, allergies, kidney and liver function, and comorbid conditions. Whenever possible, narrow-spectrum antibiotics should be preferred, as they specifically target the causative bacteria while minimizing damage to the normal microbiota. In contrast, the unnecessary use of broad-spectrum antibiotics can disrupt the body's microbial balance and accelerate the development of resistant strains.

The correct dosage, route of administration, and duration of treatment are also critical components of rational antibiotic use. The prescribed dose must be sufficient to achieve therapeutic levels in the body and effectively eliminate the pathogen. Underdosing may allow some bacteria to survive and develop resistance, while overdosing increases the risk of toxicity and adverse effects. Similarly, the duration of therapy should be appropriate for the type of infection; too short a course may result in incomplete eradication of bacteria, whereas unnecessarily prolonged use can promote resistance and harm beneficial microorganisms.

Patient adherence to the prescribed treatment regimen is another key factor. Patients must follow the doctor's instructions carefully, take medications at the correct times, and complete the full course of antibiotics even if symptoms improve before the treatment is finished. Failure to adhere to these guidelines can lead to treatment failure, relapse of infection, and the emergence of resistant bacteria.

In addition, antibiotics should never be used without proper medical supervision. Self-medication, using leftover antibiotics, or sharing medications with others are dangerous practices that can lead to incorrect treatment and serious health risks. Each antibiotic therapy should be individualized, taking into account the patient's specific condition and medical history.

Finally, monitoring and evaluation of treatment effectiveness are essential parts of rational antibiotic use. Healthcare providers should assess the patient's response to therapy and make adjustments if necessary. If there is no improvement, further diagnostic testing may be required to identify resistant organisms or alternative causes of illness.

#### **Consequences of antibiotic misuse**

The misuse and overuse of antibiotics lead to serious consequences for both individual patients and public health. One of the most significant problems is the development of antibiotic resistance. This occurs when bacteria adapt and become resistant to the effects of antibiotics, making infections more difficult to treat and increasing the risk of complications. Antibiotic resistance can result in longer hospital stays, higher medical costs, and increased mortality rates. In severe cases, infections caused by resistant bacteria may become untreatable with existing medications, posing a major threat to global health.

Another important consequence is the disruption of the body's natural microbiota. Antibiotics not only kill harmful bacteria but also destroy beneficial microorganisms, especially in the gut. This imbalance can lead to digestive problems, weakened immunity, and an increased risk of secondary infections.



In addition, the misuse of antibiotics may cause allergic reactions and side effects, ranging from mild symptoms such as rashes to severe conditions like anaphylaxis. Incorrect use can also reduce the effectiveness of antibiotics in future treatments.

Overall, antibiotic misuse not only harms the individual but also contributes to a global health crisis, making it essential to promote their rational and responsible use.

#### **Strategies for proper use of antibiotics**

Ensuring the proper use of antibiotics requires a combination of medical, educational, and regulatory measures. One of the most important strategies is raising public awareness about the correct use of antibiotics. People should understand that antibiotics are effective only against bacterial infections and should not be used for viral illnesses such as colds or flu.

Healthcare professionals also play a key role in promoting rational antibiotic use. Doctors must prescribe antibiotics only when necessary, based on accurate diagnosis and clinical guidelines. They should also choose the most appropriate antibiotic, dosage, and duration of treatment for each patient.

Another important strategy is patient responsibility. Patients should strictly follow the doctor's instructions, complete the full course of treatment, and avoid self-medication. Sharing antibiotics with others or using leftover medications should be strictly avoided. Improving diagnostic methods is also essential. Laboratory tests can help identify the exact pathogen and determine the most effective antibiotic, reducing unnecessary use of broad-spectrum drugs.

In addition, governments and health organizations should implement strict regulations on the sale and distribution of antibiotics. Limiting over-the-counter access and monitoring antibiotic use can significantly reduce misuse.

#### **Conclusion**

Antibiotics are essential for treating bacterial infections and have saved millions of lives worldwide. However, their effectiveness is increasingly threatened by misuse and overuse. Irrational practices—such as self-medication, incorrect dosage, unnecessary prescriptions, and stopping treatment prematurely—directly contribute to the development of antibiotic resistance, which poses a serious global health threat.

Rational use of antibiotics requires a comprehensive approach, including accurate diagnosis, careful selection of the appropriate drug, correct dosage and treatment duration, and strict adherence to medical guidelines. Both healthcare professionals and patients share responsibility in ensuring antibiotics are used safely and effectively.

Public awareness and education are vital. Patients must understand that antibiotics are not effective against viral infections, must avoid self-medication, and should always complete the full prescribed course. Proper adherence prevents treatment failure, reduces the risk of resistance, and protects the individual's health.

In addition, strengthening healthcare systems, improving diagnostic capabilities, and regulating the distribution and sale of antibiotics are essential to minimize misuse. Global cooperation, continuous monitoring, and responsible policies are also critical to combating antibiotic resistance.

In conclusion, the rational and responsible use of antibiotics is crucial for maintaining their effectiveness, protecting public health, and ensuring successful treatment outcomes. By following these principles, individuals, healthcare providers, and societies can collectively reduce the spread of resistance and safeguard these vital medications for future generations.



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