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UNIT 12

Pharmacy

برنامج محمد بن راشد للتعلم الذكي
Mohammed Bin Rashid Smart Learning Program

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Introduction

Pharmacy is the study of drug action and the effects that they have on our body. For example; our cells, organs, bodies and any other living things. Throughout our lives, we have taken some form of medication. So, it is important to have a basic understanding of pharmacy. The study of pharmacy has led to the discovery of many medicines such as painkillers, antihistamines and antibiotics. All of these drugs help to improve many lives. Allergies, infections and even cancer have all become more manageable due to modern drugs. Pharmacy has made a huge impact on the development of such drugs. If you are going on to study nursing, medicine, dentistry, pharmacy or many other medical professions, this unit will be helpful.

In this unit, you will learn the major principles of pharmacy. You will learn how different drugs are classed and how they are administered. You will learn about the uses of antibiotics, commonly used measurements and formulas used in pharmacy, and finally, how to administer and store drugs safely at home.

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Learning outcomes

Standard HSC.3.9.01: Identify the major principles of pharmacy and medical mathematics and describe the safety measures of drug administration and storage at home.

Learning outcomes:

HSC.3.9.01.001	State the major principles of pharmacy.
HSC.3.9.01.002	Identify classes of drugs and their administration.
HSC.3.9.01.003	Identify the appropriate use of antibiotics.
HSC.3.9.01.004	Demonstrate the correct use of measurements and formulas that apply to pharmacy.
HSC.3.9.01.005	Identify the safety measures required for drug administration and storage at home.
HSC.3.9.01.006	Demonstrate scientific report writing.

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Keywords

Word	Form	Definition
abbreviation	noun	a shortened form of a word or name that is used in place of the full word or name
absorption	noun	how something gets into something else; how the drug gets into the bloodstream
administration	noun	to provide something
agonist	noun	connects to a receptor and produces a maximum effect
diffusion	noun	spread out over a large space
distribution	noun	the way something is shared; which part of the body a drug goes to
dosage	noun	the amount and how often you should take a medication or drug
metabolism	noun	what the body does to break down the drug
pharmacodynamics	noun	the effect that drugs have on the body
pharmacokinetics	noun	the study of what happens to drugs once they enter the body
pharmacy	noun	the study of drugs and the effect they have on the body
prescription	noun	a written message from a doctor that officially tells someone to use a medicine
procedures	noun	a set of actions that are an accepted way of doing something
receptors	noun	part of a cell that, when connected to a substance, causes a chemical change within the cell
side effect	noun	an often harmful and unwanted effect of a drug; this normally happens along with the desired effect
solution	noun	a liquid mixture of different components
plagiarise	verb	when the work of one person is copied by someone else and it is not referenced

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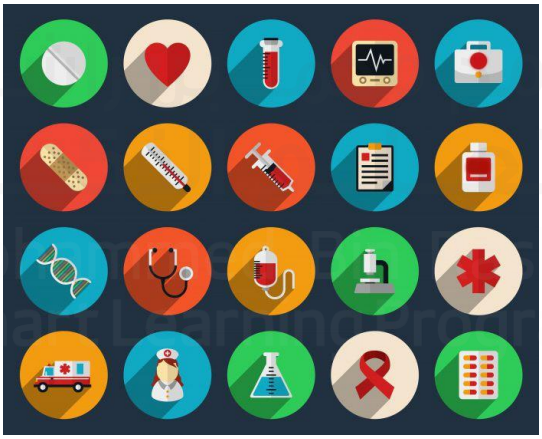
12.1 The major principles of pharmacy

What is pharmacy?

Pharmacy is the science of collecting, preparing and dispensing drugs. The healthcare professional who does this is called a pharmacist.

Pharmacy is a part of chemistry and biology. It is the study of drug action and the effects that they have on our bodies.

You may be familiar with the word pharmacy as it is the name of the shop that sells medicines and health-related items. Perhaps after an appointment with a doctor, you would visit the pharmacy to collect a prescription. A prescription is medication which the doctor has requested for you to take in order to improve or cure your condition. However, you don't always need a prescription to visit a pharmacy as they sell many items.



Everyone will take some form of medication during their life. It is important to have a basic understanding of pharmacy and to find out how drugs work in the body.

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Pharmacokinetics and pharmacodynamics

Let's look at two major principles of pharmacy; pharmacokinetics and pharmacodynamics.

Break it down

Phar-ma-co-kin-et-ics
Phar-ma-co-dy-nam-ics

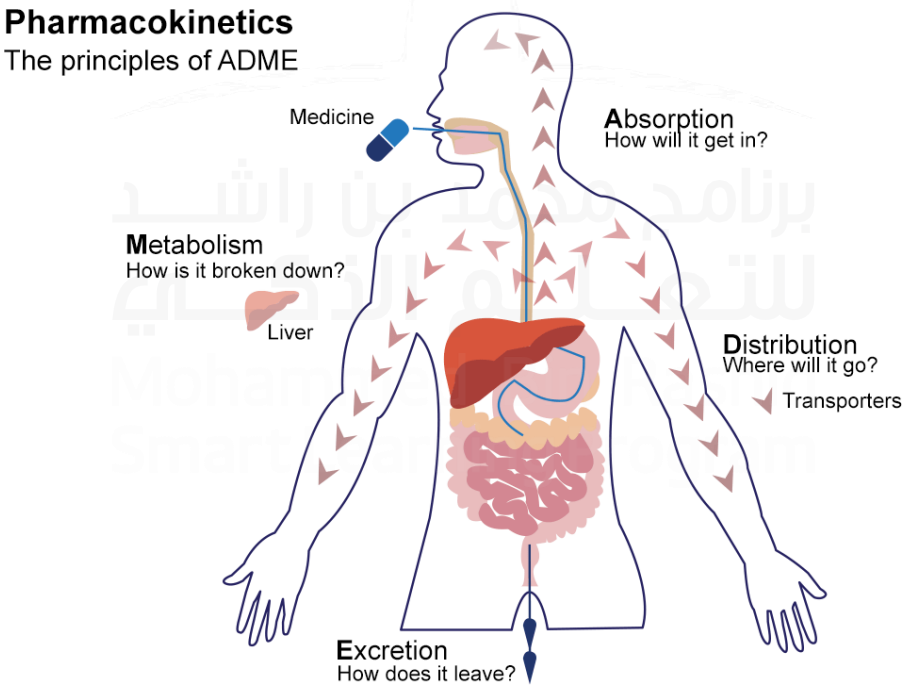
Pharmacokinetics is the study of what the body does to the drug.

