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Ear disease in Aboriginal and Torres Strait Islander children

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Summary

What we know

- Ear disease and associated hearing loss are highly prevalent among Aboriginal and Torres Strait Islander (Indigenous) children.
- Otitis media is a major source of ear disease in Indigenous children. It often begins within weeks of birth, has repeated episodes, and can persist into adolescence.
- There are many risk factors that contribute to the development and persistency of ear disease in Indigenous children, including household overcrowding, passive smoking, premature birth, bottle feeding and malnutrition.
- Hearing loss can lead to delayed speech and educational development. The long-term effects of these lags on the wellbeing of Indigenous children is substantial.

What works

- Antibiotic treatments and *Haemophilus influenzae* type b (Hib) vaccination can help reduce the number of otitis media episodes.
- Neonatal screening for early identification of congenital malformations and early intervention enables timely treatment and management.
- Routine child health checks that incorporate ear and hearing assessments allow for early identification, management and treatment, and if necessary, fitting of hearing aids.



- The Child Hearing Health Co-ordinator program uses a case management model of service delivery where a co-ordinator administers clinical care and links children with specialist and community health services. This program has improved the hearing health of Indigenous children in the Northern Territory.
- Indigenous-specific clinical guidelines provide the basis for better management of ear disease and the resultant hearing loss.

What doesn't work

- Population based screening as a sole strategy has not been found to reduce the prevalence of ear disease among Indigenous children. A coordinated approach comprising disease prevention, treatment and management is required.

What we don't know

- Why some of the ear disease in Indigenous children is not amenable to treatment and management, in contrast to its transitory nature in non-Indigenous children.
- Why the uptake of Indigenous population-specific, evidence-based clinical guidelines is still slower than desired.
- The epidemiology of ear disease in Indigenous children is still poorly understood.
- The full extent of the problem can't be assessed as there is no nationally consistent data collection in Australia.

Introduction

Ear disease and the associated hearing loss are significant health problems for Indigenous children (Morris et al. 2005; Khoo 2009; NAHSWP 1989). Children in many Indigenous communities suffer from chronic ear disease, in particular otitis media, at rates that well exceed the 4% threshold at which a disease is regarded as a major public health problem (WHO 1998). Ear disease, particularly where it leads to hearing loss, is a large contributor to poor educational achievement and higher unemployment and, as a consequence, greater contact with the criminal justice system later in life (AHMAC 2012; AIHW 2012a; SCARC 2010).

While the roots of this disease essentially lie in disadvantage and poverty, a number of environmental factors, individual genetics and microbial genomic factors also contribute (Couzos et al. 2007; Burns & Thomson 2013). Preventing ear disease in Indigenous children by tackling these factors is a high priority (AHMAC 2012; NAHSWP 1989).

While the social and biological bases of ear disease are reasonably well understood, many programs and strategies for its prevention do not appear to have worked effectively (Bowes & Grace 2014). In some cases, programs to prevent ear disease and associated hearing loss have been implemented without sufficient planning and high quality evidence (Khoo 2009). However, recent health services delivered under the Stronger Futures in the Northern Territory (SFNT) strategy have shown some success in reducing hearing loss, the prevalence of otitis media, and the severity of hearing impairment (AIHW 2014).

This resource sheet reviews past and current programs, research and strategies (both government and non-government) for the prevention and treatment of ear disease in Indigenous children. While the focus of the document is on preventing ear disease, programs aimed at treating infection and minimising hearing loss are also reviewed.



Ear disease in Indigenous children

A historical perspective

The high prevalence of ear disease (and the associated hearing problems) among Indigenous children has been recognised since the 1970s (Hudson & Rockett 1984; Sunderman & Dyer 1984). In the late 1980s, it was identified as a major concern for Indigenous Australians by the National Aboriginal Health Strategy (NAHS) (NAHSWP 1989).

In response to the 1994 review of NAHS, the Australian Government developed the National Aboriginal and Torres Strait Islander Hearing Strategy 1995–1999. This strategy, which focused on the ear health and hearing of children aged 0–5 years, sought to improve disease prevention at all levels and raise the standards of care (DHAC 2001).

In 2001, in response to the House of Representatives Inquiry into Indigenous Health, the Australian Government agreed to commit additional resources to monitor ear disease in Indigenous children at birth and to test their hearing by the age of 3 years (DHAC 2001). The Australian Government also committed to improving access to hearing health services for Indigenous Australians under the 2001 Commonwealth Hearing Services Program (OATSIH & OHS 2002).

