



Australian Government

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*Authoritative information and statistics
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Ear and hearing health of Indigenous children in the Northern Territory

Australian Institute of Health and Welfare
Canberra

Cat. no. IHW 60

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ISBN 978-1-74249-226-1

Suggested citation

Australian Institute of Health and Welfare 2011. Ear and hearing health of Indigenous children in the Northern Territory. Cat. no. IHW 60. Canberra: AIHW.

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Published by the Australian Institute of Health and Welfare

Printed by Instant Colour Press

Please note that there is the potential for minor revisions of data in this report. Please check the online version at <www.aihw.gov.au> for any amendments.

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Acknowledgments

This report was produced jointly by the Australian Government Department of Health and Ageing (DoHA) and the Australian Institute of Health and Welfare (AIHW). In particular, Bin Tong, Ruth Penm, Rachael Kitchens, Tim Adair, Jan Watson and Kimberley Branson of the institute's Indigenous Analyses and Reporting Unit contributed to the entry, analysis and interpretation of the data presented here. The authors specially thank Fadwa Al-Yaman and Indrani Pieris-Caldwell for their guidance and invaluable comments.

Special thanks go to the many clinicians and administrators who supported the audiology and ear, nose and throat (ENT) data collection and provided complex clinical services in remote locations across the Northern Territory. The authors of this report are grateful for the support and cooperation of the Northern Territory Department of Health, with particular thanks to Kathy Currie for providing valuable comments on the draft report.

The authors gratefully acknowledge comments from the members of the Monitoring and Evaluation Memorandum of Understanding Committee for Northern Territory Primary Health Care Expansion and Reform.

We thank Professor Stephen O'Leary of the Department of Otolaryngology at the University of Melbourne, Professor Harvey Coates of the School of Paediatrics and Child Health in the Department of Otolaryngology at the University of Western Australia and Dr Hemi Patel from the Department of Surgery & Critical Care, Royal Darwin Hospital for reviewing and commenting on the draft report.

Funding to support the data collection and report production was provided through DoHA.

Abbreviations

AIHW	Australian Institute of Health and Welfare
AOM	Acute otitis media
CHC	Child Health Check
CHCI	Child Health Check Initiative
CSOM	Chronic suppurative otitis media
CtG	Closing the Gap
dB HL	Decibel hearing level
DoHA	Department of Health and Ageing
ENT	Ear, nose and throat
ETD	Eustachian tube dysfunction
HRN	Hospital registration number
ID	Identification number
NATSIHS	National Aboriginal and Torres Strait Islander Health Survey
NT	Northern Territory
NT DoH	Northern Territory Department of Health
NTER	Northern Territory Emergency Response
OM	Otitis media
OME	Otitis media with effusion
VROA	Visual Reinforced Orientation Audiometry
WHO	World Health Organization

Summary

The report presents data from the Australian Government-funded follow-up ear and hearing health services delivered through the Child Health Check Initiative (CHCI) and then the Closing the Gap (CtG) in the Northern Territory National Partnership Agreement. These services were made available to children in prescribed areas of the Northern Territory from August 2007. This report provides information on the following aspects of the program as delivered until May 2011:

- follow-up services provided to children with an audiology or ear, nose and throat referral from their Child Health Check (CHC)
- details of audiology and ENT services provided
- ear and hearing health status of children who received audiology and ENT services.

Key findings

- Among children who received an audiology or ENT referral during the CHCs, around 70% of children received the service for which they were referred, and the average waiting time between referral and service was 14.3 months for audiology services and 24.5 months for ENT services.
- Between August 2007 and May 2011, 7,421 audiology services and 3,840 ENT services were received by 4,993 and 2,670 children respectively.
- The high need for services is likely to continue into the near future. Among children who needed further services about 36% and 22% received the subsequent CHCI (CtG) audiology and ENT services respectively. For children who had an ENT operation, less than 60% received post-operation care through the CHCI (CtG) program. Some children, however, have received services through other programs, so the total number of children who received subsequent services may be underestimated. In total, by 31 May 2011, 2,020 children were on the waiting list for audiology services and 2,217 children required ENT consultations.
- About 66% of children who received an ENT consultation or an audiological assessment were diagnosed with at least one type of middle ear condition. The most common diagnoses were otitis media with effusion (OME), dry perforation and chronic suppurative otitis media (CSOM). The prevalence of CSOM among children who received services (12%) was three times the prevalence rate defined by the World Health Organization (WHO) as a massive public health problem (4%).
- Among children who received an audiology service, 53% had some form of hearing loss and 33% had hearing impairment. Around 11% had a level of hearing impairment (moderate, severe or profound) defined by the WHO as a disability, and without further intervention the development of these children will be affected.
- Of children who received two or more audiology or ENT services, there was a decline in the proportion with a middle ear condition (decreasing from 85% at first service to 70% at last service). The prevalence of hearing loss decreased from 70% at their first audiology service to 61% at their last service among children who received two or more audiology services. More than half the children (56%) who had hearing impairment at their first audiology check experienced an improvement.

1 Introduction

A wide range of research has shown the extensive ear and hearing problems of Indigenous children in Australia. Ear disease is far more common in Indigenous than in non-Indigenous populations, and the prevalence is among the highest in the world (Couzos & Murray 2003, Morris et al. 2005). Poor ear health and hearing impairment have been shown to affect negatively children's development and wellbeing, particularly in relation to speech and language, behaviour and educational achievement (Couzos & Murray 2003, Williams et al. 2009).

The poor ear health of Indigenous children was corroborated by child health checks, a component of the Child Health Check Initiative (CHCI) introduced under the Northern Territory Emergency Response (NTER)¹. Child Health Check data revealed that of 9,373 Indigenous children who received health checks 30% had ear disease (AIHW & DoHA 2009). Of these children, 1,291 (14%) were referred to audiology services and 896 (10%) were referred to an ear, nose and throat specialist at their initial health check. In addition, 734 (7%) children received an ENT referral at subsequent health checks or through the chart review process.

In response to the extensive ear and hearing problems of Indigenous children in the prescribed communities and town camps, the CHCI included funding for follow-up services from the middle of 2007. The Australian Government funded the Northern Territory Government to provide follow-up audiology and ENT services. The audiology follow-up services assessed the middle ear condition of the child, tested for hearing loss and recommended rehabilitation. The ENT follow-up services comprised both consultation and surgery. These services operated in prescribed areas of the Northern Territory where the CHCs were conducted.

The focus of this program was to provide follow-up audiology and ENT services to children with a referral from their CHC. Although priority was given to such children, if possible and if funding allowed, services were also provided to other children in need or who sought services. Children living in prescribed areas of the NT were eligible for these services if they received a CHC or were under 16 years of age.

Since July 2009, the follow-up audiology and ENT services were funded as part of the Closing the Gap (CtG) initiatives of the Northern Territory National Partnership Agreement signed by the Australian and Northern Territory governments. This report covers services provided under both the CHCI and CtG programs. These programs are referred to as CHCI (CtG) throughout this report.

This chapter provides background information on the ear health of Indigenous children in the Northern Territory (including challenges to managing ear disease and providing services in Indigenous communities), outlines the key questions addressed in this report and provides a brief description of the CHC audiology and ENT data collections.

¹ The NTER has implemented a range of measures that aim to protect children and improve the safety of communities to provide a better future for Aboriginal people in the Northern Territory (FAHCSIA 2010).

1.1 Ear health of Indigenous children

Otitis media (OM) is one of the most common ear problems experienced by Indigenous children. This is a disease of the middle ear associated with inflammation, accumulation of fluid and the bulging of the tympanic membrane or eardrum (Wiertsema & Leach 2009). OM is the most common cause of hearing loss and impairment². Research has demonstrated that Indigenous children have substantially higher prevalence of OM than non-Indigenous children, that Indigenous infants less than one year of age are four times as likely as non-Indigenous infants to develop acute OM (AOM) and three times as likely to have OM with effusion (OME) (Boswell & Nienhuys 1996). Between the ages of 2 and 20, Indigenous people are expected to have 32 months of OM, while non-Indigenous children will have only 3 months (Couzos & Murray 2003). The severity of AOM, OME and eardrum perforation in Indigenous children means that it commonly persists until adolescence and adulthood (Boswell & Nienhuys 1996, Couzos & Murray 2003, Williams et al. 2009). Research has shown that in the past 30 years there has been no clear decline in OM among Indigenous children (Wiertsema & Leach 2009).

The prevalence of chronic suppurative OM (CSOM) in Aboriginal Australians is among the highest in the world. The prevalence for children who participated in the CHCI (CtG) programs was 12%. The World Health Organization has stated that a prevalence of CSOM of over 4% indicates a substantial public health problem (WHO 2004). Further, the WHO (2004) stated that the prevalence of perforation rates of Indigenous Australians (29-43%) was the highest of all populations studied.

1.2 The impact of ear health on children's development

Poor ear health in Indigenous children leads to significant hearing problems, which may impact upon development of speech and language, as well as attention, behaviour and other educational problems (Couzos & Murray 2003, Williams et al. 2009). Research has found that Indigenous children with OM have lower phonological awareness, and poorer reading and spelling skills than Indigenous children without OM (Williams & Jacobs 2009). This is especially a problem for children learning English as a second language. The risk of children having poor speech and language due to OM is high when they experience OM in the first year of life; where there is more than one episode of OM before 12 months of age, and where there are long periods of infection (Williams & Jacobs 2009).

According to WHO, disabling hearing impairment in children is defined as a hearing threshold of 31dB or above (WHO, cited in Couzos & Murray 2003). Among children who received audiology services through the CHCI (CtG) program, 11% had hearing impairment at a hearing threshold of 35 dB HL or above. Without further intervention or rehabilitation, the speech and language development as well as the social and educational achievements of these children will be affected.

² Definitions of hearing loss and hearing impairment can be found in section 4.2.1.

1.3 Challenges in managing otitis media in the NT Indigenous communities

The nature of OM makes it a complicated disease to manage due to:

- the potential duration of the condition (the disease can persist for an extended time)
- the extent of morbidity
- the need for treatment to be provided at critical times in the disease process (it requires management to tight physiological parameters)
- major commitments of time and effort required from caregivers for a substantial time (repeated treatments)
- frequent monitoring required
- the need for managing the coordination of multiple health service providers, for example, GPs, paediatricians, child health nurses and ENT specialists
- the condition requires adjustment in a non-medical environment (especially in school but also later in vocational pursuits).

Apart from the above difficulties, challenges in managing otitis media and in delivering services to Indigenous communities in the NT include:

- logistic limitations due to inclement weather and road closures
- families not wishing to access follow-up services on the days available
- child and family unable to be found during the ENT outreach visit to the community
- carers unable to be found to attend specialist consultations with children, particularly in the town camps in Central Australia
- access restrictions during community events such as ceremonies, death and major sports events.

1.4 About this report

The AIHW was commissioned by the Australian Government Department of Health and Ageing to collect, manage and report on the data collected from the audiology and ENT services funded through the CHCI (CtG) program. Based on the data collected, this report provides information on the extent of services provided through the Australian Government funded CHCI (CtG) program, and the ear and hearing health of children who received these services.

As such, this report is a tool to monitor the implementation of one part of the CHCI. It is not an evaluation of the CHCI. A recent evaluation of the CHCI titled Evaluation of the Child Health Check Initiative and the Expanding Health Services Delivery Initiative can be found on the website of the Department of Health and Ageing³.

³ <<http://www.health.gov.au/internet/main/publishing.nsf/Content/health-oatsih-nt#Evaluation>>

The main questions addressed in this report are:

- What proportion of children with an audiology and ENT referral from their Child Health Check received follow-up services and, if they received a service, how long did they wait for the service?
- How many audiology and ENT services were provided and what proportion of eligible children in the prescribed areas of the Northern Territory received these services?
- What type of middle ear conditions were diagnosed and treated? What is the hearing status of children receiving these services, and how do they compare with other Australian children?
- Are there any changes in prevalence of middle ear condition and hearing status among children who received these services?

Information collected

The information presented in this report is derived mainly from three data collections: the CHC audiology database, the CHC ENT consultation database and the CHC ENT surgery database. These data collections were established to monitor the progress of follow-up service delivery through the CHCI (CtG) program. The relevant health professionals responsible for providing these services (audiologists, ENT specialists and primary health care workers) completed a paper-based or electronic questionnaire with information about the service provided and the child's demographic characteristics. The questionnaires were then submitted to the AIHW for processing. The detailed data items collected in these three datasets are described in the relevant chapters of this report. Data collection forms are included in Appendix 1.