Pharmacodynamics is the study of what the drug does to the body.

Pharmacokinetics

This describes what the body does to the drug. The four stages of pharmacokinetics are:

- How the medicine gets into the body – this is called **absorption.**
- Where the medicine goes in the body – this is called **distribution.**
- What the body does to the medicine – this is called **metabolism.**
- How the body gets rid of the medicine – this is called **excretion.**



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12.1 The major principles of pharmacy

Pharmacodynamics

This describes the effect that a drug has on the body. The key points to consider in pharmacodynamics are:

- What does the drug do to the body?
- What receptors are activated?
- What other effects does the drug have?

There are factors that influence pharmacodynamics, these are:

- Patient age
- Disease type
- Other drugs in the body
- Pregnancy

Further information

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Receptors

When a drug enters the body, it starts interacting with receptors. Receptors are the parts of a cell that connect to a substance and cause a chemical reaction in that cell.

There are many types of receptors for different purposes. Cell receptors can be on the outside or the inside of the cell. If they are on the outside, they are known as cell surface receptors. If they are on the inside, they are known as intracellular receptors.

When a drug connects to a receptor, the level of the response differs. There are three different levels of response.

Full agonist

When a drug connects to a receptor and produces a maximum effect.

Partial agonist

When a drug connects to a receptor and produces less than a maximum effect.

Antagonist

When a drug connects to a receptor, but there is no effect.

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12.2 Classes of drugs

Classes of drugs

Drugs are chemicals. When drugs enter the body, they bind to receptors and have an effect on the functioning of the body.

Medicines are a type of drug which are used to do the following:

- Ease symptoms, e.g. painkillers to treat a headache.
- Cure acute diseases, e.g. antibiotics to cure a bacterial infection.
- Control chronic diseases, e.g. insulin medication to treat diabetes.

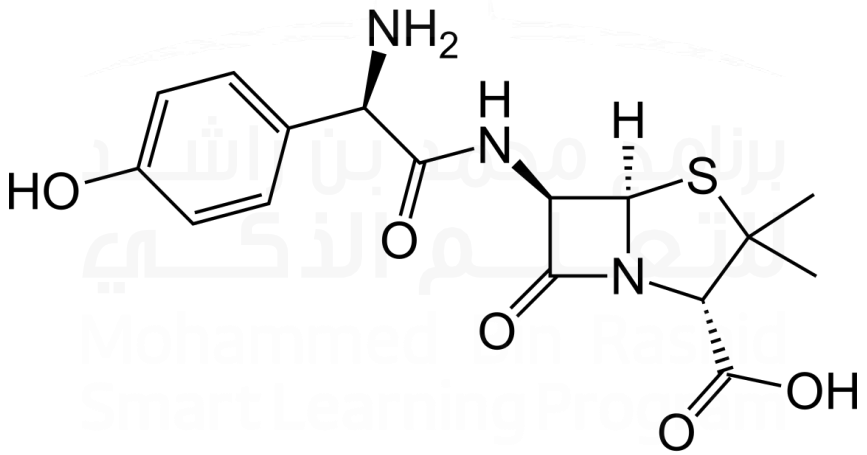
Advances in medicine have seen drugs cure many diseases and save lives.

Naming drugs

In the majority of cases, drugs have three different names.

Chemical name

When a drug is first discovered, it is given a chemical name. This name describes the molecular structure of the drug. Chemical names are often very long and usually too difficult for general use. Therefore, the chemical name is not often used.



amoxicillin

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Example

The chemical name for amoxicillin is (2S,5R,6R)-6-[[(2R)-2-amino-2-(4-hydroxyphenyl)acetyl]amino]-3,3-dimethyl-7-oxo-4-thia-1-azabicyclo[3.2.0] heptane-2-carboxylic acid.

Generic name

After the chemical name is formed, the drug then needs to be approved by a government agency who makes sure that the drug is safe and effective when used. At this point, it is given a generic name which is the name the drug will be commonly known as. The generic name for the drug in the previous example is amoxicillin. Other generic drug names are paracetamol, metformin, and ibuprofen.

Brand name

This is the name developed by the company who create the drug. Brand names must be unique, so they cannot be mistaken for another. Brand names are usually catchy and often related to the use of the drug. Examples of brand names are:

- Skelaxin – relaxes skeletal muscles
- Lopressor – lowers blood pressure
- Glucotrol – controls high blood glucose.

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12.2 Classes of drugs

Drug groups

Drugs will belong to a specific group. Drug groups generally reflect what the drug does or the area of the body it affects.

Painkillers

Painkillers are used to manage pain. The type of painkiller used depends on the type of pain you have. Painkillers are available to buy over the counter without a prescription from a doctor.

