



## GUIDELINE

### Hearing and Ear Health

|                       |                  |
|-----------------------|------------------|
| <b>Scope (Staff):</b> | Community health |
| <b>Scope (Area):</b>  | CAHS-CH, WACHS   |

#### Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this [disclaimer](#)

### Aim

To promote the wellbeing and development of children by timely prevention, screening and identification of childhood hearing impairment and/or ear disease.

To understand the importance of normal hearing function and the impact that hearing impairment has on the development and health of a child.

### Risk

Unrecognised and/or unmanaged ear disease and hearing impairment can have a significant effect on a child's speech and language, social and psychological development, educational progress and long term social and vocational outcomes.

### Background

Normal hearing is vital for the development of language and communication in children.<sup>1</sup> Impaired hearing that occurs at key developmental periods early in a child's life can significantly affect speech, language, social and cognitive development. In turn, this may lead to poor attention and listening, and behavioural problems, making it difficult to engage in school and learning.<sup>2,3,4</sup> Longer term outcomes may include poor academic performance, limited employment options and income, antisocial behaviour, and increased contact with police and the criminal justice system.<sup>2,3</sup>

Hearing loss may result from a variety of issues including; genetic causes, complications at birth, infectious diseases, chronic ear infections, use of certain medicines, injuries and accidents, exposure to loud noise and aging.<sup>5</sup> While universal neonatal screening enables early identification and intervention for congenital hearing issues, otitis media (OM) and associated conditions are common causes of temporary and longer term hearing impairment in early childhood, especially for Aboriginal children.<sup>6</sup>

A large scale Australian longitudinal study explored the impact of ear infection and health impairment among indigenous and non-indigenous children. It was estimated that at least

half of all children experience at least one episode of OM by the age of three years. It was found that children who experienced repeated ear infections were significantly more likely to sustain hearing loss and increased risk of poor health and developmental outcomes.<sup>6</sup> There is strong clinical and epidemiological evidence that recurrent infections, ear disease and hearing loss are highly prevalent among Australian Aboriginal children.<sup>7</sup> Research has found that Aboriginal children in rural and remote areas suffer high rates of persistent OM from early infancy. Further, recent research in Western Australia (WA) found that approximately half of Aboriginal children living in metropolitan Perth experienced OM by the age of six months.<sup>8</sup>

The newborn screening program is well established in WA and has significantly improved the identification and treatment of congenital hearing loss. Subsequent screening of infants and young children through to the early school years enables early detection and treatment of hearing loss which may occur after the neonatal period, for example, as a result of recurrent middle ear disease. A review of screening programs globally recommended use of otoscopy and tympanometry tests, and audiometry for children who can follow directions for a hearing test.<sup>4</sup>

The *WA Child Ear Health Strategy 2017-2021* promoted a strong focus on all children aged 0-5 years to achieve changes in prevention, early intervention and effective management.<sup>9</sup> Subsequently, the WA Auditor General recommended additional screening and prevention activity to address the burden of ear disease among young Aboriginal infants and young children.<sup>10</sup>

## Key points

- Additional and early ear health screening for Aboriginal children aged 0 – 5 years is critical to enabling early identification of abnormalities, preventing ear disease and optimising health and development.
- Hearing screening should only be performed by staff who have successfully completed undertaken approved CAHS-CH or WACHS (or equivalent) training.
- Hearing risk factors are identified at each universal contact. Additional checks and support are offered for children at risk of hearing and ear health issues.
- Families will be provided with key health education messages to promote ear health and hearing as appropriate to their circumstances. (See Appendix A).
- Clinical judgement is important to determine actions required for each child, including the following considerations;
  - parent/caregiver responses to screening questions
  - nurse observations
  - otoscopy, audiometry and/or tympanometry results
  - teacher observations, as relevant
  - child's risk factors and social circumstances.
- Staff to conduct screening in accordance with the otoscopy, audiometry and tympanometry procedures in the Community Health Manual.
- The schedules for ear health and hearing screening for WA children is outlined in Table 1 and Table 2 in this document.

- Children with identified concerns are offered referral, liaison and advocacy as required.
- The planning and implementation of ear health screening and related services should be co-designed with consumers and communities to better meet their needs and increase service effectiveness.
- For schools and communities where ear health screening may be regularly or intermittently conducted by non-government agencies, community health staff should liaise with the agency to avoid service gaps and overlaps.

## Hearing loss and disorders of the ear

There are three types of hearing loss, categorised as conductive, sensorineural or mixed.<sup>1</sup> Hearing loss may be congenital or acquired.

### Conductive hearing loss

Conductive hearing loss is caused by a physical blockage or mechanical problem which interferes with sound transmission through the outer or middle ear. Conductive hearing loss is usually acquired. It can be caused by otitis media, perforated ear drum and a break in one of the ossicles, or foreign object in ear canal. Most causative conditions can be corrected by medical or surgical intervention, and/or use of amplification.<sup>1</sup>

### Sensorineural hearing loss

Sensorineural hearing losses are caused by damage to the hair cells of the inner ear, the auditory nerve or brain. Sensorineural hearing loss is considered to be permanent; however, most cases can be assisted with amplification.<sup>1</sup>

Common causes of sensorineural hearing loss include meningitis, genetic factors, aging, certain drugs, certain pre-natal conditions, some viruses and noise exposure.<sup>1</sup>

### Mixed hearing loss

Mixed hearing loss is a combination of conductive and sensorineural hearing loss. Children with mixed hearing loss require management for the hearing loss, which may involve allied health, medical and/or surgical intervention.<sup>1</sup>

### Otitis media

Otitis media (OM) refers to inflammation and infection of the middle ear, associated with illness and hearing loss. It is the leading cause of medical consultations, antibiotic prescriptions and surgery among young children.<sup>8</sup> OM can be described as a spectrum of diseases, ranging from mild - OM with Effusion (OME) to severe - Chronic Suppurative Otitis Media (CSOM). See Appendix B for more information.