The National Strategic Framework for Aboriginal and Torres Strait Islander Health 2003–2013 further highlighted the need to respond to hearing loss in accordance with the NAHS priorities and develop a focus on children at educational risk due to this impairment.

In 2007, the Australian Government funded hearing and oral health services for 16,000 Indigenous children living in communities in the Northern Territory, as part of the Northern Territory Emergency Response (NTER) (AIHW 2012b). Follow-up audiology and ear nose and throat services were also provided. Between July 2009 and June 2012, these follow-up services were funded as part of Closing the Gap initiatives under an agreement between the Australian and Northern Territory Governments.

The Australian Government has continued to invest in hearing and oral health services under the terms of the SFNT Agreement, which provides \$754.4 million over 10 years for health services. Under the Agreement, audiology services are available to all children under 16 in the Northern Territory, and the Child Hearing Health Coordinator program is available to Indigenous children with an identified middle ear condition or hearing impairment who have been referred to the program (AIHW 2014).

The Australian government's recent Care for Kids' Ears campaign is aimed at increasing awareness of ear disease and hearing loss in Indigenous communities, with a view to improving educational and employment outcomes (DoHA 2013). The campaign features resources for health workers, nurses and doctors, parents and carers, teachers and early childhood workers to inform Indigenous children and families about ear health.

In addition to the efforts of the Australian Government, state and territory governments have also developed and implemented a variety of programs and strategies to minimise the incidence and impact of ear disease on Indigenous children.

For a detailed list of various programs and projects to tackle ear disease in Indigenous Australians, see Australian Indigenous HealthInfoNet (2014).



Risk factors for ear disease

Health conditions experienced by Indigenous Australians must be seen in the context of the disempowerment and separation from land, family and culture experienced by most Indigenous Australians and their ancestors (Reid & Trompf 1991; Grant et al. 2007; Osborne et al. 2013). Ear disease and the associated hearing loss are no exception.

Overcrowding, passive smoking, premature birth, bottle feeding and malnutrition also play a role in the development, recurrence and persistence of ear disease (Reid & Trompf 1991; Couzos et al. 2001).

The collective effect of these risk factors is large.

Pathology and types of hearing loss

Indigenous children suffer from a variety of aural pathologies and types of hearing loss. While several congenital and anatomical abnormalities contribute to the problem, otitis media—inflammation or infection of the middle ear—is the major presentation of ear disease in Indigenous children (AIHW 2013a). In particular, the Indigenous profile of otitis media is markedly different from the non-Indigenous profile (Box 1).

Box 1: Otitis media in Indigenous children

The nature and progression of otitis media in Indigenous children is markedly different to that experienced by their non-Indigenous counterparts.

For non-Indigenous children, otitis media is commonly an infectious disease with acute symptoms—acute otitis media—that are usually transitory in nature. Over time, these children mount sufficient immune response to clear or control the infection.

In Indigenous children, the disease manifests early, often within weeks of birth, and usually presents as middle ear effusion, or glue ear, without the overt acute symptoms of earache and fever. Middle ear effusion often remains undiagnosed and, in a significantly large proportion of cases, persists and leads to perforated ear drum(s) and discharge over time—termed chronic suppurative otitis media. (For a classification of various types of otitis media in Indigenous children, see AIHW 2013a.)

Due to the high prevalence of otitis media, conductive hearing loss is far more common than sensorineural hearing loss in Indigenous children (Box 2). Conductive hearing loss was experienced by 95% of the children identified as having hearing loss in audiology checks through the SFNT program (AIHW 2012b; 2014). The prevalence of sensorineural hearing loss among these children is also high by world standards.

Box 2: Nature and types of hearing loss

Hearing loss is usually categorised as conductive or sensorineural, based on damage to the anatomical and auditory components of the hearing apparatus in one or both ears.

- *Conductive hearing loss* results from interruption of the transmission of sound from the external auditory canal to the inner ear. It is commonly caused by a middle ear condition such as otitis media.
- *Sensorineural hearing loss* is due to damage sustained by the sensory end organ or hair cells of the inner ear or due to dysfunction of the auditory nerve.

If both types of hearing loss occur together, the person is categorised as having a mixed hearing loss.

