Ear health

Caring for older adults with hearing loss

Hilary Harkin and Catherine Kelleher describe how nurses can promote good ear care, and outline the options available to patients when problems develop

Abstract

This article discusses hearing impairment and the frequency with which it occurs in older adults. Anatomy and physiology of the ear are examined. Categories of hearing loss, causes, assessment and management are explored, including hearing aids, auditory implants and approaches to communication with hearing-impaired patients.

Keywords

Communication, ear health, hearing aids, hearing loss

AN UNDERSTANDING of the basic anatomy and physiology of the ear is important to be able to assess, diagnose and offer appropriate treatment options for someone with hearing loss. The ear can be divided into three sections: external, middle and inner. The external and middle ear are mainly involved with sound transmission while the organ of hearing, the cochlea, as well as structures concerned with balance are housed in the inner ear (Figure 1).

The external ear consists of the pinna and the external auditory canal (EAC). The pinna and the outer third of the EAC are made up of cartilage, while the inner two thirds are within the petrous portion of the temporal bone of the skull. The EAC is approximately 2.5cm long, lined with skin and ends with the tympanic membrane or eardrum, which divides the external ear from the middle ear.

The ceruminous glands are located in the cartilaginous entrance of the EAC and are commonly known as the wax-producing glands. Dead skin from the EAC, dust and debris mix with secretions from these glands to produce cerumen (ear wax). The function of wax is to clean and lubricate the ear canal and, due to its slightly acidic nature, it has bactericidal properties to protect from infection. Hairs are also located in this area, which help to trap and waft debris out of the EAC. The hairs also provide protection for the skin by holding the acidic wax off the delicate lining to reduce the possibility of irritation. The shape of the EAC enables cylindrical movement of the dead skin cells out of the canal.

The ear's nerve supply is complex and includes branches of the V, VII, IX and X cranial nerves together with supply from the cervical plexus. The X cranial nerve (vagus) has an auricular branch in the EAC and stimulation of this nerve can occur during wax removal leading to reflex coughing. Referred pain from any of the other cranial nerve distributions or cervical nerves can cause otalgia (earache).

The middle ear is ventilated by the eustachian tube, which communicates with the nasopharynx. The three smallest bones in the body – malleus, incus and stapes – articulate across the middle ear with synovial joints.

The inner ear houses the cochlea, which is shaped like a snail shell and is the organ of hearing. The cochlea contains the organ of Corti, which consists of cells with hair-like projections on a membranous layer and connects with the terminal ends of the auditory nerve. The canals of the cochlea and the organ of Corti are bathed in fluid (endolymph and perilymph). Three semicircular canals are also housed in the inner ear. These assist in the perception of body position against gravity and in the maintenance of balance. Balance is maintained by the adjustment of muscles, joints, tendons and ligaments in response to information gathered by the inner ear as well as that received by the eyes.

Transmission of sound The external ear collects and concentrates sound waves. The EAC carries
sound to the eardrum, which vibrates in response to changes in sound waves and sets into motion the malleus, incus and stapes. These three tiny bones vibrate against the fluid-filled cochlea, transmitting sound waves into the fluid. Inside the cochlea, nerve cells detect sound waves in the fluid and generate nerve impulses. The auditory nerve carries nerve impulses from the cochlea to the brain, where they are received and heard as sound.

Detailed information on anatomy and physiology of the ear can be found in Harkin (2011).

Hearing loss

It is estimated that one in six people in the UK has hearing loss. This accounts for 10 million people, of whom 6.4 million are aged 65 and over. Severe or profound hearing loss affects 685,000 people aged 65 and over; 71.1 per cent of those aged over 70 and 41 per cent of over 50 year olds have some degree of hearing loss. As well as hearing loss, around half of older people in the UK have additional disabilities or long-term health conditions (Action on Hearing Loss 2011). Hearing loss can lead to ‘miscommunication, social withdrawal, confusion, depression and reduction in functional status’ (Demers 2007). Morgan and Carter (1997) have found that older adults with a hearing impairment are significantly more likely to be involved in accidents. Durga et al (2007) suggest that taking a daily supplement of folic acid (800µg) may slow down the progression of hearing loss.

