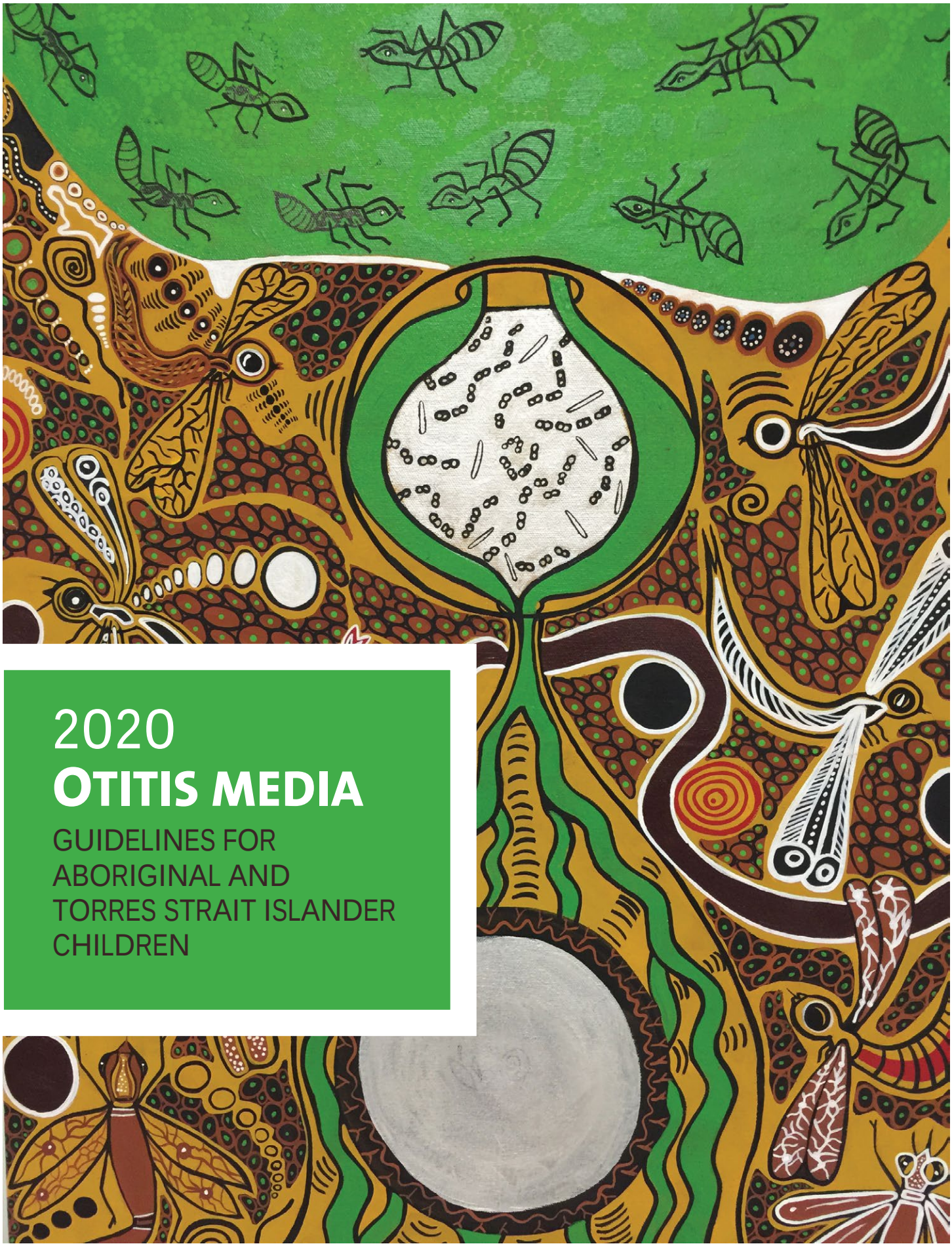

2020

# OTITIS MEDIA

## GUIDELINES FOR ABORIGINAL AND TORRES STRAIT ISLANDER CHILDREN

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**Citation and links to OM app download**

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Google Play. https://play.google.com/store/apps/details?id=com.otitismediaguidelines.guidelines

**Desktop version is available at**

http://otitismediaguidelines.com




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# ABOUT THE UPDATED GUIDELINES

These 2020 OM Guidelines have been prepared following consultation with experts in the field of ear and hearing health (the Technical Advisory Group, TAG) and are based on information available at the time of their preparation, in March 2017. Practitioners should have regard to any information on these matters which may become available subsequent to the preparation of these 2020 OM Guidelines. The TAG does not accept any contractual, tortious or other liability whatsoever in respect of their contents or any consequences arising from their use. While all advice and recommendations are made in good faith, the TAG does not accept legal liability or responsibility for such advice or recommendations.


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**The 2020 OM Guidelines are dedicated to the memory of Judith Boswell, PhD.**

Judith commenced her PhD with Menzies in Darwin in 1990. Her work described the extraordinarily early onset of otitis media and hearing loss in Aboriginal infants in remote communities. Judith campaigned for hearing services for Aboriginal children under 3-years of age, and for greater public awareness of the disabling impacts of otitis media. Judith was a co-author of the inaugural 2001 national Otitis Media Guidelines, and later joined the Darwin Otitis Guidelines Group for the 2010 update and national campaign. Judith was committed throughout her career to implementing an evidence-based approach to ear health and hearing, particularly in remote communities. Despite ill-health, Judith joined the Technical Advisory Group for the 2017 update. Judith joined all teleconferences, a face-to-face meeting in Sydney, and revised tables and text – all pro-bono, and during times when she would have felt incredibly ill. Judith passed away on 4th April 2017. She and Sam Harkus had already prepared a presentation for the June 2017 International Symposium on Recent Advances in Otitis Media, so we know her passion was with her to her very last days.

We dedicate these 2020 OM Guidelines to Judith.

# RESEARCH PARTNERS

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# CONTENTS

*Information to assist all health care providers in the delivery of comprehensive, effective and appropriate care for Aboriginal and Torres Strait Islander people with otitis media (ear infections) and associated hearing loss.*

# AN OVERVIEW OF OTITIS MEDIA

Otitis media (OM) refers to inflammation and infection of the middle ear space. It is a complex condition associated with both illness and hearing loss. It is best to regard OM as a spectrum of disease that ranges from mild (otitis media with effusion, OME) to severe (chronic suppurative otitis media, CSOM). In all populations, every child will experience episodic OME (fluid behind the tympanic membrane) at some time [1]. Nearly all children will experience at least one episode of acute otitis media (AOM). In developed countries, most children will improve spontaneously [1]. Concerns about OM arise in children who suffer frequent episodic AOM or persistent OME. This is usually a problem in the first 6 years of life (with spontaneous resolution more likely in older children) [2]. Children who develop CSOM (the most severe form of OM) are most likely to suffer problems as adults [3]. Unfortunately, for some of these affected individuals, OM (and its associated hearing loss) is a lifelong problem. CSOM in adults lasts on average for 10 years.
All forms of OM cause conductive hearing loss (CHL). Episodic OME and AOM can cause a mild hearing loss while there is fluid in the middle ear space. Chronic disease (persistent OME and CSOM) can cause moderate hearing loss. Additionally, the hearing loss can fluctuate depending on the health of the middle ear. CHL is often regarded as a temporary condition because its causes are generally amenable to medical or surgical treatment. However, it will be a chronic problem in chronically diseased ears. In addition, sensorineural hearing loss can occur secondary to long-term chronic OM [3].
All forms of OM can impair hearing. The degree of impairment depends on the disease state. The more persistent and severe the OM condition, the greater its effect upon hearing sensitivity and auditory-language development. Permanent CHL can occur as a result of recurrent, acute or chronic inflammation, TM perforation or adhesions, ossicular discontinuity, fixation or erosion. Some Aboriginal and Torres Strait Islander children with 'mild' conductive hearing loss are much more disadvantaged than other children. Their hearing impairment may be exacerbated by very early onset and long duration, multiple language demands in the home environment, lack of access to pre-school, limited exposure to standard Australian English prior to school- entry, major grammatical and phonological differences between Aboriginal and Torres Strait Islander languages and standard English.
Hearing loss resulting from otitis media affects verbal and written communication, and has long-term consequences. It is associated with impaired school performance, poorer reading skills in primary school, impaired language skills (auditory temporal abilities, first and subsequent language acquisition), impaired attention span, speech disorders, anxiety, depression and attention problems later in life, higher unemployment, impaired social relationships, lower IQ in later childhood in children already at risk of poor cognitive development, hearing loss that continues in adulthood, increased rates of incarceration. Hearing loss interacts with other social, language and developmental problems to disadvantage the child even more. Parental stress regarding the effects on their child's development, shame and frustration with treatment efficacy need to be addressed to enhance outcomes for children. Early intervention from health and hearing services can ameliorate consequences of hearing loss.
Aboriginal and Torres Strait Islander children are the target populations for these recommendations. While OM is a common illness in all populations, Aboriginal and Torres Strait Islander populations have the highest

rates of severe and persistent OM described in the medical literature. In some areas (generally rural and remote Aboriginal and Torres Strait Islander communities), the clinical course of OM is characterised by early age of onset and high prevalence and long duration of severe disease. This is quite different from the clinical course described in most well-designed studies involving other children (where spontaneous resolution of disease is common). This high natural cure rate has meant that intervention studies are limited in their ability to detect sustained clinical improvement over time. For children at high risk of CSOM, we recommend interventions where there is strong evidence of short-term benefit even if the long-term benefits are less clear.

*by Kelvin Kong, Harvey Coates and Peter Morris*

The CRE_ICHEAR logo is an artwork by a Darwin-based Indigenous artist and past Menzies staff member, Norma Benger Chidanpee. The story depicts the dragonfly which the grandmothers use to test a baby's reaction to the wing vibrations.

A baby who cannot hear is given special care by the family.

There are two eardrums – one with a large perforation and multiple pneumococci and non-typeable *Haemophilus influenzae,* and one is a normal translucent drum and light reflection. The perforated ear is being treated in the traditional way with a wash made from the green tree-ant. The healthy drum is surrounded by a ring of natural and vaccine-induced antibodies which keep the middle ear healthy.

# INTERPRETING THESE GUIDELINES ± THE GRADE APPROACH

The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) system was developed in 2000 with the aim of establishing a common international grading system for the development of recommendations in systematic reviews and guidelines. It has become the most widely used clinical recommendation grading system in the world and has been adopted by prominent groups such as the World Health Organization, the Cochrane Collaboration and UpToDate.

The GRADE system consists of two components:

1. Rating the quality of evidence
2. Grading the recommendation

This edition of the 2020 OM Guidelines has utilised the GRADE approach (https://gdt.gradepro.org/app/handbook/handbook.html) [4]. GRADE is a transparent system for rating the quality of a body of evidence and subsequently grading recommendations. In addition to critically appraising evidence quality, the decision on the strength of a recommendation also considers other factors such as benefits and harms, the estimated effect size, the values and preferences of the patient population, cost, and health equity. Where GRADE was unable to be used due to a paucity of evidence, consensus recommendations have been provided. These replace 'Good Practice Points' in previous editions. Evidence from the 2010 Guidelines has been re-examined using the GRADE approach. New evidence derived from an explicit search of the medical literature has also been critically appraised using GRADE.

Each recommendation has been explicitly linked to the source of the original relevant evidence (type and level) and any evidence-based guidelines that have made the same recommendation. Two main information sources of information have been used: i) evidence-based clinical practice guidelines, evidence summaries and systematic reviews, and ii) high quality primary research on OM and hearing loss. Most of the recommendations were regarded as interventions and classified as strong or weak according to GRADE (see Box 3, below). Recommendations are also linked to any other available evidence-based clinical practice guidelines that addressed the same issue.

## Quality of evidence

*(https://gdt.gradepro.org/app/handbook/handbook.html#h.9rdbelsnu4iy)*

For every recommendation, a structured assessment of the quality of the supporting evidence has been made, following the GRADE evaluation system. The quality rating listed in the 2020 OM Guidelines reflects the overall quality of the evidence, firstly considering study design, where Randomised Control Trials (RCTs) start as high quality and observational studies as low quality. RCTs are then critically analysed.

Quality may be downgraded if there are:

- Limitations of study design and execution: incomplete blinding
- Inconsistency of results: unexplained heterogeneity
- Indirectness of evidence
- Imprecision: low sample size
- Publication bias

Low quality studies may be upgraded if:

- There is a large magnitude of effect
- All plausible confounding would reduce the demonstrated effect or increase the effect if no effect was observed
- There is a dose-response gradient

It was then decided by the guideline panel whether the flaws/benefits of a study warrant downgrading or upgrading the overall pool of evidence for that PICOT question/ intervention. This highlights that in the GRADE approach there is an element of judgement. It is not the reproducibility of a judgement or recommendation that is important, but being explicit in how recommendations are reached and the transparency of this to users. The evidence used to form recommendations, and the assessment of the quality of that evidence can be reviewed in the GRADE Summary of Findings (SoF) tables linked to the 2020 OM Guidelines and explained in the GRADE handbook. ***(https://gdt.gradepro.org/app/handbook/handbook.html#h.wlsfq2lmj0gb)***

## "What happens"

We used the "What happens" section of the Summary of Findings tables to provide a simple Population Intervention Comparison Outcome Time (PICOT) statement, including the use of 'is/ are', 'possibly is/are' and 'probably is/are' to reflect the quality or confidence in the effect (high, moderate, low or very low), for each intervention and for multiple outcomes. Where possible we added number needed to treat (NNT), number needed to harm (NNH).

For example:

- High confidence: In P treated with I compared to C there are fewer O at T.
- Moderate confidence: In P treated with I compared to C there are probably fewer O at T.
- Low or very low confidence: In P treated with I compared to C there are possibly fewer O at T.

## BOX 1 Definitions of large and very large effect

| Magnitude of Effect | Definition | Quality of Evidence |
|---|---|---|
| Large | RR* >2 or <0.5<br>(based on direct evidence, with no plausible confounders) | May increase 1 level |
| Very large | RR* >5 or <0.2<br>(based on direct evidence with no serious problems with risk of bias or precision, i.e. with (sufficiently narrow confidence intervals) | May increase 2 levels |

* Note: these rules apply when effect measure is expressed as relative risk (RR) or hazard ratio (HR). They cannot always be applied when the effect measure is expressed as odds ratio (OR). We suggest converting OR to RR and only then assessing the magnitude of an effect.

## BOX 2 Four categories of evidence quality

| Quality Grade | Definition |
|---|---|
| **High** | We are very confident that the true effect lies close to the estimate of the effect.<br>Further research is unlikely to change confidence in the estimate of effect. |
| **Moderate** | We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.<br>Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. |
| **Low** | Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.<br>Further research is very likely to have an important impact on the confidence in estimate of effect and is very likely to change the estimate. |
| **Very Low** | We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.<br>Any estimate of effect is very uncertain. |

## Strength of recommendations

*(https://gdt.gradepro.org/app/handbook/handbook.html#h.33qgws879zw)*

Each recommendation made in the 2020 OM Guidelines comes with an indicator of how strongly the recommendation is made. The strength given to each recommendation reflects the extent to which the authors are confident that desirable effects of an intervention outweigh undesirable effects, based on:

- The quality of the supporting evidence, that is the overall certainty of the evidence
- The magnitude of the estimated effect of following the recommendation on desirable and undesirable outcomes
- The balance between benefits and harms
- Consideration of values and preferences of patients and caregivers
- Costs and health equity
- The feasibility of the option

When the desirable effects of an intervention clearly outweigh the undesirable effects, or clearly do not, guideline panels offer strong recommendations. On the other hand, when the trade-offs are less certain—either because of low quality evidence or because evidence suggests that desirable and undesirable effects are closely balanced—weak recommendations become mandatory.

## BOX 3 Strength of recommendation grades and what they mean for different users of guidelines:

| | Strong Recommendation | Weak Recommendation |
|---|---|---|
| For patients | Most individuals in this situation would want the recommended course of action and only a small proportion would not. | The majority of individuals in this situation would want the suggested course of action, but many would not. |
| For clinicians | Most individuals should receive the recommended course of action. Adherence to this recommendation according to the guideline could be used as a quality criterion or performance indicator. Formal decision aids are not likely to be needed to help individuals make decisions consistent with their values and preferences. | Recognize that different choices will be appropriate for different patients, and that you must help each patient arrive at a management decision consistent with her or his values and preferences. Decision aids may well be useful helping individuals making decisions consistent with their values and preferences. Clinicians should expect to spend more time with patients when working towards a decision. |
| For policy makers | The recommendation can be adapted as policy in most situations including for the use as performance indicators. | Policy making will require substantial debates and involvement of many stakeholders. Policies are also more likely to vary between regions. Performance indicators would have to focus on the fact that adequate deliberation about the management options has taken place. |

Where GRADE was unable to be used due to a paucity of evidence, consensus recommendations (replacing Good Practice Point, 2010 edition) have been provided

For more information about GRADE, go to *http://www.gradeworkinggroup.org*

GRADE guidelines series [5]

# DEFINITIONS AND ABBREVIATIONS

## High Risk

**High-risk child:** High-risk child: Children at high risk include those living in remote communities; those less than 2 years of age and/or who have had their first episode of otitis media before 6 months of age; those with the following diagnosis or history - persistent OME, current bilateral AOMwoP or history of recurrent AOMwoP, have current AOMwiP or history of recurrent AOMwiP, or have current chronic suppurative otitis media (CSOM) or history of CSOM, with a family history of CSOM; children with craniofacial abnormalities, cleft palate, Down Syndrome, immunodeficiency or cochlear implants, with developmental delay, with hearing loss, with severe visual impairment.

**High-risk episode:** Children at high risk of AOM treatment failure include those under 2 years of age with bilateral acute otitis media (AOM), AND/OR children under 2 years of age with fever > 38.5oC.

**Population at high risk of CSOM:** In this document, children living in populations with a CSOM prevalence rate of greater than 4% are described as high-risk for CSOM. This will apply to most rural and remote Aboriginal communities where persistent disease and chronic perforation of the tympanic membrane are common. The World Health Organization has recommended that rates higher than 4% are unacceptable and represent a massive public health problem.

## Otitis Media Terms:

**Otitis Media (OM):** Refers to all forms of inflammation and infection of the middle ear. Active inflammation or infection is nearly always associated with a middle ear effusion (fluid in the middle ear space).

**Otitis Media with Effusion (OME):** Presence of fluid behind the tympanic membrane without any acute symptoms. Other terms have also been used to describe OME (including 'glue ear', 'serous otitis media' and 'secretory otitis media'). OME may be episodic or persistent. A type B tympanogram or reduced mobility of the tympanic membrane on pneumatic otoscopy are the most reliable indicators of OME.

**Episodic OME:** OM as defined above of duration less than three months.

**Persistent (Chronic) Otitis Media with Effusion (pOME):** Presence of fluid in the middle ear for more than 3 months without any acute symptoms or signs of inflammation.

**Acute Otitis Media (AOM):** General term for both acute otitis media without perforation and acute otitis media with perforation. It is defined as the presence of fluid behind the tympanic membrane plus at least one of the following: bulging tympanic membrane, red tympanic membrane, recent discharge of pus, fever, ear pain or irritability. A bulging tympanic membrane, recent discharge of pus, and ear pain are the most reliable indicators of AOM.

**Acute Otitis Media without Perforation (AOMwoP):** The presence of fluid behind the tympanic membrane plus at least one of the following: bulging tympanic membrane, red tympanic membrane, fever, ear pain or irritability. A bulging tympanic membrane and/or ear pain are the most reliable indicators of AOMwoP.

**Recurrent Acute Otitis Media (rAOM):** The occurrence of 3 or more episodes of AOM in a 6-month period, or occurrence of 4 or more episodes in the last 12 months.

**Acute Otitis Media with Perforation (AOMwiP):** Discharge of pus through a perforation (hole) in the tympanic membrane within the last 2 weeks. The perforation is usually very small (a pinhole) when the tympanic membrane first ruptures. The perforation can heal and re-perforate after the initial onset of AOMwiP. The size of the perforation should be recorded, as this directs management, and duration of discharge is often difficult to establish.

**Chronic Suppurative Otitis Media (CSOM):** Persistent ear discharge through a perforation (hole) in the tympanic membrane lasting 2 weeks or more and tympanic membrane perforation large enough to allow penetration of topical antibiotics into the middle ear space (generally > 2% of the pars tensa). The size of the perforation should be determined and recorded, as this directs management, and duration of discharge is often difficult to establish.

**Tympanostomy Tube Otorrhoea (TTO):** Middle ear discharge (otorrhoea) through tympanostomy tubes (or "grommets") in situ. TTO may be further classified as: Early post-operative – occurring within 4 weeks of TT insertion, delayed- occurring after 4 weeks of TT insertion, chronic- persisting 3 months or longer, recurrent- 3 or more discrete episodes.

**Dry Perforation (DP):** Presence of a perforation (hole) in the tympanic membrane without any signs of discharge or fluid behind the tympanic membrane. Some people also refer to this as inactive CSOM.

**Attic Perforation:** This is a perforation in the superior part of the tympanic membrane. A perforation in this location may be associated with a deep retraction pocket or cholesteatoma.

**Cholesteotoma:** Abnormal growth of skin cells in the middle ear, which continues to grow eventually causing erosion of surrounding structures (middle ear ossicles, facial nerve, base of skull), resulting in hearing loss, facial paralysis or intracranial complications.

**Otitis Externa:** Infection of the ear canal associated with pain, swelling and discharge. Other terms have also been used to describe otitis externa (including 'tropical ear' and 'swimmers' ear'). This is not a form of OM.

**Clinical risk factors for poor outcomes:** Persistent OME or CSOM, early age of AOM, current AOMwiP or history of recurrent AOMwiP, bilateral AOMwoP or history of recurrent AOMwoP.

## Surveillance, screening and diagnostic procedures:

**Surveillance for Otitis Media:** The systematic and ongoing collection, analysis and interpretation of measures of middle ear disease and hearing loss in order to identify and correct deviations from normal.

**Screening for Otitis Media:** Any measurement (completed at a single point in time) that aims to identify individuals who could potentially benefit from an intervention for OM. This may include the use of symptoms, signs, laboratory tests, or risk scores for the detection of existing or future middle ear disease.

**Otoscopy:** Looking in the ear with a bright light to identify features associated with outer or middle ear disease. This is sometimes referred to as 'simple otoscopy'.

**Pneumatic Otoscopy:** The combination of simple otoscopy with the observation of tympanic membrane movement when air is blown into the ear canal. Pneumatic otoscopy can determine mobility of the tympanic membrane. Reduced mobility of an intact tympanic membrane is a good indication of the presence of middle ear fluid.

**Video Otoscopy:** Observing the tympanic membrane via a small camera placed in the ear canal. The image is displayed on a screen. Video pneumatic otoscopy (including video images of tympanic membrane mobility) is also possible.

