



Otitis media: a common childhood illness

Acute otitis media is the most common reason why children in primary care are prescribed antibiotics, despite guidance recommending against routine use. In many cases, a watchful waiting approach will be appropriate. Antibiotic treatment is recommended only in children with certain features that make them more likely to have severe infection or other complications.

KEY PRACTICE POINTS:

- Otitis media is defined as inflammation of the middle ear and is classified into three categories:
 - Acute otitis media (AOM; most common): acute inflammation and effusion of the middle ear, with rapid onset of symptoms and signs consistent with an ear infection; in younger children, symptoms may be non-specific
 - Otitis media with effusion (OME): middle ear effusion without symptoms and signs of an acute ear infection
 - Chronic suppurative otitis media (CSOM): chronic inflammation of the middle ear and mastoid cavity, characterised by otorrhoea through a perforated tympanic membrane or grommet – and otitis externa has been excluded
- AOM can be diagnosed based on acute onset of otalgia and fever, supported by evidence of middle ear inflammation and effusion on examination; symptoms may be less specific in children aged under two years
- AOM should be managed on a case-by-case basis, considering factors such as age, infection severity, whether infection is unilateral or bilateral and previous history of otitis media
- An analgesic, such as paracetamol or ibuprofen, is the first-line treatment, if required
- Antibiotics are usually unnecessary as most infections are self-limiting; a watchful waiting approach for 24 – 48 hours is recommended before considering antibiotics, except in children at high risk
- Consider antibiotics early in children at high risk or who have red flags, e.g.
 - Systemic symptoms
 - Aged < 6 months
 - Aged < 2 years with severe or bilateral infection
 - Tympanic membrane perforation and/or otorrhoea
 - If there has been no improvement within 48 hours
- Also consider antibiotics in children with recurrent infections, i.e. ≥ 3 episodes of AOM within six months or ≥ 4 episodes within 12 months
- Serious complications from otitis media are rare and do not differ in incidence between children who receive antibiotics immediately or delayed

This is a revision of a previously published article.
What's new for this update:

- Evidence that air pollution and male sex are risk factors for the development of otitis media
- Minor update to recommended amoxicillin dose: if antibiotics are indicated, the recommended regimen for amoxicillin is now 15 – 30 mg/kg/dose, three times daily, for five to seven days. The higher dose is used to treat children with severe or persistent infection.
- Annual influenza vaccination may be useful to reduce the likelihood of developing severe upper respiratory tract infections

Diagnosing otitis media in children

Otitis media is characterised by middle ear and tympanic membrane inflammation resulting from an upper respiratory tract infection due to viral (e.g. respiratory syncytial virus, rhinovirus, influenza viruses, adenovirus) or bacterial infection (e.g. *Streptococcus pneumoniae*, non-typeable *Haemophilus influenzae*, *Moraxella catarrhalis*), or a combination of both.¹

Otitis media is most common in early childhood due to anatomically shorter and more horizontal eustachian tubes; pathogens can enter the middle ear from the nasopharynx more easily and subsequently cause infection.² Children also have larger adenoids than adults; when they swell, the eustachian tubes become blocked, making fluid drainage from the middle ear difficult.

There are three main categories of otitis media:

- **Acute otitis media** (AOM; most common) is characterised by acute inflammation and effusion of the middle ear with rapid onset of symptoms and signs consistent with an ear infection
- **Otitis media with effusion** (OME) is defined as middle ear effusion without symptoms and signs of an acute ear infection
- **Chronic suppurative otitis media** (CSOM) is chronic inflammation of the middle ear and mastoid cavity, characterised by otorrhoea through a perforated tympanic membrane or grommet – and otitis externa has been excluded

Environmental and individual factors contribute to the risk of developing otitis media

Factors influencing the risk of a child developing otitis media are divided into individual or environmental and may be modifiable or non-modifiable (Table 1).