When the body has an injury, disease or is damaged, the tissues in the area release chemicals which communicate with the nerves. The nerve pathway then carries the message from the area to the spinal cord and up to the brain. Painkillers interfere with the nerve pathway and change the way you feel pain.

Example

Panadol belongs to the painkillers group.

Paracetamol

Paracetamol is an example of the generic name for a painkiller. It has very few side effects and is available in many forms. Paracetamol relieves pain and reduces fever; it treats conditions such as:

- Headaches
- Muscle aches
- Arthritis
- Backaches
- Colds
- Fever

Research: Paracetamol

In pairs, research as many products that contain paracetamol as you can.

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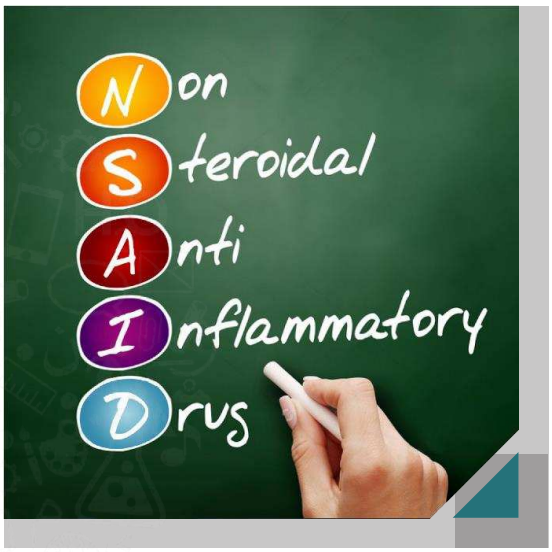
NSAIDs (Non-steroidal anti-inflammatory drugs)

This medication will relieve or reduce aches and pains caused by inflammation. Inflammation is the immune system's response to infection and injury. Heat, redness, swelling and pain are all signs and symptoms of inflammation. NSAIDs reduce the effect of inflammation on the nerve pathway while also easing pain, heat and swelling.



NSAIDs are available to buy over the counter without a prescription from a doctor. Taking high doses of NSAIDs for a long period of time can cause ulcers to develop in the stomach. This can be very painful. You should never take more than one type of NSAID at the same time.

Ibuprofen

Ibuprofen is an example of the generic name of an NSAID. It is used to treat conditions such as:

- Toothaches (swollen gums)
- Migraines
- Pain
- Fever
- Inflammation of the joints (arthritis)
- Swelling

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12.2 Classes of drugs

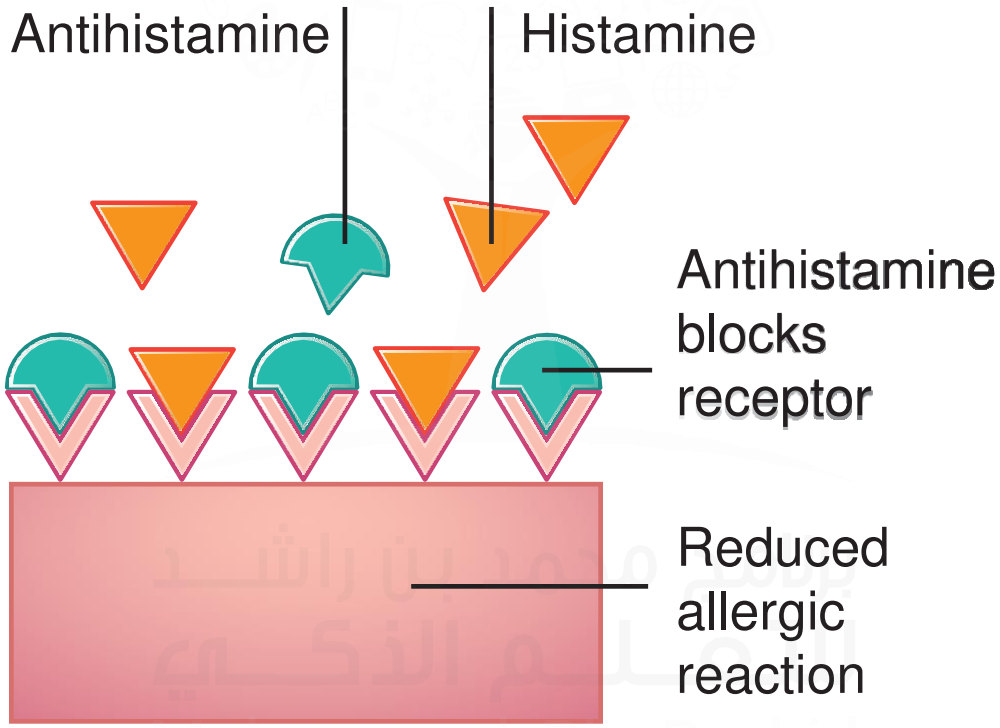
Antihistamines

Break it down

An-ti-his-ta-mines

These are medicines used to treat allergies and reactions to bites and stings. They are also sometimes used to help with motion sickness. Most antihistamines can be bought over the counter, but some are only available on prescription. They come in several different forms, including tablets, capsules, liquids, creams, eye drops and nasal sprays.

Antihistamines work by stopping a substance called histamine affecting the cells of the body. Histamine is a chemical that is released when the body detects something harmful.



Further information

Antihistamines work by blocking histamine receptors. Histamine receptors are located in many places of the body. Some histamine receptors are found in the brain and they make you feel awake and alert. Blocking these receptors with antihistamines can cause the patient to feel tired or drowsy.

