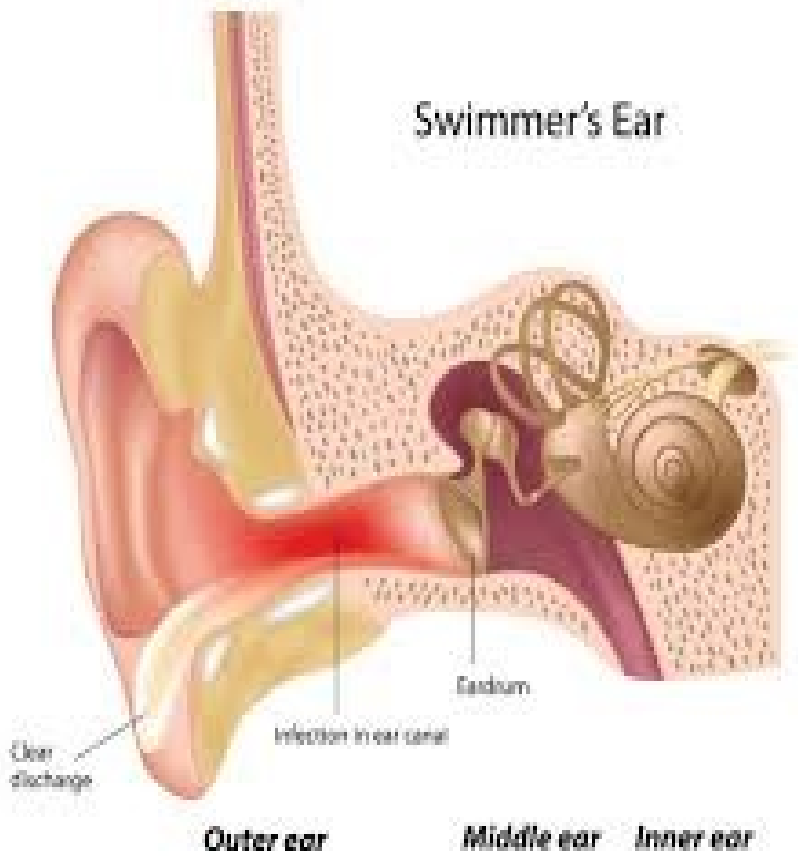
EAR CONDITIONS



Course Name: Over-the-Counter drugs
Course Code: 0521416
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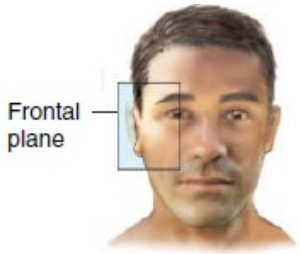
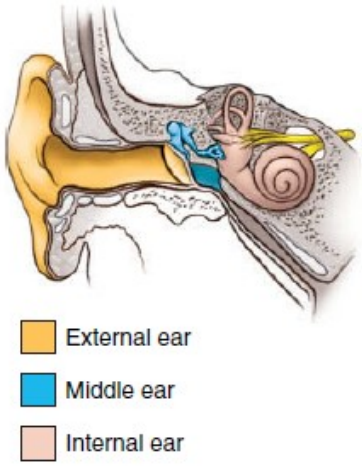
BACKGROUND