Acute otitis media (AOM)

AOM is defined as acute inflammation and effusion of the middle ear accompanied by the rapid onset of symptoms and signs of an ear infection, e.g. otalgia, fever and erythema of the tympanic membrane. The peak prevalence of AOM is between ages 6 – 18 months.¹³ By age four years, approximately 60% of children will have experienced at least one episode of AOM.¹ In New Zealand, it is estimated that approximately 27% of children aged 0 – 4 years are affected by AOM each year, of those, almost 4% experience recurrent episodes.¹⁰


Diagnosing AOM

The most notable features of AOM are otalgia, often with fever and sometimes otorrhoea.⁵ Younger children with AOM may present with non-specific symptoms in conjunction with an upper respiratory tract infection, e.g. ear tugging, irritability, refusal to feed and not settling or waking at night.^{5, 14}

On otoscopic examination, the tympanic membrane may:^{13, 14}

- Show areas of intense erythema* and/or a yellow colouration
- Show a loss of translucency and be dull or cloudy
- Bulge due to effusion with a loss of normal landmarks

* Children with prolonged crying, fever or an upper respiratory tract infection may have a mildly red tympanic membrane; it is unlikely the child will have otitis media in the absence of other characteristic symptoms and signs, e.g. bulging of the tympanic membrane¹⁵

 For otoscopic images of the tympanic membrane, see: www.rch.org.au/clinicalguide/guideline_index/Acute_otitis_media/

Management of AOM

Symptom relief with regular analgesics, such as paracetamol or ibuprofen* is recommended for most children, alongside watchful waiting for 24 – 48 hours.^{5, 13} There is no evidence that antihistamines, decongestants or oral corticosteroids provide benefit.¹³ In approximately 80% of children with AOM, symptoms will spontaneously resolve within three days, and 90% of children with AOM will have resolved otalgia within seven to eight days without the need for antibiotics (see below for when antibiotics should be considered initially).⁵

* Ibuprofen is contraindicated in children with signs of dehydration or concurrent NSAID-sensitive asthma¹⁶


 **Best Practice tip:** An additional short-term option for analgesia in a child with acute severe otalgia is the topical application of lignocaine inside the ear canal, provided the tympanic membrane is intact. This can be administered at the practice via a syringe using lignocaine solution or parents

Table 1. Common individual and environmental factors influencing a child's risk of developing otitis media.³⁻⁵

Individual factors	
Age	Otitis media first peaks in children aged between 6 – 24 months and again, between ages four and five years
Sex	Otitis media is more common in males; the reason for this is unknown
Anatomical abnormalities	Abnormalities such as cleft palate, cleft lip and narrow eustachian tubes increase the risk of otitis media. N.B. Children with Down syndrome are at increased risk of otitis media due to a combination of thicker mucoid secretions, narrower eustachian tubes and increased susceptibility to infection.
Breastfeeding	Breastfeeding for at least six months may protect against otitis media
Use of a dummy (pacifier)	Nasopharyngeal pressure changes can result in secretions from the throat entering the eustachian tube and increase the risk of otitis media. Limiting pacifier use after age six months can reduce the incidence of acute otitis media; the strongest evidence (30% reduction in AOM incidence) is to limit pacifier use in children aged under 18 months.
Environmental factors	
Passive exposure to smoking	Passive exposure to smoking is one of the most significant modifiable risk factors for the development of otitis media. Passive exposure to smoking can increase a child's susceptibility to infection; absence of tobacco exposure can be protective against AOM development.
Attendance at early childhood care	Attending an early childhood education/care facility is associated with a small increase in the risk of otitis media, most notably during the first year of life; likely through greater exposure to respiratory pathogens and close contact with other children
Overcrowded homes and/or a large number of siblings	As with early childhood care, there is an increased risk of otitis media with close contact between children, e.g. siblings; the risk of otitis media is also greater in overcrowded homes
Seasons	Upper respiratory tract infections are more common in autumn and winter which can lead to AOM; cold, damp and mouldy homes over winter also increases the likelihood of respiratory tract infections and, therefore, the risk of otitis media
Air pollutants	Children exposed to higher levels of nitric oxide in the air* have greater risk of developing otitis media ² * One of the main sources of nitric oxide in the environment is combustion of fossil fuels. Most places in New Zealand remain under guideline values for nitric oxide, but children living in areas of high traffic density or industry may be exposed to higher levels.

can apply one to two drops of 2% lignocaine gel (not funded), however, this can be impractical to insert due to the small size of the ear canal in children. Although there is limited evidence of benefit, this adjunctive option for analgesia is recommended in some guidelines.¹³

Antibiotics are not routinely required in the treatment of AOM

In most cases of AOM, antibiotics are not needed for effective management; antibiotics do not reduce pain in the short-term and can result in adverse effects such as diarrhoea and vomiting.¹⁷ Serious complications from otitis media are uncommon (see: "Mastoiditis") and do not differ in incidence between children who receive antibiotics immediately or delayed.¹⁷