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12.3 Routes of administration

Routes of administration

Keyword

administration

to provide something

You have probably taken many different kinds of medication. Some drugs are taken by mouth, such as tablets like Panadol. People who have asthma may use an inhaler. Some people may have used gels or creams as pain relief or to stop an infection. In more serious cases, medication can also be given intravenously (injected into a vein) in a hospital.

The route of administration tells us how the drug has entered the body. Each drug has a specific method in which it should enter the body. The route used depends on three main factors:

- The part of the body being treated.
- How the drug works within the body.
- The formula of the drug.

There are many routes of administration. It is important to understand the various routes and how they can affect the absorption of a drug.

You will learn about some of the routes of administration on the following pages.

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Oral

This route is the most commonly used. It is where the patient takes medication through the mouth. Drugs taken orally are normally pills or capsules. The pill or capsule is broken apart along the way to the intestines and then dissolved and transported into the bloodstream. Once it is in the bloodstream, it can act on various organs of the body including the brain.

Advantages

- It is the easiest, safest and most cost-effective route.
- Tablets and capsules are very stable drugs. This means they provide a very accurate dose for the patient.
- There are "slow-release" forms available. This means that the drug releases slowly over a set time period, like twelve or twenty-four hours. Patients will only need to take a tablet once or twice a day.

Disadvantages

- The unpredictable absorption of a drug - if there is food present in any part of the digestive system, this may change the rate of absorption. Because of this, the drug may not have the desired effect.
- Slow absorption - drugs taken orally are absorbed into the body slower than other routes. It takes a while for the drug to start showing any effects. If an immediate effect was needed, it would be better to use a different route of administration.

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12.3 Routes of administration

Sublingual and buccal

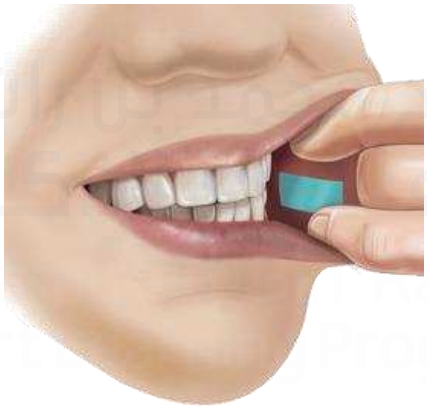
These are two methods of giving medication via the mouth. They are not common methods of administration, but they are used in emergencies, for example during a heart attack.

Sublingual administration

The drug is placed under the tongue. It will dissolve and absorb into the blood through the tissue under the tongue.

Buccal administration

The drug is placed between the gum and cheek. Here it will be dissolved and absorbed into the blood.



These areas of the mouth have a lot of tiny blood vessels. Absorption of the drug is very fast because it does not have to go through the digestive system.

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Advantages:

- Lower doses can be given because the drug goes straight into the bloodstream.
- If a patient is unable to swallow tablets, this is a good alternative.
- If oral tablets cause the patient to suffer from side effects such as nausea, using one of these routes is an easier alternative.

Disadvantages:

- It can be uncomfortable for a patient to hold the drug in their mouth for a long period of time.
- A patient can accidentally swallow the drug. This will take longer to have the desired effects. Another dose cannot be given as this can lead to an overdose.
- If the patient eats or drinks while the medication is in their mouth, it can affect how the drug is absorbed and how well it works

Topical

The drug is administered in the form of a cream, gel or ointments and applied directly to the area that needs treating. This is used when the area needed to be treated is easy to reach. It includes areas such as the skin, eyes, ears and nose.

Advantages

- Topical medication is easy to apply for any age.
- It is useful if treatment is only needed in a specific area.
- Low risk of side effects and affecting other drugs.

Disadvantages

- Creams, gels, ointments etc. are not well absorbed into deeper layers of the skin.
- Absorption can be slow.
- Creams and ointments applied to the skin can stain clothes.

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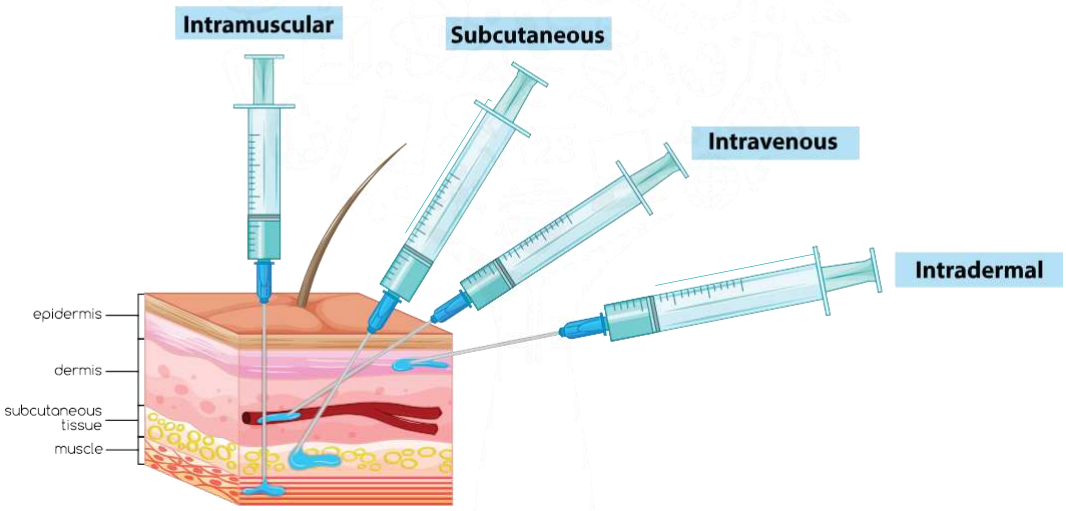
12.3 Routes of administration

Parenteral

The most common type of parenteral administration is the use of injections. There four different types of injection, these are:

- Intradermal – the drug is injected into layers of skin e.g. vaccinations.
- Intravenous – the drug is injected into the bloodstream through a vein e.g. morphine.
- Subcutaneous – the drug is injected into the fat layer under the skin e.g. insulin.
- Intramuscular – the drug is injected into the muscle e.g. paracetamol.