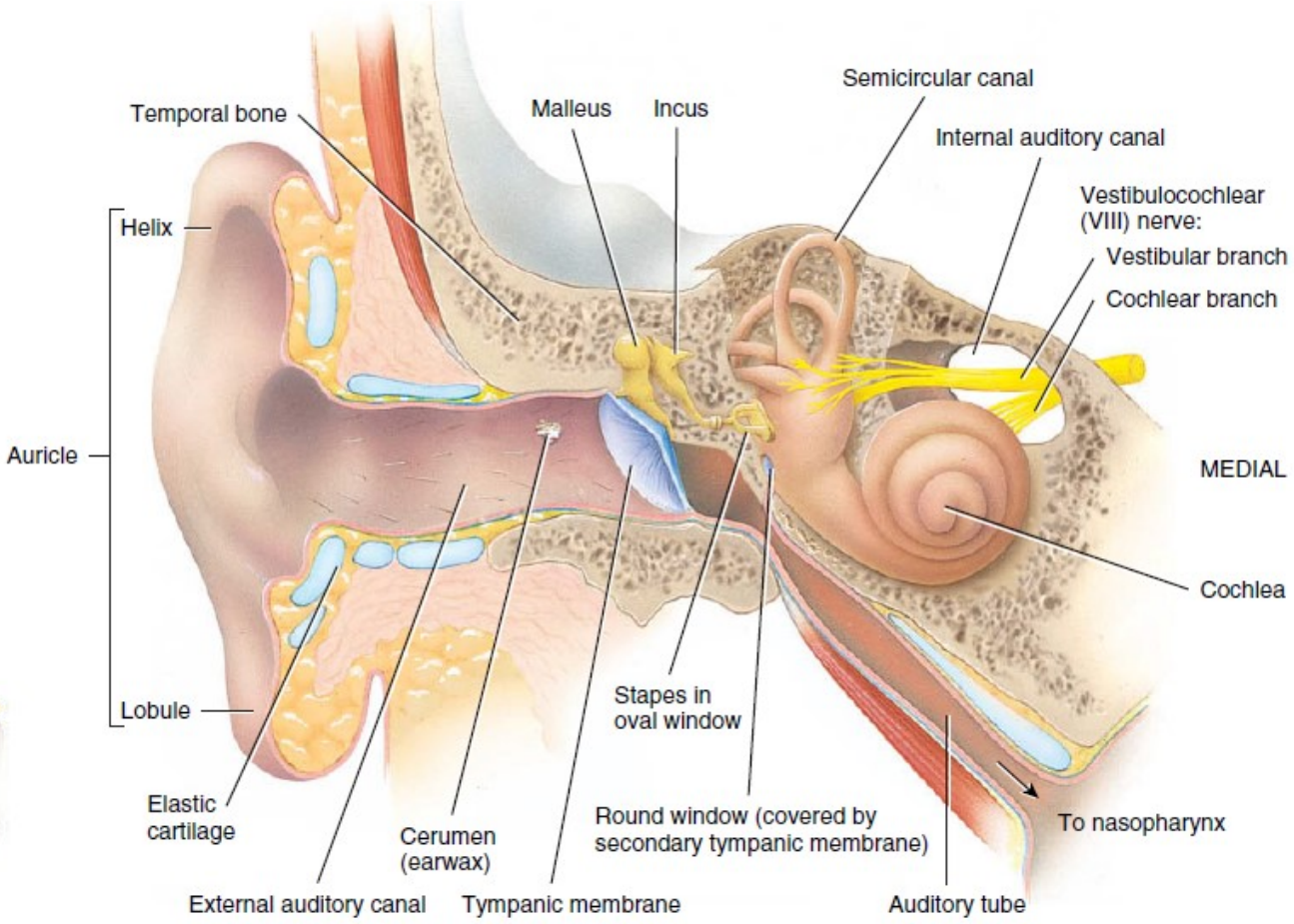
- Currently, community pharmacists can ONLY offer help to patients with conditions that affect the external ear

→Therefore, concentrates on external ear problems.

The ear has three principal regions: the external (outer) ear, the middle ear, and the internal (inner) ear.

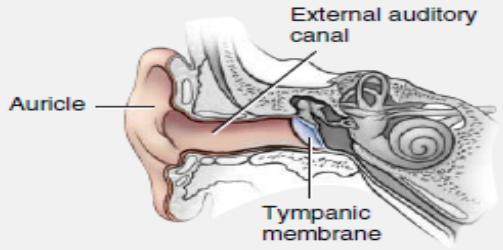
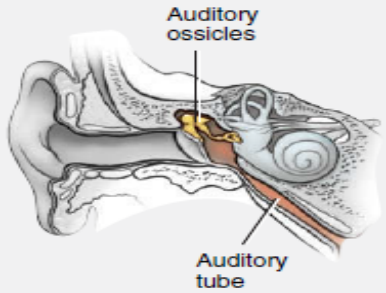
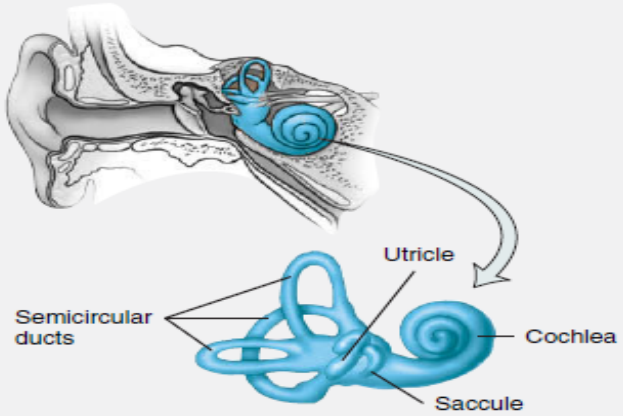




