Stethoscope and oto/ophtalmoscope

- principles of operation
  - function
  - use
  - scientific principles
- construction
  - components
  - system diagram
  - inputs/outputs
- troubleshooting
  - identifying common faults
  - replacing components
  - rectifying faults
- safety considerations
  - user and patient safety

13.3.9 Maintain a stethoscope and oto/ophthalmoscope.

Unit B 13.3 Maintaining General Bedside Nursing Equipment

Module 279 18 B Medical Instrumentation I

Function

What is a **stethoscope** ?

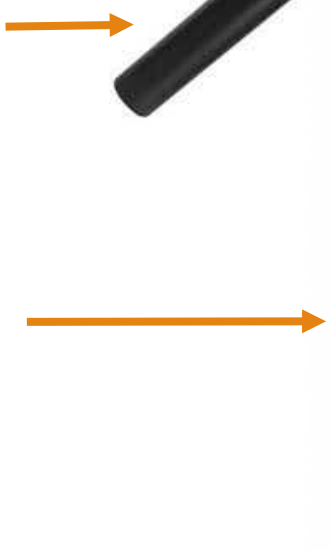
A stethoscope is an **acoustic** medical device for **auscultation**, or listening to the internal sounds of the human body. It is often used to listen to **lung and heart sounds**, the **intestines** and **blood flow** in arteries and veins. In combination with a sphygmomanometer, it is used to measure blood pressure.

What is an **otoscope** ?

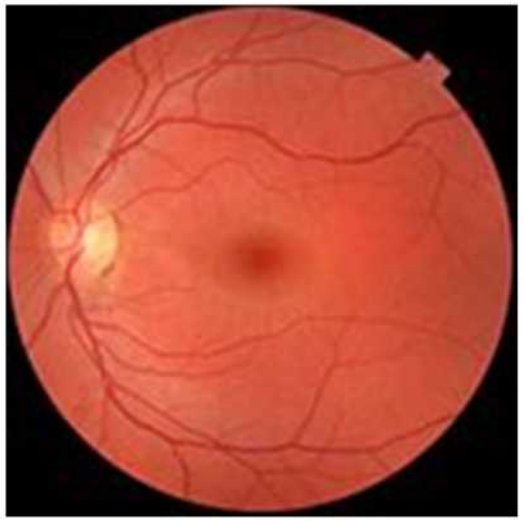
An otoscope is an **optical** medical device that is used to look into the **ears**. Healthcare providers use otoscopes to **screen for illness** during regular check-ups and also to investigate **ear symptoms**, e.g. to identify infection

What is an **ophthalmoscope**?

An ophthalmoscope is an **optical** medical device that allows a healthcare provider to see the **backside (fundus) of the eye**, as part of an eye examination.