Antibiotics may be considered in children with AOM:^{1, 5, 13, 17}

- Aged under six months
- Aged two years and under with bilateral or severe infection, e.g. moderate-to-severe otalgia and/or fever > 39°C
- Whose condition worsens or does not improve within 48 hours
- At high risk of developing complications, e.g. children:
 - Who are immunocompromised
 - With infection in their only hearing ear or in children with a cochlear implant
 - Who are systemically unwell or there is evidence of sepsis
 - Who have a possible suppurative complication
- With recurrent AOM, i.e. ≥ 3 episodes within six months or ≥ 4 episodes within 12 months

The inequities of otitis media

Significant disparity exists in the prevalence and severity of otitis media between Māori or Pacific children and European children in New Zealand.^{6, 7} Factors that contribute to this include socioeconomic deprivation, overcrowded and sub-standard housing and exposure to second-hand smoke.^{6, 8} Many families/whānau or caregivers also face barriers to accessing healthcare that can make it difficult for their child to receive appropriate care. This may include the affordability of attending primary care, e.g. travel costs, potential loss of income from leaving work to attend an appointment and organising care of dependents.⁹

Children of Māori or Pacific ethnicity have higher rates of OME and recurrent AOM, i.e. ≥ 3 episodes of AOM within six months or ≥ 4 episodes within 12 months, than non-Māori or non-Pacific children.^{6, 10} If otitis media is left untreated, complications can develop such as hearing loss, which can lead to further challenges, e.g. learning and speech developmental delays. Children of Māori ethnicity have higher rates of mild, moderate and bilateral hearing loss compared to children of European/Other ethnicity; data for Pacific children are less clear, but they are also likely to have higher rates of hearing loss.¹⁰

Otitis media hospitalisations are higher in children of Māori or Pacific ethnicity

Children of Māori or Pacific ethnicity aged 14 years and under are more likely to be admitted to hospital for otitis media than children of European ethnicity.⁷ Socioeconomic status may be a contributor towards this, likely due to barriers in accessing primary care.¹¹ Hospitalisations for otitis media are also higher in Māori children who live in overcrowded neighbourhoods compared to non-Māori children who live in overcrowded neighbourhoods.¹¹

Strategies for reducing inequities

To help reduce the inequity gap in New Zealand for children with otitis media, reinforce prevention strategies and consider ways your practice could reduce barriers to accessing care. For example:^{3, 5}



Encourage parents or caregivers who smoke to stop, or at least smoke or vape outdoors; refer them to smoking cessation services for additional support, if required. For further information on smoking cessation, see: [bpac.org.nz/BPJ/2015/October/smoking.aspx](https://www.bpac.org.nz/BPJ/2015/October/smoking.aspx)



Encourage breastfeeding and limiting pacifier use in infants after age six months



Discuss infection prevention strategies with families/whānau or caregivers, such as frequent handwashing and cleaning of high-touch surfaces, e.g. doorknobs, and appropriate cough and sneeze hygiene



Refer to local housing services (e.g. for insulation, curtains, housing assistance) if available and the family is eligible. Links to local services are available on HealthPathways.



Check that children are up to date with their vaccinations; some vaccine-preventable illnesses, e.g. influenza, pertussis, measles and pneumococcal disease, can lead to otitis media. Ensure that parents who may be reluctant to have their child vaccinated understand these benefits.



Prominently display payment information, e.g. that there is usually no charge for a consultation* or prescription† for children aged 13 years and under



Consider ways the practice environment could be more welcoming, e.g. information available in Te Reo Māori and other languages



Offer after-hours and/or weekend appointments, if possible

* All children aged 13 years and under who are enrolled with a general practice and eligible for publicly funded health services, are included in the "Zero fees for under-14s" scheme.¹² Extended consultations, procedures and extra services, e.g. certificates or equipment, are not covered.¹²