Categories of hearing loss

A common question asked in audiology clinics is ‘What percentage of hearing loss do I have?’ When testing a patient’s hearing a range of different tones or frequencies is measured from 250Hz to 8000Hz. It is common in age-related hearing loss for patients to present with better hearing in the low frequency regions and poorer hearing in the higher frequencies (Yueh et al 2003). Therefore, a patient may have a better percentage of hearing for one frequency and a worse percentage for another. It is therefore difficult to score a percentage of hearing or hearing loss. Instead, hearing loss is categorised as: mild, moderate, severe or profound, based on deteriorating hearing thresholds.

It may also be categorised as conductive (middle and outer ear), sensorineural (inner ear), or mixed (with conductive and sensorineural components).

Conductive hearing losses affect the outer and middle ear, for example, stenosis (narrowing) of the ear canal, perforated eardrum and effusion in the middle ear. Conductive hearing loss can fluctuate and is not always permanent. In some cases hearing recovers, for example, some perforations heal. In other cases surgery can rectify conductive hearing loss, for example, tympanoplasty, an operation to reconstruct the eardrum.

Age-related hearing loss or presbycusis (progressive bilateral deafness in the higher frequencies in older age) is sensorineural hearing loss affecting the cochlea, for example, noise-induced where loud noise damages hair cells in the cochlea. Meningitis may affect the cochlea. Not everyone who contracts meningitis acquires hearing loss but it is known in some cases to cause sensorineural deafness as a result of the infection spreading into the cochlea or inflammation of the auditory nerve.

Mixed losses include patients who may have any of the aforementioned problems at the same time. For example, a patient may have sensorineural hearing loss due to noise damage and discharge due to a perforated eardrum as well.

Causes

There are a number of reasons why people may be deaf or lose their hearing. Some common conditions include otosclerosis, a disease of the bone surrounding the inner ear. Otosclerosis is mainly conductive in nature but can sometimes be sensorineural when the disease invades the inner ear. Cureoglu et al (2010) summarised current advances in research and clinical aspects of otosclerosis and concluded that when otosclerosis is sufficiently severe to involve the cochlea, it usually fixes the stapes as well. This reduces the ability of the stapes to vibrate, meaning that transmission of sound is reduced leading to conductive hearing loss.
Some medications can be toxic to the ear causing damage specifically to the cochlea or auditory nerve and sometimes the vestibular (balance) system. The result of ototoxicity can be sensorineural hearing loss, imbalance or both; tinnitus (noises that some people hear in their ears or head) can also arise. Sometimes the effects can be reversed but sometimes they are permanent. Known ototoxic drugs include certain antibiotics, particularly aminoglycosides such as gentamicin. Other known ototoxic drugs include chemotherapy and non-steroidal anti-inflammatory agents, especially salicylates, diuretics and antimalarials (Rybak and Whitworth 2005, Yorgason et al 2006). More than 130 drugs are ototoxic (Palomar et al 2001).

Prolonged and repeated exposure to noise in the workplace can cause noise-induced hearing loss, which is sensorineural in nature and irreversible. The Control of Noise at Work Regulations 2005 came into force in 2006 to ensure that workers’ hearing is protected from excessive noise in the workplace. Further information on noise at work is available from the Health and Safety Executive (2011).

Perforated eardrums, unsuccessful ear surgery, for example, failed tympanoplasties and stapes surgery can also contribute to varying degrees of hearing loss.

About 2 to 4 per cent of people in the UK have a build up of wax that causes them symptoms at any one time. Impacted wax is more common in older adults and in patients with cognitive impairment. Estimates suggest that between 19 and 65 per cent of those aged over 65 have wax impaction (Roland et al 2008). Older adults have drier wax and slower movement of skin and debris out of the ear canal and so are more likely to experience build up (Roeser and Ballachanda 1997). With ageing, the hairs at the entrance of the ear canal often become coarse and can block wax in the ear canal especially in older men. These hairs can be trimmed with a nurse’s scissors or by the barber or hairdresser.

