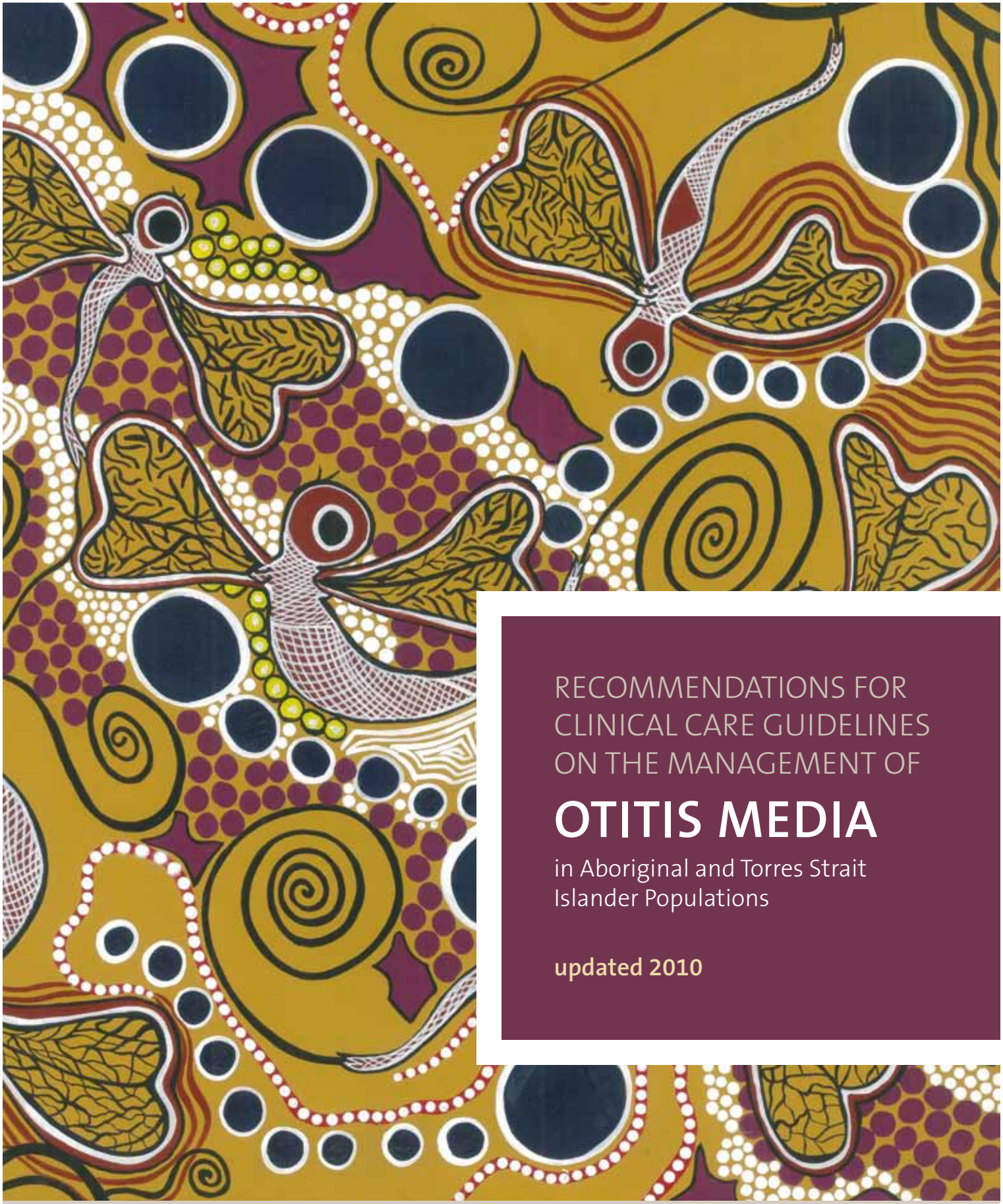


RECOMMENDATIONS FOR CLINICAL CARE GUIDELINES ON THE MANAGEMENT OF

OTITIS MEDIA

in Aboriginal and Torres Strait Islander Populations

updated 2010

Prepared by the Darwin Otitis Guidelines Group

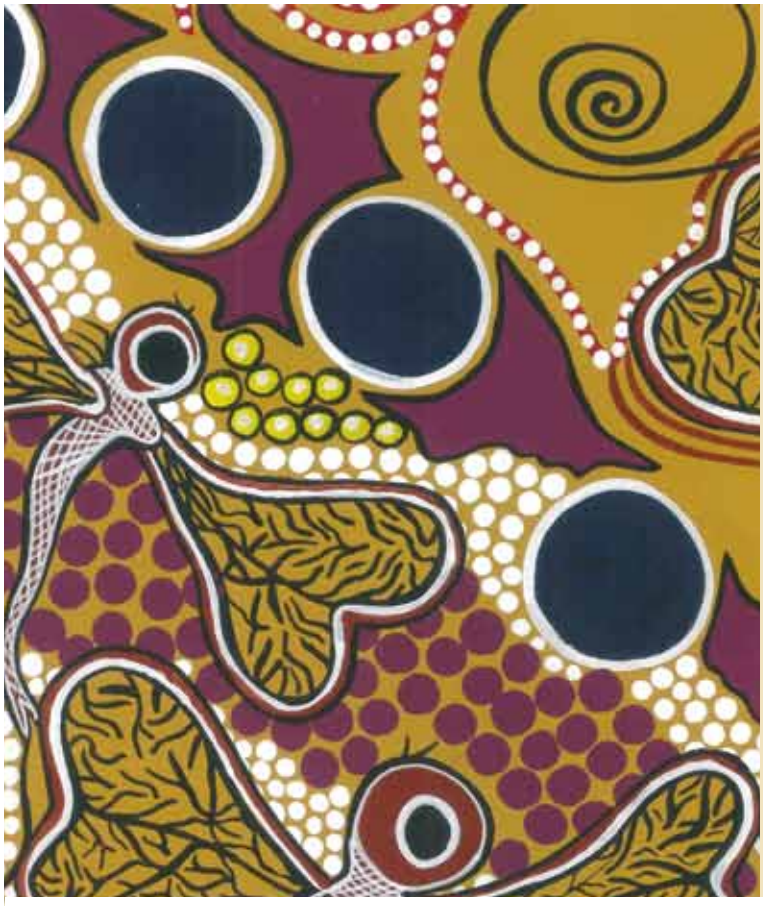
Australian Government
Department of Health and Ageing

menzies school of health research

COVER ARTWORK

Ngummama by Norma Benger Chidanpee

When babies are born in the dry season this is also the time of the birth of the dragonfly, which hums and buzzes around the air excited about the birth of the new season. The grandmothers catch the dragonflies to test babies' hearing, making them buzz near the babies' ears. When ababy responds we know that they have good hearing, if not, the old ladies bring the dragonfly closer so the baby can feel the vibration and the sound of its wings, then she sings to the spirits and the dragonfly, "we all must look after this child together to help him to grow and be able to communicate". So if you see a dragonfly buzzing around a baby, it is just looking and checking the baby's response because that's what they do. In the past, everyone worked together - dragonflies, grandmothers and the spirits.



RECOMMENDATIONS FOR CLINICAL CARE GUIDELINES ON THE MANAGEMENT OF

OTITIS MEDIA

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updated 2010

Prepared by the Darwin Otitis Guidelines Group

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Based on the *'Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations - March 2001'.*

April 2010

For the Office for Aboriginal and Torres Strait Islander Health, Australian Government Department of Health and Ageing, Canberra, ACT.

Australian Government
Department of Health and Ageing

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school of health research

Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal & Torres Strait Islander Populations (April 2010)

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These guidelines have been noted by the Communicable Disease Network Australia.

These Guidelines have been prepared following consultation with experts in the field of ear and hearing health and are based on information available at the time of their preparation. Practitioners should have regard to any information on these matters which may become available subsequent to the preparation of these guidelines.

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CONTENTS

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

USING THE RECOMMENDATIONS FOR CLINICAL CARE GUIDELINES ON OTITIS MEDIA

The original 'Recommendations for Clinical Care Guidelines on the Management of Otitis Media'[1] were directly linked to the Systematic Review of Existing Evidence and Primary Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations (March 2001).[2] This updated version is based on the 2001 Guidelines and relevant research studies published since 2001. It results from a synthesis of information derived from a process of explicit searching of the medical literature and critical appraisal. The literature search was last updated on the 1st April 2010. Recommendations in each of the sections are grouped according to their clinical relevance.

Our intended users are health care professionals who work with Aboriginal and Torres Strait Islander populations. This includes Aboriginal Health Workers, Aboriginal ear health workers, primary care and specialist physicians, nurses, remote area nurses and nurse practitioners, audiologists, audiometrists, speech therapists, and child development specialists (including Advisory Visiting Teachers and Teachers of the Deaf). Aboriginal and Torres Strait Islander health staff working with Aboriginal and Torres Strait Islander families are likely to have the greatest impact on severe otitis media. The guidelines are also suitable to be adopted for use in local clinical practice guidelines and standard treatment protocols (e.g. Central Australian Rural Practitioners Association Standard Treatment Manual,[3] Queensland Primary Clinical Care Manual[4] etc).

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.[5] Nearly all children will experience at least one episode of acute otitis media (AOM). In developed countries, most children will improve spontaneously.[5] 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).[6] Children who develop CSOM (the most severe form of OM) are most likely to suffer problems as adults.[7] Unfortunately, for some of these affected individuals, OM (and its associated hearing loss) is a lifelong problem.

OM causes 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.[8,9] 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.[7]

The target populations for these recommendations are Aboriginal and Torres Strait Islander Australians.[10] While OM is a common illness in all populations, Indigenous Australians have the highest rates of severe and persistent OM described in the medical literature.[7] In some areas (generally rural and remote Indigenous communities), the clinical course of OM is characterised by early age of onset and high prevalence 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).[11] 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 were less clear.

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. While the recommendations have been based on the best available evidence, their applicability will also be dependent on local factors. Most important are the personal preferences of the affected individuals, and the local resources available to assist in the management of OM. These local factors should always be considered when developing an ear health program and when advising families about their management options. In some cases, strict adherence to the guidelines will not be appropriate.

Most of the recommendations were regarded as interventions and classified according to the levels of evidence for Prevention, Management and Health Care Delivery shown in Table 2.[12] Additional tables describing levels of evidence for diagnostic accuracy studies and prognosis studies have been included for the relevant sections (see Tables 4 and 5).[12] Recommendations are also linked to any other available evidence-based clinical practice guidelines that addressed the same issue. The criteria used for identifying clinical practice guidelines that have a high likelihood of scientific validity are shown in Table 6.

Overall, we identified 51 evidence-based guidelines, reviews and summaries: 12 evidence-based guidelines,[13-24] 10 clinical evidence reports,[5-7;25-31] 1 evidence-based text-book,[8] 21 Cochrane Systematic Reviews,[32-52] and 7 other systematic reviews.[2;53-58] Nearly all of these were new publications. There are likely to be other evidence-based documents in the grey literature that we were not able to identify with our search strategy.

Grading of Recommendations According to NHMRC[12] (Table 1)

Each recommendation has been graded according to the most recent National Health and Medical Research Council (NHMRC) grading system 2010.[12] Grade A recommendations are based on several level I or II studies with low risk of bias where all studies show consistent results. Grade A recommendations are applicable to the Australian health care context. Grade B recommendations are based on one or two level II studies with low risk of bias or a systematic review of level III studies with low risk of bias. In addition, the results of most of the studies are consistent. Grade B recommendations are applicable to the Australian health care context with few caveats. Grade C recommendations are based on Level III studies with low risk of bias or level I or level II studies with moderate risk of bias. For Grade C recommendations, some inconsistencies reflect genuine uncertainty around the clinical question. Grade C recommendations are probably applicable to the Australian health care context with some caveats. Grade D recommendations are based on level IV studies or level I, II and III studies with high risk of bias. Grade D recommendations should be applied cautiously in the Australian health care context.

TABLE 1. NHMRC Grade of Recommendations[12]

Grade of Recommendation	Description
A	Body of evidence can be trusted to guide practice.
B	Body of evidence can be trusted to guide practice in most situations.
C	Body of evidence provides some support for recommendation but care should be taken in its application.
D	Body of evidence is weak and recommendation must be applied with caution.
GPP	No reliable evidence exists directly addressing the impact of the recommendation. The recommendation (a Good Practice Point) reflects the consensus view of the multidisciplinary guidelines group and is based on clinical experience.

TABLE 2. NHMRC Levels of Evidence for Prevention, Management and Health Care Delivery[12]

Level of Evidence:	Level Based on:
I	a systematic review of level II studies.
II	a randomised controlled trial.
III-1	a pseudo-randomised controlled trial (i.e. alternate allocation or some other method).
III-2	a comparative study with concurrent controls: • non-randomised experimental trial • cohort study • interrupted time series with a control group.
III-3	a comparative study without concurrent controls: • historical control study • two or more single arm study • interrupted time series without a parallel control group.
IV	a case series with either post-test or pre-test/post-test outcomes.