**Tympanometry:** An electro-acoustic measurement of the stiffness, mass and resistance of the middle ear (more simply described as mobility of the tympanic membrane). This test can be used to describe normal or abnormal middle ear function.

**Telemedicine:** The collection and/or exchange of information between doctors, allied health and patients by means of electronic systems such as telephone, email, internet and video conferencing. Telemedicine refers to the clinical services aspect of the broader umbrella term Telehealth.

**Insufflation:** Blowing air into the ear via the ear canal to determine the mobility of the tympanic membrane. This is done as part of pneumatic otoscopy.

## Surgical Terms:

**Mastoiditis:** Infection of the mastoid air cells of the mastoid bone (behind the middle ear).

**Myringotomy:** A surgical incision in the tympanic membrane to drain fluid.

**Tympanostomy Tube ('Grommet' or 'ventilation tube'):** A small tube surgically implanted in the tympanic membrane to re- establish ventilation to the middle ear'.

**Myringoplasty:** A surgical operation to repair a damaged tympanic membrane.

**Tympanocentesis:** The insertion of a needle through the tympanic membrane in order to aspirate fluid from the middle ear space.

**Tympanoplasty:** A surgical operation to correct damage to the middle ear and restore the integrity of the tympanic membrane and bones of the middle ear.

**Adenoidectomy:** A surgical operation to remove the adenoid tissue at the back of the nose (near the tonsils).

**Mastoidectomy:** A surgical operation to remove infected mastoid air cells in the mastoid bone.

## Audiological Terms:

**Hearing Loss (HL):** Any hearing threshold response outside the normal range that is detected by audiometry. It can be at any test frequency in either ear (normal = thresholds less than 20 dB).

**Conductive Hearing Loss (CHL):** Hearing loss that results from dysfunction of the outer or middle ear that interferes with the efficient transfer of sound to the inner ear. It is characterised by a loss in sound intensity.

**Sensorineural Hearing Loss:** Hearing loss that results from dysfunction in the inner ear (especially the cochlea). This is where sound vibrations are converted into neural signals. This type of hearing loss may also occur secondary to dysfunction of any part of the auditory nerve.

**Fluctuating Hearing Loss:** Hearing loss that changes significantly over time (thresholds vary by more than 5 dB). This results in inconsistent auditory input. CHL is often associated with fluctuations related to changes in the OM condition.

**Screening for Hearing Loss:** Any measurement (completed at a single point in time) that aims to identify individuals who require a more detailed diagnostic hearing assessment. This may include the use of risk factors, symptoms, signs, electro-acoustic tests or behavioural tests for the detection of existing or future hearing loss.

**Universal Neonatal Hearing Screening:** The use of objective audiometric tests to identify neonates who might have significant congenital hearing loss.

**Audiometry (Hearing Assessment):** The testing of a person's ability to hear various acoustic stimuli. A measure of hearing threshold for a range of pure-tone stimuli.

**Pure-tone Audiometry:** The assessment of hearing sensitivity for pure-tone stimuli in each ear. This is done using headphones (air conduction) or via a bone conductor (bone conduction). Testing is possible from around 6 months of age, using a range of developmentally-appropriate assessment techniques.

**Visual Reinforcement Orientation Audiometry (VROA):** A behavioural technique that enables assessment of hearing sensitivity in children from 6 months to 3 years of age. The child is conditioned to respond to stimuli delivered via earphones using pure tones, or via a speaker using warble tones. The latter does not allow the testing of each ear individually. Typically, a puppet in a lightbox is used to reinforce the child's behavioural response, e.g. a head turn.

**Play Audiometry:**
A cbehavioural technique that enables assessment of hearing sensitivity in children from 3 years of age. The child is conditioned to respond to pure tones delivered through earphones or warble tones delivered via a speaker using a play approach. For example, dropping a block in a box each time they hear a sound.

**Hearing Impairment Classification:**
A categorisation that describes the degree of disability associated with hearing loss in each ear or in the better ear. Hearing impairment classification applies a graded scale of mild, moderate, severe and profound. This is based on degree of deviation from normal threshold. It is typically calculated as a 3 or 4 frequency average (3FA or 4FA) of the threshold of hearing (in dB HL) at 500 Hertz (Hz), 1000 Hz and 2000 Hz (and 4000 Hz if calculating a 4FA). This classification is based on audiometry on the day of the test. However, hearing loss associated with OM can vary in severity over time and has a substantial effect upon hearing for frequencies outside those routinely tested. In addition, this does not account for the impact of early age of onset, language spoken, processing ability and environmental factors. Hence, average hearing levels based upon a single assessment could underestimate the degree of impairment.

**r Hearing Loss:** A device which amplifies sounds around the individual to overcome the loss of hearing sensitivity. Australian children and young adults under the age of 26 are eligible for subsidised hearing services under the Australian Government Hearing Services Program

**Decibel (dB):** A unit used to measure the intensity of a sound.

## BOX 4 Grades of hearing loss (HL) are defined for children*

| Grade | Corresponding audiometric ISO value (in the better ear) | Performance |
|---|---|---|
| None or slight | 20 dB or lower | No or very slight hearing problems. Able to hear whispers. |
| Mild | 21-31 dB | Not able to hear and repeat words spoken in normal voice at >1 metre. |
| Moderate* | 31-60 dB | Not able to hear and repeat words spoken in raised voice at >1 metre. |
| Severe | 61-80 dB | Not able to hear most words when shouted into better ear. |
| Profound | 81 dB or greater | Unable to hear or understand even a shouted voice. |

*Disabling hearing loss: refers to hearing loss greater than 40 dB in the better hearing ear in adults and greater than 30 dB in the better hearing ear in children

## BOX 5 Red flags for hearing-related developmental milestones in children (also refer to Section C)

| Simplified parental questionnaires can elicit a child's progress through the following hearing-related growth milestones | |
|---|---|
| 3-6 months | Not communicating by vocalising or eye gaze. Not starting to babble. |
| 9 months | Poor feeding or oral co-ordination. No gestures (pointing, showing, waving). No 2-part babble (e.g. gaga). |
| 12 months | Not babbling. No babbled phrases that sound like talking. |
| 20 months | Only pointing or using gestures (i.e. not speaking). No clear words. Cannot understand short requests. |
| 24 months | Using < 50words, not following simple requests. Not putting words together. Most of what is said is not easily understood. |
| 30 months | No two-word combinations. |
| 36 months | Speech difficult to understand. No simple sentences. |
| 48 months | Speech difficult to understand. Not following directions with 2 steps. |
| 60 months | Difficulty telling parent what is wrong. Cannot answer questions in a simple conversation. |

# Abbreviations

**AOM:** Acute otitis media

**AOMwiP:** AOM with perforation

**AOMwoP:** AOM without perforation

**CHL:** Conductive hearing loss

**CRE_ICHEAR:** Centre of Research Excellence in Ear and Hearing Health of Aboriginal and Torres Strait Islander Children (aka CRE in Indigenous Children's Healthy EARs)

**CSOM:** Chronic suppurative otitis media

**dB:** Decibel

**ENT:** Ear Nose and Throat

**GRADE:** The Grading of Recommendations, Assessment, Development and Evaluation

**Hz:** Hertz

**OM:** Otitis media

**OME:** Otitis media with effusion

**OMapp:** Otitis media app

**RCT:** Randomized Control Trial

**rAOM:** Recurrent acute otitis media

**PICOT:** Population Intervention Comparison Outcome Time

**SoF:** Summary of Findings

**TTO:** Tympanostomy tube otorrhoea

# PRACTICAL TREATMENT PLANS

*A summary of practical plans for the management of otitis media in Aboriginal and Torres Strait Islander children.*

## 1. Aerated Middle Ear

**(Normal)**

**Family Education:** Discuss the importance of ear assessments at routine health checks, even when their child is well.

1. Discuss importance of hearing, impact of hearing loss on language and developmental milestones.
2. Give hints on language stimulation and on monitoring listening behavior for signs of hearing loss.
3. Discuss the importance of going to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.

## 2. Episodic bilateral or unilateral OME

**Fluid in middle ear without symptoms.**

**Family Education:** Advise the family about the likely temporary hearing loss (usually around 20 dB) and the difficulty their child will have hearing speech, speech at a distance, and speech in background noise.

1. Discuss importance of hearing, impact of hearing loss on language and developmental milestones.
2. Give hints on language stimulation and on monitoring listening behavior for signs of hearing loss.
3. Discuss the importance of going to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.

**Medical:** Review monthly. Record date of each OM diagnosis. If OME persists for 3 months of more – see persistent OME.

## 3. Persistent bilateral or unilateral OME

**Fluid in the middle ear without any symptoms for greater than 3 months .**

**Family Education:** Advise the family about the likely hearing loss (usually around 20 dB) and the difficulty their child will have hearing speech, speech at a distance, and speech in background noise. Tell caregivers about the need for a hearing test. Treatment will be determined by the level of hearing loss in the better hearing ear.

- Discuss importance of hearing, impact of hearing loss on language and developmental milestones.
- Give hints on language stimulation and on monitoring listening behavior for signs of hearing loss.
- Discuss the importance of going to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.

**Medical:** Review monthly to monitor for resolution. Long term antibiotics may be appropriate for some children with risk factors for CSOM. Consider 2 to 4 weeks antibiotics (amoxycillin 50 mg/kg/day in two to three divided doses) if bilateral OME for 3 months.

**Surgical:** Refer for ENT assessment if OME persistent for 3 months or hearing loss of >20 dB in the better ear. If audiology is not available, assume hearing loss in children with persistent bilateral effusions. Surgery for persistent OME has potential benefits and risks. It is appropriate to have a higher threshold for ENT surgery for the child at increased risk of CSOM. Sometimes after parental discussion with ENT specialist, observation may be considered in place of surgery and this is a reasonable alternative.

Refer for ENT assessment if severe retraction of the tympanic membrane is present (i.e., retraction pocket or atelectasis).

**Autoinflation:** Nasal balloon inflation therapy has shown benefits for some children.

**Audiological:** Monitor listening behavior for signs of hearing loss. Refer for hearing assessment if OME persistent for 3 months. If hearing loss is >20 dB, ensure ongoing audiological, language and educational support. The school-aged child will benefit from classroom sound-field amplification. If hearing loss >30 dB, and ENT surgery delayed, also refer for hearing aid consult.

**Speech Pathology:** Consider referral for speech therapy in children with hearing loss and language delay.

## 4. AOM without perforation (AOMwoP)

**Bulging of the tympanic membrane with or without symptoms (e.g., ear pain), plus fluid in the middle ear.**

**Family Education:** Emphasise the need for adherence to antibiotics to prevent AOMwiP and CSOM particularly if the child is at high risk or has a high-risk episode. Advise the family about the likelihood of temporary hearing loss (usually around 20 dB) and the difficulty their child will have hearing speech, speech at a distance, and speech in background noise.

- Discuss importance of hearing, impact of hearing loss on language and developmental milestones.
- Give hints on language stimulation and on monitoring listening behavior for signs of hearing loss.
- Discuss the importance of going to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.

**Medical:** Adopt a watchful waiting strategy and treat with oral analgesics if the child is not at high risk and does not have a high-risk episode. If child meets criteria for high risk, treat with amoxycillin 50 mg/kg/day in two to three divided doses for 7 days. Tell caregivers to re-present if worse or no improvement in 2 to 3 days. Review all children after 4-7 days.

**If no clinical improvement:**

- For children initially managed symptomatically and who have not improved, start amoxycillin 50mg/kg/day in two to three divided doses for 7 days
- For children initially managed with standard dose amoxycillin and who have not improved, increase dose to 90mg/kg/day in two to three divided doses for 7 days
- For children initially managed with high dose amoxycillin and who have not improved, or who live in regions with known penicillin resistance, change to amoxycillin + clavulanic acid, 90 mg/kg/day amoxycillin component in two to three divided doses for 7 days. Augmentin Duo preparations (7:1 ratio amoxycillin:clavulanate) are appropriate.
- In children where adherence to antibiotics is likely to be poor or whose families do not have refrigeration, give a single dose of 30 mg/kg azithromycin; if not improved at day 7, give a second dose.
- Continue to review weekly and at 3 months after completion of treatment. See “Recurrent AOM” if 3 or more episodes in 6 months or 4 or more episodes in 12 months. See “Persistent OME” if effusions persist at 3 months.

## 5. AOM with perforation (AOMwiP)

**Discharge through a perforation of less than 2 weeks duration or through a very small (difficult to see) perforation (< 2%)**

**Family Education:** Emphasise the need for adherence to antibiotics to prevent CSOM. Emphasise the need to clean all discharging ears with tissue spears or washing (syringing) twice a day, including 'tragal pumping', and to take medications as prescribed to prevent CSOM. Advise the family about the likelihood of temporary hearing loss (usually at least 20 dB) and difficulty their child will have hearing speech, speech at a distance, and speech in background noise.

- Discuss importance of hearing, impact of hearing loss on language and developmental milestones.
- Give hints on language stimulation and on monitoring listening behavior for signs of hearing loss.
- Discuss the importance of going to the health centre if they have concerns about language development.

**Medical:**

- Give amoxycillin 50-90 mg/kg/day in two to three divided doses for at least 14 days or a single dose azithromycin 30 mg/kg if adherence difficult or no refrigeration. Continue for at least 3 days after ear becomes dry. Review at 7 days, or earlier if no better.
- If no clinical improvement, change to amoxycillin 90 mg/kg/day in two to three divided doses or second dose azithromycin or combination therapies amoxycillin + clavulanic acid (90 mg/kg/day amoxycillin component in two to three divided doses) for 7 days. Augmentin Duo preparations (7:1 ratio amoxycillin:clavulanate) are appropriate. Continue to review weekly.
- Record position and size of perforation as well as duration of dry perforation. Add ciprofloxacin (2 to 5 drops 2 to 4 times per day after dry mopping with tissues spears or syringing) if perforation becomes large enough (bigger than 2% pars tensa and readily seen).

See "CSOM" if discharge through a persistent and easily visible perforation (>2%) present for > 2 weeks despite appropriate treatment for AOM.

**Small**
**< 2%**

**Medium**
**2% to 30%**

**Large hole**
**> 30%**

**Subtotal**

## 6. Recurrent AOM (rAOM)

**Three or more episodes of AOM in the previous 6 months or four or more episodes in the last 12 months.**

**Family Education:** Emphasise the need to take medications as prescribed to prevent AOMwiP and CSOM. Advise the family about the likely temporary hearing loss (usually 20 dB) and the difficulty their child will have hearing speech, speech at a distance, and speech in background noise. Children who have had AOM are more likely to have further episodes. Record dates of each AOM episode.

- Discuss importance of hearing, impact of hearing loss on language and developmental milestones.
- Give hints on language stimulation and on monitoring listening behavior for signs of hearing loss.
- Discuss the importance of going to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.

**Medical:** Prophylactic antibiotics are not routinely recommended. Give prophylactic antibiotics (amoxycillin 50 mg/kg/day one time per day for 3-6 months) if child is <2 years old with rAOM, particularly if the child is at risk of AOMwiP or CSOM.

In children where adherence to antibiotics is likely to be poor or for families who do not have refrigeration, give a single dose of 30 mg/kg azithromycin. If not improved at day 7, give a second dose.

Probiotics (Lactobacillus rhamnosus GG) may reduce the incidence of acute otitis media. Other probiotics are not recommended.

**Surgical:** Refer for ENT assessment when rAOM fails to improve despite a trial of antibiotic prophylaxis

**Audiological:** Refer for a hearing test if child with rAOM also experiences persistent OME between AOM episodes. Monitor hearing impairment and delay in language development. If hearing loss >30 dB, and ENT surgery delayed, also refer for hearing aid consult.

## 7. Chronic Suppurative OM (CSOM)

**Persistent discharge through a visible tympanic membrane perforation (>2%) lasting at least 2 weeks or with a TM perforation large enough to allow drops to be pumped into the middle ear.**

**Family Education:** Advise the family about the likely hearing loss (usually >30 dB, which the World Health Organization define as disabling for children) and that their child may have difficulty hearing speech, even at close distances. Emphasise the need to adhere to twice daily ear cleaning with tissue spears or syringing, and to take medications as prescribed and that treatment may need to continue for a long time. Explain that only profuse discharge will be readily visible outside of the ear canal and that health staff need to assess the ear discharge regularly. Recognise that AOMwiP and CSOM are a continuum and that effective treatment of AOMwiP will reduce progression to CSOM. Assessing hearing is important.

- Discuss importance of hearing, impact of hearing loss on language and developmental milestones.
- Give hints on language stimulation and on monitoring listening behavior for signs of hearing loss.
- Discuss the importance of going to the health centre if the ear discharge gets worse or if they have concerns about language development.

**Medical:** Clean pus from the ear canal with dry mopping, syringing or suction. Record the position and size of perforation as well as duration of ear discharge.

**Small**
**< 2%**

**Medium**
**2% to 30%**

**Large hole**
**> 30%**

**Subtotal**

Instill ciprofloxacin eardrops 5 drops two times per day after cleaning and tragal pumping. Add amoxycillin 50 to 90 mg/kg/day in two to three divided doses if the perforation is not readily visible or smaller than a pinhole (< 2% TM surface area). Continue for at least 3 days after ear becomes dry.
Review weekly until discharge has resolved, and again 4 weeks after resolution of symptoms. Prolonged periods of the treatment may be necessary.

**Surgical:** Refer children with unilateral or bilateral CSOM for ENT assessment or at any time when families or others are concerned about a child's hearing or language development.

A**udiological:** Refer children with unilateral or bilateral CSOM for audiological assessment, or at any time when families or others are concerned about a child's hearing or language development. If hearing loss >30 dB, and ENT surgery delayed, also refer for hearing aid consult.

## 8. Tympanostomy Tube Otorrhoea (TTO)

**Middle ear discharge through TTs**

**Family Education:** Emphasise the need for adherence to medications. TTO is common, occurring at least once in approximately 50% of children with TTs (though rates vary widely). Most episodes are sporadic, brief and not usually painful. Advise water precautions if previously associated with TTO.

- Discuss importance of hearing, impact of hearing loss on language and developmental milestones.
- Give hints on language stimulation and on monitoring listening behavior for signs of hearing loss.
- Discuss the importance of going to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.

**Medical:** Clean pus from the ear canal with tissue spears or syringing at least twice daily. Instill ciprofloxacin eardrops 5 drops two times per day for one week, after cleaning and tragal pumping.

Review weekly until resolved and monthly after resolution.

**Surgical:** Refer to treating ENT specialist when continuous TTO for 4 weeks despite treatment, or intermittent TTO for 3 months.

## 9. Dry Perforation (DP)

**Perforation without discharge**

**Family Education:** Advise the family about the likely hearing loss (varies from normal if perforation small to >40 dB (disabling HL) if very large) and that their child may have difficulty hearing speech, even at close distances. Emphasise the need to re-examine the child in 3 months. Advise water precautions if previously associated with discharge.

- Discuss importance of hearing, impact of hearing loss on language and developmental milestones.
- Give hints on language stimulation and on monitoring listening behavior for signs of hearing loss.
- Discuss the importance of going to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.

**Small** **< 2%** | **Medium** **2% to 30%** | **Large hole** **> 30%** | **Subtotal**

**Medical:** Record position and size of perforation as well as duration of dry perforation.
**Surgical:** Refer for ENT assessment and consideration of myringoplasty if hearing loss >30 dB in the better ear.
**Audiological:** Refer for audiological assessment when there is concern about a child's hearing or language development. If hearing loss >30 dB in the better ear, and ENT surgery delayed, also refer for hearing aid consult.

## 10. Chronic Dry Perforation (cDP)

**Perforation without any signs of discharge for at least 3 months**

**Family Education:** Advise the family about the likely hearing loss (varies from normal if perforation small to >40 dB (disabling HL) if very large) and that their child may have difficulty hearing speech, even at close distances. Advise of the need for a hearing test. Treatment will be influenced by the level of hearing loss in the better hearing ear.

- Discuss importance of hearing, impact of hearing loss on language and developmental milestones.
- Give suggestions for language stimulation and for monitoring listening behavior for signs of hearing loss.
- Discuss the importance of going to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.

**Surgical:** Refer for ENT assessment and consideration of myringoplasty if hearing loss >30 dB in the better ear, or if there is concern about a child's hearing or language development.

**Audiological:** Refer for audiological assessment when there is concern about a child's hearing or language development. If hearing loss >30 dB in the better ear, and ENT surgery delayed, also refer for hearing aid consult.

# KEY MESSAGES
## FOR PRIMARY HEALTH CARE PROVIDERS

*Aboriginal and Torres Strait Islander health staff working with Aboriginal and Torres Strait Islander families are likely to have the greatest impact on reducing severe otitis media and assisting children with hearing loss.*

1. Let families know that hearing is important for learning culture and language, for learning English and for getting a job. Aboriginal and Torres Strait Islander children are at greatly increased risk of persistent and severe otitis media (OM) and poor hearing that can affect their whole lives.

2. Let families know that severe OM can be prevented with improved and less crowded living conditions, more hand and face washing, breast feeding, avoiding smoke exposure, and getting all vaccinations on time.

3. Let families know the importance of attending the local health clinic as soon as possible whenever a baby or child develops ear pain or ear discharge.

4. Let families know that they can ask for their child's ears to be checked, even when the child is well. Health care providers should use either pneumatic (video)otoscopy, or both (video) otoscopy and tympanometry whenever possible.

5. Antibiotics (amoxycillin) are recommended for all children with acute otitis media with perforation (AOMwiP), and for children with acute otitis media without perforation (AOMwoP) if they are at high risk of chronic suppurative otitis media (CSOM). Antibiotics and regular review should be continued until the bulging and/or discharge have resolved. If discharge persists and the perforation size is bigger than a pinhole, topical antibiotic drops need to be added.

