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# TYPES OF ANTIBIOTICS ACCORDING TO THE SCOPE OF THEIR EFFECT AND THEIR IMPORTANCE IN THE HEALTH CARE SYSTEM

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**Abstract**
Antibiotics are one of the most important tools in the fight against bacterial infections in the healthcare system. They revolutionized modern medicine and saved countless lives. In this article, we explore the importance of antibiotics in the healthcare system.

**Keywords:** antibiotics, microbial resistance, infections, health care, treatment, prevention, health care, drug development, antimicrobial resistance.

Antibiotics are drugs that kill bacteria and relieve the symptoms of bacterial infections. They are one of the most prescribed drugs in the world and have saved countless lives since their discovery. There are different types of antibiotics and their range of action is determined by their mechanism of action and the specific bacteria they target. The discovery of antibiotics is attributed to Alexander Fleming, who discovered penicillin from a fungus in 1928. Antibiotics target bacteria by either killing them or preventing them from multiplying. They are used to treat bacterial infections such as pneumonia, strep throat, urinary tract infections, and more. The discovery of antibiotics revolutionized modern medicine and has saved countless lives since their introduction. Antibiotics are powerful drugs that can fight bacterial infections and diseases. The use of antibiotics has made the healthcare system more efficient, reduced morbidity and increased life expectancy since they were introduced to the market. The importance of antibiotics in the healthcare system can be traced to their ability to treat and prevent infections. The infection can cause serious illness and even death if left untreated. They can harm both the individual and the community because they are easily transmitted from person to person and can become resistant to treatment if left untreated or misused. Antibiotics are essential in treating everything from mild sore throats to chronic conditions such as tuberculosis, syphilis, and meningitis. Their effectiveness in treating infections has been proven time and time again, and they remain an important part of healthcare practice. However, antibiotics are only effective against bacterial infections and cannot treat viral illnesses such as colds and flu. It should also be noted that although antibiotics are very effective, they are not without risks. Misuse, overuse, and misuse of antibiotics can lead to the development of antibiotic resistance, which occurs when bacteria mutate and evolve to survive the effects of the drugs. This means that antibiotics are no longer effective and more powerful drugs are required, leading to higher healthcare costs, longer hospital stays and an increased risk of death. Antibiotic stewardship is an important part of the health care system, with the goal of maintaining the effectiveness and usefulness of antibiotics and reducing potential harm. Antibiotic stewardship programs educate health care workers about appropriate prescribing



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practices, proper dosing, and the importance of implementing infection prevention practices such as hand hygiene and disease control programs.

Antibiotics are a class of drugs used to treat bacterial infections by killing or inhibiting the growth of bacteria. They are one of the most important medical discoveries of the 20th century, revolutionizing the treatment of infectious diseases and saving countless lives. Antibiotics are now widely used in the healthcare system to treat a variety of bacterial infections, ranging from minor skin infections to life-threatening conditions such as sepsis. There are many different types of antibiotics, each with its unique mechanisms of action and spectrum of activity. Antibiotics can be broadly categorized according to the scope of their effect, i.e., whether they target a specific type of bacteria or a broad range of bacteria, and their importance in the healthcare system.

One of the main problems in the healthcare system is the emergence of antibiotic-resistant bacteria. Resistance occurs when bacteria develop resistance to the antibiotics used to treat them. This can happen naturally, but is often accelerated by the misuse and overuse of antibiotics. Overuse of antibiotics can lead to the emergence of resistant strains of bacteria that can cause serious health problems. Antibiotics have many advantages in the healthcare system. They helped reduce death rates from infectious diseases such as pneumonia and tuberculosis. They have also helped reduce the need for hospitalization and surgery, which can be expensive and invasive. The correct use of antibiotics is very important in the fight against bacterial infections. Antibiotics should be prescribed only when necessary and used for as short a period as possible. Antibiotics should never be prescribed for viral infections because they are ineffective against viruses.

