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Introduction

In the first of two articles on ear care, we revised the anatomy and physiology of the ear, focusing on cerumen production. This was followed by a discussion of the key aspects of making an assessment when patients present with ear problems, using the SOAP (Subjective, Objective, Assessment, Planning) mnemonic. In this second article, we will discuss current best practice for cerumen removal in a primary care or community setting following a diagnosis of cerumen impaction.

Cerumen impaction can result in hearing loss, dizziness, tinnitus, itching or pain (Wright, 2015). It can also lead to social withdrawal and decreased function (Guest et al, 2004). It is estimated that up to four percent of the population have cerumen impaction (Guest et al, 2004). Ear irrigation is a common procedure in primary care with approximately two million people in England and Wales having their ears irrigated with water every year (Loveman et al 2011).

Despite the scale of cerumen-related ear conditions in primary care there is still poor evidence to support current best practice recommendations (Burton and Doree, 2009; Loveman et al, 2011; Wright, 2015). In 2009 there was a Cochrane Systematic Review of cerumenolytics (Burton and Doree, 2009) which revealed only nine trials suitable for inclusion. In 2011 Loveman et al undertook a further systematic review of all interventions including cerumenolytics and ear irrigation and found twenty-six suitable trials. In 2015, Wright undertook a further systematic review of all methods relating to cerumen removal and found ten studies. All three systematic reviews noted the poor quality of many studies and Wright (2015) found no randomised controlled trials for ear irrigation. There is a current Cochrane review in progress to provide an update to their original guidance (Burton et al, 2016) but this has not yet been published.

The following recommendations have been drawn from the conclusions detailed in the systematic reviews above and published best practice guidelines from the Primary Ear Care Centre (PECC) (2014a, 2014b, 2014c, 2014d, 2014e, 2016) and the American Academy of Otorhinolaryngology (Schwartz et al, 2017). However, it should be noted that these guidelines are recommendations only and do not replace clinical decision-making – they are a support for this process. As discussed in the first article, nurses remain accountable for their practice to the Nursing and Midwifery Council (NMC, 2014; NMC, 2015) and it is also important to recognise and respond to patient preference (NMC, 2015) which may justify some variation from guidelines on an individual basis.

Ear drops

The National Institute for Health and Care Excellence Clinical Knowledge Summaries (NICE CKS, 2016) and the PECC (2014b) both recommend the use of cerumenolytics – ear drops to soften or remove cerumen – to either facilitate irrigation or to remove the need for the procedure. There is limited evidence as to the most effective cerumenolytic to use (Schwartz et al, 2017) but it is likely that proprietary preparations may increase the risk of adverse dermatological reactions (Burton and Doree, 2009). Water or saline may be as effective as proprietary softening agents but may cause swelling of any keratin or organic foreign body present within the external auditory meatus (EAM), thus creating further complications and patient discomfort (Wright, 2015).

The consensus recommendation is for the use of olive oil drops for people presenting with symptomatic cerumen impaction. These should be instilled twice daily for up to one week before

reassessing the need for irrigation. Where tolerated, or where irrigation may be contraindicated or undesirable to the patient, patients can use olive oil drops for up to three weeks as this may lead to sufficient resolution of impacted cerumen (Burton and Doree, 2009) through natural expulsion, negating the need for irrigation entirely.

Patients should be counselled that, when instilling ear drops, they may find that any hearing loss or sense of 'fullness' in the affected ear may become temporarily worse. This is because impacted cerumen is often quite dry, which results in multiple cracks which allow some sound transmission. When ear drops are instilled, they will temporarily occlude these cracks, reducing sound transmission. As the cerumen softens, these will further occlude the cracks until the cerumen is removed through the natural process of epithelial migration.

Instructions for instilling ear drops
<ol style="list-style-type: none"> 1. Warm the bottle of drops for a few minutes in your hand to reduce the potential discomfort of the drops. 2. Lie on your side with the affected ear up 3. Using your non-dominant hand, pull the top of your ear up and out a bit to straighten the ear canal. 4. With the other hand, instil a few drops into the ear canal, trying not to touch the ear with the dropper. 5. Release your ear and stay lying on your side for a few minutes. 6. When you sit up, use a tissue or cotton wool to clean any excess oil that might drip out. 7. If you need to use drops in both ears, repeat this process for the other ear. 8. Do not put cotton wool in your ear as this will soak up the drops and they will be less effective at softening the wax

Table 1: How to instil ear drops: instructions for patients

If an individual is unable to lie down to instil ear drops, for example due to limited mobility or for children, then olive oil sprays are commercially available which may be better tolerated or easier to apply.

Ear Irrigation

Indications for irrigation

Irrigation should be undertaken when an individual has complete occlusion of the TM by cerumen or where the entire EAM needs to be clear, for example when taking moulds for hearing aids or for specific audiological tests (Schwartz et al, 2017; Wright, 2015). Where ear drops have been unsuccessful in removing sufficient cerumen, and where there are no contraindications, ear irrigation using an approved electronic irrigator can be undertaken by a suitably trained practitioner (PECC, 2014c). This can be in a patient's home or in a primary care setting.