Many children from all populations groups experience episodic OME at some time, and most children will experience at least one episode of acute OM (AOM). In developed countries, spontaneous resolution will occur in most children, especially in older children. However, children who suffer frequent episodic AOM or persistent OME are of concern and may require antibiotic treatment, especially when infections occur in the first six years of life.<sup>7</sup>

Recurrent OM may lead to effusion or 'glue ear', with (temporary) hearing impairment. When an ear drum perforates and does not heal, pathogens (such as *Pseudomonas*

aeruginosa and *Staphylococcus aureus*) may become established and can result in CSOM. This condition may persist for months and years, leading to destruction of the bone in and around the ear and permanent hearing loss.<sup>1</sup> Ongoing infection may indicate an ear cyst, or cholesteatoma in the middle ear which can be life threatening. Specialist intervention may be required for those afflicted by chronic ear disease, including audiology, speech pathology and surgery.<sup>1</sup>

CSOM and persistent OME, often termed 'ear disease', are associated with poor social determinants and poverty. Australian Aboriginal children have among the highest prevalence of ear disease in the world.<sup>3</sup> Others at risk include children with Down Syndrome, unrepaired cleft palates or cranio-facial disorders, and children from refugee backgrounds or from high-risk countries.<sup>11,12</sup>

Prevalence of CSOM above 4% is considered a serious public health issue by the World Health Organization. In some WA Aboriginal communities with poor living conditions, the prevalence is significantly higher.<sup>1</sup> In rural and remote areas, tobacco smoke, crowded living conditions, and high bacterial load in the nasopharynx are linked to increased risk of early OM.<sup>8</sup> It is estimated that many Aboriginal children experience up to 32 months of conductive hearing loss in their first five years of life, leading to long-term impact on speech and language, educational and vocational outcomes.<sup>1</sup> Further, it has been found that up to 90% of Aboriginal prison inmates have hearing loss.<sup>3</sup>

## Children at Risk - Signs and Risk Factors

### Important signs which may indicate hearing problems

- Lack of awareness of usual environmental sounds
- Less or no vocalising after early babbling or poor or monotonous vocalisations
- Often talking too loudly
- Frequent inattentiveness
- Recurrent ear infections and/or ear discharge
- Consistently not responding when called
- Listening to TV or electronic devices at a loud volume.<sup>13</sup>

### Risk factors for hearing impairment or loss

- Recurrent or persistent OME
- CSOM
- Strong family history of permanent hearing loss from a young age
- History of rubella, cytomegalovirus, toxoplasmosis, syphilis or herpes during pregnancy
- Dysmorphic deviations: e.g., low set ears, skin tags, accessory tragi, malformed auricles, auricular sinus, peri auricular sinus
- Hyperbilirubinemia requiring exchange transfusion
- Birthweight less than 1500gms
- Head trauma with fractured temporal bone
- Infectious diseases e.g., measles, mumps, rubella and meningitis

- Genetic syndromes known to include sensory hearing loss, e.g., Down's Syndrome, 22q11.2 Deletion Syndrome, Osteogenesis Imperfecta, Trisomy 13
- Ototoxic medication, e.g., gentamycin
- Neurodegenerative disease, e.g. Friedrich's ataxia

#### **Risk factors for Otitis Media**

- Socio economic disadvantage
- Premature birth
- Not breastfed
- Nutritional deficiencies
- Household overcrowding
- Poor hygiene
- Inadequate access to running water
- Poor waste removal and/or poorly functioning sewerage
- Second-hand cigarette smoke
- Craniofacial abnormalities
- Infected or enlarged adenoids
- Incomplete immunisation for age.

#### **Children at risk of poor health (including ear health), development and wellbeing**

- Infants who are the subject of a neonatal special referral
- Clients of concern
- Children in care
- Children who have a refugee background and/or who have come from a country which has a history of conflict and human rights violations.<sup>2</sup>

## Hearing and ear health screening schedules for WA children

**Table 1. Universal Schedule**

|   | <b>All children</b><br>See Table 2 for Screening<br>Aboriginal children and<br>others at increased risk | <b>If concerns or risk<br/>factors identified</b>   |
|---|---|---|
| <b>Birth</b>  | Newborn hearing<br>screening  |   |
| <b>0-14 days</b><br><b>Universal child health<br/>contact</b>   | Screening questions<br>and observations <sup>a</sup>  |   |
| <b>8 weeks</b><br><b>Universal child health<br/>contact</b>   | Screening questions<br>and observations <sup>a</sup>  | Otoscopy<br>Tympanometry  |
| <b>4 months</b><br><b>Universal child health<br/>contact</b>  | Screening questions<br>and observations <sup>a</sup>  | Otoscopy<br>Tympanometry  |
| <b>12 months</b><br><b>Universal child health<br/>contact</b>   | Screening questions and<br>observations <sup>a</sup>  | Otoscopy<br>Tympanometry  |
| <b>2 years</b><br><b>Universal child health<br/>contact</b>   | Screening questions and<br>observations <sup>a</sup>  | Otoscopy<br>Tympanometry  |
| <b>School Entry Health<br/>Assessment</b><br><b>Universal child health<br/>contact</b>  | Screening questions<br>and observations <sup>b</sup><br>Otoscopy<br>Audiometry                          | Tympanometry  |
| <b>Additional screening assessment (Universal Plus)</b><br>For any child (0-18 years) in clinic, community or school<br>settings; <ul style="list-style-type: none"> <li>○ In response to concerns expressed by families,<br/>school staff or child.</li> <li>○ To address concerns previously identified by the<br/>health staff.</li> </ul> |   | Screening questions<br>and observations <sup>a,b</sup><br>Otoscopy<br>Tympanometry<br>Audiometry <sup>c</sup> |
| <b>Key health education</b> messages to promote ear health and hearing will be provided<br>for families, children and school staff as appropriate to their circumstances. (See<br>Appendix A).  |   |   |

a. Screening questions and observations for children 0-4 years are listed in Table 3.

b. Screening questions for school-aged children are included in CHS 409 or CHS 719. Screening questions and observations may involve asking teachers about hearing/behaviour for individual children.

c. Audiometry used as developmentally appropriate for children from 3 years.