Use: everywhere, often as part of routine examination

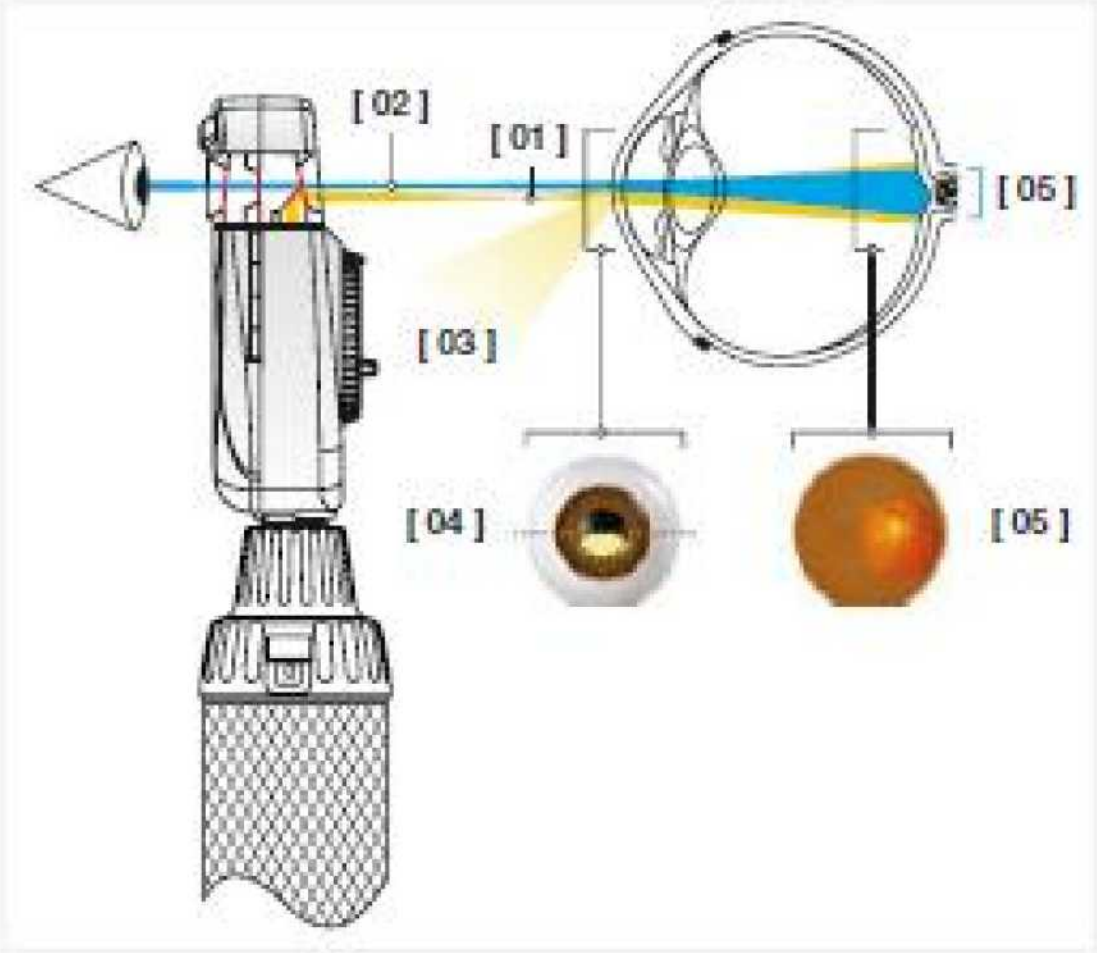


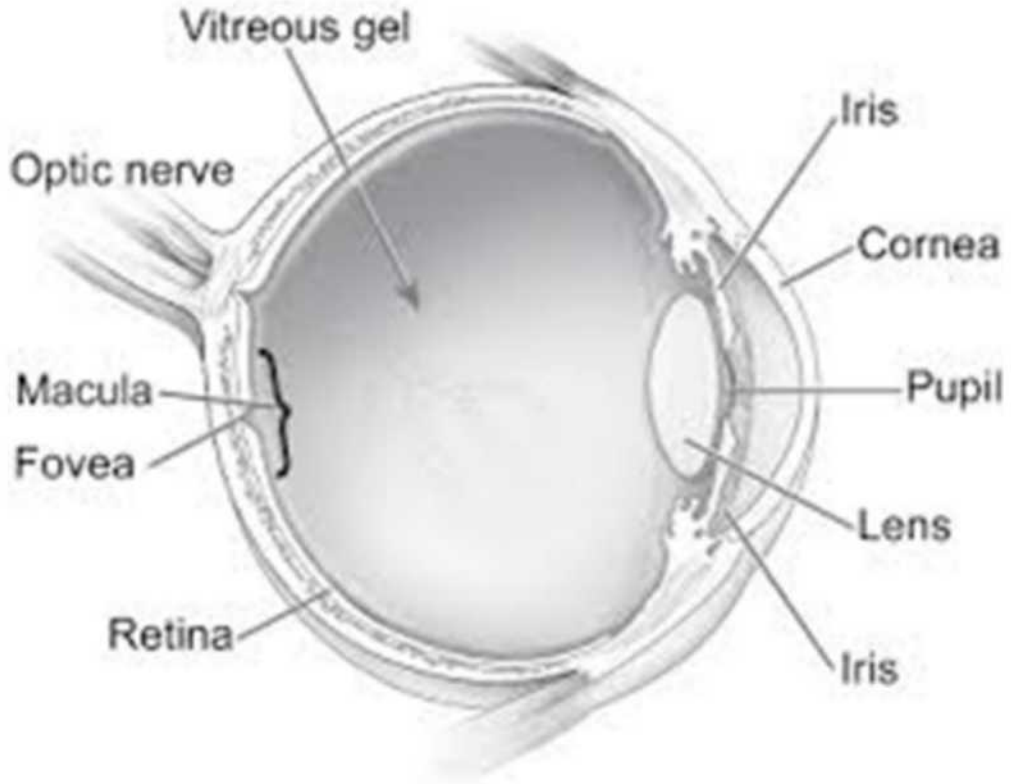
Otoscopes are often sold with ophthalmoscopes as a diagnostic set.

Otoscopes are also used for examining patients' noses and upper throats.

