

External ear problems

By Dr Luke Bereznicki and Professor Gregory Peterson

Learning objectives:

After reading this article, the reader should be able to:

- Discuss commonly occurring disorders of the external ear.
- Outline the prevalence and nature of cerumen (ear wax) impaction and otitis externa.
- Discuss the management options for each of these disorders, including preventive strategies, and
- Consider the role of the pharmacist in the management of cerumen impaction and otitis externa.

Introduction

The ear consists of three parts: the external ear, which comprises the pinna (auricle) and external auditory canal that leads to the tympanic membrane; the middle ear that connects with the throat via the Eustachian tube; and the inner ear (see Figure page 818). Disorders of the external ear such as cerumen impaction and *otitis externa* are common, and pharmacists are often asked to provide primary health care in these situations. Cerumen impaction is a common cause of hearing impairment in the elderly, and may affect up to 57% of nursing home residents. *Otitis externa* affects up to 10% of people at some stage in their lives and often interrupts daily activities. This article will review the prevalence, nature and treatment of common disorders affecting the external ear.

Cerumen (ear wax) impaction

Cerumen impaction is a common reason for presentation to general practitioners (GPs) and cerumen removal is the most common ear, nose and throat procedure performed in primary care. Approximately 4% of primary care patients consult their GP for cerumen impaction.¹ It has been estimated that cerumen impaction is present in approximately 10% of children, 5% of healthy adults, up to 57% of older patients in nursing homes, and 36% of patients with intellectual disability.² The skin lining the outer two-thirds of the external auditory canal has a well-developed subcutaneous layer containing hair follicles, ceruminous glands and sebaceous glands. Cerumen is a mixture of secretions from these glands and the exfoliated squamous epithelium (the major



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component).¹ Cerumen has a pH of 5.2 to 7.0 and also contains glycopeptides, lipids, hyaluronic acid, sialic acid, lysosomal enzymes and immunoglobulins.³ Cerumen exerts a protective, antibacterial effect by helping to maintain an acidic pH; it also serves to lubricate the external auditory canal.¹ Cerumen, together with dust and dirt, normally migrates laterally and out of the external auditory canal;⁴ movements of the jaw assist this self-cleaning process. The consistency of cerumen differs depending on genetics and age. Asians are more likely to have a dry type (grey and flaky), while Caucasians and Africans are more likely to have a wet type (honey to dark brown and moist).⁵

The self-cleaning mechanism fails sometimes, resulting in retention or impaction of cerumen. The accumulation of cerumen may cause several problems; it can (i) interfere with the clinician's view of the tympanic membrane; (ii) cause a conductive hearing loss and interfere with assessment of hearing; (iii) cause discomfort and vertigo, if in contact with the tympanic membrane; and (iv) contribute to infection.⁶ Commonly reported symptoms include itching, pain, tinnitus and dizziness, and occasionally more serious sequelae result, such as hearing loss, perforated eardrums, social withdrawal



and poor work function.⁷ Impaction is more common in the elderly because the ceruminous glands atrophy with age and cerumen tends to become drier, leading to build up and oxidation.⁸ The prevalence of cerumen impaction is also higher in men, and people with intellectual impairment.⁹⁻¹¹ The presence of a hearing aid can impair the extrusion of cerumen and lead to impaction.⁸ The use of cotton buds is not recommended, as it risks damage to the sensitive lining of the ear canal and usually results in impaired lateral movement of cerumen.¹²⁻¹⁴ People with dermatological disease of the periauricular skin or scalp and those with deformed or narrow ear canals are also susceptible to cerumen impaction.

Cerumen removal may be attempted by irrigation (syringing) of the external auditory canal (normally by practice nurses and GPs), with or without the use of cerumenolytics; by cerumenolytics alone; or by manual removal.¹⁵ Manual removal methods have not been well studied, although they are considered effective. A small study found that 5.3% of patients who were not treated had complete clearing of impacted cerumen and 26.3% had moderate clearing after five days, attesting to the self-cleaning mechanisms of the external auditory canal.⁶ Pharmacists can recommend cerumenolytics to disperse cerumen and reduce the need for irrigation, or to facilitate irrigation if required.⁸ However, irrigation is the procedure of first choice for many GPs.⁷ There are a variety of cerumenolytic products available, which may be water-based, oil-based, and non-water-based/non-oil-based. Water-based and non-water-based/non-oil-based agents increase cerumen miscibility, while oil-based preparations lubricate the wax (see Box 1).¹⁵ Theoretically, sodium bicarbonate drops might increase the risk of *otitis externa*, which is associated with an alkaline pH in the ear canal.¹⁶ Cerumenolytics are contraindicated if inflammation of the external auditory canal is present or if the tympanic membrane is perforated.¹⁷ Ear candles are hollow candles that are inserted into the ear and lit. It is suggested that as they burn, they produce a vacuum in the hollow of the candle

that theoretically 'draws' the wax and other debris out.¹⁸ Ear candles have been demonstrated to be both ineffective and potentially harmful, and should not be recommended.¹⁹