Apart from the above databases, the information on the number of ENT services provided from August 2007 to June 2009 is derived from the CHC Chart review database, because detailed CHC ENT consultation and ENT surgery data were only available to AIHW from July 2009 onwards. The Chart review database was established to monitor whether children received follow-up care for the referrals they received during their health checks. It includes information on children's demographic characteristics and whether they were seen by the health professional to whom they were referred.

Children who had an ENT or audiology referral at their CHC were also linked to the services funded through other sources in order to monitor their follow-up status and to avoid duplication of services.

The amount of data received by the AIHW depends on the child's family consenting to share this information. There are three scenarios for the provision of data under the consent requirements:

- If consent is given, all data are sent to the AIHW.
- If consent is not given, a limited amount of information, sufficient to determine that follow-up to a referral is provided to children who had a referral at their CHC, is sent to the AIHW.
- If consent is not given and the child does not have a referral from the CHC, only the aggregate information is provided to AIHW: the number of services provided and the number of children receiving a service by 5-year age group, sex and community.

Limitations of data

The audiology and ENT data collections have some limitations that should be considered when interpreting the findings.

- Scope of the CHC audiology, ENT consultation and ENT surgery data collections are limited to the CHCI (CtG) audiology and ENT services. Audiology and ENT services provided through other funding sources (for example services funded by the NT Government or private sector) are not included (except for a small amount of these services data in the audiology and ENT referral sections). As such, this report may underestimate the number of children who received subsequent services.
- As AIHW does not receive detailed information on audiology and ENT services if children do not consent to share the data, the data for which consent has not been obtained are not included in most of the analysis of this report.
- As personal information, such as the child's name, is not provided to the AIHW, children can only be tracked using their Hospital Registration Number (HRN). A very small percentage of children (1.1%) could not be tracked due to missing or incorrect HRN.
- Children who received an audiology or ENT service were not a random sample of Indigenous children in the prescribed areas or of children who had a CHC. Firstly, audiology and ENT services were only provided to children who volunteered for them. Secondly, although all Indigenous children in prescribed areas of the Northern Territory were eligible to receive a CHCI (CtG) audiology or ENT service, children with referrals as a result of their CHC were targeted for follow-up by the outreach teams. Thus, the findings are not representative of the Northern Territory Aboriginal child population or the Aboriginal population of children within prescribed areas of the NTER CHCI.
- The analysis comparing outcomes between first and latest audiology or ENT services should be treated with caution, because only a small proportion of children received subsequent services following an initial audiology check and ENT consultation.

Structure of report

The information in this report relates to audiology and ENT services provided as part of the CHCI (CtG) program from August 2007 to 31 May 2011.

This report contains the following chapters:

- Chapter 2, **Service delivery: Audiology**, details the follow-up status of children with an audiology referral from their CHC, the delivery of audiology services, number and characteristics of children receiving these services, and the type of further action required.
- Chapter 3, **Service delivery: ENT**, details the follow-up status of children with an ENT referral from their CHC, the delivery of ENT services, number and characteristics of children receiving these services, the type of follow-up services required.
- Chapter 4, **Ear and hearing health status of children receiving ENT and audiology services**, examines ear and hearing health of children receiving these services, and compares the ear and hearing health status of children who received audiology or ENT services with other Australian children.

Appendix 1 presents the questionnaire used in the CHCI (CtG) audiology, ENT consultation and ENT surgery data collections. A glossary is provided in Appendix 2.

2 Service delivery: Audiology

Highlights

- A total of 1,291 children received a referral for audiology services at the CHCs. Of these, 70% received a service and the average waiting time between referral and service varied from 11 months in Central Australia to 18 months in Katherine/Barkly.
- A total of 7,421 CHCI (CtG) funded audiology services were received by 4,993 children between August 2007 and May 2011.
- Of children who received an audiology service, 73% were reported as requiring further action. Among children who required further action, 36% received subsequent audiology services. This reflects the challenges of providing follow-up services in areas of the NT.
- The high need for services is likely to continue into the near future. At 31 May 2011 there were 2,020 children who were either waiting for an audiology check or needed continued monitoring of their hearing.

Audiological assessments provide information about the status of middle ear function, diagnosis of hearing loss, and recommendations for clinical care and rehabilitation, such as communication strategies, classroom amplification, hearing aids, speech therapy and educational support. Audiological assessments can also monitor changes in hearing associated with medical and surgical management of middle ear conditions.

The audiology services provided under CHCI (CtG) were designed to enable three visits to each community in the NTER prescribed areas, allowing repeated audiological assessments to monitor hearing loss and middle ear function of children in these communities. These ongoing assessments are necessary because otitis media in Indigenous children is commonly recurrent, persistent and chronic.

To meet the need for audiology services, the Australian Government bought additional audiology testing facilities (hearing booths) to add to those operating in the regional centres of the Northern Territory. Twenty-one hearing booths were bought for about \$4.3 million between July 2007 and June 2010. The booths were placed at the following communities: Ali Curung, Ampilatwatja, Angurugu, Borroloola, Epenarra, Galiwinku, Gapiwuyak, Hermannsburg, Lajamanu, Maningrida, Ngukurr, Nguiu, Oenpelli, Papunya, Santa Teresa, Ti Tree, Yuenduma, Wadeye, Lake Nash and at Congress and Danila Dilba Health Services. These hearing booths were serviced by NT DoH (formerly NT Department of Health and Family). Specialised audiology facilities housed in these hearing booths were used for hearing assessment of children aged 3 years or less. These facilities provided audiology testing using Visual Reinforced Orientation Audiometry (VROA), or sound field measurement (see Section 4.2).

Although priority was given to children with a CHC referral, if possible and if funding allowed, services were also provided to other children in need or other children who sought services.

The audiology services were delivered by outreach teams consisting of audiologists and at least one other member of staff: a registered nurse, an Aboriginal health worker, a community hearing worker or an administrative officer. The outreach teams worked with local families, primary health organisations, community personnel, schools and early childhood organisations.

This chapter focuses on the provision of audiology services funded by the CHCI (CtG) program in the NTER prescribed areas. The hearing assessment results from these audiology services are included in Chapter 4: Ear and hearing health status of children receiving ENT and audiology services.

As mentioned in the introduction of this report, apart from aggregated information on number of services, no information was provided to the AIHW if the parent or guardian of the child did not give consent for sharing detailed information. Therefore, except in section 2.2 of this chapter, the analyses are based on consented data only.

2.1 Audiology data collection

Audiology data are received by the AIHW in paper form from the NT DoH audiology team (the provider of audiology services).

The audiology data include:

- details about the child (that is, Hospital Registration Number, date of birth and sex)
- community identification (ID) and date of service
- whether the child had received previous audiology checks and, if so, the type of intervention and extent of change in hearing level since that check
- outcomes from the audiology check
- whether further action was recommended.

A child may receive a number of audiological assessments and have more than one record in the audiology data collection. Each record in the audiology data collection corresponds to a single assessment of middle ear function and peripheral hearing (audiological assessment). A course of care for otitis media may consist of one or a series of audiological assessments to monitor hearing loss and assess middle ear function.

2.2 Follow-up care for children who received a CHC audiology referral

About 14% of children who had a CHC received an audiology referral (AIHW 2009). The following section presents data on the audiology follow-up services that were provided to these children.

Apart from audiology data collected through the CHCI (CtG) program, data on follow-up services were obtained by linking to audiology services provided by other programs or funding sources in order to monitor their follow-up status and avoid duplication of services.

Of the 1,291 children who received a referral for audiology services at their CHC, 903 children (70%) received a service (Table 2.1). The majority of these children (826 children) received services from the CHCI (CtG) funded program and 77 children received the services funded by other sources.

The average waiting time varied across regions. The time in each region was largely determined by the timing of audiology services rolled out and the availability of hearing facilities. The audiology services were rolled out region by region and, although it was logistically possible to provide audiology services in very remote regions, hearing booths were not always available as there were only 19 hearing facilities in the largest communities.

Of the children who received a referral, the highest proportion who received a service were in Arnhem (76%), followed by Central Australia (72%), Darwin Rural (70%) and Katherine/Barkly (63%). The average waiting time between referral and service was 14 months. Katherine/Barkly, as well as having the lowest proportion of children with a referral receiving a service, had the longest average waiting time (18 months). The shortest average waiting time was in Central Australia (11 months) (Table 2.1).

More than half of children who had not been seen by an audiologist were lost to follow-up. The reasons include: failure to attend services after three attempts to provide services by the audiology outreach teams (208 children); moving out from prescribed areas (9 children); and deaths (1 child).

At 31 May 2011, 170 children had an outstanding audiology referral (they had not received an audiology service for their referral) (Table 2.1).

Table 2.1: Number of Indigenous children^{(a)(b)} with an audiology referral: whether received an audiology service, average waiting time and audiology referral outstanding, by region, August 2007 to May 2011

Region ^(c)	Children with audiology referral	Children receiving audiology service		Average waiting time between referral and service (months) ^(d)	Loss follow-up ^(e)	Outstanding audiology referral as at 31 May 2011
		Number	Per cent			
Arnhem	242	185	76.4	15.0	35	22
Central Australia	412	298	72.3	10.9	73	41
Darwin Rural	304	212	69.7	14.8	50	42
Katherine/Barkly	333	208	62.5	17.8	60	65
Total	1,291	903	69.6	14.3	218	170

(a) Excludes children with an unknown or invalid HRN.

(b) Excludes children who have not consented to sharing information.

(c) Region where received first audiology service.

(d) Average waiting time excludes outstanding audiology referrals.

(e) Loss to follow-up is defined as children who failed to attend services after 3 or more attempts to find children by DHF outreach team (208 children) or children who moved outside the prescribed communities (9 children) or died (1 child).

Source: AIHW analysis of NTER CHCI audiology database on audiology services provided as at 31 May 2011.

2.3 Total services provided

Although the focus of the program was to provide services to children with a referral from the CHC, where possible and where funding allowed, other children were also provided with services. This section provides information on the total number of children who received audiology services through a CHCI (CtG) funded program.

Between August 2007 and May 2011, a total of 7,421 audiology services were received by 4,993 children (Table 2.2). The highest number of services provided was in the 2008–09 financial year, when 3,530 services were provided to 2,883 children. The number of audiology services provided in 2010–11 decreased to 1,137 due to changes in the funding arrangement. The rate of non-consent has declined. Between August 2007 and June 2008, consent was not provided for 12% of children, compared with 3% from July 2010 to May 2011.

Table 2.2: Number of audiology services provided and number of Indigenous children who received services for the first time, by financial year, August 2007 to May 2011

Financial year		Services			Children		
		Consent	Non-consent	Total	Consent	Non-consent	Total
August 2007-June 2008	Number	861	113	974	791	110	901
	Per cent	88.4	11.6	100	87.8	12.2	100
July 2008-June 2009	Number	3,239	291	3,530	2,641	242	2,883
	Per cent	91.8	8.2	100	91.6	8.4	100
July 2009-June 2010	Number	1,673	107	1,780	1,347	105	1,452
	Per cent	94.0	6.0	100	92.8	7.2	100
July 2010-May 2011	Number	1,103	34	1,137	952	34	986
	Per cent	97.0	3.0	100	96.6	3.4	100
Total	Number	6,876	545	7,421	4,502^(a)	491	4,993
	Per cent	92.7	7.3	100	90.2	9.8	100

(a) As one child can receive more than one service in different periods, the sum of children who received services in different periods does not add up to total number of children.

Note: Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of NTER CHCI audiology database on audiology services provided as at 31 May 2011.

2.4 Demographic characteristics of children who received audiology services

Data analyses for the remainder of this chapter are based on information from 4,502 children who received audiology services and whose parent/ guardian gave consent for sharing their child's information with the AIHW.

There were differences in the coverage of audiology services between regions. Central Australia had the highest proportion of children who received audiology services (35%) (Table 2.3). This was followed by Arnhem (28%), and Katherine/ Barkly (27%). Darwin Rural had the lowest proportion of children who received audiology services (19%). These differences were caused by the working schedule and equipment availability in the areas.

