Ear Health & Hearing Impairment

Background to Ear Disease and Deafness

Globally more than **1.5 billion people experience some degree of hearing loss**. Of these, an estimated **430 million have disabling hearing loss**, a number that could rise to **over 700 million by 2050.**

If unaddressed, hearing loss negatively impacts communication, development of language and speech in children; cognition; education; employment; mental health; and interpersonal relationships.

- Genetic factors
- Hypoxia or birth asphyxia
- Low birth weight
- Hyperbilirubinemia
- Perinatal infections
- Meningitis
- Ototoxic chemicals and medications

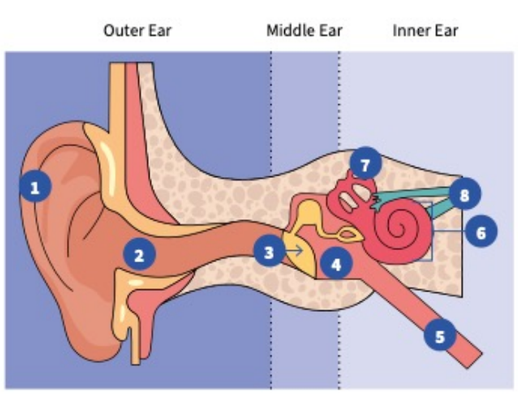
COMMON CAUSES OF HEARING LOSS. MOST ARE PREVENTABLE.

- Smoking
- Nutritional deficiencies
- Ear or head trauma
- Otitis media
- Exposure to loud sounds
- Ageing

In children, almost 60% of hearing loss is due to causes that can be prevented through measures such as immunization, improved maternal and neonatal care, screening for, and early management of otitis media.

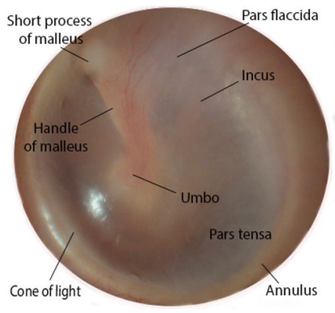
The prevalence of disabling hearing loss increases exponentially with age, rising from 15.4% among people aged in their 60s, to 58.2% among those aged more than 90 years. Unaddressed hearing loss may be responsible for over 8% of cases of dementia among older adults.

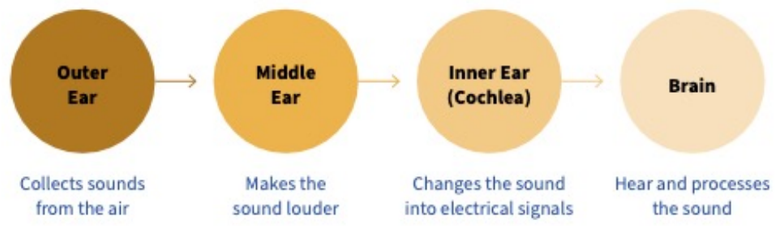
Ear anatomy, development of hearing and definitions of impairment



Key

1. Pinna
2. External auditory canal
3. Tympanic membrane (Ear drum)
4. Tympanic cavity
5. Eustachian tube
6. Cochlea
7. Vestibular system
8. Hearing (auditory) nerve