**Table 2. Screening for WA Aboriginal children and others at increased risk**

| <b>Offer for all Aboriginal children and others at risk</b>  |  |
|--|--|
| <b>Birth</b>   | Newborn hearing screening  |
| <b>0-14 days</b><br><b>Universal child health contact</b>  | Screening questions and observations <sup>a</sup>  |
| <b>8 weeks</b><br><b>Universal child health contact</b>  | Screening questions and observations <sup>a</sup><br>Otoscopy, Tympanometry                            |
| <b>4 months</b><br><b>Universal child health contact</b>   | Screening questions and observations <sup>a</sup><br>Otoscopy, Tympanometry                            |
| <b>12 months</b><br><b>Universal child health contact</b>  | Screening questions and observations <sup>a</sup><br>Otoscopy, Tympanometry                            |
| <b>2 years</b><br><b>Universal child health contact</b>  | Screening questions and observations <sup>a</sup><br>Otoscopy, Tympanometry                            |
| <b>School Entry Health Assessment</b><br><b>Universal child health contact</b>   | Screening questions and observations <sup>a</sup><br>Otoscopy, Tympanometry, Audiometry <sup>b</sup>   |
| <b>Pre-primary</b>   | Screening questions and observations <sup>a</sup><br>Otoscopy, Tympanometry, Audiometry <sup>b</sup>   |
| <b>Year 1</b>  | Screening questions and observations <sup>a</sup><br>Otoscopy, Tympanometry, Audiometry <sup>b</sup>   |
| <b>Additional (targeted) screening assessment (Universal Plus)</b><br>For any child (0-18 years) in clinic, community or school settings; <ul style="list-style-type: none"> <li>○ In response to concerns expressed by families, school staff or child.</li> <li>○ At every ECHS contact (WACHS only)</li> <li>○ To address concerns previously identified by health staff.</li> <li>○ Other (opportunistic) contacts.</li> </ul> | Screening questions and observations <sup>a,b</sup><br>Otoscopy, Tympanometry, Audiometry <sup>c</sup> |
| <b>Key health education</b> messages to promote ear health and hearing will be provided for families, children and school staff as appropriate to their circumstances. (See Appendix A).   |  |

a. Screening questions and observations for children 0-4 years are listed in Table 3.

b. Screening questions for school-aged children are included in CHS 409 or CHS 719. Screening questions and observations may involve asking teachers about hearing/behaviour for individual children.

c. Audiometry used as developmentally appropriate for children from 3 years.

For more information on assessment of Aboriginal children and others with risk factors aged 0-3 years, see [Appendix C](#), and for those aged over 3 years, see [Appendix D](#).

## Collecting hearing and ear health history

Screening questions are suggestions for asking age-appropriate questions of parents or caregivers to gather history about children's hearing and ear health. Further health history as relevant for individual children may be based on risk factors.

**Table 3. Screening questions and observations**

|   |   |
|---|---|
| <b>0 – 14 days</b><br><b>Universal</b><br><b>child health</b><br><b>contact</b> | <p>Did baby have a newborn hearing screen?</p> <p>Did baby pass their newborn hearing screen or were they referred?</p> <p>Does baby recognise their mother's voice?</p> <p>Does an awake baby jump or cry at sudden loud noises like a door slamming or a dog barking nearby?</p> <p>Do sudden, loud noises wake the baby?</p> <p><u>Observations</u></p> <ul style="list-style-type: none"> <li>• May 'corner' eyes reflexively to side of noise</li> <li>• Shows preference to mother's voice</li> </ul>   |
| <b>8 weeks</b><br><b>Universal</b><br><b>child health</b><br><b>contact</b>     | <p>Do sudden loud noises wake the baby?</p> <p>Does your baby cry at very loud noises?</p> <p>When baby is awake, do they jump at sudden, loud noises like a door slamming or a dog barking nearby?</p> <p>Does baby calm for a short time when they hear your voice?</p> <p>Are you worried about your baby's hearing?</p> <p><u>Observations</u></p> <ul style="list-style-type: none"> <li>• Turns head or eyes to sound at ear level</li> <li>• May move head from side to side if searching for sound source</li> <li>• Quietens or smiles at sound of familiar voice before being touched.</li> </ul>   |
| <b>4 months</b><br><b>Universal</b><br><b>child health</b><br><b>contact</b>    | <p>Does baby sometimes turn their eyes or start to turn their head to see where a noise comes from?</p> <p>Does your baby quieten or smile at the sound of your voice when they can't see you?</p> <p>Is baby distracted from feeding by moderately loud sounds nearby?</p> <p>Does baby make a variety of babbling sounds?</p> <p>Does baby enjoy playing with noisy toys or objects?</p> <p>Are you worried about your baby's hearing?</p> <p><u>Observations</u></p> <ul style="list-style-type: none"> <li>• Turns head or eyes to sound at ear level</li> <li>• May move head from side to side if searching for sound source</li> <li>• Vocalises in synchrony to language of caregiver.</li> </ul> <p><u>Signs of Possible Hearing Loss</u></p> <ul style="list-style-type: none"> <li>• Not starting to babble.</li> <li>• 3-6 months - not communicating by vocalising or eye gaze.</li> </ul> |