Maintain a stethoscope and oto/ophthalmoscope

Scientific principles: ophtalmoscope





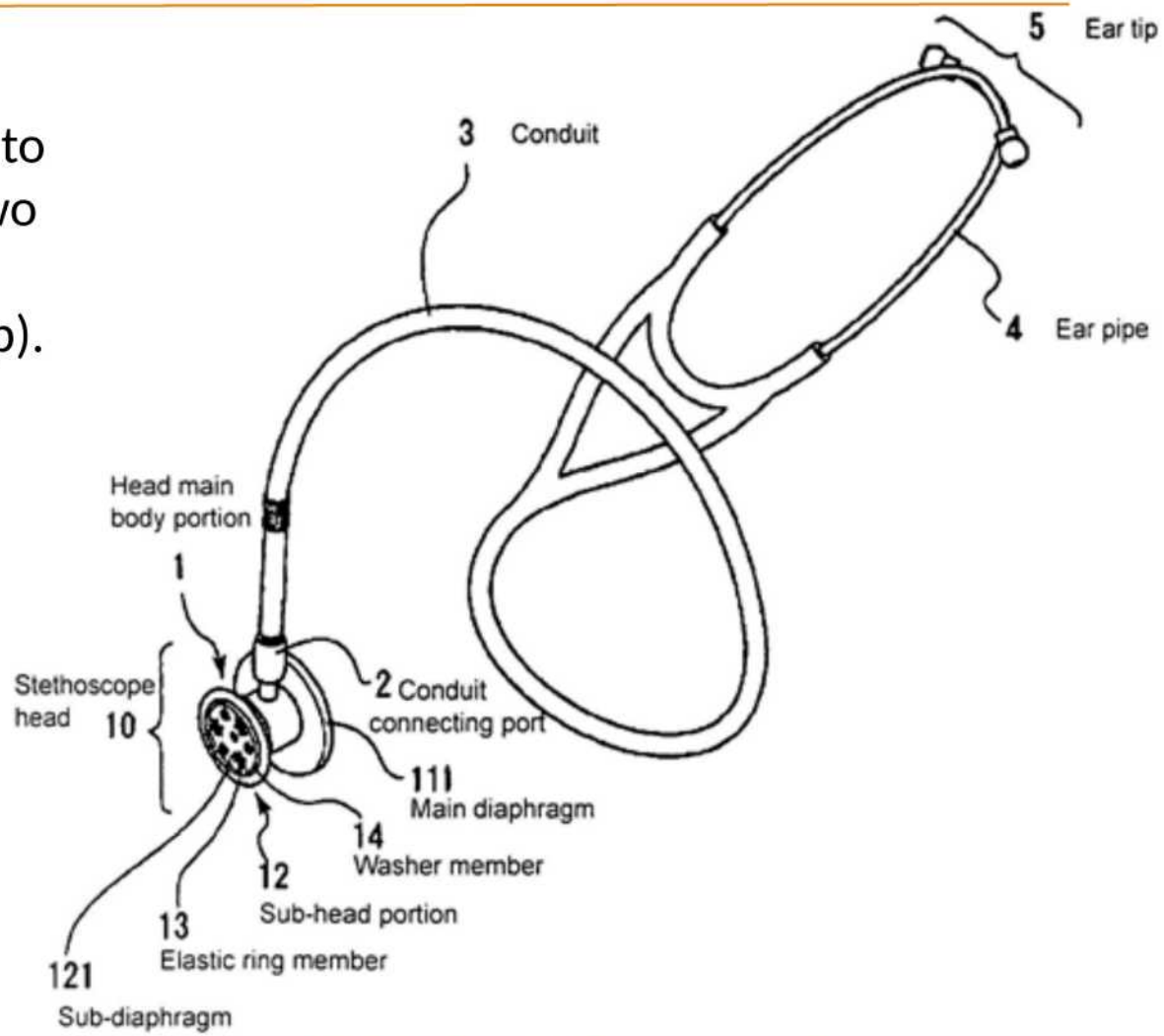
Stethoscope

Acoustic stethoscopes operate on the transmission of sound from the **chest piece**, via **air-filled hollow tubes**, to the listener's ears. The chest piece usually consists of two sides that can be placed against the patient for sensing sound; a **diaphragm** (plastic disc) and a **bell** (hollow cup).

If the **diaphragm** is placed on the patient, body sounds vibrate the diaphragm, creating acoustic pressure waves which travel up the tubing to the listener's ears.

If the **bell** is placed on the patient, the vibrations of the skin directly produce acoustic pressure waves traveling up to the listener's ears.

The bell transmits **low frequency sounds**, while the diaphragm transmits **higher frequency sounds**.



Maintain a stethoscope and oto/ophthalmoscope

Electronic Stethoscope

Electronic stethoscopes overcome the low sound levels by **electronically amplifying** body sounds.

