

REVIEW ARTICLE

Review article: Topical antibiotic treatments for acute otitis externa: Emergency care guidelines from an ear, nose and throat perspective

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Abstract

Acute otitis externa (AOE), also known as ‘swimmer’s ear’, is a common acute problem. It is one of the most common ED presentations. Atypical organisms, recalcitrant disease and antibiotic options contribute to making AOE a clinical challenge. There are a number of red flags associated with AOE which require consideration when treating patients with AOE. We discuss an evidence-based approach to management of AOE in the emergency setting, with indications for specialist referral.

Key words: *acute otitis externa, emergency medicine, topical treatment.*

Introduction

Otitis externa (OE), also known as ‘swimmer’s ear’, refers to an inflammatory pathology of the external auditory canal (EAC) and is a common ED presentation. Depending on the infection history it can be acute (lasting less than 4–6 weeks), recurrent or chronic (lasting more than 3 months).¹ Acute OE (AOE) is one of the most common ED presentations.

The annual incidence is 0.4% in the USA, and 1% in the UK.^{2,3} In tropical Australia, the annual incidence is greater than 1.5% because of the ambient humidity.⁴ Incidence is increased by water sports, psoriasis, eczema, hygiene (cotton-bud usage and ear syringing), immunosuppression, diabetes and narrow EACs.^{4,5}

Methods

Embase, Ovid-Medline and Ovid-PubMed databases were searched for literature specifically for management of AOE in the emergency setting using the search strategy in Table 1. The historical range from each database was explored; papers included were limited to those involving humans and published in the English language.

Clinical presentation

Patients with AOE typically present with earache, itching, aural fullness or hearing impairment, and less commonly with painful lymphadenopathy. Ear discharge is often reported by patients as well.⁶

A distinguishing feature between AOE and acute otitis media with

Key findings

- Acute otitis externa is usually bacterial in origin.
- *Pseudomonas* is the most common bacterium.
- Ciprofloxacin is the only antimicrobial without risk of ototoxicity.
- Multiple eardrop options are available in Australia for bacterial and fungal otitis externa.
- Targeted use of eardrops is key in treatment; adjuncts may be needed.

discharge, is discomfort/pain upon pinna or tragal manipulation; this is because of contiguous stimulation of an inflamed EAC. Bacterial AOE has an oedematous, friable canal with or without debris/discharge (Fig. 1). Fungal AOE has a creamy discharge with or without fungal spores (black or white) or hyphae (Fig. 2).⁷

Complications of AOE

- Proximally contiguous infection can cause inflammation of the ear drum (myringitis) which can lead to perforation.
- Distally contiguous disease can cause periauricular cellulitis, perichondritis of the pinna, regional facial cellulitis and systemic toxicity.⁵
- In immunocompromised patients and diabetics, malignant/necrotising OE can lead to temporal bone osteomyelitis.^{8,9}

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TABLE 1. Search strategy employed for literature review

Search strategy	Database	Results
1. otitis externa.mp. or Otitis Externa	PubMed	16
2. limit 1 to (english language and humans)		
3. acute.mp.		
4. Administration, Topical/ or topical.mp.	Medline	11
5. ear drops.mp.		
6. 4 or 5		
7. 2 and 3 and 6	Embase	2
8. emergency.mp. or Emergencies		
9. 7 and 8		

of treatment.¹¹ Eardrops available in Australia are listed in Table 2. Multi-agent eardrops with steroids are better for AOE with myringitis or granulation.¹² A guideline is shown in Figure 3 to aid in both diagnosis and management of AOE.

Bacterial AOE

- EAC swab should be taken.
- Start with a topical treatment with pseudomonal coverage.
- If tympanic membrane perforation is suspected, or the membrane cannot be seen, we recommend ciprofloxacin as it is the only antibiotic option that does not cause ototoxicity.

Fungal AOE

- Choices such as Ciloxan (Novartis Pharma AG, Basel, Switzerland) and Soframycin (Sanofi-Aventis, Paris, France) will be ineffective.
- Locacorten Vioform (Novartis, Dorval, QC, Canada), Kenacomb Otic (Bristol Meyers Squibb, New York, NY, USA)/Otocomb Otic and topical Canesten (clotrimazole) are appropriate choices.
- Anecdotally, gramicidin-containing compounds are less effective than the other options listed.
- Fungal OE often requires referral to ear, nose and throat (ENT) specialists for ear toileting.