Advantages

- The drug action is fast so it is suitable for use in an emergency.
- It is useful in unconscious patients.
- It is suitable when orally administered drugs do not work.

Disadvantages

- They require aseptic (disease-free) conditions and preparation should be sterile.
- The equipment is expensive.
- The technique can be uncomfortable or painful for the patient.
- Most injections cannot be self-administered as they require a trained medical professional.
- They can be dangerous if administered incorrectly.

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Below shows the time taken for each route of administration to have an effect:

Route of administration	Time until effect
Oral	20 minutes – 1 hour
Sublingual and buccal	3-5 minutes
Topical	Variable (minutes to hours)
Subcutaneous	15-30 minutes
Intravenous	30-60 seconds
Intramuscular	10-20 minutes

Routes of administration and forms of medication:

Oral medication	Sublingual and buccal medication	Topical medication	Parenteral medication
Capsules Liquids Drops Pastilles Powder	Small tablets Films Wafers Sprays	Creams Lotions Gels Ointments Sprays Inhalers Liquids	Injections Infusion

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12.4 Antibiotics

What are antibiotics?

Break it down

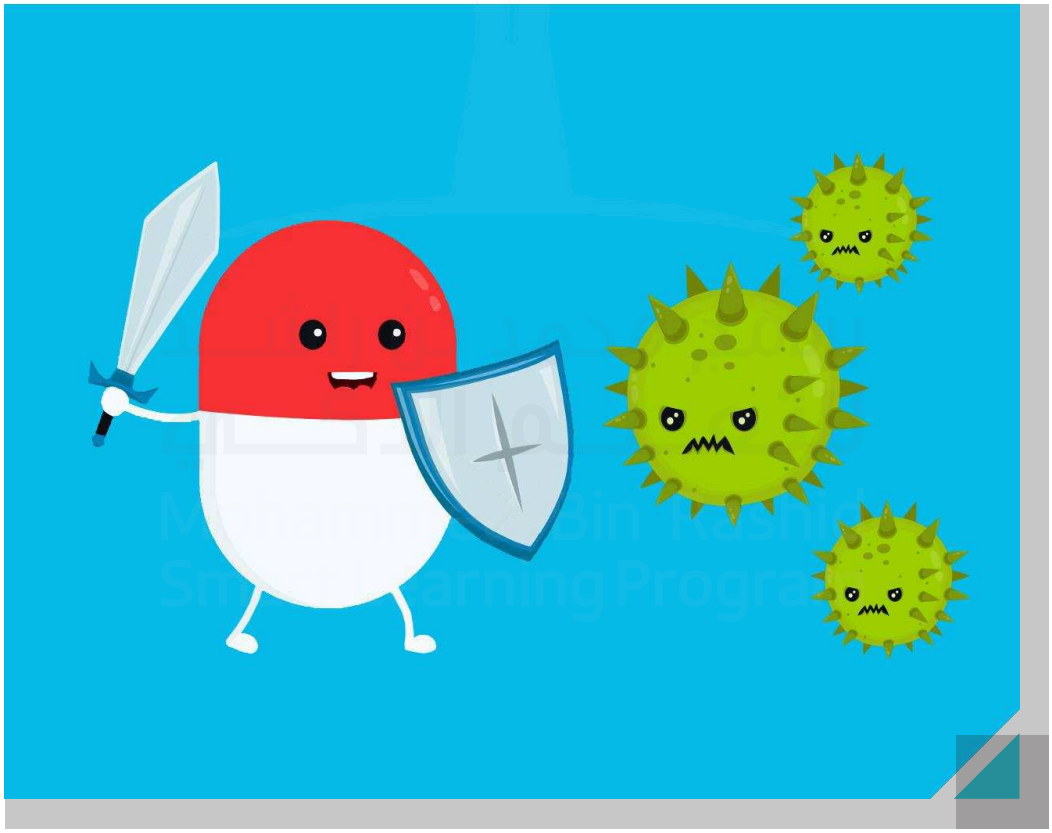
An-ti-bi-ot-ics

Antibiotics are medications that either destroy or slow the growth of bacteria. They include a range of powerful drugs and treat diseases which are caused by bacteria.

Remember

Antibiotics cannot fight viral infections such as the common cold or COVID-19.

Normally when bacteria multiply in the body, the immune system can kill them and fight the infection. However, sometimes the body's own immune system cannot fight all the bacterial cells by itself. This is when antibiotics are used. When antibiotics are used properly, they can cure infection and they can even save lives.



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Did you know?