† Unless the prescription is for a medicine that is not fully funded¹²

Table 2. Dosing protocol when antibiotics are indicated for AOM.^{16,17}

	Dose
First line: amoxicillin	15 mg/kg/dose, three times daily, for five days; OR 30 mg/kg/dose, three times daily, for seven days in severe or persistent infection* Do not exceed the maximum dose of amoxicillin: Neonate aged seven to 28 days – 125 mg/dose Child aged one month to 18 years – 1 g/dose
If penicillin allergy or intolerance to amoxicillin: erythromycin	10 – 12.5 mg/kg/dose, four times daily, for five to seven days (maximum 1.6 g/day, however, in severe infections, to a maximum of 4 g/day)
Alternative: trimethoprim + sulfamethoxazole [†]	24 mg/kg/dose (to maximum of 960 mg/dose), twice daily, for five to seven days

* If infection has not resolved after high dose amoxicillin, expert opinion is that amoxicillin + clavulanic acid can be considered

† Formerly referred to as co-trimoxazole. Oral liquid 40 + 200 mg/5 mL; now expressed as the total dose of trimethoprim + sulfamethoxazole (ratio 1:5) – 240 mg/5 mL oral liquid. Avoid in infants aged under six weeks, due to the risk of hyperbilirubinaemia.¹⁶



Delayed (“back pocket”) prescribing may be appropriate in some cases, e.g. for families/whānau who are unable to return for re-examination.^{5, 17}

Providing a prescription with advice to use only if symptoms persist for more than 24 – 48 hours can reduce antibiotic use while providing the family/whānau with reassurance. This can also be written on the prescription for pharmacists to provide counselling on delayed use if the prescription is presented for immediate dispensing. Alternatively, the prescription could be post-dated.

The family/whānau should be asked to return if the child’s condition worsens despite the use of antibiotics or if they have concerns about the child’s health.



Mastoiditis although rare (incidence of 3.8 per 10,000 AOM episodes), is the most serious complication arising when otitis media is untreated or treatment is not successful.¹⁷ Earache, swelling behind the ear and erythema over the mastoid process along with pain on movement of the head or ear is characteristic of mastoiditis (see: www.rch.org.au/clinicalguide/guideline_index/Acute_otitis_media/ for an image of acute mastoiditis).¹⁴ If mastoiditis is suspected, referral to hospital is required as the child will likely need intravenous antibiotics.

Recurrent AOM

Recurrent AOM is defined as three or more episodes within six months or four or more episodes within 12 months, with at least one of those episodes occurring in the preceding six months.⁴ Children who have a recurrent episode of AOM should ideally return after four weeks to check for resolution.

Each DHB is likely to have different criteria for referral to ENT for a child with recurrent AOM; check your local HealthPathways and ensure that children are referred as soon as they are eligible.

Otitis media with effusion (OME)

OME, also known as “glue ear”, is defined by middle ear effusion without symptoms or signs of an acute ear infection. OME most often occurs following an episode of AOM but can arise spontaneously.³ OME occurs in up to 13% of all children, primarily in those aged between one and five years, and in approximately 90% of children with a cleft palate.^{3,16}

Multiple factors are thought to contribute to the frequency and recurrence rates of OME, including gastro-oesophageal reflux, pollution and passive exposure to smoking, viral infections, allergies and atopic conditions, e.g. allergic rhinitis, and genetic factors.^{3,4}

Almost all children with OME spontaneously improve within three months.³ However, when resolution does not occur, there is potential for OME to contribute to ongoing problems, e.g. hearing loss and younger children may experience a delay in speech and language development.³

Diagnosing OME

Hearing loss, although not always present, is the most reported feature of OME. For example, parents/caregivers may describe difficulties with communication, withdrawal or lack of attention, or notice the television needs to be louder or that they need to raise their voice when talking to the child. Other symptoms

of OME may include aural fullness or a sensation that the ear is popping, a combination of sleep and balance disturbances, irritability and less commonly, otalgia.^{3,5}

A confirmed diagnosis of OME can be made if tympanic membrane mobility is reduced or absent. Characteristic changes in OME are:³

- Dullness and retraction observed using an otoscope
- A type B curve tracing using tympanometry (see: "Interpretation of tympanometry")

Additional indicators of OME when examining the middle ear may include abnormal colouring of the tympanic membrane, e.g. bluish or an opaque colouration, or the presence of air bubbles.^{3,4}

Management of OME

Children experiencing their first episode of OME should be managed with watchful waiting for three months; OME is rarely associated with infection and most cases spontaneously resolve.^{3,4}