|   |   |
|---|---|
| <p><b>6 – 9 months</b><br/><b>Additional contact (as appropriate)</b></p> | <p>Does your baby turn immediately to a familiar voice across the room?<br/>Does baby enjoy playing with noisy toys or objects?<br/>Are you worried about your baby's hearing?</p> <p><u>Observations</u></p> <ul style="list-style-type: none"> <li>• Listens to voice when person is not in view</li> <li>• Locates sound made above and below ear level</li> <li>• Turns to sound, particularly voice</li> </ul> <p><u>Signs of Possible Hearing Loss</u></p> <ul style="list-style-type: none"> <li>• Not babbling</li> <li>• 9 months - No two-part babble (e.g. gaga)</li> </ul>  |
| <p><b>12 months</b><br/><b>Universal child health contact</b></p>         | <p>Does baby show pleasure when hearing sounds like food being prepared or kids coming home?<br/>Does baby copy words and sounds?<br/>Does baby respond when you call from another room?<br/>Do they respond when you say <i>no</i> or <i>bye-bye</i>, without visual gestures?<br/>Do they show a quick response to their name or other familiar words?<br/>Has baby had many ear infections or colds?<br/>Are you worried about your child's hearing?</p> <p><u>Observations</u></p> <ul style="list-style-type: none"> <li>• Knows and turns to own name</li> <li>• Locates sound in any direction</li> <li>• Babbles loudly in conversation style</li> </ul> <p><u>Signs of Possible Hearing Loss</u></p> <ul style="list-style-type: none"> <li>• Not babbling. No babbled phrases that sound like talking.</li> </ul> |
| <p><b>18 months</b><br/><b>Additional contact (as appropriate)</b></p>    | <p>Does your baby use 10-20 recognisable words?<br/>Does your baby 'talk' with a mixture of babble and words?<br/>Does baby sing along to familiar songs?<br/>Has baby had many ear infections or colds?<br/>Are you worried about your child's hearing?</p> <p><u>Observations</u></p> <ul style="list-style-type: none"> <li>• Listens and responds to people talking to them</li> </ul>  |
| <p><b>2 years</b><br/><b>Universal child health contact</b></p>           | <p>Does your child listen with interest to general conversation?<br/>Are they saying 50 or more recognisable words<br/>Can they put two or more words together to make a simple sentence?<br/>Has your child had many ear infections or colds?<br/>Are you worried about your child's hearing?</p> <p><u>Observations</u></p> <ul style="list-style-type: none"> <li>• Direct localisation of sounds to side, above and below.</li> </ul> <p><u>Signs of Possible Hearing Loss</u></p>  |

|   |  |
|---|--|
|   | <ul style="list-style-type: none"> <li>• 20 months – Only pointing or using gestures (i.e. not speaking). No clear words.</li> <li>• Cannot understand short requests.</li> <li>• 24 months - Using &lt; 50 words, not following simple requests. Not putting words together. Most of what is said is not easily understood.</li> </ul>  |
| <b>3 years<br/>Additional<br/>contact (as<br/>appropriate)</b>                                      | <p>Does your child speak sentences and use many different words?<br/>Has your child had many ear infections or colds?<br/>Are you worried about your child's hearing?</p> <p><u>Observations</u></p> <ul style="list-style-type: none"> <li>• Answers and asks simple questions</li> <li>• Speech understandable, but many immature sound substitutions</li> </ul> <p><u>Signs of Possible Hearing Loss</u></p> <ul style="list-style-type: none"> <li>• 30 months – No two-word combinations</li> <li>• 36 months - Speech difficult to understand. No simple sentences.</li> </ul>   |
| <b>4 years<br/>Universal<br/>child health<br/>contact<br/>(Questions as<br/>used in<br/>CHS409)</b> | <p>Has anyone in your family had childhood hearing problems?<br/>Has your child had repeated ear infections, discharged from ears, hearing loss, grommets or an ear operation?<br/>Has your child ever had medical care for ears or hearing?<br/>Do you have any concerns or worries about your child's hearing or ears?</p> <p><u>Observation</u></p> <ul style="list-style-type: none"> <li>• Speech is clearly understood</li> </ul> <p><u>Signs of Possible Hearing Loss</u></p> <ul style="list-style-type: none"> <li>• Speech difficult to understand.</li> <li>• Not following two-step directions.</li> <li>• Requires physical prompts to follow directions</li> <li>• Teacher concerns about child's speech or hearing</li> </ul> |

## Follow up and referral pathway

Staff will comply with the specific follow-up and referral processes outlined in the audiometry, otoscopy and/or tympanometry procedures.

## Documentation

Nurses maintain accurate, comprehensive and contemporaneous documentation of assessments, planning, decision making and evaluations according to CAHS-CH and WACHS processes.

## Compliance monitoring

Failure to comply with this policy document may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the [Integrity Policy Framework](#) issued

pursuant to section 26 the [Health Services Act 2016](#) (WA) and is binding on all CAHS and WACHS staff as per section 27 of the same Act.

Compliance monitoring methods will include:

- Health Service reporting of Universal Child Health Contacts.
- Health Service reporting of Aboriginal Ear Health Assessment.