Ear care
As ear care is not on the nursing curriculum nurses will have to attend an ear care study day. This is provided nationally by the Primary Ear Care Centre and Ear Care Services (see find out more box at the end of the article). Delegates are taught the importance of considering the person with an ear-related problem and how to promote ear health, thereby reducing the chance of problems occurring. The nurse will learn to educate the older adult on how to take care of their ears. Many adults insert an implement in the ear such as a cotton bud. There is a link between wax impaction, external ear infections and cotton bud use (Nussinovitch et al 2004, Hobson...
Ear health and Lavy (2005). With their knowledge of anatomy nurses can explain optimum ear care to the patient. Cotton buds or instruments should not be used as the ear is self-cleaning and ‘fiddling’ with the ears adversely affects this process. If the person has itchy ears they should keep their ears dry from any entry of water using cotton wool and petroleum jelly. Rodgers (2003) advocates the occasional use of oil, which can improve lubrication and condition of the skin in the ear canal. This will hopefully reduce the likelihood of wax impaction and itchy ears.

**Signs**

Common signs of hearing loss include people reporting that those around them mumble or speak very softly. Patients will also often complain of difficulty hearing in groups or in noise. They may find that they have to ask people to repeat what they have said, often have their television and/or radio turned up loud and may have varying degrees of difficulty using the telephone.

**Assessment**

An example of a brief screening questionnaire to assess hearing loss is shown in Figure 3. This can be used in all areas where older adults are nursed. Yueh et al (2003) advocate the use of questionnaires as they are accurate in detecting hearing loss and inexpensive. If signs are present, a full assessment of hearing is advised. In the authors’ audiology department referrals are accepted directly from GPs if the following criteria are met:

- Patient over 60 years of age.
- No excessive wax in either ear.
- No active discharge or history of discharge.
- No skin disease in ear canals.
- No perforated or inflamed ear drums.
- No earache.
- No tinnitus other than occasional or transient.
- No sudden onset of hearing loss or sudden deterioration of loss.
- No fluctuating loss beyond that linked with colds.
- No vertigo (not the common unsteadiness of older age).
- No markedly asymmetrical hearing loss.

If any of the above are present then referral to an ear, nose and throat (ENT) specialist should be made. The authors recommend that you liaise with your nearest audiology department to find out local policy. Direct referrals are advocated by the NHS as they reduce waiting times for ENT surgical appointments and are more cost effective (Eley and Fitzgerald 2010).

A pure tone audiogram (hearing test) is conducted to measure thresholds of hearing and where indicated hearing aids are advised. It is current practice locally to offer binaural hearing aids where bilateral hearing loss has been diagnosed.

**Management**

**Hearing aids**

There are a number of different types of hearing aid available through the NHS and various private hearing aid dispensers. Hearing aids will not restore hearing but they can improve a person’s ability to hear in difficult environments and their quality of life. It is important to note that no single hearing aid will be appropriate for all patients. Hearing aid technology is increasingly more sophisticated and can be programmed to help with more challenging environments. This may include a programme to help with background noise, usually a directional

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**Figure 3 Brief hearing loss screener**

<table>
<thead>
<tr>
<th>Clinical scale to detect hearing loss</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age: ______</td>
<td></td>
</tr>
<tr>
<td>If age &gt;70 years = 1 point</td>
<td></td>
</tr>
<tr>
<td>2. Sex:</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>3. Highest education attended</td>
<td></td>
</tr>
<tr>
<td>12th grade (GCSE level) or less</td>
<td></td>
</tr>
<tr>
<td>Greater than 12th grade (GCSE level)</td>
<td></td>
</tr>
<tr>
<td>If ≤ 12th grade (GCSE level) = 1 point</td>
<td></td>
</tr>
<tr>
<td>4. Have you ever had deafness or trouble hearing with one or both ears?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
<tr>
<td>If ‘Yes’, continue to Question 5. If ‘No’, go to Question 6</td>
<td></td>
</tr>
<tr>
<td>5. Did you ever see a doctor about it?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
<tr>
<td>6. Without a hearing aid, can you usually hear and understand what someone says without seeing their face if that person whispers to you from across the room?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
<tr>
<td>If ‘Yes’ = 1 point</td>
<td></td>
</tr>
<tr>
<td>7. Without a hearing aid, can you usually hear and understand what someone says without seeing their face if they talk to you in a normal voice from across the room?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
<tr>
<td>If ‘No’ = 2 points</td>
<td></td>
</tr>
</tbody>
</table>

Total ______

A total score of 3 or more points indicates a need for further evaluation. (Demers 2007, reproduced with permission)
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The hearing aid can be kept clean by wiping it with a dry cloth.