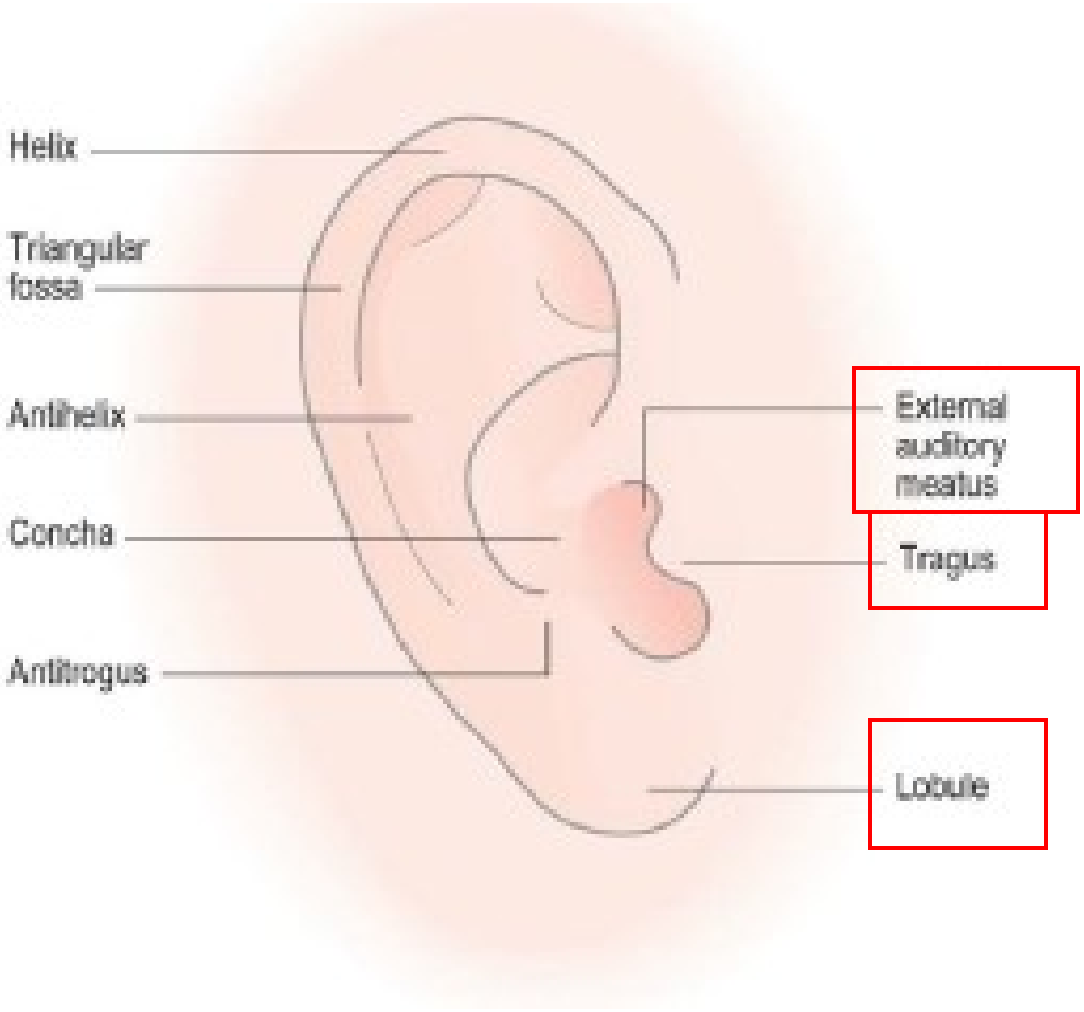


Frontal section through the right side of the skull showing the three principal regions of the ear

Summary of Structures of the Ear

REGIONS OF THE EAR AND KEY STRUCTURES	FUNCTION
External (outer) ear 	***Auricle (pinna):*** Collects sound waves. ***External auditory canal (external auditory meatus):*** Directs sound waves to eardrum. ***Tympanic membrane (eardrum):*** Sound waves cause it to vibrate, which in turn causes malleus to vibrate.
Middle ear 	***Auditory ossicles:*** Transmit and amplify vibrations from tympanic membrane to oval window. ***Auditory tube (eustachian tube):*** Equalizes air pressure on both sides of tympanic membrane.
Internal (Inner) ear 	***Cochlea:*** Contains a series of fluids, channels, and membranes that transmit vibrations to spiral organ (organ of Corti), the organ of hearing; hair cells in spiral organ produce receptor potentials, which elicit nerve impulses in cochlear branch of vestibulocochlear (VIII) nerve. ***Vestibular apparatus:*** Includes semicircular ducts, utricle, and saccule, which generate nerve impulses that propagate along vestibular branch of vestibulocochlear (VIII) nerve. ***Semicircular ducts:*** Detect rotational acceleration or deceleration. ***Utricle:*** Detects linear acceleration or deceleration that occurs in a horizontal direction and also head tilt. ***Saccule:*** Detects linear acceleration or deceleration that occurs in a vertical direction.

