Acute otitis externa (AOE), also known as ‘swimmer’s ear’, is a common disease of children, adolescents and adults. It is defined by diffuse inflammation of the external ear canal. Primarily a disease of children over two years of age, it is commonly associated with swimming. Local defence mechanisms become impaired by prolonged ear canal wetness. Skin desquamation leads to microscopic fissures that provide a portal of entry for infecting organisms.[1] Other risk factors for AOE include: trauma, a foreign body in the ear, using a hearing aid, certain dermatological conditions, chronic otorrhea, wearing tight head scarves and being immunocompromised. Ear piercing may lead to infection of the pinna.[2][3] While AOE is primarily a local disease, more serious and invasive disease can occur in certain situations. Several evidence-based clinical practice guidelines and reviews have been published.[4][6]

Clinical presentation
Typically, patients present with otalgia (70%), itching (60%), or fullness (22%), with or without hearing loss (32%) or ear canal pain when chewing. Many patients with AOE have discharge from their ear canal. A distinguishing sign of AOE from acute otitis media with otorrhea is the finding of tenderness of the tragus when pushed and of the pinna when pulled in AOE. These signs are classically described as out of proportion to the degree of inflammation observed. On direct otoscopy, the canal is edematous and erythematous and may be associated with surrounding cellulitis.[4] There may be cellulitis or chondritis of the pinna.

Elements to consider in the diagnosis of diffuse acute otitis externa:
1. Rapid onset (generally within 48 h) in the past three weeks

AND
2. Symptoms of ear canal inflammation, including
   - otalgia (often severe), itching or fullness
   - WITH OR WITHOUT hearing loss or jaw pain*

AND
3. Signs of ear canal inflammation, including
   - tenderness of the tragus, pinna, or both

OR
   - diffuse ear canal edema, erythema, or both
   - WITH OR WITHOUT otorrhea, regional lymphadenitis, tympanic membrane erythema, or cellulitis of the pinna and adjacent skin

*Pain in the ear canal and temporomandibular joint region intensified by jaw motion[4]

Etiological organisms
Infection causes the vast majority of AOE cases. The two most commonly isolated organisms are Pseudomonas aeruginosa and Staphylococcus
The isolates are polymicrobial in a significant number of cases. Other Gram-negative bacteria are less common. Rare fungal infections have been described with Aspergillus species and Candida species. Swabs from the external canal should be interpreted with caution because they may reflect normal flora or colonizing organisms. Swabs should be taken only in unresponsive or severe cases.

Management
The management of AOE has been the subject of one Cochrane systematic review (updated 2010) [8], one meta-analysis by the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS), [11] and one clinical practice guideline (AAO-HNS).[4] The Cochrane publication reviewed 19 studies that included 3382 participants. Overall, only three of the 19 studies were considered to be of high quality and only two were done in a primary care setting. Similar findings were reached in the AAO-HNS meta-analysis and are reflected in the practice guideline.

It is clear that topical antimicrobials are effective in mild-to-moderate AOE. No randomized control trials have been published comparing topical to systemic antimicrobials. Topical antimicrobials increased absolute clinical cure rates of AOE by 46% and bacteriological cure rates by 61% compared with placebo.[11] There seemed to be minimal to no difference in clinical or bacteriological cure rate for the addition of topical steroids to topical antimicrobials, although the quality of these studies was poor.[4][12] A systematic review showed that in a combined total of only 92 patients there was a slight superiority of topical steroids compared with topical steroids and topical antimicrobials for clinical cure at seven to 11 days. Topical acidifying solutions (eg, Buro-Sol) have also been shown to be equally effective as topical antimicrobials in clinical cure rates at one week, but inferior in clinical and microbiological cure at two to three weeks. Topical antiseptics such as alcohol, gentian violet, m-Cresyl acetate, thimerosal and thymol have been shown in small studies to be equally effective as topical antimicrobials but are not specifically marketed in Canada for treatment of AOE.

Ototoxic topical agents such as gentamicin or neomycin, agents with a low pH (including most acidifying and antiseptic agents), or Cortisporin (Johnson & Johnson Inc., USA) topical drops should not be used in the presence of tympanostomy tubes or a perforated tympanic membrane because there is an increasing body of literature concerning ototoxicity in both settings.[13] These agents should also not be used if the tympanic membrane cannot be seen.

