

Module 1:

Core skills for hearing assistance

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Aim

To assist learners, gain essential practical skills as a foundation for assisting hearing impaired clients.

By the end of this module learners should have an initial understanding of

- Important impacts of hearing loss
- Tactics and techniques to use when speaking to a hearing impaired person
- Basic hearing aid management and trouble shooting skills for commonly experienced problems
- Identification of hearing impaired clients

Note: To achieve proficiency in the skills demonstrated in this module on-the-job or work experience **practice** is essential.

Scope

The video and associated material is useful for pre-service and in-service training of nurses and other care staff in residential and home settings and in hospitals.

An effective hearing assistance program benefits staff as well as those they care for and if performed systematically should not be time consuming.

Related modules

- Module 2: Communicating with hearing impaired clients
- Module 3: Hearing assistance needs assessment and care planning
- Module 4: Hearing assistance implementation and evaluation

1. Hearing Assistance in Aged Care

Module 1 consists of training material useful for in-service and pre-service training of nurses and other care staff in residential and home care situations and in hospitals.

The module includes:

- The **instructional video**, *Hearing Assistance in Aged Care*. This can be shown in a 30-minute training session. However, completion of the multiple-choice quizzes in the Revision sheet is highly desirable and is expected to take at least another 30 minutes.
- A **revision sheet** designed to test essential knowledge gained from the video.
- **Prompt cards** designed as a practical aid for care staff and nurses in managing and troubleshooting resident's hearing aids. (These may be modified by individual service providers.)

Teaching Aid 1: Video

Run time: (26 min 34 sec)

PART A

- 6 min 45 sec:
Aged care residents talk about their experience of hearing loss and how hearing impairment has impacted on their quality of life.
- 2 min 54 sec:
The video addresses effective ways of speaking to someone with a hearing loss via a series of pictorial cartoons and comments.

PART B

- 8 min 35 sec:
Section 1: Skills for managing hearing aids. Recommended for nurses and carers.
- 8 min 21 sec:
Section 2: Further trouble shooting.

Access: www.youtube.com/watch?v=O15xOkOkFVQ&feature

1.1 Hearing Assistance in Aged Care Video

The skills demonstrated in the *Hearing Assistance in Aged Care* video are essential to all aspects of hearing assistance.

Part A opens with aged care residents talking about their experience of hearing loss and how hearing impairment affects their quality of life. Their comments are applicable to other hearing impaired adults. A brief explanation of the impact of high pitch hearing loss is given. The video then promotes effective ways of speaking to a hearing impaired person.

More than three quarters of Australians over 75 years of age have some hearing loss. This generally rises to some 85% for people in residential aged care. Many people who would benefit from using hearing aids or alternative listening devices do not use them. It is therefore **essential** that all personal carers and nurses have a thorough understanding of the difficulties hearing impaired clients experience when spoken to regardless of whether they use hearing aids. Study of **Module 2** is therefore highly desirable for staff in all aged care setting and in hospitals.

Part B demonstrates the basic skills needed by staff to assist clients with management of their hearing aids and to troubleshoot common problems.

1.2 Assessment of Learning from the Video

The multiple-choice quizzes in the Revision sheet for the video *Hearing Assistance in Aged Care* are designed to test essential knowledge gained from the video as an aid to learning and as a benchmark for the basic skills needed in this area of care. The multiple-choice quizzes may be used by a trainer with a group of learners or by an individual learner.

After viewing the video, it may be appropriate to complete the quizzes section by section and check responses by again viewing the relevant section of the video before moving on to the next section.

Exercise 1: Video focus questions

Learners to answer multiple choice quizzes in the Revision sheet.

Support materials:

Revision sheet handout (See Appendix 1).

Assessment of Learning: Free Hearing Assistance online course

A one-hour *Hearing Assistance* course is freely available at <http://hearnetlearning.org.au>

The course includes clips from the *Hearing Assistance in Aged Care*, multiple choice quizzes to assess learning and a certificate on satisfactory completion.

1.3 Managing and Troubleshooting Residents Hearing Aids Prompt Cards

The **prompt cards** in Appendix 2 are designed as a practical aid for care staff and nurses in managing and troubleshooting clients' hearing aids. (These may be modified by individual service providers.)

It is recommended that the two sheets are photocopied double sided and then laminated for reference on-the-job.