EXTERNAL EAR ANATOMY (PINNA)



EXTERNAL EAR ANATOMY

- PINNA + external auditory meatus (EAM, ear canal) = collect and transmit sound to the tympanic membrane (eardrum).
- The pinna consists chiefly of **cartilage** and has a firm elastic consistency.
- The EAM opens behind the tragus and curves inwards for approximately 3 cm; the inner two-thirds is bony and the outer third cartilaginous.
- The skin lining the cartilaginous outer portion has a well-developed subcutaneous layer that contains **hair follicles, ceruminous and sebaceous glands**.
- The two portions of the meatus have slightly different directions; the **outer cartilaginous** portion is **upward and backward** where as the **inner bony** portion is **forward and downward.** This is important to know when examining the ear.

PHYSICAL EXAMINATION

- ✓This is best performed using an otoscope, however currently most pharmacists have not had appropriate training in their use.

- ✓An alternative way to inspect the EAM would be to use a pen torch.

- ✓Because of the shape of the EAM, when performing an examination the **pinna needs to be manipulated** to obtain the best view of the ear canal

TABLE 30-4 Differentiation of Common Otic Disorders

Disorder	Etiology	Pain	Itching
Ruptured tympanic membrane	Otitis media or trauma to ear such as sharp blows, diving into water, forceful irrigation of ear	Brief, severe	No
External otitis (swimmer's ear)	Local trauma to EAC caused by excessive moisture or abrasions; subsequent fungal/bacterial infections	Acute onset, varies from mild to severe, increases with movement of tragus or auricle	Yes
Otitis media	Bacterial infection of middle ear, usually following upper respiratory tract infections	Sharp, steady, frequently unilateral; does not increase with movement of tragus or auricle	No
Foreign object in ear	Insects, insertion of objects by children, hearing aids, sound attenuators	Dull-to-severe pain with sense of fullness or pressure while chewing	Yes
Trauma to ear	Burns from curling iron, frostbite, hematomas/injuries from contact sports or ill-fitting helmets, ear piercing, improper cerumen removal techniques, abrasions of EAC, rapid changes in air pressure	Varies from sharp and steady to brief and severe	Rare
Tinnitus	Hearing disorders, blockage of EAC, exposure to high noise levels, acoustic trauma, systemic diseases, drug toxicities (salicylate, quinidine, aminoglycosides, and other antibiotics)	Possible	No
Excessive/impacted cerumen	Overactive ceruminous glands, obstructed migration of cerumen	Rare, dull pain if present	No
Water-clogged ears	Excessive moisture in EAC	None	No

Key: EAC, external auditory canal.

Source: References 29–32.

Ear Symptoms and the Affected Ear Structure

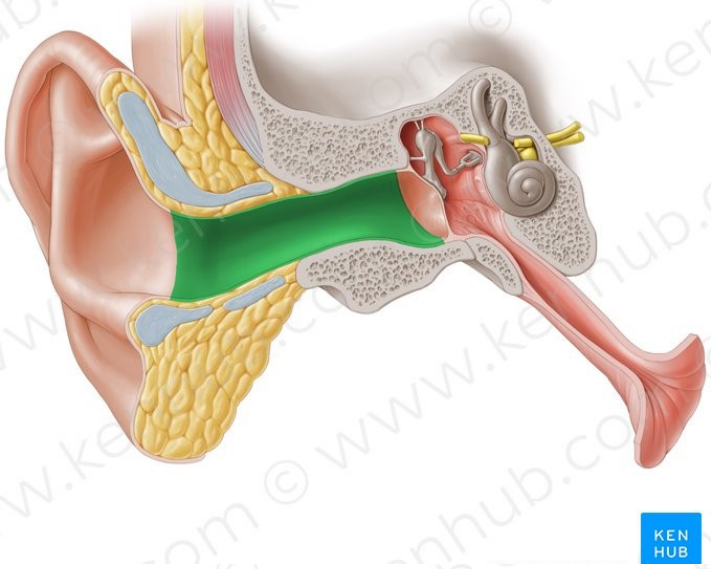
Table 3.1
Ear symptoms and the affected ear structures