## References

1. Coates H, Kong K, Mackendrick A, Bumbak P, Perry C, Friedland P, Morris P & Chunghyeon O. *Aboriginal, Torres Strait Islander and Pacific Islander Ear Health Manual*. Perth: Garnett Passe and Rodney Williams Foundation, 2020.
2. Burns J & Thomson N. *Review of ear health and hearing among Indigenous Australians*. Perth: Edith Cowan University, Australian Indigenous HealthInfoNet, 2013.
3. Sibthorpe B, Agostino J, Coates H, Weeks S, Lehmann D, Wood M, Lannigan F & McAullay D. Indicators for continuous quality improvement for otitis media in primary health care for Aboriginal and Torres Strait Islander children, *Australian Journal of Primary Health*, 2017, 23: 1-9.
4. Yong M, Panth N, McMahon CM, Thorne PR & Emmett SD. How the World's Children Hear: A narrative review of school hearing screening programs globally. *American Academy of Otolaryngology – Head and Neck Surgery, OTO Open* 2020, 4(2): 1-8.
5. Australian Institute of Health and Welfare. *Australia's health 2018. Australia's health series No. 16 AUS 221*. Canberra: AIHW, 2018.
6. Yiengprugsawan V, Hogan A & Strazdins L. Longitudinal analysis of ear infection and hearing impairment: findings from 6-year prospective cohorts of Australian children, *BMC Pediatrics*, 2013, 13-28.
7. Technical Advisory Group. *Otitis Media in Aboriginal and Torres Strait Islander Children*. Darwin: Menzies School of Health Research; 2020
8. Richmond HJ, Swift VM, Doyle JE, Morrison NR, Weeks SA, Veselinovic T, Jacoby P, Brennan-Jones CG, Richmond PC & Lehmann D. Early onset of otitis media is a strong predictor of subsequent disease in urban Aboriginal infants; Djaalinj Waakinj cohort study. *Journal of Paediatrics and Child Health*, Vol 59, 5 May 2023
9. Government of Western Australia, Aboriginal Health Council of WA, Rural Health West, Telethon Kids Institute (Wesfarmers Centre of Vaccines & Infectious Diseases) & WA Primary Health Alliance. *WA Child Ear Health Strategy*. Perth, 2017.
10. Office of the Auditor General Western Australia. *Improving Aboriginal Children's Ear Health (Report 23, June 2018-19)*. Perth: Office of the Auditor General Western Australia, 2019.
11. HealthPathways - Western Australia, *Otitis Media with Effusion (Glue Ear) in Children*. HealthPathways; 2017 (Updated August 2020).
12. WAPHA HealthPathways - Western Australia, *Specific Populations: Migrants and Refugees*. HealthPathways; 2023.
13. Le Clercq C, Goedegebure A, Jaddoe V, Raat H, Baatenburg de Jong R & van der Schroeff M. Association between portable music player use and hearing loss among children of school age in the Netherlands, *JAMA Otolaryngology Head Neck Surgery*, 2018, 144(8): 668-675.

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| <b>Related internal policies, procedures and guidelines</b>  |
| The following documents can be accessed in the CH Clinical Nursing Manual: <a href="#">HealthPoint link</a> or <a href="#">Internet link</a> or for WACHS staff in the <a href="#">WACHS Policy Manual</a> |
| Audiometry   |
| Otoscopy   |
| Physical assessment 0-4 years Guideline  |
| Tympanometry   |
| Universal Contact - School Entry Health Assessment   |
| Universal Contacts – 8 week, 4 months, 12 months, 2 years  |
| <b>The following documents can be accessed in the <a href="#">CAHS-CH Operational Policy Manual</a></b>  |
| Infection Control Manual   |
| <b>The following documents can be accessed in the <a href="#">WACHS Policy Manual</a></b>  |
| Ear tissue spearing, irrigation and ear drop installation procedure  |
| Engagement procedure   |
| Enhanced Child Health Schedule   |
| <b>Related CAHS-CH Forms</b>   |
| The following resources and forms can be accessed from the <a href="#">CAHS-Community Health Forms page</a> on HealthPoint   |
| Consent for ear health school screening form CHS 719   |
| Ear health assessment results CHS 423  |
| Ear health school screening results for parents CHS 423A   |
| School Entry Health Assessment Parent Questionnaire CHS 409-1  |
| School Entry Health Consultation for Education Support Students CHS 409-5  |
| School Entry Health Assessment Results for parents CHS 409-6A  |
| <b>Related WACHS resources</b>   |
| <a href="#">Child Ear Health Services: Codesign Framework</a>  |

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| Ear Health Module 1 – Overview (EHOV EL1) WACHS My Learning  |
| Ear Health Module 2 – Otoscopy (EHOT EL1) WACHS My Learning  |
| Ear Health Module 3 – Tympanometry (EHTT EL1) WACHS My Learning  |
| Ear Health Module 4 – Play Audiometry (EHPA EL1) WACHS My Learning   |
| Ear Health Module 5 – Referrals (EHRE EL1) WACHS My Learning   |
| <b>Related CAHS training resources</b>   |
| Module 1: Ear Health Assessment and Hearing Screening  |
| Module 2: Otoscopy   |
| Module 3: Child Health Tympanometry  |
| Module 4: School Health Tympanometry   |
| <b>Related external resources</b>  |
| Coates H, Kong K, Mackendrick A, Bumbak P, Perry C, Friedland P, Morris P & Chungheyeon O. Aboriginal, Torres Strait Islander and Pacific Islander <a href="#">Ear Health Manual</a> . Perth: Garnett Passe and Rodney Williams Foundation, 2020.  |
| <a href="#">PLUM and HATS speech resource</a> – Pictures and questions to assist with talking to parents about hearing, speech and language, National Acoustic Laboratories.   |
| <a href="#">Blow-Breathe-Cough Program</a> . Hearing Australia resources for teachers and early childhood educators to promote ear health.   |
| <a href="#">Care for Kid's Ears</a> . A wealth of information and resources for parents, early childhood educators, teachers and health professionals. Includes material in several different language groups.   |
| <a href="#">Otitis Media Guidelines Smartphone App</a> . Created by the Centre for Research Excellence in Ear and Hearing Health of Aboriginal and Torres Strait Islander Children. The App is for use by clinicians and health workers who have responsibility for management of OM in Aboriginal and Torres Strait Islander children – in urban, rural and remote populations. |

## Appendices

### Appendix A: Key health education messages for children, families, schools and communities to promote ear health and hearing

Provide the following messages in ways that meet the needs of family and community culture, language and circumstances.

