



Antibiotics and Their Side Effects

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ABSTRACT: Antibiotics work by killing bacteria and preventing them from multiplying. Common antibiotics include gentamicin, cephalexin, ertapenem, erythromycin, ciprofloxacin, and metronidazole.

They include a range of powerful drugs used to treat diseases caused by bacteria.

Antibiotics cannot treat viral infections, such as cold, flu, and most coughs.

KEYWORDS: antibiotics, work, functions, side effects, bacteria

I. INTRODUCTION

Antibiotics are powerful medications that treat certain infections and can save lives when used properly. They either stop bacteria from reproducing or destroy them.

Before bacteria can multiply and cause symptoms, the immune system can typically kill them. White blood cells (WBCs) attack harmful bacteria — even if symptoms occur, the immune system can usually cope and fend off the infection.

However, sometimes the number of harmful bacteria is excessive, and the immune system cannot clear them all. Antibiotics are useful in this scenario.[1,2,3]

The first antibiotic was penicillin. Penicillin-based antibiotics, such as ampicillin, amoxicillin, and penicillin G, are still available to treat a variety of infections and have been in use for many years.

Several types of modern antibiotics are available, and they are usually only available with a prescription in the United States. Topical antibiotics are available in over-the-counter (OTC) creams and ointments.

How do antibiotics work?

There are different types of antibiotics, which work in their unique way. However, the two main they work include:

- A bactericidal antibiotic, such as penicillin, kills the bacteria. These drugs usually interfere with either the formation of the bacterial cell wall or its cell contents.
- A bacteriostatic stops bacteria from multiplying.

It may take a few hours or days after taking the first dose before people feel better or their symptoms improve.



Types of antibiotics

There are various classes or groups of antibiotics, which depend on their chemical structure. Some classes of antibiotics include the following:

Class	Examples
Penicillins	amoxicillin (Amoxil)
Macrolides	azithromycin (Zithromax) and erythromycin (Ery-Tab)
Cephalosporins	cephalexin (Keflex) and cefdinir (Omnicef)
Fluoroquinolones	ciprofloxacin (Cipro) and levofloxacin (Levaquin)
Beta-lactams with increased activity	amoxicillin/clavulanate (Augmentin)
Urinary anti-infectives	nitrofurantoin (Macrobid)
Lincosamides	clindamycin (Cleocin)
Tetracyclines	minocycline, rolitetracycline, and doxycycline
Sulfonamides	sulfamethoxazole (Bactrim, Septra, Sulfatrim)
Glycopeptides	vancomycin (Firvanq), teicoplanin (Targocid), telavancin (Vibativ), ramoplanin
Aminoglycosides	gentamicin (Garamycin), amikacin (Arikase), tobramycin (Tobrasol), neomycin (Neosporin), and streptomycin (Agrimysin-17)

This list is not inclusive — other classes and brand names exist. In addition, penicillins, cephalosporins, and other antibiotics may be regarded as subclasses of beta-lactam drugs.

Why is it important to take antibiotics when needed?

Experts advise using antibiotics only when they are needed. This is to ensure that the bacteria is killed and is unable to multiply and spread to other parts of the body.

Also, antibiotic use can sometimes be associated with side effects and antibiotic resistance.

II. DISCUSSION

Resistance

Antibiotic resistance occurs when germs no longer respond to the antibiotic designed to kill them. Inappropriate prescription of antibiotics is driving up the incidence of antibiotic resistance.

Sometimes prescriptions of the wrong medication — or the wrong dosage — can lead to antibiotic misuse. Misuse can also occur when people do not take antibiotics as their doctor prescribes. Some measures people can take include finishing the treatment course and not sharing antibiotic medications with others— even if they have the same symptoms.

The Centers for Disease Control and Prevention (CDC) Trusted Source state that in the United States, around 47 million antibiotic courses are inappropriately prescribed to people, meaning their illness did not require antibiotics.[4,5,6]



Some bacteria — such as Enterobacterales — can become resistant to carbapenems, a major class of last-line antibiotics. Enterobacterales are an order of bacteria that can cause pneumonia, meningitis, and other diseases. *Escherichia coli* (*E.coli*) is an example of an Enterobacterales.