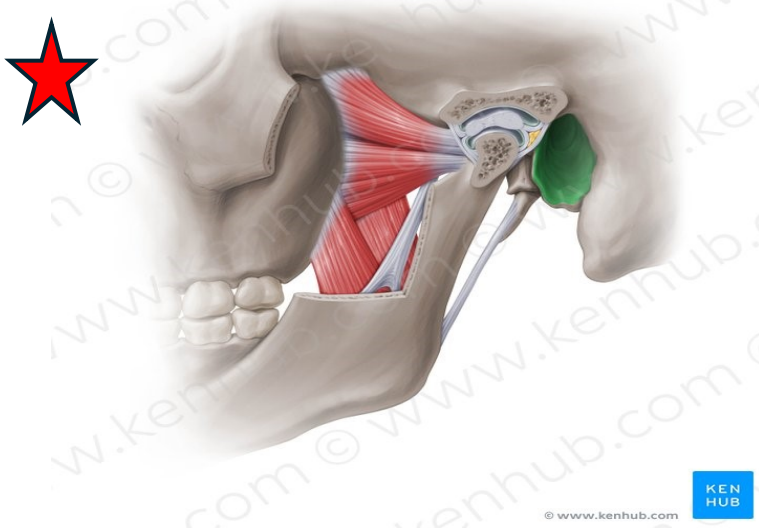
Symptom	External ear	Middle ear	Inner ear
Itch	✓		
Pain	✓	✓	
Discharge	✓	✓	
Deafness	✓	✓	✓
Dizziness			✓
Tinnitus			✓

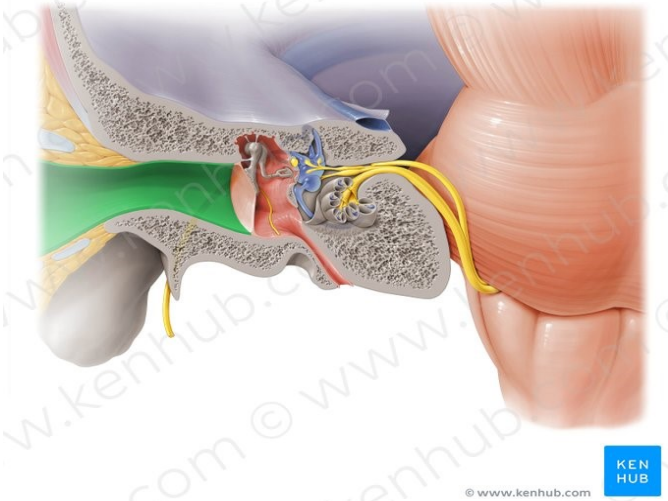
*** Temporomandibular Joint (TMJ) Disorders

A ringing sound in the ear, also known as tinnitus, is often a part of TMJ ear pain.

https://www.kenhub.com/en/library/anatomy/external-acoustic-meatus







Possible Causes Of The Presenting Complaint

Table 3.2
Possible causes of the presenting complaint

Patient presents with	Possible causes
Redness and swelling	Perichondritis, haematoma
Discharge	Otitis externa or media. If discharge mucinous, originates from middle ear as EAM has no mucous glands
Pain in mastoid area	Otitis media, mastoiditis
Pain when pressing tragus or moving pinna	Otitis externa

EAR WAX- INTRODUCTION

- ✓ ***Produced in the outer third of the cartilaginous portion of the ear canal by the ceruminous glands.***
- ✓ **The high number of presentations may be due to patient misconception that earwax needs to be removed.**

FUNCTIONS OF EAR WAX

A- Mechanical protection of the tympanic membrane (trapping dirt and repelling water).

B- Contributing to a slightly acidic medium that has been reported to exert protection against bacterial and fungal infection.

COMPOSITION OF EAR WAX:

- ✓ Major components of earwax include cerumen, produced by a type of modified sweat glands and sebum.
- ✓ Both components are made by glands located in the outer ear canal.

The chemical composition of ear wax includes

→ Keratin, saturated and unsaturated long chain fatty acids, alcohols, squalene and cholesterol.

→ *It also contains dead skin cells and hair.*

Composition varies between individuals , can be divided into:

1- 'Wet or sticky' type of wax (50% lipids) → dominant and common in Caucasians and African-Americans→ light brown or dark brown

2- 'Dry' (20% lipids) → recessive and common in Asian and pacific populations→ gray or tan and brittle

PREVALENCE AND EPIDEMIOLOGY

A number of patient groups appear to be more prone to ear wax impaction than the general population:

→Patients with congenital anomalies (narrowed ear canal).

→Patients with learning difficulties and those fitted with a hearing aid.

→The elderly are more susceptible to impaction due to the decrease in cerumen producing glands resulting in drier and harder ear wax.