Hairspray and aftershave spray can affect the hearing aid. Allow products to dry before inserting the hearing aid.

Keep hearing aids away from water and direct heat.

Remove hearing aids before you go to sleep.

Make sure hearing aids are switched off when not in use to save the battery.

If the sound outlet is blocked by wax or moisture, remove the wax with the tool provided and remove the moisture with a small blower. Both of these should be supplied with the aid or can be purchased from a hearing aid provider.

When washing the ear mould patients are advised to:

- Disconnect the ear mould from the hearing aid;
- Keep the tubing in the mould.
- Wash the ear mould in warm soapy water regularly, especially if you notice the tubing is blocked.
- Allow the ear mould to dry out completely before re-attaching it to the hearing aid. This will prevent moisture entering the hearing aid and causing damage.
- Never wash the hearing aid.

Whistling sounds may be experienced because of the following:

- The ear mould has not been inserted properly.
- The ear mould is no longer a good fit.
- Too much wax in the ear canal.

Microphone feature. Induction loop systems can also be used to help wearers hear better in more challenging public environments, for example, churches, theatres, banks, post offices and some supermarkets. The areas are usually well signposted (Figure 4). Loops work by transmitting sound from a source, for example, television, microphone or other sound system, directly to the hearing aid when it is on the telecoil (T) programme. All these additional features are discussed with patients when they attend for assessment and fitting by an audiologist.

Figure 5 is an example of a standard digital behind-the-ear (BTE) hearing aid that is supplied in the authors’ trust. BTE aids have an ear mould that fits inside the ear, while the rest of the aid sits behind the ear. Controls and design will differ with hearing aids. It should be noted that the following information relates to BTE hearing aids only.

Caring for the hearing aid and ear mould is explained at the appointment so that optimal use of the aid(s) can be maintained and common problems, such as whistling, avoided. Wax build-up can reduce the performance of hearing aids. Manufacturers estimate that 60 to 70 per cent of all hearing aids sent for repair are damaged as a result of contact with wax (Kochkin 2005). This is costly to the NHS and leaves the wearer without hearing assistance for a period of time, which is isolating and can lead to depression. It is therefore even more important that older adults with hearing aids undergo a routine annual ear assessment so they receive ear care before damage to the hearing aid occurs.

At the authors’ trust the following general information about caring for hearing aids is provided to patients:
Ear infection/discharge.
Faulty hearing aid.

The flexible ear mould tubing should be changed once every four months or sooner if it is blocked, has moisture inside or is hard. It can be obtained free of charge from your NHS hearing aid provider. The procedure for retubing the ear mould is as follows:
- Detach the ear mould from the hearing aid.
- Pull out the old tube from the mould and put it aside.
- Cut one end of the new tube to a point.
- Push this end through the hole at the back (flat) side of the mould so that the tube bends upwards.
- NB. If the ear mould has two holes, note from which hole you pulled out the old tubing and ensure the new tube is inserted into that hole. This is always the top (and usually bigger) hole.
- Pull the tube all the way through the mould (this may be easier with pliers) until you reach the bend in the tubing. Ensure that the uncut end faces upright.
- Cut the pointed end of the tube flush with the tip of the mould.
- Using the old piece of tubing, measure how long the upright tubing needs to be (about an inch usually) and cut accordingly. This needs to be accurate to ensure optimum comfort. Discomfort can make it difficult to wear the hearing aid.
- Re-attach to the hearing aid.

It is sometimes useful for a person to see a hearing therapist who will equip them with the skills necessary to assist communication. This may include tactics to communicate and manage difficult listening environments. Lip-reading classes can improve communication further and are often recommended. There are also a variety of listening devices that can be used in the home such as doorbell and fire alarm trigger units and loop systems for telephone and television. These are usually available through the sensory impairment unit in social services.