A Cochrane review to assess the effectiveness of cerumenolytics for the removal of symptomatic ear wax found that the poor quality and heterogeneous nature of the trials available made it difficult to make clear recommendations regarding their effectiveness.⁹ In one trial, 'active' treatment (either sodium bicarbonate, sterile water or dichlorobenzene with chlorbutol) was superior to no treatment at all, but there were no significant differences between the 'active' treatments.⁶ Two trials have found that sodium bicarbonate drops, dichlorobenzene with chlorbutol, triethanolamine polypeptide and docusate were no more effective than sterile water or a saline placebo.^{6,20} Another trial found that 10% aqueous sodium bicarbonate and 2.5% aqueous acetic acid were equally effective in children with cerumen accumulation.²¹ In this study, cerumenolytic therapy was significantly more effective in children compared to adults possibly because cerumen tends to be more moist in children and smaller cerumen deposits are present. The limited trial data suggests that simple remedies, such as water or olive oil, are as effective as marketed products. Cerumenolytics may take up to a week to achieve the desired effect, and if at that time there is no symptom relief, irrigation by a GP or nurse may be required.²²

Syringing (or irrigation) involves a stream of water (or saline) at body temperature being passed into the ear at a rate of approximately 10mL per second (for adults), with the wash being collected below the ear. Current evidence suggests that the use of cerumenolytics may improve irrigation success by as much as 97%.²³ There appears to be no difference in the outcomes associated with an increased duration of cerumenolytic treatment before irrigation. Use of a cerumenolytic agent 15 to 30 minutes before irrigation is as effective as several days of treatment.²³ Overall, no cerumenolytics appear to be superior to saline, making saline an inexpensive first-line agent.²³

Contraindications to irrigation include a history of perforated eardrum, unilateral deafness and a history of recurrent *otitis externa*.¹⁷ In a survey of GPs, 38% of respondents reported experiencing complications associated with cerumen removal.²⁴ Major complications were associated with approximately 1 in 1000 ears irrigated, and included pain, tinnitus, vertigo, *otitis media* or *externa*, damage to the skin of the external auditory canal, infection, disturbance in balance causing nausea and vomiting, and perforation of the tympanic membrane.²⁴ If initial irrigation fails, based on current evidence, another attempt should be made following the instillation of saline drops, which can be left in place for 15 to 30 minutes. If the second attempt fails, it is reasonable to use a cerumenolytic for two to three to days, followed by another trial of irrigation.¹⁵

Box 1. Topical agents for cerumen removal.

Modified from McCarter et al. 2007.¹⁵

- Water-based
 - Docusate sodium (*Waxsol*)
 - 3% Hydrogen peroxide
 - 2.5% acetic acid
 - 10% sodium bicarbonate
 - Water or saline (*Audiclean*)
- Oil-based
 - Arachis oil, chlorbutol, paradichlorobenzene, orthodichlorobenzene (*Cerumol*)
 - Olive, almond or mineral oil
- Non-water-based/non-oil-based
 - Carbamide peroxide (*Ear Clear for Ear Wax Removal*)
 - Glycerol (*Auralgan Otic*)

Otitis externa

Otitis externa is an inflammatory process of the external auditory canal, often with infection, and it is thought to affect 10% of people at some stage in their lives.²⁵ In one American study, 56% of outpatient visits involving *otitis externa* were for adults, the remaining 44% for children.²⁶ *Otitis externa* may present in a variety of forms (acute, chronic or necrotising) and be disabling enough to cause 36% of patients to interrupt their daily activities for a median duration of four days, with 21% requiring bed rest.²⁷ The inflammation is usually generalised throughout the external auditory canal (diffuse *otitis externa*), but may be localised (e.g. furuncles).