Age	Hearing and responding	Talking
Birth–3 months	• Startles at loud sounds • Becomes quiets or smiles when parent is speaking	• Makes cooing sounds
4–6 months	• Moves eyes in the direction of sound • Responds to changes in the parent's tone of voice • Notices toys that make sounds • Pays attention to music	• Coos and babbles when playing alone or with someone • Makes speech-like babbling sounds, such as "pa", "ba", or "mi"
7 months – 1 year	• Turns and looks in the direction of sound • Turns when someone calls by name • Understands words for common items and people, such as "water", "daddy" • Starts to respond to simple words and phrases, such as "No", "Come here", or "Want more?"	• Babbles long strings of sounds, such as "mimi", "upup", "babababa" • Imitates different speech sounds • Says one or two words, such as "hi", "dog", "dada", "mama", or "uh-oh". (This will likely happen around the first birthday, but sounds may not be clear)
1–2 years	• Points to a few body parts when asked • Follows one-part directions, such as "Roll the ball" or "Hold the toy" • Responds to simple questions, such as "Who's that?" or "Where's your shoe?" • Listens to simple stories, songs, and rhymes	• Uses a lot of new words • Asks questions, such as "What's that?" or "Who's that?" • Puts two words together, such as "more apple" or "no bed".
2–3 years	• Understands opposites, such as go–stop, big–little, and up–down • Follows two-part directions, such as "Get the spoon" and "Put on the table" • Understands new words quickly	• Has a word for almost everything • Talks about things that are not in the room • Puts 3 words together to talk about things • May repeat some words and sounds
3–4 years	• Responds when called from another room • Understands words for some colours, such as red, blue, and green • Understands words for some shapes, such as circle and square • Understands words for family members, such as brother, grandmother, or aunt	• Answers simple "who", "what", and "where" questions. • Says rhyming words, such as hat–cat • Says words that most people can understand • Asks "when" and "how" questions • Puts 4 words together
4–5 years	• Follows longer directions, such as "Put your pyjamas on", "Brush your teeth", or "Choose a book" • Hears and understands most of what is said at home and in school	• Can talk without repeating sounds or words most of the time • Names letters and numbers • Tells a short story • Keeps a conversation going

Grade	Hearing threshold* in better hearing ear in decibels (dB)	Hearing experience in a quiet environment for most adults	Hearing experience in a noisy environment for most adults
Normal hearing	Less than 20 dB	No problem hearing sounds	No or minimal problem hearing sounds
Mild hearing loss	20 to < 35 dB	Does not have problems hearing conversational speech	May have difficulty hearing conversational speech
Moderate hearing loss	35 to < 50 dB	May have difficulty hearing conversational speech	Difficulty hearing and taking part in conversation
Moderately severe hearing loss	50 to < 65 dB	Difficulty hearing conversational speech; can hear raised voices without difficulty	Difficulty hearing most speech and taking part in conversation
Severe hearing loss	65 to < 80 dB	Does not hear most conversational speech; may have difficulty hearing and understanding raised voices	Extreme difficulty hearing speech and taking part in conversation
Profound hearing loss	80 to < 95 dB	Extreme difficulty hearing raised voices	Conversational speech cannot be heard
Complete or total hearing loss/deafness	95 dB or greater	Cannot hear speech and most environmental sounds	Cannot hear speech and most environmental sounds
Unilateral	< 20 dB in the better ear, 35 dB or greater in the worse ear	May not have problem unless sound is near the poorer hearing ear. May have difficulty in locating sounds	May have difficulty hearing speech and taking part in conversation, and in locating sounds

How to diagnose ear disease and hearing impairment

Combining a history of symptoms (pain, discharge, hearing loss) with clinical signs (redness, swelling, pus) found on examination, can help make an accurate diagnosis. Once a better understanding of the patient's problem has been made the best actions to help can be delivered.

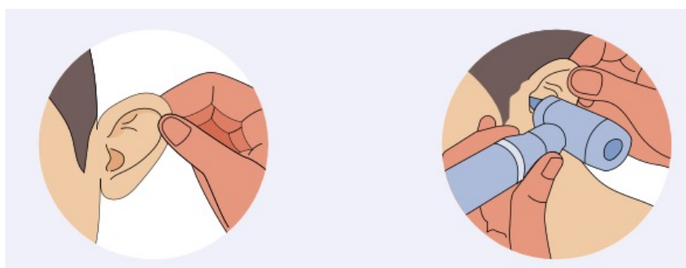
The three steps in assessing ear and hearing problems: take history, examine ears, test hearing

History Taking: Onset and duration of pain, discharge, hearing loss

Procedure:

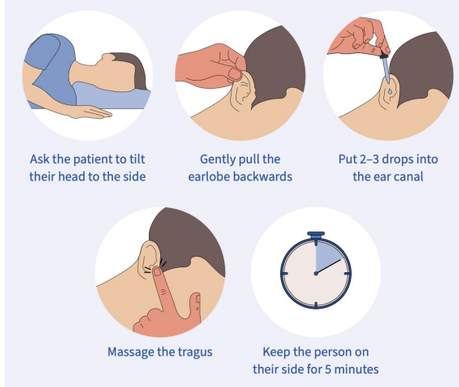
1. Make sure you are in a quiet room.
2. The baby should sit in the lap of the parent. The parent should be asked to sit still and be silent.
3. The "distractor" should sit in front of the baby, with the wooden blocks (or another toy).
4. The "tester" should sit behind and to the side of the baby, holding the rattle. The tester should be about 1 metre away from the baby.
5. The distractor plays a game with the baby, for example, stacking wooden blocks on top of each other.
6. The distractor stops playing and covers the blocks (or the toy) with a towel or sheet.
7. The tester then gently shakes the rattle for five seconds. The baby should turn towards the sound.
8. The tester then moves to the other side (of the baby).
9. Steps 5 to 7 are then repeated. But first, repeat steps 5 and 6. Do not make any sound. The baby should not turn its head. This is to crosscheck that when Step 7 is repeated, the baby is actually turning its head because of hearing the sound of the rattle.
10. If the baby does not turn towards the sound, the test can be repeated with a louder rattle. If there is no response the child should be referred to a specialist for further tests.

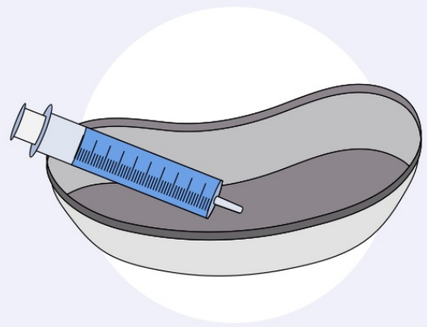
Voice Test



Examination: Observe, palpate, otoscopy – canal and tympanic membrane

Primary Ear Care Actions



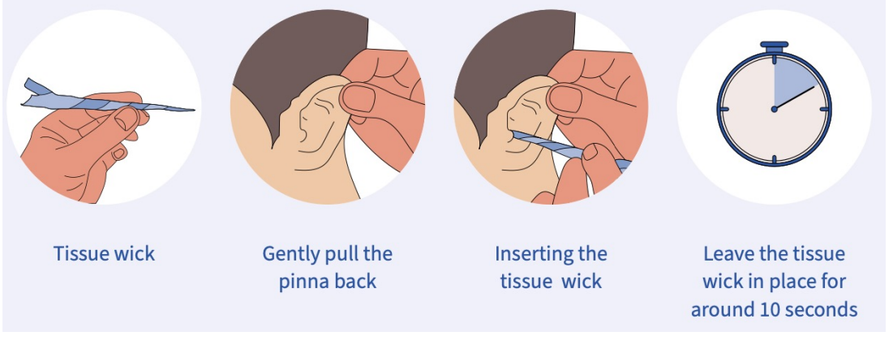


Syringe filled with water and a kidney bowl

Syringe placed in ear canal

Procedure:

1. Wash your hands and ask permission.
2. First examine the ear (Practical B).
3. Make the irrigation solution. Water should be slightly warmed to make sure it is neither too cold nor too warm. The ideal temperature is 37 °C, i.e. the same as body temperature.
4. Fill the syringe with water. If using iodine, draw up 1 ml of povidone-iodine with 19 ml of water.
5. Place the tip of the syringe into the ear canal. Point the syringe so that it is facing towards the top of the ear canal, and slightly backwards.
6. Ask the patient to hold the kidney dish or other bowl under the ear and tight against the skin of the neck.
7. Push the irrigation solution into the ear canal. The solution will drain into the bowl, and may contain wax, a foreign body or pus.
8. Repeat washout until there is only clear solution coming out of the ear, and no wax or pus.
9. Examine the ear again with an otoscope. Repeat washout if needed.



Tissue wick | Gently pull the pinna back | Inserting the tissue wick | Leave the tissue wick in place for around 10 seconds

Procedure:

1. Wash your hands.
2. Ask permission of the patient.
3. Examine the ear (see Practical B, Module 2) to diagnose the underlying ear problem.
4. Twist the end of a tissue to make a "tissue wick".
5. Pull the pinna back. Insert the tissue wick 2–3 centimeters into the ear canal.
6. Leave the tissue wick in place for around 10 seconds.
7. Pull out the wick and see if it has pus or other fluid on it.
8. Throw away the wick you have just used.
9. Repeat with another tissue wick. Continue repeating until the tissue wick is no longer wet when withdrawn.
10. Repeat otoscopy to confirm that all pus or other fluid has been removed.