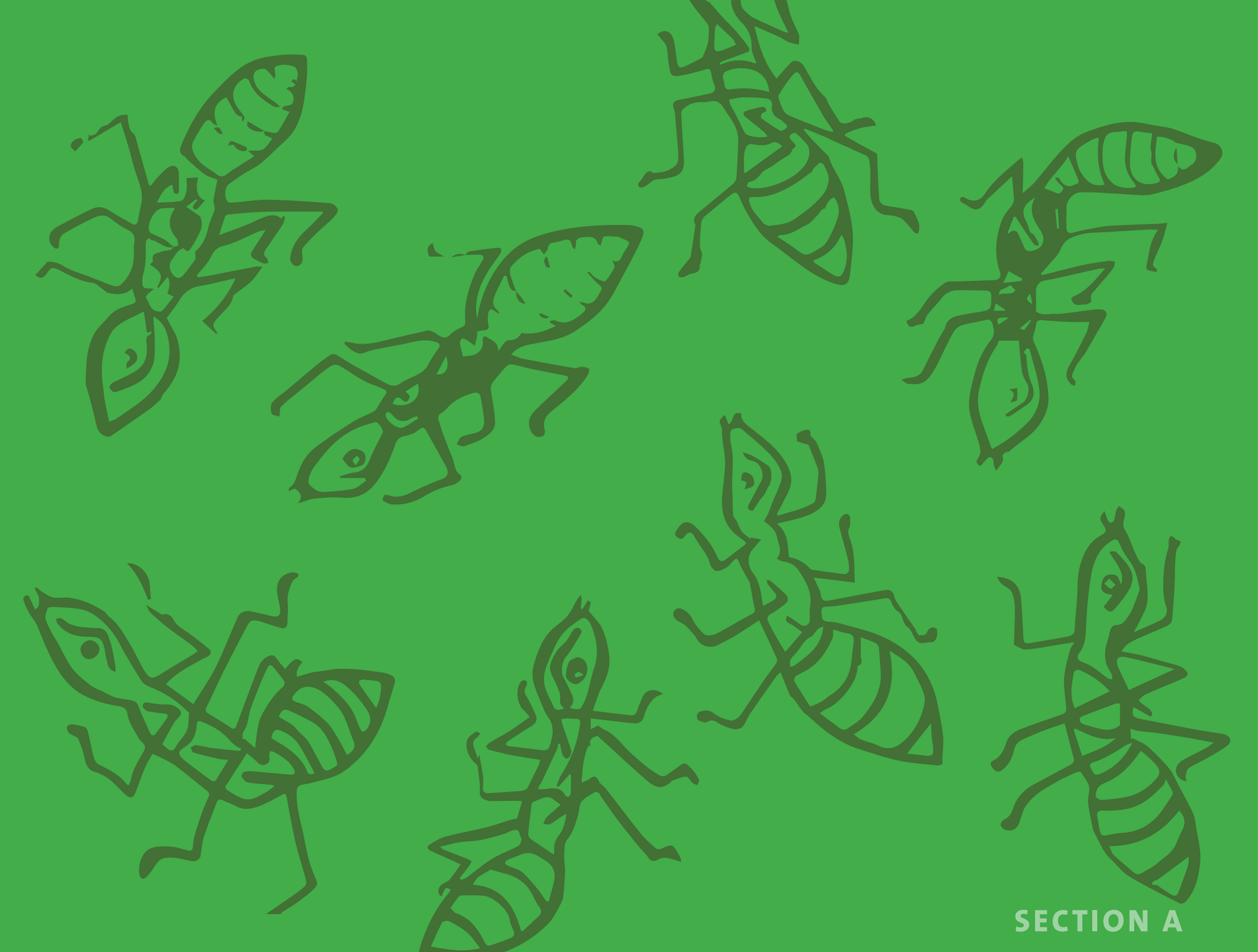
6. CSOM should be diagnosed in children who have persistent ear discharge for at least 2 weeks. Effective treatment of CSOM requires a long-term approach with regular dry mopping or syringing of ear discharge followed by the application of topical antibiotics. Children with CSOM should be referred for ENT consultation.

7. All children with persistent bilateral OM (all types) for greater than 3 months should have their hearing assessed, so that appropriate management and referrals can be planned.

8. Let families of children with disabling hearing loss (>30dB) know the benefits of improved communication strategies, and options for surgical procedures and hearing aids.

9. Let families know that all babies and young children learn to talk by hearing people. Babies and children with any type of OM may have problems with hearing and learning. Families can help by encouraging a lot of talking, storytelling, reading books and following their child's talking and stories.

10. Aim to provide patients or families with the knowledge to help manage their own health needs. Use communication techniques, language translation and resources that facilitate true understanding.



SECTION A

# **SECTION A:** PREVENTION OF OTITIS MEDIA AND HEARING LOSS

*Prevent the occurrence of otitis media, hearing loss and associated learning difficulties in Aboriginal and Torres Strait Islander children - primary, secondary and tertiary prevention*

| | |
|---|---|
| Primary prevention | avoids the development of a disease. Population-based health promotion activities are examples of primary preventive measures. |
| Secondary prevention | focuses on early disease detection, and implementation of interventions to prevent disease progression and emergence of symptoms. |
| Tertiary prevention | reduces the negative impact of an already established disease by restoring function and reducing disease-related complications |

Strategies listed below are some options families might like to consider. Each prevention strategy is only recommended based on the available evidence. Whether a family tries the strategy is dependent on the family's preferences.

## STRATEGY: Anticipatory guidance ± CONSENSUS recommendation

**Tell all expectant mothers about:**

- Importance of prevention, early detection and treatment of OM to prevent associated hearing loss, poor language and social skills, and educational disadvantage.
- Importance of neonatal screening.

Crowding and mixing with young children increase the spread of germs that cause early OM in babies.

## STRATEGY: Encourage Early Interventions

**Ensure that information about OM** and effective communication strategies for people with hearing loss are available throughout the community. (Section C)

**Tell the families/caregivers that:**

- Onset of OM in Aboriginalinfants may occur within the first weeks or months of life.
- The early onset of OM is associated with high risk of:
    - Persistent OME throughout early years
    - Recurrent AOMwoP and AOMwiP
    - CSOM
    - Hearing loss, language delay, learning difficulties and behaviour problems (See Section C)
- Children are at increased risk of AOM during other upper respiratory infections (runny nose).
- Some features of OM (such as ear pain) may be absent.
- Regular health centre attendance for ear examinations is recommended.
- All forms of OM are associated with some degree of hearing loss.
- Language stimulation is very important for normal language development (See Section C).

**Tell the families/caregivers to:**

- Attend the health centre as soon as possible whenever a child develops ear pain or discharge, particularly if the child is young.
- Request and assist ear examinations whenever their child attends their health centre (every ear of every child at every opportunity).

## STRATEGY: Vaccination

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Give pneumococcal conjugate vaccination** during infancy according to local immunisation schedule to reduce AOM, rAOM, and the need for surgery.<br>Pneumococcal conjugate vaccination is primarily given to prevent invasive pneumococcal disease. [6] | **STRONG** recommendation | SoF Table- 1 |
| | HIGH quality evidence<br>⊕⊕⊕⊕<br>Small effect | In children vaccinated with PCV compared to no PCV there is less **all cause AOM** (NNV ~63), less pneumococcal AOM (NNV ~111) and less vaccine serotype AOM (NNV ~143) at ~2 years follow-up. [6]<br>NNV ~63 to ~143 |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Small effect | In children vaccinated with PCV compared to no PCV there are probably fewer **tympanostomy tube surgeries** at 2 to 3.5 year follow-up. [6]<br>NNV ~167 |
| **Give influenza vaccination** according to local immunisation schedule.<br>Influenza vaccination is primarily given to prevent influenza illness. [7] | **STRONG** recommendation | SoF Table-2 |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Moderate effect | In children receiving seasonal influenza vaccine compared to placebo / no treatment there is probably less risk of **OM** (NNV ~19) and fewer courses of **antibiotics** during 6-18 months follow-up (NNV ~9). [7]<br>NNT ~9 to ~19 |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Moderate adverse events | In children receiving seasonal influenza vaccine compared to placebo / no treatment there are probably more **adverse events of fever.** [7]<br>NNH ~38 |

## STRATEGY: Encourage Breast Feeding

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Encourage mothers** to continue breast feeding for at least 6 months to reduce the risk of OM during first 2 years of life. [8] | **STRONG** recommendation | SoF Table-3 |
| | VERY LOW quality evidence<br>⊕○○○<br>No estimate of effect | In children exclusively breastfed for first 6 months of life compared nonexclusive breast feeding there are possibly **less AOM episodes** in first 2 years of life. [8]<br>NNT not evaluable |
| | VERY LOW quality evidence<br>⊕○○○<br>No estimate of effect | In children breastfed compared to other feeding or less breastfed there are possibly **less AOM episodes** in first 2 years of life. [8]<br>NNT not evaluable |
| If the child is bottle-fed, the upright position is recommended. | **CONSENSUS** recommendation | |

## STRATEGY: Encourage Personal Hygiene

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Keep sick children away from babies.**<br>Nasal discharge carries germs (viruses and bacteria) which are responsible for OM. | **CONSENSUS** recommendation | |
| **Frequent hand washing and drying** is recommended. [9]<br>• Children should wash and dry their hands after blowing their noses or coughing (into elbow).<br>• Children's faces and hands should be kept clean of nasal discharge.<br>**This is particularly important in crowded settings such as in day care centres or over-crowded households.** | **STRONG** recommendation | SoF Table-4 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children <3 years attending daycare centres with hygiene promotion programs compared to no intervention there are possibly fewer days with **ear ache** per person year at risk, and fewer **doctor visits** for AOM. [9]<br>Benefits are similar in children > 3 years.<br>NNT not evaluable |

## STRATEGY: Restrict Pacifier Use

| | | |
|---|---|---|
| **Tell families to restrict pacifier (dummy) use after 6 months of age** as it can increase the risk of OM. [10, 11] | **WEAK** recommendation | SoF Table-5 |
| | VERY LOW quality evidence<br>⊕◯◯◯<br>Large effect | In children who have restricted pacifier use compared to no pacifier use there are possibly **fewer with rAOM** at up to ~5 years follow-up. [10, 11]<br>NNT ~9 |

## STRATEGY: Discourage smoking

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Strongly discourage** people from smoking around children. [12, 13] | **STRONG** recommendation | SoF Table-6 |
| | VERY LOW quality evidence<br>⊕○○○ | In children exposed to household smoking or postnatal smoking compared to no household or no postnatal smoking there is possibly an **increased risk of OM or surgery for OM** during follow-up of 6 months to 10 years. [12]<br>NNH not evaluable |
| | VERY LOW quality evidence<br>⊕○○○ | In Australian Aboriginal children exposed to smoking compared to no smoking there is possibly an **increased risk of OM** (AOM, OME, tympanic membrane perforation) during 12 months. [13]<br>NNT not evaluable |
| Effective smoking cessation programs have not been reported in Australian Indigenous settings. [14] | LOW quality evidence<br>⊕⊕○○ | In Australian Aboriginal Children whose parents receive SHS intervention programs there is possibly no reduction in **new episodes of OM** during 12 months. [14]<br>NNT not evaluable<br>SoF Table-7 |

## STRATEGY: Probiotics (Lactobacillus GG)

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Probiotics (Lactobacillus rhamnosis GG)** may reduce the incidence of acute otitis media. [15-19]<br><br>Other probiotics are not recommended | **WEAK** recommendation | SoF Table-8 |
| | LOW quality evidence<br>⊕⊕◯◯<br><br>Moderate effect | In children receiving probiotics (LGG) compared to placebo there are possibly fewer **episodes of AOM** at 3-12 months follow-up. [17]<br><br>NNT ~17 |
| | LOW quality evidence<br>⊕⊕◯◯<br><br>Few adverse events | In children receiving probiotics compared to placebo there is possibly no difference in **adverse events** during 3-12 months follow-up. [16, 18, 19]<br><br>NNH Not evaluable. |

## STRATEGY: Vitamin D Supplementation

| | | |
|---|---|---|
| **Vitamin D supplementation** may be beneficial for otitis prone children during winter months or those with low vitamin D levels. [20] | **WEAK** recommendation | SoF Table-9 |
| | LOW quality evidence<br>⊕⊕◯◯<br><br>Large effect | In otitis prone children treated with vitamin D supplementation compared to placebo there is possibly a reduction in **episodes of AOM** (AOMwiP or AOMwoP) at 1-6 months follow up. [20]<br><br>NNT ~5 |
| | LOW quality evidence<br>⊕⊕◯◯<br><br>Few adverse events | In otitis prone children treated with vitamin D supplementation compared to placebo there is possibly no increase in on **adverse events.** [20]<br><br>NNH Not evaluable |

## STRATEGY: Xylitol

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Daily xylitol** (administered 3-5 times per day as syrup, gum or lozenge) may reduce otitis media episodes in non-otitis prone children whilst receiving Xylitol. [21] | **WEAK** recommendation | SoF Table-10 |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Medium effect | In children receiving xylitol compared to placebo there is probably a reduction in **AOM episodes during treatment.** [21]<br>NNT ~14 |
| | MODERATE quality evidence<br>⊕⊕⊕○ | In children receiving xylitol compared to placebo during respiratory infection or in otitis-prone children, there is probably no reduction in **AOM episodes during 3 weeks follow-up.** [21]<br>NNT Not evaluable |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Few adverse events | In children receiving xylitol compared to placebo there are probably no more **gastrointestinal-related adverse events** at ~3 months follow-up. [21]<br>NNH Not evaluable |

## STRATEGY: Zink Supplementation

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Zinc supplementation does not** prevent of otitis media. **Do not use [22]** | **STRONG** recommendation | SoF Table-11 |
| | MODERATE quality evidence<br>⊕⊕⊕◯ | In children receiving zinc supplements compared to placebo there is probably no reduction in **AOM or rAOM** during 4-6 months follow up. [22]<br><br>NNT Not Evaluable |
| | LOW quality evidence<br>⊕⊕◯◯<br><br>Few adverse events | In children treated with zinc supplements compared to placebo for prevention of AOM there are possibly more **adverse events** (vomiting) which have led to discontinuation of treatment. [22]<br><br>NNH ~167 |

## GRADE Working group grades of evidence

| Quality Grade | Definition |
|---|---|
| **High** | We are very confident that the true effect lies close to the estimate of the effect.<br>Further research is unlikely to change confidence in the estimate of effect. |
| **Moderate** | We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.<br>Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. |
| **Low** | Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.<br>Further research is very likely to have an important impact on the confidence in estimate of effect and is very likely to change the estimate. |
| **Very Low** | We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.<br>Any estimate of effect is very uncertain. |


SECTION B

# **SECTION B:** DIAGNOSIS, PROGNOSIS AND MANAGEMENT OF OTITIS MEDIA

*Facilitate early detection of otitis media and associated hearing, improve family understanding of the likely outcomes of illness and facilitate resolution or prevent progression of otitis media and hearing loss to minimise possible adverse effects.*

## Management of Persistent Otitis Media with Effusion (pOME) (Persistent OME for >3 months)

### **STRATEGY: Accurate Diagnosis of persistent otitis media with effusion –** *CONSENSUS recommendation*

- Accurate diagnosis of OM requires assessment of the appearance of tympanic membrane (TM) by otoscope (or video otoscope) plus compliance or mobility of the TM by pneumatic otoscopy or tympanometry.
- Otitis media with effusion (OME) should be diagnosed in children with evidence of middle ear effusion (MEE) behind an intact tympanic membrane, in the absence of signs and symptoms of acute inflammation.
- Check the medical records to determine duration of OME.

### **STRATEGY: Education for persistent otitis media with effusion –** *CONSENSUS recommendation*

**Tell the families/caregivers that:**

- If OME has persisted for 3 months, antibiotics, hearing assessment, speech and language development assistance and possibly surgery may be considered.
- Their child will likely have hearing loss (usually around 20 dB) and need a hearing test if chronic ear disease affects both ears. Treatment will be determined by the level of hearing loss in the better hearing ear.
- It is important to go to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.

See Section C language developmental milestones, detecting hearing loss and developmental delay, and hints on language stimulation.

## STRATEGY: Treatment – Antibiotics for persistent otitis media with effusion

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Antibiotics** for OME may reduce the duration of OME.<br>Give all children with persistent OME antibiotics. [23]]<br>**Amoxicillin 50mg/kg/day in two to three divided doses orally for 2-4 weeks.** | **WEAK** recommendation | SoF Table-12 |
| | LOW quality evidence<br>⊕⊕○○ | In children with bilateral OME treated with 2 to 4 weeks antibiotics compared to placebo / no treatment / unproven treatment there is possibly no improvement in **hearing** outcomes at 2-4 weeks. [23]<br>NNT Not evaluable |
| | LOW quality evidence<br>⊕⊕○○<br>Large benefit | In children with OME treated with antibiotics compared to placebo / no treatment / unproven treatment there is possibly more **resolution of OME** at 2-3 and at 6 months follow-up. [23]<br>NNT ~ 4 to 5 |
| | LOW quality evidence<br>⊕⊕○○ | In children with OME treated with antibiotics compared to placebo / no treatment / unproven treatment there is possibly no reduction in **TT insertion** within 3 to 6 months. [23]<br>NNT Not evaluable |
| | LOW quality evidence<br>⊕⊕○○<br>Modest adverse events | In children with OME treated with antibiotics compared to placebo / no treatment / unproven treatment there are possibly more **adverse events** at 2-8 weeks follow-up. [23]<br>NNH ~20 |

| | | |
|---|---|---|
| **Antibiotics** for OME are particularly recommended in:<br>• Children at risk of acute perforation<br>• Children living in populations with high risk of CSOM (prevalence >4%)<br>• Children with persistent OME at risk of hearing and language problems. [23]<br>**Amoxicillin 50mg/kg/day in two to three divided doses orally for 2-4 weeks.** | **STRONG** recommendation | SoF Table-12 |
| | LOW quality evidence<br>⊕⊕◯◯<br><br>Large benefit | In Aboriginal children with OME treated with antibiotics compared to placebo there is possibly a reduction in **tympanic membrane perforation** during therapy. [23]<br>NNT ~ 7 |

## STRATEGY: Surgical Management for persistent otitis media with effusion

**Tell parents/caregivers that surgical insertion of Tympanostomy tubes (TTs) (also called 'grommets or ventilation tubes') for persistent OME has:**

**Potential benefits:**

- TTs may provide modest hearing improvement for 3 to 9 months with benefits for speech and language development

**Potential risks:**

- Tympanostomy tube otorrhoea (pus discharging through grommets)
- Tube extrusion and repeat surgery
- Structural changes to the tympanic membrane including persistent perforations which may need surgical repair
- No difference to hearing in the long term

**Other options:** Sometimes after parental discussion with ENT specialist, observation may be considered in place of surgery and this is a reasonable alternative.

Note that suppurative complications of grommets are likely to occur much more commonly in populations at high risk of CSOM – it is appropriate to have a higher threshold for ENT surgery for these children.

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Tympanostomy tubes (TTs) insertion**<br>Refer the child with OME and at low risk of CSOM for tympanostomy tube insertion if:<br>• Child has persistent OME >= 3 months.<br>• Child has OME, hearing loss >30dB and/or speech and language delay. [24-26] | **STRONG** recommendation | SoF Table-13 |
| | MODERATE quality evidence<br>⊕⊕⊕◯ | In children with OME treated with TTs compared to no surgical intervention there is probably better **hearing** at 3 -9 months follow-up, and probably no difference in **hearing** at 12 months. [24, 26] |
| | MODERATE quality evidence<br>⊕⊕⊕◯ | In children with OME treated with TTs compared to no surgical intervention there is probably no improvement in **comprehensive or expressive language development** at 6-9 months. [26] |
| | LOW quality evidence<br>⊕⊕◯◯<br>Small benefit | In children with OME treated with TTs compared to no surgical intervention there is possibly **less time spent with effusion** at 12 months follow up. [26]<br>NNT not evaluable |
| | VERY LOW quality evidence<br>⊕◯◯◯<br>Variable adverse events | In children with OME treated with TTs compared to no surgical intervention there are widely varying rates of **adverse events** (TTO). [25, 26] |

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Tympanostomy tubes insertion**<br>Refer the child at high risk of CSOM for TTs insertion if<br>• Child has persistent bilateral OME >= 3 months and/or speech and language delay.<br>• Surgery is consistent with the parents' preferences.<br>Post-operative TTO may occur in >30% children. [25, 26] | VERY LOW quality evidence<br>⊕○○○ | In the Northern Territory, Aboriginal children with OME treated with TT compared to non-Aboriginal children, there is possibly no difference in rates of **TT otorrhoea** at 2 years. [25]<br>SoF Table-14 |
| **Adenoidectomy-alone** is not routinely recommended.<br>**Adenoidectomy-alone** in children >4 years of age is recommended if<br>• bilateral OME has occurred despite previous tympanostomy tube insertion<br>• the child is at high risk of CSOM. [29] | **WEAK** recommendation | SoF Table-14 |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Large benefit | In children >4 years with OME treated with adenoidectomy +/- TTs compared with no adenoidectomy (nonsurgical treatment or TTs alone) there is probably less **treatment failure** (classified as: ≥4 episodes of AOM per year, presence effusion for >50% of time (>6 months), need for additional surgery, hearing improvement <10 dB) at 12 months follow-up. [29]<br>NNT~6 |

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Adenoidectomy-alone** has not been shown to reduce treatment failure in children < 4 years of age. [29] | **STRONG** recommendation | SoF Table-14 |
| | MODERATE quality evidence<br>⊕⊕⊕○ | In children <4 years with OME treated with adenoidectomy +/- TT compared with no adenoidectomy (nonsurgical treatment or TT alone) there is probably no reduction in **treatment failure** at 12 months follow-up. [29]<br>NNT Not evaluable |
| | | Adverse events of surgery are few or have not been reported. |
| **Adenoidectomy as an adjunct to TTs** is recommended [27, 28] | **STRONG** recommendation | SoF Table-14 |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Large benefit | In children with **OME** treated with adenoidectomy plus TTs compared to TTs alone there is probably more resolution of OME at 6 and 12 months follow-up and less **repeat tympanostomy tube surgery** during 2 to 5 years follow-up. [27, 28]<br>NNT ~ 4 to 5 |

## STRATEGY: Audiology referral for persistent otitis media with effusion – *CONSENSUS recommendation*

OME of any duration is associated with hearing loss.

Refer children for audiology assessment when bilateral OME persists for 3 months or longer, or at any time if there is concern about a child's hearing or language development.

See Section C for language developmental milestones, detecting hearing loss and developmental delay, and hints on language stimulation.

Referral to ENT specialist and/or paediatrician can be made at the same time.

### STRATEGY: Speech therapy referral for persistent otitis media with effusion – *CONSENSUS recommendation*

Consider referral to Speech Pathology in children with hearing loss and language delay.

### STRATEGY: ENT referral for persistent otitis media with effusion – *CONSENSUS recommendation*

Consider referral to ENT services if **OME with bilateral hearing loss** (>20dB in better ear) has been present for 3 months.

If audiology services are not accessible, children with persistent bilateral effusions should be assumed to have hearing loss and be referred accordingly.