Adjuncts to topical antibiotics

Severe cases of AOE may need wick insertion into the EAC to ease eardrop administration. Wicks must be completely inserted in the ear canal, and not prolapse out. Recent evidence indicates that wicks may remain *in situ* for up to 5 days.¹³ Systemic antibiotics may be indicated where contiguous infection of the pinna, or folliculitis is concerned – those with anti-pseudomonal coverage are wise given that *P. aeruginosa* is isolated in up to 55% of cases.¹⁴

Advice on how to administer drops

Patients should be advised on how to properly administer drops to

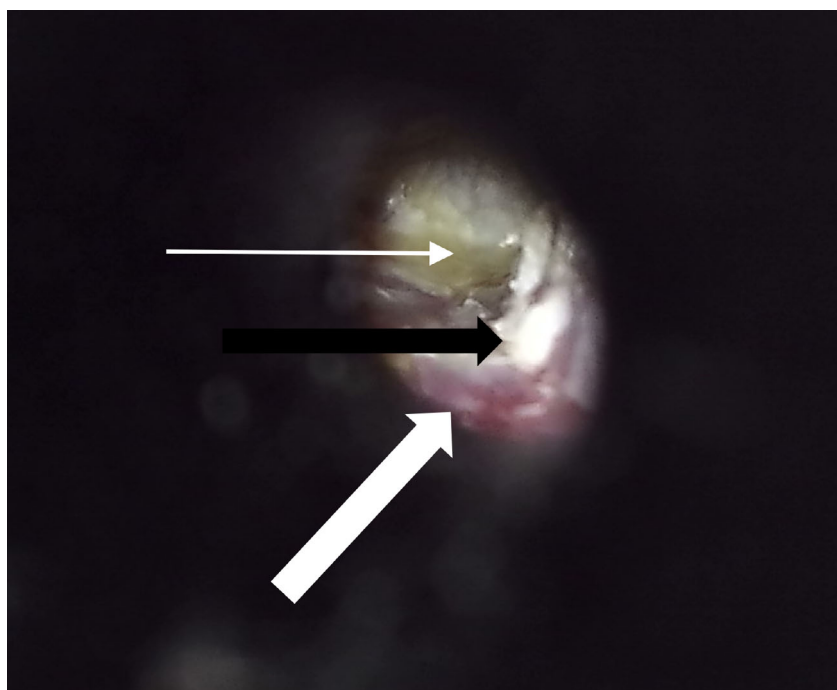


Figure 1. Otoscopic view of acute bacterial otitis externa during aural toilet. Thin white arrow shows purulent exudate pooling next to the tympanic membrane. Thick white arrow shows the erythematous and friable external auditory canal mucosa typical of bacterial acute otitis externa. Thick black arrow shows residual debris in the external auditory canal.

Pathogens

- AOE is secondary to bacterial or fungal infection.
- Although the most common bacteria in AOE are *Pseudomonas aeruginosa* and *Staphylococcus aureus*, in many cases infections are polymicrobial.¹⁰

- Up to 10% of cases are fungal in nature, most commonly because of *Aspergillus* spp. and *Candida* spp.⁷

Topical management of AOE

Topical antibiotics for AOE are highly effective and are the mainstay

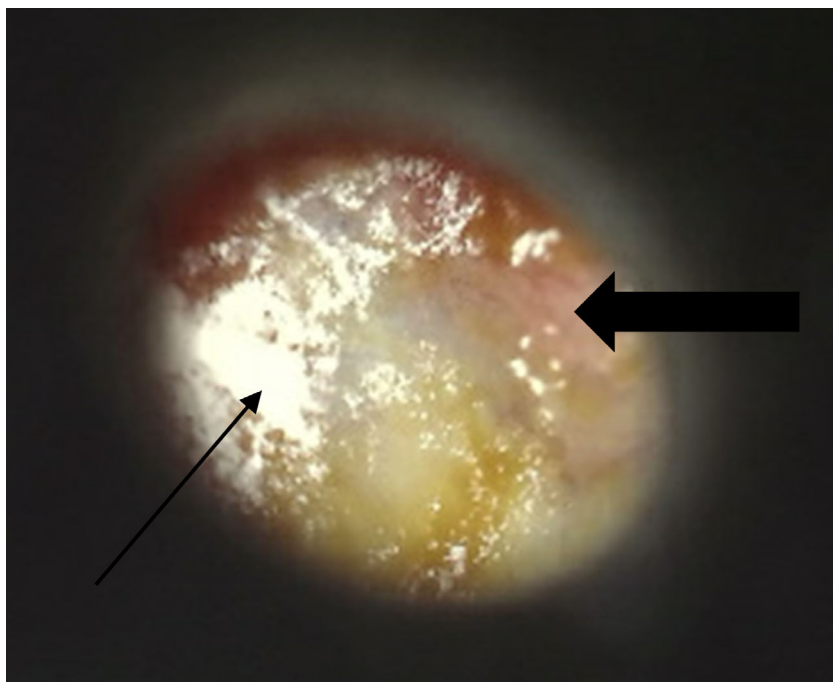


Figure 2. Otoscopic view of fungal otitis externa. Thin arrow shows white fungal hyphae. Thick arrow shows an inflamed tympanic membrane.

provide maximum efficacy. Ear-drops should be placed in the EAC with the head in a dependent position, with tragal-pumping to allow maximum drop penetration (Fig. 4).