TABLE 3. NHMRC Levels of Evidence for Aetiology[12]

Level of Evidence:	Level Based on:
I	a systematic review of level II studies.
II	a prospective cohort study.
III-1	an 'all or none' study.
III-2	a retrospective cohort study.
III-3	a case-control study.
IV	a cross-sectional study or case series.

TABLE 4. NHMRC Levels of Evidence for Diagnostic Accuracy[12]

Level of Evidence:	Level Based on:
I	a systematic review of level II studies.
II	a study of test accuracy with an independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation.
III-1	a study of test accuracy with an independent, blinded comparison with a valid reference standard, among non–consecutive persons with a defined clinical presentation.
III-2	a comparison with reference standard that does not meet the criteria required for Level II and III-1 evidence.
III-3	a diagnostic case–control study.
IV	a study of diagnostic yield (no reference standard).

TABLE 5. NHMRC Levels of Evidence for Prognosis[12]

Level of Evidence:	Level Based on:
I	a systematic review of level II studies.
II	a prospective cohort study.
III-1	an 'all or none' study.
III-2	an analysis of prognostic factors amongst persons in a single arm of a randomised controlled trial.
III-3	a retrospective cohort study.
IV	a case series, or a cohort study of persons at different stages of disease.

TABLE 6. Criteria for Evidence-based Clinical Practice Guidelines[1]

Level of Guideline:	Level Based on:
I~A	a guideline composed by a national or external guideline development group representing all relevant disciplines based on the best available evidence, where the process of retrieving that evidence has been clearly described (i.e. an explicit search strategy), and where recommendations are directly linked to evidence.
I~B	a guideline composed by a national or external guideline development group representing all relevant disciplines and based on the best available evidence, and where recommendations are directly linked to evidence.

DEFINITIONS AND ABBREVIATIONS

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 eardrum 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 eardrum on pneumatic otoscopy are the most reliable indicators of OME.

Persistent (Chronic) Otitis Media with Effusion: Presence of fluid in the middle ear for more than 3 months without any 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 eardrum plus at least one of the following: bulging eardrum, red eardrum, recent discharge of pus, fever, ear pain or irritability. A bulging eardrum, 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 eardrum plus at least one of the following: bulging eardrum, red eardrum, fever, ear pain or irritability. A bulging eardrum and/or ear pain are the most reliable indicators of AOMwoP.

Acute Otitis Media with Perforation (AOMwiP): Discharge of pus through a perforation (hole) in the eardrum within the last 6 weeks. The perforation is usually very small (a pinhole) when the eardrum first ruptures. The perforation can heal and re-perforate after the initial onset of AOMwiP.

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.

Chronic Suppurative Otitis Media (CSOM): Persistent ear discharge through a persistent perforation (hole) in the eardrum. Definition of CSOM varies in the duration of persistent ear discharge (from 2 weeks to 12 weeks). Importantly, the diagnosis of CSOM is only appropriate if the tympanic membrane perforation is seen and if it is large enough to allow the discharge to flow out of the middle ear space.

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

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.

Population at High-risk of Persistent (Chronic) OME: In this document, children living with recognised OM risk factors are considered to be a high risk population for persistent OME. The most important risk factors are strong family history for OM, attending child care, frequent exposure to other children, and being of Aboriginal and/or Torres Strait Islander descent.

Population at High-risk of CSOM: In this document, populations with a prevalence rate of CSOM 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 eardrum are common. The World Health Organization has recommended that rates higher than 4% are unacceptable and represent a massive public health problem.

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 eardrum movement when air is blown into the ear canal. Pneumatic otoscopy is able to determine mobility of the eardrum. Reduced mobility of an intact eardrum is a good indication of the presence of middle ear fluid.

Video Otoscopy: Observing the eardrum via a small camera placed in the ear canal. The image is displayed on a screen. Video pneumatic otoscopy (including images of eardrum 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 eardrum). This test can be used to describe normal or abnormal middle ear function.

Acoustic Reflectometry: A simple, painless and non invasive diagnostic tool for detecting middle ear effusion. It performs spectral gradient analysis of sound reflected off the eardrum. This is often a less sensitive and specific test than pneumatic otoscopy or tympanometry. It has the advantage that it is easy to perform in uncooperative children.

Grommet (Tympanostomy Tube): A small tube surgically placed across the eardrum to re-establish ventilation to the middle ear. It is also called a 'ventilation tube', a 'PE tube' (pressure equalisation tube), or a 'tympanostomy tube'.

Insufflation: Blowing air into the ear to determine the mobility of the eardrum. This is done as part of pneumatic otoscopy.

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

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

Myringotomy: A surgical incision in the eardrum to drain fluid.

Myringoplasty: A surgical operation to repair a damaged eardrum.

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 eardrum 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: Any hearing threshold response outside the normal range that is detected by audiometry. It can be at any test frequency in either ear.

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. 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 could potentially benefit from an intervention for hearing loss. 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.

Pure-tone Audiometry: The assessment of hearing sensitivity for pure-tone stimuli in each ear. This is done using headphones (air conduction) or via bone conductors (bone conduction). Testing is possible from around 3 years of age.

Visual Reinforcement Audiometry: A technique that enables assessment of hearing sensitivity in young children from around 6 months to 3 years of age. This testing does not allow the testing of each ear individually.

Hearing Loss in a Population: The number of children who have abnormal hearing. Hearing loss may affect one ear (unilateral) or affect both ears (bilateral).

Hearing Impairment Classification: A categorisation that describes the degree of disability associated with hearing loss 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 thresholds in the 'better ear' as recorded through audiometry. It is typically calculated as a 3 frequency average (3FA) of the threshold of hearing (in dBHL) at 500Hz, 1000Hz and 2000Hz. However, hearing loss associated with OM can vary in severity over time and have a substantial effect upon hearing for frequencies outside those routinely tested. In addition, this classification is based on pure tone audiometry on the day of the test. It does not account for the impact of early onset, language, processing ability and environmental factors. Hence, average hearing levels based upon a single assessment could underestimate the degree of impairment.

Grades of Hearing Impairment*:[9]

Grade of Impairment		Corresponding Audiometric Value from 'Australian Hearing'
0	No Hearing Loss	20dB or better (better ear)
1	Mild Hearing Loss	21-45dB (better ear)
2	Moderate Hearing Loss	46-65dB (better ear)
3	Severe Hearing Loss	66-90dB (better ear)
4	Profound Hearing Loss	91dB or greater (better ear)

**These categories may not be appropriate for young children speaking English as a second language. Refer to section E for more information about signs, consequences and recommendations of hearing impairment.*

Any child with permanent or long term (more than 3 months) bilateral hearing loss greater than 20dB in the better ear should be referred to an audiologist for evaluation of hearing and communication needs. This will include consideration of suitability for personal amplification or assistive devices. In the first instance, referral would be made to state or territory funded audiological services where available. Referral to an ENT surgeon and/or paediatrician can be made at the same time.

Health Care Terms:

Primary Health Care: Primary health care is a practical approach to maintaining health and making essential health care universally accessible to individuals and their families. Primary health care happens in local communities in a manner acceptable to the local community and with their full participation. Primary health care is more than an extension of basic health services and has social and developmental dimensions.

Audiologist: An allied health practitioner responsible for the diagnosis and non-medical management of hearing loss and related verbal communication difficulties. Their responsibilities include provision of hearing aids and devices, and auditory training.

Speech Pathologist: An allied health practitioner responsible for the diagnosis and non-medical management of speech or language delays/ disorders. Their responsibilities include provision of speech therapy.

ENT Surgeon: A medical specialist trained in advanced diagnostic, medical and surgical interventions for pathologies of the ears, nose and throat.

Other Related Terms:

Aboriginal or Torres Strait Islander: "A person of Aboriginal or Torres Strait Islander descent who identifies as an Aboriginal or Torres Strait Islander and is accepted as such by the Aboriginal or Torres Strait Islander community in which he (she) lives".[10]

Good Practice Point (GPP): This recommendation has been applied where no reliable evidence exists directly assessing the impact of the recommendation. The recommendation reflects the consensus of the multidisciplinary guidelines group and is based on clinical experience.

PRACTICAL TREATMENT PLANS

A summary of practical treatment plans for the management of childhood otitis media in populations at high risk of CSOM

DIAGNOSIS	MANAGEMENT
1. Aerated Middle Ear (Normal)	1. **Family Education:** Discuss the normal language development milestones and the importance of going to the health centre if their child develops ear discharge.
2. Episodic OME *Fluid in middle ear without symptoms.*	1. **Family Education:** Advise the family about the likely hearing loss (usually around 25dB) and the need to re-examine the child in 3 months time (see chronic OME below). Discuss the normal language development milestones and the importance of going to the health centre if their child develops ear discharge.
3. Persistent OME *Fluid in the middle ear without any symptoms for greater than 3 months.*	1. **Family Education:** Advise the family about the likely hearing loss (usually around 25dB) 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. Discuss the normal language development milestones and the importance of going to the health centre if their child develops ear discharge. 2. **Medical:** Review every 3 months. Recommend referral for grommet surgery if OME persists for >3months and hearing loss >35dB, or if severe retraction of the eardrum is present (i.e. retraction pocket or atelectasis). 3. **Audiological:** Monitor for delay in language development. If hearing loss is 20-35dB, the child will benefit from classroom sound-field amplification and enhanced communication strategies (e.g. get close, speak clearly, check understanding etc). If hearing loss >35dB, also refer for hearing aids.
4. AOMwoP (Acute Otitis Media) *Bulging of the eardrum or ear pain plus fluid in the middle ear.*	1. **Family Education:** Emphasise the need for adherence to antibiotics to prevent CSOM. Advise the family about the likely hearing loss (usually around 25dB). Discuss the normal language development milestones and the importance of going to the health centre if their child develops ear discharge. 2. **Medical:** Recommend at least 7 days amoxycillin (50mg/kg/day). Review at 4-7 days. If bulging persists, continue for further 7 days (90mg/kg/day). [If AOM associated with diarrhoea or pneumonia can use daily IM procaine penicillin 50mg/kg/day until clinically improved, then complete course with amoxycillin. If AOM associated with trachoma, can use single dose of 30mg/kg azithromycin. It should be noted that azithromycin is not currently licensed for use in children under six months of age].

5. AOMwiP *Discharge through a perforation.*	1. **Family Education:** Emphasise the need to take medications as prescribed to prevent CSOM. Advise the family about the likely hearing loss (usually around 35dB). Discuss the normal language development milestones and the importance of going to the health centre if the ear discharge does not improve. 2. **Medical:** Recommend 14 days amoxycillin (50-90mg/kg/day). Review at 4-7 days, and again at 10-14 days. Continue antibiotics until discharge and eardrum bulging has resolved. [If AOM with perforation associated with diarrhoea or pneumonia can use daily IM procaine penicillin as above.] Persistent perforation despite amoxycillin 90mg/kg/day: change to amoxycillin-clavulanate (90mg/kg/day) for further 14-28 days and introduce cleaning of discharge followed by ciprofloxacin ear drops (2-5 drops 2-4 times a day). Continue to review weekly. [If child develops diarrhoea or pneumonia can use daily IM procaine penicillin 100mg/kg/day until clinically improved, then complete course with oral antibiotics.]
6. Recurrent AOM *3 or more episodes of AOM in the previous 6 months or 4 or more episodes in the last 12 months.*	1. **Family Education:** Emphasise the need to take medications as prescribed. Discuss the normal language development milestones and the importance of going to the health centre if their child develops ear discharge. 2. **Medical:** Families of infants should be given the option of treatment with daily amoxycillin for a period of 3-6 months (25-50mg/kg 1-2 times daily). This will reduce further episodes of AOM by about 50% and risk of perforation by about 40%.
7. CSOM *Persistent discharge with an easily visible TM perforation.*	1. **Family Education:** Emphasise the need to take medications as prescribed and that treatment may need to continue for a long time. Explain that only profuse discharge will be visible outside of the ear canal. Discuss the normal language development milestones and the importance of going to the health centre if the ear discharge gets worse. 2. **Medical:** Clean the ear canal with dry mopping, syringing or suction. Dry and add ciprofloxacin eardrops (2-5 drops 2-4 times a day). Continue until ear has been dry >3 days. Review 1-2 times weekly. Prolonged periods of the treatment may be necessary. Treatment is successful in up to 50% of children in some remote settings. If no improvement despite good compliance, consider admission to hospital for IV antibiotic treatment. 3. **Audiological:** Hearing loss usually around 35dB. Monitor for delay in language development. If hearing loss is 20-35dB the child will benefit from classroom sound-field amplification and enhanced communication strategies. If hearing loss >35dB, also refer for hearing aids.

