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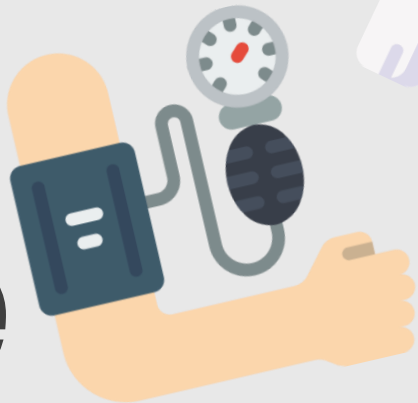
Medical Devices Made Simple



DON'T MISS THE
KIDS' CORNER
A special fun page
just for kids

KCL Biomedical Engineering – Group Eels

Glucometer

A device that quickly measures blood sugar (glucose) levels

Key Features

Quick and Easy: Provides results in just a few seconds

Portable and lightweight: small enough to fit in a pocket or bag

User-Friendly: Simple Interface, making it easy for anyone to use

Physical Characteristics

Consists of a:
Glucometer – measures glucose levels

Disposable test strips – to insert the blood into the device

Lancet– a small needle to prick the finger to retrieve a drop of blood

Interesting Facts

1. Before glucometers, doctors tested urine instead of blood to estimate sugar levels, but it wasn't as accurate or immediate.
2. The first glucometer, called the Ames Reflectance Meter, was invented in the 1970s and was originally the size of a large book!
3. Dogs can be trained to detect low blood sugar in people with diabetes by sensing changes in their owner's scent—sometimes even before a glucometer picks it up!

Why It's Important

Knowing your blood sugar (glucose) levels is essential for managing diabetes and maintaining overall health.

Where is it used?

Ideal for hospitals, clinics, and home monitoring - helps to detect high and low blood sugar levels - essential for people with diabetes to manage to condition

What does it measure

Blood sugar levels is measured in milligrams per decilitre (mg/dL)

How to Use the Device

Step 1: Insert the test strip into the glucometer

Step 2: Use the lancet to prick your fingertip for a drop of blood

Step 3: Place the blood drop on the test strip.

Step 4: Wait a few seconds for the device to display your glucose level

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Hearing Aids

A compact, non-invasive device that help individuals with hearing loss regain access to sounds

Key Features

Provides **clear sound amplification** instantly, enhancing hearing with minimal effort

Easily worn throughout the day and discreetly carried in your pocket or bag

Designed to be **simple and comfortable** for users of all ages, with easy-to-use controls

Physical Characteristics

Size: Compact and discreet, designed to fit comfortably in or behind the ear

Weight: Lightweight (around 2 – 6 grams)

Power: Battery-operated (with long-lasting life, many featuring rechargeable options)

Where is it used?

Ideal for individuals with hearing loss/disorder, to improve communication and sound clarity.

What is it capable of

1. Speech clarity: Improves understanding of speech, especially in noisy environments.
2. Environmental Sounds: Enhances awareness of surrounding sound, such as traffic or household noises.

Interesting Facts

1. The first hearing aid was invented in the late 19th century, often in the form of a large, cumbersome device.
2. Morden hearing aids can be customized with different features, including Bluetooth connectivity for phone calls or streaming music.
3. Many hearing aids are now digital, offering noise reduction, feedback cancellation, and directional microphones for better clarity

Why It's Important

Hearing aids help individuals with hearing loss regain access to sounds, improving communication, social interaction, and overall QOL. They can reduce the risks associated with hearing loss, such as isolation, cognitive decline and depression.

How to Use the Device

Step 1: Place the hearing aid in/behind your ear

Step 2: Turn the device on using the power button

Step 3: Adjust the volume as needed

Step 4: Turn off to save battery life

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Inhaler

An inhaler is a handheld device that delivers medicine as a spray for easier breathing

Key Features

Quick and Easy – Delivers medicine in seconds

Portable and Lightweight – Inhalers fit inside your pocket to keep with you all day

Effective Relief – Directly targets the lungs for fast action

Physical Characteristics

Size: pocket-sized

Weight: Lightweight (around 100 grams)

Different colours indicate their purpose:
Blue: Reliever Inhaler
Orange/Brown: Prevent Inhaler
Green/Purple/Red: Combination Inhaler

How does it work?

Inhalers deliver medicine directly to the lungs, relaxing airways and reducing swelling
Some inhalers use pressurised gas, while others are powder based

Types of Inhalers:

- **Reliever Inhalers**: used to relieve asthma symptoms when they occur
- **Prevent Inhalers**: contain steroids to prevent asthma symptoms from occurring – used everyday
- **Combination**: combine the effects of both reliever and preventer inhalers – taken everyday

Interesting Facts

1. The first modern inhaler was invented in 1956 by George Maison for his daughter
2. Some inhalers use spacers to make it easier to inhale the medicine
3. Cats can get asthma and can be treated using an inhaler similar to that of humans.

