Approach to otitis externa

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Abstract

Objective To provide family physicians with a practical evidence-based approach to management of otitis externa.

Sources of information The approach described is based on MEDLINE and PubMed literature published between 1993 and 2023.

Main message Otitis externa is diffuse inflammation of the external auditory canal and typically occurs from moisture exposure and trauma. Management focuses on eliminating infection, pain management, education, and preventing recurrence. The primary treatment of uncomplicated otitis externa is topical. Complicated presentations may require additional systemic therapy.

Conclusion History taking and physical examination can help differentiate among acute, chronic, and necrotizing otitis externa. At-risk populations, typically those who are immunosuppressed, are more likely to develop necrotizing otitis externa and should be carefully monitored.

Editor's key points

- Otitis externa is diffuse painful inflammation of the external auditory canal occurring in patients after exposure to moisture or trauma. Findings of a careful history and physical examination can help differentiate among acute, chronic, and necrotizing otitis externa, and other conditions with otorrhea and pain.
- Patients who are elderly, have diabetes, or are immunosuppressed are at higher risk of developing necrotizing otitis externa and warrant special consideration.
- Antimicrobial drops with or without steroids are first-line treatment of uncomplicated otitis externa. Patients with complicated or severe disease require additional systemic antibiotics and evaluation by an otolaryngologist–head and neck surgeon. Patients benefit from counselling on proper otic drop technique and strategies to prevent recurrence.

Case introduction

V.E., a 68-year-old woman with a history of hypertension, osteoporosis, and hyperlipidemia, presents to her family physician with sudden-onset right ear pain. Following an aquatic fitness class, V.E. felt her ear get itchy and subsequently used cotton-tipped swabs. For 2 days her ear has been painful to touch and her hearing "muffled." She experiences minor relief with ibuprofen. She denies changes to her voice or swallowing. She notes 3 prior episodes of "swimmer's ear."

Main message

Otitis externa is diffuse inflammation of the external auditory canal (EAC) generally caused by bacterial infection and can present as acute, chronic, or necrotizing (also referred to as *malignant*).[1,2] Otitis externa affects approximately 10% of individuals during their lifetimes[3] and in 2007 an estimated 8.1 health care visits per 1000 population in the United States were for acute otitis externa (AOE).[4] The highest incidence of AOE was in patients between ages 5 and 14; however, 53% of health care visits were for patients 20 years and older.[4]

Patients with AOE are usually managed by primary care, with 3% of patients requiring specialist care.[5] While uncomplicated cases of AOE respond well to topical treatment, patients with diabetes or immunosuppression may require systemic treatment.[4,6] Complicated or necrotizing infections can substantially impact function and quality of life. Patients with these infections should be referred to an otolaryngologist–head and neck surgeon (OHNS) for management.[7]

Sources of information

MEDLINE and PubMed databases were searched for English-language human research, review articles, and guidelines on otitis externa published between 1993 and 2023. Most retrieved articles provided level II and III evidence.

Symptoms and causes

Acute otitis externa is inflammation of the EAC and can extend to the tympanic membrane or pinna.[2] Known as *swimmer's ear* or *tropical ear,* it often occurs after increased water exposure or humidity.[8] More than 90% of AOE infections are bacterial; typical microbes include *Pseudomonas aeruginosa* or *Staphylococcus aureus,*[9,10] and one-third of cases are polymicrobial.[2] Dermatologic diseases including lupus erythematosus, psoriasis, atopic dermatitis, acne, and seborrheic dermatitis can predispose patients to AOE.[11]

Cerumen is mildly acidic and produces lysosomes that inhibit microbial growth.[8,12] Disruption of the cerumen barrier or altering the pH in the EAC through water exposure, trauma (eg, from cotton-tipped swabs, hearing aids, earplugs, excoriation), soap deposits, or alkaline drops can increase the risk of otitis externa.[2,10,13,14]