Table 2.3: Number of Indigenous children receiving audiology services and as a proportion of population aged 15 years and under, by region, August 2007 to May 2011

Region ^(a)	Children	Population 0-15 years ^(b)	Per cent of population 0-15 years
Arnhem	930	3,350	27.8
Central Australia	1,363	3,934	34.6
Darwin Rural	989	5,188	19.1
Katherine/Barkly	1,037	3,787	27.4
Hospital ^(c) / Out of area ^(d)	183	n.a.	n.a.
Total	4,502	16,259	27.7

n.a. not available.

- (a) Region where received audiology service.
 (b) Estimated Indigenous resident population figures for children aged 15 years and under who live in communities and town camps covered by the CHCI. These estimates were provided by the DoHA.
 (c) Received audiology service in hospital.
 (d) Received audiology service outside prescribed area.

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of NTER CHCI audiology database on audiology services provided as at 31 May 2011.

Of the children who received an audiology service, half were aged between 6 and 11 years, 30% were five years and under, 17% were aged 12 to 15, and 2% were over 16 (Table 2.4). A similar proportion of male and female children received services.

Table 2.4: Number of Indigenous children who received audiology services, by age and sex, August 2007 to May 2011

Age and sex	Number	Per cent
Age group		
0–5 years	1,359	30.2
6–11 years	2,278	50.6
12–15 years	758	16.8
16+ years	93	2.1
Not recorded	14	0.3
Total	4,502	100.0
Sex		
Male	2,310	51.3
Female	2,190	48.6
Not recorded	2	0.0
Total	4,502	100.0

Notes

1. Data are only provided for children for whom consent was given.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of NTER CHCI audiology database on audiology services provided as at 31 May 2011.

2.5 Further action required

During audiology consultations, the audiologists recommend appropriate further action for the continuing care of the child. These actions include care from an ENT specialist, primary health care or other hearing services, rehabilitation and educational services. Of those children who had received an audiology service, 73% were judged to require further action (Table 2.5). The most common action was continued monitoring by NT hearing services (54%), followed by case management by primary health care workers (45%) and case management by an ENT specialist (36%). About 16% of children were referred to the Department of Education, Employment and Training Hearing Advisory Support, and 9% were referred to Australian Hearing for rehabilitation.

A large proportion of children who required further services were children with hearing loss. Some children who did not have hearing loss (at the time when their hearing assessment was conducted) also required further services. Treatment or monitoring may be required to prevent hearing loss, particularly for children with OM.

Table 2.5: Type of further action required, Indigenous children who received an audiology service, August 2007 to May 2011

Type of further action required	No hearing loss		Hearing loss		Missing		Total	
	No. children	%	No. children	%	No. children	%	No. children	%
At least one further action required ^(a)	686	38.3	2,329	97.7	291	88.7	3,306	73.4
Ongoing monitoring by NT hearing services	398	22.2	1,832	76.8	213	64.9	2,443	54.3
Case management by primary health care services	331	18.5	1,489	62.4	197	60.1	2,017	44.8
Case management by Ear, Nose and Throat specialist	230	12.9	1,274	53.4	102	31.1	1,606	35.7
Referral to Department of Education, Employment and Training hearing advisory support	24	1.3	693	29.1	21	6.4	738	16.4
Referral to Australian Hearing (rehabilitation)	6	0.3	384	16.1	12	3.7	402	8.9
Other	123	6.9	708	29.7	43	13.1	874	19.4
No further action required	1,103	61.7	56	2.3	37	11.3	1,196	26.6
Total children	1,789	100.0	2,385	100.0	328	100.0	4,502	100.0

(a) Children can have multiple further actions required, and as such, sum of this category totals more than 100%.

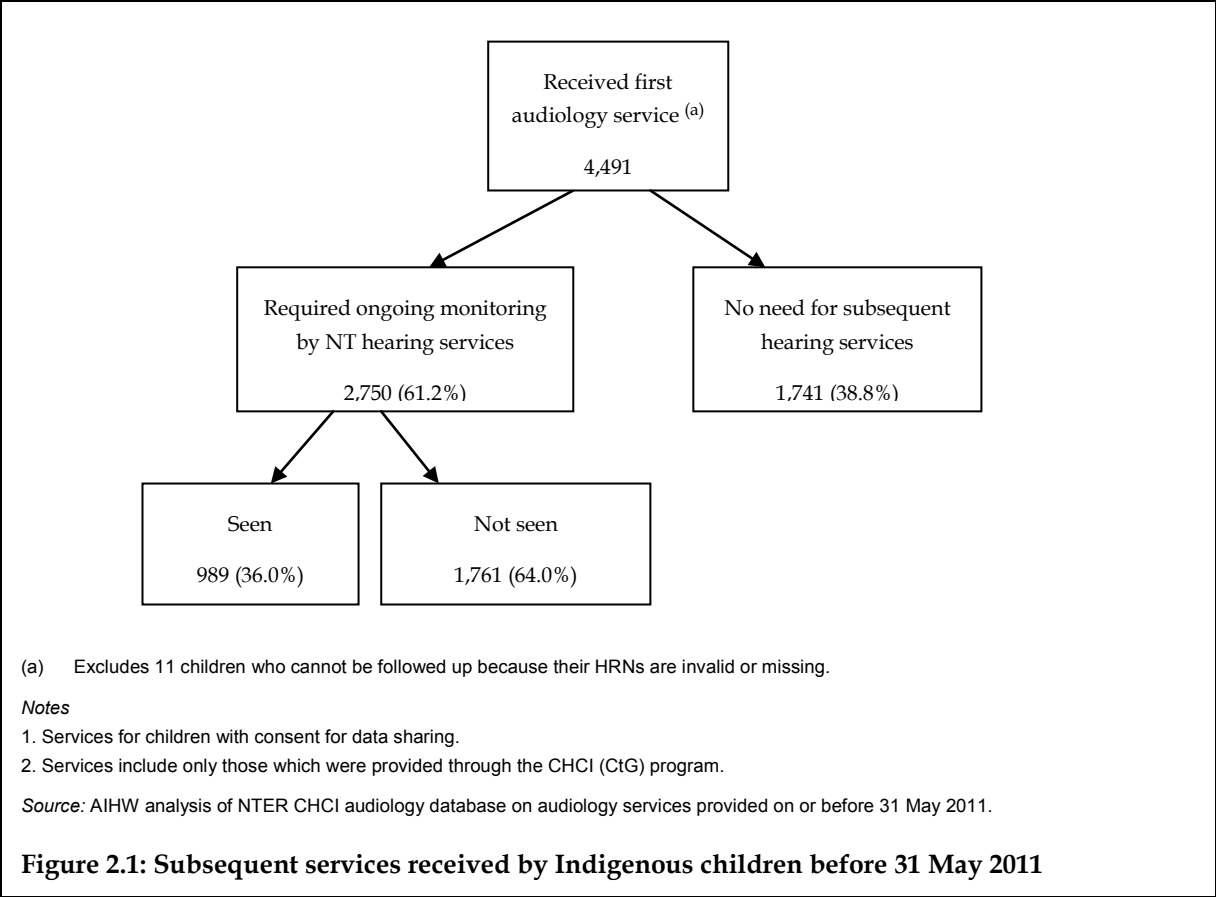
Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of NTER CHCI audiology database on audiology services provided as at 31 May 2011.

2.6 Subsequent audiology services

Over half the children (61% or 2,750) who had received their first audiology service through the CHCI (CtG) needed continued audiology services. Of these children, 989 (36%) received a CHCI (CtG) subsequent service at least once by 31 May 2011, and 1,761 (64%) were not seen (Figure 2.1). Some children, however, might have received a service through another program, and so the total number of children who received subsequent services may be underestimated.



Although the proportion of children who had received services subsequent to the first service is low, some of these children had active referrals (that is, the recommended time frame for the provision of service had not expired by 31 May 2011). For example, if children were assessed by an audiologist on 1 April 2011 and given a 6-month review period, they would not need to be re-examined until 1 October 2011. Because information on the review period is not included in the audiology database, it is not possible to distinguish children whose review periods were still active from those whose review periods had expired. It is likely, however, that the review periods were still active for the 21% of children who had been on the waiting list for less than one year (Table 2.6). For those who had been waiting for more than one year (79%), it is probable that their review periods had expired and they had not received services.

Table 2.6: Length of time children wait for subsequent audiology services as at 31 May 2011

Length of time children wait for subsequent audiology services	Number of children who were waiting for audiology services as at 31 May 2011	Per cent
<3 months	110	6.2
3 to <6 months	48	2.7
6 months to <1 year	209	11.9
More than 1 year	1,394	79.2
Total	1,761	100.0

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of NTER CHCI audiology database on audiology services provided as at 31 May 2011.

The low proportion of children who received subsequent audiology services reflects the challenges of providing services in the Northern Territory. These are outlined in Section 1.3.

The number of children seen does not include those who were seen through audiology services funded by other sources. As such, the total number of children who received subsequent services may be under-counted.

2.7 Further need for audiology services

Despite providing over 7,400 audiology services in the prescribed areas in the Northern Territory in the past three and a half years, the high need for these services is likely to continue. In total, 2,020 children were either waiting for an initial audiology check or needed continued monitoring of their hearing⁴: These include:

- 170 children who had received an audiology referral at their health check but had not yet seen by an audiologist
- 415 children who received an audiology referral from their ENT consultation and were waiting to be seen by audiologist
- 116 children who required audiology follow-up care after their ENT surgery
- 1,761 children who were identified through their audiology check as requiring ongoing monitoring by an audiologist.

Central Australia had the highest number of children requiring follow-up audiology services (573), followed by Katherine/Barkly (491), Darwin Rural (453) and Arnhem (342) (Table 2.7).

⁴ Because some children may be referred to audiology services from multiple sources, sum of individual referral category does not add up to total number of children with referral (2,020 children).

Table 2.7: Number of Indigenous children^(a) requiring follow-up audiology services as at 31 May 2011, by region

Region	Number	Per cent
Central Australia	573	28.4
Katherine/Barkly	491	24.3
Darwin Rural	453	22.4
Arnhem	342	16.9
Hospital/out of area	161	8.0
Total	2,020	100.0

(a) Excludes children with an unknown or invalid HRN.

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of NTER CHCI audiology database on audiology services provided on or before 31 May 2011.

3 Service delivery: ENT

Highlights

- During the CHCs, 1,630 children received an ENT referral. Of these 73% received an ENT service. The average waiting time between ENT referral and service was 25 months.
- A total of 3,840 ENT services (ENT consultation and ENT surgery) were provided to 2,670 children between August 2007 and 31 May 2011.
- A total of 2,490 ENT consultations were provided to 1,968 children from July 2009 to May 2011. About 89% of consultations were provided face to face and 11% were provided through teleotology.
- Almost one-third (32%) of children who received an ENT consultation received treatment. The most common type of treatment was medication (29%).
- Almost three quarters (73%) of children who received an ENT consultation required at least one further action. The most common further action required was ENT review (65%), followed by audiological assessment (63%) and case management by Primary Health Care Services (42%). Surgery was recommended for 24% of children.
- Among children who received an ENT consultation through the CHCI (CtG), 1,283 (65%) needed further ENT review. By 31 May 2011, 22% of children received subsequent services after their initial ENT consultation.
- A total of 283 children received 291 ENT operations provided through CHCI (CtG) funding by the end of May 2011. The average waiting time between recommendation and surgery was 42.6 days. Just under 60% of children who had ENT surgery received audiology or ENT follow-up care after their surgery.
- A total of 2,217 children were found to require further ENT services at 31 May 2011.

Since early 2008, the Australian Government has provided specific funding to the NT DoH to enhance ENT services (including ENT consultation and ENT surgery). From July 2009, additional funding was provided for outreach ENT consultations as part of Closing the Gap ear health outreach services.

ENT outreach services were delivered in conjunction with audiology outreach services. These services were provided by teams consisting of an ENT specialist, an audiologist, an ENT Surgical Care Coordinator (Registered Nurse) and administration support staff. The outreach teams were based in regional centres and travelled by air and road to deliver services.

Although priority was given to children with a CHC referral, if possible and if funding allowed, services were also provided to other children in need or who presented for services.

Where possible, consultations were delivered face-to-face. In remote areas where it was difficult for outreach teams to conduct physical visits, teleotology was used. In this service delivery model, a nurse collects relevant case history information and uses a video-otoscope to take digital images of a child's eardrum. The nurse provides primary health

treatment for the child at the time of consultation. This information together with an audiological assessment (where possible) is sent to an ENT specialist who reviews the information and completes an ENT consultation form. The ENT specialists review the images and case history within one week and provide recommendations for further treatment. The recommendations are implemented by a primary health worker.