8. Dry Perforation *Perforation without any discharge for less than 3 months.*	1. **Family Education:** Advise the family about the likely hearing loss (varies from normal if perforation small to >40dB if very large) and the need to re-examine the child in 3 months time (see chronic dry perforation below). Discuss the normal language development milestones and the importance of presenting early to the health centre if their child develops ear discharge.
9. Chronic Dry Perforation *Perforation without any signs of discharge for greater than 3 months.*	1. **Family Education:** Advise the family about the likely hearing loss (varies from normal if perforation small to >40dB if very large) and the need to organise a hearing test. Treatment will be influenced by the level of hearing loss in the better hearing ear. Discuss the normal language development milestones and the importance of going to the health centre if the child develops ear discharge. 2. **Medical:** If hearing loss >35dB or having frequent infections with discharge, refer to ENT surgeon for consideration of eardrum repair. 3. **Audiological:** Monitor for delay in language development. If hearing loss is 20-35dB, the child will benefit from classroom sound-field amplification and enhanced communication strategies. If hearing loss >35dB, refer for hearing aids.

SECTION A:

Prevention of Otitis Media and Hearing Loss

SECTION A: PREVENTION OF OTITIS MEDIA AND HEARING LOSS

Prevent the occurrence of otitis media and hearing loss in Aboriginal and Torres Strait Islander children

STRATEGY	RECOMMENDATION AND GRADING	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
Anticipatory Guidance	**GPP*: Tell all expectant mothers** about the importance of prevention, early detection and treatment of OM for prevention of OM associated hearing loss. The potential effects on language and education should be emphasised.		
Encourage Early Interventions	**GPP: Ensure that information about OM** and effective communication strategies for people with hearing loss is available throughout the community.	IV[25;29;59;60]	I~A[15]
	GPP: Tell the families/caregivers that:		
	• Onset of OM in Aboriginal infants may occur within the first months of life. The early onset of OM is associated with high risk of: » Persistent OME » CSOM » Hearing loss.	IV[25;29;59-63]	I~A[16]
	• Children are at increased risk of AOM during other upper respiratory infections.	IV[5;6;64]	I~A[15;16;18;19] I~B[23]
	• To attend the health centre as soon as possible whenever a child develops ear pain or discharge, particularly if the child is young.	IV[5]	I~A[16]

*GPP = Good Practice Point

Encourage Early Interventions *continued*	• Some features of OM (such as ear pain) may be absent, and that regular health centre attendance for ear examinations is recommended.	IV[61;65;66]	I~B[23]
	• All forms of OM are associated with some degree of hearing loss.	IV[8]	I~A[15]
	• Hearing loss can affect the development of speech and language skills. Additional language stimulation is very important for normal language development.	IV[67-69]	I~A[18] I~B[23]
	• (If applicable) certain babies are at high risk for development of OM and its consequences (e.g. those with cleft palate and other craniofacial abnormalities, foetal alcohol syndrome, fragile X syndrome, Down syndrome).	IV[5;28]	I~A[16;17;19]
Breast Feeding	**GPP: Encourage mothers** to continue breast feeding for at least 6 months to reduce the risk of OM.	IV[5;25;26;55;70]	I~A[15;16;18]
Personal Hygiene	**GPP: The health practitioner should tell families or caregivers** that nasal discharge carries germs (viruses and bacteria) which are responsible for OM. Children should wash and dry their hands after blowing their noses or coughing. Children's faces and hands should be kept clean of nasal discharge. Frequent hand washing is also recommended.	IV[5;39;71-73]	I~A[16] I~B[23]
Vaccination	**Grade A: Give pneumococcal conjugate vaccination** during infancy according to local immunisation schedule to reduce AOM, rAOM and the need for surgery.	I[37;74-78;5;29]	I~A[16]
	Grade B: Give influenza vaccination according to local immunisation schedule. This may be beneficial if given just before the flu season.	I[38;79;58;5;29]	I~A[16]
Pacifier	**Grade B: Tell the families/caregivers** that the use of a pacifier (dummy) after 6 months of age can increase the risk of OM.	II[26;25;28;55;87]	I~A[15;16;19]

Swimming	**Grade D:** Swimming should not be discouraged routinely. If swimming is known to be associated with new or persistent ear infections in an individual, it is reasonable to recommend keeping the ear dry.	III[80-82]	I~A[18]
Smoking	**GPP: Strongly discourage** people from smoking around children.	IV[55;83-86]	I~A[15;16;18]
Bottle Feeding	**GPP: Tell the families/caregivers** that if the child is bottle-fed, the upright position is recommended.	IV[6;25;88]	I~A[15;16;18] I~B[23]

SECTION B:

Diagnosis of Otitis Media

SECTION B: DIAGNOSIS OF OTITIS MEDIA

Facilitate early detection of persistent otitis media and associated hearing loss to avoid possible adverse effects

STRATEGY	RECOMMENDATION AND GRADING	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
Otitis Media Surveillance	**GPP:** Ear examination for OM should be part of the clinical assessment of children.	IV[29;31]	I~A[19]
	GPP: Health staff should undertake ear examinations when they do regular child health checks. Accurate surveillance of OME usually requires pneumatic otoscopy or tympanometry.		
Hearing Loss, Speech and Language Surveillance	**GPP:** Monitor for hearing loss in all children younger than 5 years and in older children at high risk of hearing impairment. Assessment tools include simplified parental questionnaires, pneumatic otoscopy and tympanometry (in children older than 4 months).	IV[30]	I~A[16]
	GPP: Refer for hearing tests if there are parental or teacher concerns about hearing or behaviour or learning. The following milestones are an appropriate indication for immediate referral to a paediatrician and an audiologist: • 3-6 mo: not communicating by vocalising or eye gaze • 9 mo: poor feeding or oral co-ordination • 12 mo: not babbling • 20 mo: only pointing or using gestures (i.e. not speaking)		I~A[16;17]

Hearing Loss, Speech and Language Surveillance *continued*	• 24 mo: using <20words, not following simple requests • 30 mo: no two word combinations.		
Otoscopy	**Grade A:** 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.	I[53;56;89;90;5;28;29;31;91]	I~A[16;18;19]
	GPP: Otoscopy requires a clear view of the TM. Syringing or cleaning with tissue spears may be required to remove wax, pus or foreign bodies from the ear canal.	IV[29]	I~A[19]
	GPP: Cleaning pus from the ear canal with correctly prepared tissues spears can be done by anybody. Syringing with clean warm water can be done by appropriately trained individuals. Cleaning with canal instruments can be done by appropriately trained individuals using direct vision (e.g. a head-light, 'LumiView' or operating microscope). Suctioning by a trained health care professional may also help to obtain a clear view of the eardrum.		I~A[18]
	GPP: Choose the largest diameter otoscope tip that will fit comfortably in the child's ear.		
	Grade A: A bulging, cloudy or distinctly red TM are the most consistent signs in the diagnosis of AOM.	I[53;56;5;28;25;29]	I~A[15;19] I~B[23]
	Grade A: Lack of acute inflammation despite visible fluid through an intact TM indicates OME.	I[53;5;6;25]	I~A[19] I~B[23]

Otoscopy *continued*	**GPP:** The duration of discharge should be noted. Consideration to be given to documenting the size and position of the TM perforation. This will allow distinction of AOM with perforation from CSOM and the assessment of progression of the disease. AOM with perforation is most common in the first 18 months of life.		I~A[13]
	GPP: All episodes of OM managed by the health clinic (and all associated test findings) should be documented in the medical record.		I~A[16]
Tympanometry	**Grade A:** In cases where the diagnosis of OME is uncertain, tympanometry can be used as an adjunct to otoscopy.	I[53;31;92;5;25;30;93-95]	I~A[15;19]
	GPP: For children at least 4 months of age, tympanometry with a standard 226Hz probe tone is reliable. Infants younger than 4 months may require specialised tympanometric equipment with a higher probe tone frequency.	III[96;97]	I~A
	Grade A: A type B tympanogram (flat) may be used to confirm a clinical diagnosis of OME.	I[53;92;25;30;93;98]	I~A[19]
	Grade A: A type A or type C tympanogram (peaked) may be used to confirm a clinical diagnosis of no OM.	I[53;30;25;98]	
Pneumatic Otoscopy	**Grade A:** Pneumatic otoscopy is the most accurate method of ear examination. It assesses TM mobility. It is recommended for confirming a diagnosis of OME and AOM.	I[53;5;28;30;25;91;93;94]	I~A[15;18;19]

Video Otoscopy	**GPP:** Video otoscopy (if available) should be used. Pneumatic video otoscopy is always the preferred option. Video otoscopy has the following advantages: • It provides objective documentation of ear disease and progress over time. • It facilitates review of diagnosis by experts at other locations. • It helps the families/caregivers to better understand middle ear disease.	III[89;90;91;99;100]	
Acoustic Reflectometry	**Grade C:** Acoustic reflectometry is another test that may assist in determining the presence of fluid in the middle ear.	I[31;97;30;101;102]	I~A[15;19]
Hearing Assessment	**GPP:** Neonatal hearing screening aims to detect early, permanent hearing loss. Families and staff should be aware that a 'Pass' on a neonatal hearing screen does not guarantee that the child's hearing will remain adequate for communication development.	III[103-105;106]	
	GPP: A child can develop (or have deterioration of) sensorineural or conductive hearing loss at any age.	IV[103;106]	
	GPP: Any child with either bilateral OM (all types) persisting longer than 3 months or suspected hearing loss should be referred to an audiologist for a full hearing assessment.	IV[5;6;28;25]	I~A[18;13] I~B[23]
ENT Assessment	**GPP:** Any child with OME and hearing loss persisting longer than 3 months should be referred to an ENT specialist.	IV[25]	I~A[18]

SECTION C:

Prognosis – What to Expect Following Otitis Media

SECTION C: PROGNOSIS

Improve family understanding of the likely outcomes of illness to raise awareness and avoid possible adverse effects of persistent otitis media and persistent hearing loss

DIAGNOSIS	RELEVANT INFORMATION	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
OME	**Tell the families/caregivers that:**		
	• Persistent OME is a frequent complication of episodic OME or AOM in populations at high risk of CSOM (see definition).	II[63;5;6]	I~A[17;18]
	• OME frequently resolves spontaneously within a 3 month period in populations at low risk of CSOM.	II[107;108;5;6;25]	I~A[17]
	• Conductive hearing loss (CHL) in OME may be either 'mild' or 'moderate'. It is expected to return to normal when middle ear effusion/fluid resolves. The average hearing loss associated with OME is around 25dB.	II[8;5;6;30]	I~A[17]
	• Hearing loss will be greater in bilateral OME, or where a fluid level or bubbles behind the TM are not visible.		
AOM	**Tell the families/caregivers that:**		
	• AOM may occur as early as within the first few weeks of life. It is most often asymptomatic in populations at high risk of CSOM. Discharge from the perforated eardrum may be the first sign of disease in this group of children.	I[53;11;5;25;61]	
	• Spontaneous resolution of AOM to OME is much less likely in populations at high risk of CSOM.	II[65;5;28]	
	• AOM frequently resolves spontaneously in populations at low risk of CSOM. Mastoiditis, meningitis and cerebral abscess are all recognised complications of AOM, but are uncommon.	II[30;5;28]	I~A[16;19;14]

AOMwiP	**Tell the families/caregivers that:**	
	• In populations at low risk of CSOM, very few children develop spontaneous perforation of the TM.	II[35;5;28]
	• AOMwiP is a frequent occurrence in populations at high risk of CSOM. It may lead to CSOM if not treated appropriately.	I[53;61;66;5]
rAOM	**Tell the families/caregivers that:**	
	• Recurrent or persistent AOM or AOMwiP in populations at high risk of CSOM is a condition that requires commitment and dedication to manage effectively.	III[109]
CSOM	**Tell the families/caregivers that:**	
	• CSOM is difficult to treat in high risk populations. Management is long-term (often months) and aimed at reducing the incidence of permanent hearing disability and suppurative complications.	III[7;27]
	• In populations at low risk of CSOM, very few acute perforations progress to CSOM. In these populations, children more commonly develop CSOM as a complication of grommet insertion (tympanostomy tube) or underlying immunodeficiency.	III[54;5;27;29]
	• CHL associated with eardrum perforation may be as high as 60dB. The hearing loss depends on the size and position of the perforation and the amount of discharge.	II[5;27;29]
	• There is an increased risk of sensorineural hearing loss with recurrent or persistent CSOM.	II[7;8;27]
	• In combination with an underlying conductive loss, persistent CSOM can lead to a moderate to severe mixed hearing loss.	II[7;8;27]
Dry Perforation	**Tell the families/caregivers that:**	
	• People with dry perforations are at risk of further infections associated with new discharge. This can lead to CSOM.	