1. Narrow-Spectrum Antibiotics - Narrow-spectrum antibiotics target a specific set of bacteria, making them more effective at treating infections caused by specific bacteria. These antibiotics can only fight against gram-positive or gram-negative bacteria. Gram-positive bacteria have thick outer cell walls, while Gram-negative bacteria have thin outer cell walls. Some examples of narrow-spectrum antibiotics are penicillin G, clindamycin, and vancomycin. Narrow-spectrum antibiotics are antibiotics that are effective against a specific type of bacteria or a group of related bacteria. They are usually the first-line treatment for infections caused by known bacterial pathogens. These antibiotics are effective against a limited range of bacteria, which makes them more selective in their actions and reduces the likelihood of developing antibiotic resistance. Examples of narrow-spectrum antibiotics include penicillin, cephalosporins, and macrolides. Penicillin is a type of beta-lactam antibiotic that is effective against gram-positive bacteria. Cephalosporins are a group of antibiotics that are effective against both gram-positive and gram-negative bacteria, and they are often used to treat urinary tract infections and skin infections. Macrolides are antibiotics that are effective against a wide range of gram-positive bacteria, and they are often used to treat respiratory tract infections.

a) Penicillin G is a beta-lactam antibiotic that fights gram-positive bacteria, including streptococci, staphylococci, and Clostridium species. It works by inhibiting the synthesis



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of the bacterial cell wall, which leads to the weakening of the bacterial cell wall, resulting in the lysis of the bacterial cell.

b) Clindamycin is a lincosamide antibiotic that fights gram-positive bacteria such as streptococci and staphylococci. It works by blocking bacterial protein synthesis, which causes the bacteria to die.

c) Vancomycin is a glycopeptide antibiotic that targets gram-positive bacteria such as Staphylococcus aureus and Streptococcus pneumoniae. It works by binding to the bacterial cell wall and inhibiting cell wall synthesis, leading to bacterial death.

2. Broad-spectrum antibiotics - intended for a wide range of gram-positive and gram-negative bacteria. They are prescribed when the bacteria causing the infection is unknown or when several bacteria are responsible for the infection. Some examples of broad-spectrum antibiotics are tetracyclines, fluoroquinolones, and macrolides.

a) tetracyclines - a group of antibiotics that includes Doxycycline and Tetracycline. They target gram-positive and gram-negative bacteria and are used to treat a number of infections, including acne, respiratory infections, and sexually transmitted infections. They work by inhibiting bacterial protein synthesis, which causes the bacteria to die.

b) Fluoroquinolones are a group of antibiotics that target Gram-negative bacteria such as Escherichia coli and Haemophilus influenzae. They are used to treat urinary tract infections, respiratory tract infections, and gastrointestinal infections. They work by inhibiting bacterial DNA synthesis, which causes the bacteria to die.

c) Macrolides are a group of antibiotics targeting gram-positive and gram-negative bacteria. They are used to treat respiratory infections, sexually transmitted infections, and skin infections. Macrolides work by inhibiting bacterial protein synthesis, which causes the bacteria to die.

3. Combined antibiotics

Combination antibiotics are combinations of two or more antibiotics that target different bacteria. They are used to treat infections caused by multiple bacterial strains that may be resistant to single antibiotics. Combination antibiotics are commonly used to treat severe infections such as pneumonia and sepsis. Some examples of combination antibiotics are amoxicillin-clavulanic acid, trimethoprim-sulfamethoxazole, and ceftriaxone-azithromycin.

a) Amoxicillin-clavulanic acid is a combined antibiotic containing aminopenicillin (amoxicillin) and a beta-lactamase inhibitor (clavulanic acid). This combination targets gram-positive and gram-negative bacteria and is used to treat respiratory, urinary tract, and skin infections.

b) Trimethoprim-Sulfamethoxazole is a combination antibiotic targeting gram-positive and gram-negative bacteria. It is used to treat urinary tract infections, respiratory tract infections, and gastrointestinal infections.

c) Ceftriaxone-azithromycin is a combination antibiotic targeting gram-negative bacteria. It is commonly used to treat sexually transmitted infections such as gonorrhea and chlamydia.



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## Conclusion

In summary, antibiotics are an important drug in the treatment of bacterial infections. Their spectrum of action varies depending on the specific bacterial strains, making them narrow- or broad-spectrum. Combination antibiotics are used to treat infections caused by many bacterial strains. The right choice of antibiotic depends on the type and severity of the bacterial infection, as well as the resistance of the bacterial strain to antibiotics. It is important to always consult a doctor before taking antibiotics. Antibiotics have revolutionized modern medicine and saved countless lives. However, the emergence of antibiotic-resistant bacteria is a major problem in the health care system. Appropriate use of antibiotics is essential to ensure that antibiotics are effective for future generations. The importance of antibiotics in the health care system cannot be overstated, and it is imperative that we continue to develop new antibiotics and use them responsibly.

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