ENT surgical teams comprise an ENT specialist, anaesthetic specialist and nursing theatre staff. Surgery was conducted at Gove Hospital, Katherine Hospital, Tennant Creek Hospital and Alice Springs Hospital. Surgery in Top End regional hospitals was mostly conducted by visiting interstate ENT specialists. Some of the ENT and specialist personnel were from Royal Darwin Hospital and were involved in a surgical block at Alice Springs Hospital. This team was also extensively involved in overseeing the Teleotology program, including advice on validation of the protocol.

The priority for ENT outreach services after July 2009 was to reach children who had not previously received ENT services as part of the CHCI (CtG). Service provision was initially targeted at communities with a high number of referrals from the CHCs (more than 10). Where a community with a lower number of referrals was geographically near a high referral community, it would be visited by the ENT specialist, or the children would be brought to the community being visited. After this initial targeting of communities, the approach was to visit most of the remaining communities with children who had outstanding ENT services. Children without a referral also received services if they presented for care.

3.1 Information collected

Information was collected using an ENT consultation data collection form and an ENT surgery data collection form.

The ENT consultation form provides information on:

- the date of service and ID of the community or town camp where the service was provided
- details of the child, including hospital registration number, date of birth, and sex
- diagnosis of each ear
- actions taken and follow-up required
- type of surgery recommended.

The ENT surgery form provides information on:

- the pre-operation examination
- the type of surgery performed.

Because detailed information from the CHC ENT consultation and surgery data were available to AIHW only from July 2009 on, the information on the number of ENT services provided from August 2007 to June 2009 is derived from the CHC Chart review database. The Chart review data was established to monitor whether children received follow-up care for the referrals they received at their CHC. It includes information only on children's demographic characteristics and whether they were seen by the health professional they were referred to. Thus, the information from the Chart review is available only for sections 3.2 and 3.3.

This chapter examines the provision of ENT services funded through the CHCI (CtG) program and follow-up care for children who had an ENT referral from a CHC. The ear condition findings are included in Chapter 4: Ear health status of children receiving ENT and audiology services.

3.2 ENT follow-up care for children with an ENT referral from their CHC

During the CHCs, 1,630 children (17% of total children who had CHCs) (AIHW 2009) received an ENT referral. In total, 1,190 children received follow-up services for their referral. The majority of these children (1,027 children) received services from the CHCI (CtG) funded program and 163 children received the services funded by other sources.

Darwin Rural had the highest proportion of children with a referral receiving an ENT service (77%) and Arnhem the lowest (64%) (Table 3.1). The average waiting time between ENT referral and service was 25 months. Darwin Rural had the longest average waiting time (26 months) and Katherine/Barkly the shortest waiting time (22 months). At the end of May 2011 there were 226 children with an outstanding ENT referral (they had not received an audiology service for their referral), the highest number being in Arnhem (63).

Just under half of children (214 children) who had not been seen by an ENT specialist were lost to follow-up (Table 3.1). Among these children, 208 failed to attend services after three attempts were made by the ENT outreach teams to provide services, and 6 children moved out of the prescribed areas or died.

Table 3.1: Number of Indigenous children^(a) with an ENT referral who received an ENT service, outstanding referrals and average waiting time by region, July 2009 to May 2011

Region ^(b)	Children with ENT referral ^(c)	Children receiving ENT service		Average waiting time between referral and service (months) ^(d)	Loss to follow-up ^(e)	Outstanding ENT referral
		Number	Per cent			
Arnhem	328	211	64.3	25.1	54	63
Central Australia	575	441	76.7	25.8	83	51
Darwin Rural	280	216	77.1	26.3	14	50
Katherine/Barkly	447	322	72.0	21.8	63	62
Total	1,630	1,190	73.0	24.5	214	226

(a) Excludes children with an unknown or invalid HRN.

(b) Region where received first audiology service.

(c) Referral from CHC and Chart review.

(d) Average waiting time excludes outstanding ENT referrals.

(e) Loss to follow-up is defined as children who failed to attend services after 3 or more attempts by a DHF outreach team to locate them (208 children), or children who either died or moved outside the prescribed communities (6 children).

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

3.3 Total services provided

Although the focus of the program was to provide services to children with a referral from the CHC, where possible and where funding allowed, other children were also provided with services. This section provides information on the total number of children who received ENT services through a CHCI (CtG) funded program.

Between August 2007 and May 2011, a total of 3,840 ENT services were provided to 2,670 children (Table 3.2). From August 2007 to June 2009, 968 services were received by children, as reported by Chart review data. In 2009–10, 1,791 ENT consultations were received by 1,576 children, and 790 consultations were received by 728 children from July 2010 to May 2011. ENT surgery was performed on 243 children in 2009–10 and on 42 more from July 2010 to May 2011.

Table 3.2: Number of ENT services provided to Indigenous children by year, August 2007 to May 2011^(a)

Financial year		Services			Children		
		Consent	Non-consent	Total	Consent	Non-consent	Total
<i>Chart review</i>							
August 2007-June 2009	Number	968	0	968	968	0	968
	Per cent	100.0	0.0	100.0	100.0	0.0	100.0
<i>ENT consultation</i>							
July 2009-June 2010	Number	1,713	78	1,791	1,500	76	1,576
	Per cent	95.6	4.4	100.0	95.2	4.8	100.0
July 2010-May 2011	Number	777	13	790	715	13	728
	Per cent	98.4	1.6	100.0	98.2	1.8	100.0
<i>ENT surgery</i>							
July 2009-June 2010	Number	249	n.a.	249	243	n.a.	243
	Per cent	100.0	n.a.	100.0	100.0	n.a.	100.0
July 2010-May 2011	Number	42	n.a.	42	42	n.a.	42
	Per cent	100.0	n.a.	100.0	100.0	n.a.	100.0
Total^(b)	Number	3,749	91	3,840	2,581	89	2,670
	Per cent	97.6	2.4	100.0	96.7	3.3	100.0

n.a. not available.

(a) A number of CHCI (CtG) funded ENT consultations and surgery were provided to the children in the prescribed areas before 1 July 2009. Apart from information collected from Chart review, these data were not collected and therefore are not included in this report.

(b) As one child can receive more than one service in different periods and can receive both ENT consultation and surgery, the column does not add up to sub-total or total.

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those provided through the CHCI (CtG) program.

Source: AIHW analysis of NTER CHCI audiology and ENT database for ENT services provided as at 31 May 2011.

3.4 Demographic characteristics of children

Until 31 May 2011, 16% of children aged 0-15 years in the prescribed areas received an ENT service (Table 3.3). Central Australia had the highest proportion of the population aged 15 years and under that received an ENT service (21%), while Darwin Rural had the lowest (10%).

Table 3.3: Number of Indigenous children receiving ENT services^(a) and as proportion of population aged 15 years and under, by region, August 2007 to May 2011

Region ^(b)	Children	Population 0-15 years ^(c)	Per cent of population 0-15 years
Arnhem	441	3,350	13.2
Central Australia	815	3,934	20.7
Darwin Rural	512	5,188	9.9
Katherine/Barkly	611	3,787	16.1
Hospital ^(d)	197	n.a.	n.a.
Out of area ^(e)	5	n.a.	n.a.
Total	2,581	16,259	15.9

n.a. not available.

(a) Includes children who received ENT consultation, ENT surgery and Chart review.

(b) Region where received ENT service.

(c) Estimated Indigenous resident population figures for children aged 15 years and under who live in communities and town camps covered by the CHCI. These estimates were provided by the DoHA.

(d) Received ENT service in hospital.

(e) Received ENT service outside prescribed area.

Notes

1. Data are provided only for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

More than half (52%) of children who received an ENT service (including ENT consultation, ENT surgery or as per Chart review) were aged 6-11 years (Table 3.4). Twenty-nine per cent of these children were aged 0-5 years. A similar number of males and females received an ENT service.

Table 3.4: Number of Indigenous children who received an ENT service^(a), by age and sex, August 2007 to May 2011

	Number	Per cent
Age group^(b)		
0–5 years	752	29.1
6–11 years	1,332	51.6
12–15 years	426	16.5
16+ years	69	2.7
Missing	2	0.1
Total	2,581	100.0
Sex		
Male	1,293	50.1
Female	1,287	49.9
Missing	1	0.0
Total	2,581	100.0

(a) Includes ENT consultation, ENT surgery and Chart review.

(b) Age based on latest ENT service received.

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

3.5 Type of ENT consultation

The information provided from this section is derived from 2,490 ENT consultations provided for 1,968 children who received services from July 2009 to May 2011 and gave consent for sharing information.

A large proportion of ENT consultations were face-to-face (89%) and just over one in 10 ENT consultations involved the use of teleotology (Table 3.5).

Table 3.5: Type of ENT consultation, July 2009 to May 2011

Type of ENT consultation	Number of children	Number of consultations	Per cent
Face to face consultation	1,791	2,209	88.7
Teleotology	277	281	11.3
Total number of ENT consultations	1,968^(a)	2,490	100.0

(a) As children may receive both type of consultation, the column does not add up to the total.

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

The analysis indicated that the time that elapsed between the teleotology photo being taken and reviewed far exceeded the one week specified in the NT remote community teleotology protocol. The median time between digital images of a child’s eardrum being taken and reviewed was about six weeks. The minimum time that elapsed was two weeks and the maximum was about nine weeks (Table 3.6).

It must be noted, however, that this technology has only recently been implemented by the NT DoH and requires a high level of coordination between local health workers, nurses, ENT specialists and administrators. With time, it is expected that this process will become more efficient.

Table 3.6: Time elapsed between photo taken and photo reviewed for teleotology, July 2009 to May 2011

Time elapsed	Number of weeks
Minimum	2.0
Median	5.9
Maximum	9.4

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHC (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

3.6 Results of ENT consultations

During the ENT consultations, ENT specialists examined children and then provided a diagnosis on their ear diseases. Some children received treatment on site, and some of them also received a recommendation for surgery and a follow-up plan.

The treatment and recommendations provided in the ENT consultations are detailed below, and the diagnoses of ear conditions are included in Chapter 4.

Type of treatment given during ENT consultations

A range of treatments were available to children during the ENT consultations. Almost one-third (32%) of children who received a consultation were treated (Table 3.7). The most common type of treatment was medication (29%), which comprised topical antibiotic (22%), oral antibiotics (11%) and other drugs (3%). An aural toilet was provided to 9%. A total of 1,340 children did not receive any treatment, but 906 (46%) of these received a recommendation for further action or surgery.

Table 3.7: Type of treatment given during ENT consultation, Indigenous children who received an ENT consultation, July 2009 to May 2011

Treatment	Number	Per cent
Total number of children receiving any treatment^(a)	628	31.9
Medication	579	29.4
<i>Antibiotics (oral)</i>	209	10.6
<i>Antibiotics (topical)</i>	438	22.2
<i>Other drugs</i>	50	2.5
Foreign body removed	48	2.4
Aural Toilet	180	9.1
Other	16	0.8
Total number of children receiving no treatment	1,340	68.1
Recommended for further action or surgery	906	46.0
Total number of children receiving ENT consultation	1,968	100.0

(a) This is a multiple response item. The sum does not add up to the total because one surgery can involve multiple procedures.

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

Further action required

Almost three-quarters (73%) of children who received an ENT consultation required at least one further action after their initial ENT consultation (Table 3.8). The further actions required were ENT review (65%), audiological assessment (63%), case management by Primary Health Care services (42%) and Australian Hearing for review of hearing aids (3%).

Surgery was recommended for 24% of children who received a consultation (Table 3.8). The most common surgery recommended was myringoplasty (16%), followed by myringotomy (6%) and adenoidectomy (5%).