In some circumstances the *Happy Hearing* app can be a valuable on-the-job reference. The free app is available from Google Play or the App Store.

1.4 Some common indicators of hearing loss and its severity

Learners' attention should be drawn to the *Common indicators of hearing loss* at the foot of Prompt Card 2 as recognition of clients' hearing loss is **essential**.

See valuable additional information on common indicators of hearing and loss and its severity in Appendix 3.

Appendix 1: Exercise Handout – Revision sheet for assessment of learning from video Hearing Assistance in Aged Care

(Cover Page)

Revision Sheet on the *Hearing Assistance for Aged Care* video

PART A

Question 1

What is the number one enemy of hearing impaired people that is likely to interfere with their easy participation in a conversation?

Select one:

A. Boring conversation

B. Groups larger than two

C. Background noise

D. Being yelled at

Question 2

Draw a line to the correct word to complete the following statements about the most unfortunate side effects of hearing loss.

- Struggling to hear in social situations can cause withdrawal, ...

frustration

- Misunderstandings can cause confusion and even be mistaken for signs of ...

isolation & depression

- Incorrectly responding to a conversation or noise can cause ...

dementia

- People speaking fast and mumbling can cause ...

embarrassment

Question 3

Which of the following behaviours is **not** typically an indication that a person may have a hearing loss?

Select one:

A. Watching a speaker's face and gestures intently.

B. Listening to the TV or radio on a low volume.

C. Frequent requests for repetition.

D. Difficulty understanding conversation in groups.

Question 4

Wearing hearing aids is often abandoned because the return of forgotten sounds, especially background noises can be overwhelming. True or False?

Select one:

A. True

B. False

Question 5

Which of these sayings particularly applies to hearing?

Select one:

A. The greatest gift you can give another is your attention.

B. It's a rare person who wants to hear what he doesn't want to hear.

C. Use it or lose it

D. No one is as deaf as the one who will not listen.

Question 6:

Communication is a two-way responsibility. Use the list of words at the side, to complete the following sentences about important tactics and techniques you can use to help a hearing impaired person more easily understand what you are saying:

- Speak _____ - if necessary, a little slower rather than louder
- Reduce _____ noise – turn off TV, music, etc.
- Face client at same _____ level about one metre apart
- Have _____ on your face and not in client's eyes
- Keep your _____ away from your face.
- If you're not understood, say the same thing _____ – don't just repeat it.

light
differently
hands
clearly
background
eye

Question 7

Which of the following statements is false?

Select one:

A. When hearing loss is associated with aging it usually affects high pitch sounds first.

B. When a client has trouble hearing consonants using different words rather than shouting can help.

C. Vowels are more important than consonants in giving words their meaning.

D. Consonant are more affected when high pitched speech sounds are not heard clearly.

Question 8

If a hearing impaired person has difficulty understanding what is said, what is the critical question to ask oneself?

Select one:

A. Is it worth pursuing this line of conversation?

B. What could I have done differently?

C. Should I have tried to engage in conversation with this person?

PART B SECTION 1

Question 1

Draw a line to match the underlying causes of hearing aid damage with the following activities.

Moisture

Drying hair with a hair dryer.

Rubbing

Sleeping in bed at night with aids on.

Heat

Having a bath or shower.

Question 2

Use the list of words at the side, to complete the following statements about protecting hearing aids from moisture.

- Hearing aids are exposed to body warmth and _____ when worn.
- If moisture regularly accumulates in the mould or tubing it may help to store aids in an _____ container with a drying agent.
- The battery compartment should be left _____ with the battery in it when in the dehumidifier container.
- Drying agents will need to be _____ periodically and are available from hearing service providers.

Replaced

open

air-tight

sweat

Question 3

Draw a line to match the label to the correct type of hearing aid.