Aetiology

- The skin of the tympanic membrane is unusual. It is not simply shed as skin is from the rest of the body but is migratory. This is because the auditory canal is the body's only 'dead end' and abrasion of the stratum corneum cannot occur.

- Skin therefore moves outwards away from the ear drum and out along the ear canal. This means that the ears are largely self-cleaning as the ear canal naturally sheds wax from the ear. However, this normal function can be interrupted, usually by misguided attempts to clean ears. Wax therefore becomes trapped, hampering its outward migration.

Arriving at a differential diagnosis

Table 3.3
Specific questions to ask the patient: Ear wax

Question	Relevance
Course of symptoms	The patient usually has a history of gradual hearing loss with ear wax impaction
Associated symptoms	Dizziness and tinnitus indicates an inner ear problem and should be referred. Ear wax impaction rarely causes tinnitus, vertigo or true pain
History of trauma	Check if the person has recently tried to clean the ears. This often leads to wax impaction
Use of medicines	If a patient has used an appropriate OTC medication correctly this would necessitate referral for further investigation and possibly ear-syringing

CLINICAL FEATURES OF EAR WAX IMPACTION

The key features of ear wax impaction are:

1- A history of gradual hearing loss

2- Ear discomfort (to variable degrees).

3- Recent attempts to clean ears.

- Itching, tinnitus and dizziness occur *infrequently*.
- Otoscopical examination should reveal excessive wax.

Conditions to eliminate

1- Trauma of the ear canal

→ use all manner of implements to try and clean the ear canal of wax (e.g. cotton buds, hairgrips, and pens).

→ Inspection of the ear canal might reveal laceration of the ear canal and the patient may experience greater conductive deafness because of the wax becoming further impacted.

→Trauma might also lead to discharge from the ear canal; these cases are probably best referred.

2- Foreign bodies

→Symptoms can mimic ear wax impaction but, over time, discharge and pain is observed.

→Children are the most likely age group to present with a foreign body in the ear canal and suspected cases need to be referred to a GP.

TRIGGER POINTS indicative of referral: Ear wax

Symptoms/signs	Possible danger/reason for referral
Dizziness or tinnitus	Suggests inner ear problem; requires further investigation
Pain originating from the middle ear Fever and general malaise in children	Middle ear infection?
Associated trauma-related conductive deafness Foreign body in the EAM OTC medication failure	Requires further investigation by doctor

TABLE 30-5 Treatment of Common Otic Disorders

Disorder	Etiology	Treatment
Otalgia	Intrinsic: infection, trauma, foreign objects, perichondritis Extrinsic: dental or jaw problems, nasopharyngeal infections, tumors, cysts, migraine headaches, neuralgias, cervical arthritis	Medical referral unless cause is clearly obvious, self-limiting, and self-treatable; always refer infections; self-care may delay seeking proper treatment
Otic pruritus	Contact dermatitis, seborrhea, psoriasis, infection (external otitis), excessive dryness related to decreased sebum production	Excessive dryness: 1–2 drops of mineral oil; avoid application of alcohol, insertion of foreign objects; medical referral if severe; see also Chapters 34 and 35.
Hearing loss	Foreign objects, water trapped in canal, infection, upper respiratory tract congestion, neoplasms, tympanic membrane perforation (abrupt), excessive pressure in ear canal, excessive cerumen, excessive noise, medications	Medical referral unless hearing loss is related to excessive water or impacted cerumen
Dizziness	Inner ear lesions, otitis media, rapid change in pressure on the tympanic membrane, migraine headache, ototoxic drugs, postural hypotension, cardiac disease, neoplasms, irrigation of ear canal with very hot or cold water, motion sickness	Medical referral unless related to motion sickness
Tinnitus	Hearing disorders, blockage of EAC, exposure to high noise levels, acoustic trauma, systemic diseases, drug toxicities (salicylate, quinidine, aminoglycosides, and other antibiotics)	Check for impacted cerumen; discontinuation of offending drug; medical referral for all other causes (OTC medications are ineffective)
Foreign body	Insects, beads, seeds, small batteries, or other objects	Medical referral; mineral oil can quickly suffocate the insect until removed by a clinician; moisture causes seeds to swell, making removal more difficult

Source: References 29–32.

Practical prescribing: Summary of medicines for ear wax

Table 3.4
Practical prescribing: Summary of medicines for ear wax

Name of medicine	Use in children	Likely side effects	Drug interactions of note	Patients in which care exercised	Pregnancy & breastfeeding
Oil-based products	No lower age limit stated	None	None	None	OK
Peroxide-based products		Irritation			
Docusate		Irritation			
Sodium bicarbonate		None			
Glycerin	>1 year (Earex Plus)				

- The findings from reviews **support** the use of oil-based softeners, sodium bicarbonate and sterile water over no treatment at all, but no active treatment proved more superior over any other.
- Oil-based products to be ***significantly better than*** saline but again showed no differences between each other.