Table 3.8: Type of further action required and type of surgery recommended for Indigenous children who received an ENT consultation, July 2009 to May 2011

	Number	Per cent of children who received ENT consultation
Type of further action required		
Case management by Primary Health Care services	824	41.9
Audiological assessment	1,243	63.2
Australian Hearing	53	2.7
ENT review	1,283	65.2
Total number of children who had at least one further action required	1,436^(a)	73.0
Type of surgery recommended		
Myringoplasty	322	16.4
Adenoidectomy	92	4.7
Myringotomy		
Myringotomy only	74	3.8
Myringotomy+Grommets	38	1.9
Subtotal for myringotomy	102	5.7
EUA ^(b)	44	2.2
Exploration of middle ear/ mastoid	14	0.7
Removal of tubes	5	0.3
Other procedure	20	1.0
Total number of children who had at least one surgery recommended	468^(a)	23.8
Total number of children who received ENT consultation	1,968	100.0

(a) This is a multiple response item. The sum does not add up to the total because one surgery can involve multiple procedures.

(b) Examination under anaesthetic.

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

3.7 Subsequent ENT consultation

Among children who received an ENT consultation through the CHCI (CtG) program, 1,283 (65%) needed further ENT review (Figure 3.1). Most common reasons for requiring further ENT review included OME, dry perforation, CSOM and AOM.

Overall, the follow-up rate for children who needed further ENT review was low. Of the 1,283 children who needed review, only 22% received a follow-up service provided through the CHCI (CtG) program, and 59% were not seen by an ENT specialist after their review period expired. Some children however, may have received a service through another program, and so the total number of children who received subsequent services may be underestimated.

About 20% of children had not been seen but their review period had not expired by 31 May 2011 or they did not have a fixed review period (Figure 3.1). Among children who received an ENT review, about 61% were reviewed on time and 39% were seen after their review periods had expired (Table 3.9).

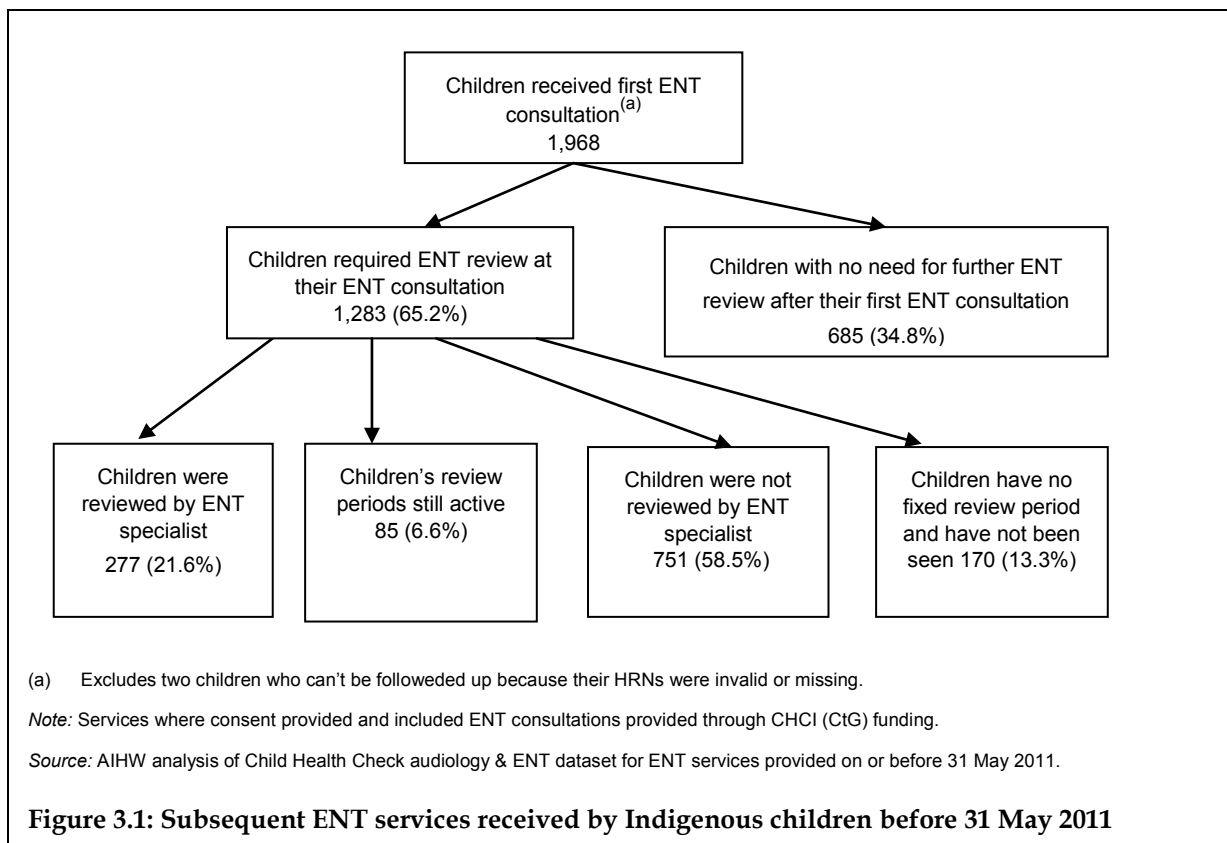


Table 3.9: The timeliness of subsequent ENT consultation

Recommended review period	Children seen on time		Children seen outside recommended time frame		Total number of children reviewed by ENT specialist	
	Number	%	Number	%	Number	%
3 months	57	41.9	79	58.1	136	100.0
6 months to 1 year	96	77.4	28	22.6	124	100.0
Administration time determined by patient's need	17	100.0	0	0.0	17	100.0
Total	170	61.4	107	38.6	277	100.0

Notes

- Data are only provided for services where consent was obtained.
- Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

3.8 ENT Surgery and procedures

CHCI (CtG) program funded ENT surgeries were carried out before July 2009, but no data was collected at the time. The information in this section includes ENT surgery conducted from July 2009 to the end of May 2011. During this period, 283 children received 291 ENT operations, in which 352 ENT procedures were undertaken (Table 3.10).

A number of types of ENT procedures were provided to children during surgery. The most common procedure was myringoplasty, which was performed in 68% of ENT surgeries. The next most common were myringotomy (25%), adenoidectomy (14%) and examination with or without anaesthetic (9%) (Table 3.10).

Most of the ENT surgery was performed on children who were aged 5 years or over as children in this age group are more suitable for ENT procedures. The type of procedures performed varied between age groups. Myringoplasty was performed only on children over 5, while the majority of children under 5 received myringotomy.

Of the 468 children who were recommended for surgery just over 50% received surgery funded through the CHCI (CtG) program (Table 3.11). One reason was that the NT DoH was constrained by the amount of funding available for surgery. Some surgeries had to be cancelled or delayed as children's ears were not in condition for surgery at the time. Several patients declined surgery.

Table 3.10: Type of ENT procedure, Indigenous children who received ENT surgery, July 2009 to May 2011

Type of ENT procedure	ENT procedure for children under 5 years		ENT procedure for children 5 years or over		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
Myringoplasty	0	0	198	73.6	198	68.0
Myringotomy	19	86.3	55	20.4	74	25.4
Myringotomy only	12	54.5	46	17.1	58	19.9
Myringotomy + grommets	7	31.8	9	3.3	16	5.5
Adenoidectomy	12	54.5	30	11.2	42	14.4
Exploration of middle ear/ mastoid with or without anaesthetic	n.p.	n.p.	n.p.	n.p.	26	8.9
Other procedure	n.p.	n.p.	n.p.	n.p.	12	4.1
Total number of ENT procedures	35	n.p.	317	n.p.	352	n.p.
Total number of ENT surgery^(a)	22	100.0	269	100.0	291	100.0
Total number of children who received surgery	22	..	261	..	283	..

.. not applicable

n.p. not published due to small cell sizes

(a) This is a multiple response item. The sum does not add up to the total because one surgery can involve multiple procedures.

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

Time elapsed between surgery recommendation and operation

Of the 468 children who were recommended for ENT surgery at the ENT consultation, over 50% received ENT surgery by the end of May 2011. The average waiting time between recommendation and surgery was 42.6 days, with the longest waiting time being 64.1 days in Arnhem and the shortest being 31 days in Katherine/Barkly (Table 3.11).

Table 3.11: Number of Indigenous children^(a) recommended for ENT surgery, received ENT surgery and average waiting time, where consent provided, July 2009 to May 2011

Region ^(b)	Number of children recommended for ENT surgery	Children who received an ENT surgery		Average waiting time between surgery recommendation and surgery (days) ^(c)
		Number	Per cent	
Arnhem	65	38	58.5	64.1
Central Australia	121	55	45.5	43.1
Darwin Rural	110	54	49.1	59.5
Katherine/Barkly	130	63	48.5	31.0
Hospital and out of areas ^(d)	42	26	63.4	3.2
Total^(e)	468	236^(f)	50.4	42.6

(a) Excludes children with an unknown or invalid HRN.

(b) Region where received ENT surgery.

(c) Based on last ENT consultation before surgery and first surgery. Average waiting time excludes outstanding surgery recommendations.

(d) Received ENT service in hospital.

(e) Includes children who received service outside of prescribed area.

(f) Although 283 children received ENT surgery 236 children were recommended through ENT consultations funded by the CHCI (CtG) program and are included in this analysis.

Notes

1. Data are only provided for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

Follow-up care after ENT surgery

Follow-up care after ENT surgery is important to ensure the appropriate continued care. Of the 283 children who received surgery, 59% received a follow-up audiology or ENT service through the CHCI (CtG) program (Table 3.12). Some children, however, may have received services through another program, and so the total number of children who received post-operation follow-up services may be underestimated. The median waiting time was 3.5 months between surgery and audiology service, and 3.4 months between ENT service and surgery.

Table 3.12: Number of Indigenous children who received audiology or ENT service after surgery^(a), July 2009 to May 2011

Type of procedure	Number of children received procedure	Post operation audiology check			Post operation ENT check		
		Number	Per cent	Median waiting time (months)	Number	Per cent	Median waiting time (months)
Myringoplasty	193	121	62.7	3.3	122	63.2	3.2
Myringotomy							
Myringotomy only	56	39	69.6	3.5	38	67.9	3.5
Myringotomy +grommets	16	7	43.8	7.1	5	31.3	3.5
Adenoidectomy	25	22	88.0	3.5	23	92.0	3.4
EUA	26	17	65.4	5.1	16	61.5	3.3
Other procedure	12	8	66.7	6.9	7	58.3	7.0
Total	283	167	59.0	3.5	166	58.7	3.4

(a) Based on last ENT surgery and first service after surgery. Median waiting time excludes children not receiving service after surgery.

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

3.9 Further need for ENT services

A need for further ENT services remains within the prescribed areas of the Northern Territory. A total of 2,217 children⁵ were found to require further ENT services at 31 May 2011 (Table 3.13). These include:

- 226 children who received an ENT referral from their health checks who had not been seen
- 1,012 children who required an ENT follow-up from their audiology service
- 117 children who required an ENT follow-up after their ENT surgery
- 1,006 children who required continued ENT monitoring (as identified through their audiology consultation).

Central Australia contained the highest number of children requiring follow-up ENT services (658), followed by Katherine/Barkly (484), Arnhem (477), and Darwin Rural (435) (Table 3.13).

⁵ Because some children may be referred to ENT services from multiple sources, sum of individual referral category does not add up to total number of children with referral (2,217 children).

Table 3.13: Number of Indigenous children^(a) requiring follow-up ENT service at 31 May 2011, by region

Region	Number	Per cent
Central Australia	658	29.7
Katherine/Barkly	484	21.8
Arnhem	477	21.5
Darwin Rural	435	19.6
Hospital/out of area	163	7.4
Total	2,217	100.0

(a) Excludes children with an unknown or invalid HRN, and includes only children who provided consent for sharing information with the AIHW.

Notes

1. Data are provided only for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology & ENT dataset for ENT services provided on or before 31 May 2011.

4 Ear and hearing health status of children receiving ENT and audiology services

Highlights

Middle ear condition

- About 66% of children who received an ENT consultation or an audiological assessment through the CHCI (CtG) program were diagnosed with at least one type of middle ear condition. The most common type of middle ear condition was OME (27% of children), followed by dry perforation (16%) and CSOM (12%). The prevalence of CSOM among these children was three times the rate defined by the WHO as 'a massive public health problem' (WHO 2004).

Hearing loss and hearing impairment

- About 53% of children who received an audiology check had hearing loss in at least one ear.
- About 33% of all children who received an audiology check had hearing impairment. Around 11% of them had moderate, severe or profound hearing impairment, which is considered by the WHO to be a disability (WHO, cited in Couzos & Murray 2003). The development of children with hearing impairment may also be affected without further intervention or rehabilitation.