Source: Northern and Downs 2014.

Epidemiology

Prevalence

There are varying estimates in the research literature regarding the prevalence of ear disease and hearing loss among Indigenous Australian children:

- Community-based epidemiological studies in remote communities in northern and central Australia have found otitis media to be highly prevalent (more than 90%) among children aged 0–5 (Morris et al. 2005, MSHR 2013).
- Almost three quarters (72%) of the 1,541 Indigenous children who were provided with audiology services as part of the SFNT program were diagnosed with at least one type of middle ear condition. Over half (51%) of the children had some form of hearing loss (AIHW 2014).
- Analysis of screening data collected from 119 Indigenous children attending 3 primary schools in Perth (Western Australia) found that 42% of these children had otitis media. Almost 1 in 5 of the children (19%) had mild or moderate hearing loss (Williams et al. 2009).
- The Western Australian Aboriginal Child Health Survey found that 20% of children aged up to 11 were reported by their carers as having recurring ear infections. The prevalence of recurring ear infections was found to be somewhat but not significantly higher in extremely isolated areas (Zubrick et al. 2004).

The 2012–13 Aboriginal and Torres Strait Islander Health Survey found that 7% of Indigenous children aged 0–14 across Australia had ear or hearing problems. The proportion of children with ear or hearing problems was found to be the same in non-remote and remote areas. Around 1 in 30 children (3%) were reported to have hearing loss (ABS 2013). After adjusting for differences in the age structures of the Indigenous and non-Indigenous populations, it was found that Indigenous people are significantly more likely (1.3 times) to have ear or hearing problems than non-Indigenous people (ABS 2013).

To summarise, a comprehensive national profile of the prevalence and impact of ear disease among Indigenous children is not yet available; however, the current evidence (clinical, epidemiological and by self-report) shows prevalence rates that are much higher than among non-Indigenous children and well above World Health Organization thresholds.



Hospitalisation

Overall, Indigenous children aged 0–14 are hospitalised for ear disease more commonly than non-Indigenous children of the same age. While young Indigenous children (aged 0–4) were hospitalised for diseases of the ear significantly less often than their non-Indigenous counterparts in 2008–10 (9.9 and 12.2 per 1,000 respectively), the hospitalisation rate for Indigenous children in the age range 5–14 (8.4 per 1,000) was almost twice as high as it was for non-Indigenous children (4.3 per 1,000) (AIHW 2013b). This pattern is associated with the ongoing and chronic nature of ear disease among Indigenous children.

Indigenous children also have higher rates of surgery to treat severe ear disease. While the rate of myringotomy procedures (incision in the eardrum to relieve pressure caused by excessive fluid build-up) in 2009–10 was 20% lower for Indigenous than non-Indigenous Australians (SCRGSP 2011), between July 2008 and June 2010, the rate of tympanoplasty (the reconstruction of the eardrum or tympanic membrane or the small bones of the middle ear) on Indigenous children (aged 0–14) was over 7 times that for non-Indigenous children (AHMAC 2012).

Fitting of hearing aids

An indirect measure of the extent of hearing loss or impairment in Indigenous children is the fitting of hearing aids. One out of 10 Australian children fitted with a hearing aid or cochlear implant in 2010 was Indigenous—this was more than 2.5 times higher than the proportion of non-Indigenous children requiring the same treatment (Australian Hearing 2012).

Programs for the prevention of ear disease

An effective approach to otitis media and hearing loss in young Aboriginal children needs to be part of a comprehensive approach to family, maternal and child health and be embedded in coordinated primary care systems (ARTD Consultants 2008).

A number of approaches, many of them stand-alone, have been developed to prevent the occurrence of ear disease among Indigenous children, but there is inconsistent evidence regarding their effectiveness. They are summarised below.

Health promotion

There is concern that there may be limited awareness about the extent and impact of ear disease in the Indigenous population (CIRCA 2010). Poor knowledge of causes, prevention and interventions are other issues of concern (DHAC 2001). To address this lack of awareness, Australian governments have designed and implemented several ear health promotion campaigns (DoHA 2013; NSW Health 2011; Queensland Health 2009). These include the Australian Government's Care for Kids' Ears campaign <www.careforkidsears.health.gov.au/>, which started in 2009 and is ongoing.