The onset of AOE is usually within 48 hours of cerumen barrier disruption.[2] Associated symptoms include unilateral EAC pain, itching, feeling of fullness, jaw pain, and hearing loss. Physical examination typically reveals findings of external ear tenderness, EAC edema, erythema, and limited cerumen (**Figure 1**).[15] Other physical findings include otorrhea, regional lymphadenitis, tympanic membrane erythema, or cellulitis of the pinna and adjacent skin.[11,13] Instances of severe AOE are characterized by intense pain, auditory canal obstruction with edema or otorrhea, purulent discharge, adenopathy, and periauricular edema.[8]

Acute otitis externa lasts for less than 6 weeks, whereas chronic otitis externa (COE) lasts for more than 3 months.[3,10,16] Chronic otitis externa is characterized by painless, mild discomfort and itching. On examination, the skin of the ear canal may appear dry, flaky, and erythematous, with clear otorrhea[17,18] (**Figure 2**).[15] Patients with COE may exhibit episodes of AOE.[19] Otoscope examination findings may resemble AOE; however, skin thickening may be noted.[10] Chronic infections should be cultured to guide treatment.[17]

Red flags. Necrotizing otitis externa (NOE) is an invasive infection more commonly seen in patients who have diabetes, are older than 65, or are immunocompromised.[7,20] *Pseudomonas aeruginosa* is responsible for more than 90% of cases. Patients initially present with AOE, but when left untreated it progresses to osteomyelitis of the skull base and advances to the surrounding tissue of the middle ear, inner ear, and brain.[2,21] On examination, granulation tissue may be observed in the EAC. Patients with advanced infections may exhibit facial nerve palsy[21] and occasionally lower cranial nerve (ie, nerves 9 to 12) palsies.[7,22] Patients with cranial nerve palsies may present with dysphagia, dysphonia, and shoulder weakness, and can develop meningitis or brain abscess.[7,22] Progression to NOE is associated with considerable morbidity and mortality; therefore, it is important to identify patients early and monitor at-risk populations.[20]

Otomycosis. Fungal pathogens *Candida albicans* and *Aspergillus* species are most often responsible for otomycosis, a fungal infection of the EAC.[23] Fungal infections may be noted in patients who continue to have symptoms despite completion of antibiotic therapy. Risk factors are similar to those for AOE but also include chronic otitis media with tympanic membrane perforation and antibiotic use. Common symptoms include pruritis, otalgia, hearing loss, and otorrhea.[24] Physical examination will classically show findings of otorrhea, edematous or erythematous EAC, and cottonlike fungal growth[25] (**Figure 3**).[15] Cultures can provide mycologic confirmation of fungal infection.

Figure 1. Otoscopic view of acute otitis externa: *Note the canal edema, erythema, and lack of cerumen.*

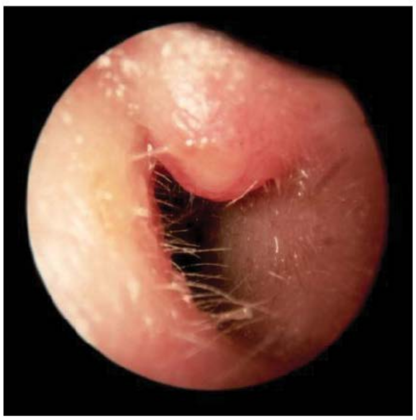


Image reproduced courtesy of Dr Michael Hawke and OtoSim Inc.[15]

Figure 2. Otoscopic view of chronic otitis externa with characteristic dry, flaky canal

Image reproduced courtesy of Dr Michael Hawke and OtoSim Inc.[15]

Diagnosis. A diagnosis of AOE or COE is clinical and based on history and physical examination findings. The physical examination should include otoscopic or otomicroscopic inspection of the EAC and tympanic membrane, and examination of the pinna, mastoid process, head and neck lymph nodes, cranial nerves, and surrounding skin.[13] Patients may present with a fever.