Electronic stethoscopes require conversion of **acoustic** sound waves to **electrical** signals which can then be **amplified and processed** for optimal listening.

Because the sounds are transmitted electronically, an electronic stethoscope can be a wireless device, can be a **recording** device, and can provide **noise reduction** and **signal enhancement**.

Otoscope

The most commonly used otoscopes consist of a **handle** and a **head**. The head contains a **light source** and a simple low-power **magnifying lens**. The front end of the otoscope has an attachment for disposable plastic ear **specula**.

The examiner looks through a lens on the rear of the instrument to see inside the ear canal. In many models, the lens can be removed, which allows the examiner to insert **instruments through** the otoscope into the ear canal, such as for removing earwax.

Most models also have an insertion point for a bulb capable of pushing air through the speculum which is called **pneumatic** otoscope. This puff of air allows an examiner to test the **mobility** of the **eardrum** (tympanic membrane).

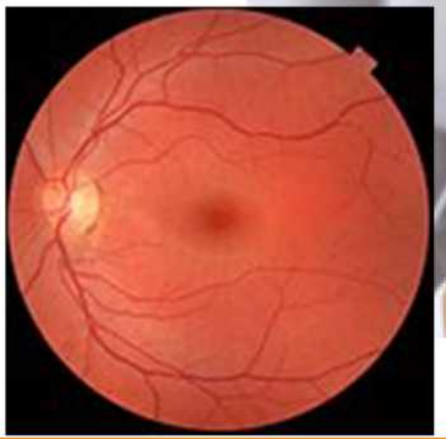
A **speculum** is a tool for investigating body orifices, with a form dependent on the orifice for which it is designed.

Maintain a stethoscope and oto/ophthalmoscope

Direct Ophthalmoscope

The **direct** ophthalmoscope is an instrument about the size of a small flashlight (torch) with several lenses that can magnify up to about **15 times**.

This type of ophthalmoscope is most commonly used during a **routine physical examination**.

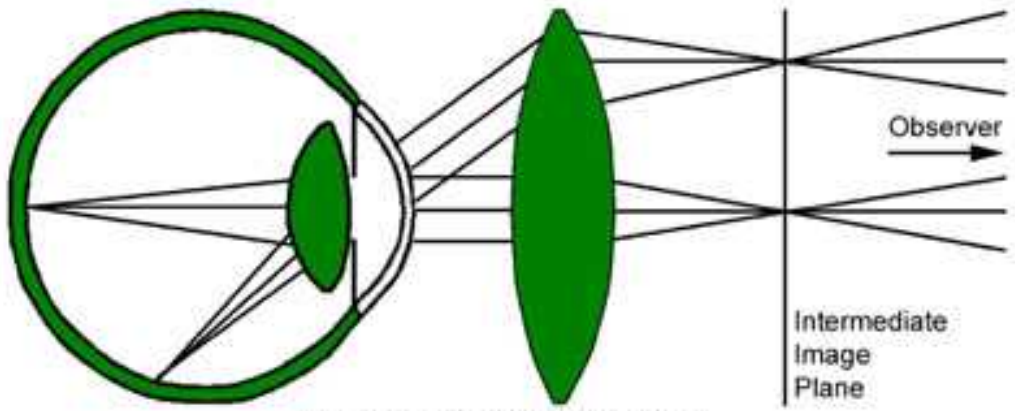


Maintain a stethoscope and oto/ophthalmoscope

Indirect Ophthalmoscope

An **indirect** ophthalmoscope contains a light attached to a headband, in addition to a small handheld lens. It provides **a wider view** of the inside of the eye. It is used for **peripheral viewing of the retina**.

In addition, it allows a **better view** of the fundus of the eye, even if the lens is **clouded by cataracts**.



Indirect Ophthalmoscopy

An indirect ophthalmoscope can be either monocular or binocular.

Maintain a stethoscope and oto/ophthalmoscope

Trouble shooting Stethoscope

Stethoscopes require little maintenance apart from **replacement** of lost, cracked, or broken parts, such as **ear-pieces** and **diaphragms**. On the older types, the **tubing** may perish and need replacing.

While it is possible to buy proper, but expensive, stethoscope tubing, ordinary tubing of a suitable size may be fitted. Most newer stethoscopes have tubing that does not perish, though it can become sticky if certain chemicals come into contact with it.

If **nothing can be heard** through a stethoscope, check whether:

- The **earpieces are blocked**; if they are, unscrew them, push the blockage out and clean with a little spirit.
- The **diaphragm is missing or split**; replacements can be purchased or can be made out of a piece of radiographic film or similar plastic sheet.
- The **tube is split**.

END

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