BTE (Behind The Ear) aid



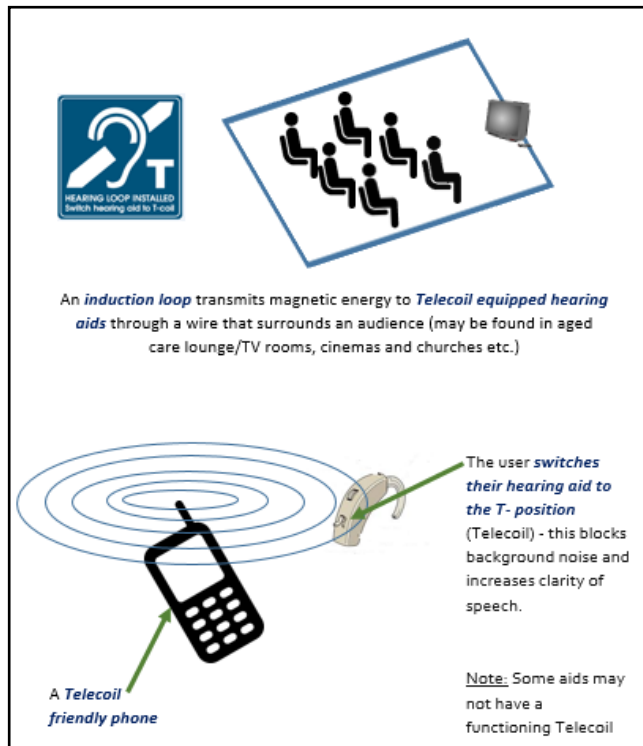
ITE (In The Ear) aid

Question 4

Use the words below to complete the statement about telecoils.

phones	looped	Background
--------	--------	------------

Telecoils (also known as a T-switches or T-coils) are a feature of some hearing aids which when switched on, reduce _____ noise when the user is talking on Telecoil friendly _____ or in a _____ community area.



Question 5

Which two images show the direction that the wheel needs to be turned to increase the volume on the hearing aids shown below?



BTE aid – move wheel upwards
A

ITE aid – move wheel towards face
B

BTE aid – move wheel downwards
C

ITE aid – move wheel towards back of head
D

Select one:

- A. The correct images are B and C.
- B. The correct images are D and A.
- C. The correct images are C and D.
- D. The correct images are A and B.

Question 6

Before inserting a hearing aid into the ear, it is important to:

- Check that the aid's battery is functioning satisfactorily by closing the battery compartment then cupping hand around the aid. If it whistles the battery is satisfactory.
- Check the colour indicators to ensure the aids are inserted in the correct ear.

Draw a line to match the labels to the correct images.

blue



Right



red

Left ear

Question 7

Number from 1 - 5 to show the order in which the following steps should be carried out when inserting an ITE aid.

Steps for inserting a ITE aid

Order

(1 being the first step and 5 being the last)

- Wash hands with water or alcohol wipes and check for any blood, discharge or broken skin.
- If the aid whistles when turned on in the ear repeat the insertion process.
- Give the ear lobe a gentle pull down to make sure the aid is seated correctly in the ear.
- Check colour indicator to ensure the aid is inserted in the correct ear.
- Insert the aid the right way up so that the curve of the aid follows the curve of the ear. A removal line or air vent should sit in the forward bottom corner of the ear.

Question 8

Use the list of words at the side, to complete the following statements describing the procedure for inserting a BTE aid.

- After washing hands and asking permission of the client, check for any signs of broken skin, _____ or discharge.
- When inserting a BTE aid into the ear canal twist the mould towards the _____ of the head.
- Make sure that the top of the mould goes _____ the lip of the ear to avoid discomfort for the wearer and possible _____ irritation.
- If the aid _____ try to settle the mould better into the ear.

whistles
under
blood
back
skin

Question 9

After an aid has been inserted and any whistling stopped what should be the final check to ensure that the aids are working satisfactorily?

Select one:

A. Stand behind the client and note if they can hear you clapping.

B. Check that the client is using their aids on your next scheduled visit.

C. Whisper and observe if the client can understand what you are saying.

D. Turn aside from the client and ask them a straightforward question in a normal voice.

Question 10

Which of the following statements about removing an aid is false?

Select one:

A. Before removing the BTE mould, gently lift the aid slightly clear of the top of the ear and then gently withdraw the mould.

B. When an ITE or BTE aid is placed in its storage box or dehumidifier container, the battery compartment should left open with the battery in it.

C. Gently withdraw an ITE aid by pulling on the removal line (if there is one) and lifting it up as you take the aid out.