Differential diagnosis of otitis externa includes acute otitis media, mastoiditis, furunculosis, cholesteatoma, herpes zoster oticus (Ramsay Hunt syndrome), otomycosis, contact dermatitis, and retained foreign body.[2,8,13,26]

For suspected NOE, magnetic resonance imaging is best for detecting early head and neck soft tissue changes, whereas computed tomography is ideal for identifying later bony erosion.[13,21,27] Technetium 99 scanning is the most sensitive imaging modality for NOE and identifies early bony disease.[28] Gallium 67 scintigraphy and indium 111–labelled leukocyte scans detect early stages of NOE bony involvement and are helpful to monitor for disease resolution.[28] Cultures, a markedly elevated erythrocyte sedimentation rate, and biopsy findings can help distinguish NOE from squamous cell carcinoma, which may present with otorrhea and ear pain.[13,20] Erythrocyte sedimentation rate and C-reactive protein level can help assess disease progression.[20]

Management. **Figure 4** is a flowchart for the management of patients with otitis externa in primary care.[13]

Topical therapy: In patients presenting with uncomplicated AOE, the 2014 American Academy of Otolaryngology–Head and Neck Surgery clinical practice guidelines recommend topical antimicrobial or antiseptic therapies as first-line treatment.[2] Topical treatments are highly effective for AOE as they deliver concentrated medication directly to affected tissue. They are well tolerated and 65% to 90% of patients' symptoms clinically resolve in 7 to 10 days.[2,16,29] Patients typically note substantial improvement in 72 hours.[30] Clinical outcomes are similar for topical antimicrobial treatments—either quinolones or nonquinolones with or without added steroids[31] (**Table 1**).[24,32-45] There is limited evidence to support use of topical steroid treatment alone.[3] There are no systematic studies of dosing frequency for ototopical treatment of AOE; however, quinolone studies suggest that twice daily dosing is adequate.[31,46] Topical aminoglycosides should be avoided in patients with tympanic membrane perforation, suspected perforation, or in situ tympanostomy tubes, as they can be ototoxic.[29,47] Children with a history of tympanostomy tube insertion should be carefully examined as tubes can remain in situ for 3 years or longer. Quinolone drops are non-ototoxic and recommended for patients with suspected or perforated tympanic membrane.[2] Antiseptic drops alone, such as those containing acetic acid, show similar rates of resolution if treatment duration is shorter than 1 week. Antibiotic treatments with or without steroids lasting longer than 1 week show improved rates of cure and shorter symptom duration.[29] There are low rates of adverse events noted with ototopical therapy; however, pruritis (5% to 7% incidence) and site reaction (4% incidence) are most commonly reported.[29,31] Contact dermatitis is rare after a single course of treatment for AOE; however, patients treated for COE with aminoglycosides are at increased risk (40% to 60%).[48]

Figure 3. Otoscopic view of otomycosis with fuzzy, cottonlike fungal hyphae

Image reproduced courtesy of Dr Michael Hawke and OtoSim Inc.[15]