Hearing Loss as a Consequence of OM

Tell the families/caregivers that:

• 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.	II[6;27]	
• Permanent CHL can occur as a result of recurrent, acute or chronic inflammation, TM perforation or adhesions, ossicular discontinuity, fixation or erosion.	II[8;6;27]	
• Some Indigenous Australian children with 'mild' conductive hearing loss are much more disadvantaged than other children. Their hearing impairment may be exacerbated by: » very early onset » 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 Indigenous Australian languages and standard English.		I~A[21]

SECTION D:

Medical Management of Otitis Media

SECTION D: MEDICAL MANAGEMENT OF OTITIS MEDIA

Facilitate resolution or prevent progression of otitis media and hearing loss to minimise possible adverse effects

Management of Episodic Otitis Media with Effusion (OME)

(Unilateral OME or bilateral OME for <3 months)

STRATEGY	RECOMMENDATION AND GRADING	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
Patient and Family Education	**Grade B: Tell families/caregivers that** episodic OME is very common in all populations. No investigation or treatment is required for episodic OME. If the bilateral OME is present, check the medical records to make sure it has not been persistent.	II[8;5;6;29]	I~A[17;19;14]
Medical Review	**GPP: Repeat the ear examination** in 3 months to ensure resolution.	III[66;30]	I~A[17;19;14]

Management of Persistent Otitis Media with Effusion (OME)

(Persistent bilateral OME for >3 months)

STRATEGY	RECOMMENDATION AND GRADING	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
Treatment *Antibiotics*	**Grade A:** Antibiotics are not recommended routinely for OME. However, long term antibiotics (e.g. amoxycillin 25-50mg/kg 1-2 times daily for 3-6 months) are an option for infants who are at high risk of developing CSOM. Antibiotics (e.g. amoxycillin) are an option prior to surgical treatment.	I[110;8;5;6;25;60;29]	I~A[18;14] I~B[23]
Other Medical Therapy	**Grade A:** Topical or systemic steroids are not recommended.	I[50;5;6;30;29;111]	I~A[16-18;14]
	Grade A: Antihistamines and decongestants are not recommended.	I[36;5;6;30;29]	I~A[17;18;14]
Autoinflation	**Grade B:** Autoinflation devices are not recommended routinely.	I[46;5;6;29]	I~A[18;14]
Patient and Family Education	**GPP: Tell the families/caregivers to:** • provide a high level of language stimulation to babies and toddlers • encourage early attempts at speaking • encourage early attempts at writing • tell stories and read to young children • participate in their children's early learning at child care centre and pre-school.	IV[67;112;113;114]	I~A[17-19]
	GPP: If talking to a hearing impaired person, make sure you speak slowly (and clearly) after gaining their attention in well-lit conditions. Health educators should use visual prompts.	IV[115;116]	I~A[15] I~B[22]
Medical Review	**GPP: Refer children** with persistent bilateral OME plus speech, language or behavioural problems for hearing evaluation within 3 months.	IV[67]	I~A[13]

Audiology Referral	**GPP: Refer children** for hearing tests when bilateral OME persists for 3 months or longer or at any time if there is concern about a child's hearing. Referral to ENT specialist and/or paediatrician can be made at the same time. Refer to **Section E: 'Audiological Assessment and Management'** for further guidance on: • signs of hearing loss • when to refer for hearing help including aids and devices.	IV[5;6;25]	I~A[13;14;17]
Speech Therapy Referral	**GPP: Refer all the children** with language, learning or behavioural problems for speech therapy.	IV[67;112]	I~A[18;14]
ENT Referral	**Grade A: Consider an ENT assessment** if OME with bilateral hearing loss (>25dB) has been present for 3 months.	I[42;8;57;25]	I~A[16-18;14]
	GPP: Tell families/caregivers about potential benefits (short-term improvement on hearing) and potential risks of ENT surgery (ear discharge, tube extrusion and structural changes with TM). The potential complications of grommet (tympanostomy tube) surgery are much more common in children at high risk of CSOM.	IV[57;6;117] IV[29]	I~A[16;17] I~B[23]
	Grade A: Refer the child (who is not at high risk for CSOM) for grommet insertion if: • the child has a persistent hearing loss >20dB • the parents understand that the operation will provide a modest improvement in hearing for 6-9 months • surgery is consistent with the parents' preferences. The likelihood of benefit from grommets increases with greater levels of hearing loss.	I[42;53;57;5;6;30;25;29]	I~A[17]

ENT Referral *continued*	**GPP: Refer the child (who is at high risk for CSOM) for grommet insertion if:** • the child is >3 years old • the child has persistent hearing loss >35dB • the child has failed medical treatment despite good compliance • the family agrees to attend for treatment if ear discharge occurs • surgery is consistent with the parents' preferences.	IV[29]	
	Grade B: Adenoidectomy plus myringotomy is not recommended routinely.	I[118;119;8;5;6]	I~A[17;13;14]
	Grade A: Tonsillectomy or myringotomy alone is not recommended routinely.	II[119;8;5;6]	I~A[13;14]
	Grade B: Consider referral for adenoidectomy if bilateral OME has occurred despite previous grommet (tympanostomy tube) insertion or if the child is at high risk of CSOM.	I[52;119;29]	I~A[17;13;14]
	Grommets plus adenoidectomy can be an option for children >3 years who have recurrent persistent OME and hearing loss after previous grommet insertion, severe nasal obstruction, or chronic adenoiditis.		I~A[13]

Management of Acute Otitis Media without Perforation (AOMwoP)

(AOM without middle ear discharge)

STRATEGY	RECOMMENDATION AND GRADING	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
Treatment *Pain Relief*	**Grade B: Treat with analgesics** (e.g. paracetamol or ibuprofen) if ear pain is present.	II[120;5;28;25;121]	I~A[16;24] I~B[23]
Antibiotics for populations not at high risk of CSOM	**Grade A: Antibiotic treatment should be considered.** Treat with antibiotics if <2 years of age with bilateral disease, and those with a history of AOM with ear discharge. Antibiotics will only provide a modest benefit for other children in populations not at high risk of CSOM. As most cases will resolve spontaneously, a 'Watch and Wait' strategy should be applied if adequate follow-up can be assured. Alternatively, give the family an antibiotic script that can be filled if the child does not improve within 24-48 hours.	I[35;48;49;54;122;5;28;25;29]	I~A[15;16;18;24] I~B[23]
Antibiotics for populations at high risk of CSOM	**Grade A: Treat with antibiotics** – especially all children <2 years of age with bilateral disease, and those with a history of AOM with ear discharge.	I[35;49;54;5;25;28;29]	I~A[15;19]
	Grade A: Treat with antibiotics (e.g. amoxycillin 50mg/kg 2-3 times daily for 7 days) to reduce the likelihood of prolonged pain or persistent discharge and/or disease.	I[49;53;54;5;28;29]	I~A[16;18] I~B[23]
	GPP: Treat with high doses (e.g. amoxycillin 90mg/kg) if: • recent antibiotic use within 1 month • failure to respond to standard treatment within one week • regions with known penicillin resistance.	IV[5;28;25;123]	I~A[19;14;24] I~B[23]

Treatment *Antibiotics for populations at high risk of CSOM* *continued*	**Grade B: Treat with azithromycin** (30 mg/kg stat) as a second line option if there are other indications for the use of this antibiotic (e.g. presence of trachoma). It should be noted that azithromycin is not currently licensed for use in children under six months of age.	II[65;28;25]	I~A[15;19;23]
Other Therapies	**Grade A:** Decongestants and antihistamines are not recommended routinely.	I[33;53;5;28;29]	I~A[15 24] I~B[23]
	GPP: Alternative medical therapies (insertion of oils, homeopathy etc) are not recommended.		I~A[18;14]
Medical Review	**GPP: Review all children with AOM** after 4-7 days or earlier if there is any deterioration. A further review should take place after completion of therapy. Up to 50% of children will have effusion 1 month post AOM. Further antibiotic therapy is required if children are symptomatic or if there are signs of TM inflammation (i.e. bulging or recent discharge).		I~A[15] I~B[23]
Audiology Referral	**GPP:** Audiometry is not recommended for episodic AOMwoP.		I~A[18]

Management of Acute Otitis Media with Perforation (AOMwiP)

(AOM with middle ear discharge)

STRATEGY	RECOMMENDATION AND GRADING	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
Accurate Diagnosis	**GPP: Document the duration of ear discharge.** Consideration to be given for documenting the size and position of the TM perforation. This allows the assessment of progression of the disease and to guide the use of topical and systemic antibiotics. A video, photograph or drawing is the best way to record size of the perforation.	IV[7]	I~A[13]
Treatment *Oral Antibiotics*	**Grade A: Treat with longer course of antibiotics** (e.g. amoxycillin 50-90mg/kg 2-3 times daily for 14 days).	I[49;53;54;5;28;25]	I~A[15;19;14] I~B[23]
	GPP: Treat with high dose antibiotics (amoxycillin 90mg/kg) or combination therapies (e.g. amoxycillin-clavulanate) if AOM with perforation persists for >7 days.	IV[5;25;25]	
	GPP: Continue treatment with high doses of antibiotics in all children with persistent signs of AOM (with or without persistent perforation).	IV[5;25]	I~A[19]
Topical Antibiotics	**GPP: Add ear cleaning plus topical antibiotics** in children with persistent discharge (despite 7 days oral antibiotics).	IV[5]	
Patient and Family Education	**GPP: Show the families/caregivers** how to clean/dry mop the ears with correctly prepared tissue spears, and also how to maximise effects of ear drops by 'tragal pumping'.		
Medical Review	**GPP: Review weekly** until the signs of AOM have resolved. Also review within 4 weeks after resolution for children at high risk of CSOM.		I~A[15] I~B[23]
	GPP: 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).	IV[27;124]	I~A[16] I~B[23]
Audiology Referral	**GPP:** Audiometry is not recommended for episodic AOMwiP.		

Management of recurrent Acute Otitis Media (rAOM)

(3 episodes of AOM within a 6 months period / 4 episodes within 12 months)

STRATEGY	RECOMMENDATION AND GRADING	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
Prophylaxis	**Grade A: Consider treatment with long-term antibiotics** (e.g. amoxycillin 25-50mg/kg 1-2 times daily) for 3-6 months in children <2 years of age who are at risk of developing CSOM. The decision to prescribe long-term antibiotics should be discussed with the families.	I[41;110;125;8;126;5;28]	I~A[15;16]
	GPP: Long-term antibiotics are not recommended routinely. Long-term antibiotic treatment has been associated with increasing antibiotic resistance.	IV[28]	I~B[23]
ENT Referral	**Grade B: Refer for consideration of grommet surgery if:** • The child is at low risk of developing CSOM • rAOM fails to improve on antibiotic prophylaxis (>3 episodes in 6 months or >4 episodes in 1 year).	I[45;5;28;127]	1~A[16;18;14]
	Grade B: Adenoidectomy is not recommended.	I[52;118;119;8]	

Management of Chronic Suppurative Otitis Media (CSOM)

(OM with persistent middle ear discharge and easily visible eardrum perforation

STRATEGY	RECOMMENDATION AND GRADING	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
Accurate Diagnosis	**GPP: Only diagnose CSOM** in children who have persistent ear discharge over 2-6 weeks and a visible eardrum perforation that allows discharge to pass through easily.	IV[7;27;29;124]	Ì~B[23]
	GPP: If the eardrum has only recently perforated, treatment should follow the AOMwiP recommendations. AOMwiP occurs most commonly in the first 18 months of life. Effective treatment will dramatically reduce the incidence of CSOM.	IV[7;5;61]	
	GPP: Document the duration of ear discharge and size (and position) of any perforation. This allows AOMwiP to be distinguished from CSOM and any progression of severe disease to be monitored. A drawing of the eardrum is often the best way to record size of perforation.	IV[7]	I~A[13]
Treatment *Cleaning*	**GPP: 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. Cleaning must be combined with antibiotic drops in order to reduce the production of more pus.	IV[5;30;25;124;128]	
	Grade A: Treatment with disinfectant (such as betadine and acetic acid) alone is not recommended. Disinfectants alone are not as effective as topical antibiotics.	I[32;44;7;27;124]	
	GPP: Consider referral for suctioning under direct vision if cleaning and syringing have not been effective.		
Topical Antibiotics	**Grade A: Treat with topical antibiotics** (e.g. ciprofloxacin 2-5 drops 2-4 times a day after cleaning) until ear has been dry for at least 3 days. This may require prolonged periods of treatment.	I[44;129;7;5;27;29;124;128]	