a. Diffuse otitis externa

The external auditory canal is warm, dark and prone to becoming moist, creating an environment prone to bacterial and fungal growth.²⁸ It is easily traumatised, and the exit of debris, secretions and foreign bodies may be impeded by its structure and the presence of hair. As discussed in the previous section, the external auditory canal has its own defences, including cerumen and a unique epithelial migration that occurs from the tympanic membrane, resulting in lateral migration of cerumen and accumulated debris.^{29,30} *Otitis externa* results from a failure of these defence mechanisms or occurs when the epithelium is damaged. *Otitis externa* may be associated with eczema of the ear canal, and is more common in swimmers, humid environments, people with absence of ear wax or with narrow ear canals, hearing-aid users and following mechanical trauma (e.g. induced by the use of cotton buds).³¹ There are many precipitants of *otitis externa*

Box 2. Precipitants of otitis externa.

Taken from Sander 2001.²⁸

- **Moisture**
 - Swimming
 - Perspiration
 - High humidity
- **Water contaminated with bacteria**
- **High environmental temperatures**
- **Mechanical removal of cerumen**
- **Insertion of foreign objects**
 - Cotton buds
 - Fingernails
 - Hearing aids
 - Ear plugs
- **Other trauma to ear canal**
- **Chronic dermatological disease**
 - Eczema
 - Psoriasis
 - Seborrhoeic dermatitis
 - Acne

(see Box 2), but the most common is excessive moisture, which results in elevation of the pH and removes the protective cerumen (e.g. swimmer's ear).²⁸ Once cerumen is removed, keratin debris absorbs water, creating a nourishing medium for bacterial growth.

Diffuse *otitis externa* is characterised by otalgia (ear discomfort) and otorrhoea (discharge in the external auditory canal).²⁸ Ear discomfort may range from pruritis to severe pain, which may be exacerbated by chewing. The patient may also complain of a sensation of 'fullness' in the ear and hearing loss, which result from swelling sufficient to occlude the external auditory canal.³² If swelling is severe, a wick may need to be inserted to allow the administration of topical medications. If the external auditory canal is visible, it generally appears red and inflamed. The most common cause of *otitis externa* is bacterial infection, with *Pseudomonas aeruginosa* and *Staphylococcus aureus* the most frequent pathogens.³³ Fungal overgrowth (e.g. with *Aspergillus niger*) is also common (causing approximately 10% of cases), particularly following prolonged antibiotic therapy.²⁹ Chronic *otitis externa* may result in external auditory canal stenosis with associated hearing loss.

Management of acute diffuse *otitis externa* is aimed at improving or abolishing symptoms and preventing recurrence and complications. Many cases of *otitis externa* resolve spontaneously over a number of weeks or months. The signs and symptoms of bacterial *otitis externa* tend to be more intense than for other forms.²⁸ Depending on its severity, otalgia may require systemic analgesia (e.g. paracetamol or non-steroidal anti-inflammatory drugs plus or minus codeine). The affected ear canal should not be irrigated with water. Debris or exudate should be removed by dry aural toilet by a health professional, either by mechanical suction under direct vision or dry mopping with cotton wool on a thin carrier (not a cotton bud).²⁸ Once the ear has been cleansed as much as possible, in the absence of signs of fungal infection, topical antibacterial therapy should be commenced. Simple acidification with 2% acetic acid is considered to be effective, though there is a lack of evidence to support its use alone.³⁴ In one comparative study, ear drops containing a corticosteroid were more effective than acetic acid drops in the treatment of acute *otitis externa* in primary care.³⁵ However, combined acetic acid and corticosteroid drops were as effective as combined antibiotic and corticosteroid drops.³⁵ Acetic acid may cause further irritation and pain if inflammation is present. Additionally, the only proprietary preparation available in Australia also contains alcohol, which may lead to further irritation. A range of effective topical preparations for *otitis externa* is available in Australia (see Table). The addition of steroids to the ear drops may decrease inflammation and oedema and result in more rapid resolution of symptoms, but not all studies have shown a benefit.²⁸ The addition of a topical steroid may also result in sensitisation.