For treating mild-to-moderate acute otitis externa, the following steps are recommended:

1. First line therapy for mild-to-moderate AOE should be a topical antibiotic with or without topical steroids for seven to 10 days.[4] More severe cases should be managed with systemic antibiotics that cover S aureus and P aeruginosa.
2. Adequate pain control for mild-to-moderate AOE can be achieved with systemic acetaminophen, non-steroidal anti-inflammatory medications or oral opioid preparations. Topical steroid preparations have had mixed effects on hastening pain relief in clinical trials and cannot be recommended as monotherapy.
3. If the clinician cannot see the ear canal, an expandable wick can be placed to decrease canal edema and facilitate topical medication delivery.[14] Although aural toileting and wick therapy are common and logical practices, there have been no randomized controlled trials examining their effectiveness. Ear candling has been shown to have no efficacy and can be harmful.[15]

Clinical response should be evident within 48 h to 72 h [16] but full response can take up to six days in patients treated with antibiotic and steroid drops.[8] Nonresponse should prompt an evaluation for obstruction, the presence of a foreign body, non-adherence to therapy or an alternative diagnosis (eg, dermatitis from contact with nickel, a viral or fungal infection or antimicrobial resistance).

Malignant otitis externa
In patients who are immunodeficient or who have insulin-dependent diabetes, special measures should be taken to rule out malignant otitis externa. This invasive infection of the cartilage and bone of the canal and external ear may present with facial nerve palsy and pain as a prominent symptom. Imaging with a computed tomography or magnetic resonance imaging scan may be needed to confirm the clinical diagnosis. [17] Aggressive debridement with systemic antibiotics targeted at P aeruginosa, and in some cases Aspergillus species, is critical.

Prevention
Targeting typical causal culprits of AOE, such as moisture and trauma, seems prudent. Some experts recommend simple techniques for keeping water out of
the ears (e.g., inserting a soft, malleable plug into the auricle to block entry to the ear canal) or removing water from the ears after swimming (by positioning or shaking the head, or by using a hair dryer on a low setting). Others advise avoiding cotton swabs because they might impact cerumen. Daily prophylaxis with alcohol or acidic drops during at-risk activities has also been suggested but not studied. Using hard earplugs should be avoided because they can cause trauma, and the use of custom ear canal molds and tight swim caps remains controversial.[5]

### TABLE 1
Medications available in Canada for acute otitis externa

<table>
<thead>
<tr>
<th>Brand name</th>
<th>Active ingredients</th>
<th>Dosing and duration as per the product monograph</th>
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| Polysporin plus pain relief ear drops*† | Polymyxin B sulphate – lidocaine HCl          | Three to four drops four times/day
Infants and children, two to three drops are suggested.
Solution may be applied by saturating a gauze or cotton wick which may be left in the canal for 24 h to 48 h, keeping the wick moist by adding a few drops of solution as required.
No duration stated |
| Polysporin eye/ear drops*†         | Polymyxin B sulphate – gramicidin              | One to two drops four times/day, or more frequent as required
No duration stated |
| Neosporin eye and ear solution*‡ | Polymyxin B sulphate – neomycin sulphate – gramicidin | One to two drops two to four times/day for seven days |
| Cortisporin otic solution sterile*†§ | Neomycin sulphate – polymyxin B sulfate – hydrocortisone | Four drops three to four times/day
No duration stated |
| Sofracort*¶                      | Framycetin sulfate – gramicidin – dexamethasone | Two to three drops three to four times/day
No duration stated |
| Ciprodex**                        | Ciprofloxacin HCl – dexamethasone               | Four drops twice/day for seven days |
| Buro-Sol otic solution*††‡‡        | Aluminum acetate – benzethonium chloride – acetic acid | Two to three drops three to four times/day
No duration stated |
| Garasone otic solution*§§          | Gentamicin – betamethasone                      | Three to four drops three times/day
No duration stated |
| Garamycin otic drops*‡‡           | Gentamicin sulfate                               | Three to four drops three times/day
No duration stated |

* Should not be used in patients with a non-intact tympanic membrane; †Johnson & Johnson Inc., USA; ‡GlaxoSmithKline, UK; §sanofi-aventis Canada Inc.; ¶Alcon Canada Inc.; **Off-label use; †† Stiefel Canada Inc.; ‡‡Merck Canada Inc.; §§Schering Canada Inc.

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## References

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