Systemic Antibiotics	**Grade A:** Treatment with oral antibiotics (e.g. quinolones) is not recommended routinely. Oral antibiotics are usually less effective than topical treatment.	I[32;27;101;124]	
	Grade B: Consider referral (after 3 months of treatment) for intravenous or intramuscular antibiotics (e.g. ceftazidime twice daily). This will usually require hospitalisation for 2-3 weeks and should be discussed with the local doctor.	I[32;7;124]	
Patient and Family Education	**GPP: Show families/caregivers** how to do 'tragal pumping' (pressing several times on the flap of skin in front of the ear canal). This should always be used after the antibiotics drops are inserted into the ear canal. The topical antibiotic treatment will only work if it can be pushed through the perforation.		
	GPP: Tell families/caregivers to: • provide a high level of language stimulation to babies and toddlers • encourage early attempts at speaking • encourage early attempts at writing • tell stories and read to young children • participate in their children's early learning at child care centre and pre-school.	IV[67;112;113;114]	I~A[17-19]
	GPP: If talking to a hearing impaired person, make sure that you speak slowly and clearly after gaining their attention in well-lit conditions. Health educators should use visual prompts.	IV[115;116]	I~A[15] I~B[22]
Medical Review	**GPP: Review 1-2 weekly** until the signs of CSOM have resolved. A further review 4 weeks after resolution is recommended.		
Audiology Referral	**GPP: Refer the patient for audiological management** when unilateral or bilateral CSOM persists for 3 months or longer.	IV[27;124]	

Audiology Referral *continued*	**GPP:** Audiometry referral is also recommended at completion of treatment to inform further referral pathways, or at any time when families or others are concerned about a child's hearing. **Refer to Section E: Audiological Assessment and Management** for further guidance on: • signs of hearing loss • when to refer for hearing help including aids and devices.		
Speech Therapy Referral	**GPP: Refer all the children** with language, learning or behavioural problems for speech therapy.	IV[67;112]	
ENT Referral	**GPP: Refer to an ENT specialist** anyone who fails prolonged medical therapy (e.g. ciprofloxacin 2-5 drops 2-4 times a day after cleaning for 4 months). The ENT specialist is able to 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.	IV[7;130;27;131]	I~A[16]

Management of Dry Perforation

(Presence of a perforation in the eardrum without any discharge)

STRATEGY	RECOMMENDATION AND GRADING	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
Patient and Family Education	**GPP: Tell people with dry perforations** to attend the clinic for oral and topical antibiotics as soon as any new episodes of discharge occur.		
	GPP: Tell families/caregivers to: • provide a high level of language stimulation to babies and toddlers • encourage early attempts at speaking • encourage early attempts at writing • read to young children • participate in their children's early learning at child care centre and pre-school.	IV[67;112;113;114]	I~A[17-19]
	GPP: If talking to a hearing impaired person, make sure that you speak slowly and clearly after gaining their attention in well-lit conditions. Health educators should use visual prompts.	IV[115;116]	I~A[15] I~B[22]
Audiology Referral	**GPP: Refer for hearing test** when dry perforation persists for 3 months or more (or to monitor effects of any surgical interventions).		
Speech Therapy Referral	**GPP: Refer all the children** with language, learning or behavioural problems for speech therapy.	IV[67;112]	
ENT Referral	**Grade C: Refer to an ENT specialist:** • all children >6 years with a dry perforation persisting for >6-12 months • those with significant conductive hearing loss (>20dB) or recurrent infections.	III[130;5;131;132]	
	GPP: Tell teenagers and adults with persistent dry perforation about possible tympanoplasty and potential restoration of hearing after this operation.	IV[7;27]	I~A[19]

SECTION E:

Audiological Assessment and Management

SECTION E: AUDIOLOGICAL ASSESSMENT AND MANAGEMENT

Enhance hearing, communication and access to relevant information

STRATEGY	RECOMMENDATION AND GRADING	EVIDENCE STUDIES	EVIDENCE-BASED GUIDELINES
When to Perform Audiology Assessment	**GPP: Tell families/caregivers** that hearing assessment is recommended for the following reasons: • confirmation of middle ear condition • diagnosis of degree and type of hearing loss • recommendation for ongoing clinical care • monitoring the outcomes of interventions on the peripheral hearing system • planning hearing and communication (re)habilitation. Audiological assessment contributes different information at each stage in the disease process and the treatment progress.		I~A[15]
Choice of Audiology Assessment	**GPP: Tell families/caregivers** that hearing can be evaluated at any time after birth. The type of assessment depends upon the: • age of the child • disease stage/state • treatment, referral or (re)habilitation objective(s) • access to skills and equipment. Valid hearing assessment requires a quiet test environment.	IV[133]	I~A[20]

Screening and Surveillance	**GPP:** Hearing screening at school entry in populations with near-universal OM and CHL is not recommended. Hearing screening in older asymptomatic children (single pass/fail assessment) is not recommended. **Regular surveillance** (with appropriate testing when indicated) is preferred to school entry screening.	IV[5;134;47]	I~A[15]
	GPP: Put the children with recurrent, persistent and chronic OM conditions on a review register. These children should be assessed as recommended in these guidelines specific to the OM diagnosis.		
Signs of Hearing Loss	**GPP: Tell families/caregivers** that the most obvious clue to the presence of the hearing loss is a history of OM. Hearing loss may have been present for some time before noticeable signs are observed and reported.	IV[135]	I~A[14]
	GPP: Observe and ask questions about hearing behaviors: • Babies and toddlers with hearing loss might not respond to quiet voices, might not startle in response to loud sounds and might speak later or less clearly than their peers. • A child or adult with a mild or moderate hearing loss might appear to 'hear when they want to' or intermittently. Such a loss is particularly affected by: » the presence of background or competing noise » use of second language » new and unfamiliar speakers » new and unfamiliar words or concepts » being at a distance from the speaker. Hearing loss in cross cultural settings can lead to inappropriate assumptions. People might judge a person with hearing loss to be 'inattentive', 'uninterested', 'rude' or 'stupid'.	IV[136]	

Effects of Hearing Loss	**GPP: Tell families/caregivers that** hearing loss affects verbal and written communication. It is associated with: • impaired first language acquisition • impaired second (and later) language acquisition • inability to follow complex verbal instructions and understand complex verbal information • poor auditory attention – inability to sustain attention • slow progress at school leading to limited literacy and numeracy • poor educational outcomes and subsequent limited access to post-secondary education and training • high rates of unemployment or low employment status • impaired social relationships.	IV[68;137;138]	
Enhancing Language Acquisition	**GPP: Encourage families/caregivers to:** • provide a high level of language stimulation to babies and toddlers • encourage early attempts at speaking • encourage early attempts at writing • tell stories and read to young children • participate in their children's early learning at child care centre and pre-school. Children with hearing loss often benefit from a quiet environment and additional language stimulation.	IV[67;112;113]	I~A[16;18]
Recommended Educational and Rehabilitation Support	**GPP: Tell people** working with children (e.g. in child care centres, kindergartens, schools) about the high rates of hearing loss and factors affecting hearing in educational settings.	IV[113]	I~A[20]

Recommended Educational and Rehabilitation Support

continued

GPP: Tell caregivers and teachers that for children with ongoing mild hearing loss averaging <35dB, the most common forms of intervention include:

- sound-field amplification systems in the classroom
- preferential seating and use of complimentary visual information.

GPP: Tell caregivers and teachers that for children with ongoing mild to moderate hearing loss averaging >35dB, the most common forms of intervention include:

- sound-field amplification systems in the classroom
- personal hearing aid
- visual cues (lip-reading, body language and hand talk), raised speech volume (amplification) and contextual cues in the classroom
- auditory training
- language stimulation and speech correction at home and school.

GPP: Tell caregivers and teachers that children with severe and profound hearing loss averaging >65dB must urgently receive:

- personal hearing aid
- auditory training
- intensive speech therapy
- support from teachers of the deaf for the development of all language skills.

GPP: Tell families that they can enhance their children's learning at school by providing support at home.

Written ENT specialist advice is required to advise whether there are any medical contraindications to the fitting of personal amplification.

Recommended Educational and Rehabilitation Support *continued*	In the choice of hearing device audiologists will consider the following factors: • presence of discharge • stability of middle ear • parent/caregiver/child wishes • the impact of the hearing loss on the child's life • other medical and cultural factors.		
Communicating with a Hearing Impaired Person	**Grade C: If talking to a hearing impaired person**, make sure that you speak slowly and clearly after gaining their attention in well-lit conditions. Health educators should use visual prompts and cues and public address systems if available.	III[115;116]	I~A[15] I~B[22]
	GPP: Use listening devices to assist communication with hearing-impaired patients.		
	GPP: Speak in the patient's language (or use interpreters) to communicate important messages. Try to establish why communication is breaking down e.g. hearing, language or cultural differences?		
Speech Therapy	**GPP: Refer to a speech pathologist** all children suspected of speech and language delay (see list of behaviours to observe under 'Diagnosis of OM').		

SECTION F-1:

Practical Considerations in Health Care Delivery

SECTION F-1: PRACTICAL CONSIDERATIONS IN HEALTH CARE DELIVERY

Address implementation issues and barriers to ensure effective, high quality care for all clients

STRATEGY	RELEVANT INFORMATION
Effective Prevention	**Severe OM is usually a disease of poverty.** Improved living standards, maternal education, breast feeding, provision of a smoke free environment and pneumococcal vaccination will decrease rates of acute perforation and CSOM.
	Awareness among families and teachers for early identification of language, learning and behavioural problems, early hearing assessment and appropriate management is very important for the prevention of OM related hearing loss and its consequences.
	Interpreters should be used whenever possible if English is not the first language of the family.
	A video otoscope can assist in helping patients and families to understand ear disease. This may lead to greater engagement in its prevention and management.
	Aboriginal Health Workers are the main workforce delivering primary care services in remote communities. Training and support should be provided for all health staff to increase adherence to the strategies for improve prevention, diagnosis and management of OM.
	Additional community-based ear workers may be required to sustain hearing health education programs.
Effective Diagnosis	**Training is required for staff** (including all health workers, nurses and GPs) in the following diagnostic instruments. Training should also cover the appropriate interpretations of results.
	A tympanometer or a wall mounted pneumatic otoscope is essential equipment for all Community Health Centres. Specific instruction on how to examine young children should be provided. This equipment can help to assess middle ear aeration. It supports the accurate diagnosis of OME.
	A video otoscope is useful for informing family members about ear problems, for recording changes in the eardrum over time, and for transmitting images for diagnostic review (tele-otology).

Effective Diagnosis *continued*	**A 'LumiView'** (or similar instrument for hands-free illumination of the ear canal) allows thorough cleaning of the canal under direct vision. This can greatly improve the visualisation of the TM.
	A pure-tone audiometer enables trained staff (ear health workers, Aboriginal Health Workers and remote nurses) to perform hearing tests. Diagnostic hearing assessments should only be performed by qualified, trained audiologists or audiometrists.
	Standardised, calibrated audiometers and a quiet environment are required for pure tone audiometry. Do not perform hearing tests if a very quiet room is not available (e.g. heavy rain outside).
	Referral to a major regional hearing centre is required to determine level of hearing loss in children <3 years of age. Referral to a major regional hearing centre is also required for all children with hearing loss >25dB.
	Telehealth strategies may results in better diagnosis and management as well as opportunities for ongoing training and support.
Effective Management	**Early intervention** for detection of OM (and related hearing loss and its consequences) should be made a priority for infant and early childhood health and education programs. Formal collaboration between local health clinics and education services is recommended.
	Compliance with treatment is essential to achieve expected outcomes. Combinations of appropriate patient instruction, reminders, close follow-up, supervised self-monitoring and rewards for success are recommended.
	Refrigeration of antibiotics may represent a problem for some families. This issue should be addressed at the time of initial treatment and options proposed e.g. supervised dosing, use of intramuscular antibiotics, single dose azithromycin or use of antibiotic sachets to be made up by families.
	A strategic plan for the management of OM and hearing loss in individual communities should be developed by local health and education staff. This should be supported by regional and visiting specialist staff. Ideally, this should be evaluated regularly using the available process and outcome indicators.
	Additional process indicators (e.g. frequency of assessment, detection, treatment, and referral) should be considered in order to monitor the level of service. Each indicator should be defined to ensure that they can influence continuous quality improvement without being a burden. Health Centre record reviews can help in monitoring levels of activity.

Effective Management *continued*	
	Disease registers (clinic-based recall and reminder systems) are recommended for all chronic illnesses that improve with adherence to a structured treatment plan. Health practitioners should consider putting all children with CSOM and persistent hearing loss on disease registers (local clinic-based recall and reminder systems). This can be used to ensure regular review and to follow clinical progression or resolution of the disease. Disease registers may also include clear information on all diagnostic findings, results of hearing assessment and other tests; treatments given, referral notes and findings. They should support two way communication between primary care and audiology/ENT/speech services. There should be a written ENT management plan available after each ENT procedure. The visiting ENT surgeon should be available via phone/email for post operative concerns.
	Access to specialist services (Audiology and ENT) is essential in the provision of comprehensive care. When referral to an audiologist for full hearing assessment is necessary (and if they cannot be seen locally), the family should be given the option of travelling to a major centre. Where referral is indicated, the hearing test should occur within 3 months, and review by an ENT surgeon should occur as soon as possible and within 6 months.
	Access to speech therapy is essential for those children who suffer from speech and language problems. The primary care workers should be given information about the 'Education Services' and 'Disability Support Units', and how to access other relevant services in their region.
	Schools and other educational services should be aware of educational resources that are locally available. This would include the access to Health Centres, 'Teachers of the Deaf', 'Advisory Visiting Teachers', and sound field amplification systems.
	Hearing assessments in regional centres may need to be booked in conjunction with a medical appointment to ensure that travel assistance is available.
	ENT surgeons are responsible for ensuring that a post-operative management plan is available for each individual who has surgery. Written recommendations should be discussed with the appropriate health care providers.