The role of ear toilet

In patients with discharge that occludes the canal, ear toilet should be considered, especially if infection is recalcitrant or not adequately cleared with gentle tissue spears. It is important that ear toilet is performed only by ENT surgeons, or physicians with advanced training to avoid iatrogenic injury to the tympanic membrane or ossicles.

Specific considerations

Perforated tympanic membrane

- If there is a perforated tympanic membrane, aminoglycoside-containing medications should be

TABLE 2. Eardrops available for use in Australia for acute otitis externa

Brand name	Active ingredients	Indication	Dosage/duration
Single agent			
Ciloxan†	Ciprofloxacin 0.3%	CSOM, OE, discharging grommets	Five drops, twice a day, until a few days after symptoms have cleared
Soframycin‡§	Framycetin 0.5%	OE	Three drops, thrice a day, until a few days after symptoms have cleared
Multi-agent with steroid			
Sofradex/Otodex‡§	Dexamethasone 0.05%, framycetin 0.5%, gramicidin 0.005%	CSOM, OE	Three drops, three to four times a day, until a few days after symptoms have cleared
Locacorten Vioform§¶	Flumetasone 0.02%, clioquinol 1%	Fungal OE, bacterial OE	Three drops, twice a day, until a few days after symptoms have cleared
Ciprofloxacin HC¶	Hydrocortisone 1%, ciprofloxacin 0.2%	CSOM, OE, discharging grommets	Three drops, twice a day, until a few days after symptoms have cleared
Kenacomb Otic‡§/ Otocomb Otic‡§	Triamcinolone 0.1%, neomycin 0.25%, gramicidin 0.025%, nystatin 100 000 units/g	OE (including fungal), CSOM	Three drops, twice to thrice a day, until a few days after symptoms have cleared

†PBS, Pharmaceutical Benefits Scheme (authority required). ‡PBS (general). §Should not be used in patient with tympanic membrane perforations. ¶Non-PBS. CSOM, chronic suppurative otitis media; OE, otitis externa.