Contraindications to the use of electronic irrigation for cerumen removal

There are some conditions where ear irrigation may be contraindicated. These are listed in Table 2 below.

Condition	Rationale
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Previous complications from ear irrigation	If a patient has previously had adverse effects from irrigation, they are likely to suffer adverse effects from any further procedure
History of a middle ear infection in the last six weeks	It is possible that there may still be infection present and irrigation will cause pain. If there is still effusion in the middle ear there is an increased risk of TM perforation
The patient has undergone ANY form of ear surgery (apart from grommets that have extruded at least 18 months previously and it is documented subsequently that the tympanic membrane is intact) unless explicitly cleared by a relevant specialist	The patient may not have an intact TM. Irrigation will cause water to flow into the middle and inner ear, with the potential to cause trauma and infection
The patient has a perforation	Irrigation will cause water to flow into the middle and inner ear, with the potential to cause trauma and infection
History includes mucous discharge	It is possible that there may be otitis media and irrigation will cause pain. If there is effusion in the middle ear there is an increased risk of TM perforation
Evidence of acute otitis externa	Examination and irrigation will cause acute pain and the patient is unlikely to tolerate the procedure

Table 2: Contraindications for ear irrigation. (References: PECC, 2014c; Schwartz et al, 2017; Wright, 2015)

Cautions for use of electronic irrigators

Where there are any cautions, always use only the lowest pressure setting on the electronic irrigator (PECC, 2014c) as this will reduce the risk of complications. The list of conditions that require cautious irrigation are listed in Table 3 below. It should be noted that Wright (2015) lists permanent hearing loss in the non-affected ear as a contraindication for irrigation on the basis that there is a rare but serious risk of permanent hearing loss in that ear, resulting in complete deafness. However, this is not discussed in other guidance (Burton and Doree, 2009; Schwartz et al, 2017) and the PECC (2017) specifically states that permanent hearing loss in the unaffected ear is NOT a contraindication as the risk of permanent hearing loss is outweighed by the benefits of cerumen removal and resultant improvement in hearing. Nurses should use their own clinical judgement in discussion with the patient in this situation.

Condition	Rationale
Tinnitus	One of the potential side effects of ear irrigation is tinnitus so this procedure may worsen the existing tinnitus either temporarily or on a permanent basis
Healed Perforation	Once the TM has been perforated, it is at greater risk of further perforation.
Dizziness	Dizziness may be exacerbated due to either stimulation of the vagal nerve or poor

	equalisation in the inner ear due to the presence of water occluding the EAM
Anti-coagulants	There is an increased risk of bleeding
Cleft palate (repaired or not)	Due to possible involvement of sinuses and Eustachian tube, ear irrigation on someone with a cleft palate should be undertaken with caution
Previous radiation to head and neck	Radiotherapy can cause epithelial thinning and increase healing time
Immunocompromise	Increased risk of post-procedure otitis externa
Dermatological conditions (e.g. eczema, seborrheic dermatitis)	Dermatological conditions result in disruption to epidermis and increase the risk of complications such as trauma, bleeding and post-procedure otitis, as well as delayed healing and cerumen production
Diabetes	There is a higher risk of developing post-procedure otitis externa. Advice includes the use of acetic acid drops to re-acidify the EAM after irrigation
Permanent hearing loss in the non-affected ear	There is a rare but potential risk of permanent hearing loss in the good ear

Table 3: Conditions where caution must be used for ear irrigation. (References: PECC, 2014c; Schwartz et al, 2017; Wright, 2015)

Undertaking Ear Irrigation

After a full assessment has been undertaken and a decision has been made to irrigate after checking for contraindications and cautions, informed consent must be gained and documented in clinical notes. **This may be through electronic EMIS templates or paper forms such as the sample in Figure 1.** Although electronic irrigators are considered safe, any invasive procedure carries with it a risk of adverse effects. When irrigating, patients must be made aware of the risks which include dizziness, nausea, tinnitus, bleeding, infection, hearing loss or TM perforation (PECC, 2014c; Schwartz et al, 2017; Wright, 2015). There is also the possibility of irrigation being ineffective at removing the impacted cerumen. Although most of these adverse effects are transient, there is a small risk of permanent tinnitus or hearing impairment because of the procedure.

Full step-by-step guidance on undertaking ear irrigation can be found on the PECC website (PECC, 2014c). Key points for irrigation include:

- Irrigation works by directing a pulsing jet of water onto the EAM and behind the impacted cerumen to break it up and force it out of the ear. The irrigator probe should never be pointed directly at the impacted cerumen as this may create further impaction or push the cerumen onto the TM, causing discomfort and increasing the risk of TM perforation.
- The irrigator probe should be directed at the posterior wall of the EAM (towards the back of the patient's head) (PECC, 2014c). Aiming the stream of water at the anterior wall risks stimulating the vagus nerve.