Why It's Important

An inhaler helps people with asthma, allergies, and lung conditions breathe more easily by delivering medicine straight to the lungs

How to Use the Device

Step 1: Shake the inhaler before use

Step 2: Exhale fully, then place in your mouth

Step 3: Press down on the inhaler while breathing in

Step 4: Hold your breath for a few seconds, then breathe out slowly

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Nebuliser

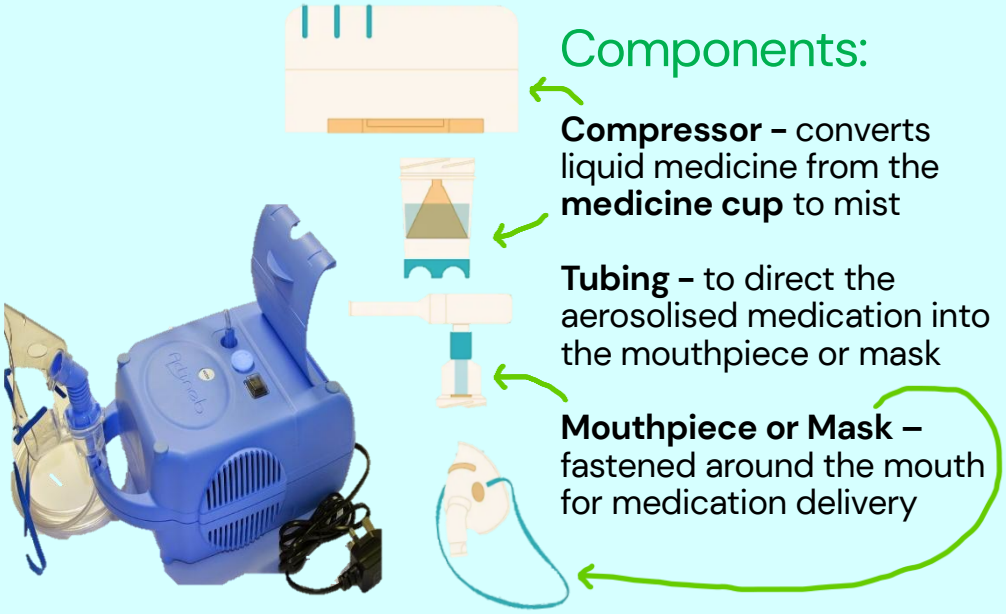
A device that turns liquid medicine into a fine mist that can be inhaled through a mouthpiece

Key Features

Effective Delivery – Ensures medication reaches deep into the lungs for optimal treatment

User-Friendly – Suitable for patients who struggle with inhalers

Versatile – can be used with a variety of medication!



Components:

Compressor - converts liquid medicine from the **medicine cup** to mist

Tubing - to direct the aerosolised medication into the mouthpiece or mask

Mouthpiece or Mask – fastened around the mouth for medication delivery

Why it's important

A nebulizer is helpful for a variety of conditions:

Chronic Obstructive Pulmonary Disease (COPD)

Severe Asthma Attacks

Bronchiectasis and **Pulmonary fibrosis** – use with saltwater solution to manage phlegm build up

Interesting Facts

1. Jean Sale-Girons invented the first nebulizer, the 'pulverisateur' in 1858 – it used a handpump to create mist
2. NASA has researched nebulisers to ensure astronauts can receive medication in space
3. Not just for Humans! Nebulisers are also used for animals, including horses, cats, dogs and birds

Types of Nebulisers:

Jet Nebulisers – use compressed air to turn medication into mist (most common)

Ultrasonic Nebulisers – use high frequency vibrations (mainly for hospital use)

How to Use the Device

Step 1: Fit all the components together and fill the medicine cup

Step 2: Sit upright to ensure effective delivery of the medication

Step 3: Turn on the compressor and breathe in the mist slowly (10-15 minutes)

Step 4: After each use, clean it as instructed to keep it hygienic and working well

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Portable BP

A compact, non-invasive device that quickly measures blood pressure (BP) and Pulse Rate

Key Features

Quick and Easy: Provides accurate blood pressure readings in just a few seconds

Portable and lightweight: Easily carried in your pocket or bag for convenient monitoring on the go

User-Friendly: Simple interface designed for anyone to use without prior training

Physical Characteristics

Size: Approximately 4"x3"

Weight: Lightweight (around 200 – 300 grams)

Power: Battery-operated (with auto power-off to save battery)

Where is it used?

Ideal for hospitals, clinics, and home monitoring— useful for people managing hypertension needing regular blood pressure tracking.

Interesting Facts

1. The first blood pressure monitor was invented in 1881 by Samuel Siegfried Karl Ritter von Basch
2. High blood pressure (hypertension) is often called the "silent killer" because it has no symptoms
3. Some smart blood pressure monitors can sync with mobile apps for easy tracking and analysis

What does it measure

1. **Systolic Pressure** (top number): The pressure in your arteries when your heart beats.
2. **Diastolic Pressure** (bottom number): The pressure in your arteries between beats.
3. **Pulse Rate:** The number of heart beats per minute.