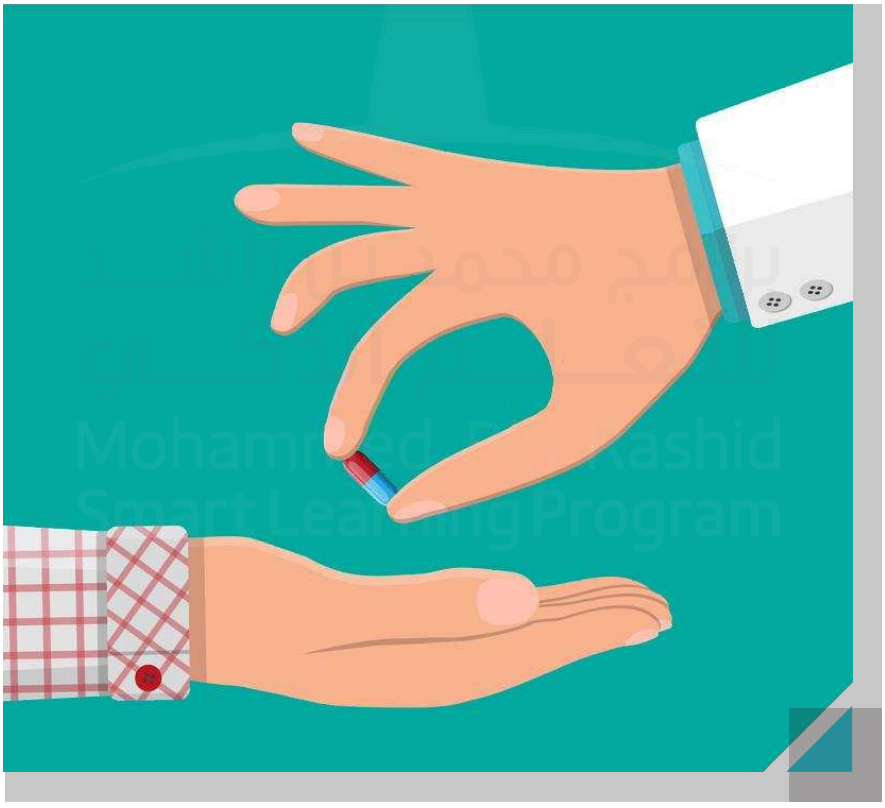
The first antibiotic was penicillin. It was discovered in 1928 and it is still very widely used today.

There are now many antibiotics available. In the UAE, you may only get antibiotics with a prescription from the doctor. It is against the law to buy antibiotics over the counter without a prescription.

Using antibiotics

Peopleusuallytakeantibioticsorally. Theycanalsobeadministeredviaaninjectionordirectly applied to the part of the body that is infected using the topical route of administration.

Most antibiotics begin fighting bacteria within a few hours. It is important to complete the whole course of medication even after symptoms of the infection have improved. This means you should take all of the antibiotics that you have been prescribed by the doctor even if you feel well again. By doing this, it reduces the risk that bacteria will become resistant to the antibiotics.



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12.4 Antibiotics

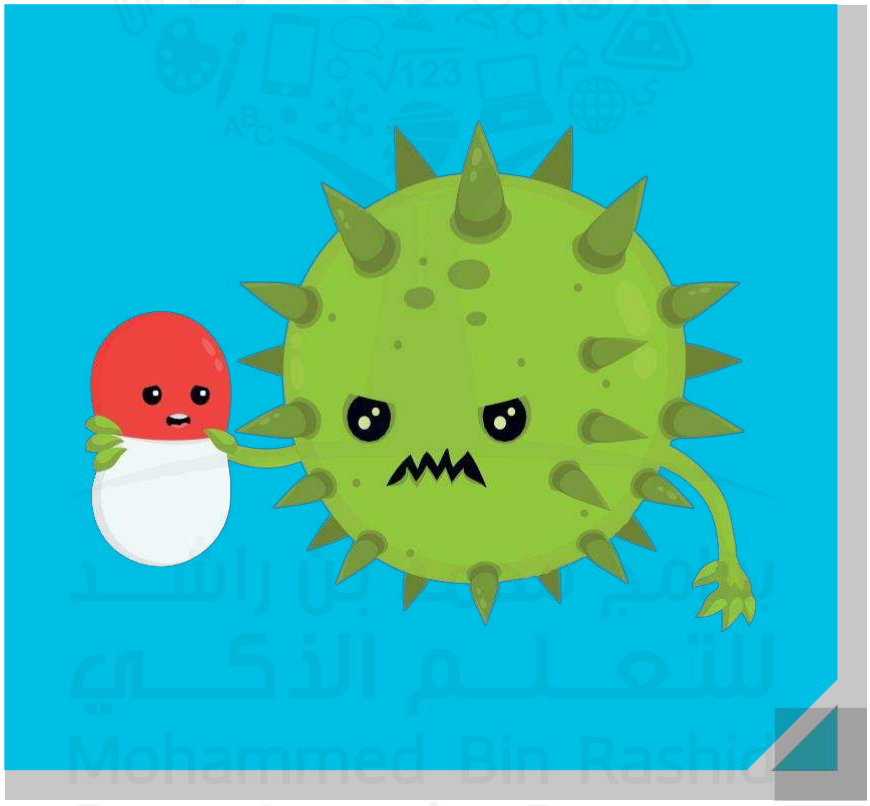
Antibiotic resistance

Keyword

resistance

stopping something from having an effect

Some medical professionals believe that people are overusing antibiotics. This overuse explains the growing number of bacteria that are becoming resistant to antibiotic medications. In other words, the antibiotic becomes useless against the bacteria because the bacteria have improved their defences.



Antibiotics should only be prescribed to treat conditions:

- that are not very serious but are unlikely to clear up without the use of antibiotics.
- that are not very serious but could spread if not treated.
- where antibiotics can significantly speed up recovery time.
- where the risk of not prescribing antibiotics can lead to more serious complications.