The Care for Kids' Ears campaign aims to increase awareness of ear disease and hearing loss in Indigenous communities (DoHA 2013), and it highlights the importance of seeking treatment. An evaluation of the campaign found that it has been effective in raising the awareness of ear disease and hearing loss in Indigenous communities (CIRCA 2013).



Vaccination

Of the common nasopharyngeal and otitis media pathogens, vaccines are currently available against *Streptococcus pneumoniae* (pneumococcal vaccine) and *Haemophilus influenzae* type b (Hib vaccine). No vaccine is available against *Haemophilus influenzae* (NTHi) or *Moraxella catarrhalis*, two of the other major otitis media pathogens.

Pneumococcal vaccination has the potential to prevent ear disease in Indigenous children (Menzies et al. 2004; Darwin Otitis Guidelines Group 2010; NACCHO/ RACGP 2012). In view of this potential, the Australian Government administers pneumococcal vaccination programs for Indigenous children (Box 3).

Box 3: Pneumococcal and *Haemophilus influenzae* type b (Hib) vaccination for Indigenous children

The Australian Government administers a variety of immunisation programs for Indigenous Australians through the National Immunisation Program and the National Indigenous Pneumococcal and Influenza Immunisation Program. Details can be found on the Australian Childhood Immunisation Register at <http://www.medicareaustralia.gov.au/provider/patients/acir/index.jsp>.

Vaccination against *Haemophilus influenzae* type b (Hib) was introduced in Australia in 1993 for children aged up to 15, and up to the age of 10 for children born since 1993. This vaccination program has reduced the incidence of invasive Hib infection in Indigenous children by 98% (Menzies et al. 2004).

The following studies have found that influenza vaccination can prevent acute otitis media:

- A meta-analysis of the efficacy of inactivated influenza vaccine found that it was effective in preventing acute otitis media in healthy children aged over 2 (Manzoli et al. 2007).
- An analysis of research studies for the purpose of developing an Italian guideline for the prevention of acute otitis media concluded that influenza vaccination can be useful in preventing a first episode of the disease in otherwise healthy children (Marchisio et al. 2010).

Evidence regarding the effectiveness of the pneumococcal conjugate vaccine (7vPCV) in reducing otitis media episodes is mixed (Eskola et al. 2001; Grijalva et al. 2006; Jansen et al. 2009; Taylor et al. 2012). Vaccines aimed at a broader range of pneumococcal strains have now been developed (Barry et al. 2012), but their capacity to prevent acute otitis media has not yet been fully investigated.

There has been no assessment of the impact of pneumococcal and influenza vaccination on otitis media episodes among Indigenous children specifically. There are suggestions that pneumococcal vaccination might not be fully effective in Indigenous children, possibly due to the ability of persistent otitis media pathogens to bypass their immune system (Wiertsema & Leach 2009).

Antibiotic preventative treatments

A recent Cochrane review of the use of antibiotics for the prevention of acute and chronic otitis media in children found that antibiotics are effective in preventing acute otitis media, but the long-term effects of this intervention are uncertain (Leach & Morris 2011).

The benefit of antibiotics must be weighed against the cost and inconvenience of the treatment and the risk of occasional side effects (Leach et al. 2008). There are questions about which antibiotic is most appropriate, the optimal length of the treatment, and the number of episodes required. There is also a risk that the use of antibiotics could promote the emergence of antibiotic resistance in otitis media pathogens (Halter et al. 2004).



Reduction in exposure to passive smoking

Passive smoking has been identified as a significant risk factor for ear disease among Indigenous children (Couzos et al. 2007). There is evidence of a decline in the exposure of children to passive smoking in Indigenous households, as detailed in Box 4.

Box 4: Trends in exposure of children to tobacco smoking in Indigenous households

The proportion of Indigenous households with children where there are resident smokers is on the decline. More than 1 out of 4 Indigenous households in 2004–05 had at least one resident who regularly smoked indoors (ABS 2007). The figure was 25% lower in 2007–08 (AIHW 2013a).

There are no recent data regarding the exposure of Indigenous children to environmental tobacco smoke; however, in view of the 8 percentage point decline in daily tobacco smoking by Indigenous Australians between 2002 and 2012–13 (ABS 2013), the proportion of Indigenous children exposed to tobacco smoke is likely to have continued to decline.