Changes over time

- Of children who received two or more audiology or ENT services, there was a decline in the proportion with a middle ear condition (decreasing from 85% at first service to 70% at last service).
- The prevalence of hearing loss decreased from 70% at first check to 61% at latest check among the children who received two or more audiology checks.
- More than half of children (56%) who received two or more audiology checks experienced an improvement in degree of hearing impairment between their first and last audiology service.

During the ENT and audiology consultations children were examined by ENT specialists and their hearing status was tested by audiologists. This chapter provides information on the prevalence of middle ear conditions, hearing loss and hearing impairment among the children who received these services through the CHCI (CtG) program, and examines changes over time. Where possible, the prevalence of middle ear conditions and hearing loss in these children is compared to the prevalence of these conditions among other Indigenous and non-Indigenous children.

The data presented in this section were compiled using the CHC ENT and audiology databases. A total of 4,708 children received ENT consultations or audiology services (Table 4.1). The majority received both these services. For children who had an ENT consultation, the diagnosis of middle ear condition recorded on the ENT consultation form is used in this section. For children who received an audiology check only, the diagnosis recorded on their

audiology form is used. If children received two or more of these services, the diagnosis in the most recent service is used.

4.1 Prevalence of middle ear conditions

At least one type of middle ear condition was diagnosed in 66% of children who received an audiology or ENT service (Table 4.1). The most common middle ear condition was OME (27% of children), followed by dry perforation (16%) and CSOM (12%). Nine per cent of children were diagnosed with Eustachian tube dysfunction (ETD) and 7% were diagnosed with AOM.

The prevalence of CSOM among these children was three times the rate defined by WHO as a massive public health problem (4%) needing urgent action (WHO 2004).

Table 4.1: Type of middle ear condition^(a), Indigenous children who received an audiology service or ENT consultation, July 2007 to May 2011

Type of middle ear condition	Number	Per cent
<i>At least one type of middle ear condition</i>	3,110 ^(b)	66.1
OME	1,246	26.5
AOM	307	6.5
CSOM	580	12.3
Dry perforation	756	16.1
ETD	419	8.9
Foreign body	50	1.1
Other	269	5.7
<i>No middle ear condition^(c)</i>	1,480	31.4
<i>Missing^(d)</i>	118	2.5
Total children receiving audiology service or ENT consultation	4,708	100

(a) Middle ear condition at most recent ENT service or, if only received audiology service, most recent audiology service.

(b) Because one child can have more than one middle ear condition, the column does not add up to sub-total.

(c) Where no middle ear condition reported for both ears.

(d) Includes cases where there is a missing value for one ear, and no middle ear condition in the other ear. Missing includes not stated, unsure, invalid and not tested responses.

Notes

1. Data are only provided for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

The presence of middle ear conditions varied by children's age, sex and region (Table 4.2). The youngest children (0-5 years) had the highest prevalence of middle ear conditions, with 76% of children in this age group being diagnosed with at least one middle ear condition. The prevalence decreased with age, being 62% for children aged 6 to 11 years and 60% for children 12 years and over. The majority of children in the 12 years and over age group comprised mainly of children who were under 16.

The types of middle ear condition were also distributed differently among children in different age groups. OME (36%), CSOM (15%) and AOM (12%) were most common conditions in children aged 0-5 years. The prevalence of these conditions decreased with age, being 14% for OME, 12% for CSOM and 3% for AOM among children aged 12 and

over. In contrast, the prevalence of dry perforation increased sharply with age from 11% in the youngest age group to 25% in the oldest age group.

Table 4.2: Type of middle ear condition^(a), by age group, Indigenous children^(b) who received an audiology or ENT service, July 2007 to May 2011

Type of middle ear condition	Age group						Total	
	0–5 years		6–11 years		12 + years			
	Number of children	Per cent	Number of children	Per cent	Number of children	Per cent	Number of children	Per cent
<i>At least one middle ear condition</i>	1,098	76.2	1,487	62.1	525	60.3	3,110	66.1
AOM	173	12.0	111	4.6	23	2.6	307	6.5
CSOM	219	15.2	253	10.6	108	12.4	580	12.3
OME	519	36.0	607	25.4	120	13.8	1,246	26.5
ETD	146	10.1	222	9.3	51	5.9	419	8.9
Dry perforation	159	11.0	382	16.0	215	24.7	756	16.1
Foreign body/ Other	94	6.5	164	6.9	60	6.9	318	6.8
<i>No middle ear condition^(c)</i>	289	20.1	863	36.1	328	37.7	1,480	31.4
<i>Missing^(d)</i>	54	3.7	43	1.8	18	2.1	118	2.5
Total	1,441	100.0	2,393	100.0	871	100.0	4,708	100.0

(a) Middle ear condition at most recent ENT service or, if only received audiology service, most recent audiology service.

(b) Excludes children with an unknown or invalid HRN.

(c) Where no middle ear condition reported for both ears.

(d) Missing cases for middle ear condition, which are 2.5% of cases, are not shown. Missing cases include cases where there is a missing value for one ear, and no middle ear condition in the other ear. Missing also includes not stated, unsure, invalid and not tested responses.

Notes

1. Data are only provided for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

The presence and type of middle ear condition were similar for males and females (Table 4.3).

Regional differences in the presence of at least one middle ear condition were small (Table 4.4). The highest proportion of children with at least one middle ear condition was in Katherine/Barkly (69%) and the lowest in Central Australia (64%). Dry perforation was highest amongst children seen in a hospital/out of area (29%).

Table 4.3: Type of middle ear condition^(a) by sex, Indigenous children^(b) who received an audiology or ENT service, July 2007 to May 2011

Type of middle ear condition	Sex				Total ^(e)	
	Male		Female		Number of children	Per cent
	Number of children	Per cent	Number of children	Per cent		
<i>At least one middle ear condition</i>	1,591	65.9	1,518	66.2	3,110	66.1
AOM	164	6.8	143	6.2	307	6.5
CSOM	303	12.5	277	12.0	580	12.3
OME	650	26.9	596	26.0	1,246	26.5
ETD	228	9.4	191	8.3	419	8.9
Dry perforation	359	14.9	397	17.3	756	16.1
Foreign body/ Other	167	6.9	151	6.6	318	6.8
<i>No middle ear condition^(c)</i>	762	31.6	718	31.3	1,480	31.4
<i>Missing^(d)</i>	60	2.6	58	2.4	118	2.5
Total^(e)	2,415	100.0	2,293	100.0	4,708	100.0

(a) Middle ear condition at most recent ENT service or, if only received audiology service, most recent audiology service.

(b) Excludes children with an unknown or invalid HRN.

(c) Where no middle ear condition reported for both ears.

(d) Missing cases for middle ear condition, which are 2.5% of cases, are not shown. Missing cases include cases where there is a missing value for one ear, and no middle ear condition in the other ear. Missing also includes not stated, unsure, invalid and not tested responses.

(e) Include one child with missing value on sex.

Notes

1. Data are only provided for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

Table 4.4: Type of middle ear condition^(a) (%), by region, Indigenous children^(b) who received an audiology or ENT service, July 2007 to May 2011

Type of middle ear condition	Region					Total
	Arnhem	Central Australia	Darwin Rural	Katherine /Barkly	Hospital/ out of area	
<i>At least one middle ear condition</i>	65.0	63.7	66.4	69.2	70.3	66.1
AOM	7.2	5.8	4.8	8.5	6.3	6.5
CSOM	12.1	11.9	12.0	13.0	14.8	12.3
OME	26.5	25.8	27.1	27.5	19.5	26.5
ETD	10.4	6.8	10.6	9.6	1.6	8.9
Dry perforation	12.6	18.5	14.3	15.9	28.9	16.1
Foreign body/ Other	7.7	5.6	7.3	6.9	7.0	6.8
<i>No middle ear condition^(c)</i>	33.0	33.1	30.6	29.1	28.1	31.4
<i>Missing^(d)</i>	2.1	3.2	2.9	1.7	1.6	2.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

(a) Middle ear condition at most recent ENT service or, if only received audiology service, most recent audiology service.

(b) Excludes children with an unknown or invalid HRN.

(c) Where no middle ear condition reported for both ears.

(d) Missing cases for middle ear condition, which are 2.5% of cases, are not shown. Missing cases include cases where there is a missing value for one ear, and no middle ear condition in the other ear. Missing also includes not stated, unsure, invalid and not tested responses.

(e) Some children received CHCI (CtG) program funded audiology services in non-prescribed areas.

Notes

1. Data are only provided for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

The level of middle ear condition found in the prescribed communities of the Northern Territory is similar to that reported previously. In one study of 29 remote communities in Northern and Central Australia, it was reported that 91% of Aboriginal children aged 6-30 months had OM, 33% had AOM (with or without perforation), 41% had OME and 15% had CSOM (Morris et al. 2005). Table 4.2 shows that for children aged 0-5 years, there were similar levels of OME (36%) and CSOM (15%), while AOM prevalence was lower (12%).

4.2 Hearing status and hearing impairment

During the audiology services, children’s hearing status was examined by an audiologist, including hearing loss, type of hearing loss and degree of impairment.

This section details how their hearing status was assessed and the outcomes of the assessment.

4.2.1 Methods of audiological assessment

The audiological assessment includes tests for middle ear function and hearing acuity. These include standard or digital otoscopic ear examination, diagnostic pure tone audiometry and diagnostic tympanometry.

Visual Response Orientation Audiometry (VROA) is also used to assess hearing in children between 9 months and 3 years of age and results are recorded as having been obtained in a sound field where both ears are being presented with sounds at the same time without

differentiation, via a calibrated speaker. Diagnostic audiology results obtained through sound field measurements do not provide detailed information on separate ears and generally reflect the ear with the best hearing acuity.

A diagnosis of hearing loss defines a functional limitation that may affect activity or participation. It is diagnosed when any pure tone audiometry hearing threshold response falls outside the normal range in either ear at any sound frequency. Hearing loss may be present in one ear (unilateral) or both ears (bilateral).

Hearing impairment is a measured health problem that diagnoses risk to performance in language development, cognition, socialisation and employment attributable to hearing loss. Hearing impairment is classified using a scale of mild, moderate, severe and profound, and is based on the average of the pure tone threshold, in the best hearing ear, at three frequencies - 500Hz, 1000Hz and 2000Hz. The WHO considers moderate, severe and profound hearing impairment to be disabling (Couzos & Murray 2003).

The degree of hearing impairment is defined as follows:

- Mild: 16-30 dB HL in soundproof conditions and 26-35 dB HL in non-soundproof conditions.
- Moderate: 31-60 dB HL in soundproof conditions and 36-60 dB HL in non-soundproof conditions.
- Severe: 61-90 dB HL in soundproof conditions and 61-90 dB HL in non-soundproof conditions.
- Profound: 91+ dB HL in soundproof conditions and 91+ dB HL in non-soundproof conditions.

4.2.2 Hearing status and hearing impairment of children

The audiology services revealed that 53% of children who received a check had hearing loss (Table 4.5), 40% of children had no hearing loss, and the information was missing for 7% of children. Of those 2,385 children with hearing loss, 62% had bilateral hearing loss and 32% had unilateral hearing loss. A further 6% who had hearing loss were tested with a sound field, so it could not be determined whether they had bilateral or unilateral hearing loss⁶.

6 A hearing test using a sound field can detect hearing loss (based on hearing ability of the best ear), but it cannot determine if the hearing loss is bilateral or unilateral.

Table 4.5: Hearing status^(a), type of hearing loss and degree of hearing impairment, Indigenous children who received an audiology service, July 2007 to May 2011

Hearing status	Number of children	Per cent of children who had an audiology check	Per cent of children with hearing loss
<i>No hearing loss</i>	1,789	39.7	..
<i>Hearing loss</i>	2,385	53.0	100.0
Unilateral (one ear)	759	16.9	31.8
Bilateral (both ears)	1,476	32.8	61.9
As tested by sound field ^(b)	150	3.3	6.3
<i>Missing^(c)</i>	328	7.3	..
Total number of children who received an audiology service	4,502	100.0	..

.. not applicable.

(a) Where child received multiple audiology services, information is from latest service.

(b) Children tested for hearing loss using a sound field are presented separately, because it is not possible to distinguish unilateral and bilateral hearing loss using this testing.

(c) Missing includes not stated, unsure, invalid and not tested responses.