- Previous guidance recommended moving the probe and changing the angle of water along the posterior wall between superior (upper) and inferior (lower) aspects. This is no longer recommended.
- Irrigation should not cause pain. If the patient expresses discomfort, the procedure should be stopped immediately.
- At periodic intervals, use your otoscope to inspect the EAM for trauma and whether the TM can be visualised.
- Use a maximum of one canister of water per ear.

Irrigation should only be undertaken using an approved electronic irrigator and by a suitably trained practitioner. The use of syringes, either metal or plastic, is not recommended.

Aural toilet

Following ear irrigation, comprehensive aural toilet is required to reduce the risk of infection. Irrigation may cause abrasion to the EAM and stagnation of water may cause maceration which increase the risk of infection (PECC, 2014c). To perform aural toilet, use a Jobson Horne probe (probe with serrated end) wrapped in good quality cotton wool or an ear mop in a circular motion to gently cleanse the EAM of debris and water (PECC, 2014b) under direct visualisation. The cotton wool must be replaced as soon as it becomes soiled, and should never touch the TM (PECC, 2014b). Commercially available cotton buds should not be used as the quality of cotton wool used increases the risk of TM abrasion, they are too large to adequately insert into the EAM and maintain adequate vision of the EAM, and they are not licensed for this purpose. In fact, most cotton bud manufacturers explicitly state they are not suitable for insertion into the ear.

Microsuction and manual removal through instrumentation

Microsuction may be used for cerumen removal for those patients for whom irrigation is contraindicated or not tolerated. It can be performed in primary care but only by a suitably trained practitioner (Wright, 2015). Microsuction is contraindicated in individuals with hyperacusis (sensitivity to loud noise), severe dizziness or who have experienced difficulties with the procedure in the past (PECC, 2014d). Microsuction is a technique that requires specialist training and equipment. Where this is not available in primary care, referral to a specialist clinic will be required.

Some practitioners may be trained in manual removal of cerumen through instrumentation. This involves using a Jobson Horne probe, wax hook, ring probe or specialist forceps to remove cerumen under direct vision (PECC, 2014a). This procedure may be better tolerated than microsuction due to the lack of loud noise.

If either microsuction or manual removal are required and the resources are not available in your clinical area, patients will require referral to the appropriate specialist service.

Alternative methods of cerumen removal

One study found that self-irrigation was as effective as irrigation in primary care and therefore more cost-effective (Loveman et al, 2011) but no detail was given about the type of self-irrigation and

there are some concerns regarding the safety of these devices in terms of the amount of pressure applied and the associated risk of TM perforation (Schwartz et al, 2017).

Ear candling has been marketed as a method of removing cerumen. The process involves placing a lit hollow candle into the EAM. This is meant to create a negative pressure and draw out the impacted cerumen through the suction it creates. There are very few studies investigating the effectiveness of ear-candling but those that have been undertaken show no benefit with regards to cerumen removal compared to no treatment or conventional treatments. Ear-candling has been found to have greater adverse effects in the form of burns to the external ear and deposition of candle wax within the EAM (Schwartz et al, 2017).

Ear-candling and self-irrigation are not recommended as methods for cerumen removal.

Additional information

Children

Ear irrigation is not contraindicated in children but should only be attempted if the child is likely to be able to tolerate it and remain sufficiently still during the procedure (PECC, 2014c). It may be helpful for the parent to hold the child on their lap.

Flying

According to PECC (2017), flying is not a contraindication for ear irrigation. However, it is recommended that irrigation be undertaken 2-3 days before flying to allow the ear to produce further cerumen.

Infection control

Kalcioglu et al (2004) identified the presence of Hepatitis B in cerumen in one study. This was confirmed by another study (Goh et al., 2008) but they concluded that the risk of transmission was low due to low levels of a particular antigen linked to Hepatitis B transmission. Despite this low risk, nurses must practice good infection control when examining ears and removing cerumen as part of standard precautions. As well as standard precautions such as gown and gloves, it is recommended to wear eye and face protection due to the risk of splash injury.

All equipment used for examination and treatment of cerumen impaction should be single use (e.g. otoscope specula, ear mops) or should be cleaned according to manufacturer's guidelines (e.g. otoscope handle, electronic ear irrigators). There is specific guidance for disinfection of ProPulse® electronic ear irrigators, alongside the manufacturer's cleaning instructions, which specifies the use of Sodium Dichloroisocyanurate (ChlorClean®) to disinfect prior to use (PECC, 2016).

Documentation

Nurses should always maintain documentation to the required standard (NMC, 2015). This involves documentation of consent to any procedure, the findings from history and examination, and the outcome of any treatment.

Conclusion:

Cerumen impaction is a frequently occurring issue and is a common presentation in primary and community care. Nurses need to use their clinical knowledge and skill to accurately diagnose, or confirm the diagnosis of, impacted cerumen and work collaboratively with patients to determine the most appropriate treatment for removal using recommended best practice guidelines as appropriate. They also need to be aware of the evidence base for these guidelines and apply their clinical judgement to ensure a satisfactory outcome for patients and reduce adverse effects.

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