Ear health and hearing is very important for babies and small children:

- Babies can get ear infections within the first weeks or months of life. This can lead to ear infections throughout the child's early years.
- Repeated ear infections can lead to hearing loss, difficulties with speech and problems with learning and behaviour.
- The first four years of life are most important for learning language and communication skills. It is important that children hear well at this time.
- Learning language well allows children to fully take part in family and community life, to make friends, get along with others, learn at school, and to get a job later.
- Parents and family are the most important teachers of language and communication skills.
- Talk face-to-face with your child and allow them time to respond.

Good hygiene is important:

- Children and adults should wash hands with soap and water before eating, after going to the toilet, after coughing or wiping nose, before going to bed.
- Teach children to blow their nose to remove all discharge and dispose of soiled tissues appropriately.
- Keep clean with regular showers.
- Regularly wash clothes, bed linen and towels.

Good child and family health is important:

- Avoid tobacco smoke (passive smoking) and smoking in pregnancy.
- Encourage a healthy diet for the family, including iron-rich foods, and crunchy foods to encourage chewing.
- Encourage breastfeeding, exclusively for the first six months, and continue for 12 months.
- Encourage Blow Breathe Cough activities.

Prevention and treating ear problems early is important:

- Encourage regular visits to the health centre for ear examinations, even if children are well.
- Promote immunisation and provide information about local clinics.
- Let parents know that children with ear discharge need to see a nurse or doctor as soon as possible.
- If a child has any hearing or ear problems, parents should bring the child to the GP or health clinic promptly.

Ear health screening and health education can be optimised with consideration of home and community environmental health factors. If concerned about environmental factors that may be contributing to ill-health, an environment health referral or contact with Department of Communities is recommended.

### **Strategies to help children to hear and listen**

Parents, families and teachers can help children with hearing issues to learn listening, language and communication skills.

- Speak clearly and loudly.
- Let the child watch the face of speaker.
- Position the child in places to minimise distractions (visual and noise).
- Provide plenty of opportunities to learn speech and language (speaking to child every day, singing, reading, telling stories, reading books together etc).
- Use gestures and pictures.
- Use amplification for individuals in the classroom.
- When a child has ear and hearing trouble, it's important to increase talking and listening activities at home.

More detailed strategies for helping children at home and in classrooms are available in: Coates et al. Aboriginal, Torres Strait Islander and Pacific Islander [Ear Health Manual](#). Perth: Garnett Passe and Rodney Williams Foundation, 2020.