TABLE 30-3 Selected Products for Otic Disorders

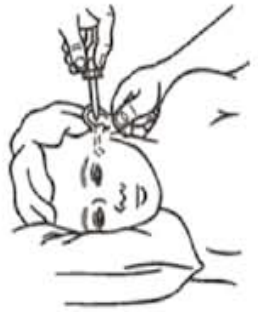
Trade Name	Primary Ingredients
Cerumen-Softening Products	
Auro Ear Drops	Carbamide peroxide 6.5%; anhydrous glycerin
Debrox	Carbamide peroxide (non-USP) 6.5%; glycerin; propylene glycol; sodium stannate
Murine Earwax Removal System	Carbamide peroxide 6.5%; glycerin; alcohol 6.3%; polysorbate 20; packaged with syringe
Murine Earigate Ear Cleaning System	Isotonic, desalinated sea water; packaged with syringe
OTIX drops	Carbamide peroxide 6.5%; anhydrous glycerin; propylene glycol; water; trolamine triethanolamine; sodium citrate
Physician's Choice	Carbamide peroxide 6.5%; anhydrous glycerin; sodium lauryl sarcosinate
Ear-Drying Products	
Auro-Dri Drops	Isopropyl alcohol 95%; anhydrous glycerin
Star Otic	Isopropyl alcohol; anhydrous glycerin
Swim Ear Drops	Isopropyl alcohol 95%; anhydrous glycerin
Botanical and Homeopathic Products	
Earsol-HC Drops	Alcohol 44%; hydrocortisone 1%; propylene glycol; yerba santa; benzyl benzoate
Herbs for Kids Willow/Garlic Ear Oil	Extra virgin olive oil; garlic, calendula; willow bark; usnea; Vitamin E oil
Murine Earache Relief	Chamomilla HPUS 10X; mercurius solubus HPUS 15X; sulfur HPUS 12X; Lycopodium clavatum HPUS 8x
Similasan Healthy Relief Homeopathic Ear Drops	Chamomilla HPUS 10X; mercurius solubus HPUS 15X; sulfur HPUS 12X; glycerin

Key: *HPUS, Homeopathic Pharmacopoeia of the United States.*

TABLE 30-1 Guidelines for Administering Eardrops

1. Wash your hands with soap and warm water; then dry them thoroughly.
2. Carefully wash and dry the outside of the ear, taking care not to get water in the ear canal.
3. Warm eardrops to body temperature by holding the container in the palm of your hand for a few minutes. Do not warm the container in hot water. Hot eardrops can cause ear pain, nausea, and dizziness.
4. If the label indicates, shake the container.
5. Tilt your head (or have the patient tilt his or her head) to the side, as shown in drawing A. Or lie down with the affected ear up, as shown in drawing B. Use gentle restraint, if necessary, for an infant or a young child.
6. Open the container carefully. Position the dropper tip near, but not inside, the ear canal opening. Do not allow the dropper to touch the ear, because it could become contaminated or injure the ear. Eardrop bottles must be kept clean.
7. Pull your ear (or the patient's ear) backward and upward to open the ear canal (see drawing A). If the patient is a child younger than 3 years old, pull the ear backward and downward (see drawing B).
8. Place the proper dose or number of drops into the ear canal. Replace the cap on the container.
9. Gently press the small, flat skin flap (tragus) over the ear canal opening to force out air bubbles and push the drops down the ear canal.
10. Stay (or keep the patient) in the same position for the length of time indicated in the product instructions. If the patient is a child who cannot stay still, the primary care provider may tell you to place a clean piece of cotton gently into the child's ear to prevent the medication from draining out. Use a piece large enough to remove easily, and do not leave it in the ear longer than an hour.
11. Repeat the procedure for the other ear, if needed.
12. Gently wipe excess medication off the outside of the ear, using caution to avoid getting moisture in the ear canal.
13. Wash your hands.

A



B

Source: APhA Special Report: Medication Administration Problem Solving in Ambulatory Care. Washington, DC: American Pharmaceutical Association; 1994:9.

OTITIS EXTERNA--- Background, Prevalence and epidemiology

- Otitis externa refers to generalised inflammation throughout the EAM and is often associated with infection.
- It usually occurs as an acute episode but may become chronic (greater than 3 months) in children.
- It is more common in hot and humid climates and in western society the number of episodes increases in the summer months.
- People who swim are **FIVE** times more likely than non-swimmers to contract it.
- It is commoner in adults and reported to be slightly more common in women than men.