## STRATEGY: Treatment – Autoinflation for persistent otitis media with effusion

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Autoinflation devices** for rresolution of persistent OME during a period of observational management.<br>There is insufficient evidence to recommend autoinflation devices. There may be benefits for some children. [30, 31] | **WEAK** recommendation | SoF Table-15 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with OME who have autoinflation therapy compared to watchful waiting there is possibly no difference in **hearing** improvement (>10dB) during 3 weeks to 3 months follow-up. [30]<br>NNT Not Evaluable |
| | LOW quality evidence<br>⊕⊕◯◯<br>Modest benefit | In children with OME who have autoinflation therapy compared to watchful waiting there is possibly **tympanogram improvement** at up to 1 month and at 1-3 months follow-up. [30, 31]<br>NNT ~4 to 10 |
| | LOW quality evidence<br>⊕⊕◯◯<br>Modest benefit | In children with OME who have autoinflation therapy compared to watchful waiting there is possibly lower OMQ-14 **symptom score** indicating better QOL at 3 months follow-up. [31]<br>NNT Not evaluable |
| | LOW quality evidence<br>⊕⊕◯◯<br>Few adverse events | In children with OME who have autoinflation therapy compared to watchful waiting there are possibly no more **adverse events** (nosebleeds) at 3 months follow-up. [31]<br>NNH Not evaluable |

## STRATEGY: Treatment – Steroids (topical/oral/as adjunct to antibiotics) for persistent otitis media with effusion

| RECOMMENDATION | **Strength of Recommendation**<br>Grading of Evidence<br>Benefit | **WHAT HAPPENS**<br>**Link to evidence based table**<br>***'possibly'** infers limited confidence<br>****'probably'** infers moderate confidence |
|---|---|---|
| **Intranasal steroids** are not recommended for treating persistent OME. [32, 33] | **WEAK** recommendation | SoF Table-16 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with OME treated with intranasal steroids compared to placebo there is possibly no improvement in **hearing** outcomes at 9 months and no **resolution of OME** in short, medium or long term. [32, 33]<br>NNT Not evaluable |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Few adverse events | In children with OME treated with intranasal steroids compared to placebo there is probably no difference in **adverse events.** [33]<br>NNT Not evaluable |
| **Oral steroids** are not recommended for treating persistent OME. [32] | **WEAK** recommendation | SoF Table-17 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with OME treated with oral steroids compared to placebo there is possibly no difference in **hearing** improvement of > 10 dB at 6 weeks. [32]<br>NNT Not evaluable. |
| | MODERATE quality evidence<br>⊕⊕⊕◯ | In children with OME treated with oral steroids compared to placebo there is probably no increase in **OME resolution** at 2, 4 or 6 weeks. [32]<br>NNT Not evaluable |

| | | |
|---|---|---|
| **Oral steroids** in conjunction with antibiotics for OME are not generally recommended. [32] | **WEAK** recommendation | SoF Table-17 |
| | LOW quality evidence<br>⊕⊕◯◯<br><br>Modest benefit | In children with OME treated with antibiotics, adjunct oral steroids for up to 2 weeks compared to placebo there is possibly **improved resolution of OME** at 7 to 28 days. [32]<br>NNT ~4 |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Few adverse events | In children with OME treated with antibiotics, adjunct oral steroids compared to placebo there is probably no difference in **adverse events.** [32]<br><br>NNH Not evaluable. |

## STRATEGY: Treatment – Antihistamines for persistent otitis media with effusion

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| Antihistamines and/or decongestants should not be used in treating persistent OME. [34] | **STRONG** recommendation | SoF Table-19 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with OME treated with antihistamines and/or decongestants compared with placebo there is possibly no **hearing** improvement during 1 month follow-up or at one year. [34]<br>NNT Not evaluable |
| | MODERATE quality evidence<br>⊕⊕⊕◯ | In children with OME treated with antihistamines and/or decongestants compared with placebo there is probably no reduction in **persistent OME** at <1 to 12 months. [34]<br>NNT Not evaluable |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with OME treated with antihistamines and/or decongestants compared with placebo there is possibly no reduction in need for **surgical interventions.** [34]<br>NNT Not evaluable |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Modest adverse events | In children with OME treated with antihistamines and/or decongestants compared with placebo there are probably more **adverse events.** [34]<br>NNH ~9 |

# Management of Acute Otitis Media without Perforation (AOMwoP)

### STRATEGY: Accurate Diagnosis of AOM without perforation – *CONSENSUS recommendation*

- Accurate diagnosis of OM requires assessment of the appearance of tympanic membrane (TM) by otoscope (or video otoscope) plus compliance or mobility of the TM by pneumatic otoscopy or tympanometry.
- Acute otitis media (AOMwoP) should be diagnosed in children with evidence of middle ear fluid behind an intact tympanic membrane that is bulging, cloudy or distinctly red
- Check the medical records to make sure AOMwoP has not been diagnosed more than 3 times in 6 months or 4 times in 12 months (see recurrent AOM)

### STRATEGY: Education for AOM without perforation – *CONSENSUS recommendation*

**Where you think appropriate, tell parents/caregivers that:**

- AOM frequently resolves spontaneously in children at low risk of CSOM
- Their child is likely to have temporary hearing loss.
- Their child needs the medications as prescribed.
- Children can be asymptomatic with AOM, particularly those living in high-risk populations.
- AOM can occur in the first few weeks of life, particularly in high risk populations, when ear discharge may be the first sign [38-40]
- For children at increased risk of CSOM, adherence to antibiotics is important to prevent CSOM.
- It is important to go to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.
- Mastoiditis, meningitis and cerebral abscess are all recognised complications of AOM, but are uncommon in low- and high-risk children (<1% of OM cases) [35-37]

See Section C for language developmental milestones, detecting hearing loss and developmental delay, and hints on language stimulation.

## STRATEGY: Pain Relief for AOM without perforation

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Treat with oral analgesics** if ear pain is present. [41]<br>**Paracetamol 15mg/kg/dose 4-6 hourly (maximum 4 doses per 24 hours)** | **STRONG** recommendation | SoF Table-20 |
| | LOW quality evidence<br>⊕⊕◯◯<br>Large benefit | In children with AOM treated with paracetamol compared to placebo there is possibly less **pain** reported at 48 hours. [41]<br>NNT ~6 |
| | VERY LOW quality evidence<br>⊕◯◯◯<br>Few adverse events | In children with AOM treated with paracetamol compared to placebo there is possibly no difference in **adverse events.** [41]<br>NNH Not evaluable |
| Non-steroidal anti-inflammatory drugs (NSAIDs (alone are not recommended. [41]<br>**Ibuprofen 10mg/kg/dose 4-6 hourly (maximum 3 doses per 24 hours)** | **STRONG** recommendation | SoF Table-20 |
| | LOW quality evidence<br>⊕⊕◯◯<br>Large benefit | In children with AOM treated with NSAIDs compared to placebo there is possibly less **pain** reported at 48 hours. [41]<br>NNT ~6 |
| | VERY LOW quality evidence<br>⊕◯◯◯<br>Few adverse events | In children with AOM treated with NSAIDs compared to placebo there is possibly no difference in **adverse events** at 48 hours. [41]<br>NNH Not evaluable |

| | | |
|---|---|---|
| There is no additional benefit of adding an NSAID to Paracetamol. [41] | **STRONG** recommendation | SoF Table-21 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with AOM treated with NSAID and paracetamol compared with paracetamol alone, there is possibly no difference in **pain** reported at 24 hours. [41]<br>NNT Not evaluable. |
| | VERY LOW quality evidence<br>⊕◯◯◯<br>Few adverse events | In children with AOM treated with NSAIDs with or without paracetamol compared to paracetamol alone there is possibly no difference in **adverse events.** [41]<br>NNH Not evaluable |
| **Give topical analgesia** for immediate pain relief if there is severe pain [42]<br>Topical analgesia should only be used under direct medical supervision. Do not use when there is perforation of the TM or pus in the canal (suggesting unseen perforation)<br>**Lignocaine aqueous 2% 3 drops intra-aurally 2hrly PRN** | **WEAK** recommendation | SoF Table-22 |
| | LOW quality evidence<br>⊕⊕◯◯<br>Modest benefit | Children with AOMwoP who have local anaesthetic ear drops administered by a health professional compared to placebo possibly have a reduction in **pain score** by 50% at 10 minutes. [42]<br>NNT ~5. |

## STRATEGY: Immediate Antibiotics for AOM without perforation

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| Give antibiotics at diagnosis in children **at high risk of CSOM [37]** | **STRONG** recommendation | SoF Table-23 |
| **Amoxycillin 50mg/kg/day in two to three divided doses orally for 7 days** | MODERATE quality evidence<br>⊕⊕⊕○<br>Large benefit | In children with AOM treated with antibiotics compared to placebo there are probably fewer **tympanic membrane perforations** during 4 weeks follow-up. [37]<br>NNT ~33 |
| | HIGH quality evidence<br>⊕⊕⊕⊕<br>Modest adverse events | In children with AOM treated with antibiotics compared to placebo there are more **adverse events** during 4 weeks follow-up. [37]<br>NNH ~14 |
| Give antibiotics at diagnosis in children **at risk of clinical failure,** even if not at high risk of CSOM if: [43]<br>• **<2 years of age OR**<br>• **bilateral disease OR**<br>• **AOMwiP** | **STRONG** recommendation | SoF Table-23 |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Modest benefit | In children with AOM **<2 years** of age treated with antibiotics compared to placebo there are probably fewer **treatment failures** during 3-5 days follow-up. [43]<br>NNT ~7 |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Modest benefit | In children with **bilateral** AOM treated with antibiotics compared to placebo there is probably **fewer treatment failures** during 3-5 days follow-up. [43]<br>NNT ~5 |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Large benefit | In children with **AOMwiP** (otorrhoea) at diagnosis treated with antibiotics compared to placebo there is probably fewer **treatment failures** at 3-5 days follow-up. [43]<br>NNT ~3 |

| | | |
|---|---|---|
| Antibiotics are not generally recommended for children **not at risk of CSOM** or clinical failure [37, 43]<br>• > 2 years<br>• unilateral AOM | **STRONG** recommendation | SoF Table-23, SoF Table-24 |
| | HIGH quality evidence<br>⊕⊕⊕⊕ | In children with AOM treated with antibiotics compared to placebo there is no reduction in **pain** at 24 hours. [37]<br>NNT Not evaluable |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Modest benefit | In children with AOM treated with antibiotics compared to placebo there is probably a reduction in **pain** at 2-3 days (NNT ~7), **pain** at 4-7 days (NNT ~20), possibly also **pain** at 10-12 days (NNT ~7). [37]<br>NNT ~7 to ~20 |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Small benefit | In children **>2 years** with AOM treated with antibiotics compared to placebo there are probably **fewer treatment failures** at 3-7 days follow-up. [43]<br>NNT ~23 |
| | MODERATE quality evidence<br>⊕⊕⊕◯ | In children **>2 years** with **unilateral** AOM treated with antibiotics compared to placebo there is probably no less **treatment failure** at 3-5 days follow-up. [43]<br>NNT Not evaluable |
| | MODERATE quality evidence<br>⊕⊕⊕◯ | In children with AOM treated with antibiotics compared to placebo there is probably no difference in tympanometry findings and AOM recurrences during 3 to 6 months follow-up. [37]<br>NNT Not evaluable. |
| | HIGH quality evidence<br>⊕⊕⊕⊕<br>Modest adverse events | In children with AOM treated with antibiotics compared to placebo there are more **adverse events** during 4 weeks follow-up. [37]<br>NNH ~14 |

## STRATEGY: Treatment – Antibiotics for AOM without perforation – initial choice – duration and frequency / FIRST line

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **When using antibiotics, recommend amoxycillin. [44-46]**<br>**Amoxycillin 50mg/kg/day in two to three divided doses orally for 7 days.** | **STRONG** recommendation | SoF Table-25, SoF Table-26 |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Modest harm | In children with AOM treated with a shorter antibiotic course (3-5 days) compared to longer antibiotic course (7-10 days) there are probably more **treatment failures** at 1 month follow-up. [45, 46]<br>NNH ~ 8-12. |
| | LOW quality evidence<br>⊕⊕○○<br>Large benefit | In children with AOM treated with a shorter course (3-5 days) compared to longer course (7-10 days) of antibiotics there are possibly fewer **adverse events** at 1 month follow-up. [45, 46]<br>NNH ~31 |
| | LOW to MODERATE quality evidence<br>⊕⊕⊕○ | In children with AOM treated with BD compared to TDS Amoxicillin there is probably no difference in **cure rates** at 7-10 days (end of therapy) and no increased **AOM recurrence** rate at 3 months follow-up. [44]<br>NNT Not evaluable |

| | | |
|---|---|---|
| | **OR** | |
| **Azithromycin 30mg/kg/day single dose orally.**<br>Consider in children any age (Azithromycin 10-20 mg/kg/day single dose orally ~3 days recommended in eTGA for neonatal conjunctivitis, pertussis, mild pneumonia – i.e. OK for < 6 mo) where adherence to antibiotics is likely to be poor or whose families do not have refrigeration. [46-49]<br>If not improved on day 7 give a second dose. | **STRONG** recommendation | SoF Table-27 |
| | MODERATE quality evidence<br>⊕⊕⊕◯ | In children with AOM treated with single dose or 3-6 day courses of Azithromycin compared to 7-10 day courses of Amoxicillin+/-clavulanate, there is probably no reduction in **treatment failure** during 8-19 days or 1 month follow-up. [46-49]<br>NNT Not evaluable |
| | MODERATE quality evidence<br>⊕⊕⊕◯ | In Australian Aboriginal Children in remote communities with AOM treated with single dose Azithromycin compared to 7 days Amoxicillin there is probably no reduction in **treatment failure** at 6-11 days follow-up. [49]<br>NNT Not evaluable |
| | LOW quality evidence<br>⊕⊕◯◯<br>Modest benefit<br>Few adverse events | In children with AOM treated with Azithromycin compared to Amoxicillin+/-clavulanate there are possibly fewer gastrointestinal **adverse events** during 1 month follow-up. [46, 47, 49]<br>NNH ~14 |

| | | |
|---|---|---|
| **OR** | | |
| **Trimethoprim+ Sulfamethoxazole 4+20 mg/kg/ dose up to 160+800 mg orally, two times per day (BD) for 5 days.**<br>**For children with hypersensitivity to penicillin.** | **CONSENSUS** recommendation | eTG reference |

### STRATEGY: Treatment – Antibiotics – SECOND or THIRD line – *CONSENSUS recommendation*

- For children initially managed with standard dose amoxicillin and who have not improved, increase amoxicillin dose to 90mg/kg/day in two to three divided doses for 7 days.
- For children initially managed with high dose amoxicillin and who have not improved, or who live in regions with known penicillin resistance, change to amoxicillin with clavulanate* (amoxicillin component 90 mg/kg/day in two to three divided doses for 7 days. Augmentin Duo preparations (*7:1 ratio amoxicillin:clavulanate).

### STRATEGY: Review for AOM without perforation – *CONSENSUS recommendation*

- **Review all children with AOM** after 4-7 days or earlier if there is any deterioration.
- Escalate to second or third line therapy for children not responding to initial treatment.
- Review all children treated with antibiotics at the end of therapy.

### STRATEGY: Ongoing review for AOM without perforation – *CONSENSUS recommendation*

**Review all children 3 months after completion of treatment**

- Be aware that up to 50% of children will have persisting middle ear effusion at 1 month after an episode of AOM.
- See "Persistent OME" section for recommendations if effusions persist at 3 months.

## STRATEGY: Watchful Waiting for AOM without perforation

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Apply a 'Watch and Wait' strategy if:**<br>• Child is >2 years old<br>• Child is not in population at high risk of CSOM<br>• Child has no perforation<br>• Adequate follow-up in 48hrs can be assured. [37]<br>Give the family an antibiotic script that can be filled if the child does not improve within 24-48 hours.<br>This strategy is only in children who do not meet any of the criteria for immediate treatment | **WEAK** recommendation | SoF Table-28 |
| | LOW to MODERATE quality evidence<br>⊕⊕⊕◯ | In children with AOM treated with immediate antibiotics compared to watchful waiting there is probably no less **pain** at 3-7 days and possibly no less **pain** at 11-14 days. [37]<br>NNT Not evaluable. |
| | LOW to MODERATE quality evidence<br>⊕⊕⊕◯ | In children with AOM treated with immediate antibiotics compared to watchful waiting there is possibly no improvement in **tympanometry** findings, no fewer **AOM recurrences** and no reduction in **TM perforation.** [37]<br>NNT Not evaluable. |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Modest adverse events | In children with AOM treated with immediate antibiotics versus watchful waiting probably have more **adverse events** of vomiting, diarrhoea or rash at 7 to 40 days follow-up. [37]<br>NNH 9 |

## STRATEGY: Other Treatments for AOM without perforation – *CONSENSUS recommendation*

**Decongestants and antihistamines** are not recommended routinely.

**Alternative medical therapies** (insertion of oils, homeopathy etc.) are not recommended.

## STRATEGY: Audiology Referral for AOM without perforation – *CONSENSUS recommendation*

**Audiometry** is not recommended for episodic AOMwoP, however children at high risk with more than one episode should be referred for audiology.
See Section C for language developmental milestones, detecting hearing loss and developmental delay, and hints on language stimulation.

## GRADE Working group grades of evidence

| Quality Grade | Definition |
|---|---|
| **High** | We are very confident that the true effect lies close to the estimate of the effect.<br>Further research is unlikely to change confidence in the estimate of effect. |
| **Moderate** | We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.<br>Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. |
| **Low** | Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.<br>Further research is very likely to have an important impact on the confidence in estimate of effect and is very likely to change the estimate. |
| **Very Low** | We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.<br>Any estimate of effect is very uncertain. |

# Management of recurrent Acute Otitis Media (rAOM)
## (≥3 episodes of AOM within a 6 months period or ≥4 episodes within 12 months)

### **STRATEGY: Accurate diagnosis of recurrent AOM –** *CONSENSUS recommendation*

- Accurate diagnosis of OM requires assessment of the appearance of tympanic membrane (TM) by otoscope (or video otoscope) plus compliance or mobility of the TM by pneumatic otoscopy or tympanometry.
- Recurrent acute otitis media (rAOM) should be diagnosed in children who have documented AOMwoP and/or AOMwiP more than 3 times in 6 months or 4 times in 12 months (r AOM)

### **STRATEGY: Education for AOM –** *CONSENSUS recommendation*

**Tell parents/caregivers that:**

- Their child needs the medications as prescribed.
- Children who have had AOM are more likely to have further episodes.
- Their child will likely fluctuating have hearing loss.
- It is important to go to the health centre if their child develops ear discharge, pain, or if they have concerns about language development.

See Section C for language developmental milestones, detecting hearing loss and developmental delay, and hints on language stimulation.

## STRATEGY: Prophylaxis – Oral Antibiotics for recurrent AOM

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Consider treatment with long-term antibiotics** in children <2 years of age with rAOM and who are at risk of developing AOMwiP or CSOM. [50]<br>**Amoxycillin 25-50mg/kg/day in two divided doses for 6 months.** | **STRONG** recommendation | SoF Table-29 |
| Long-term antibiotics are otherwise not routinely recommended.<br>Long-term antibiotic treatment has been associated with increasing antibiotic resistance. | MODERATE quality evidence<br>⊕⊕⊕○<br>Large benefit | In children with rAOM treated with prophylactic antibiotics compared to placebo/no treatment there are probably fewer **children with any AOM or CSOM** during treatment at 2-24 months. [50]<br>NNT ~5 |
| | MODERATE quality evidence<br>⊕⊕⊕○ | In children with rAOM treated with prophylactic antibiotics compared to placebo/no treatment there are probably **fewer episodes of AOM or CSOM** during treatment [50]<br>Prevents ~1.5 episodes per year of treatment, per child. |
| | VERY LOW or LOW quality evidence<br>⊕○○○<br>Few adverse events | In children with rAOM treated with prophylactic antibiotics compared to placebo/no treatment there is possibly no increase in **adverse effects** or **antibiotic resistance** during 24 months follow-up. [50]<br>NNH Not evaluable. |

## STRATEGY: ENT Referral for recurrent AOM – *CONSENSUS recommendation*

- Refer to ENT for consideration of tympanostomy tubes +/- adenoidectomy when rAOM fails to improve despite a trial of antibiotic prophylaxis

## STRATEGY: Surgical Management

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Tympanostomy tubes** surgery for children with rAOM can be considered if:<br>• The child is from a high risk CSOM population<br>• Child with hearing loss and/ or speech and language difficulties.<br>• rAOM fails to improve on antibiotic prophylaxis (≥2 episodes in 6 months, ≥3 episodes in one year) [51-55] | **WEAK** recommendation | SoF Table-30 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with rAOM receiving TTs compared to no surgery there is possibly an improvement in **hearing** at 6 months, which is not sustained at 12 or 24 months follow-up. [51]<br>NNT not evaluable |
| | LOW quality evidence<br>⊕⊕◯◯<br>Large benefit | Children with rAOM receiving TTs compared to no surgery are possibly more likely to remain **free of otitis media** at 6-24 months follow-up. [52-55]<br>NNT ~4 |
| **Adenoidectomy** (with or without TTs) can be considered in children <2 year with rAOM [29] | **WEAK** recommendation | SoF Table-31 |
| | LOW quality evidence<br>⊕⊕◯◯<br>Large benefit | In children <2 years old with rAOM undergoing adenoidectomy (+/-TTs) compared to no surgery/ TTs alone, there are possibly fewer **treatment failures** (classified as: ≥4 episodes of AOM per year, presence effusion for >50% of time (>6 months), need for additional surgery, hearing improvement <10dB) at 12 months follow-up. [29]<br>NNT ~ 9 |

## STRATEGY: Audiology Referral for recurrent AOM – *CONSENSUS recommendation*

Some children with rAOM experience persistent OME between AOM episodes. Monitor for hearing impairment and delay in language development. If hearing loss >30dB, also refer for hearing aids. Audiometry is recommended for rAOM.

See Section C for language developmental milestones, detecting hearing loss and developmental delay, and hints on language stimulation.

## STRATEGY: Probiotics for prevention of rAOM

| **RECOMMENDATION** | **Strength of Recommendation**<br>Grading of Evidence<br>Benefit | **WHAT HAPPENS**<br>**Link to evidence based table**<br>***'possibly'** infers limited confidence<br>****'probably'** infers moderate confidence |
|---|---|---|
| Probiotics (Lactobacillus rhamnosus GG) may reduce the incidence of acute otitis media. [16-19]<br>Other probiotics are not recommended. | **WEAK** recommendation | SoF Table-8 |
| | LOW quality evidence<br>⊕⊕○○<br>Modest benefit | In children receiving probiotics (LGG) compared to placebo there are possibly fewer **episodes of AOM** at 3-12 months follow-up. [17]<br>NNT ~17 |
| | LOW quality evidence<br>⊕⊕○○<br>Few adverse events | In children receiving probiotics compared to placebo there is possibly no difference in **adverse events** during 3-12 months follow-up. [16, 18, 19]<br>NNH Not evaluable. |

# Management of Acute Otitis Media with Perforation (AOMwiP)

## STRATEGY: Accurate diagnosis of AOM with perforation – *CONSENSUS recommendation*

- Accurate diagnosis of OM requires assessment of the appearance of tympanic membrane (TM) by otoscope (or video otoscope) plus compliance or mobility of the TM by pneumatic otoscopy or tympanometry.
- Acute otitis media with perforation (AOMwiP) should be diagnosed in children with evidence of a recent (< 2 weeks) small (< 2% pars tensa) perforation of the tympanic membrane.
- Check medical records to make sure AOMwiP has not been diagnosed at least 3 times in 6 months or at least 4 times in 12 months (see recurrent AOM)
- Document the duration of ear discharge
- Document the size and position of the TM perforation (a drawing or photograph is best). This allows the assessment of progression of the disease over time and to guide the use of topical and systemic antibiotics. A video, photograph or drawing is the best way to record size of the U' perforation.
- Recognise that AOMwiP and CSOM exist on a continuum of pathology. [56-58]

Generally, any readily visible perforation is considered moderate to large.