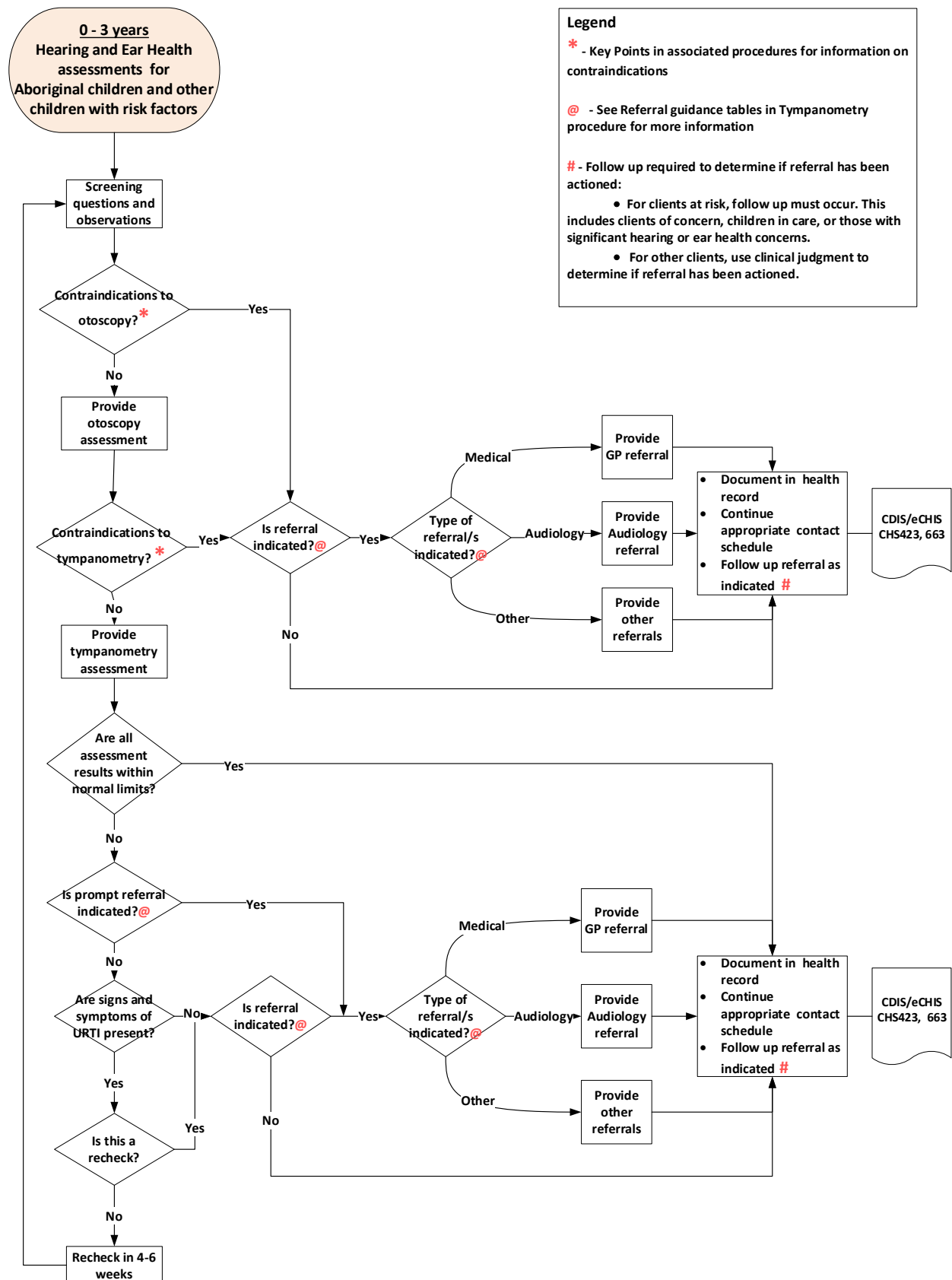


**Appendix B: Childhood ear disorders**

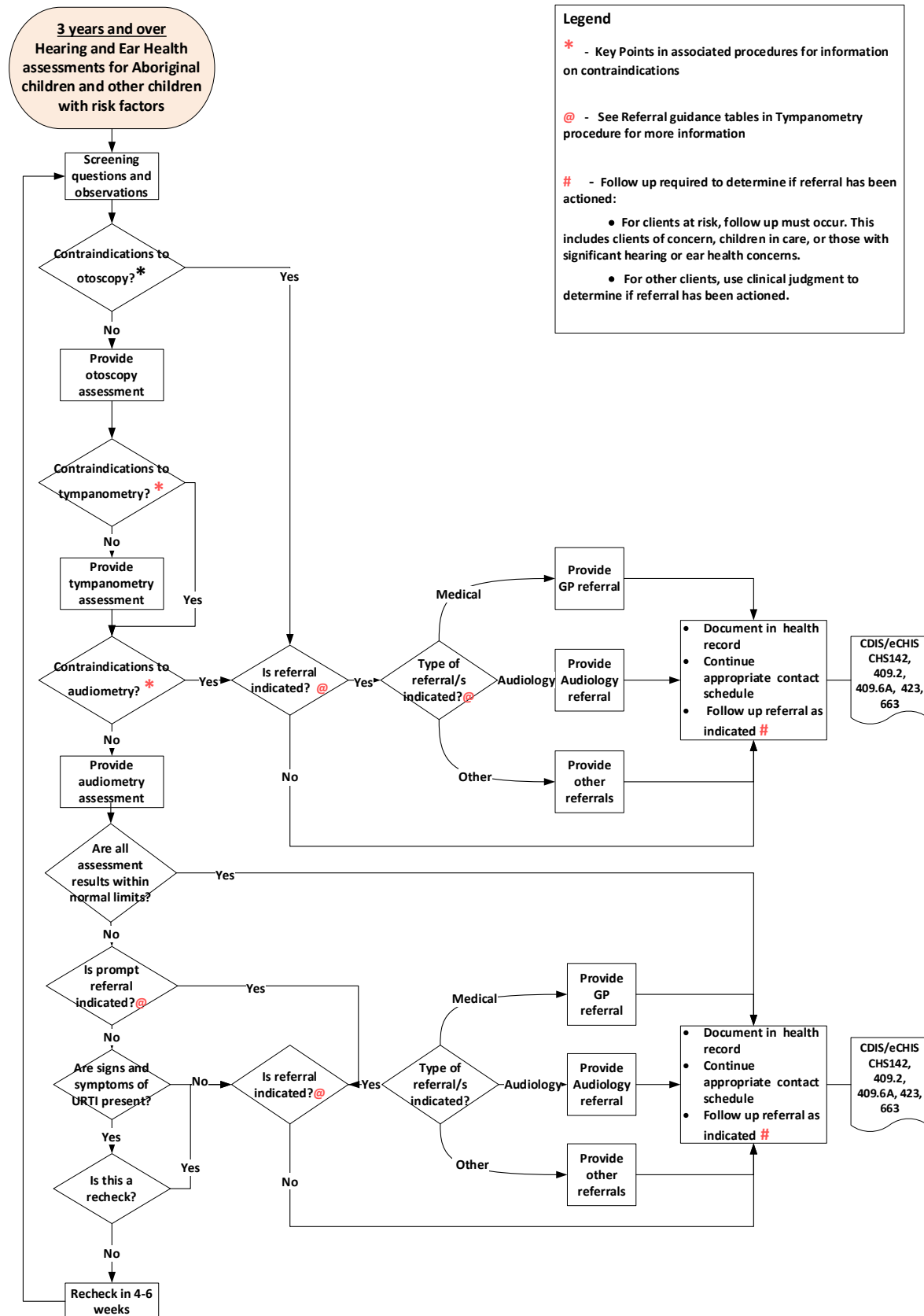
| Disorder <sup>1,9</sup>   | Main causes   | Signs and symptoms   |
|---|---|--|
| <b>Outer ear disorders</b>  |   |  |
| Deformities of the pinna or canal   | Congenital anomalies  | Diminished sound conduction  |
| Ear wax   | Excessive wax causing a plug  | Occluded ear canal<br>Hearing difficulties   |
| External infection of the pinna   | Infection as a result of trauma e.g ear piercing, insect bite, eczema   | <ul style="list-style-type: none"> <li>• Itching</li> <li>• Pain</li> <li>• Redness, swelling</li> </ul>   |
| Foreign bodies  | <ul style="list-style-type: none"> <li>• Small objects, e.g. seeds, beans, stones, beads or insects</li> <li>• Sand</li> <li>• Fungal infections</li> </ul>   | Visible in the ear canal<br>Hearing difficulties   |
| Otitis externa  | <ul style="list-style-type: none"> <li>• Infection of hair follicle</li> <li>• Poking with cotton wool or other objects</li> <li>• Humidity and moisture</li> <li>• Contaminated water</li> <li>• Contact allergy</li> <li>• Pre-existing skin disease</li> </ul> | <ul style="list-style-type: none"> <li>• Itching</li> <li>• Scaling skin or scanty discharge</li> <li>• Severe pain and redness</li> <li>• Oedema</li> <li>• Hearing difficulties</li> </ul> |
| <b>Middle ear disorders</b>   |   |  |
| Cholesteatoma   | Accumulation of normal lining skin of the eardrum in the middle ear or parts of the temporal bone.  | <ul style="list-style-type: none"> <li>• Gradually increasing hearing loss</li> <li>• White mass in the tympanic membrane or middle ear.</li> </ul>  |
| Dry perforation<br><i>Inactive CSOM</i>   | <ul style="list-style-type: none"> <li>• Trauma</li> <li>• Previous infection</li> </ul>  | Perforation of tympanic membrane visible with no fluid present.<br>Hearing difficulties possible depending on size.  |
| Otosclerosis<br><i>Bone overgrowth in the middle ear (very rare in children).</i> | Unknown   | <ul style="list-style-type: none"> <li>• Gradual hearing loss</li> <li>• Tinnitus</li> <li>• Dizziness</li> </ul>  |
| <b>Inner ear disorders</b>  |   |  |
| Viral infection   | AOM or CSOM that spreads to middle ear  | <ul style="list-style-type: none"> <li>• Facial palsy</li> <li>• Dizziness, vertigo</li> <li>• Deafness</li> </ul>   |
| Acoustic shock  | Noisy machinery, loud music, explosions etc   | Mild to profound hearing impairment  |