Antibiotics provide little-to-no long-term benefit;

a Cochrane review (23 randomised controlled trials [RCTs] including 3,258 children with OME) found that children taking antibiotics were more likely to have complete resolution at two to three months compared to children not taking antibiotics, however, they were also more likely to experience adverse effects such as diarrhoea, vomiting and skin rash (moderate-quality evidence).¹⁹ Antibiotic use did not result in fewer grommet insertions (low-quality evidence) and the impact on hearing loss, speech, language and cognitive development is uncertain.¹⁹

Children with OME should ideally return after four weeks to check for resolution; subsequent recalls should be placed if OME has not resolved. Monitoring the appearance of the tympanic membrane and speech development can be useful to track potential changes during the period of watchful waiting.³

Referral to paediatric ENT for consideration of grommet insertion is generally recommended in children with effusions

Interpretation of tympanometry

Tympanometry assesses middle ear function by measuring tympanic membrane compliance (mobility).^{3,18} Tympanometry may also be used to track the resolution of an effusion which can take up to 12 weeks following AOM.¹³

Tympanograms vary between patients, however, there are three broad types of trace that can be used for diagnostic purposes (Figure 2):^{3,4,18}

1. **The type "A"** trace reflects a normal middle ear mechanism
2. **The type "B"** trace lacks a sharp peak or is completely flat, suggesting decreased mobility of the tympanic membrane, which may be due to the presence of fluid within the middle ear. This trace often indicates OME but can also suggest perforation or obstruction of the canal.
3. **The type "C"** trace indicates negative pressure within the middle ear space and correlates with a retracted tympanic membrane. This suggests eustachian tube dysfunction, which may be indicative of a partial effusion or AOM.

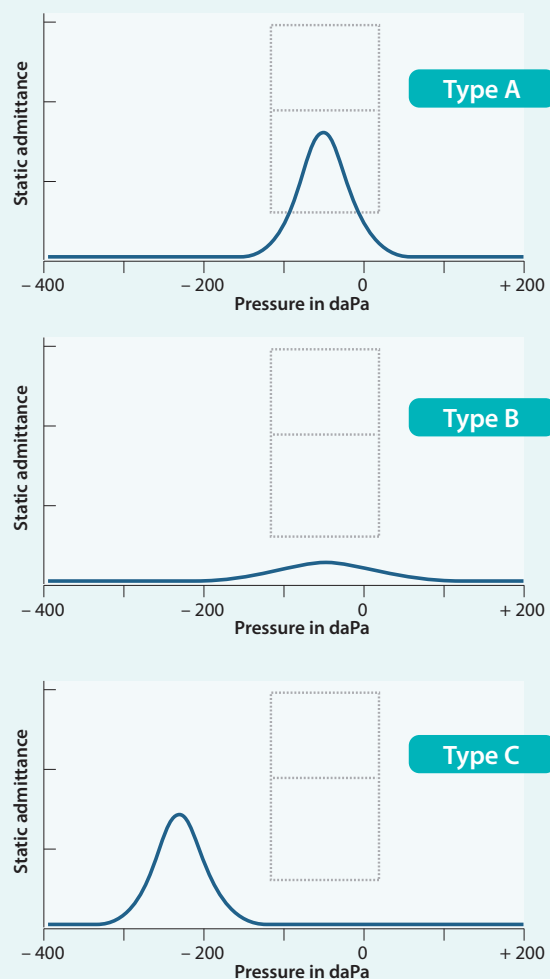


Figure 2. Type "A", "B" and "C" tympanograms adapted from Schilder *et al.*, 2016.⁴

persisting for longer than three months (see: “Grommets: indications, outcomes and complications”).¹³ Also consider referral to audiology or a child speech language therapist if there is suspicion of speech and language delay in children aged > 2.5 years. Check local HealthPathways for specific referral criteria. The Ministry of Health also funds free hearing checks at birth and as part of the B4 School Check for children aged four years throughout New Zealand. Further information is available for parent and caregivers at: www.health.govt.nz/your-health/services-and-support/health-care-services/free-hearing-checks-children.