SECTION F-2:

Prioritisation of Primary Health Care Services in Different Settings

SECTION F-2: 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. 2) **Encourage** breast feeding, avoidance of passive smoking exposure and reducing exposure to germs (through frequent hand and face washing and drying). 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). 2) **Distinguish** between AOMwiP and CSOM by history and review of medical record. 3) **Use syringing/suctioning** if required to obtain clear view of TM for more accurate diagnosis. 4) **Refer (or send video images) for second opinion** if there is a doubt about the diagnosis.

Effective Management	
	AOMwiP 1) **Organise weekly review** and update register (local clinic-based recall and reminder systems) of affected children every month. 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. 3) **Ensure that the ear cleaning is effective** and that the antibiotic drops are being pushed through the perforation. 4) **Review** strategies to improve adherence with recommended treatment. 5) **Discuss option of long-term antibiotics** with family. This would continue even after the episode of AOMwiP has resolved. 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. 2) **Ensure that topical ciprofloxacin** (2-5 drops 2-4 times a day) is being given after ear cleaning. 3) **Ensure that the cleaning is effective** and that the antibiotic drops are being pushed through the perforation. 4) **Review** strategies to improve adherence with recommended treatment. 5) **Discuss option of long-term antibiotics** with family. This would continue even after the episode of CSOM has resolved. 6) **Refer for hearing assessment** after 3 months or at any time there are concerns. 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 >25dB (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. 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. 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. 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 guidelines. 2) **Review** regularly (3-6 monthly). 3) **Tell families/caregivers and teachers** that children's listening may be affected in the following situations: » being far away from person speaking » background or competing noise » use of a second language » new and unfamiliar speakers » new and unfamiliar words or concepts. 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. 5) **Recommend sound-field classroom amplification** and use any amplification devices recommended by the audiologist.

Effective Management *continued*	6) **Advise family** to participate actively in learning and language development. 7) **Repeat** hearing tests after 3 months. 8) **Refer to an ENT specialist for:** » grommet insertion for persistent OME » 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. 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. 2) **Document** duration of discharge and preferably size (and position) of the eardrum perforation (if possible). 3) **Use syringing/suctioning** if required to obtain clear view of TM for accurate diagnosis. 4) **Refer (or send video images) for second opinion** if there is doubt about diagnosis. 5) **Refer for hearing assessment**.
Effective Management	1) **Organise 1-2 weekly reviews** and updates (local clinic-based recall and reminder systems) register of affected children every month. 2) **Ensure that topical ciprofloxacin** (2-5 drops 2-4 times a day) is being given after ear cleaning. 3) **Ensure that ear cleaning is effective** and make sure that the antibiotic drops are being pushed through the perforation. 4) **Review s**trategies to improve adherence with recommended treatment. 5) **Consider** hospitalisation for parenteral antibiotic if there is no response to topical antibiotic treatment after 16 weeks. 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. 7) **Recommend sound-field classroom amplification** and support use of amplification devices recommended by the audiologist.

Effective Management *continued*	8) **Advise family** to participate actively in learning and language development. 9) **Refer to an ENT specialist** if the diagnosis is uncertain or there is no response to medical therapy. 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 >35dB 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. 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). 2) **Distinguish** between bilateral persistent OME, dry perforation and other TM abnormalities (like scarring or severe retraction). 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. 2) **Refer for appropriate hearing aid**. 3) **Recommend effective communication strategies**. 4) **Recommend auditory training support** from speech therapist. 5) **Recommend language stimulation** and speech correction at home and school. 6) **Repeat hearing assessment** after 3 months. 7) **Refer to an ENT specialist for:** » grommet insertion for persistent OME » myringoplasty for dry perforation. 8) **Organise a repeat medical review** after 3 months and update register (local clinic-based recall and reminder systems) of affected children regularly.

METHODS USED IN DEVELOPING THE GUIDELINES

Aim

To develop a series of clear recommendations relevant to the clinical care of Aboriginal and Torres Strait Islander Australians that are:

i) based on the best available evidence

ii) acceptable to a multi-disciplinary expert panel experienced in this area

iii) presented in plain English and incorporated into algorithms.

Identification of Important Clinical Care Questions

The information contained within the 'Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations - March 2001' was reviewed and compared to the available new high quality evidence-based guidelines and systematic reviews. Additional draft recommendations were suggested by the Darwin Otitis Guidelines Group and the Technical Advisory Group. These statements were then converted into evidence-based clinical questions. These questions were answered using the best available evidence identified by the search strategy used in the Recommendations of March 2001 and updated by the Guidelines Group in April 2010. The final recommendation had to be consistent with this evidence.

Search Strategy

We used a hierarchical approach to identify the best available evidence relevant to the recommendations. The search strategy described in Phase 1 was used to find all the relevant evidence-based guidelines, evidence summaries and systematic reviews. The search strategy described in Phase 2 was used to find well-designed original studies relevant to the management of OM published since 2001. These searches were modified versions of the filters available through Clinical Queries in PubMed (US National Library of Medicine). For clinical questions that were not addressed in the original Guidelines, the search strategy was extended to cover studies published prior to 2001 (in the Cochrane Library and MEDLINE database).

Phase 1

1. otitis OR hearing loss

in the National Guideline Clearinghouse, Agency for Healthcare Research and Quality, Canadian Medical Association Clinical Practice Guidelines, the Guide to Clinical Preventive Services, (2nd edition), Centres for Disease Control and Prevention, Scottish Intercollegiate Guidelines Network, the UK Health Technology Assessment, and the World Health Organization (accessed via the NIHR HTA programme http://www.hta.ac.uk/, the National Guideline Clearinghouse

http://www.guidelines.gov/, and the WHO http://www.who.int/ on 1st April 2010).

2. (otitis [MeSH Terms] OR otitis [Text Word] OR hearing loss, partial [MeSH Terms] OR deafness [Text Word] OR hearing loss [Text Word]) AND practice guideline [PTYP]

in MEDLINE (accessed via PubMed on 1st April 2010).

3. Handsearch of "Evidence-Based Otitis Media"[8] and "Clinical Evidence, April 2010."[6;27;28]

4. (otitis [MeSH Terms] OR otitis [Text Word] OR hearing loss, partial [MeSH Terms] OR deafness [Text Word] OR hearing loss [Text Word])

in the Cochrane Library, Issue 2, 2010 and limited to reviews (accessed on 1st April 2010).

5. (otitis [MeSH Terms] OR otitis [Text Word] OR hearing loss, partial [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 medline [Text Word]) OR (review [PTYP] AND systematic* [Text Word]) OR overview [Text Word])

in MEDLINE (accessed via PubMed on 1st April 2010).

Phase 2

6. (otitis [MeSH Terms] OR otitis [Text Word] OR hearing loss, partial [MeSH Terms] OR deafness [Text Word] OR hearing loss [Text Word])

in the Cochrane Library, 2010 and limited to studies listed in the Controlled Clinical Trials Register and published since 2001 (accessed on 1st April 2010).

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

8. (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]))

9. (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])

in MEDLINE and limited to publications since 1997 (accessed via PubMed on 1st April 2010).

10. otitis OR hearing loss

in the Aboriginal and Torres Strait Islander Health Information database and limited to publications since 1997 (accessed via http://www.healthinfonet.ecu.edu.au/ on 1st April 2010).

Result of Search

A thorough literature search identified more than 300 articles. Additional references were identified by group members and peer reviewers. All material was assessed and evidence synthesised in accordance with NHMRC methodology. Material not deemed to be of sufficient quality was discarded. Overall, we identified 51 evidence-based guidelines, reviews, and summaries: 12 evidence-based guidelines,[13-24] 10 clinical evidence reports,[5-7;25-31] 1 evidence-based text-book,[8] 21 Cochrane Systematic Reviews,[32-52] and 7 other systematic reviews.[2;53-58] Nearly all of these were new publications. When necessary, we extended our search prior to 2001 to address new clinical questions. On the basis of this explicit search, we prepared 116 recommendations. Out these, we have 23 recommendations which are based on Cochrane Systematic Reviews. Those recommendations which are not evidence-based, but considered to be good practice by the expert panel, have been labelled as Good Practice Points (GPP).

Links to Best Available Evidence

Each recommendation has been explicitly linked to the level of evidence on which it is based. All relevant Level I Evidence Studies and Guidelines have been referenced. Selections of the best Level II, Level III and Level IV Evidence Studies have also been referenced. The source of expert opinion for Good Practice Points has not been referenced.