Topical treatment for acute diffuse *otitis externa* is generally required for five to seven days; in some cases 10 to 14 days may be required.²⁸ Usually, three to four drops are placed in the affected ear three to four times a day; ciprofloxacin may be administered twice-daily. Administration instructions for ear medications are shown in Box 3. Oral antibiotics are rarely required²⁶ but may be necessary when *otitis externa* is persistent, when otitis media is suspected, or when local or systemic spread has occurred.²⁹ Indications for systemic antibiotics include fever, spread of inflammation to the pinna, and folliculitis.³⁶ Systemic antibiotics should also be considered when the patient is immunocompromised (e.g. those with diabetes or those taking systemic corticosteroids).²⁸ The ear should be kept dry during and for two weeks after treatment. Patients with *otitis externa* should avoid water sports for at least seven to 10 days, although competitive swimmers may be allowed to return after two to three days provided that pain has resolved.³⁷

b. Acute localised otitis externa

Acute localised *otitis externa* is usually a furuncle associated with a hair follicle in the external auditory canal, and is commonly caused by *Staphylococcus aureus*.²² The patient may experience severe pain, particularly when the pinna is moved, and a small red swelling can often be seen. Systemic

antibiotics are usually curative, although surgical drainage may be required.³⁶ Oral analgesics may also be useful.

Contact dermatitis, both irritant and allergic, can involve the pinna as well as the external auditory canal. Either type may be complicated by secondary bacterial infection. Contact dermatitis is commonly caused by sensitivity to earrings. Nickel-free earrings may be worn as an alternative, or a protective coating can be applied to reduce the risk of contact dermatitis. Other potential causes include topically applied medications, hearing aids or earplugs. Hypoallergenic silicone hearing aids and earplugs are available to avoid this risk. The key to management is to identify and remove the irritant or allergen. Topical steroids and emollients are beneficial. Acetic acid solutions (e.g. Burrows otic solution) may also be added to reduce the risk of secondary infections, re-acidify the skin, dry lesions and remove crusts. In more severe cases, systemic corticosteroids and antihistamines may be necessary.^{29,16}

c. Prevention of recurrence

Preventing a recurrence of *otitis externa* involves avoiding the numerous precipitants (see Box 2) and treating any underlying chronic dermatologic disorders.²⁸ Prevention is of particular importance for patients with unusually viscous cerumen, deformity of the external auditory canal, those who perspire excessively or participate in water sports regularly.²⁸ Preventive strategies include the following:

- Drying the external auditory canal after swimming or bathing with a hair dryer on the lowest heat setting;
- Water exclusion with earplugs during showering and swimming (a tight-fitting bathing or swimming cap may be preferable as impermeable ear plugs may predispose to otitis externa);
- Prophylactic topical preparations instilled into each ear after shaking the water out following water immersion; and
- Avoiding any manipulation of the skin of the external auditory canal (e.g. scratching or cotton buds).

A number of topical preparations are available to prevent otitis externa. The marketed preparations contain acetic acid plus isopropyl alcohol (*Aquaeer*), isopropyl alcohol plus glycerol (*Ear Clear Dry & Clear*) and propylene glycol diacetate (*Vosol Complete Care for Swimmers Ear*). These preparations have not been evaluated to date in randomised clinical trials.

Conclusion

Pharmacists can play a key role in the management of cerumen impaction and otitis externa. Cerumen impaction is extremely common in the nursing home environment, and often results in hearing impairment, which may in turn lead to frustration of residents and also be mistakenly perceived by caregivers as cognitive decline. A range of strategies is effective, with none shown to be any more effective than simple remedies such as water, saline or olive oil drops. These

Box 3. Administration of ear medications.

Modified from the Australian Medicines Handbook, 2008.¹⁷

The ear should be clean and dry and the patient should lie with the affected ear uppermost.

Method of drug application depends on degree of swelling of ear canal:

- For minimal swelling, instil drops directly into ear canal then remain in position for a few minutes.
- For swelling that narrows canal, saturate a sponge wick or ribbon gauze with drops and insert into the ear canal; review daily until swelling settles.

Drops are preferred; warm container in cup of warm water if necessary to reduce viscosity - administration of cold drops may result in dizziness.

A small cotton plug moistened with the drops can be used to help retain the drops in the ear if the patient cannot lie still long enough to allow absorption.

Gentle massage or pressure on the tragus (cartilage flap over the opening of the ear canal) may aid penetration of the drops.

Ear ointments are used less commonly as they may accumulate and cause obstruction of the ear canal.

A small amount of ointment should be gently squeezed into the ear canal; it may also be used on or around the ear.