**Small < 2%** | **Medium 2% to 30%** | **Large hole > 30%** | **Subtotal**

## STRATEGY: Education for AOM with perforation – *CONSENSUS recommendation*

**Show families/caregivers:**

- How to clean/dry mop the ears with correctly prepared tissue spears
- How to maximise effects of ear drops by 'tragal pumping'

**Tell the families/caregivers that:**

- Their child needs the medications as prescribed to prevent CSOM
- About the likelihood of temporary hearing loss
- It is important to go to the health centre if they have concerns about language development.

See Section C for language developmental milestones, detecting hearing loss and developmental delay, and hints on language stimulation.

### STRATEGY: Treatment – Oral antibiotics for AOM with perforation – *CONSENSUS recommendation*

- **Treat with longer course of antibiotics** (e.g. Amoxycillin 50-90mg/kg/day in two to three divided doses for 14 days). Continue for at least 3 days after ear becomes dry.
- **Treat with high dose antibiotics** (Amoxycillin 90mg/kg/day in two to three divided doses) or combination therapies (e.g. Amoxycillin-clavulanate) if AOM with perforation persists for >7 days.
- Treat with 2 weekly single doses of Azithromycin 30mg/kg/dose OR in children where adherence to antibiotics is likely to be poor or for families who do not have refrigeration, give a single dose of 30mg/kg/day azithromycin. If not improved at day 7, give a second dose.
- **Add ciprofloxacin ear drops** if perforation large enough (> 2% pars tensa), following ear cleaning with tissues spears. Clean the ear canal with dry mopping, syringing or suction.
- **Continue treatment** with high doses of antibiotics in all children with persistent signs of AOM (with or without persistent perforation).

### STRATEGY: Treatment – Adjunct topical antibiotics for AOM with – *CONSENSUS recommendation*

**Add ear cleaning plus topical** ciprofloxacin **antibiotics** in children with:

- Visible medium to large perforations and/or
- Persistent discharge (despite 7 days oral antibiotics) for more than 2 weeks.

### STRATEGY: Review for AOM with perforation – *CONSENSUS recommendation*

**Review weekly** until the signs of AOM have resolved. Also review within 4 weeks after resolution for children at high risk of CSOM.

**Commence management for CSOM** if persistent discharge through an easily visible perforation continues despite treatment (oral antibiotics should be ceased unless recommended by a specialist).

### STRATEGY: Audiology Referral for AOM with perforation – *CONSENSUS recommendation*

Audiometry is not recommended for episodic AOMwiP.

# Management of Chronic Suppurative Otitis Media (CSOM)
## (OM with persistent middle ear discharge and/or easily visible tympanic membrane perforation)

**STRATEGY: Accurate Diagnosis of CSOM –** *CONSENSUS recommendation*

- Accurate diagnosis of CSOM requires assessment of the appearance of tympanic membrane (TM) by otoscope (or video otoscope)
- CSOM should be diagnosed in children who have persistent ear discharge > 2 weeks and/or if tympanic membrane perforation can be visualised and size estimated to be adequate to allow topical treatments to pass through easily. An easily visible perforation is >2%.
- Recognise that AOMwiP and CSOM exist on a continuum of pathology. [56-58]
- Document size and position of perforations (a drawing or photograph is best) as well as duration of ear discharge.

**Small**
**< 2%**

**Medium**
**2% to 30%**

**Large hole**
**> 30%**

**Subtotal**

- If ear discharge through a perforated TM has been present for <2 weeks, treat according to the AOMwiP recommendations.
- AOMwiP is more common in children <18 months age. However, children as young as 6 months may have CSOM.
- Effective treatment of AOMwiP will dramatically reduce the incidence of progression to CSOM.
- Patients with an attic perforation or persistent crusting or granulation (above the malleus, in the top part of the TM) should be referred to an ENT surgeon immediately to exclude cholesteatoma.

## STRATEGY: Education for CSOM – *CONSENSUS recommendation*

**Show parents/caregivers:**

- How to clean/dry mop the ears with correctly prepared tissue spears
- How to maximise effects of ear drops by 'tragal pumping'

**Tell parents/caregivers that:**

- Antibiotic drops and cleaning may be required at least twice daily for months.
- Treatment adherence is important to reduce suppurative complications and long-term hearing loss.
- Only profuse discharge will be visible outside of the ear canal.
- Their child will likely have hearing loss (usually > 20dB) and need a hearing test if chronic ear disease affects both ears.
- It is important to go to provide their child support for speech and language development
- It is important to go to the health centre if the ear discharge gets worse or if they have concerns about language development

See Section C for language developmental milestones, detecting hearing loss and developmental delay, and hints on language stimulation.

## STRATEGY: Treatment – Cleaning and tragal pumping for CSOM – *CONSENSUS recommendation*

- Clean the ear canal by using twisted tissue paper (dry mopping) or syringing with dilute betadine (1:20). Syringing should be the initial treatment if the pus is thick or if the TM cannot be seen.
- Consider referral for suctioning under direct vision if cleaning and syringing have not been effective.
- Show families/caregivers how to do 'tragal pumping' (pressing several times on the flap of skin in front of the ear canal). This should be performed after the antibiotic drops are inserted into the ear canal. The topical antibiotic treatment will only work if it can be pushed through the perforation. [59]

## STRATEGY: Treatment – Topical Antibiotics for CSOM

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Treat with topical quinolone antibiotics - after cleaning** - until ear has been dry for at least 3 days.<br>This may require prolonged periods (weeks to months) of treatment. [60, 61]<br>**Ciprofloxacin 5 drops 2 times a day** | **STRONG** recommendation | SoF Table-33, SoF Table-34, SoF Table-35 |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Large benefit | In patients with CSOM treated with topical antibiotics compared to ear toilet alone there is possibly fewer patients with **persistent ear discharge** at 1 week follow-up. [60]<br>NNT ~2. |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Large benefit | In patients with CSOM treated with topical quinolone compared to topical antiseptic there are probably fewer patients with **persistent ear discharge** at 2-4 weeks follow-up. [60, 61]<br>NNT ~ 4 |
| | LOW quality evidence<br>⊕⊕○○ | and no difference in **tympanic membrane healing**<br>NNT not evaluable |
| | LOW quality evidence<br>⊕⊕○○ | In patients with CSOM treated with topical quinolone antibiotics compared to topical non-quinolone antibiotics there are possibly fewer patients with **persistent discharge** at 2 weeks follow-up. [60]<br>NNT ~8 |
| | LOW quality evidence<br>⊕⊕○○ | In remote Aboriginal children with CSOM treated with topical Ciprofloxacin compared to topical Framycetin-Gramicidin-Dexamethasone there is possibly no difference in **persistent discharge** at 6-8 weeks. [60]<br>NNT Not evaluable |

### STRATEGY: Medical Review for CSOM – *CONSENSUS recommendation*

**Review weekly** until the signs of CSOM have resolved, and again a further 4 weeks after resolution of symptoms.

### STRATEGY: Audiology Referral for CSOM – *CONSENSUS recommendation*

**Refer all children** with CSOM for audiological management at time of diagnosis.

See Section C for language developmental milestones, detecting hearing loss and developmental delay, and hints on language stimulation.

### STRATEGY: Speech Therapy Referral for CSOM – *CONSENSUS recommendation*

**Refer all children** with language, learning or behavioural problems for speech therapy at time of diagnosis.

### STRATEGY: ENT Referral for CSOM – *CONSENSUS recommendation*

**Refer all children with CSOM to an ENT specialist** at time of diagnosis.

The ENT specialist can confirm the diagnosis, exclude the possibility of a cholesteatoma, and consider the options of tympanoplasty and/or mastoidectomy.

Anyone with an attic perforation should be referred to an ENT surgeon immediately to exclude cholesteatoma.

**The GP or primary care giver should continue active management and follow-up whilst awaiting ENT review.**

## STRATEGY: Treatment – Systemic antibiotics for CSOM

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| Oral antibiotics alone are **not** recommended routinely for CSOM. [62] | **STRONG** recommendation | SoF Table-36 |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Large harm | In patients with CSOM treated with oral antibiotics-alone compared to topical antibiotics, there are probably more **treatment failures** at 1-2 weeks follow-up. [62]<br>NNH ~3 |
| Treat with **oral antibiotics as an adjunct to topical quinolones** for 6 to 12 weeks if failed topical treatment-alone. [63]<br>**Oral Trimethoprim/ Sulfamethoxazole dose (8 mg/kg/day - trimethoprim component - in two to three divided doses).** | **WEAK** recommendation | SoF Table-37 |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Large benefit | In children with CSOM treated with TMP-SMX as an adjunct to topical therapy compared to topical therapy alone there are probably fewer children with **persistent otorrhoea** at 6 weeks follow-up. [63]<br>NNT ~4 |
| If discharge persists after 3 months of treatment, consider referring for a course of 2-3 weeks of IV or IM antibiotics Antibiotic choice should be directed by discharge culture and sensitivity results, ceftazidime has been most thoroughly studied. | **STRONG** recommendation | In children with pseudomonal CSOM treated with ceftazidime compared to aztreonam there was possibly no difference in complete dryness at 8 days follow-up. [64] |

## STRATEGY: Topical steroids as an adjunct to topical antibiotics for CSOM

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| There is no added benefit in using drops with a steroid component. [65] | **STRONG** recommendation | SoF Table-38 |
| | LOW quality evidence<br>⊕⊕◯◯ | In patients with CSOM treated with topical quinolones + steroids compared to topical quinolone only there is possibly no difference in **clinical cure** at 15 days follow-up. [65]<br>NNT Not evaluable |

## STRATEGY: Swimming as treatment for CSOM

| | | |
|---|---|---|
| There is no benefit of swimming among Aboriginal children with CSOM. [66] | **WEAK** recommendation | SoF Table-39 |
| | LOW quality evidence<br>⊕⊕◯◯ | In remote Australian Aboriginal children with CSOM who swim daily compared to no swimming there is possibly no difference in ear discharge at 4 weeks follow-up. [66]<br>NNT Not evaluable |

## GRADE Working group grades of evidence

| Quality Grade | Definition |
|---|---|
| **High** | We are very confident that the true effect lies close to the estimate of the effect. Further research is unlikely to change confidence in the estimate of effect. |
| **Moderate** | We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.<br>Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. |
| **Low** | Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.<br>Further research is very likely to have an important impact on the confidence in estimate of effect and is very likely to change the estimate. |
| **Very Low** | We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.<br>Any estimate of effect is very uncertain. |

# Management of Dry Perforation
(Presence of a perforation in the tympanic membrane without any discharge)

### STRATEGY: Education for Dry Perforation – *CONSENSUS recommendation*

**Tell parents/caregivers that:**

- Children with dry perforations are at risk of developing CSOM.
- About the likely hearing loss and the need to organise a hearing test if chronic ear disease affects both ears.
- Treatment will be determined by the level of hearing loss in the better hearing ear.
- It is important to go to the health centre if ear discharge develops or if they have concerns about language development

See Section C for language developmental milestones, detecting hearing loss and developmental delay, and hints on language stimulation.

### STRATEGY: Audiology Referral for Dry Perforation – *CONSENSUS recommendation*

Refer to Audiology when a dry perforation persists for 3 months or more (or to monitor effects of any surgical interventions).

### STRATEGY: Speech Therapy Referral for Dry Perforation – *CONSENSUS recommendation*

Refer all the children with language, learning or behavioural problems for speech therapy.

### STRATEGY: ENT Referral for Dry Perforation – *CONSENSUS recommendation*

**Refer to an ENT specialist:**

- all children >6 years with a dry perforation persisting for >6-12 months
- children with significant conductive hearing loss (>20dB) or recurrent infections

**Tell teenagers and adults** with persistent dry perforation about possible tympanoplasty and potential restoration of hearing after this operation. Add somewhere about crusting and granulation.

# Management of Tympanostomy Tube Otorrhoea (TTO)
## (Presence of discharge through tympanostomy tubes in situ)

**STRATEGY: Education –** *CONSENSUS recommendation*

**Tell parents/caregivers that:**

- TTO is common, occurring at least once in approximately 50% of children with TTs (though rates vary widely) [67-70]
- TTs usually stay in place for 10-18 months and fall out of their own accord, though some need to be removed. [71]
- It is important to attend follow-up visits with the ENT or GP [28]
- It is important to go to the health centre if their child develops ear discharge, even if the child seems well and doesn't have pain.

## STRATEGY: Prevention of TTO – at time of TTs surgery and/or post TT surgery

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Single dose topical antibiotics or saline washout** are recommended as prophylaxis of TTO at time of tympanostomy tube insertion. [72] | **WEAK** recommendation | SoF Table-40, SoF Table-41 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children undergoing TTs surgery antiseptic irrigation at time of surgery compared to no treatment there is possibly no reduction in **TTO** at 1 week follow-up. [72]<br>NNT Not evaluable |
| | | In children undergoing TTs surgery, saline irrigation at time of surgery compared to 5-days post-surgery treatment with topical Ofloxacin there is possibly no difference in **TTO** at 2 weeks follow-up. [72]<br>NNT Not evaluable |
| **Prolonged topical antibiotics** are recommended as prophylaxis for children at risk of TTO. [72] | **WEAK** recommendation | SoF Table-42 |
| | VERY LOW or LOW quality evidence<br>⊕◯◯◯ | In children with TTs treated with single dose Ciprofloxacin compared to Ciprofloxacin for 5 days post-surgery there is no difference in **TTO** at 2 weeks follow-up. [72]<br>NNT Not evaluable |

## STRATEGY: Treatment – Cleaning for TTO – *CONSENSUS recommendation*

- Clean the ear canal by using twisted tissue paper (dry mopping) or syringing with dilute betadine (1:20). Syringing should be the initial treatment if the pus is thick or if the TTs cannot be seen. Cleaning must be followed with antibiotic drops in order to reduce the production of more pus.
- Keep ear dry during acute episode of tympanostomy tube otorrhoea.
- Consider referral for suctioning under direct vision if cleaning and syringing have not been effective.
- Culture the discharge if it is persistent despite treatment.

## STRATEGY: Treatment – Topical Antibiotics for TTO

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| **Treat with topical antibiotics - after cleaning - in** uncomplicated cases.<br>Uncomplicated cases:<br>• No systemic involvement<br>• No external ear cellulitis<br>• Less than 4 weeks otorrhoea [73]<br>**Ciprofloxacin 5 drops 2 times a day for 7 days.** | **STRONG** recommendation | SoF Table-43, SoF Table-44 |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Large benefit | In children with TTO treated with topical antibiotic+/-steroid eardrops compared to no treatment there are probably fewer children with ear discharge at 2 weeks follow-up (NNT ~2) and fewer children with persistent ear discharge at >4weeks follow-up (NNT ~7). [73]<br>NNT 2 to 7 |
| | MODERATE quality evidence<br>⊕⊕⊕○<br>Large benefit | In children with TTO treated with topical Ciprofloxacin compared to saline rinsing there are probably fewer children with ear discharge at 1 week follow-up. [73]<br>NNT ~3 |

| | | |
|---|---|---|
| Topical antibiotic/steroid formulations have no added benefit in uncomplicated cases. | **STRONG** recommendation | SoF Table-45 |
| | LOW quality evidence<br>⊕⊕◯◯<br><br>Large benefit | In children with TTO treated with topical antibiotic and steroid eardrops compared to topical antibiotic eardrops alone there is possibly more resolution of ear discharge at <2 weeks. [73]<br><br>NNT ~7 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with TTO treated with topical antibiotic and steroid eardrops compared to topical antibiotic eardrops alone there is possibly no difference in resolution of ear discharge at 2-4 weeks follow-up. [73]<br><br>NNT not evaluable |
| | LOW quality evidence<br>⊕⊕◯◯<br><br>Few adverse events | In children with TTO treated with topical antibiotic and steroid eardrops compared to topical antibiotic eardrops alone there is possibly no difference in adverse events during 4 weeks follow-up. [73]<br><br>NNH Not evaluable |
| In complicated cases (bleeding suggests the presence of a polyp and inflammation) treat with antibiotic/steroid formulations.<br><br>Ciprofloxacin and hydrocortisone (Cipro HC) drops, 5 drops two times a day for 7 days. | **CONSENSUS** recommendation | |

### STRATEGY: Tragal pumping – *CONSENSUS recommendation*

Show families/caregivers how to do 'tragal pumping' (pressing several times on the flap of skin in front of the ear canal). This should be performed after the antibiotics drops are inserted into the ear canal. The topical antibiotic treatment will only work if it can be pushed through the tympanostomy tube. [59]

### STRATEGY: ENT Referral – persistent TTO – *CONSENSUS recommendation*

Discuss urgently with the treating ENT Specialist:

- Children with **continuous** TTO for **4 weeks** that has not responded to treatment
- Children with **intermittent or recurrent** TTO for **3 months**

### STRATEGY: Treatment – Oral Antibiotics as adjunct to topical antibiotics for TTO – *CONSENSUS recommendation*

Treat with oral antibiotics in addition to topical therapy for complicated cases.

Complicated cases:

- Fever >38.5 or systemic illness
- Cellulitis beyond the external auditory canal
- Continuous discharge for > 4 weeks

**Amoxicillin with clavulanate* (Amoxicillin component 90mg/kg/day) in two to three divided doses for 7 days.**

**(*7:1 ratio amoxicillin:clavulanate)**

Fever or cellulitis systemic antibiotics that provide Gram-negative cover (seek advice of an infectious diseases specialist) and urgent ENT referral are recommended (consensus recommendation).

## STRATEGY: Water precautions to prevent TTO – *CONSENSUS recommendation*

| **RECOMMENDATION** | **Strength of Recommendation**<br>Grading of Evidence<br>Benefit | **WHAT HAPPENS**<br>**Link to evidence based table**<br>***'possibly'** infers limited confidence<br>****'probably'** infers moderate confidence |
|---|---|---|
| Water precautions to avoid water ingress is not recommended routinely, unless the child has experienced an episode of TTO with water exposure. [74] | **WEAK** recommendation | SoF Table-46, SoF Table-47 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with TTO who wear ear plugs compared to no ear plugs when swimming or bathing there are possibly fewer **episodes of otorrhoea** at 1 year follow-up. [74]<br>NNT Not evaluable |
| | VERY LOW quality evidence<br>⊕◯◯◯ | In children with TTs advised to avoid swimming and head submersion during bathing compared to unrestricted swimming or head submersion during bathing there are possibly no fewer **episodes of otorrhoea** at 1 year follow-up. [74]<br>NNT Not evaluable |

## STRATEGY: Treatment – Oral Antibiotics for TTO

| RECOMMENDATION | Strength of Recommendation<br>Grading of Evidence<br>Benefit | WHAT HAPPENS<br>Link to evidence based table<br>*'possibly' infers limited confidence<br>**'probably' infers moderate confidence |
|---|---|---|
| Oral antibiotics alone are **not** generally recommended [73] | **STRONG** recommendation | |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Large benefit | In children with TTO treated with Amoxicillin and clavulanate compared with placebo there is probably more **resolution of ear discharge** at <2 weeks follow-up. [73]<br>NNT 3<br>SoF Table-48 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with TTO treated with Amoxicillin compared to saline rinsing or oral placebo there is possibly no difference in **resolution of ear discharge** at 1 week follow-up. [73]<br>NNT Not evaluable<br>SoF Table-49 |
| | MODERATE quality evidence<br>⊕⊕⊕◯<br>Large benefit | In children with TTO treated with Ciprofloxacin compared to Amoxicillin there is probably more **resolution of ear discharge** at one week follow-up. [73]<br>NNT ~3<br>SoF Table-50 |

## STRATEGY: Treatment – Oral corticosteroids for TTO

| | | |
|---|---|---|
| Oral steroids are not recommended for TTO. [73] | **STRONG** recommendation | SoF Table-51 |
| | LOW quality evidence<br>⊕⊕◯◯ | In children with TTO treated with Prednisolone compared to placebo there is possibly no difference in **resolution of ear discharge** at 2 weeks follow-up. [73]<br>NNT Not evaluable |

SECTION C

# **SECTION C:** AUDIOLOGICAL ASSESSMENT AND MANAGEMENT

*Enhance hearing, communication and access to relevant information*

## Topic 1: Preventing hearing loss and its impacts on listening and communication skills

| STRATEGY | GUIDANCE |
|---|---|
| **Background information for health staff** | **Early and unremediated hearing loss is linked with:**<br>• Decreased language skills (auditory temporal abilities [75-78], first and subsequent language acquisition)<br>• Lower achievement at school, poorer reading skills in primary school [79]<br>• Lower IQ in later childhood in children already at risk of poor cognitive development [80]<br>• Reduced attention span [81]<br>• Speech and language disorders [82, 83]<br>• Anxiety, depression and attention problems later in life [84]<br>• Higher unemployment [85]<br>• More difficulties with social relationships [85]<br>• Hearing loss that continues in adulthood [86, 87]<br>• Increased rates of incarceration [88] |
| **FAMILY EDUCATION** | **Why is it important to hear well?**<br>Tell families/caregivers that:<br>• All children with ear trouble will have some level of hearing loss. [89]<br>• When children with significant hearing loss are not helped to hear well promptly, their learning of listening, language and communication skills may be held back.<br>• These skills are important for making friends, getting along with others, learning at school, and later, getting a job. They are equally important for learning language, culture and traditions, and taking part in family and community life. [90]<br><br>**How can family keep language and communication skills developing?**<br>Tell families/caregivers that:<br>• It's important to pick up hearing loss early and take steps to make sure babies and young children hear well.<br>• If ear trouble persists for more than three months, it's time to get a hearing test.<br>• The first four years of life are the most important for learning language and communication skills. It is especially important that children hear well at this time.<br>• Family are the most important teachers of language and communication skills. These are some important things families and caregivers can do to help babies and children learn listening, language and communication skills well [91, 92]:<br>• Talking with babies and children as much as possible every day: tell stories, sing, and read or talk about books together<br>• Playing listening games<br>• When doing these things, turn down background noise or go somewhere quiet and make sure children can see your face<br>• When recommended, wear hearing aids every day, so that children can hear easily. |