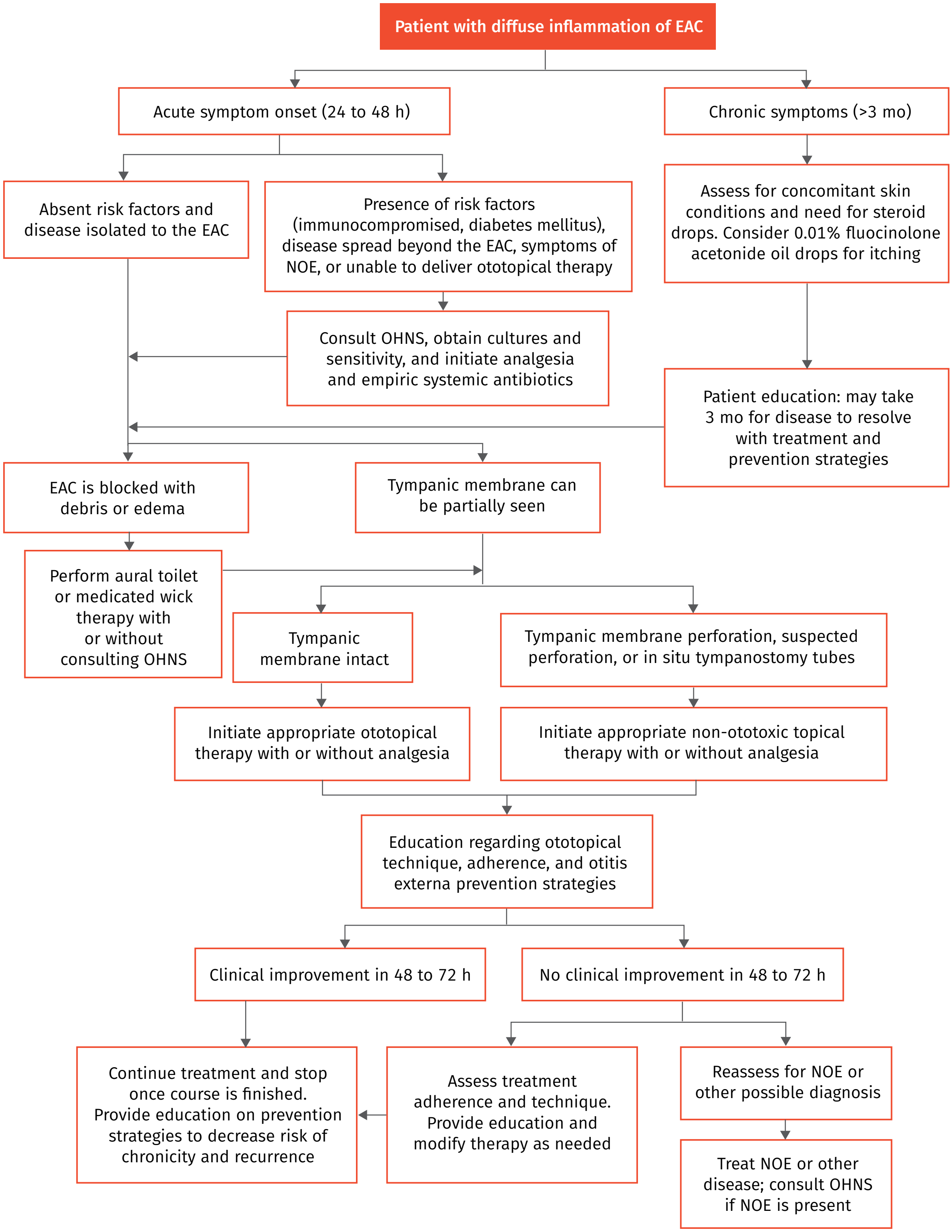
Bacterial COE infections are treated similarly to AOE. Patients with COE with chronic dermatologic conditions benefit from topical steroid cream applied twice daily (0.1% triamcinolone cream or 0.05% desoximetasone cream).[17] Chronic fungal infections should be treated with topical antifungal drops or creams and tympanic membrane perforation should guide treatment selection.[13]

Medicated wick therapy and aural toilet: Patients with severely edematous ear canals that preclude use of ototopical drops may benefit from medicated wick therapy. Wicks should ideally be made of compressed cellulose or ribbon gauze.[2,49] Refrain from using cotton balls as they can disintegrate and be challenging to remove.[2,49] Dry wicks should be placed in the ear canal and expanded immediately with instilled antibiotic drops. After 24 to 48 hours, replace the wick if the tympanic membrane cannot be seen; otherwise remove the wick and continue ototopical therapy for 7 to 10 days.[29,30]

Uncomplicated aural toilet of ear canals occluded with discharge or cerumen can be performed with a small suction cannula inserted less than 1 cm into the canal.[2,50] More challenging cases should be referred to an OHNS. While no studies evaluate the efficacy of aural toilet and medicated wicks, these treatments continue to be suggested in guidelines.[2,3,29] The risks of medicated wicks or aural toilet include pain and trauma.[2]

Patient education: Guidelines strongly recommend educating patients on proper administration of drops, as technique and adherence impact outcomes.