Notes

1. Data are only provided for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

The proportion of children with hearing loss differed by age. Table 4.6 shows that 57% of children aged 5 years and under were found to have hearing loss, as did 50% of children aged 6-11 years and 54% of children aged 12 and over.

A similar percentage of males and females were found to have hearing loss. There was only small variation in the proportion of children with hearing loss by region. Hearing loss was highest in Katherine/Barkly and Central Australia (55% and 54%), and lowest in Arnhem (48%). Children who received audiology services in hospitals or clinics outside the prescribed areas, although small in number, had the highest prevalence of hearing loss.

Table 4.6: Hearing status^{(a)(b)} by age, sex and region, Indigenous children^(c) who received an audiology service, July 2007 to May 2011

	Total number of children who received an audiology service	Number of children with hearing loss	Hearing loss (%)
Age group			
0–5 years	1359	772	56.8
6–11 years	2278	1148	50.4
12+ years	851	457	53.7
Missing ^(d)	14	8	57.1
Total	4,502	2,385	53.0
Sex			
Male	2310	1220	52.8
Female	2190	1164	53.2
Total^(e)	4,502	2,385	53.0
Region			
Arnhem	930	449	48.3
Central Australia	1363	731	53.6
Darwin Rural	989	487	49.2
Katherine/Barkly	1037	574	55.4
Hospital / out of area	183	144	78.7
Total	4,502	2,385	53.0

(a) Where child received multiple audiology services, information is from latest service.

(b) Hearing impairment is based on the child's better ear. Therefore, degree of hearing loss is only reported for those children who may have bilateral hearing loss.

(c) Excludes children with an unknown or invalid HRN.

(d) Missing includes not stated, unsure, invalid and not tested responses.

(e) Includes children with missing sex variable.

Notes

1. Data are only provided for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

Of children who had hearing loss (2,385), 87% had conductive hearing loss, while only a small proportion had sensorineural (3%) and both conductive and sensorineural (3%) (Table 4.7). Conductive hearing loss was found in 46% of all children who received an audiology check.

Table 4.7: Type of hearing loss^(a), Indigenous children who received an audiology service, July 2007 to May 2011

Type of hearing loss	Number	Per cent of children who had an audiology check	Per cent of children with hearing loss
Conductive	2,075	46.1	87.0
Sensorineural	68	1.5	2.8
Mixed (both conductive and sensorineural)	66	1.5	2.8
Missing ^(b)	176	3.9	7.4
Total number of children with hearing loss	2,385	53.0	100.0
Total number of children who had an audiology check	4,502

.. not applicable.

(a) Where child received multiple audiology services, information is from latest service.

(b) Missing includes not stated, unsure, invalid and not tested responses.

Notes

1. Data are only provided for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

In total, 1,503 children (33% of those who received an audiology check) had hearing impairment (Table 4.8). About 23% of children had mild hearing impairment, 10% had moderate and less than 1% had either severe or profound hearing impairment. About 11% of children (those who had moderate, severe or profound hearing impairment) can be described as having a disabling hearing impairment (WHO, cited in Couzos & Murray 2003).

Table 4.8: Degree of hearing impairment^(a), Indigenous children who received an audiology service, July 2007 to May 2011

Degree of hearing impairment	Number	Per cent of children who had an audiology check
Hearing impairment		
Mild	1,015	22.5
Moderate	467	10.4
Severe	15	0.3
Profound	6	0.1
<i>Sub-total number of children with hearing impairment</i>	<i>1,503</i>	<i>33.4</i>
Total number of children who received an audiology check	4,502	100.0

(a) Hearing impairment is based on the child's better ear. Therefore, degree of hearing loss is reported only for those children who may have bilateral hearing loss. Where child received multiple audiology services, information is from latest service.

Notes

1. Data are provided only for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

Hearing impairment also varied by age, but less so by sex and region. Of children aged 5 years and under, 43% had a hearing impairment (25% had mild and 17% had moderate, severe or profound hearing impairment) (Table 4.9). The prevalence of hearing impairment decreased among children who were 6 years and over (30%). Again, males and females had similar levels of hearing impairment. The region with the highest proportion of children with hearing impairment was Central Australia (35%) and the lowest was Arnhem (30%).

Table 4.9 Degree of hearing impairment^{(a)(b)}, by age, sex and region, Indigenous children^(c) who received an audiology service, July 2007 to May 2011

	Number of children received audiology service	Children with hearing impairment					
		Mild		Moderate/Severe/Profound		Total	
		Number	Per cent	Number	Per cent	Number	Per cent
Age group							
0–5 years	1,359	340	25.0	237	17.4	577	42.5
6–11 years	2,278	497	21.8	175	7.7	672	29.5
12+ years	851	176	20.7	74	8.7	250	29.4
Total^(d)	4,502	1,015	22.5	488	10.8	1,503	33.4
Sex							
Male	2,310	535	23.2	231	10.0	766	33.2
Female	2,190	479	21.9	257	11.7	736	33.6
Total	4,502	1,015	22.5	488	10.8	1,503	33.4
Region							
Arnhem	930	213	22.9	64	6.9	277	29.8
Central Australia	1,363	286	21.0	184	13.5	470	34.5
Darwin Rural	989	210	21.2	87	8.8	297	30.0
Katherine/Barkly	1,037	247	23.8	104	10.0	351	33.8
Hospital and out of area	183	64	35.0	44	24.0	108	59.0
Total	4,502	1,015	22.5	488	10.8	1,503	33.4

(a) Where child received multiple audiology services, information is from latest service.

(b) Hearing impairment is based on the child's better ear. Therefore, degree of hearing loss is only reported for those children who may have bilateral hearing loss.

(c) Excludes children with an unknown or invalid HRN.

(d) Includes missing variable on age.

Notes

1. Data are only provided for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

4.2.3 Hearing status and hearing impairment by ear disease

There was a substantial difference in children's hearing status according to the presence of middle ear conditions (Table 4.10). Of children with at least one middle ear condition, 69% were found to have hearing loss, compared with 9% of children with no middle ear condition. There was variation in the prevalence of hearing loss by the type of middle ear condition. Children diagnosed with CSOM had the highest levels of hearing loss (83%), with 63% of these children reported as having bilateral hearing loss. Hearing loss was found in 83% of children with dry perforation, 74% with OME, 70% with AOM, and 52% with ETD.

Table 4.10: Hearing status (%), by middle ear condition, Indigenous children^(a) who received an audiology service, July 2007 to May 2011

	Type of hearing loss				Sub-total of hearing loss	Missing ^(b)	Total
	No hearing loss	Bilateral	Unilateral	Tested by sound field			
At least one middle ear condition	23.3	43.2	21.7	3.9	68.8	7.9	100.0
AOM	13.1	39.7	15.7	14.1	69.5	17.4	100.0
OME	18.8	49.9	19.0	4.7	73.6	7.6	100.0
CSOM	7.4	63.1	16.2	3.3	82.6	10.0	100.0
Dry perforation	14.0	50.5	30.9	1.1	82.5	3.5	100.0
ETD	41.9	27.6	21.3	2.6	51.5	6.6	100.0
Foreign body/other	23.4	39.2	23.7	2.9	65.8	10.8	100.0
No middle ear condition ^(c)	87.5	4.7	3.2	0.9	8.8	3.7	100.0
Total	39.7	32.8	16.9	3.3	53.0	7.3	100.0

(a) Excludes children with an unknown or invalid HRN.

(b) Missing includes not stated, unsure, invalid and not tested responses.

(c) Where no middle ear condition reported for both ears.

Notes

1. Data are provided only for services where consent was obtained.
2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

There were also substantial differences in the degree of hearing impairment according to whether a child had a middle ear condition (Table 4.11). Of children with at least one middle ear condition, 14% had moderate hearing impairment and 30% had mild hearing impairment, while for children with no middle ear condition the respective figures were 1% and 3%. No hearing impairment was found in 48% of children with at least one middle ear condition and 92% of children with no middle ear condition.

Hearing impairment was most common amongst children with CSOM, with about 27% of children with CSOM having moderate hearing impairment or worse. Moderate hearing impairment or worse was also highly prevalent amongst children with AOM (21%) and less common amongst those with ETD (16%), OME (15%) and dry perforation (4%). Mild hearing impairment was most common amongst children with CSOM (36%), OME (35%) and ETD (34%), and lower for AOM (29%) and dry perforation (22%) (Table 4.11).

Table 4.11: Hearing impairment (%) by type of middle ear condition^(a), Indigenous children^(b) who received an audiology service, July 2007 to May 2011

	Children with hearing impairment				Sub-total of hearing loss	Missing ^(c)	Total
	None	Mild	Moderate	Severe/ Profound			
<i>At least one middle ear condition</i>	47.7	29.6	13.8	0.6	44.0	8.3	100.0
AOM	32.1	28.9	20.7	0.3	49.9	18.0	100.0
OME	41.3	34.9	15.2	0.5	50.6	8.2	100.0
CSOM	27.1	35.8	26.5	0.4	62.7	10.3	100.0
ETD	46.7	33.7	15.9	0.4	50.0	3.2	100.0
Dry perforation	67.5	21.5	3.0	0.8	25.3	7.2	100.0
Foreign body/other	48.9	28.4	10.3	1.4	40.1	11.1	100.0
<i>No middle ear condition^(d)</i>	92.4	3.2	0.6	0.3	4.1	3.6	100.0
Total	59.0	22.6	10.4	0.5	33.5	7.5	100.0

(a) Middle ear condition at most recent ENT service or, if only received audiology service, most recent audiology service.

(b) Excludes children with an unknown or invalid HRN.

(c) Missing includes not stated, unsure, invalid and not tested responses.

(d) Where no middle ear condition reported for both ears.

Notes

1. Data are provided only for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

4.3 Other studies of hearing loss in Indigenous children

Comparing measurements of hearing loss in Aboriginal communities is difficult due to differences in the methods and criteria used.

An overview of published studies to 1990 reported that hearing loss, defined as greater than 25dB HL, in Aboriginal children ranged from 60-70% (Couzos & Murray 2003). Studies have reported hearing loss to exceed 35dB HL for more than half of children with bilateral CSOM (Health InfoNet 2004). A study examining hearing loss found that Indigenous children with a perforated eardrum had an average hearing loss of 30dB HL, those with OME had an average loss of 20.3dB HL, and children with normal ears had an average loss of 11.2dB HL (Nienhuys et al. 1994).

Another study, of school-aged children in the Eastern Goldfields region of Western Australia, found 41% had an average hearing loss of more than 35dB HL in at least one ear (Couzos & Murray 2003). A study of Aboriginal schoolchildren in Perth found the prevalence of mild to moderate hearing loss (26-60dB HL) was 19% (Williams et al. 2009). A further study found these problems persist to adulthood: among Aboriginal adults in and near Darwin, 4% had moderate to high hearing loss (>41dB HL) and 12% had mild hearing loss (26-40dB HL) (Health InfoNet 2004). The severity of OM in Aboriginal populations has meant that conductive hearing loss has been found in children less than 2 months old (Health InfoNet 2004).

Ear or hearing problems among Indigenous children reported in the National Aboriginal and Torres Strait Islander Health Survey 2004-05 (NATSIHS) was three times the rate in non-Indigenous children in the National Health Survey (10% compared with 3%) (AIHW 2009).

4.4 Changes in hearing loss, hearing impairment and middle ear condition over time

A total of 1,585 children received two or more services (either ENT consultation or audiology service) (Table 4.12) and about 1,436 children received two or more audiology checks over three and half years (Table 4.13). This provides an opportunity to examine the changes in prevalence of ear disease and hearing status among these children in this period.

Although some of these changes may be partly attributed to the fluctuating nature of OM and hearing loss associated with this condition, the information in this section provides valuable indications of the outcomes of medical intervention and hearing services of the CHCI (CtG) hearing program.

4.4.1 Prevalence of middle ear conditions

The proportion of children with at least one type of middle ear condition between their first and last audiology or ENT service declined from 85% to 70% (Table 4.12). Notable declines occurred in OME (first service 32%, last service 21%), dry perforation (first service 31%, last service 24%) and AOM (first service 10%, last service 5%). CSOM showed no change (both first service and last service 17%).