E. Gently remove the mould of the BTE aid by pulling on the tubing.

Question 11

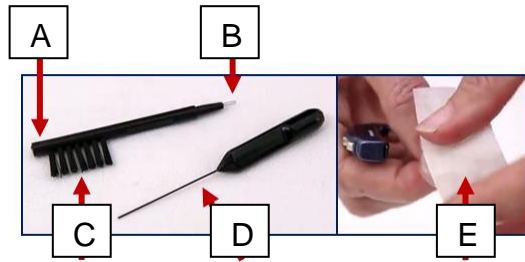
Use the list of words at the side, to complete the following statements about the use of lubricants.

- A water-based personal lubricant can be smeared onto the mould to assist with the _____ of the ear mould.
- Care needs to be taken to ensure the lubricant does not get into the _____ on the end of the mould or ITE aid.
- To avoid possible cross-infection do not let the _____ of the tube come into contact with the mould, particularly if the lubricant is being used by more than one person.

holes
insertion
tip

Question 12

Match the names of hearing aid cleaning tools with the letters in the images below:



Letter	Cleaning tool
	Wire loop
	Magnet
	Cleaning wire
	Tissue or alcohol wipe
	Brush

Question 13

Match the hearing aid cleaning tools listed below with the statement that describes their function.

cleaning wire	magnet	tissue or alcohol wipe	wire loop	brush
---------------	--------	------------------------	-----------	-------

Hearing aid cleaning tool	Function
	For picking wax out of the sound holes of an ITE aid.
	For removing the battery from the aid.
	For cleaning the outside of the mould.
	For brushing wax out of holes in the mould and removing debris.
	For sliding up and down the air vent in BTE and ITE moulds to remove wax.

Question 14

Use the list of words at the side, to complete the following statements describing the steps to take if a hearing aid is not working.

- Step 1: Check the aid is turned _____.
- Step 2: Check that the battery is fresh and working by cupping the aid in your hand and then hold it up to your ear where it should _____.
(Flat batteries is the most common reason for aids not working.)
- Step 3: If the aid doesn't whistle, check if the tubing or mould is _____ by disconnecting the tubing from the aid and repeating step 2.
- If the aid whistles the battery is working but there is a blockage in the _____ or tubing which needs cleaning.

Whistle
blocked
mould
on

Question 15

Which of the following statements about changing the battery for a hearing aid is false?

Select one:

A. Never force a battery into the compartment as this may damage the casing.

B. All types of aids take the same sized batteries.

D. Dispose of old batteries immediately to avoid confusion with the new battery.

PART B Section 2

Question 1

If wax cannot be removed from the mould or tubing of a BTE aid with a cleaning tool, the mould and tubing may need to be washed. Show the order in which you would carry out the following steps for washing a BTE mould and tubing.

Steps for washing the mould and tubing of a BTE aid

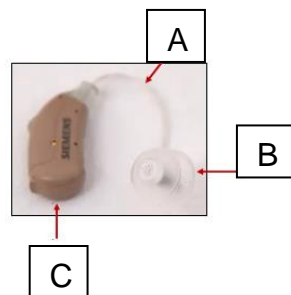
Order

(1 being the first step and 4 being the last)

- Reattach the mould to the aid, ensuring the curve of the mould and the curve of the aid follow the same line.
- Carefully detach the tubing from the aid holding the hook, not the body of the aid. Keep the aid well away from water.
- Dry the mould and tubing thoroughly with a soft cloth. Blow moisture from the tubing and mould using a small puffer until completely dry. (Otherwise tap the mould on a soft cloth and drain overnight.)
- Wash the mould in warm soapy water and rinse in running water.

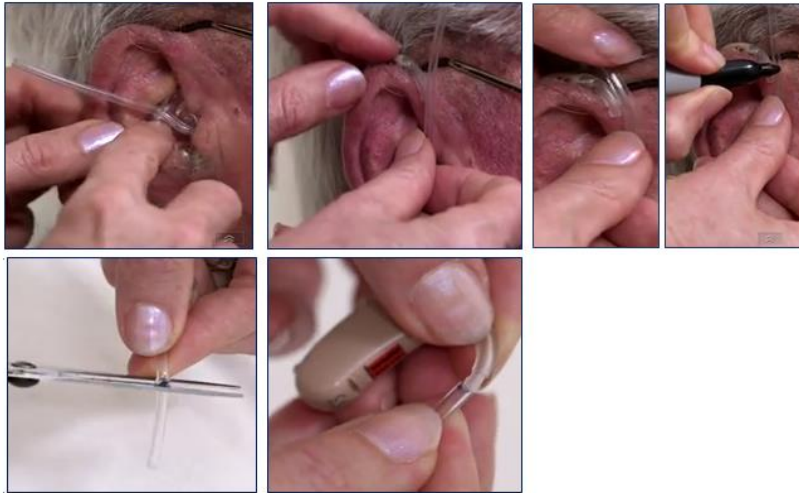
Question 2

Increasingly small light BTE aides are being fitted with very narrow tubing and 'domes' instead of moulds. Match the correct labels with the letters on the image of a small BTE aid.