Figure 4. Flowchart for management of patients with otitis externa



EAC—external auditory canal, NOE—necrotizing otitis externa, OHNS—otolaryngologist–head and neck surgeon.

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Table 1. Topical antimicrobial otic therapies for patients with otitis externa

TREATMENT CLASS	ACTIVE AGENTS	POPULATION	DOSAGE	OTOTOXIC*	NOTES
Antibiotic otic drops	10,000 IU of polymyxin B and 0.025 mg of gramicidin per mL[32]	≥6 y	1-2 drops 4 times a day for 5-7 days	Yes	Over the counter
	Ofloxacin 0.3%[33]	≥6 mo	• Ages 6 mo to 13 y: 5 drops daily for 7 days • Older than 13 y: 10 drops once daily for 7 days	No	Prescription
	Ciprofloxacin 0.2%[34]	≥1 y	Instill 1 container (0.25 mL) in ear twice a day for 7 days	No	Prescription
Combined antibiotic otic drops	10,000 IU of polymyxin B and 50 mg of lidocaine hydrochloride per mL[35]	≥6 y	Instill 3-4 drops 4 times a day for 5-7 days	Yes	Over the counter
	Ciprofloxacin hydrochloride 0.3% and dexamethasone 0.1%[36]	≥6 mo	4 drops twice a day for 7 days	No	• Prescription • Ciprofloxacin ophthalmic drops can be used in instances of ciprofloxacin-dexamethasone shortages[37]
	Acetic acid 2% and hydrocortisone 1%[38]	≥3 y	3-5 drops 3 or 4 times a day	Yes	Prescription
	Neomycin sulfate 0.35%, 10,000 IU of polymyxin B sulfate, and hydrocortisone 1%[39]	≥2 y	4 drops 3 or 4 times a day for a maximum of 10 days	Yes	Prescription
	Ciprofloxacin hydrochloride 0.3% and fluocinolone acetonide 0.025%[40]	>6 mo	Instill 1 container (0.24 mL) in ear twice a day for 7 days	No	Prescription
Antiseptic drops	Isopropyl alcohol 95%[41]	No guidelines	Apply 4-5 drops per ear once after water or moisture contact	Yes	Over the counter
Antifungal medication	Flumethasone pivalate 0.02% and clioquinol 1%[42]	≥2 y	2-3 drops daily for fewer than 10 days	Yes	Prescription
	Voriconazole 1%[43,44]	No guidelines	No guidelines; suggest 3 drops 3-4 times daily for 14 days[43,44]	No	Prescription, requires compounding, and is expensive
	Clotrimazole 1%	No guidelines	No guidelines; suggestions include a coated wick changed every 3 days for 1 wk[24,45]	No	Over the counter

*Contraindicated in patients with perforated tympanic membrane.

Patients should lie with the affected ear upward with drops instilled until the ear canal is filled. Gentle manipulation of the pinna or tragus can help filling. Patients should maintain this position for 5 minutes or longer, then the ear should be left to drain and dry naturally.[2] Patients should take their drops for the length of recommended treatment and inform their physician if symptoms persist. Failure of symptoms to respond to conservative treatment after 7 days is a risk factor for NOE.[7]

Systemic antibiotics: Patients with uncomplicated AOE should be first treated with topical antibiotics.[2,51] Despite strong evidence for topical therapy, 20% to 44% of patients with AOE receive a prescription for systemic antibiotics.[52,53] Indications for systemic therapy alongside topical treatment include diabetes, immunosuppression, symptoms of NOE, infection spread beyond the EAC, symptoms refractory to topical treatment, or substantial challenges with topical delivery.[2,13] Systemic treatment should be selected according to bacterial cultures and sensitivity; however, empiric antibiotics that target *P aeruginosa* are appropriate.[13,54] Treatment with oral quinolones, particularly ciprofloxacin, considerably reduces hospitalization and use of intravenous antibiotics, and resolves symptoms in 90% of patients with few adverse events.[21] Length of NOE treatment is based on clinical presentation and requires close follow-up with an OHNS.[20,21,55]