## Topic 1: Identifying hearing loss early

| STRATEGY | GUIDANCE |
|---|---|
| **Background information for health staff** | • In general, the more severe the Otitis Media, the greater the level of hearing loss it causes. For example, both CSOM and OME cause hearing loss, but the average hearing loss caused by CSOM is greater [89]<br>• Family, early childhood teachers and health practitioners all play a role in detecting hearing loss in very young children. When parents/caregivers themselves have hearing loss, it can be more difficult to recognise the signs of hearing loss in their children [93]. Signs of hearing loss can be mistaken for 'normal naughtiness'. [90]<br>• Age-appropriate listening behaviour is a reliable indicator of hearing ability. When parents and caregivers understand the specific listening behaviours to look for, they are enabled to become experts on their child's hearing ability.<br>• The PEACH (Parent Evaluation of Aural/Oral Performance of Children) is one useful, validated parent checklist scale for evaluating listening behaviour in very young children [94]<br>• Other useful questions to ask parents can be found in the Audiology Australia COMHeLP [95] |

| STRATEGY | GUIDANCE |
|---|---|
| **Listening behaviours and warning signs to ask parents about** | **Ask families/caregivers whether, *most of the time*, their child:**<br><br>**Birth – 3 months**<br>• Startles at loud sounds.<br>• Quietens or smiles when you talk.<br>• Quietens at your voice if crying.<br>**4 – 6 months**<br>• Moves their eyes toward sounds.<br>• Notices toys that make sounds.<br>• Pays attention to music.<br>**7 months – 1 year**<br>• Turns to look at sounds.<br>• Understands common words: cup, juice, Daddy.<br>• Responds to: 'No' 'Want more?'<br>• Plays games like peek-a-boo<br>• Listens to stories for a short time.<br>**1 – 2 years**<br>• Points to some body parts when you ask.<br>• Follows 1-part directions, like 'Roll the ball' or 'Kiss the baby.'<br>• Responds to simple questions: 'Who's that?' or 'Where's your shoe?'<br>• Listens to simple stories, song & rhymes.<br>• Points to pictures in a book when you name them.<br>**2 – 3 years**<br>• Understands opposites, like go–stop, big–little, and up–down.<br>• Follows 2-part directions, like "Get the spoon and put it on the table."<br>• Understands new words quickly.<br>**3 – 4 years**<br>• Responds when you call from another room.<br>• Understands words for some colours, like red, blue, and green.<br>• Understands words for some shapes, like circle and square.<br>Understands words for family, like brother, Nanna, and Aunty<br>**4 – 5 years**<br>• Understands words about order, like first, next, and last.<br>• Understands words for time, like yesterday, today, and tomorrow.<br>• Follows longer directions: 'Brush your teeth, put your shoes on, and get your bag.'<br>• Hears and understands most of what she hears at home and in school.<br><br>Adapted from ASHA 'How Does Your Child Hear and Talk?' https://www.asha.org/public/speech/development/chart/ |
| | Warning signs which should prompt immediate referral for audiology, speech pathology and paediatric assessment [96, 97]:<br>• 3-6 months: not communicating by vocalising or eye gaze<br>• 9 months: poor feeding or oral coordination<br>• 12 months: not babbling<br>• 20 months: only pointing or using gestures (i.e. not speaking)<br>• 24 months: using <20 words, not following simple requests<br>• 30 months: no two-word combinations |

| STRATEGY | GUIDANCE |
|---|---|
| **Screening and surveillance: what is recommended** | **Hearing loss at birth**<br>Universal Newborn Hearing Screening is recommended. Newborn hearing screening aims to provide early detection of significant, permanent hearing loss.<br>Families and staff should be aware that a 'Pass' on a neonatal hearing screen does not rule out a mild hearing loss or guarantee that the child's hearing will remain normal. [85]<br>Always ensure that a 'refer' on newborn hearing screening is followed up, and, should hearing loss be diagnosed, families are supported to connect with the hearing services they are referred to.<br>**Hearing health surveillance**<br>Regular OM surveillance from birth upwards would be preferred to pre-school or school entry screening, which occurs after the critical age for intervention for hearing loss.<br>While screening activities are often disconnected from routine primary health care and parent/carer involvement, surveillance is a continuous process carried out by primary health professionals that can involve screening of hearing but is broader in its scope. It considers parent/carer input, the context and history of the child, and links to advice, information giving and care. [98]<br>Surveillance can be undertaken at childhood immunisation visits, at well-baby and child health checks, and opportunistically at other clinical interactions.<br>Children with recurrent, persistent and chronic OM conditions should be placed on a review register. These children should be managed according to their OM diagnoses as recommended by these 2020 OM guidelines.<br>Routine and opportunistic ear and hearing checks by primary health staff should include:<br>• Otoscopy or pneumatic otoscopy (all ages)<br>• Tympanometry using 1000Hz probe tone for children whose corrected age is younger than 6 months.<br>• Tympanometry using 226Hz probe tone for children whose corrected age is equal to or greater than 6 months.<br>• Audiometry (> 3.5 years)<br>Otoacoustic Emissions may also be included, acknowledging that middle ear disease will obscure emissions. Presence of emissions, indicating normal or near-normal hearing, is a useful result in young children whose hearing is not easily assessed in the primary health setting using behavioural techniques. |

| STRATEGY | GUIDANCE |
|---|---|
| **Screening and surveillance: what is recommended** | **School screening**<br>In Aboriginal and Torres Strait Islander populations with known high prevalence of early onset, chronic ear disease:<br>• Resources should be directed in the first instance to strengthening primary health care prioritising youngest children first; and<br>• Screening of school-age children without direct linkage to primary health by the screening service or to referral pathways is not recommended.<br><br>Planned or existing school-based hearing screening programs should be carefully considered to ensure:<br>• They are not the sole or primary strategy for the population they service. Primary health surveillance systems, targeting the youngest children first, should be prioritised over school screening as they are likely to result in earlier identification, diagnosis and management, and link directly to health promotion, treatment, referral and remediation of hearing loss.<br>• They connect children to available and accessible services that provide intervention according to current standards.<br>• There is evidence that, for children who receive a 'refer', therapy alters outcomes. That is, children's ear health and/or hearing ability is improved [98]<br><br>Hearing screening in older asymptomatic children (single pass/fail assessment) is not recommended. [85, 99] |

## Topic 3: Referral and specialist input – *Who can help and what can they do?*

| STRATEGY | GUIDANCE |
|---|---|
| **Who can help and what can they do?** | **When appropriate, tell families/caregivers that:**<br>• Sometimes, children will need to see other ear health, hearing or speech specialists in order to get the right help.<br>• It's important to go to these appointments<br>• Some examples of specialists are:<br>o Ear, Nose and Throat doctors, who provide specialist ear health medicine and surgery when needed.<br>o Diagnostic audiologists, who work out how well the child is hearing and may recommend a referral to rehabilitative audiologists if needed.<br>o Rehabilitative audiologists, who work out whether hearing aids or other devices would make it easier for the child to learn listening, speech and language skills.<br>o Speech pathologists, who work with the child and family to help with developing the child's language and communication skills |
| **When to refer to diagnostic audiology** | Babies and children should be referred to an audiologist for evaluation of hearing when<br>• Health staff or parents suspect hearing loss, and/or<br>• CSOM is diagnosed, or<br>• Any other form of otitis media has persisted for 3 months or more. [95]<br>• There are speech, language or developmental delays<br>As OM can be long term and the hearing loss it causes can fluctuate, ongoing monitoring of hearing and repeated audiological assessments can be required.<br>Hearing assessment is recommended for the following reasons:<br>• Diagnosis of the degree and type of hearing loss<br>• Confirmation of middle ear condition<br>• Inform clinical care decision-making with respect to treatment and referral<br>• Monitoring the outcomes of interventions<br>• Planning hearing and communication (re)habilitation.<br>Aside from testing hearing, Audiologists make recommendations for ongoing care, monitor the outcomes of interventions, help plan hearing and communication rehabilitation, and provide professional development for health and education services. [100, 101]<br>Audiological services may be difficult to access or there may be a significant (>3 months) wait period. During this time families/carers and the early childhood centre/school should be encouraged to provide interventions to reduce the impact of conductive hearing loss on development of listening, language and communication skills. Refer to enhancing language acquisition and communicating with people who have hearing loss – sections below. |

| STRATEGY | GUIDANCE |
|---|---|
| **When to refer to rehabilitative audiology (hearing aid evaluation)** | In general, referrals for hearing aid consultation are made following diagnostic audiology.<br><br>Hearing aid consultation referrals are recommended for rehabilitative audiology (hearing aid) consultation promptly:<br><br>• Upon diagnosis of bilateral CSOM in children aged under three years.<br>• When other forms of OM have persisted longer than 3 months and diagnostic audiology has shown hearing loss to be worse than 30dB average in the better ear, calculated from available thresholds.<br>• When parents or caregivers feel their child may need hearing aids<br>OR<br>• When the above points apply, hearing could be expected to be improved by ENT Specialist management, but the expected wait for ENT consultation is longer than six months.<br><br>Earlier hearing aid fitting may be associated with better language outcomes, even for children with milder degrees of hearing loss. The critical period for remediation of hearing loss and acquisition of listening, language and communication skills is most likely to be within the first three years of life.<br><br>Aboriginal and Torres Strait Islander children represent 9% of Australian hearing aid-wearing children. The average age of first hearing aid fitting for Aboriginal and Torres Strait Islander children is predicted to be significantly later than optimal.<br><br>When hearing aids are fitted, primary health can support the family by:<br><br>• Providing emotional and practical support to the family as they incorporate hearing aid into their child's daily routine.<br>• Providing helpful strategies if toddlers or young children are resisting hearing aid use. Information can be found here: https://www.hearing.com.au/About-hearing/Hearing-in-babies-children/Technology<br>• When issues arise, encouraging the family to contact their hearing service and assisting with this if needed. |
| **When to refer to speech pathology** | Hearing loss is a significant risk factor for speech and language delay. Children should be referred to a speech pathologist if they have a confirmed hearing loss, or if they have other signs of speech and language delay. [75, 76, 78, 83, 92, 102]<br><br>Warning signs which should prompt immediate referral for speech pathology [96, 97]:<br>• 3-6 months: not communicating by vocalising or eye gaze<br>• 9 months: poor feeding or oral coordination<br>• 12 months: not babbling<br>• 20 months: only pointing or using gestures (i.e. not speaking)<br>• 24 months: using <20 words, not following simple requests<br>• 30 months: no two-word combinations<br>Children aged 0-5 years with hearing aids should be supported to connect with an early intervention service that listening, language and communication skills development in children with hearing loss. |

## Topic 4: Supporting listening and communication skills development in young children

| STRATEGY | GUIDANCE |
|---|---|
| **Strategies for enhancing language acquisition at home** | Although children from different cultures learn language at the same time, parent/carer beliefs about their role in children's language-learning varies considerably. [103]<br><br>When otitis media and associated hearing loss is present in early childhood, parents/carer's can help ensure their child's listening, language and communication skills continue to develop by creating a language-rich environment. [104]<br><br>Tell families/caregivers that:<br><br>• They are their child's most important teacher of language and communication skills, especially from birth to three years of age.<br>• When their child has ear and hearing trouble, it's important to increase talking and listening activities at home.<br>• At home [102, 105-109] make time every day, in quiet, to:<br>o Sing, tell oral stories, read to or talk about books with children. This can start from birth.<br>o Have conversations where both the child and parent/carer are paying full attention to each other. Talking about shared memories ('Do you remember when...') is particularly powerful.<br>o Follow the child's interest, rather than changing it. If the child starts talking about a dog, carry on with this and build on this topic.<br>o Take part in their children's early learning at child-care centre and preschool. |

| STRATEGY | GUIDANCE |
|---|---|
| **Strategies for Early Childhood services and Schools** | Ask families/caregivers to make sure Early Childhood carers and school teachers are aware of their child's hearing loss.<br><br>Children with early onset ear and hearing trouble should be encouraged to attend Early Childhood services. The focus on pre-literacy skills development will be beneficial for language and communication skills development.<br><br>Schools and Early Childhood services with high numbers of children with chronic OM should assume that a proportion of students at any time will not be hearing well, and that many students' receptive and expressive communication skills will be delayed due to previous OM in early childhood.<br><br>Ensure Early Childhood and primary school educators in communities with high numbers of children with chronic OM are provided with professional development that increases their understanding of the impacts of OM and strategies for mitigating and accommodating its effects.<br><br>Schools can consult audiology services and hearing advisory teachers for strategies to assist children with OM and hearing loss. These may include:<br><br>• Teaching young children hygiene practices that assist in preventing OM such as hand and face washing, nose blowing and coughing into elbows, through daily use of the 'Blow, Breathe, Cough' activity.<br>• Creating a positive school culture in which all students are helped to understand, support and include their peers with hearing loss and hearing devices.<br>• Creating hearing support plans that document accommodations for students with diagnosed hearing loss and personal hearing devices.<br>• Using technology that improves the auditory signal for all students such as soundfield amplification.<br>• Making classroom accommodations that improve the auditory signal like preferential seating, reducing noise sources and putting acoustically-absorbent material on walls and floor to reduce reverberation.<br>• Encouraging communication strategies that increase the likelihood that everyone understands each other such as talking up close and making sure faces can be seen.<br>• Using teaching techniques such as accompanying auditory information with supporting visual information.<br>• Cultivating strong relationships with the local primary health service, as OM is a condition that crosses health and education. |

## Topic 5: Strategies for communicating with patients and co-workers with hearing loss

| STRATEGY | GUIDANCE |
|---|---|
| **Communicating with people who have a hearing loss** | *In the clinic [110, 111]*<br><br>Adults with hearing loss may appear to hear well sometimes but not others. Ease of communication will be affected by background noise and room acoustics, language differences, unfamiliar speakers, enunciation, use of unfamiliar words or concepts, or being at a distance from the person speaking.<br><br>Cultural shame or fear of being seen as a nuisance may contribute to reluctance to ask for repeats or clarification. Resulting miscommunication can lead to misunderstandings. Communication behaviours associated with not hearing well can be incorrectly ascribed to personality or behavioural causes. [112]<br><br>As hearing loss is common among Aboriginal and Torres Strait Islander adults, hearing friendly communication strategies should always be used:<br><br>• Speak clearly, at a moderate pace.<br>• Use plain language and rephrase when required.<br>• Ensure your face can be seen and the room is well lit, to maximise opportunities to make use of visual cues.<br>• Support discussions with visual information.<br><br>Health educators should use visual prompts and cues. When talking to a group, use amplification systems if available.<br><br>For patients who wear hearing aids, encourage them to wear them during consultations. If hearing aids are lost or broken, offer to help arrange repair or replacement, if help is needed.<br><br>For patients with hearing loss who do not use hearing aids, health services may choose to buy a shared headphone listening device to improve the quality of health discussions.<br><br>For patients wanting to find out more about hearing aids and other devices, health services should ask visiting Audiology services for assistance with accessing the Hearing Services Program or other appropriate services.<br><br>Speak in the patient's language or work with interpreters to communicate important health information. If communication is breaking down, try to establish why. Is the problem hearing, language or cultural differences?<br><br>At staff meetings, as well as using hearing-friendly communication strategies, make sure staff know the topics to be discussed and have them available in writing. This will help people with hearing loss understand the context of discussions. Repeat any impromptu questions so that everyone can follow the discussion. At the outset of the meeting, encourage all staff to ask for repeats and clarifications as needed. |

# SECTION D

# **SECTION D:** PRIORITISATION OF PRIMARY HEALTH CARE SERVICES IN DIFFERENT SETTINGS

*When resources are limited, focus on those most likely to benefit from the recommendations contained within this document. Develop a health care strategy for your organisation. The strategy should cover prevention, diagnosis and management*

**PRIORITY 1: Children <3 years old with discharging ears**
(These children will have either AOMwiP or early onset CSOM)

The aim of the program is to identify children early, provide appropriate antibiotic treatment, organise weekly follow ups and optimise adherence strategies. This all needs to continue until resolution of discharge is achieved.

Appropriate antibiotic treatment is the key to a better health outcome. Treatment may need to be continued for many months.

| KEY STEPS | RECOMMENDED ACTIONS |
|---|---|
| **Effective Prevention** | 1) Organise individual or group education sessions to discuss early onset of OM, signs/symptoms of OM and preventive measures to decrease OM and associated hearing loss.<br>2) Encourage breast feeding, avoidance of passive smoking exposure and reducing exposure to germs (through frequent hand and face washing and drying).<br>3) Ensure the recommended pneumococcal vaccination is given as per schedule. |
| **Effective Diagnosis** | 1) Ensure accurate diagnosis with otoscope (video otoscope preferred). Document duration of discharge and size (and position) of perforation (if possible).<br>2) Distinguish between AOMwiP and CSOM by history and review of medical record.<br>3) Use syringing/suctioning if required to obtain clear view of TM for more accurate diagnosis.<br>4) Refer (or send video images) for second opinion if there is a doubt about the diagnosis. |

| KEY STEPS | RECOMMENDED ACTIONS |
|---|---|
| **Effective Management** AOMwiP | 1) Organise weekly review and update register (local clinic-based recall and reminder systems) of affected children every month.<br>2) Ensure that high dose antibiotic therapy (amoxycillin or amoxycillin-clavulanate) plus topical ciprofloxacin (2-5 drops 2-4 times a day) after ear cleaning are being given to all children who do not respond oral antibiotics within 4-7 days.<br>3) Ensure that the ear cleaning is effective and that the antibiotic drops are being pushed through the perforation.<br>4) Review strategies to improve adherence with recommended treatment.<br>5) Discuss option of long-term antibiotics with family. This would continue even after the episode of AOMwiP has resolved.<br>6) Refer for hearing assessment after 3 months or at any time there are concerns. |
| **Early Onset CSOM** | 1) Organise weekly review and update register (local clinic-based recall and reminder systems) of affected children every month.<br>2) Ensure that topical ciprofloxacin (2-5 drops 2-4 times a day) is being given after ear cleaning.<br>3) Ensure that the cleaning is effective and that the antibiotic drops are being pushed through the perforation.<br>4) Review strategies to improve adherence with recommended treatment.<br>5) Discuss option of long-term antibiotics with family. This would continue even after the episode of CSOM has resolved.<br>6) Refer for hearing assessment after 3 months or at any time there are concerns.<br>7) Discuss option of hospitalisation for parenteral antibiotic administration if no response to topical antibiotic treatment after 16 weeks. |

**PRIORITY 2: Children <10 years old who have hearing loss of >30dB (in the better ear) plus speech/ language/ communication problems**
(These children may have any form of OM)

The aim of the program is to ensure that speech therapy and audiological management occur while medical treatment is optimised.

Appropriate medical treatment requires an accurate diagnosis and regular long-term follow up. A multidisciplinary approach adapted to meet the needs of the child is the key to a better health outcome. These children are likely to need ongoing ear health and hearing monitoring and hearing support throughout childhood.

| KEY STEPS | RECOMMENDED ACTIONS |
|---|---|
| **Effective Prevention** | 1) Organise individual or group education sessions to discuss early onset of OM, signs/symptoms of OM and preventive measures to decrease OM associated hearing loss.<br>2) Encourage family to participate actively in learning and language development. Provide support for reading, speaking and writing activities at home. |
| **Effective Diagnosis** | 1) Distinguish between persistent OME, rAOM, CSOM and dry perforation by accurate diagnosis with otoscopy (video otoscope preferred) and tympanometry or pneumatic otoscopy.<br>2) Review the history and medical record, and preferably document size and position of the perforation (if present). Also document the type and severity of the speech/language/communication problem.<br>3) Refer (or send video images) for second opinion if there is a doubt about diagnosis. |
| **Effective Management** | 1) Ensure medical management of OM as per 2020 OM guidelines.<br>2) Review regularly (3-6 monthly).<br>3) Tell families/caregivers and teachers that children's listening may be affected in the following situations:<br>» being far away from person speaking<br>» background or competing noise<br>» use of a second language<br>» new and unfamiliar speakers<br>» new and unfamiliar words or concepts.<br>4) Recommend preferential sitting and the use of visual cues (lip-reading, body language and hand talk), raised speech volume (amplification) and contextual cues in the classroom. |

| KEY STEPS | RECOMMENDED ACTIONS |
|---|---|
| **Effective Management** *continued* | 5) Recommend sound-field classroom amplification and use any amplification devices recommended by the audiologist.<br>6) Advise family to participate actively in learning and language development.<br>7) Repeat hearing tests after 3 months.<br>8) Refer to an ENT specialist for:<br>» grommet insertion for persistent OME<br>» myringoplasty for dry perforation. |

**PRIORITY 3: Children aged 3-10 years old who have discharging ears**
(These children will generally have CSOM)

Once established, CSOM can be extremely difficult to treat (this is why the Priority-1 is so important).

The aim of the program is to support long-term topical antibiotic treatment combined with appropriate audiological management.

Adherence to the treatment and regular follow up every 1-2 weeks is the key to a better health outcome. Specialist review may be needed if the diagnosis is unclear or if the child does not respond to the treatment.

| KEY STEPS | RECOMMENDED ACTIONS |
|---|---|
| **Effective Prevention** | 1) Organise individual or group education sessions to discuss the severity of CSOM and associated hearing loss.<br>2) Encourage family to participate actively in learning and language development. Provide support for speaking, reading and writing activities at home. |
| **Effective Diagnosis** | 1) Ensure accurate diagnosis with otoscope (video otoscope preferred) and medical records and distinguish between AOMwiP and CSOM by history and reviewing medical record. Most children will have CSOM.<br>2) Document duration of discharge and preferably size (and position) of the eardrum perforation (if possible).<br>3) Use syringing/suctioning if required to obtain clear view of TM for accurate diagnosis.<br>4) Refer (or send video images) for second opinion if there is doubt about diagnosis.<br>5) Refer for hearing assessment. |

| KEY STEPS | RECOMMENDED ACTIONS |
|---|---|
| **Effective Management** | 1) Organise 1-2 weekly reviews and updates (local clinic-based recall and reminder systems) register of affected children every month.<br>2) Ensure that topical ciprofloxacin (2-5 drops 2-4 times a day) is being given after ear cleaning.<br>3) Ensure that ear cleaning is effective and make sure that the antibiotic drops are being pushed through the perforation.<br>4) Review strategies to improve adherence with recommended treatment.<br>5) Consider hospitalisation for parenteral antibiotic if there is no response to topical antibiotic treatment after 16 weeks.<br>6) Recommend preferential seating and the use of visual cues (lip-reading, body language and hand talk), raised speech volume (amplification) and contextual cues in the classroom.<br>7) Recommend sound-field classroom amplification and support use of amplification devices recommended by the audiologist.<br>8) Advise family to participate actively in learning and language development.<br>9) Refer to an ENT specialist if the diagnosis is uncertain or there is no response to medical therapy.<br>10) Refer to speech pathologist if this is indicated. |

**PRIORITY 4: Other children aged <10 years old with persistent OM or tympanic abnormality and hearing loss >30dB in the better hearing ear**
(These children will generally have persistent OME or a badly scarred eardrum)

The aim of the program is to provide audiological management for all children and identify those children who will benefit from surgery.