Letter	Label
	Aid
	Dome (replaces the mould)
	Narrow tubing

Question 3



If the tubing or mould of a BTE aid has been replaced by a hearing service provider a mould with an attached length of tubing may be mailed back for attachment to the aid.

Use the list of words at the side, to complete the following statements describing the steps for attaching tubing to an aid.

- Step 1: Insert the _____, with attached tubing, into the ear correctly.
- Step 2: Place the _____ behind the ear in the correct position.
- Step 3: Mark tubing with a pen allowing sufficient overlap over the _____ of the aid (about 5mm).
- Step 4: Remove the mould from the ear and cut the tubing on the _____ side of the mark.
- Step 5: When attaching the new tubing to the aid ensure the curve of the mould _____ the curve of the hearing aid so it fits comfortably.

aid
matches
higher
mould
ear hook

Appendix 2: Template - Prompt cards for managing and troubleshooting a client's hearing aids

These sheets are designed as a practical reference for nurses and carers in managing and troubleshooting client's hearing aids and for training purposes.

Prompt Card 1: Hearing Assistance from Personal Carers

Effective communication

- Speak clearly – if necessary, a little slower and louder but don't shout.
- Reduce background noise if possible – turn off TV, music etc.
- Face client at same eye level about 1m apart.
- Have light on your face and not in client's eyes.
- Keep your hands away from your face.
- If you're not understood be patient, say the same thing differently – don't just repeat it.

Inserting hearing aid into ear

1. Wash hands or wipe with antibacterial gel.
2. Wipe aid with tissue. Brush away any wax from earmould and if necessary, pick wax out of openings in earmould, using client's **own** wax cleaning tool which has a brush and pick.
3. Close battery casing carefully then cup hand around aid. It should whistle. (If necessary, hold close to your ear to check for a quiet whistle.)
 - *If no whistle* - open battery casing and check that battery has been inserted correctly then fully close battery door and cup hand check again for whistle.
 - *If still no whistle* - change battery.
 - *If still no whistle* - **advise supervisor/ hearing champion promptly.**
4. Insert earmould carefully and snugly into correct ear (Red - Right, blue –left).
With a behind the ear aid, ensure that tubing is not twisted or pinched and that aid sits comfortably behind ear.
 - *If an aid continues to whistle after insertion* - ensure earmould is sitting snugly in the correct ear and if volume can be adjusted try turning it down.
 - *If whistling continues* - **advise supervisor/ hearing champion promptly.**
5. Ask client one or two brief straight forward questions in a normal voice.
 - *If not understood and volume can be adjusted* - try turning it up.
 - *If still not understood* - **advise supervisor/ hearing champion promptly.**

Personal care note: Do not get the hearing aids wet (remove aids before showering). Do not use hairspray or dryer/blower near hearing aids. Turn off, and preferably remove aids while face shaving with an electric razor.

Removing and storing aids

Normally undertaken before sleep or if aid is malfunctioning.
If aid is not in the client's ear or storage container look for it before it is lost!

1. Open battery casing with thumb nail.
2. Gently withdraw earmould from ear and place in storage container ensuring battery door is partly open and battery remains in the casing.

Changing a battery

If battery lost or fails between routine changes

1. Open battery casing carefully with thumb nail.
2. Remove and discard battery, if possible, using magnetic tip of wax brush to lift it out.
3. Check battery size and use by date.
4. Peel new battery off vinyl tab in packet and insert into casing with flat side (marked +) facing upwards, then gently close battery door fully.
5. Cup hand check for whistle.

Routine battery change

Normally weekly or more frequently if necessary

Clean aids with an alcohol wipe and clear wax from moulds and openings with cleaning tool brush or pick. If unsuccessful, **advise supervisor/ hearing champion promptly.**

1. Order replacement batteries for clients needing this assistance.
2. Update records.

For further information see free "Happy Hearing" app

If a client shows some common signs of hearing loss (see Prompt card 2) and advise supervisor promptly.