| Disorder <sup>1,9</sup>   | Main causes   | Signs and symptoms  |
|---|---|---|
| Trauma  | Head injury or injury to the ear  | Mild to profound hearing impairment   |
| <b>Otitis Media (OM)</b>  |   |   |
| Acute otitis media (AOM)<br><i>Acute infection of the middle ear</i>  | <ul style="list-style-type: none"> <li>• Cold, allergy or upper respiratory tract infection</li> </ul>  | <ul style="list-style-type: none"> <li>• Earache</li> <li>• Tugging or holding ear</li> <li>• Fever</li> <li>• Irritability</li> <li>• Redness/bulging of eardrum</li> <li>• Discharge of pus or fluid.</li> </ul>  |
| Otitis media with effusion (OME)<br><i>Presence of middle ear fluid without symptoms and signs of suppurative infection</i><br><i>Known as 'glue ear'</i><br><i>Can be episodic (duration &lt; 3 months) or persistent (more than 3 months without acute symptoms or signs of inflammation)<sup>7</sup></i> | <ul style="list-style-type: none"> <li>• Cold or allergy leading to blockage of Eustachian tube</li> <li>• Dysfunction of the Eustachian tube</li> <li>• Inflammation of adenoids</li> <li>• Infants drinking from a bottle laying down</li> <li>• Infection caused by pre-existent perforation via contaminated water</li> </ul> | <ul style="list-style-type: none"> <li>• Feeling of pressure</li> <li>• Blocked ear</li> <li>• Tinnitus</li> <li>• Retracted ear drum</li> <li>• Air bubbles or fluid visible</li> <li>• Hearing difficulties</li> <li>• Tugging or pulling at ear(s)</li> <li>• Loss of balance</li> <li>• Delayed speech development</li> </ul>                                   |
| Suppurative otitis media (SOM) & Chronic SOM (CSOM)<br><i>Infection of the middle ear, with perforation of the ear drum</i><br><i>Chronic if over 6 weeks</i>   | <ul style="list-style-type: none"> <li>• OM with eardrum perforation</li> <li>• Inflammation from measles or scarlet fever or tuberculosis</li> <li>• Traumatic perforation with secondary infection</li> <li>• Biofilm</li> </ul>  | <ul style="list-style-type: none"> <li>• Persistent discharge of mucous and pus, sometimes foul smell</li> <li>• Eardrum perforation</li> <li>• Hearing difficulties</li> <li>• Relief from earache</li> <li>• Continuation or re-infection after antibiotic treatment</li> </ul>   |
| <b>Developmental issues</b>   |   |   |
| (Central) Auditory processing disorder<br><i>Deficits in neural processing of auditory information which are not due to hearing loss.</i>   | <ul style="list-style-type: none"> <li>• Genetic</li> <li>• Head injury or meningitis</li> <li>• Hearing loss /auditory deprivation</li> <li>• Recurrent OM</li> <li>• Prenatal/neonatal factors i.e. low birth weight, prematurity, drug exposure.</li> <li>• May be unknown</li> </ul>  | <ul style="list-style-type: none"> <li>• Difficulty localising sound</li> <li>• Difficulty understanding spoken language, when in noisy backgrounds or speech is rapid.</li> <li>• Slow oral response</li> <li>• Frequent requests to repeat, often says "What?"</li> <li>• Difficulty learning song/rhymes</li> <li>• Poor attention, easily distracted</li> </ul> |


## Appendix C: Hearing and ear health assessments – 0 to 3 years Aboriginal children and others with hearing and ear health risk factors



## Appendix D: Hearing and ear health assessments – 3 years and over Aboriginal children and others with hearing and ear health risk factors



This document can be made available in alternative formats on request.

|                       |   |                   |                   |
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