Table. Topical anti-infective agents available to treat otitis externa. *Modified from Sander 2001.*²⁸

Class	Examples	Advantages	Disadvantages
Antiseptic/drying agent	2% acetic acid solution	Inexpensive and effective against most infections without sensitisation	Can be irritating to inflamed external auditory canal; possibly ototoxic
Antibiotic	Chloramphenicol preparations		May result in contact dermatitis
	Aminoglycoside preparations (neomycin, framycetin)	Effective; less locally irritating than acetic acid	Neomycin can be a potent sensitiser, causing contact dermatitis in 15% of patients; potentially ototoxic
	Quinolone preparations (ciprofloxacin)	Highly effective without causing local irritation or sensitisation; no risk of ototoxicity; twice-daily dosing	Increases community exposure to an important class of antibiotics, with potential for resistance
Combined antibacterial-corticosteroid	Framycetin/gramicidin/dexamethasone, ciprofloxacin/hydrocortisone, neomycin/nystatin/gramicidin/triamcinolone	Often chosen if the cause of inflammation is unidentified	Risk of fungal infection if used for > 7 days
Antifungal	Nystatin, clioquinol (present in combination preparations)	Clioquinol has antibacterial and antifungal activity	Risk of sensitisation (clioquinol)

simple management options can be attempted either before considering or 15 to 30 minutes prior to irrigation, which is not without risk for patients. The initial management of *otitis externa* generally requires treatment prescribed by GPs, but pharmacists may assist by advising on the appropriate use of topical or systemic treatments, providing simple analgesia when required, and providing general advice on ear hygiene during acute cases and preventive strategies to avoid recurrence.

Dr Luke Bereznicki is Lecturer in Pharmacy Practice and Professor Gregory Peterson is Professor in Pharmacy at the Tasmanian School of Pharmacy.

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CPD questions are on pages 844 to 846.

questions

The articles in this series are independently researched and compiled by PSA commissioned authors and peer reviewed.

I must see the pharmacist

(A score of 4 out of 5 attracts one credit point.)

- Which of the following is not correct?
 - The malleus, incus and stapes are the three small bones known as the ossicles.
 - When the ossicles move, the fluid of the middle ear moves and causes the stereocilia of the organ of Corti to bend.
 - In the inner ear, the function of the cochlea relates to hearing, while the function of the semicircular canals relates to balance.
 - The auricle and external auditory canal are both part of the outer ear.
- Conductive hearing loss:
 - Always involves a blockage of the external auditory canal.
 - Occurs when the transmission of sound through the outer and middle ear is impeded.
 - May be caused by meningitis and ototoxic drugs.
 - Is one of only two types of hearing loss.
- Which of the following statements is correct?
 - Inserting a cotton tip into the ear is an effective way of cleaning wax out of the ear.
 - No sound can be heard from an ear in which the tympanic membrane is perforated.
 - Hearing loss associated with acute otitis media is temporary.
 - Noise-related hearing loss is encountered only in adults.
- Which of the following is correct?
 - A foreign body in the ear is a common cause of conductive hearing loss in children.
 - Otitis externa is sometimes referred to as 'swimmer's ear'.
 - The ability of a young child to hear is important for the development of speech and language.
 - All of the above.
- Which of the following drugs are considered to be ototoxic?
 - Cisplatin, intravenous frusemide, paracetamol.
 - Cisplatin, gentamicin, spironolactone.
 - Cisplatin, prednisolone, gentamicin.
 - Cisplatin, aspirin, gentamicin.

Supporting pharmacy practice

(A score of 2 out of 3 attracts half a credit point.)

- Odds Ratios are:
 - Defined as the number of times more likely, or less likely, an event is to happen in one group compared to another.
 - Used for analysis of retrospective studies.
 - The difference in risk between control group and exposed group.
 - The inverse of risk ratio.
- Relative Risk :
 - Is the measure of effectiveness commonly used by bookmakers.
 - Is generally higher numerically than for the corresponding OR.
 - Is also known as the risk ratio.
 - Should be used to report all clinical trials.

- If the odds of an event happening are 7 to 10, the risk of the event happening is:
 - 7/17.
 - 3/10.
 - 7/10.
 - 7/(1+10).

Medication review

(A score of 2 out of 3 attracts half a credit point.)