Other organisations can advise and even supply equipment such as Action on Hearing Loss and Connevans, an online resource for people with hearing difficulties. Audiologists and/or nurses can also advise patients about these agencies.

Box 1 lists points to remember when communicating with someone who has a hearing impairment.

Box 1 Points to consider when communicating with patients who are hearing impaired

- Obtain the patient’s attention before speaking.
- Make sure that you can be seen clearly.
- Avoid unnecessary noise, for example, televisions in the waiting room.
- Face the light and the patient at all times.
- Keep your head fairly still when talking.
- Do not hide your mouth when talking, for example, behind papers, files or with your hand.
- Talk directly to the hearing-impaired person.
- Do not have conversations with other people while dealing with a hearing-impaired patient.
- Speak clearly and not too fast. Enunciate but do not exaggerate and repeat if necessary or rephrase.
- Write down any important facts.
- Do not shout into anyone’s ear or hearing aid.
- Use the loop/telecoil system where available.
- Remember a hearing aid will not cut out background noise completely.
- Be patient.

An A4 poster version of this box for display purposes can be downloaded at www.nursingolderpeople.co.uk

Auditory implants Some patients cannot benefit from hearing aids and so an auditory implant may help. There are a variety of different implants available. The most common are bone anchored hearing aids (Baha), middle ear implants and cochlear implants.

A Baha is useful for patients who have conductive loss, single-sided sensorineural hearing loss where the cochlea in one ear is not working, or mixed hearing loss. Surgical Baha involves an operation to place a small titanium implant in the bone behind the ear. An abutment (coupler) is attached to the implant and a sound processor is clipped externally to the abutment. The sound processor converts sounds to vibrations and transmits these to the inner ear by vibrating the bone.

Middle ear implant may be offered to individuals who present with a sensorineural hearing loss but who are unable to use conventional hearing aids due to medical issues such as chronic eczema of the ear, psoriasis, allergies, absence of pinna or partial or complete stenosis of the ear canal. Patients who have problems with the middle and/or outer ear, for example, chronic otitis media (middle ear infection), aural atresia (absence of external ear canal), stenosis of the ear canal or otosclerosis, and present with either conductive hearing loss or mixed hearing loss may also be offered middle ear implant.

A cochlear implant is an electronic device used to replace the damaged hair cells in the inner ear. It is made up of two parts. The external portion includes a microphone, speech processor and the transmitting coil. The internal portion includes the
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receiver and electrode. Sounds in the environment are picked up by the microphone which sends the signal to the speech processor. The speech processor filters the sound into coded signals. These coded signals are then sent to the transmitting coil which sends the signal through the skin to the implanted receiver. The receiver electrically activates the electrode array which in turn stimulates the auditory nerve. Nerve impulses are sent to the brain where they are interpreted as sound.

The ENT nurse practitioner’s involvement with patients with implants is seen most for patients who have a Baha. This is due to the fact that there is a penetrating abutment through the skin. Post-operatively this site requires wound care management and a patient might need to attend their local ENT department for dressings by a specialist wound care nurse. This could potentially be ongoing because although the wound will heal it may become infected from time to time, mainly due to poor care and hygiene of the site. It is a team responsibility to ensure that patients understand and are able to care for their site but at times this can be difficult or overlooked.

Conclusion

Hearing loss is more common with ageing. Early detection and assistance will only occur if all older adults have an ear health check on an annual basis. All nurses working with older adults should have attended a recognised ear care course and be able to manage wax and promote ear health so that patients will not experience symptoms associated with wax impaction: blocked ears, discharge, pain, hearing loss, vertigo, tinnitus and otitis externa. They should also have an understanding of the care of hearing aids and how to manage basic problems with them. It is important for nurses to be aware of the options open to older adults with hearing loss. Action for Hearing Loss and Age UK provide free advice and services and patients can gain further information through local libraries.

Find out more

- Action on Hearing Loss: www.actiononhearingloss.org.uk
- Age UK: www.ageuk.org.uk/health-wellbeing/conditions-illnesses/hearing
- Connevans: www.connevans.com
- Ear Care Services: www.earcareservicesuk.com
- Primary Ear Care Centre: www.earcarecentre.com

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References