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Side effects of antibiotics

Keyword

side effect

a harmful and unwanted effect of a drug that happens alongside the desired effect

Side effects don't always occur. The chances of feeling side effects from medication will depend on the drug taken, and if it has been taken as advised by the doctor or pharmacist. Some medications show side effects in more than 1 out of every 10 people. Other medications only show side effects in 1 out of every 10,000 people. Side effects also range from mild to life-threatening conditions, although these are very rare. The risk of feeling side effects varies from person to person.

Antibiotics can cause the following common side effects:

- diarrhoea
- nausea
- vomiting
- rash
- upset stomach

Less common side effects:

- kidney stones
- blood clotting
- blood disorders
- bowel inflammation

Think

Experiencing side effects from any medication is different from having an allergic reaction to that medication.

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12.5 Measurements and formulas

Mathematics in pharmacy

Using math in pharmacy is very important.

Think

Any errors in calculations can result in underdosing or overdosing which can be dangerous to a patient.

Abbreviations used in drug preparation and administration

Abbreviations are used every day by healthcare professionals. They are an important part of medical terminology.

Keyword

abbreviation

a shortened form of a word or name that is used in place of the full word or name

It is very important for healthcare professionals to understand abbreviations. This is especially when they prepare and administer medications for patients. Doctors will often use abbreviations on prescriptions.

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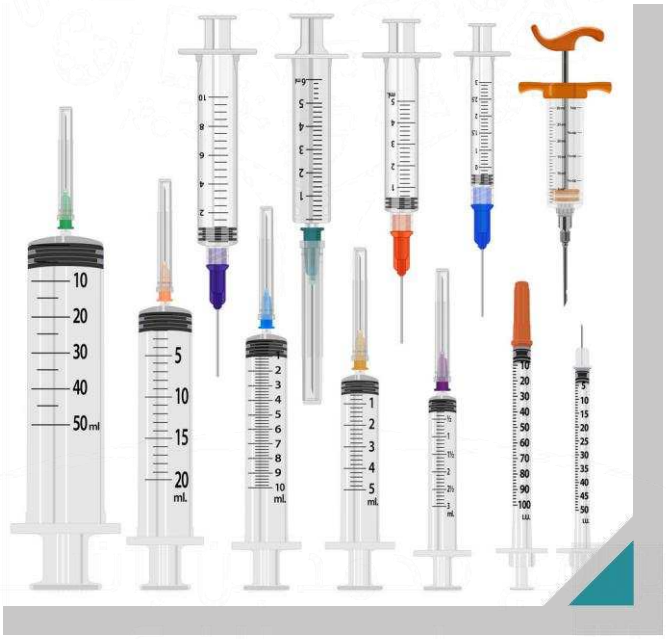
Common abbreviations include the following:

Measurements	
Abbreviation	**Meaning**
kg	kilogram
g	gram
mg	milligram
mcg	microgram
ml	millilitre
tsp	teaspoon (5ml)



Routes of administration	
Abbreviation	**Meaning**
IM	Intramuscular
IV	Intravenous
PO	Oral
SC	Subcutaneous
SL	Sublingual
TOP	Topical

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12.5 Measurements and formulas

Common unit conversions

It is important to be able to convert (change) commonly used units of measurements. Correct unit conversion makes sure the wrong dose of a medication is not given to a patient.

Solids		
1 kg = 1000g	1g = 1000mg	1 mg = 1000mcg
3 kg = 3000g	4 g = 4000mg	2 mg = 2000mcg

Volume	
1000ml = 1L	5000ml = 5L

Time	
60 sec = 1 min	60 min = 1 hour
180 sec = 3 min	120 min = 2 hours

Example

Convert 0.001kg to mg	
0.001kg X 1000 = 1g	Multiply the kg number by 1000. This will give you the gram weight.
1g X 1000 = 1000mg	Multiply the g number by 1000. This will give you the mg weight.
Answer = 1,000mg	

Convert 1,000ml to litres	
1000 ÷ 1000 = 1L	Divide the ml number by 1000. This will give you the litre volume.
Answer = 1L	

Convert 240 seconds to minutes	
240 ÷ 60= 4 minutes	Divide the seconds number by 60 because there are 60 seconds in 1 minute.
Answer = 4 minutes	

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Drug formulas in pharmacy

Calculating drug dosages

Tablet dosage

This is used to calculate how many tablets will be needed to fill a prescription from a doctor. This is also known as the "basic formula".

Desired dose ÷ stock strength = number of tablets needed

Example

The GP prescribed 120mg of a drug. The drug is only available in 30mg tablets. How many tablets should be given to the patient?

Answer:

Desired dose	Equation	Stock strength	Equals	No. of Tablets
120 mg	÷	30 mg	=	4

The GP prescribed 200mg of a drug. The drug is only available in 40mg tablets. How many tablets should be given to the patient?

Answer:

Desired dose	Equation	Stock strength	Equals	No. of Tablets
200 mg	÷	40 mg	=	5

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12.5 Measurements and formulas

Mixtures and solution

To calculate the amount of a solution that should be given to the patient we can use the following formula.

Desired dose ÷ stock strength x stock volume = amount of solution

Example

The doctor prescribed 120mg paracetamol liquid 4 times a day. The drug is available in 250mg/5ml. How much liquid is needed per dose?

Answer:

Desired dosage	Equation	Stock strength	Equation	Stock volume	Equals	Amount of solution required
120mg	÷	250mg	X	5ml	=	2.4ml per dose

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Calculate IV rate

This calculation is used mainly in a hospital setting. It calculates the rate of administration of IV fluids. This can be calculated over either minutes or hours.

Total IV volume ÷ time (hours or minutes) = ml administrated per hour or minute

Example

The doctor wants to administer a drug intravenously. 120ml of liquid X needs to be administered by IV over a period of 6 hours. How much liquid is administered per hour?