The clinical care guidelines on the management of otitis media in Indigenous children recommend that health care professionals strongly discourage people from smoking around children (Darwin Otitis Guidelines Group 2010). There are no evaluations of whether such advice actually influences people's smoking behaviour.

Programs for the treatment of ear disease

A variety of treatment programs to improve the ear health of Indigenous children has been developed and implemented, including screening, surveillance, and medical and surgical therapy. These strategies require coordination of multiple health service providers, including Aboriginal health workers, general practitioners, audiologists and ear, nose and throat specialists. The development and use of Indigenous-specific clinical care guidelines are important components of effective treatment.

Screening for ear disease and hearing loss

Screening is one of the first steps in any management and treatment strategy, and is a quick and easy way to identify children requiring detailed evaluation of their ear health problems (Bray et al. 2009). The success of any screening program depends on the reliability of the screening test, and the referral and follow-up (Box 5).

Box 5: Screening for ear disease and hearing loss in children: critical points

For the early diagnosis of ear disease and associated hearing loss, children should be screened at 3 critical times:

1. at birth, when screening can help identify newborns with congenital hearing loss for early referral, diagnosis and treatment
2. in infancy, to detect early aural infections that contribute to language development and hearing loss
3. at preschool age, when hearing loss can begin to interfere with engagement with formal education.

While screening is important, it needs to be part of a broader strategy and is not effective as a stand alone approach (Box 6 and 7).



Universal neonatal hearing screening

Universal neonatal hearing screening has emerged as an important sensorineural hearing loss prevention and management strategy (Coates & Gifkins 2003). Newborn screening is particularly important in view of the failure of the targeted 'risk factor-based' screening approach to identify the bulk (50–60%) of cases (MSAC 2008).

A systematic review by Nelson et al. (2008) confirmed the benefit and cost-effectiveness of neonatal hearing screening. Neonates screened in the first month of their life have earlier referral, diagnosis and treatment; they also have better language outcomes at school age.

In 2009, the Council of Australian Governments agreed to universal screening of newborns to detect congenital hearing issues (COAG 2009). Babies born in all states and territories are now screened for hearing problems within the first month after birth (AIHW 2013c; DoHA 2013). Neonatal screening can be supplemented with opportunistic screening when children are seen by health care professionals, such as when they are immunised or receive child health checks.

Other screening programs

Since July 2011, the Australian Government's Healthy Start for School program requires health checks (which include hearing tests) for all 4-year-old children whose families receive income support (DHS 2013). In addition, a variety of programs has been developed and implemented to screen Indigenous children for ear disease and hearing loss.

Box 6: Evaluation of New South Wales Otitis Media Screening Program

The NSW Otitis Media Screening Program, undertaken from 2004–2008, was a population-based screening initiative to identify and treat 0–6 year old Indigenous children with otitis media and conductive hearing loss. The program had a screening target of 85%.

An evaluation found that the program was costly and did not decrease the prevalence of otitis media in Indigenous children (ARTD Consultants 2008). It also did not address the underlying social and environmental determinants of the disease.

The ARTD Consultants' evaluation recommended disbanding the program and taking a broad public health approach to the issue. The consultants also suggested integrating the Aboriginal ear health program with existing child health surveillance and health-care programs.

Following this, in 2011, NSW Health issued Aboriginal Ear Health Program Guidelines that encourage Local Health Districts to move away from screening-only approaches and to focus instead on the prevention, treatment and management of ear disease (NSW Health 2011).

Surveillance

Surveillance is the ongoing systematic collection, analysis and interpretation of data to monitor trends in outcomes and underlying risk and causal factors (Remington & Nelson 2010). Prevention of diseases, especially those with multiple causal factors, requires the regular collection of surveillance data.

In the absence of a national population-based surveillance program to monitor and report on ear disease and associated hearing problems in Indigenous children (Couzos et al. 2007), an effective surveillance strategy can be built around regular (or opportunistic) child health checks. Given the multifactorial nature of ear disease, a mixed surveillance approach tracking both the acute and chronic aspects of the disease would be useful.

Box 7: Northern Territory Emergency Response Child Health Check Initiative (NTER CHCI)— audiology, ear, nose and throat follow-up services

In response to extensive ear and hearing problems identified among Indigenous children by the NTER CHCI, the Australian Government funded the Northern Territory Government to provide follow-up audiology and ear, nose and throat services from the middle of 2007. Between July 2009 and June 2012, these follow-up services were funded as part of Closing the Gap initiatives under an agreement between the Australian and Northern Territory governments. Although priority was given to NTER CHCI referrals, if possible and where funding allowed, services were also provided to other Indigenous children. This program was a precursor to the current 10 year SFNT Hearing Health Program.