CRE, or carbapenem-resistant Enterobacterales, pose a major concern to people in hospitals and other healthcare settings.

Experts believe that carbapenem resistance may lead to:

a greater incidence of disease

a reduction in the effectiveness of initial antibiotic therapy

poorer outcomes

In his Nobel Prize acceptance speech in 1945, Alexander Fleming said:

“Then there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug, make them resistant.”

As the man who discovered the first antibiotic predicted, drug resistance is starting to become commonplace.

Antibiotic resistance is now considered one of the greatest public health challenges.

What do antibiotics treat?

A doctor prescribes antibiotics for the treatment of a bacterial infection. It is not effective against viruses.

Knowing whether an infection is bacterial or viral helps to treat it effectively.

Viruses cause most upper respiratory tract infections, such as the common cold and flu. Antibiotics do not work against these viruses.[7,8,9]

If people overuse antibiotics or use them incorrectly, the bacteria might become resistant. This means that the antibiotic becomes less effective against that type of bacterium, as the bacterium has been able to improve its defenses.

A doctor can prescribe a broad-spectrum antibiotic to treat a wide range of infections. A narrow-spectrum antibiotic is only effective against a few types of bacteria.

Some antibiotics attack aerobic bacteria, while others work against anaerobic bacteria. Aerobic bacteria need oxygen, and anaerobic bacteria do not.

In some cases, a healthcare professional may provide antibiotics to prevent — rather than treat — infection, as might be the case before surgery. This is the “prophylactic” use of antibiotics. People commonly use these antibiotics before bowel and orthopedic surgery.

Learn more about aerobic and anaerobic bacteria.

Side effects

Antibiotics commonly cause the following side effects:

diarrhea

nausea

vomiting

rash

upset stomach



sensitivity to sunlight, when taking tetracyclines

with certain antibiotics or prolonged use, fungal infections of the mouth, digestive tract, and vagina

Some unusual side effects of antibiotics include:

low platelet count, when taking cephalosporins, and penicillins, among others

severe aches and pains, when taking fluoroquinolones

hearing loss, when taking macrolides or aminoglycosides

low granulocyte — a type of WBC — count, when taking penicillin

formation of kidney stones, when taking sulfonamides

Some people — especially older adults — may develop C.difficile infection. They may experience bowel inflammation, which can lead to severe, bloody diarrhea.

Allergy

Some people may develop an allergic reaction to antibiotics, especially penicillin. Side effects might include:

a raised rash, or hives

swelling of the tongue and face

coughing

wheezing

difficulty breathing[10,11,12]

Allergic reactions to antibiotics might be immediate or delayed Trusted Source. This means that a person may experience adverse effects of the drug within an hour or within weeks.

Anyone who has an allergic reaction to an antibiotic must tell their doctor or pharmacist. While rare, people may experience a serious and sometimes fatal reaction to an antibiotic. They are called anaphylactic reactions.

Anaphylaxis: Symptoms and what to do

Anaphylaxis is a severe allergic reaction that can be life threatening. The symptoms develop suddenly and include:

hives

swelling of the face or mouth

wheezing

fast, shallow breathing

a fast heart rate

clammy skin

anxiety or confusion

dizziness

vomiting

blue or white lips



fainting or loss of consciousness

If someone has these symptoms:

Check whether they are carrying an epinephrine pen. If they are, follow the instructions on the side of the pen to use it.

Dial 911 or the number of the nearest emergency department.

Lay the person down from a standing position. If they have vomited, turn them onto their side.

Stay with them until the emergency services arrive.[13,14,15]

Some people may need more than one epinephrine injection. If the symptoms do not improve in 5–15 minutes, or they come back, use a second pen if the person has one.

People with reduced liver or kidney function should be cautious when using antibiotics. This may affect the types of antibiotics they can use or the dose they receive.

Likewise, people who are pregnant or nursing should speak with a doctor about the best antibiotics to take.