Chronic suppurative otitis media (CSOM)

CSOM, or chronic otitis media, is chronic inflammation of the middle ear and mastoid cavity characterised by otorrhoea persisting for at least two to six weeks through a perforated tympanic membrane or grommet – and otitis externa has been excluded.^{4, 22, 23}

Parents/caregivers will most often notice otorrhoea and sometimes hearing loss, however, children with CSOM can also be asymptomatic.⁴ Hearing loss – conductive or sensorineural – is the most common complication arising from CSOM; ongoing hearing loss can be associated with language delays and behavioural problems.⁴

If the tympanic membrane can be seen through the otorrhoea, examine for erythema and perforation.^{4, 5, 23} Treatment ideally involves aural microsuction, followed by topical ear drops, however, microsuction at an ear clinic may be unaffordable or not accessible for some people. In practice, it is more common to begin treatment with ear drops containing a combination of anti-infective and anti-inflammatory agents (see: “Choosing an appropriate ear drop”).

Choosing an appropriate ear drop

When choosing an ear drop, consider which is most appropriate for the likely type of infection, the most suitable formulation and what is funded and available. In general, fluoroquinolone ear drops, e.g. Ciproxin HC, are recommended first-line in many guidelines on the balance of benefit and safety (see: “The ototoxicity of ear drops”), but they are not funded and resistance needs to be considered;²⁴ discuss with parents or caregivers the possibility of self-funding.

Ear drop options:¹⁶

- Sofradex (dexamethasone + framycetin + gramicidin); 2 – 3 drops, three to four times daily (partly funded)
- Ciproxin HC (ciprofloxacin + hydrocortisone); 3 drops, twice daily (not funded)*
- Kenacomb (triamcinolone + neomycin + gramicidin + nystatin); apply a small amount, two to four times daily (funded)

Grommets: indications, outcomes and complications

Grommets (tympanostomy or ventilation tubes) are often indicated in children with recurrent AOM, persistent OME or when OME is complicated by hearing loss, developmental delays, learning difficulties or anatomical differences of the tympanic membrane, e.g. retractions.^{3, 4} Often, grommets are extruded within the first few months of placement; if grommets come out earlier than expected (e.g. less than one year after insertion) or the child faces ongoing problems, refer back for assessment and possible re-insertion.

In children with OME, grommets may improve hearing in the short term, however, long-term efficacy is unclear and likely varies between children.³ In children with recurrent AOM, grommet insertion may prevent future episodes. A Cochrane review (five RCTs including 805 children with recurrent AOM) found:²⁰

- Children with grommets were less likely to have recurrent episodes of AOM compared to children managed through watchful waiting (low-to very-low quality evidence)
- Children with grommets had approximately one fewer episode of AOM at six months compared with children who did not have grommets; no effect was observed at 12 months

Watch out for persistent otorrhoea following grommet insertion as a potential indicator of chronic suppurative otitis media.

Otorrhoea is the most common complication associated with grommet insertion, occurring in approximately 16% of children within four weeks of grommet insertion and 26% of children at any stage following surgery (on average 12 – 14 months) when the grommet is in place.³


Post-operative otorrhoea that occurs within two weeks of grommet insertion is thought to be surgery-related or due to the condition of the middle ear during surgery, e.g. an infection prior to surgery, rather than a new infection.²¹ If otorrhoea persists for more than two to six weeks following grommet insertion,²¹ consider the possibility of chronic suppurative otitis media (see: “Chronic suppurative otitis media (CSOM)”).^{4, 22} Treatment of otorrhoea usually consists of ear drops containing a corticosteroid and antibiotic (see: “Choosing an appropriate ear drop”).²¹

- Locorten-Vioform (flumetasone pivalate + clioquinol); 2 – 3 drops, twice daily (funded)

* Ciprofloxacin eye drops 0.3% (five drops administered into the ear, twice daily, for nine days) are funded for the second-line treatment of CSOM (unapproved indication). N.B. These drops do not contain an anti-inflammatory component that is usually recommended to treat CSOM and so may be less effective than combination drops.

In practice, Sofradex is often used first-line (unless there is suspicion of *Pseudomonas* or a framycetin/gramicidin-resistant organism) as it is a thin fluid, generally well tolerated and partly funded. Locorten-Vioform is most appropriate for fungal/yeast infections in addition to aural microsuction. Kenacomb is an alternative to Locorten-Vioform, although, these drops can be difficult to instil (thick yellow liquid), and their appearance can confound whether an infection is settling or not.

If combination drops do not improve CSOM, consider swabbing to direct further treatment or discuss with an ENT specialist or request a paediatric ear nurse (if available – see link below) or ENT assessment.