Enhanced communication strategy and appropriate use of hearing aids is the key to a better health outcome.

| KEY STEPS | RECOMMENDED ACTIONS |
|---|---|
| **Effective Prevention** | 1) Encourage family to participate actively in learning and language development. Provide support for reading, speaking and writing activities.<br>2) Increase awareness of the education staff about support strategies for children with hearing loss. |
| **Effective Diagnosis** | 1) Make accurate diagnosis by otoscope (video otoscopy preferred).<br>2) Distinguish between bilateral persistent OME, dry perforation and other TM abnormalities (like scarring or severe retraction).<br>3) Refer for hearing assessment. |
| **Effective Management** | 1) Recommend preferential seating and the use of visual cues (lip-reading, body language and hand talk), raised speech volume (amplification) and contextual cues in the classroom.<br>2) Refer for appropriate hearing aid.<br>3) Recommend effective communication strategies.<br>4) Recommend auditory training support from speech therapist.<br>5) Recommend language stimulation and speech correction at home and school.<br>6) Repeat hearing assessment after 3 months.<br>7) Refer to an ENT specialist for:<br>» grommet insertion for persistent OME<br>» myringoplasty for dry perforation.<br>8) Organise a repeat medical review after 3 months and update register (local clinic-based recall and reminder systems) of affected children regularly |

**PRIORITY 5: For children 0-16 years old who are at-risk of chronic ear health problems or who reside in a high-risk population and have not had a documented ear assessment in the previous 12 months or who have missed a scheduled ear health check**

Our recommendation of the program is for a regular ear and hearing health surveillance system for at-risk children who have a history any ear discharge or OM or hearing difficulty, or who live in a high-risk population, and including older children.

| KEY STEPS | RECOMMENDED ACTIONS |
|---|---|
| **Effective Prevention** | 1) Encourage family to participate actively in prevention education.<br>2) Increase awareness of the family and community, including school staff, about the long-term consequences of middle ear infection or hearing difficulty. |
| **Effective Diagnosis** | 1) Ensure accurate diagnosis of all forms of otitis media using otoscopy and tympanometry, or pneumatic otoscopy.<br>2) Determine any unreported speech, language or developmental delay, other behavioural problems including poor school attendance or performance, or any judicial encounters that may be related to ear or hearing problems.<br>3) Review history to determine duration of condition. |
| **Effective Management** | 1) Organise an ear assessment for children 0-16 years old who are at-risk or who reside in a high-risk population and have not had a documented ear assessment in the previous 12 months or who have missed a scheduled ear health check.<br>2) Ensure appropriate medical management of ear conditions as per Guidelines.<br>3) Ensure appropriate audiological management as per Guidelines.<br>4) Ensure referral for hearing or ENT assessment as per Guidelines.<br>5) Advise family and school of strategies for improved listening and language development as per Guidelines.<br>6) Advise family to continue monitoring for any indication of ear or hearing problems. |

# METHOD USED IN UPDATING THE GUIDELINES

## Aim

The main aim of the update of 2010 OM Guideline is to provide up-to-date evidence for improving prevention, diagnosis and management of ear disease and conductive hearing loss in Aboriginal and Torres Strait Islander children across Australia.

## Rationale for Updating the 2010 OM Guidelines ("Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations")

An experienced Technical Advisory Group (TAG) was formed in 2015 by the National Health and Medical Research Council (NHMRC)-funded Centre of Research Excellence in Ear and Hearing Health of Aboriginal and Torres Strait Islander Children. The majority of TAG members had been authors of the 2010 OM Guideline. The TAG agreed to follow the GRADE approach (Grading of Recommendations, Assessment, Development and Evaluation), and to develop a multi-platform digital app with extended functionality for communication and education of health care professionals and Aboriginal and Torres Strait Islander families and children.

A copyright license deed was agreed with the Australian Government Department of Health

## Development of Otitis Media App (OMapp)

The OMapp is a multi-platform app available free of charge with downloadable content for off-line use.

There are four main windows:

1. Clinical (Diagnosis and Management): diagnostic, prevention and treatment algorithms for all types of OM;
2. Communication: audio recordings in multiple Aboriginal languages to assist caregiver understanding of their child's ear health and hearing needs. The aim is to enhance comprehension and adherence to recommended strategies for OM and hearing loss prevention and treatment.
3. Education: resources for professionals, families and children including videos of pneumatic otoscopy, hearing loss simulations, and cartoons to explain the ear and hearing health service pathways; and
4. Guidelines: evidence summaries for all strategies and recommendations for prevention and treatment with links to GRADEpro Summary of Findings tables, strength of recommendations, quality, effect size. We used the "What happens" section to provide a simple Population Intervention Comparison Outcome Time (PICOT) statement, including the use of 'possibly' and 'probably' to reflect the quality or confidence in the effect for each intervention and for multiple outcomes.

## Citation

Menzies School of Health Research (2020) Otitis Media Guidelines (version 1.1) [Mobile app]. App Store. https://apps.apple.com/au/app/otitis-media-guidelines/id1498170123 AND (version 1.0.23) [Mobile app]. Google Play. https://play.google.com/store/apps/details?id=com.otitismediaguidelines.guidelines

## Search Strategies

### Phase 1 - evidence-based guidelines, evidence summaries and systematic reviews

1. For systematic reviews and meta-analyses:

("otitis"[MeSH Terms] OR otitis[Text Word] OR "hearing loss"[MeSH Terms] OR deafness[Text Word] OR "hearing loss"[Text Word]) AND (meta-analysis[PTYP] OR meta-analysis[Text Word] OR meta analysis[Text Word] OR (review[PTYP] AND systematic[Text Word]) OR overview[Text Word])

In MEDLINE (accessed via PubMed and all search limited data search limited to 1st January 2010 to 27th March 2017, English language and Humans subject.)

2. For clinical practice guidelines:

("otitis"[MeSH Terms] OR otitis[Text Word] OR ("hearing loss"[MeSH Terms] OR ("hearing"[All Fields] AND "loss"[All Fields]) OR "hearing loss"[All Fields]) OR deafness[Text Word] OR hearing loss[Text Word]) AND practice guideline[PTYP]

### Phase 2 – all papers

3. For all papers:

(otitis[Text Word] OR "otitis"[MeSH Terms]) AND media[Text Word

4. For trials of interventions/treatment:

(otitis [MeSH Terms] OR otitis [Text Word] OR hearing loss [MeSH Terms] OR deafness [Text Word] OR hearing loss [Text Word]) AND (clinical trial [PTYP] OR random* [Text Word]

5. For diagnostic tests:

(otitis [MeSH Terms] OR otitis [Text Word]) AND (sensitivity and specificity [MeSH Terms] OR sensitivity [Text Word] OR specificity [Text Word] OR (predictive [Text Word] AND value* [Text Word]))

6. For prognostic information:

(otitis [MeSH Terms] OR otitis [Text Word]) AND (cohort studies [MeSH Terms] OR prognos* [Text Word] OR risk [Text Word] OR case control* [Text Word])

### Phase 3 - More specific searches to cover papers which may have been missed above

7. For chronic OM specifically:

"Chronic": ((otitis[Text Word] OR "otitis"[MeSH Terms]) AND media[Text Word]) AND chronic[Text Word] AND ((Guideline[ptyp] OR Clinical Trial[ptyp] OR Randomized Controlled Trial[ptyp] OR Journal Article[ptyp])

8. Regarding hearing impairment:

Hearing Impairment: ((otitis[Text Word] OR "otitis"[MeSH Terms]) AND media[Text Word]) AND hearing impairment[Text Word] AND ((Guideline[ptyp] OR Clinical Trial[ptyp] OR Randomized Controlled Trial[ptyp] OR Journal Article[ptyp])

9. For dry perforation (given the term "otitis" may not appear in these papers)

perforat* AND (ear OR tympan*) AND (dry OR chronic).

10. For tympanostomy tube otorrhoea

(tympanostomy OR grommet*) AND (otorrhoea OR otorrhea)

11. For diagnostic guidance

- tympanometry AND (child* OR paediatric OR pediatric OR infant OR young) AND (otitis OR infection OR effusion)

- otoscopy AND (child* OR paediatric OR pediatric OR infant OR young) AND (otitis OR infection OR effusion)

### Phase 4 - Searches of other databases

(using "otitis OR hearing loss", limited by date and language where possible)

- Aboriginal and Torres Strait Islander Health Information Database (healthinfonet)
- Scottish Intercollegiate Guidelines Network
- National Guideline Clearinghouse
- Agency for Healthcare Research and Quality
- Canadian Medical Association Clinical Practice Guidelines
- Centres for Disease Control and Prevention
- UK Health Technology Assessment
- Cochrane library
- BMJ Clinical Evidence

### Phase 5 - Using PubMed Clinical Queries function

12. (Therapy/Broad[filter]) AND ("otitis media")
13. Etiology/Broad[filter] AND "otitis media"[All Fields]
14. Diagnosis/Broad[filter] AND "otitis media"[All Fields]
15. Prognosis/Broad[filter] AND "otitis media"[All Fields]
16. Clinical Prediction Guides/Broad[filter] AND "otitis media"[All Fields]

## Summary of Search

A thorough literature search identified a total of 3864 articles after duplicate removal. The authors excluded 2996 articles on title alone and if article type was comments, editorials or letters to the editor. The remaining 868 articles were reviewed for exclusion based on abstract. If the authors were unable to confidently judge the relevance of an article from the abstract, the full article was obtained. Material not deemed to be of sufficient quality was discarded. Where possible the authors referenced Cochrane Systematic Reviews, of which there are 20. Other systematic reviews were also accessed, followed by individual randomised control trials. A total of 51 Summary of Findings (SoF) tables were created by reviewing the available evidence for the outcomes presented.

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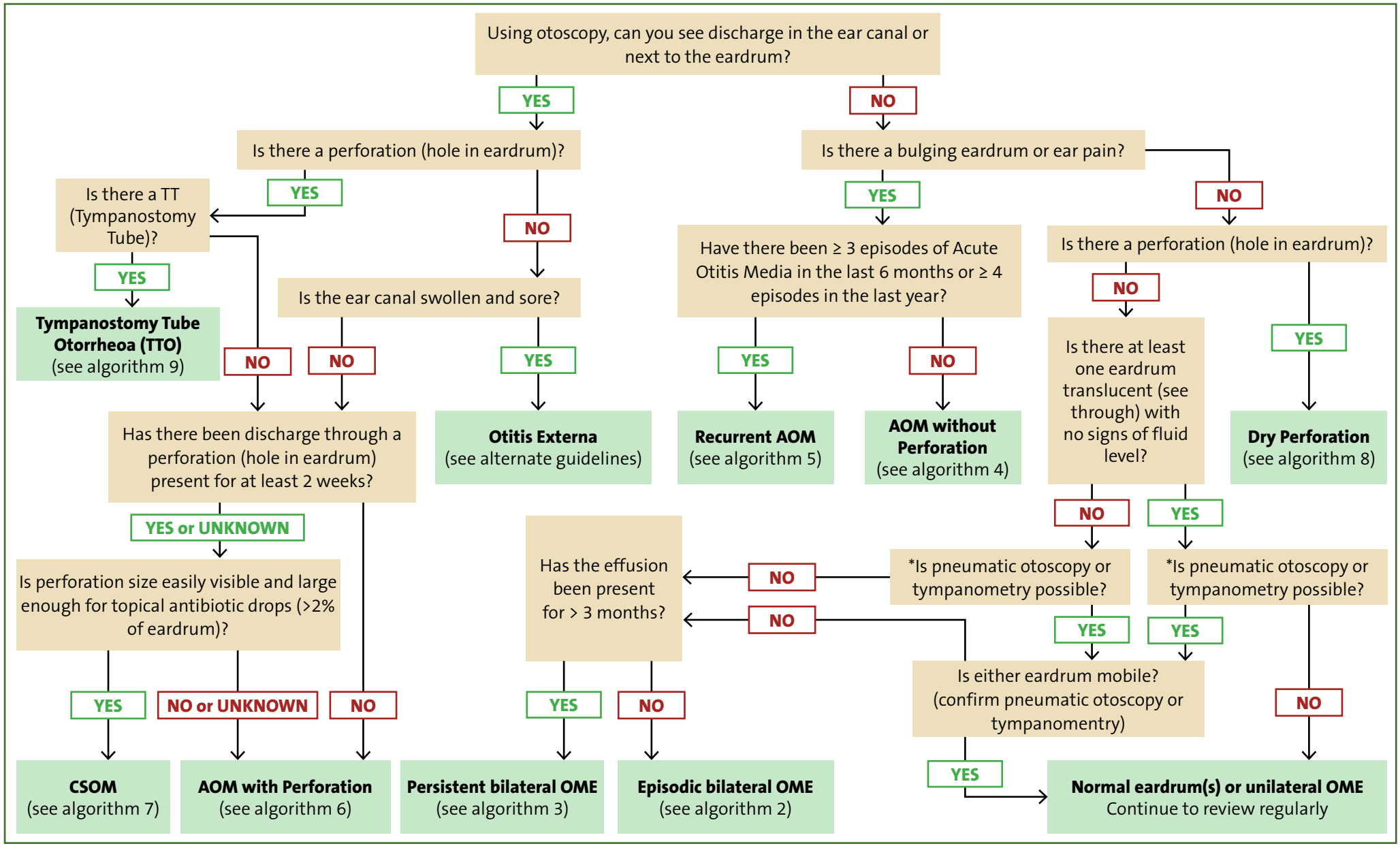
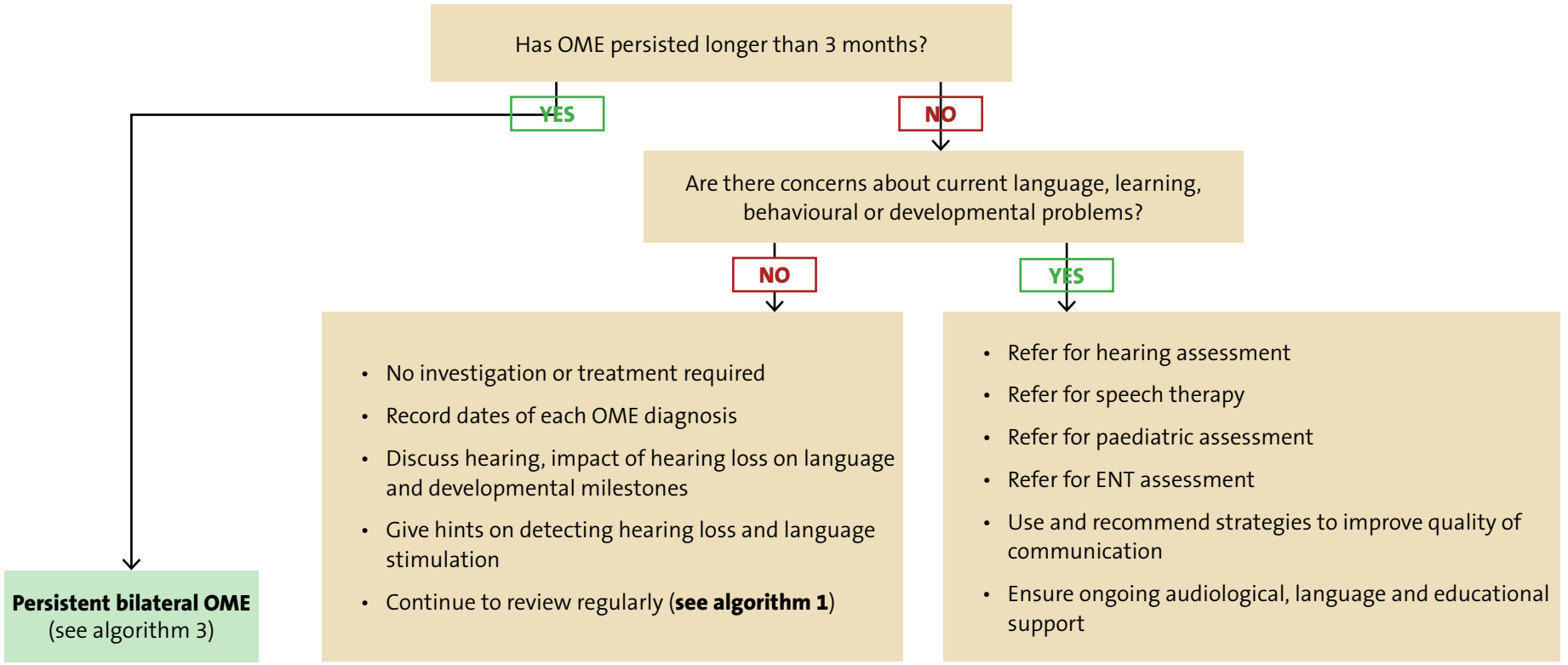
# **ALGORITHM 1: DIAGNOSIS** Could this child have a middle ear infection (otitis media)?
(Use this Algorithm during examination and management of both ears accordingly)

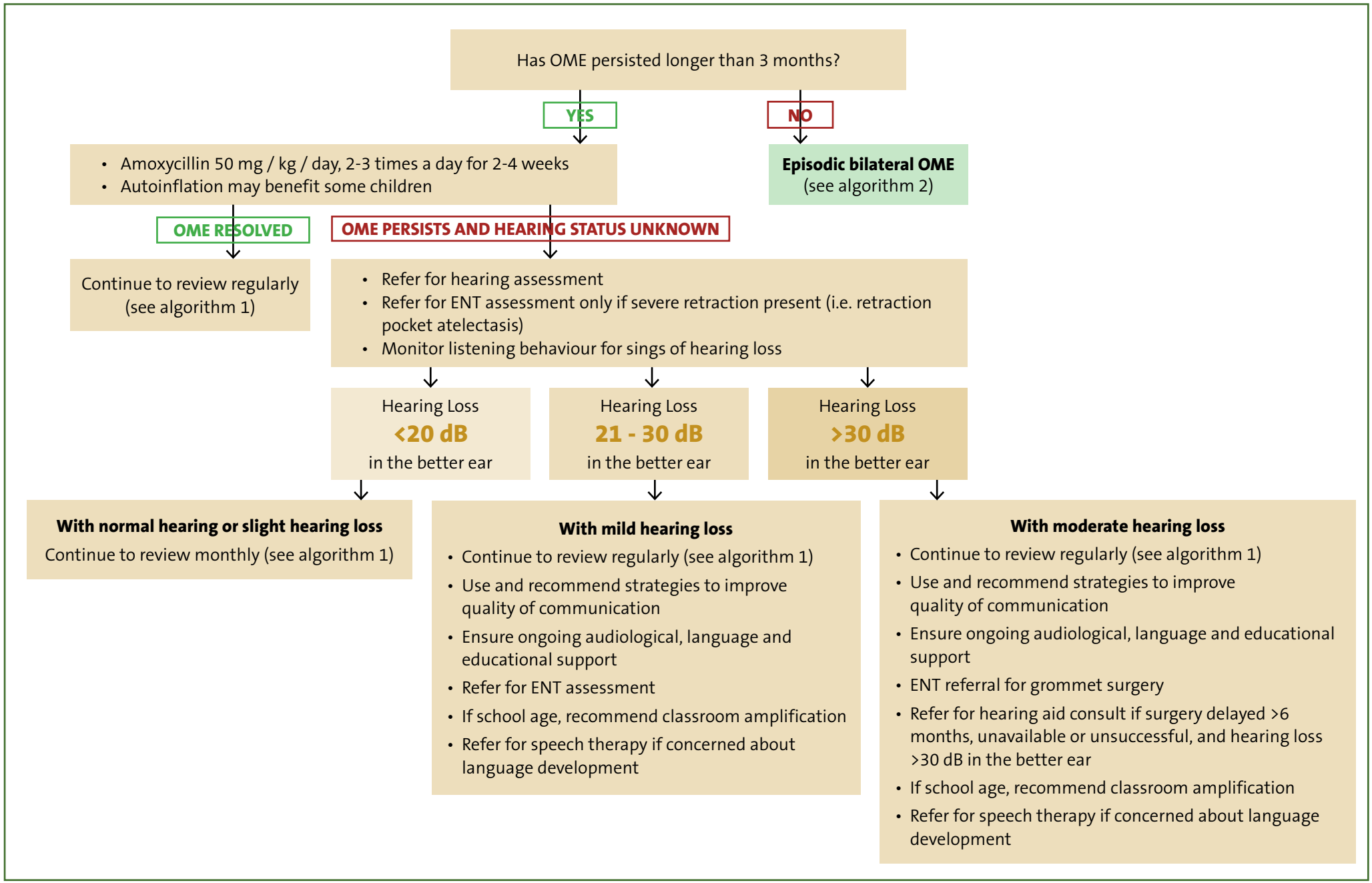



*Pneumatic otoscopy or tympanometry is required to accurately diagnose OME

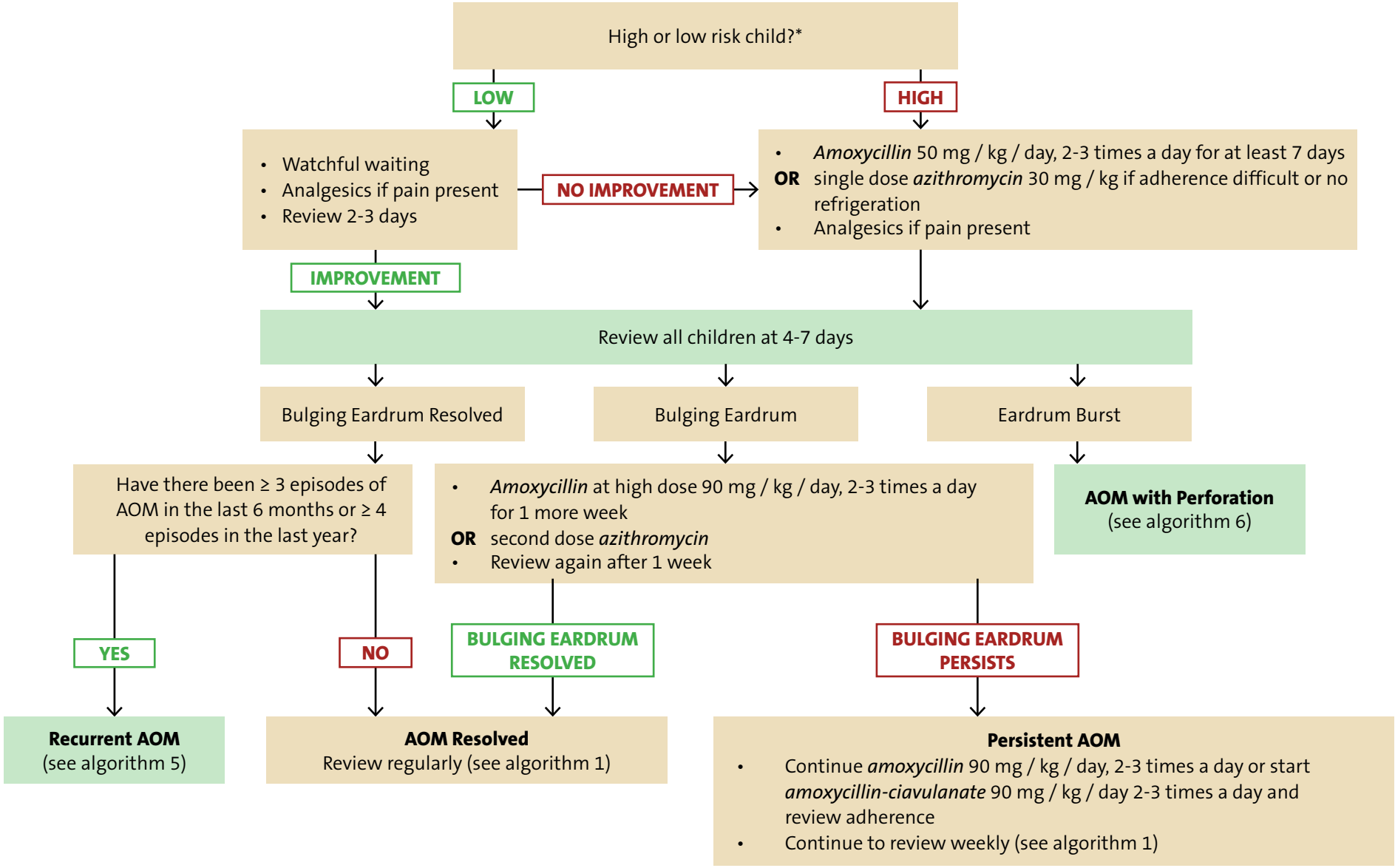
# **ALGORITHM 2: MANAGEMENT** Episodic Bilateral Otitis Media with Effusion (OME)