III. RESULTS

Individuals taking an antibiotic should not take other medicines or herbal remedies without speaking with a doctor first. Certain OTC medicines might also interact with antibiotics.

Some doctors suggest that antibiotics can reduce the effectiveness of oral contraceptives. However, research does not generally support this.

Nonetheless, people who experience diarrhea and vomiting or are not taking their oral contraceptive during illness due to an upset stomach might find that its effectiveness reduces.

In these circumstances, doctors may recommend people take additional contraceptive precautions.

Doctors may also advise avoiding alcohol for certain drugs, such as doxycycline. However, drinking alcohol in moderation is unlikely to cause problems with the most commonly used antibiotics.

Learn more about avoiding alcohol for certain drugs.

How to use

People usually take antibiotics by mouth. However, doctors can administer them by injection or apply them directly to the part of the body with infection.

Most antibiotics can start working within a few hours. Doctors advise people to complete the whole course of medication to prevent the return of the infection.

Stopping the medication before the course has finished increases the risk that the bacteria will become resistant to future treatments. The ones that survive will have had some exposure to the antibiotic and may consequently develop resistance to it.

An individual needs to complete the course of antibiotic treatment even after they notice an improvement in symptoms.



Doctors and the leaflet provided with the drug provide specific instructions on how to take the medication correctly.[16,17,18]

People can follow some tips for using antibiotics Trusted Source effectively, such as:

- Avoiding alcohol when using metronidazole.
- Avoiding dairy products when taking tetracyclines, as these might disrupt the absorption of the medication.
- Taking the medication at the same time, or at set times in the day — this depends on how many times a day a person needs to take the drug.

IV. CONCLUSION

Antibiotics can have side effects such as diarrhoea and feeling sick.

These side effects are usually mild and should pass once you finish your course of treatment.

If you get any additional side effects, contact your GP or the doctor in charge of your care for advice.

Antibiotic allergic reactions

Rarely, some people may have an allergic reaction to antibiotics, especially penicillin and cephalosporins.

In most cases, the allergic reaction is mild to moderate and can take the form of:

- a raised, itchy skin rash (urticaria, or hives)
- coughing
- wheezing
- tightness of the throat, which can cause breathing difficulties

These mild to moderate allergic reactions can usually be successfully treated by taking antihistamines.

But if you're concerned, or your symptoms do not get better with treatment, call your GP for advice. If you cannot contact your GP, call NHS 111.

In rare cases, an antibiotic can cause a severe and potentially life-threatening allergic reaction known as anaphylaxis.[19]

Call doctor now if:

- you have a skin rash that may include itchy, red, swollen, blistered or peeling skin
- you're wheezing
- you have tightness in your chest or throat
- you have trouble breathing or talking
- your mouth, face, lips, tongue or throat start swelling

You could be having a serious allergic reaction and may need immediate treatment in hospital.

Tetracyclines and sensitivity to light



Tetracyclines can make your skin sensitive to sunlight and artificial sources of light, such as sun lamps and sunbeds.

Avoid prolonged exposure to bright light while taking these medicines.

Fluoroquinolones

Severe aches and pains

In very rare cases, fluoroquinolone antibiotics can cause disabling, long-lasting or permanent side effects affecting the joints, muscles and nervous system.

Stop taking fluoroquinolone treatment straight away and see your GP if you get a serious side effect including:

- tendon, muscle or joint pain – usually in the knee, elbow or shoulder
- tingling, numbness or pins and needles

Heart problems

Fluoroquinolone antibiotics can cause serious side effects in people who are at risk of heart valve problems.

Stop taking fluoroquinolone treatment straight away and see your GP if you get a serious side effect including:

- swollen ankles, feet and legs (oedema)
- new heart palpitations (heartbeats that suddenly become more noticeable)
- sudden shortness of breath

Reporting side effects[20]

The Yellow Card Scheme allows you to report suspected side effects from any type of medicine you're taking.

It's run by a medicines safety watchdog called the Medicines and Healthcare products Regulatory Agency (MHRA).[21]

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