 To find out whether there is an ear nurse in your area, see: www.ensg.co.nz/directory/

Duration of treatment

Ear drops should be applied for at least five days, and ideally for no more than seven days.¹⁷ This should be sufficient for most people with uncomplicated infection.^{17,25} The risk of ototoxicity

is greater with increasing duration of use and when ear drops are applied after symptoms have resolved.²⁴ Occasionally, with prolonged application of topical ear drops, a secondary infection, e.g. fungal, can develop.²⁴

Vaccination can protect against otitis media

Otitis media can be a complication of other infections, such as measles, pertussis and influenza, therefore, if a child has otitis media and has not been vaccinated, use this as a time to re-iterate why routine childhood vaccinations are important.



Pneumococcal disease: Vaccination against pneumococcal disease with PCV10 (Synflorix) is included in the childhood Immunisation Schedule and is fully funded for all children aged five years and under:²⁹

- PCV13 (Prevenar) is available for children (and adults) at high risk of pneumococcal disease, e.g. those with immunodeficiency or cochlear implant
- Children who are at high risk for pneumococcal disease should also receive 23PPV (Pneumovax 23) after age two years

Following pneumococcal vaccination rollout between 2006 and 2015, a 51% decline in otitis media hospitalisations was observed for children of Māori ethnicity compared with 25% overall.³⁰ A population-based study (270,137 children) in Israel found that following the introduction of PCV13, rates of AOM and recurrent AOM reduced significantly, particularly in

The ototoxicity of ear drops

The use of ear drops in people with a perforated tympanic membrane is generally contraindicated in medicine data sheets, however, evidence suggests they can be used safely for CSOM and/or post-operative otorrhoea in people with a perforated tympanic membrane or grommets.²⁴

Studies have shown that ciprofloxacin-containing ear drops have a lower risk of ototoxicity than aminoglycoside-containing ear drops; more limited evidence is available for assessing the safety of clioquinol-containing ear drops, but they are considered preferable to aminoglycosides.²⁴ Aminoglycoside-containing ear drops may be necessary under certain circumstances, e.g. following an insufficient response to other ear drops, resistant organisms or when alternative ear drops are unavailable or unaffordable; the risk of ototoxicity can be reduced by limiting treatment duration (e.g. less than seven days) and only instilling during an active infection.²⁴




children aged two years and under.³¹ A Cochrane review (11 RCTs including 60,733 children) also showed that following pneumococcal vaccination in early infancy, the relative risk of pneumococcal confirmed AOM reduced, however, evidence for recurrent AOM and all-cause AOM was limited.³²



Influenza: Annual Influenza vaccination is recommended for all individuals aged six months and older.²⁹ This is particularly important for children with recurrent respiratory infections, if the parent/caregiver is able to meet the associated costs. Children are currently eligible for a funded influenza vaccine if they have a chronic respiratory disease (including asthma if on regular preventive treatment), have been hospitalised for respiratory illness or have another chronic condition: refer to the **immunisation**

schedule or **PHARMAC schedule** for funding details.²⁹

A Cochrane review (11 RCTs including 17,123 children) found children aged between six months and six years who received an influenza vaccine achieved a small reduction in the number of episodes of AOM (≥ 1 over at least six months), compared with children who received placebo or no treatment; 25 children need to be vaccinated to prevent one child from having ≥ 1 episode over at least six months (low-quality evidence).³³

 The eligibility criteria for funded vaccination is subject to change. To read the full list of eligibility criteria and the latest updates, see: www.health.govt.nz/publication/immunisation-handbook-2020


Key tips for aural hygiene practices

A normal external auditory canal has a self-cleaning mechanism that does not require any active cleaning.²⁶ Despite this, many people self-clean their ears which can disrupt the natural cleaning mechanism, cause trauma to the ear canal – particularly to the tympanic membrane, cerumen (earwax) impaction, infection and potential retention of the object used, e.g. cotton buds, bobby pins, paper clips, pen covers, matchsticks.²⁶

Discussion about aural hygiene with parents and caregivers of children may cover the following points:^{26,27}

1. Cerumen should not be removed at home; cerumen cleans, protects and lubricates the external auditory canal. Advise parents and caregivers that if symptoms such as hearing loss, ear fullness, otalgia, otorrhoea, tinnitus, cough and/or pruritis of the ear, develop, to seek medical attention for consideration of cerumen removal.
2. *“Nothing smaller than an elbow should be inserted into the ear”* – this phrase is often used to caution people about using objects to clean their ears. Objects have the potential to lacerate the ear canal, perforate the tympanic membrane and dislocate the hearing bones leading to hearing loss, vertigo and tinnitus.
3. Ear candles and other do-it-yourself wax removal products should be avoided. A technique that may help move older cerumen out of the ear canal is to chew and move the jaw.