- Which ONE of the following is LEAST likely to be a cause of drop attacks in the elderly?
 - Postural hypotension.
 - Cardiac arrhythmia.
 - Carotid stenosis.
 - Hypokalaemia.
- The patient in the review has a high risk of gastrointestinal bleeding. Which ONE of the following factors has the LEAST impact on this high risk?
 - Taking aspirin.
 - Taking meloxicam.
 - Taking prednisolone.
 - Taking ezetimibe.
- Which ONE of the following statements concerning drop attacks in the elderly is LEAST appropriate?
 - Cardiac syncope is a common cause in the elderly.
 - Drop attacks should not be investigated in the elderly as the cause is usually irreversible.
 - Drugs that reduce blood pressure may predispose to drop attacks in the elderly.
 - Cerebral ischaemia may contribute to drop attacks in the elderly.

Disease update

(A score of 2 out of 3 attracts half a credit point.)

- Which of the following appears most likely to result in the highest UVR levels reaching a person?
 - Beach, cloudless skies, 9am.
 - Snow field, some cloud cover, midday.
 - High latitude, some cloud cover, 10am.
 - Low altitude, some cloud cover, 3pm.
- There is strong evidence that chronic exposure to UVR causes all of the following EXCEPT:
 - Cortical cataracts.
 - Pterygium.
 - Squamous cell carcinoma of the cornea and conjunctiva.
 - Macular degeneration.
- Select the INCORRECT statement regarding photokeratitis.
 - It is caused by UVA and UVB-induced damage to the cornea.
 - Symptoms typically appear six to 12 hours after exposure to UVR.
 - Symptoms tend to resolve in 48 hours.
 - It tends to resolve without long-term consequences.



Clinical update

1. Blepharitis is an inflammation of the eyelids and eyelid margin resulting from allergy, seborrhoea or infection. True or false?
 - a) True.
 - b) False.
2. Bacterial conjunctivitis is caused by a wide range of bacteria, most commonly:
 - a) *Staphylococcus aureus* and *Staphylococcus epidermis*.
 - b) *Streptococcus pneumoniae* and *Haemophilus influenzae*.
 - c) None of the above.
 - d) Both A and B.
3. The most common cause of infective conjunctivitis in adults is adenoviral kerato-conjunctivitis which is highly contagious and will normally occur in epidemics. The typical presentation is with the following:
 - a) A scant watery discharge and red eye, possibly with conjunctival oedema.
 - b) Irritation, photophobia and possible palpable preauricular or submandibular lymph nodes.
 - c) Follicular conjunctivitis rather than papillary conjunctivitis.
 - d) All of the above.
 - e) A and C.

4. A person who wears contact lenses presenting at the pharmacy with red eyes:
 - a) Just needs saline to moisten their eyes.
 - b) Should always ring alarm bells.
 - c) Needs same day referral for slit lamp examination.
 - d) B and C.
5. A chalazion is a granulomatous, sterile mass within a meibomian gland that:
 - a) Presents as a painless lump, which increases in size over weeks to months.
 - b) Tends to occur more commonly in people with a history of blepharitis, rosacea or seborrheic dermatitis.
 - c) Can cause blindness.
 - d) B and C.
 - e) A and B.

Evidence-base update

1. Approximately what proportion of healthy adults are thought to be affected by cerumen impaction?
 - a) 5%.
 - b) 10%.
 - c) 20%.
 - d) 60%.

October

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- Select Submit Answers.
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Australian Pharmacist Continuing Professional Development (CPD) is a central element of PSA's CPD&PI program. It is also part of the New Zealand College of Pharmacy's (NZCP) education program for NZ pharmacists.

The CPD section is recognised under the PSA CPD&PI program as a Group 2 activity. Members can choose which articles they want to answer questions on and get points based on the questions they answer. The points allocated to each section and the pass mark are shown with the questions.

CPD&PI Credit points are allocated to members who get 4 out of 5 of questions correct for *I must see the pharmacist*, *Evidence-base update* and *Clinical update*, and 2 out of 3 questions correct for *Supporting pharmacy practice*, *Medication review* and *Disease update/Pathology tests*.

If not submitting online, write the correct answers in the spaces provided on the answer panel on the back of the address sheet, fill in your name, member number and address details, then either mail or fax the answer page to the relevant address and fax number for marking.

Submit your answers before 1 December
or fax/mail to:

online at www.psa.org.au and receive automatic feedback



PSA Fax:

PSA Mail address:

(03) 9389 4044

PSA CPD answers
PSA (Vic. Branch) Ltd
Level 1, 381 Royal Parade
PARKVILLE VIC 3052



NZCP Fax:

NZCP mail address:

(04) 381 4786

NZCP CPD answers
PO Box 11 640
Wellington

Answers will be printed in the December issue of *Australian Pharmacist*.

questions

The articles in this series are independently researched and compiled by PSA commissioned authors and peer reviewed.