The initiative identified children requiring specialist audiology and ear, nose and throat services. The audiology follow-up services assessed the middle ear condition of the child, tested for hearing loss, and recommended rehabilitation. At these consultations, active infection (acute otitis media and chronic suppurative otitis media) was treated with medication (both topical and oral antibiotics as well as other drugs), aural toilet, and the removal of foreign bodies.

The follow-up included both specialist consultation and surgery. Surgical procedures (myringoplasty, myringotomy, adenoidectomy and other procedures) were recommended in 1 out of 4 cases.

Findings from the SFNT program suggest that these follow-up services have had positive effects:

- When data on children who received audiology services under the NTER CHCI were linked with SFNT program data, it showed that the proportion of children with at least one type of middle ear condition decreased from 86% to 73%, and the proportion with hearing loss decreased from 75% to 60%. Sixty-four per cent of children who had hearing impairment in their last NTER CHCI service had experienced an improvement in hearing at their last SFNT service, 28% had experienced no change, and 8% had experienced a deterioration.
- Long-term improvements in children's ear health were also evident. Of children who received 3 or more services over the course of both programs (August 2007 to June 2013), the proportion with at least one type of otitis media decreased from 84% at their first service to 54% at the last service. The proportion with hearing loss declined from 85% to 64%, and the proportion with moderate, severe or profound hearing impairment decreased from 23% to 8% (AIHW 2014).

Source: AIHW 2012b, 2014.

An evaluation of the NTER CHCI found that it achieved a coverage rate of between 57% and 65% of the total eligible population. Coverage was higher in small communities and among children aged 2–9 and lower in large communities and among children aged 14–15. Nearly half of the children who received a child health check were referred for tympanometry and audiometry services (45.4%), and more than a third to ear, nose and throat specialists (34.2%). The initiative enabled the development of new delivery models for hearing, ear, nose and throat services (Allen and Clark 2011). The funding and workforce engaged through the NTER CHCI and Closing the Gap programs have also strengthened the Northern Territory's capacity for improving the ear health of its children.

Clinical care guidelines

Disease-specific clinical care guidelines are important for achieving consistency in the provision of health care, though they need to be consistently adopted. Their primary aim is to deal with uncertainty in clinical decision making (NHMRC 1999). The development of clinical guidelines is now a recommended approach to deal with intricate health issues. The guideline-based approach has the potential to improve the quality of health care, reduce the use of unnecessary, ineffective or harmful interventions and facilitate treatment with maximum chance of benefit and with minimum risk of harm.



The guidelines are mainly for use by health professionals and practitioners. Nonetheless, they can empower patients and their families to have an informed discussion of their problems with health professionals (SMED 2012).

In view of the continuing high burden of ear disease, Indigenous-specific clinical and audiological practice guidelines have been developed to assist with its management. These guidelines outline a range of practical considerations for service providers, including cultural, logistical, professional and personal support issues, which need to be addressed for effective, high quality services.

The first set of Indigenous-specific clinical care guidelines for ear disease, *Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations*, was developed in 2001 (Couzos et al. 2001; Morris et al. 2001). These guidelines were updated in 2010 (Darwin Otitis Guidelines Group 2010). To ensure a coordinated and uniform approach, the Audiological Society of Australia also released general guidelines for audiological practice with Indigenous Australians (Scott 2001). Although not Indigenous-specific, clinical guidelines have also been developed for adult cochlear implantation (Department of Health, Western Australia 2011).

Box 8 provides a summary of treatment plans for Indigenous children based on the clinical care guidelines.

Box 8: Treatment plans for the management of childhood otitis media in populations at high risk of ear disease

Recurrent acute otitis media (AOM): Three or more episodes of AOM in the previous 6 months or 4 or more episodes in the previous 12 months

Families of infants should be given the option of treatment with daily antibiotics for 3 to 6 months, which halves the likelihood of further episodes and decreases the risk of perforation of the eardrum by 40%.

Emphasise to families the need to take medications as prescribed, discuss normal language development milestones and the importance of going to the health centre if their child develops ear discharge.