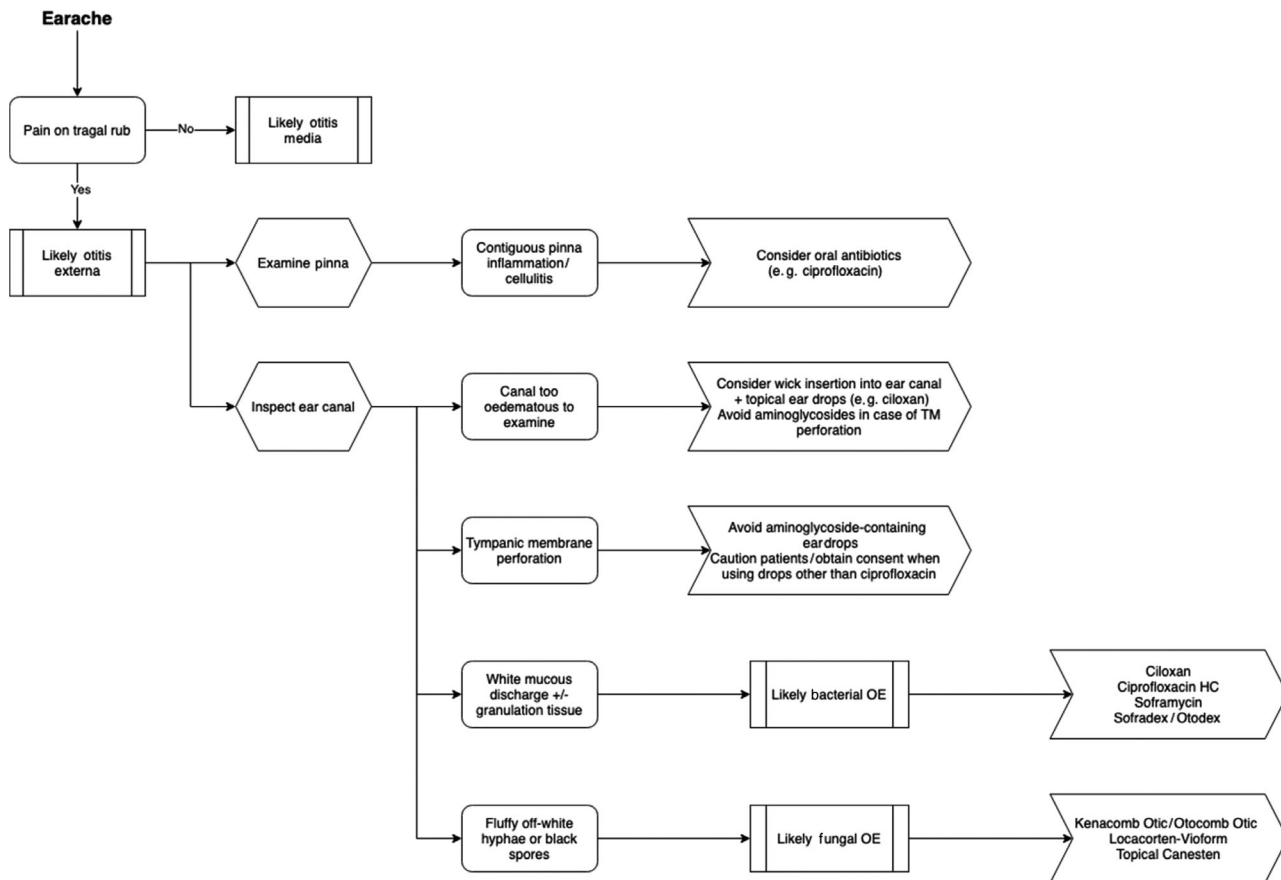


Figure 3. Management guidelines with topical antibiotics for acute otitis externa in the primary care setting. TM, tympanic membrane.

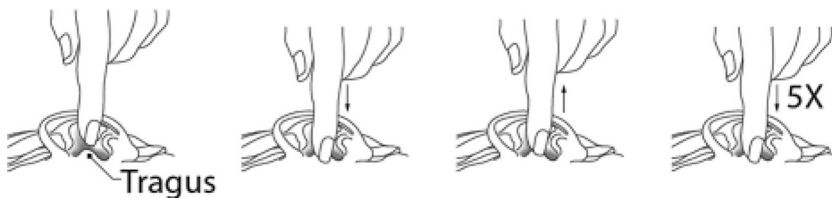


Figure 4. Visual representation of how to administer topical antibiotics to external auditory canal. Note that the head is in a dependent position, with demonstration of tragal pumping.¹⁵

avoided because of their potential to cause ototoxicity.¹⁶

- These medications include framycetin (Soframycin/Sofradex/Otodex) and neomycin (Kenacomb Otic/Otocomb Otic).
- The only current topical treatment without risk of ototoxicity is ciprofloxacin.
- Locacorten Vioform is labelled 'contraindicated' in patients with tympanic membrane perforations;

however, in clinical practice it is widely used and extremely effective.

- If Locacorten Vioform is used, counsel patients on potential for hearing impairment and vertigo, and immediately discontinue use if these symptoms are reported.
- Patients should also be counselled that the use of steroid-containing drops can cause discomfort when applied to the middle ear.

Pregnancy

- As listed in the *Australian Medicines Handbook*, all of the ear-drops listed above are listed as "safe to use" in pregnancy.
- If concerned, however, referral to an ENT specialist is recommended for ongoing ear toilet and topical administration of antimicrobial mixtures.

Prevention of recurrent disease

Dry ear precautions

- Particularly so in those with narrow/tortuous ear canals, moisture accumulation is a significant risk factor for the development of recurrent or recalcitrant infections.^{1,17}
- For those whose hobbies involve water sports, particular care must be taken to prevent water exposure to the canals.

- Good ear hygiene after-the-fact using acidifying/astringent ear-drops, or even alcohol-containing drops can hasten drying of the ear canal to prevent infection.

Avoiding EAC trauma

- Cotton-tip usage by patients is discouraged as this can damage the ear canal, impact cerumen and even cause tympanic membrane perforations.¹⁸
- Ear syringing has similar complications and is not recommended.¹⁹

Specialist referral guidelines

Emergency treatment

- If the EAC is occluded secondary to inflammation, then wick placement in the ED is recommended.
- If there is associated perichondritis, particularly so with children, hospitalisation may be necessary for i.v. antibiotics.
- In poorly controlled diabetics and immunocompromised patients at risk of developing malignant OE, early referral and treatment is recommended to prevent temporal bone osteomyelitis.