- Which ONE of the following statements regarding cerumenolytics is FALSE?
 - Saline drops are as effective as marketed products.
 - Cerumenolytics improve the effectiveness of ear irrigation by up to 97%.
 - Cerumenolytic therapy may be more effective in children than adults.
 - Before attempting ear irrigation, cerumenolytic drops should be used for at least one week.
- The elderly are more prone to cerumen impaction because:
 - The epithelium of the external ear canal migrates at a slower rate.
 - Cerumen production is increased.
 - The number of cerumen glands decreases with age.
 - Greater immobility.
- Which ONE of the following statements regarding otitis externa is FALSE?
 - The most common precipitant of otitis externa is excessive moisture.
 - Fungal overgrowth is a relatively common cause of otitis externa.
 - Irrigation of the affected ear is useful to cleanse the ear and remove debris.
 - The signs and symptoms of bacterial otitis externa tend to be more intense than for other forms.
- Which ONE of the following treatments used alone for acute bacterial otitis externa would you consider to be the LEAST effective?
 - Neomycin, nystatin, gramicidin and triamcinolone drops.
 - Acetic acid drops.
 - Framycetin, gramicidin and dexamethasone drops.
 - Hydrocortisone and ciprofloxacin drops.

knowledge in practice (Each question is worth half a credit point.)

Knowledge in practice is designed to be difficult and aims to make you apply information from articles in this month's *Australian Pharmacist* and other suggested reading to the questions below just as you would for a client/patient. This section is not meant to be easy. There are no simple clear-cut answers to the questions. The standard references listed below may be of use when answering the questions.

General references

- Sansom L (ed). *Australian Pharmaceutical Formulary and Handbook*, 20th Ed. Canberra: Pharmaceutical Society of Australia, 2006.
- Rossi S (ed). *Australian Medicines Handbook*. Adelaide: Australian Medicines Handbook Pty Ltd; 2008.
- National Prescribing Service [online]. At: www.nps.org.au
- Merck Manual of Diagnosis and Therapy [online]. At: www.merck.com/
- Product information – available from various sources, e.g. *MIMS*, *APP Guide* or online on manufacturers' websites.
- Royal College of Pathologists of Australasia. RCPA Manual [online]. At: www.rcpamannual.edu.au/

1. Management of acute otitis media

Mrs T comes into the pharmacy with her 18-month-old son Aden who has been suffering from a head cold for four days. She tells you that he has a temperature, has been tugging at his right ear all morning and vomited after lunch today. His mother learnt about the importance of using antibiotics only when really necessary when her eldest son recovered from an ear infection without antibiotics in March. She asks you for something to relieve Aden's ear ache and fever. He is not of Aboriginal and Torres Strait Islander descent and weighs 12.5kg.

Which of the following options is the **most appropriate** advice for Aden's mother?

- Research has shown that Aden's own immune system will probably clear the infection in a few days. Use paracetamol to relieve the pain and fever, but if symptoms persist for more than two days, seek medical advice as antibiotic therapy may be needed.
- Use paracetamol for relief of pain and fever, but seek medical advice after 24 hours if symptoms persist as antibiotic therapy may be needed.
- She should seek medical advice because antibiotic therapy (e.g., amoxicillin 125mg three times daily for five days) may be indicated.
- She should seek medical advice because antibiotic therapy (e.g., amoxicillin 375mg 12 hourly for five days) may be indicated.

Additional references: Summary of Therapeutic Guidelines: Antibiotic, 2006 1 for antibiotic treatment in selected respiratory and skin infections. National Prescribing Service. Clinical audit: Targeted use of antibiotics; Feb 2007. At: www.nps.org.au/__data/assets/pdf_file/0018/22824/Antibiotics2007ClinicalAuditPack.pdf

2. Grapefruit juice-drug interactions

Mrs P, a regular customer, comes into the pharmacy and asks if she can speak to the pharmacist. She has read in a news report that some anti-allergy tablets are affected by grapefruit juice. She and her husband have recently started drinking a glass of grapefruit juice each morning with their breakfast. Her husband takes *Telfast* tablets for his hay fever during the spring months and she wonders if the grapefruit juice will affect them. She also asks if you can recommend something for nausea. She thinks she must have a virus, as she has been feeling dizzy and nauseous for the past few days. You



check both Mrs P's and her husband's medication histories on the computer and find that Mrs P is taking *Noten* 50mg twice-daily, *Crestor* 10mg daily, *Tegretol* 100mg twice-daily, *Monopril* 20mg daily and *Anginine*, one when required. Her husband is taking *Zolof* 100mg daily and *Ducene* 5mg three times daily.