Answer:

Total IV Volume	Equation	Time (Hours)	Equals	mls administered
120ml	÷	6	=	20ml per hour

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12.6 Safety measures in drug administration

Safety measures

Safety measures are procedures taken to make sure that drugs are administered or taken in a safe way. This is to prevent any harm to the patient.

Keyword

procedures

a set of actions that are a good way of doing something

Drugs can be given to a patient in a clinical setting by different healthcare professionals.

Many drugs are also kept at home. This is so people can medicate themselves if they need to.

Example

Your parents may keep paracetamol at home in case they get a headache.

If safety measures are not followed, then there is a chance there will be a medication error. This is when the patient takes the wrong medication at the wrong time or in the wrong dose. The effects of these errors can range from minor to fatal.

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How to safely administer drugs

Nurses are mostly involved in the administration of drugs in a hospital. At home, the administration of drugs can be given by a responsible caregiver. There are six rules to follow if you are asked to give drugs to a family member. These rules are known as 'the six rights of drug administration'.

The six rights of drug administration

1. Right drug

The correct drug must be given to the patient. Errors can happen when the pharmacy dispenses the wrong drug. A caregiver can also administer the wrong drug to a patient. This sometimes happens if the drugs have a similar name. Always make sure you are using the correct drug every time you administer them.

2. Right patient

Give the drug to the right patient. Errors can happen at the pharmacy when two people have very similar names. At home, there may be many medications for different people kept in the same place. To avoid this, the caregiver should double-check the patient's name and date of birth when collecting and administering the drug.

3. Right dosage

Give the medication at the correct dose as directed by the doctor. If you are unsure, you should always check with the patient's doctor or the pharmacy where the drugs were collected from.

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12.6 Safety measures in drug administration

4. Right route of administration

The medication should only be given by the route it was prescribed for by the doctor. Healthcare professionals should be aware of normal routes of administration as patients can sometimes get confused.

5. Right time

The medication should be given at the correct time as prescribed by the doctor. Thirty minutes before or after the prescribed time is acceptable. Be aware that some medication must be taken on an empty stomach and some medication should be taken with food. Healthcare professionals should know this when giving you advice.

6. Right documentation

If a nurse administers medication, they should make a record as soon as possible. This is so another nurse will not double up on the dose. This is also useful at home. You should record:

- When (what day and time)
- What (medication, dose, route)
- Any side effects

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How to safely store drugs

1. **Store all medication out of reach and sight of children.**

   If your bag contains any medication put it high up and avoid leaving medicines on a desk or table at home.

2. **Think about products that you might not think of as medicines.**

   Vitamins, creams, eye drops, and hand sanitizer can all be harmful to children.

3. **Make sure that you close your medicine caps tightly after each use.**

   Many medicines have child-resistant caps. This makes it harder for children to get into medicine bottles.

4. **Put medicine away after every use.**

   Even if you are taking medicine every few hours, don't keep the medication on the table where a child can reach it. Put them away after each use.

5. **Make sure to check the best before dates on medicines.**

   Dispose of them in a proper manner. Do not put them in the bin or pour them down the drain. Drugs that are out of date should be taken to a pharmacy.

6. **Be careful in places you visit with a child.**

   You know where medicines are kept in your own home. Be aware when visiting a family members house.

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12.7 Scientific report writing

Scientific reports

Discussion: Scientific reports

Have you ever heard of a scientific report? What kind of things do you think a document like this would contain? Discuss with your class.

A scientific report is a document that contains valid and reliable information. It can contain information about research that has been carried out by the author of the report. It can also contain a summary of research that has been carried out by others.

A scientific report will usually be made up of the following parts:

1. Hypothesis
2. Title
3. Abstract
4. Authors
5. Introduction
6. Methods
7. Research design
8. Results
9. Discussion
10. Conclusion
11. Recommendations
12. References

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1. Hypothesis

The hypothesis is a theory that you are trying to prove, it is not a question. You must be able to test your hypothesis.

Example

People who eat fast food multiple times per week are more likely to be overweight and develop heart disease.

2. Title

The title of the report will give the reader a small amount of information. This is so they understand what to expect from the report. Make the title interesting.

3. Abstract

This is a brief summary of the report. It includes a small amount of information about what you did and why. It identifies the problem, and it will also briefly explain your findings and recommendations based on your findings.

4. Authors

You should include the names of all authors who have worked on your report or findings.

5. Introduction

This is some information about the topic, the reasons for doing the report and the objectives.

6. Methods

In the methods section, details are given about the exact process that was taken to carry out the research, experiment or questionnaire.

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12.7 Scientific report writing

7. Research design

In some cases, people conduct their own research, or they carry out analysis on data that already exists. Research can be quantitative or qualitative. It can be done in a clinical setting, by questionnaire, or it could be lab-based (involves doing experiments). The research design should be explained in the methods section.

8. Results

If you carried out an experiment or survey, for example, you would include the findings from your research. You do not write your own opinion. Results should be based on facts.

9. Discussion

In this section, you will explain your findings from your research. You will identify the meaning of your findings and if they prove your hypothesis.

10. Conclusion

This section is brief. It is a summary of your report. You can also mention anything that you would do differently if you had a chance to do it again.

11. Recommendations

This is where you could provide recommendations for individuals based on the results of your research.

12. Referencing

This is a record of any sources of information or text that you used in your scientific report. You should provide details and so the exact information can be found by anyone reading your report. If you do not reference another person's work, you are basically stealing their knowledge. This is known as plagiarism.

Keyword

plagiarise

when the work of one person is copied by someone else and it is not referenced

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