AETIOLOGY

1- Primary infection, **contact sensitivity** or a **combination** of both causes otitis externa.

- ***Pathogens include***

→*Pseudomonas aeruginosa*.

→*Staphylococcus* spp.

→*Streptococcus pyogenes*.

→*Fungal overgrowth* with *Aspergillus niger is also seen especially after* prolonged antibiotic treatment.

2- Certain local or general factors can precipitate otitis externa:

→**Local causes** include trauma or discharge from the middle ear

→ **General causes** include seborrhoeic dermatitis, psoriasis and skin infections.

ARRIVING AT A DIFFERENTIAL DIAGNOSIS

Table 3.5
Causes of ear symptoms and their relative incidence in community pharmacy

Incidence	Cause
Most likely	Otitis externa caused by infection or trauma
Likely	Otitis Media
Unlikely	Dermatitis (contact, allergic, seborrhoeic or atopic)
Very unlikely	Perichondritis, malignancy

Table 3.6
Specific questions to ask the patient: otitis externa

Question	Relevance
Symptom presentation	Principal symptom of acute otitis externa is itch/irritation and pain
Discharge → ***Otorrhoea***	Otitis media is the commonest cause of ear discharge and is usually mucopurulent. If discharge is present with otitis externa, then discharge is not mucopurulent
Systemic symptoms	Otitis externa should not present with any systemic symptoms Fever and cold symptoms usually present in otitis media In all forms of dermatitis, systemic symptoms should not be present

→ Chewing and manipulation of the tragus and pinna can exacerbate pain.

CONDITIONS TO ELIMINATE
1- ACUTE OTITIS MEDIA

- A rapidly accumulating effusion in the middle ear (acute otitis media) is most common in children aged 3 to 6 years old.
- In older children, ear pain/earache is the predominant feature and tends to be throbbing.
- In young children this is often manifested as irritability or crying with characteristic ear tugging/rubbing.
- Systemic symptoms can also be present such as fever and loss of appetite.
- ***Examination*** → *R*eveal a red/yellow and bulging tympanic membrane.
- Pain resolves on rupture of the tympanic membrane, which releases a mucopurulent discharge.
- ***Children may develop recurrent otitis media and is known as 'glue ear' → T-TUBE for prevention***

CONDITIONS TO ELIMINATE (continued)

2- DERMATITIS

✓Allergic, contact, seborrhoeic and atopic forms of dermatitis can occur on the external ear.

✓ **Itch is a prominent symptom and could be mistaken for otitis externa**

✓There should be no ear pain or discharge associated with dermatitis.

✓In addition, in seborrhoeic and atopic forms skin involvement elsewhere should be obvious.

3- PERICHONDRITIS

→In severe cases of otitis externa the inflammation can spread from the outer ear canal to the pinna,

4- TRAUMA

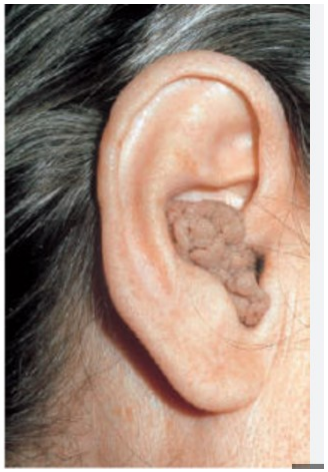
→Recent trauma (e.g. blow to the head) can cause an auricular haematoma (cauliflower ear)→ non-urgent referral.

5- MALIGNANT TUMOURS

→Any elderly patient presenting with an ulcerative or crusting lesion needs referral.

DERMATITIS

PERICHONDRITIS



MALIGNANT TUMOURS

TRAUMA

REFERRAL.. WHEN??

TRIGGER POINTS indicative of referral:
Otitis externa

- Generalised inflammation of the pinna
- Impaired hearing in children
- Mucopurulent discharge
- Pain on palpation of the mastoid area
- Patients showing signs of systemic infection
- Slow-growing growths on the pinna in elderly people
- Symptoms that are not improving and been present for 4 or more days

PRACTICAL PRESCRIBING AND PRODUCT SELECTION

Table 3.7
Practical prescribing: Summary of medicines for otitis externa

Name of medicine	Use in children	Likely side effects	Drug interactions of note	Patients in which care exercised	Pregnancy & breastfeeding
Choline salicylate	>1 year	None reported	None	None	OK
Acetic acid	>12 years	Transient stinging or burning sensation			