Which of the following is an appropriate counselling point for Mrs P?

- a) The grapefruit juice could increase the amount of *Telfast* in Mr P's blood, and side effects such as headache, dizziness, drowsiness, or nausea may be more likely to occur. It might be advisable for him to either stop drinking grapefruit juice or take an alternative antihistamine such as *Claratyne*.
- b) Mrs P's recent dizziness and nausea could be adverse effects of the *Tegretol*, as the grapefruit juice may be causing increased carbamazepine blood levels. It would be advisable for Mrs P to stop drinking grapefruit juice and to consult her doctor if the symptoms persist.
- c) The grapefruit juice may increase Mr P's blood levels of *Ducene*, resulting in drowsiness and fatigue. This could be avoided if he takes the *Ducene* an hour before or two hours after drinking the grapefruit juice.
- d) Mrs P's symptoms may be adverse effects of the *Crestor* due to increased blood levels caused by the grapefruit juice. It may be advisable for her to cut down on the quantity of grapefruit juice she drinks and consult her doctor if the symptoms persist.

Additional reference: McCloskey W, Zaiken K, Couris R. Clinically Significant Grapefruit Juice-Drug Interactions. *Nutrition Today* 2008; 43(1):19-26. At: www.nursingcenter.com/library/journalarticleprint.asp?Article_ID=773555

3. Age related macular degeneration

Peter is 60 years old and was recently diagnosed with intermediate age-related macular degeneration (AMD). He is aware that smoking is an important modifiable risk factor for AMD and has cut down his smoking from 25 to 10 cigarettes a day, but feels that he is not yet ready to reduce any further. His doctor has told him to go to his pharmacy and get a vitamin/mineral supplement that contains the ingredients in the AREDS Formula.

Which of the following is the most appropriate therapy for Peter?

- a) *Blackmores Macu-vision*, two tablets daily
www.blackmores.com.au/Products/Detail.aspx?ProductID=1919
- b) *Cenovis Antioxidant*, three tablets daily
www.cenovis.com.au/productDetails.php?ID=131750
- c) *Bioglan Multi-Vision*, one tablet daily
www.bioglan.com.au/vitamin.asp?productID=101

- d) *Ethical Nutrients Zinc Maintain*, three tablets daily
www.ethicalnutrients.com.au/ZINC.html

Additional Reference: The AREDS Formulation and Age-Related Macular Degeneration. National Eye Institute. At: www.nei.nih.gov/amd/summary.asp

4. Relative Risk and Odds Ratios

(see: Odds Ratios – The form guide for non-punters, page 822)

A clinical trial of 2,000 participants evaluated the effect of a treatment on the incidence of the common cold in one year. In the control group, 650 participants experienced colds, while 450 in the treatment group experienced colds. This can be expressed in a 2x2 contingency table as:

	Experienced common cold	
	Yes	No
Treatment with drug	450 (a)	550 (b)
No treatment with drug ('control')	650 (d)	350 (d)

(Assume 95% Confidence Intervals have supported the statistical significance of findings.)

Use an online 2x2 contingency table or the formula from page 824 to identify the incorrect statement:

- a) The difference in risk of catching a cold with treatment compared to no treatment is 20%.
- b) The odds of catching a cold in the treatment group are 1.86.
- c) The treatment reduced the relative risk of catching a cold by 30.8% compared to the control group.
- d) Five people will need to receive the drug for one year in order to prevent one additional person catching a cold.

Additional reference: Pezzullo J. 2-way Contingency Table Analysis. Revised Feb 2008. At <http://statpages.org/ctab2x2.html>

To answer Knowledge in practice questions

Answers for *Knowledge in practice* can only be submitted online through the PSA members-only area of the PSA website at: www.psa.org.au PSA members will receive instant feedback on the correct answers with an explanation of why the answer is correct. If you do not have member access details for the PSA website, you can request them via a link from the login page.