ENT specialist referral

1. AOE refractory to at least 2 weeks of topical therapy, specialist ENT referral is needed.
2. Patients who develop complications, particularly a perforated tympanic membrane.

Red flags

- Perichondritis
 - Tenderness, erythema and swelling of the auricle.
- Facial cellulitis
 - Swelling of the facial soft-tissue which may track down towards the jaw.
- Malignant OE
 - Excruciating pain disproportionate to examination findings, granulation tissue seen in the EAC.
- EAC squamous cell carcinoma

- Abnormal lesion in the EAC not responding to antimicrobial treatment.
- Intracranial infection (abscess/meningitis)
 - Altered consciousness, photophobia, headaches, visual symptoms, neck stiffness.

Conclusion

1. AOE is an extremely common ENT infection.
2. There are several topical antibiotics available.
3. Treatment is usually straightforward.
4. Prompt referral to an ENT specialist is recommended if the patient is acutely unwell or there are red flags.

Competing interests

None declared.

Data availability statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

References

1. Boustred N. Practical guide to otitis externa. *Aust. Fam. Physician* 1999; **28**: 217–21.
2. Guthrie RM, Bailey BJ, Witsell DL *et al.* Diagnosis and treatment of acute otitis externa an interdisciplinary update. *Ann. Otol. Rhinol. Laryngol.* 1999; **108**: 2–18.
3. Rowlands S, Devalia H, Smith C, Hubbard R, Dean A. Otitis externa in UK general practice: a survey using the UK general practice research database. *Br. J. Gen. Pract.* 2001; **51**: 533–8.
4. Balch G, Heal C, Cervin A, Gunnarsson R. Oral corticosteroids for painful acute otitis externa (swimmer's ear): a triple-blind randomised controlled trial. *Aust. J. Gen. Pract.* 2019; **48**: 565–72.
5. Kaushik V, Malik T, Saeed SR. Interventions for acute otitis externa. *Cochrane Database Syst. Rev.* 2010; (1): CD004740.
6. Rosenfeld RM, Brown L, Cannon CR *et al.* Clinical practice guideline: acute otitis externa. *Otolaryngol. Head Neck Surg.* 2006; **134**: S4–23.
7. Martin TJ, Kerschner JE, Flanary VA. Fungal causes of otitis externa and tympanostomy tube otorrhea. *Int. J. Pediatr. Otorhinolaryngol.* 2005; **69**: 1503–8.
8. Mirza N. Otitis externa. Management in the primary care office. *Postgrad. Med.* 1996; **99**: 157–8.
9. Hern JD, Almeyda J, Thomas DM, Main J, Patel KS. Malignant otitis externa in HIV and AIDS. *J. Laryngol. Otol.* 1996; **110**: 770–5.
10. Roland PS, Stroman DW. Microbiology of acute otitis externa. *Laryngoscope* 2002; **112**: 1166–77.
11. Rosenfeld RM, Singer M, Wasserman JM, Stinnett SS. Systematic review of topical antimicrobial therapy for acute otitis externa. *Otolaryngol. Head Neck Surg.* 2006; **134**: 24–48.
12. Sander R. Otitis externa: a practice guide to treatment and prevention. *Am. Fam. Physician* 2001; **63**: 927–37.
13. Bola S, Rashid M, Hickey S. Optimising the use of otowicks in otitis externa. *J. Laryngol. Otol.* 2017; **131**: 809–12.
14. Cheffins R, Heal C, Rudolph S, Evans R, Veitch C. Acute otitis externa: management by GPs in North Queensland. *Aust. Fam. Physician* 2009; **38**: 262–6.
15. Alcon Laboratories. *Ciprodex – Full Prescribing Information*. 2003. [Updated 2019; Cited 28 Sep 2020.] Available from URL: https://www.accessdata.fda.gov/drugsatfda_docs/label/2019/021537s017lbl.pdf
16. Leis JA, Rutka JA, Gold WL. Aminoglycoside-induced ototoxicity. *Can. Med. Assoc. J.* 2015; **187**: E52.
17. Wright DN, Alexander JM. Effect of water on the bacterial flora of swimmers' ears. *Arch. Otolaryngol.* 1974; **99**: 15–8.
18. Hobson JC, Lavy JA. Use and abuse of cotton buds. *J. R. Soc. Med.* 2005; **98**: 360–1.
19. Bird S. Ear syringing: minimising the risks. *Aust. Fam. Physician* 2008; **37**: 359–60.