Prompt Card 2: Basic Trouble Shooting

Washing mould and tubing

Wash the earmould and tubing of a behind the ear aid where wax cannot be removed with client's wax cleaning brush, pick or a blue wire. Wash one mould at a time to ensure moulds are re-attached to correct aids.

1. Disconnect tubing from aid (holding the hook, not body of the aid). Keep aid away from water.
2. Place earmould and tubing in a container, e.g. a small tea strainer or cup. Flow warm water through the tubing and earmould until clear of wax. If necessary, use soapy water and rinse thoroughly afterwards.
3. Blow moisture from tubing and earmould with a small puffer until completely dry. (Otherwise shake firmly and drain overnight in a secure place with a note.)

No sound

- Does battery need to be changed?
- Open then close battery door to re-set to start program (in case T-switch on).
- Is battery fitted correctly and battery door fully closed?
- Is earmould and/or tubing blocked by wax and/or moisture? If unsure, *carefully* disconnect tubing from aid (holding the hook, not body of the aid). If aid then whistles there is a blockage in the mould or tubing.

Whistling

- Is earmould fitted correctly in the ear?
- If volume can be adjusted, is it too high?
- Is the earmould too loose? Sometimes a light smear of ear lubricant on sides of the earmould will stop the whistling.
- An old mould or tubing may have shrunk or cracked. If so, send to hearing services provider for replacement.
- Is ear canal blocked by wax?

Sound weak

- Does the battery need to be changed?
- If volume can be adjusted, is it too low?
- Is the mould and/or tubing partly blocked by wax or moisture?
- Is tubing twisted, pinched or shrunk with age? If necessary, send to hearing services provider for replacement.
- Is there too much wax in the ear canal?
- If none of the above, client's hearing may have deteriorated and need reassessment.

If trouble shooting is unsuccessful

- Contact the client's hearing services provider.
- If aid needs repair mail to hearing services provider in a rigid container.
- Ear canals must be reasonably clear of **WAX** before hearing can be assessed or hearing aids fitted. Wax can also cause temporary hearing loss and cause aids to whistle. Arrange for ear drops and if necessary, syringing or similar procedure to clear wax.

Arrange hearing assessment if a client shows unexplained signs of hearing loss.

If necessary, arrange hearing assessments and assist eligible clients to apply for a Hearing Services Voucher – starting with obtaining the prescribed Medical Certificate.

Some common indicators of hearing loss - any one of which could indicate need for professional assessment:

- Repetition frequently requested
- Loud volume of TV or radio
- Difficulty understanding conversation in groups or noise
- Watches speaker's face and gestures intently
- Misses what is said, especially if speaker is not facing them
- Difficulty hearing phone 'rings' and / or hearing a speaker on the phone
- Responds only to loud speech or sounds and responses sometimes inconsistent with conversation.
- Withdrawing from social activities.

Appendix 3: Template - Some common indicators of hearing loss and its severity

Some common indicators of hearing loss and its severity

Signs observed in clients that may indicate a hearing loss include:

- Frequent requests for repetition
- Does not respond when name is called or back is turned
- Loud volume on TV or radio
- Difficulty understanding conversation in groups or noise
- Responds only to loud speech or sounds
- Misses what is said, especially if speaker isn't facing them
- Responses are inconsistent with conversation
- Watches speaker's face and gestures intently
- Difficulty hearing door bell, phone 'rings' and/or difficulty hearing speaker on the phone
- Withdrawing from social activities.



If at the time of an admission assessment there has been insufficient opportunity to observe such behaviours a client (or if necessary, a family member) can be asked ¹:

- Can you hear but sometimes not understand conversation?
- Do you find it much harder to hear in noise or groups of people?
- Do you have difficulty understanding what people say unless they are facing you?
- Do you think people mumble or slur their words?
- Do you have to ask for repeats a lot?
- Do you need the TV or radio up louder than others?
- Do you find you have misunderstood the topic and are embarrassed when you say the wrong thing?
- Do you avoid group meetings, social occasions, and even family gatherings because you have difficulty hearing?
- Do you hear the phone or doorbell ring?