# ALGORITHM 3: MANAGEMENT Persistent Bilateral Otitis Media with Effusion (OME)

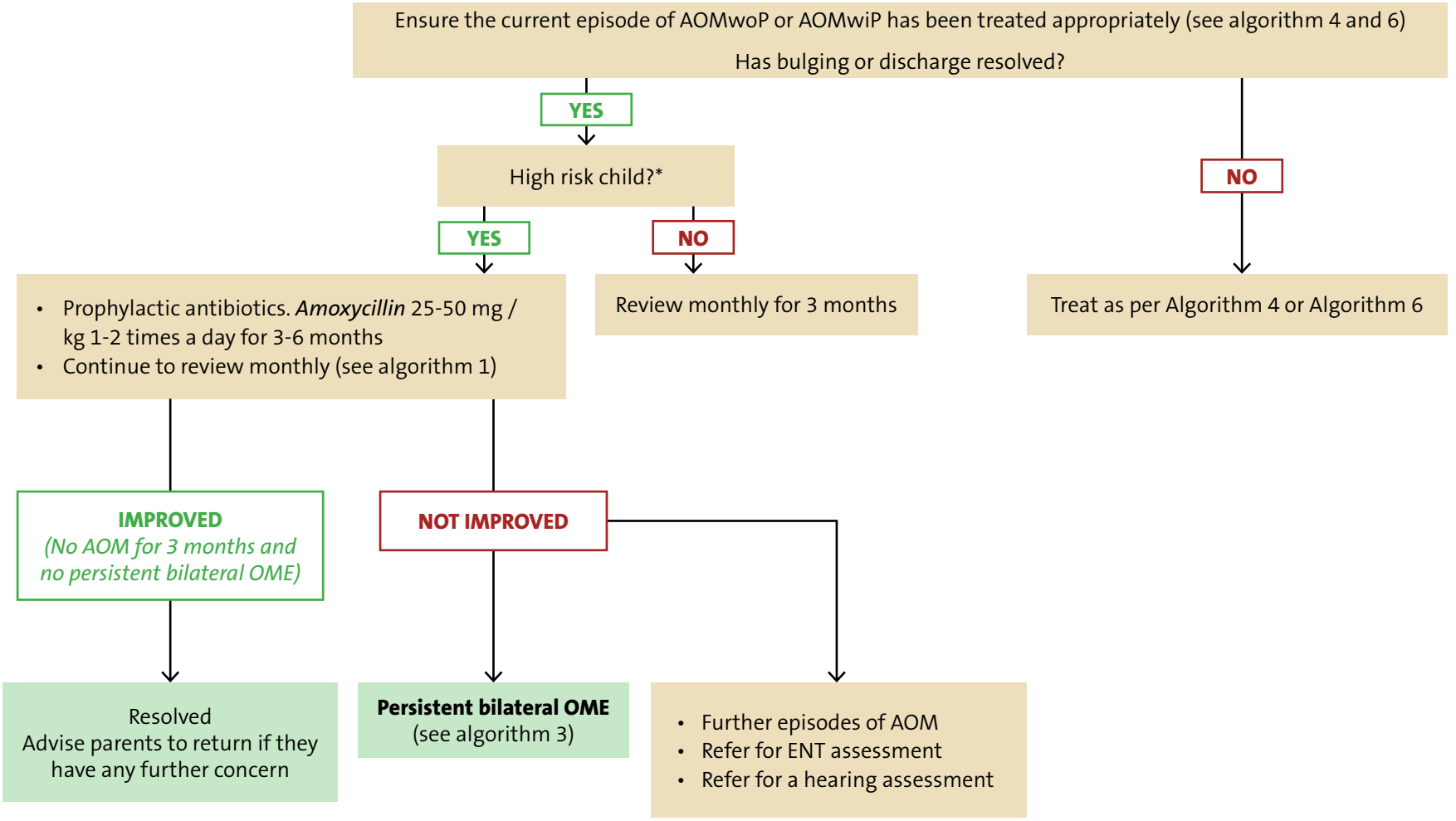


# ALGORITHM 4: MANAGEMENT Acute Otitis Media without Perforation (AOMwoP)



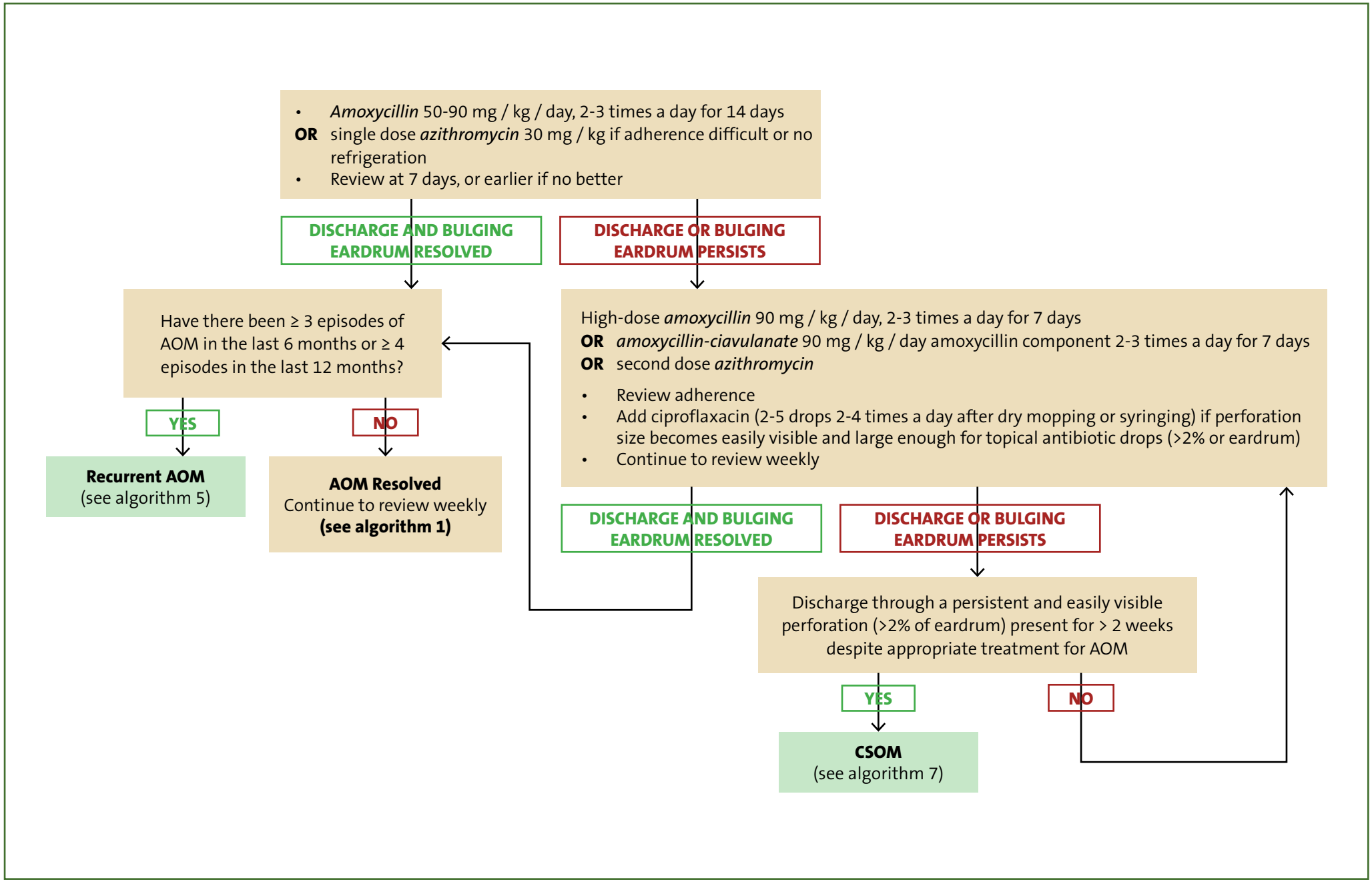

*Child at high risk of AOMwiP or CSOM has one or more of the following risk factors: who lives in remote communities; less than 2 years of age; has had their first episode of OM before 6 months of age; with a family history of CSOM; with a current or previous TM perforation; with craniofacial abnormalities, cleft palate, Down Syndrome, immunodeficiency or cochlear implants; with developmental delay; with hearing loss; with severe visual impairment.

# **ALGORITHM 5: MANAGEMENT** Recurrent Acute Otitis Media (rAOM)

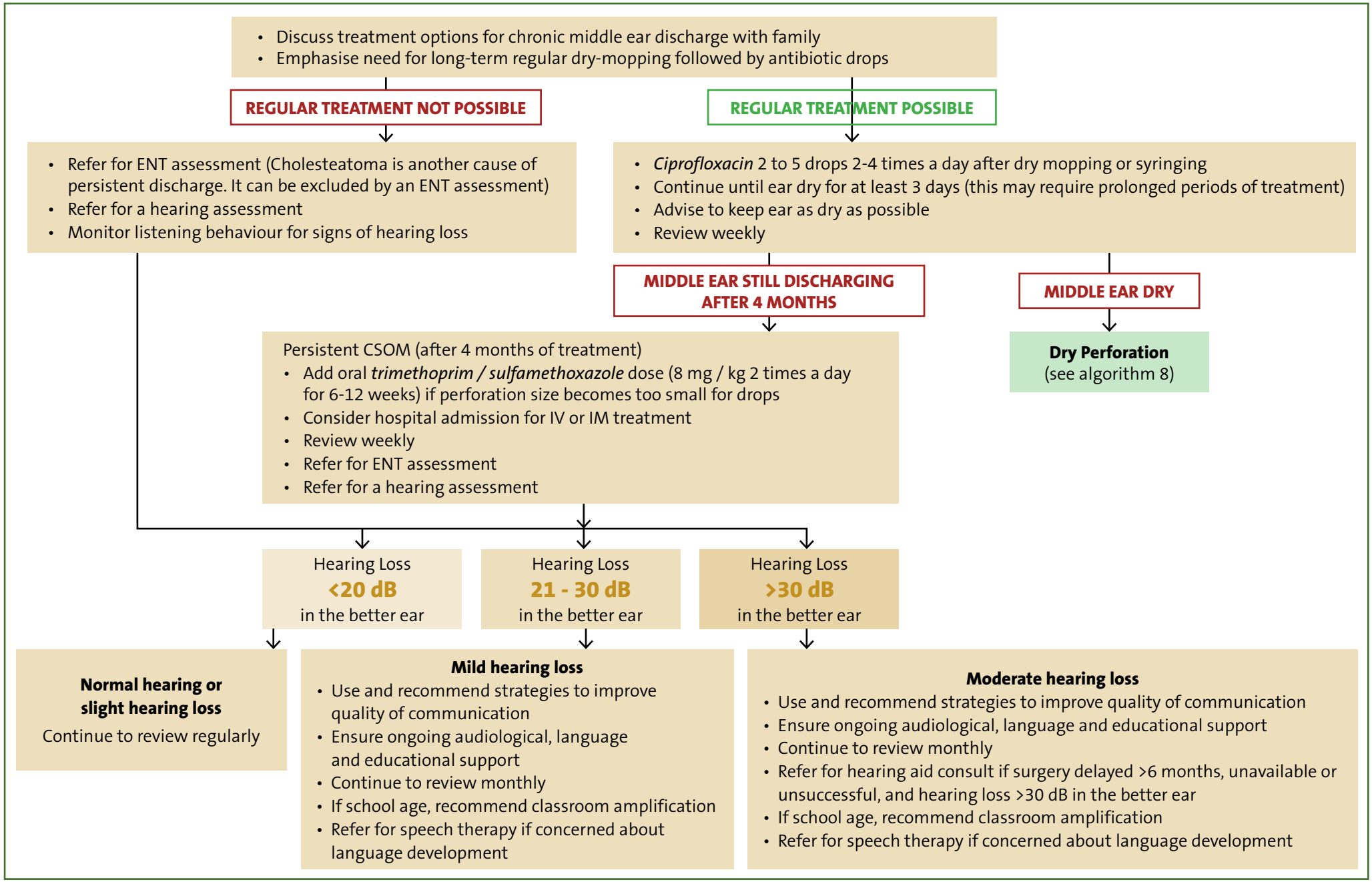



*Child at high risk of AOMwiP or CSOM has one or more of the following risk factors: who lives in remote communities; less than 2 years of age; has had their first episode of OM before 6 months of age; with a family history of CSOM; with a current or previous TM perforation; with craniofacial abnormalities, cleft palate, Down Syndrome, immunodeficiency or cochlear implants; with developmental delay; with hearing loss; with severe visual impairment.

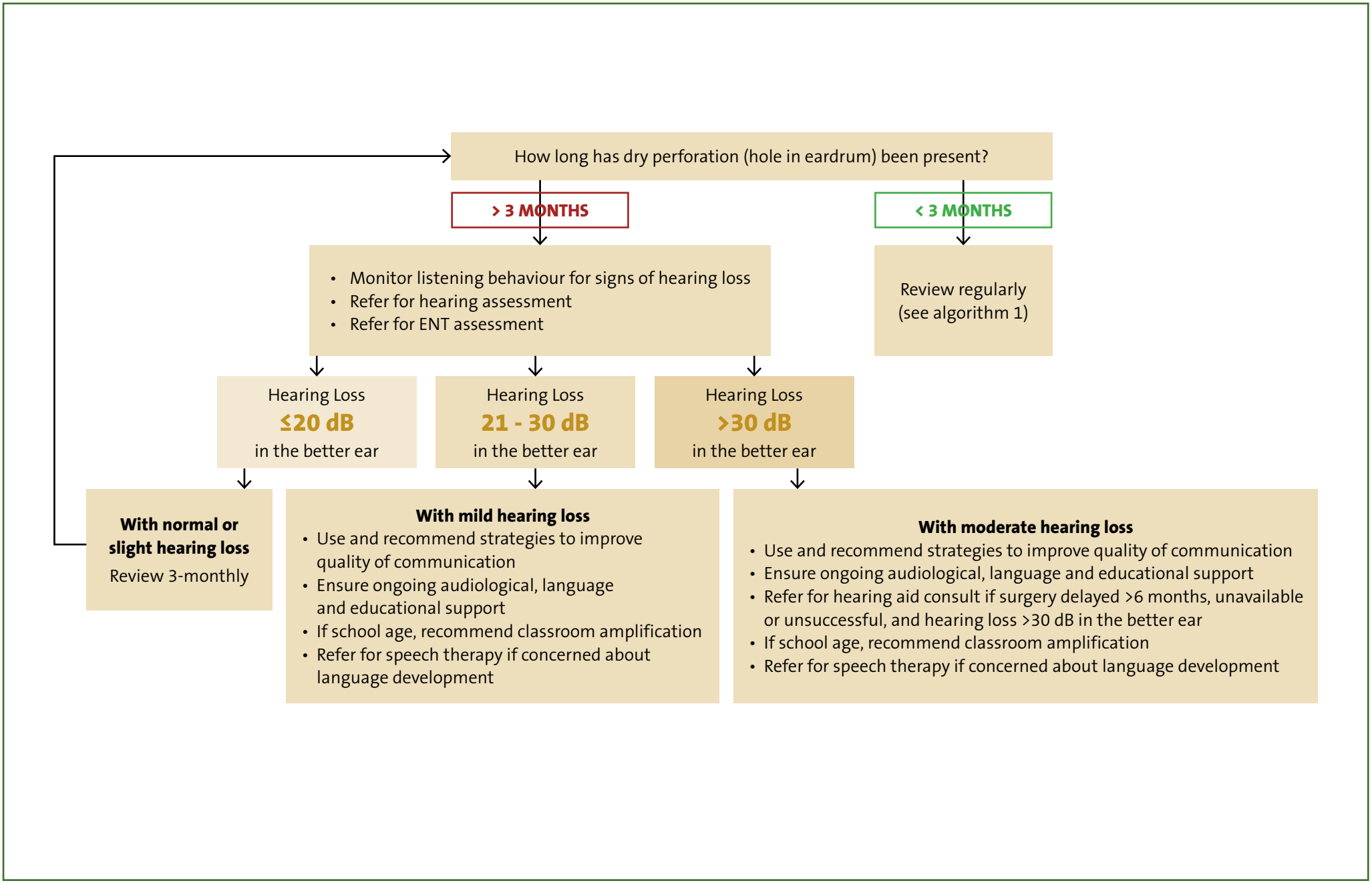
# ALGORITHM 6: MANAGEMENT Acute Otitis Media with Perforation (AOMwiP)



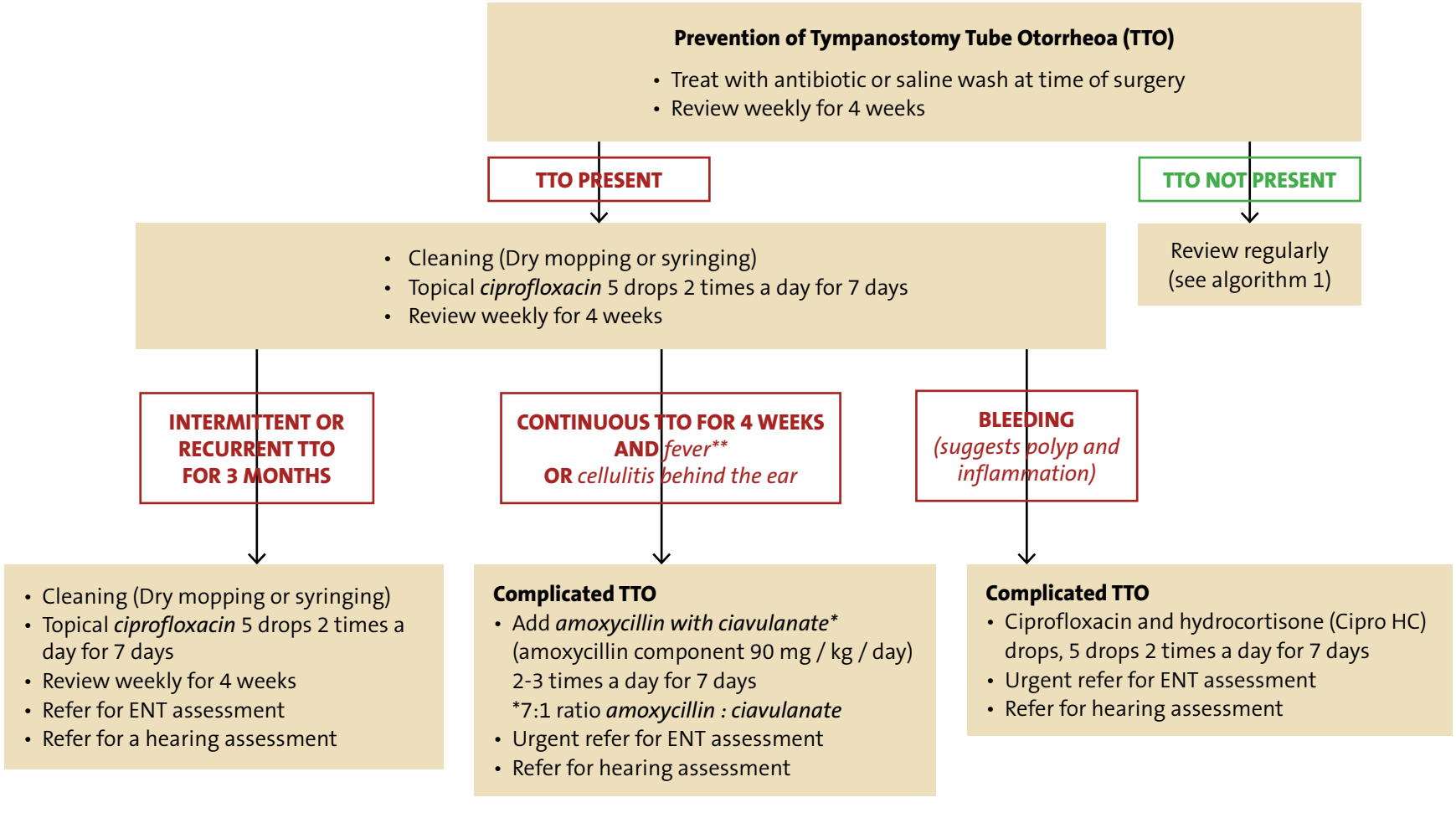
# ALGORITHM 7: MANAGEMENT Chronic Suppurative Otitis Media (CSOM)



# ALGORITHM 8: MANAGEMENT Dry Perforation (DP)



# ALGORITHM 9: MANAGEMENT Tympanostomy Tube Otorrheoa (TTO)




**For cellulitis systemic antibiotics that provide Gram-negative cover (seek advice of an infectious diseases specialist) and urgent ENT referral are recommended (consensus recommendation).

# ALGORITHM 10: MANAGEMENT Could this child have an important hearing loss due to Otitis Media?