4. Frequent use of ear plugs or ear buds can injure the ear canal and increase the chance of developing an ear infection; minimise use if possible. Foam ear plugs should be changed daily and moulded ear plugs/buds regularly cleaned.
5. Children are more vulnerable to auditory damage compared to adults when exposed to the same level of noise.²⁸ Reduce exposure to loud sounds where possible and encourage hearing protection if there is prolonged exposure, e.g. earmuffs.
6. Swimming in contaminated water should be avoided. **Safeswim** provides information about the safety of local swimming areas.
7. The ear canal should be emptied after swimming and bathing; this can be done by tilting the head horizontally. It is also important to minimise the amount of water entering the ear canal when bathing or showering by tilting the head forwards, and also avoid soap entering the ear canal.

 For further information, parents and caregivers can be referred to: www.healthnavigator.org.nz/healthy-living/e/ear-care-advice/

Clinician's Notepad: otitis media

Acute otitis media (AOM)

Assessment and diagnosis

- Assess/ask about symptoms and signs consistent with an ear infection, e.g. otalgia and fever; in younger children, i.e. aged two years and under, symptoms may be non-specific, e.g. ear tugging, irritability and not settling at night
- Use an otoscope to check for inflammation and effusion; the tympanic membrane may:
 - Show areas of intense erythema or yellow colouration
 - Lack translucency and be dull or cloudy
 - Bulge and show a loss of normal landmarks

Management

- Most cases spontaneously resolve without the need for antibiotics
- Recommend symptom relief with regular analgesics, e.g. paracetamol or ibuprofen, if required, and watchful waiting for 24 – 48 hours
- Consider prescribing antibiotics in children:
 - Aged under six months
 - Aged two years and under with bilateral or severe infection, e.g. moderate-to-severe otalgia and/or fever > 39°C
 - Whose condition worsens, or does not improve within 48 hours
 - Experiencing recurrent episodes of otitis media, i.e. ≥ 3 episodes within six months, or ≥ 4 episodes within 12 months
 - At high risk for developing complications, e.g. children:
 - Who are immunocompromised
 - With infection in their only hearing ear or in children with a cochlear implant
 - Who are systemically unwell or there is evidence of sepsis
 - Who have a possible suppurative complication
- A “back pocket” prescription may be appropriate
- Check with local HealthPathways for specific ENT referral criteria

Otitis media with effusion (OME)

Assessment and diagnosis

- Ask about hearing loss or any non-specific symptoms, e.g. difficulties with communication, lack of attention, sleep and balance disturbances, irritability
- Use an otoscope to examine for dullness and tympanic membrane retraction
- Use tympanometry – a type B curve trace suggests OME

Management

- Recommend watchful waiting for three months, with regular follow-up during this period, e.g. return after four weeks to check resolution and monitor for any hearing changes; antibiotics are not necessary
- Refer to ENT for consideration of grommet insertion if effusion persists for longer than three months. Also consider referral to audiology or a child speech language therapist if there is suspicion of speech and language delay in children aged > 2.5 years. Check local HealthPathways for specific referral criteria.

Chronic suppurative otitis media (CSOM)

Assessment and diagnosis

- Ask about the duration of otorrhoea (persisting for at least two to six weeks) and any suspicion of hearing loss
- Assess the ear for otorrhoea and examine the tympanic membrane, if visible, for perforation and erythema

Management

- Treatment usually begins with topical ear drops containing a combination of anti-infective and anti-inflammatory agents
 - Ciproxin HC (not funded) is often recommended first-line on the balance of benefit and safety; consider the possibility of resistance
 - Sofradex (partly funded), Kenacomb (funded) and Locorten-Vioform (funded) may be appropriate alternatives
- If combination drops are unsuccessful at resolving otorrhoea, consider swabs to direct further treatment or discuss with an ENT specialist or request a paediatric ear nurse (if available) or ENT assessment

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