Analgesia: Patients can take over-the-counter nonsteroidal anti-inflammatory drugs or acetaminophen for mild to moderate AOE pain.[13] Some studies suggest that topical antibiotic treatments with steroids reduce pain and edema more than antibiotics alone.[56,57] Opioids are infrequently indicated for AOE, as patients should experience considerable analgesia with appropriate topical therapy in 48 to 72 hours.[2]

Prevention: Patients with otitis externa are at high risk of chronicity or recurrence.[3] During treatment, patients should avoid moisture or putting anything in their ears until infection resolution. Patients should avoid precipitating factors such as ear scratching, cotton-tipped swabs, or other ear canal trauma, and should treat underlying dermatologic conditions.[2,13] Adjunct therapies to consider include drying ears after water exposure with a hair dryer on the cool setting and using acidifying drops (acetic acid) after ears are dry. There are no clinical trials that assess home remedies (eg, 1:1 solution of white vinegar with either isopropyl alcohol or water); however, they may be effective because of their acidifying and antiseptic properties.[2] Patients should be advised to take precautions around water: Wearing a swim cap or placing cotton balls covered with petroleum jelly in the ear canal can create an excellent water seal before swimming or bathing.[2] Earplugs may irritate the canal and increase the risk of otitis externa.[2,11] Patients with COE should similarly avoid aggravating factors and use 0.01% fluocinolone acetonide oil drops to relieve itching; resolution may take 3 months or longer.[18]

Case resolution

V.E. winces when you move her pinna to inspect her ear canal. Her right ear is erythematous and edematous with mild discharge, and the tympanic membrane is intact but swollen. Findings of a cranial nerve, lymph node, and head and neck examination are unremarkable and she is afebrile. Her presentation is consistent with AOE. You initiate ciprofloxacin-dexamethasone drops twice daily for 7 days. You advise her to continue taking ibuprofen as needed, refrain from getting water in her ear or using cotton-tipped swabs, and return to her aquatic fitness classes upon symptom resolution. You suggest that she use a swim cap and gently blow dry her ears on the cool setting after water exposure. You call her 2 days later and she reports her symptoms have considerably improved. You advise her to call if symptoms persist beyond the length of treatment.

Conclusion

Otitis externa is diffuse painful inflammation of the EAC occurring in patients after exposure to moisture or trauma. Findings of a careful history and physical examination can help differentiate among AOE, COE, NOE, and other conditions with otorrhea and pain. Patients who are elderly, have diabetes, or are immunosuppressed, who are at higher risk of developing NOE, warrant special consideration. Antimicrobial drops with or without steroids are first-line treatment for uncomplicated otitis externa. Patients with complicated or severe disease require additional systemic antibiotics and evaluation by an OHNS. Patients may benefit from counselling on proper otic drop technique and strategies to prevent recurrence.

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Contributors

Janjulee Ellis completed the literature review, wrote the manuscript, and created the charts and associated figures. **Dr Jason A. Beyea** provided an otolaryngology perspective and expertise. **Dr Allison De La Lis** and **Emily Rosen** provided audiology perspectives. **Drs Matthew T.W. Simpson** and **Michael M. Beyea** contributed family medicine and emergency medicine contexts, respectively. All authors contributed to conducting the literature review and to preparing the manuscript for submission.

Competing interests

Dr Jason A. Beyea is the owner and Medical Director of the Kingston Ear Institute, which provides services and products for hearing, balance, and vestibular loss. The other authors have no conflicts of interests to declare.

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