Why It's Important

Monitoring your blood pressure regularly helps in detecting hypertension early, preventing heart disease, stroke, and other cardiovascular issues.

How to Use the Device

Step 1: Wrap the cuff around your upper arm

Step 2: Press the power button to start

Step 3: Remain still while the cuff in/deflates

Step 4: Wait and view the result

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Pulse Oximeter

A compact, non-invasive device that quickly measures blood oxygen saturation (SpO_2) and pulse rate

Key Features

Quick and Easy: Provides accurate readings in just a few seconds

Portable and lightweight: Easily carried in your pocket or bag

User-Friendly: Simple Interface designed for anyone to use without prior training

Physical Characteristics

Size: Approximately 1"x3"

Weight: Lightweight (around 100 – 150 grams)

Power: Battery-operated (with auto power-off to save battery)

Where is it used?

Ideal for hospitals, clinics, and home monitoring—especially useful for anyone wanting a quick check on their vital signs.

What does it measure

A pulse oximeter uses light to detect the difference in light absorption between oxygenated and deoxygenated blood. It then calculates the **oxygen saturation (SpO_2) and pulse rate** based on the changes in light sensed in 5 seconds

Interesting Facts

1. Pulse oximeters were originally developed for aviation to help pilots monitor oxygen levels at high altitudes
2. They have become essential tools for early detection of respiratory issues, including monitoring COVID-19 complications
3. Their accuracy can be influenced by factors such as nail polish or poor circulation in cold fingers

Why It's Important

A pulse Oximeter helps monitor your blood oxygen levels and heart rate which are essential for your overall respiratory and cardiovascular health

How to Use the Device

Step 1: Turn on the pulse oximeter

Step 2: Place your fingertip into the sensor tip

Step 3: Wait a few seconds until the reading

Step 4: Displays your oxygen level and pulse

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Digital Thermometer

A medical device used to measure body temperature accurately

Key Features

Fast and Accurate: Provides temperature readings in seconds with high precision

Multiple Measurement modes: can be used orally, rectally, or underarm, offering flexibility

Safe and Hygienic: Comes with disposable probe covers to prevent cross-contamination.

Infrared Thermometer

Non-contact devices that measure temperature from the forehead or ear using infrared technology - Ideal for quick hygienic, and large-scale screenings

Handheld Thermometer

Compact, Portable, and typically used for oral, axillary, or rectal measurements. These are suitable for home and clinical use

Normal Temperature Ranges:

- ✓ Oral: 36.1°C – 37.5°C
- ✓ Rectal: 36.6°C – 38.0°C

Temperature Display Options:

- ✓ **Celsius (°C):** Standard international unit.
- ✓ **Fahrenheit (°F):** Commonly used in the United States.
- ✓ **Kelvin (K):** More commonly used in medical settings, primarily scientific applications.

Interesting Facts

1. In 1593, Galileo Galilei invented a simple water thermometer, allowing people to measure temperature changes for the first time.
2. Mercury thermometers used a shiny liquid that moved up and down with temperature changes, but now we often use digital ones because they're safer and easier to read.
3. Animals like snakes and some bugs can sense temperature changes without a thermometer, using special heat-sensing organs!

How to Use the Device

Step 1: Turn on the thermometer

Step 2: Place the probe in your mouth or under your armpit

Step 3: Wait a few seconds until the reading stabilises

Step 4: Displays your temperature

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Learn More About Medical Devices

Click on the links to go to websites that can give you more information

GLUCOMETER

https://www.nhs.uk/conditions/cgm-and-hcl-for-diabetes/

https://www.diabetes.org.uk/about-diabetes/looking-after-diabetes/technology/flash-glucose-monitors-and-continuous-glucose-monitors

BLOOD PRESSURE MONITOR

https://www.bhf.org.uk/informationsupport/heart-matters-magazine/medical/tests/blood-pressure-measuring-at-home

https://www.england.nhs.uk/ourwork/clinical-policy/cvd/home-blood-pressure-monitoring/

HEARING AIDS

https://www.thcp.co.uk/articles/.

https://www.nhs.uk/conditions/hearing-aids-and-implants/

https://www.nidcd.nih.gov/health/hearing-aids

NEBULISER

https://www.asthmaandlung.org.uk/symptoms-tests-treatments/treatments/nebulisers.

https://www.lhch.nhs.uk/nebulisers

https://www.pari.com/uk/nebulisers/

INHALER

https://www.asthmaandlung.org.uk/healthcare-professionals/adult-asthma/choosing-inhaler-device

https://www.rightbreathe.com/

https://www.plymouthhospitals.nhs.uk/display-pil/

PULSE OXIMETER

https://www.england.nhs.uk/wp-content/uploads/sites/52/2022/02/pulse-oximeter-easy-read-2022-digital.pdf

https://www.cuh.nhs.uk/patient-information/how-to-use-a-pulse-oximeter/

THERMOMETER

https://thermometer.co.uk/content/295-thermometry-basics

https://education.nationalgeographic.org/resource/thermometer/

https://www.sciencing.com/infrared-thermometers-work-4965130/