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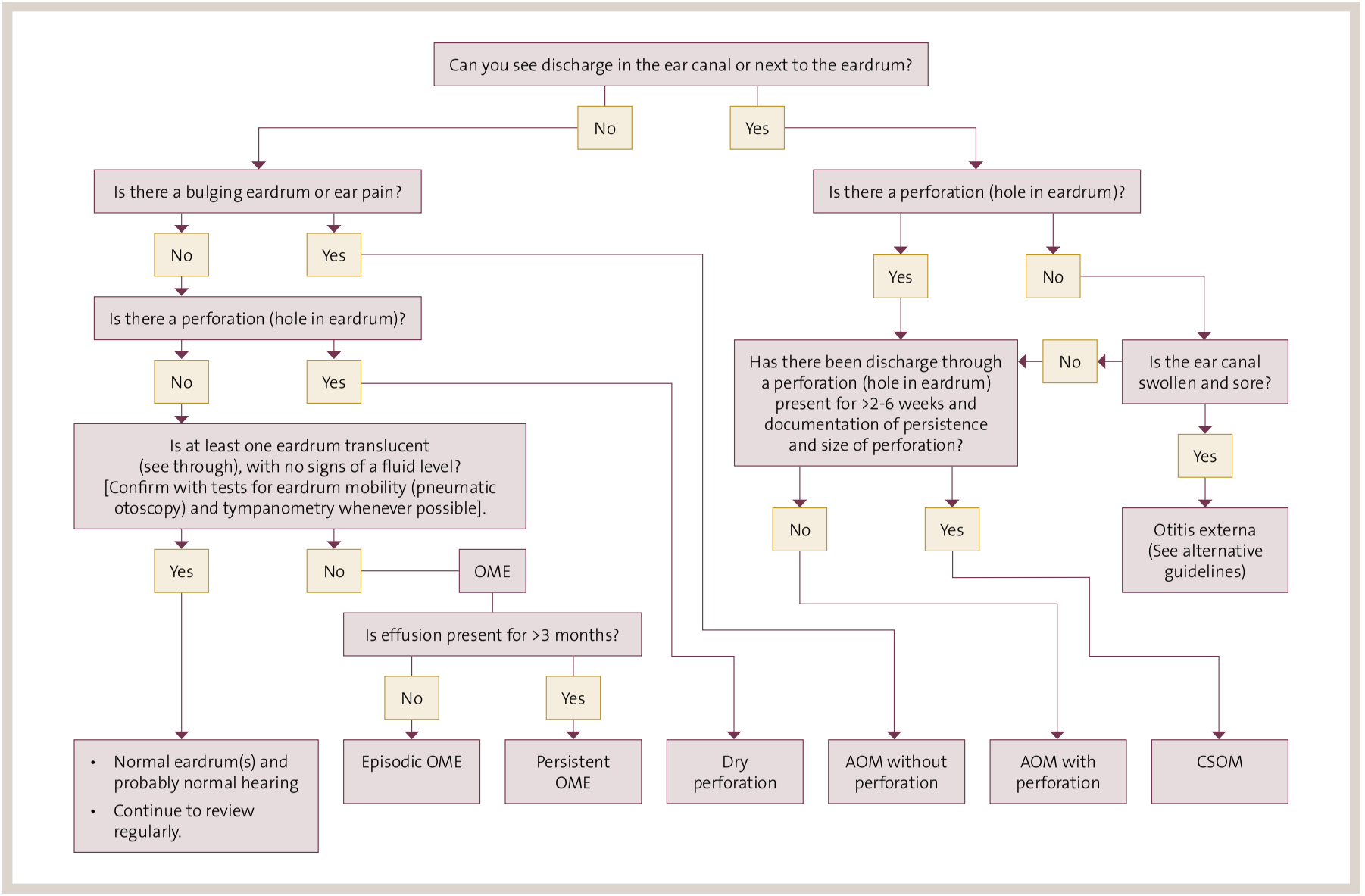
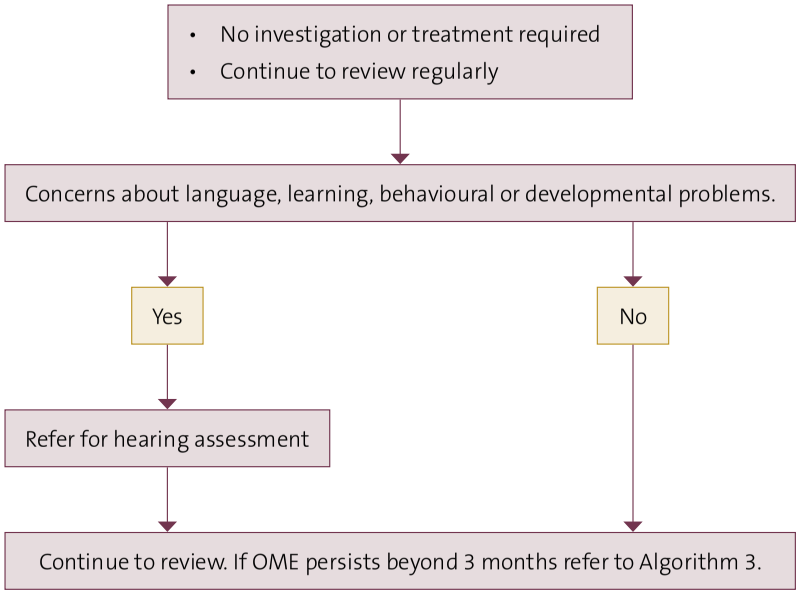
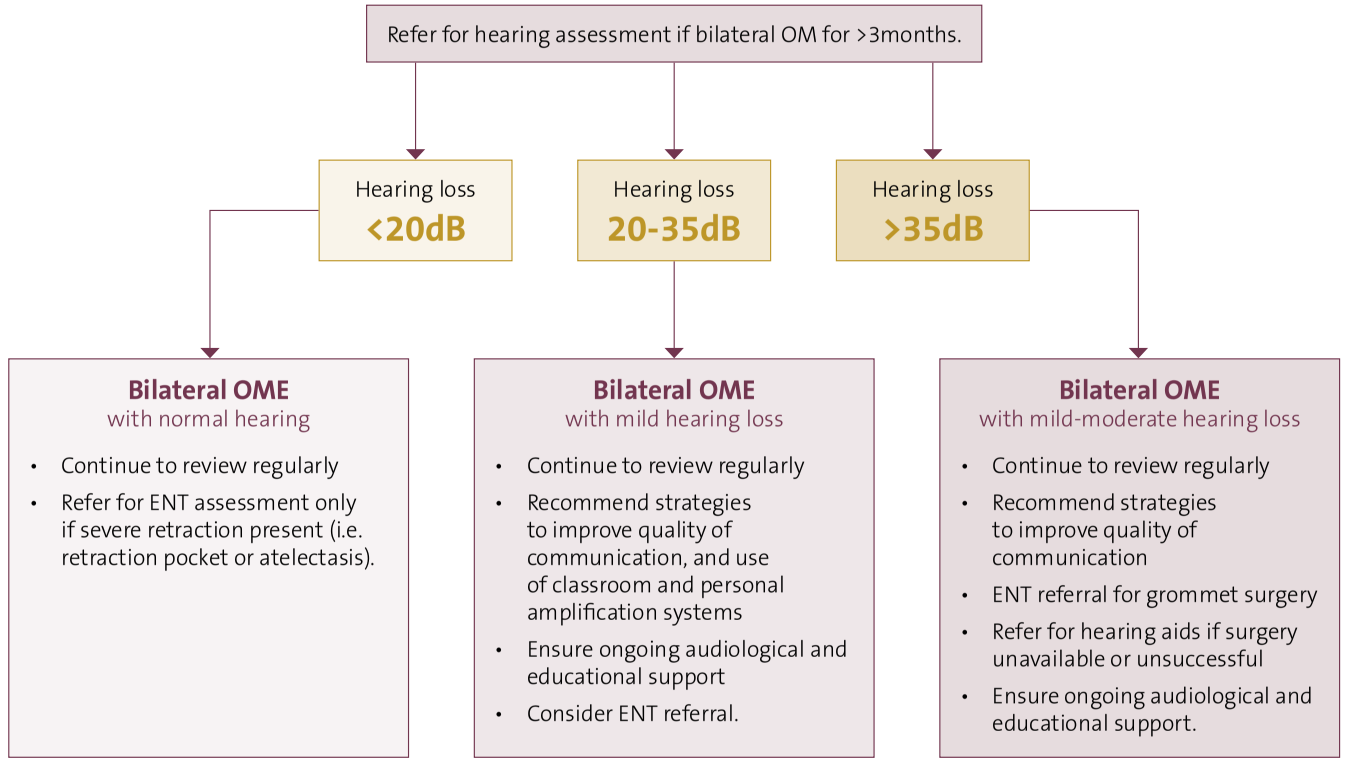
ALGORITHM 1: Could this child have a middle ear infection (otitis media)?



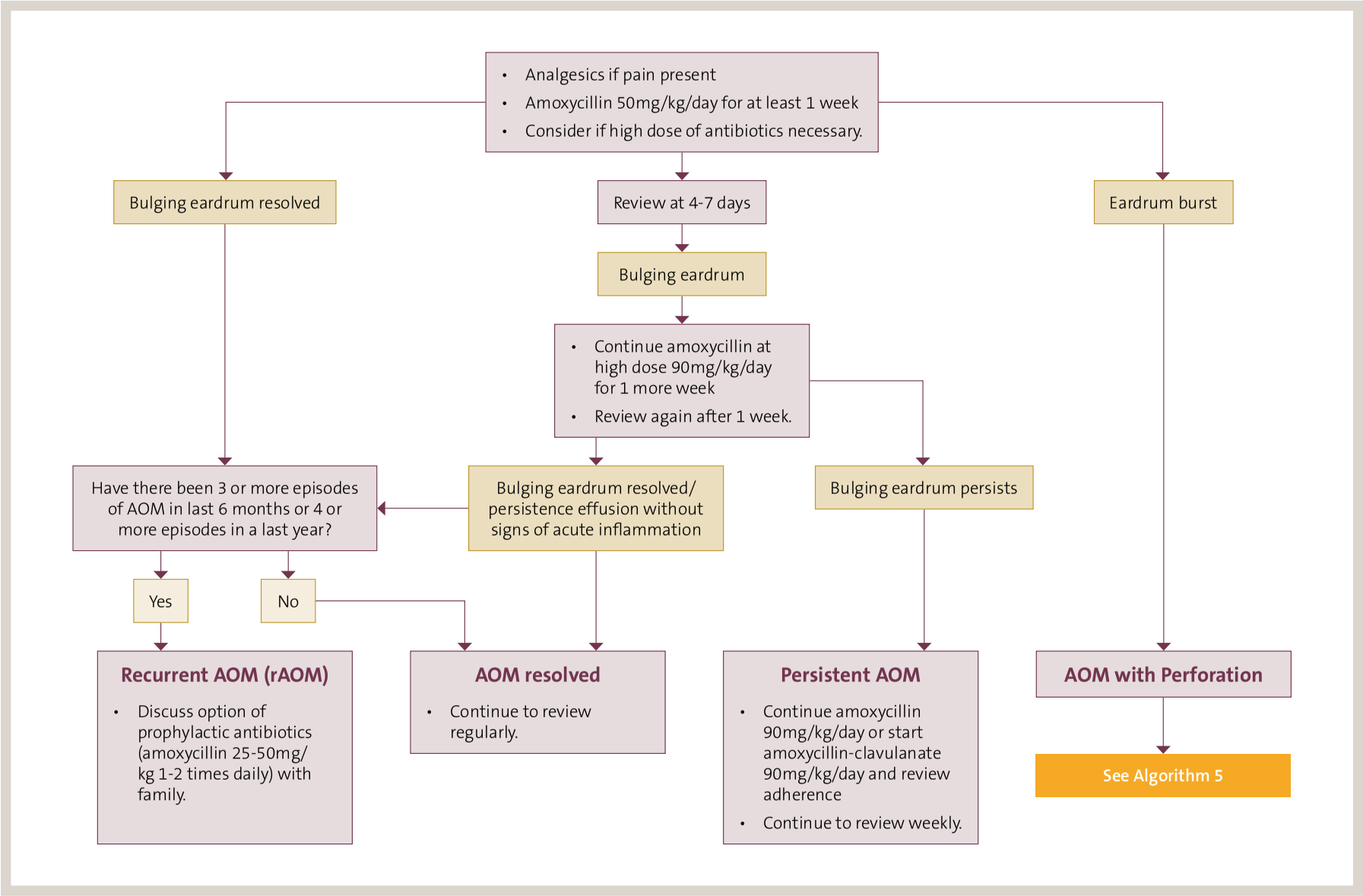
ALGORITHM 2: Management of an episodic OME in high-risk populations.



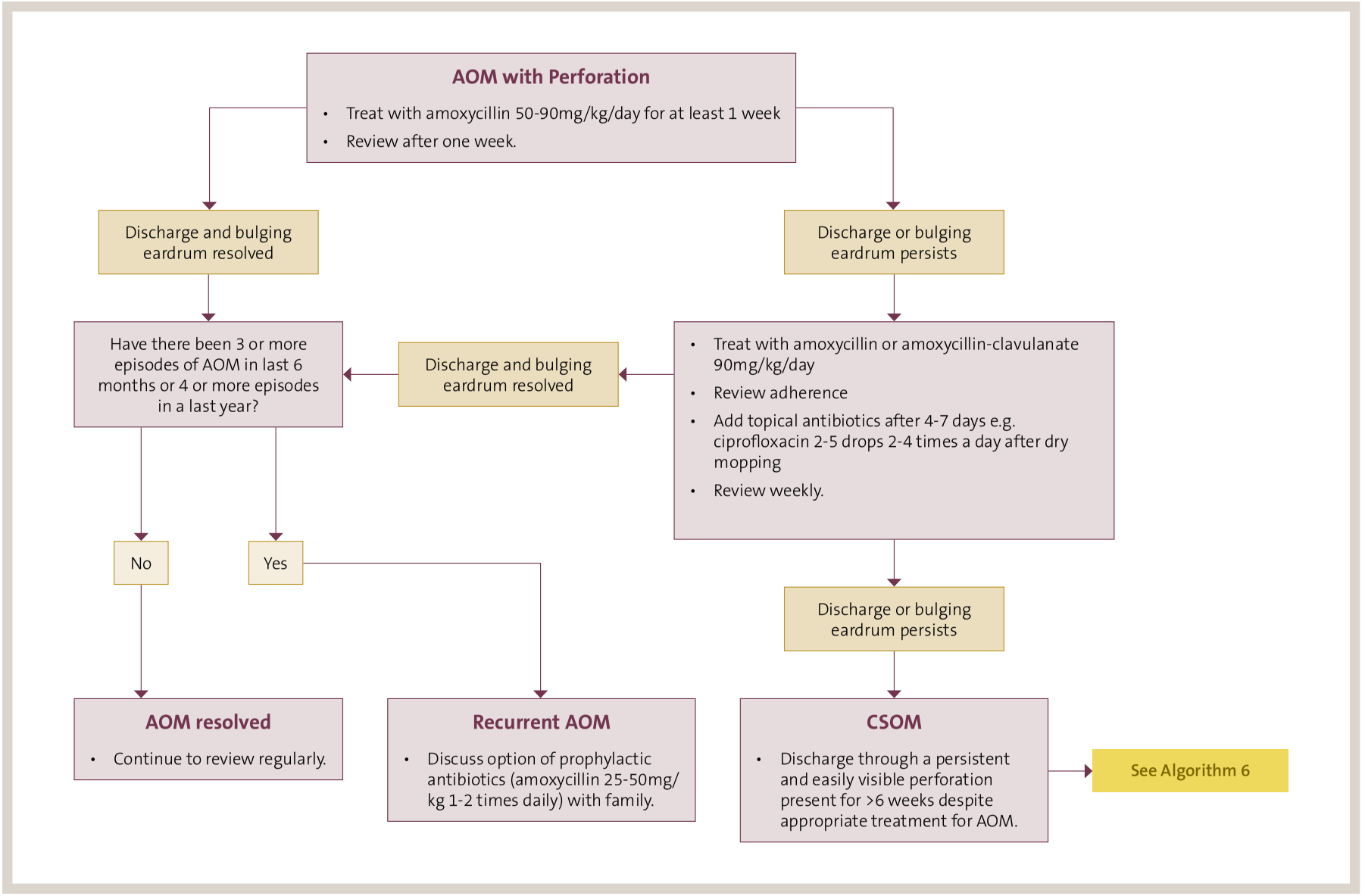
ALGORITHM 3: Management of Persistent OME in high-risk populations.