Chronic suppurative otitis media (CSOM): Persistent discharge with easily visible perforation of the ear drum

Clean the ear canal, dry and add antibiotic drops. Continue until the ear has been dry for more than 3 days and review at least weekly. Prolonged periods of treatment may be necessary. Treatment is successful in up to half of children in remote areas. If no improvement consider hospital admission. Monitor hearing loss and delay in language development. If hearing loss exceeds 35dB refer for hearing aids.

Emphasise to families the need to take medications as prescribed. Discuss normal language development milestones and the importance of going to the health centre if the ear discharge gets worse.

Source: Darwin Otitis Guidelines Group 2010.

In 2011, the Australian Government contracted the Australian General Practitioners Network, now the Australian Medicare Local Alliance, to promote and implement the updated *Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations* at 8 pilot sites. An evaluation of this implementation found that some individual medical practitioners working from private practices used the guidelines, but the project did not result in increased access by children to medical specialists or audiology services. The evaluation identified a need for more effective follow-up of children and ongoing training of medical practitioners (McDonald 2013).

The Murrumbidgee Medicare Local has also established a project to support general practice to deliver otitis media prevention, education and treatment in accordance with the 2010 *Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations* (MML 2013). There has not yet been any evaluation of this project.



Programs to minimise the impacts of hearing loss

The ability to hear well is vital to normal speech and oral language development (Northern & Downs 2014). A major aim of programs is to ensure that the communication abilities and school performance of children are not adversely impacted. Implemented effectively, these programs should improve the employment and social circumstances of children later in life.

Classroom management strategies

There is considerable variation in the degree of hearing loss due to different forms of otitis media. Children with perforated eardrums, particularly those with bilateral chronic suppurative otitis media, experience the greatest hearing loss, while those with middle ear effusion (which is often asymptomatic) could have their hearing impairment go unnoticed by the teacher.

In view of the high conductive hearing loss among Indigenous children, implementing school-based initiatives that address classroom acoustics, such as installing amplification systems, changing class seating arrangements, negotiating listening behaviours and implementing 'buddy' systems have been recommended (Burrow et al. 2009). No evaluation of the impact of these strategies has been published.

Fitting of hearing aids

Significant technological advances have been made in the development and fitting of hearing aids. Suitable hearing devices are now available for infants. The Commonwealth Office of Hearing Services funds the provision of these aids and related services to children and youth up to the age of 21 (Australian Hearing 2012).

The age distribution of Indigenous children fitted with a hearing aid or an implant is different to that of non-Indigenous children. Most non-Indigenous children who require hearing aids have them fitted in the first years of life, whereas the majority of hearing aids for Indigenous children are fitted in early primary school, despite their hearing problems starting much earlier in life (even at the pre-lingual stage). This disparity occurs because many Indigenous hearing programs are conducted in a school setting (Australian Hearing 2012). This gap between hearing loss and the fitting of hearing aids could reduce as increasing numbers of Indigenous newborns and children under 5 have hearing checks.

No systematic evaluation has been undertaken of the usefulness of hearing aids to improve the communication abilities and school performance of Indigenous children.

Gaps in evidence

Lack of quality evidence

This review of programs to prevent, treat and minimise the impact of ear disease and hearing loss in Indigenous children has found limited evidence of high-quality evaluations. Rigorous evaluations are required to properly assess a program's effect, whether it is achieving its objectives, and whether the program could successfully transfer to different places or groups of people. This last point is particularly important when considering the extension of programs and strategies implemented for non-Indigenous populations to Indigenous communities.



The number of risk factors identified as contributing or causal to ear disease is increasing, often without reference to the level of attribution. Many of these purported risk factors are far removed from the socio-biological underpinnings of the disease, and they exert their influence through a range of indeterminate intermediate steps. This tendency can affect the quality of the overall evidence.

While rigorous evaluated evidence is not yet available for many programs, there is still a need to introduce programs based on the best information available. The development and revision of Indigenous-specific guidelines for the management of otitis media (Darwin Otitis Guidelines Group 2010) is a good example of how the available evidence can be assessed and converted into a useful resource for health care practitioners who work with Indigenous people.



Information gaps

Despite many reports describing the high burden of ear disease and associated hearing loss among Indigenous children, there has been no concerted effort to generate a national statistical profile. Good quality surveillance plays an important role in preventing and treating disease and minimising its impact (Rein 2010).