When assessing older clients, it is essential not to mistake some of these behaviours as signs of dementia

Clients with a **mild to moderate** degree of hearing loss should be identified as being hearing impaired as such loss can lead to social withdrawal and reduced quality of life. See "Links between hearing loss and dementia" on the following page.

With a **mild hearing loss**, a person may not hear soft noises. Understanding speech becomes difficult in groups, noise or at a distance.

When speaking to a person who has even a mild loss it is important to remember that background noise and distance will make hearing difficult therefore appropriate communication techniques need to be used.

With a **moderate hearing loss**, speech at an average conversational level will sound very soft and there will be more difficulty understanding speech at distances greater than a metre. Particularly among older people high-pitch speech sounds may not be heard making understanding difficult. Reliance on visual clues will be required to fill in what is missed. There will be difficulty following what is said in large open areas such as community rooms and outdoors unless there is close proximity to the speaker and their face can be seen.

1.Australian Hearing Information Sheet NFR143

Links between hearing loss and dementia

(The following information has been taken directly from *Catching the Mind Robber* by Andrew Campbell (Bac Soc Sci (Psych) MClinaud MACAud), pages 16-19)

1. Social Isolation

- **As hearing in noise becomes more challenging, people tend to avoid social situations:** Not only can hearing in background noise with hearing loss be exhausting, it can potentially be humiliating. Nodding and smiling when someone is delivering bad news, answering what you thought was a question but was a statement, missing the punchline of a joke...the list goes on. Unfortunately, a common trend is to stay at home and avoid such situations. This is the point where your world becomes small and you're doing less of the things you once enjoyed. Over time, many people with untreated hearing loss become socially isolated.
- **Social isolation has far reaching consequences:** Common consequences of hearing loss are social isolation and loneliness. Studies have shown strong links between social isolation, depression, anxiety and reduced physical activity. There are also strong links between loneliness and coronary heart disease. Social isolation can be stressful; studies show that lonely people generally have higher levels of the stress hormone cortisol and consequently are at risk of chronic disease. The mechanism at play here is the sense of less social support to handle life's challenges. As the saying goes: "A problem shared is a problem halved". By treating your hearing loss, you're better able to engage, maintain relationships and stay sharp in social, family and work situations.

2. Brain Overload

- **Piecing together parts of words is a challenge for our ancient brains:** It has been theorized that humans stopped evolving for the most part around 10,000 years ago with the advent of modern agriculture. People didn't live much beyond the age of 30 at that time and the loudest sounds were likely to be the occasional shout or thunderclap. Aged related and noise-induced hearing loss, impacting our ability to hear high pitched consonants were unlikely to be a feature of daily life back then. In fact, the phenomenon of high pitch hearing loss was not formally recognised until the late 1800s. The notion of supplementing the parts of conversation that are heard, with parts that are seen (by lipreading) could be described as a modern-day practice and not something we've evolved to be particularly good at.
- **Hearing loss is tiring and puts strain on the brain:** Research tells us, the more unclear words are, and the more listening effort required to hear them, the less likely those words are going to be remembered. The process of lipreading parts of words requires a complex interaction between vision, hearing and short- and long-term memory. It can be exhausting and taxing on our cognitive resources. Researchers theorise that the strain on the brain associated with untreated hearing loss over the long term is a contributing factor to heightened dementia risk and memory impairment.

3. Cerebral Atrophy

- **Cerebral atrophy (brain shrinkage) is associated with under stimulation of the brain:** This is the third and final link between untreated hearing loss and dementia that we'll discuss here. Untreated hearing loss has been shown to result in up to 40% volume loss in parts of the brain associated with memory, language, speech and hearing. The neural pathways in the brain are, in some respects, like muscles: if you don't use them, they reduce in size. With no stimulation over time, you may lose them.
- **Untreated hearing loss has been shown to double dementia risk at mild levels:** Frank Lin at the Johns Hopkin Medical Centre in the US published research that demonstrates an increase risk of dementia by:
 - 200% at mild levels of hearing loss
 - 300% at moderate levels of hearing loss
 - 500% at severe levels of hearing lossThese shocking findings have since been replicated several times over and have sparked additional research interest into this important field.

The following image is from a study published in *Neural Plasticity Journal* 2018 entitled *Anatomical and Functional MRI Changes after One Year of Auditory Rehabilitation with Hearing Aids*.