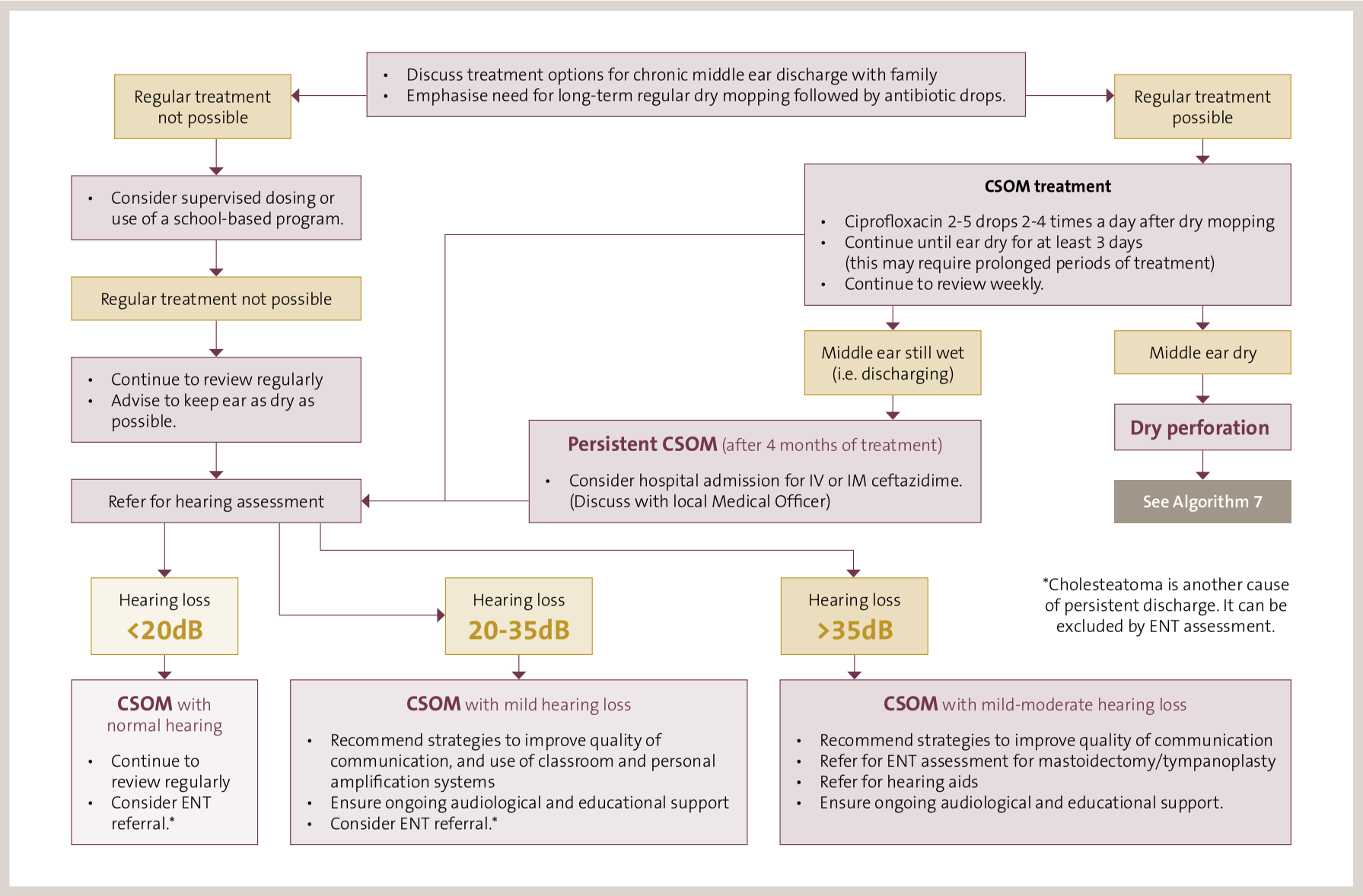
ALGORITHM 4: Management of Acute Otitis Media without perforation (AOMwoP) in high-risk populations.



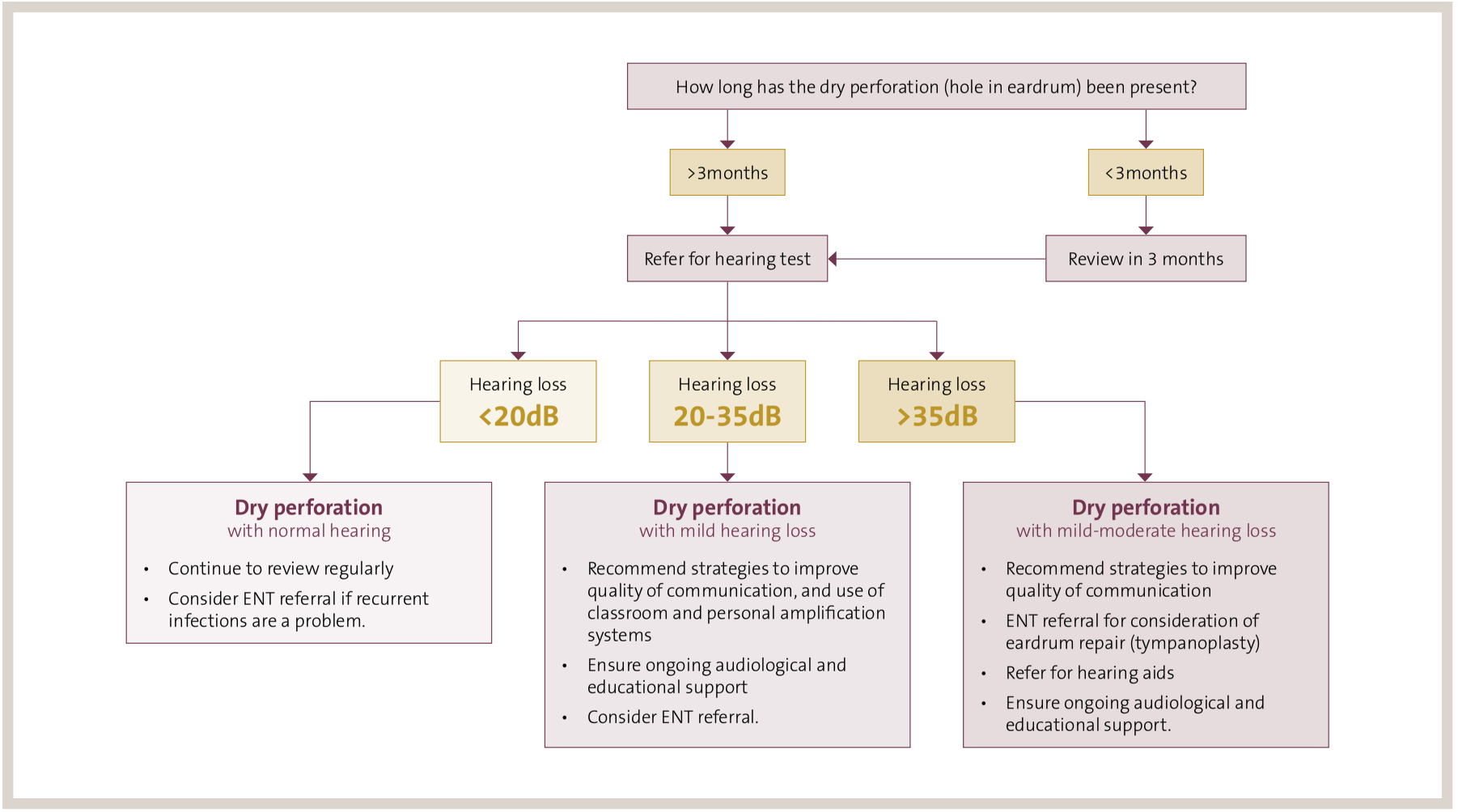
ALGORITHM 5: Management of Acute Otitis Media (AOM) with perforation in high-risk populations.



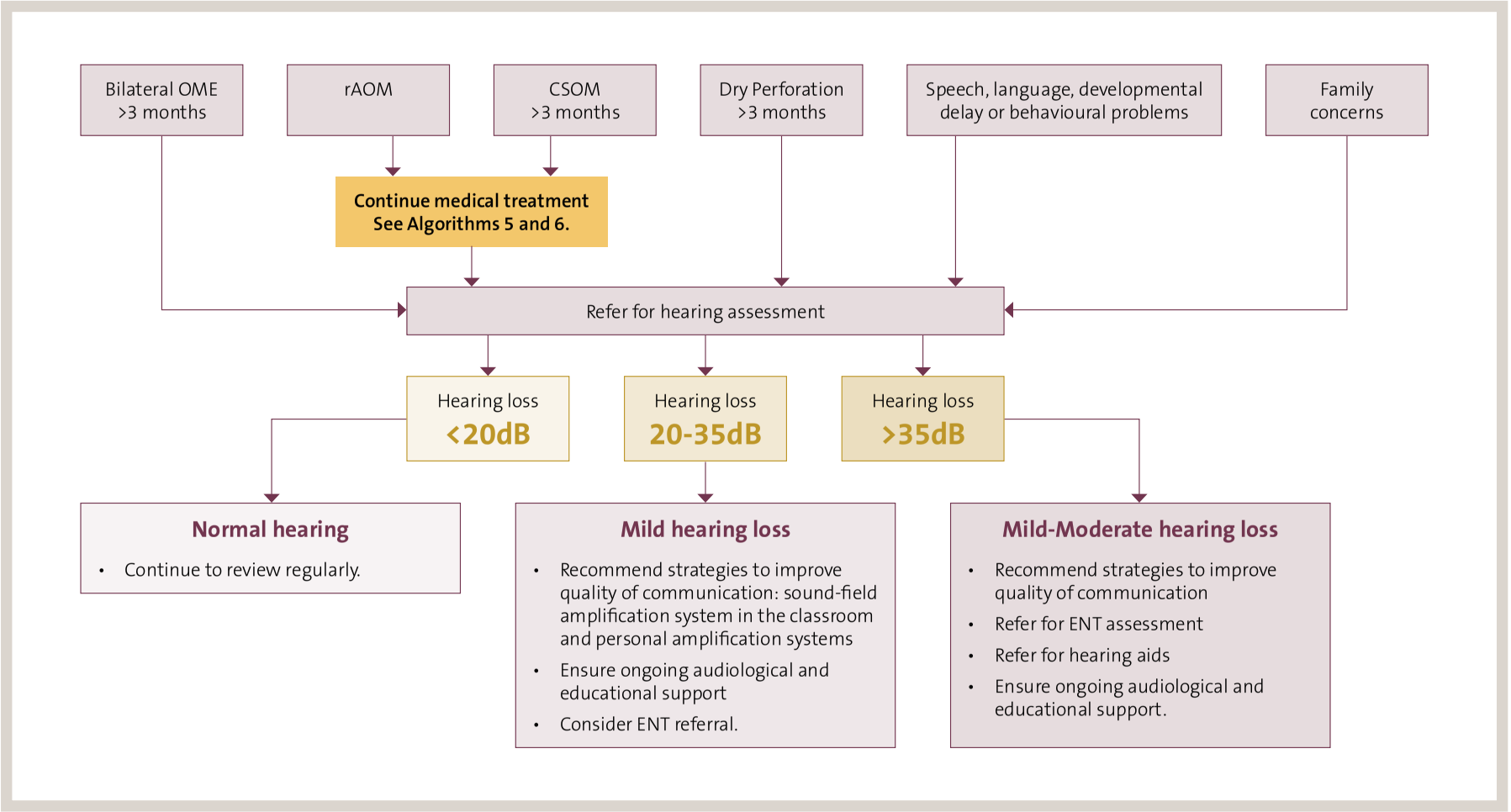
ALGORITHM 6: Management of Chronic Suppurative Otitis Media (CSOM) in high-risk populations.



ALGORITHM 7: Management of Dry Perforation in high-risk populations.



ALGORITHM 8: Could this child have an important hearing loss due to otitis media?



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 severe otitis media.

1. Families should be told that Aboriginal children are at greatly increased risk of severe otitis media (OM).
2. Families should be told that severe OM will get better with improved living standards, maternal education, breast feeding, provision of a smoke free environment and pneumococcal vaccination.
3. Families should be encouraged to attend the local health clinic as soon as possible whenever a child develops ear pain or discharge.
4. Frequent ear examinations are recommended even when the child is well. Use pneumatic otoscopy or tympanometry whenever possible.
5. Antibiotics (amoxycillin) are recommended for Aboriginal children with acute otitis media (identified by bulging eardrum or recent perforation). Antibiotics should be continued until the bulging and discharge have resolved.
6. Chronic suppurative otitis media (CSOM) should only be diagnosed in children who have persistent discharge through a perforation despite appropriate treatment for acute otitis media with perforation. 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.
7. All children with persistent bilateral OM (all types) for greater than 3 months should have their hearing assessed.
8. Families of children with significant hearing loss (>20dB) should be informed of the benefits of improved communication strategies and hearing aids.
9. Explain to families/caregivers that a child needs to hear people talking in order to learn to talk themselves. Children with OM do not hear well. They will benefit from lots of focussed verbal communication.
10. Aim to provide patients or families/caregivers with the knowledge to manage their own health needs. Use communication techniques and resources that facilitate true understanding.