In generating health statistics, it is important to recognise that Indigenous populations are not homogenous—culturally, socioeconomically or epidemiologically. They live in a wide range of ecological zones and are exposed to a variety of environmental and socio-economic factors. Each community's access to and use of health services also varies. This socio-biological diversity affects the epidemiology of ear disease in Indigenous children.

The regular publication of the Aboriginal and Torres Strait Islander Health Performance Framework provides an opportunity to report on and monitor hearing loss in Indigenous children (AIHW 2013a). The indicator for education, identified in the context of health status measures, also helps monitor the effect of otitis media related hearing loss on educational attainment. There is a need to build upon this effort to fill gaps in information about ear disease in Indigenous children, in particular by including information generated by the Office of Hearing Services regarding expenditure and program audits (Couzos et al. 2007) as well as building on the key findings from the CHCI and the SFNT Hearing Health programs.

Conclusion

A comprehensive national profile of the prevalence and impact of ear disease among Indigenous children is not yet available. Current evidence indicates that prevalence rates among Indigenous children are much higher than among non-Indigenous children and well above the 4% threshold at which a disease is considered to be a major public health problem. Indigenous health must be seen in the context of the disempowerment and separation from land, family and culture. Overcrowding, passive smoking, premature birth, bottle feeding and malnutrition also play a role in the development, recurrence and persistence of ear disease.

Otitis media (inflammation or infection of the middle ear) is the major presentation of ear disease in Indigenous children. The disease can occur within weeks of birth, and usually presents as middle ear effusion, or glue ear, often without earache or fever. If undiagnosed, the infection is likely to persist and result in perforated ear drums and significant hearing loss, which in turn can delay language development and adversely affect education.

An effective approach to otitis media and hearing loss in young Indigenous children needs to be part of a comprehensive approach to family, maternal and child health and be embedded in coordinated primary care systems. The Care for Kids' Ears campaign has been effective in raising the awareness of ear disease and hearing loss among Indigenous communities.

Influenza vaccination has the potential to prevent ear disease in Indigenous children, and Hib vaccination has reduced the incidence of invasive *Haemophilus influenzae* type b infection (which can cause otitis media) in Indigenous children by 98%. Antibiotics are effective in preventing acute otitis media, but the long-term effects of this intervention are uncertain.

A variety of treatment programs to improve the ear health of Indigenous children have been developed and implemented, including screening, surveillance, and medical and surgical therapy. These strategies require coordination of multiple health service providers, including Aboriginal health workers, general practitioners, audiologists and ear, nose and throat specialists. The development and use of Indigenous-specific clinical care guidelines are important components of effective treatment. Co-ordinated health services delivered under the Stronger Futures in the Northern Territory Hearing Health Program have demonstrated some success in reducing the prevalence of otitis media and hearing loss.



Appendix A

Table A1 contains a list of Closing the Gap Clearinghouse issues papers and resource sheets related to this resource sheet. To view the publications, visit <http://www.aihw.gov.au/closingthegap/publications/>.

Table A1: Related Clearinghouse resource sheets and issues papers

Title	Year	Author/s
Supporting healthy communities through sports and recreation programs	2013	Ware V-A & Meredith V
Housing strategies that improve Indigenous health outcomes	2013	Ware V-A
Improving the accessibility of health services in urban and regional settings for Indigenous people	2013	Ware V-A
What works? A review of actions addressing the social and economic determinants of Indigenous health	2013	Osborne K, Baum F & Brown L
Healthy lifestyle programs for physical activity and nutrition	2012	Closing the Gap Clearinghouse
Education programs for Indigenous Australians about sexually transmitted infections and bloodborne viruses	2012	Strobel NA & Ward J
Anti-tobacco programs for Aboriginal and Torres Strait Islander Australians	2011	Ivers R

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Abbreviations

AIHW	Australian Institute of Health and Welfare
CHCI	Child Health Check Initiative
NTER	Northern Territory Emergency Response
SFNT	Stronger Futures in the Northern Territory



Terminology

Indigenous: 'Aboriginal and Torres Strait Islander' and 'Indigenous' are used interchangeably to refer to Australian Aboriginal and/or Torres Strait Islander people. The Closing the Gap Clearinghouse uses the term 'Indigenous Australians' to refer to Australia's first people.

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