Table 4.12: Type of middle ear condition^(a) at first and last service^(b), Indigenous children^(c) who received an audiology or ENT service, July 2007 to May 2011

Type of middle ear condition	First service		Last service	
	Number	Per cent	Number	Per cent
<i>At least one type of middle ear condition</i>	1,347 ^(d)	85.0	1,113 ^(d)	70.2
ETD	115	7.3	99	6.2
AOM	151	9.5	75	4.7
CSOM	272	17.2	269	17.0
OME	510	32.2	340	21.4
Dry perforation	496	31.3	377	23.8
Foreign body/other ear condition	142	9.0	112	7.1
<i>No middle ear condition^(e)</i>	206	13.0	451	28.4
<i>Missing^(f)</i>	32	2.0	22	1.4
Total children receiving two or more audiology or ENT services	1,585	100.0	1,585	100.0

(a) Middle ear condition at most recent ENT service or, if only received audiology service, most recent audiology service.

(b) First service after CHC.

(c) Excludes children with an unknown or invalid HRN.

(d) Because one child can have more than one middle ear condition, the column does not add up to sub-total.

(e) Where no middle ear condition reported for both ears.

(f) Missing includes not stated, unsure, invalid and not tested responses.

Notes

1. Data are provided only for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

4.4.2 Hearing loss and hearing impairment

Along with the decline in the prevalence of ear conditions among the children who received services, hearing improvements were also observed. The proportion of children with no hearing loss increased from 22% at their first audiology service to 34% at their last service (Table 4.13). Between the first and last checks, the proportion of children with bilateral hearing loss fell from 45% to 39%, and unilateral hearing loss decreased from 23% to 20%.

Table 4.13: Hearing loss status at first and last service^(a), Indigenous children^(b) who received at least two audiology services, July 2007 to May 2011

Hearing loss status	First service		Last service	
	Number of children	Per cent	Number of children	Per cent
Hearing loss	1,006	70.0	875	60.9
Unilateral	332	23.1	292	20.3
Bilateral	651	45.3	562	39.1
<i>As tested by sound field</i>	23	1.6	21	1.5
No hearing loss	316	22.0	489	34.1
Missing ^(c)	114	7.9	72	5.0
Total children receiving two or more audiology services	1,436	100.0	1,436	100.0

(a) Based on all children who received two or more audiology services.

(b) Excludes children with an unknown or invalid HRN.

(c) Missing includes not stated, unsure, invalid and not tested responses.

Notes

1. Data are provided only for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

Among children who received two or more audiology services, 638 children had some degree of hearing impairment at their first check. More than half of these children (56%) had improved hearing at their last audiology check (Table 4.14), defined as a reduction in the degree of hearing impairment between the first and most recent audiology checks. Just under one-third (31%) had no change in the degree of impairment between their first and last audiology services, and 8 per cent experienced a deterioration, defined as an increase in the degree of impairment between the first and most recent audiology services.

Table 4.14: Changes in degree of hearing impairment^(a) between first and last audiology service^(b), Indigenous children^(c) who received an audiology service, July 2007 to May 2011

Change in degree of hearing impairment	Number	Per cent
Improved	358	56.1
No change	200	31.3
Deteriorated	48	7.5
Missing ^(d)	32	5.1
Total children receiving two or more audiology services	638	100.0

(a) Based on those children who had some degree of hearing impairment at the first service.

(b) First service after CHC.

(c) Excludes children with an unknown or invalid HRN.

(d) Missing includes not stated, unsure, invalid and not tested responses.

Notes

1. Data are provided only for services where consent was obtained.

2. Services include only those which were provided through the CHCI (CtG) program.

Source: AIHW analysis of Child Health Check audiology and ENT dataset for audiology services provided on or before 31 May 2011.

Appendix 1: Audiology and ENT data collection forms

Version 5: NTER CHCI *AUDIOLOGY SERVICES FORM*

1. Organisation Details																				
Date of service: ____/____/____ (dd/mm/yyyy)																				
ID of Community or Town Camp where this service was provided: _____																				
2. Child Details																				
HRN: _____	Date of Birth: ____/____/____ (dd/mm/yyyy)	Sex: <input type="checkbox"/> Male <input type="checkbox"/> Female																		
3. Previous Audiology check																				
Has the child had a previous Audiology check since 11/07/2007?																				
<input type="checkbox"/> Yes, please specify date: ____/____/____ (dd/mm/yyyy) If child had more than one previous check, refer to latest one only. <input type="checkbox"/> No (go to question 4) <input type="checkbox"/> Unsure (go to question 4)																				
If Yes, has any ear health intervention occurred since that check? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure If Yes, specify the type of intervention (please indicate all that apply)? <input type="checkbox"/> Enhanced primary care <input type="checkbox"/> ENT consultation <input type="checkbox"/> Surgery <input type="checkbox"/> Other, please specify _____ <input type="checkbox"/> Unsure																				
If there was a previous Audiology check, has there been any significant change in hearing levels since that check? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure If Yes, was there a <input type="checkbox"/> significant improvement or <input type="checkbox"/> significant deterioration <input type="checkbox"/> No significant change <input type="checkbox"/> Unsure																				
4. Summary of audiology findings (only select one option under each heading)																				
Hearing loss <input type="checkbox"/> None <input type="checkbox"/> Unilateral <input type="checkbox"/> Bilateral <input type="checkbox"/> Soundfield	Type of hearing loss <input type="checkbox"/> None <input type="checkbox"/> Conductive <input type="checkbox"/> Sensorineural <input type="checkbox"/> Mixed (both conductive and sensorineural)																			
Degree of hearing impairment (based on better ear) <table border="0"> <thead> <tr> <th>(av. HTL)</th> <th>Sound Proof Conditions</th> <th>Non-Sound Proof Conditions</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> None</td> <td>(0 – 15 dB)</td> <td>(0 – 25dB)</td> </tr> <tr> <td><input type="checkbox"/> Mild</td> <td>(16 – 30dB)</td> <td>(26 – 35dB)</td> </tr> <tr> <td><input type="checkbox"/> Moderate</td> <td>(31 – 60dB)</td> <td>(36 – 60dB)</td> </tr> <tr> <td><input type="checkbox"/> Severe</td> <td>(61 – 90 db)</td> <td>(61 – 90 db)</td> </tr> <tr> <td><input type="checkbox"/> Profound</td> <td>(91dB +)</td> <td>(91dB +)</td> </tr> </tbody> </table>			(av. HTL)	Sound Proof Conditions	Non-Sound Proof Conditions	<input type="checkbox"/> None	(0 – 15 dB)	(0 – 25dB)	<input type="checkbox"/> Mild	(16 – 30dB)	(26 – 35dB)	<input type="checkbox"/> Moderate	(31 – 60dB)	(36 – 60dB)	<input type="checkbox"/> Severe	(61 – 90 db)	(61 – 90 db)	<input type="checkbox"/> Profound	(91dB +)	(91dB +)
(av. HTL)	Sound Proof Conditions	Non-Sound Proof Conditions																		
<input type="checkbox"/> None	(0 – 15 dB)	(0 – 25dB)																		
<input type="checkbox"/> Mild	(16 – 30dB)	(26 – 35dB)																		
<input type="checkbox"/> Moderate	(31 – 60dB)	(36 – 60dB)																		
<input type="checkbox"/> Severe	(61 – 90 db)	(61 – 90 db)																		
<input type="checkbox"/> Profound	(91dB +)	(91dB +)																		
Middle ear condition Right <input type="checkbox"/> None <input type="checkbox"/> Eustachian Tube Dysfunction <input type="checkbox"/> Acute Otitis Media <input type="checkbox"/> Otitis Media Effusion <input type="checkbox"/> CSOM <input type="checkbox"/> Dry Perforation <input type="checkbox"/> Other, please specify _____ <input type="checkbox"/> Unsure	Left <input type="checkbox"/> None <input type="checkbox"/> Eustachian Tube Dysfunction <input type="checkbox"/> Acute Otitis Media <input type="checkbox"/> Otitis Media Effusion <input type="checkbox"/> CSOM <input type="checkbox"/> Dry Perforation <input type="checkbox"/> Other, please specify _____ <input type="checkbox"/> Unsure																			
5. Action (please indicate all that apply)																				
<input type="checkbox"/> No further action required <input type="checkbox"/> Case management by Primary Health Centre <input type="checkbox"/> Case management by ENT <input type="checkbox"/> Ongoing monitoring by NT Hearing Services <input type="checkbox"/> Referral to Australian Hearing (rehabilitation) <input type="checkbox"/> Referral to Department of Education Employment and Training Hearing Advisory Support <input type="checkbox"/> Other, please specify _____																				

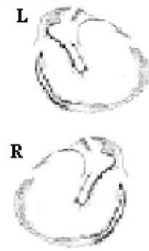
Version 5



**CLOSING THE GAP
ENT OUTREACH CONSULTATION**

COMMUNITY:	<input type="checkbox"/> ENT SURGEON NAME:	VISIT DATE:
ID:		
PATIENT NAME:	DOB: / /	HRN:
<input type="checkbox"/> MALE <input type="checkbox"/> FEMALE	ALLERGIES	MEDICARE#:
		CARER:

Notes



POST-OP CHECK

LEFT EAR			
<input type="checkbox"/> Intact TM	<input type="checkbox"/> Normal <input type="checkbox"/> Healed		
<input type="checkbox"/> Perforation	<input type="checkbox"/> Central <input type="checkbox"/> Marginal <input type="checkbox"/> Attic	Size	
	WET <input type="checkbox"/> Purulent <input type="checkbox"/> DRY <input type="checkbox"/> Squamous <input type="checkbox"/> Moist (serous) <input type="checkbox"/> Mucosal	<input type="checkbox"/> Pinhole <input type="checkbox"/> Medium	<input type="checkbox"/> Subtotal <input type="checkbox"/> Total
<input type="checkbox"/> Grommet	<input type="checkbox"/> Insitu <input type="checkbox"/> Patent <input type="checkbox"/> Blocked		
	<input type="checkbox"/> Extruded <input type="checkbox"/> TM Intact <input type="checkbox"/> Residual perforation		
RIGHT EAR			
<input type="checkbox"/> Intact TM	<input type="checkbox"/> Normal <input type="checkbox"/> Healed		
<input type="checkbox"/> Perforation	<input type="checkbox"/> Central <input type="checkbox"/> Marginal <input type="checkbox"/> Attic	Size	
	WET <input type="checkbox"/> Purulent <input type="checkbox"/> DRY <input type="checkbox"/> Squamous <input type="checkbox"/> Moist (serous) <input type="checkbox"/> Mucosal	<input type="checkbox"/> Pinhole <input type="checkbox"/> Medium	<input type="checkbox"/> Subtotal <input type="checkbox"/> Total
<input type="checkbox"/> Grommet	<input type="checkbox"/> Insitu <input type="checkbox"/> Patent <input type="checkbox"/> Blocked		
	<input type="checkbox"/> Extruded <input type="checkbox"/> TM Intact <input type="checkbox"/> Residual perforation		

DIAGNOSIS	L	R
None		
AOM		
AOM w/ perforation		
CSOM (active discharge)		
CSOM (inactive <u>dry perf</u>)		
OME		
Foreign Body		
Other		
Other		

ACTIONS TAKEN	Instructions
Medication: <input type="checkbox"/> Amoxyl <input type="checkbox"/> Ciloxan <input type="checkbox"/> Kenacomb <input type="checkbox"/> Other	<input type="checkbox"/> as per CARPA Specific instructions:
Other: <input type="checkbox"/> Wax removal <input type="checkbox"/> Foreign body removed <input type="checkbox"/> Microsuction <input type="checkbox"/> Betadine wash <input type="checkbox"/> Other	

FOLLOW-UP REQUIRED	
Primary Health	<input type="checkbox"/> Not required <input type="checkbox"/> RV progress after medication <input type="checkbox"/> Dry ear precautions <input type="checkbox"/> Monitor-Rx as req. <input type="checkbox"/> 1 wk <input type="checkbox"/> 2 wk <input type="checkbox"/> 1 month <input type="checkbox"/> 6 months Comment:
Audiology	<input type="checkbox"/> Not required <input type="checkbox"/> 3 months <input type="checkbox"/> 6 months <input type="checkbox"/> 1 year
Australian Hearing	Hearing aid: Medical clearance given to fit <input type="checkbox"/> bone conductor aid <input type="checkbox"/> hearing aid/s LEFT RIGHT <input type="checkbox"/> Has aids -review required
ENT Review	<input type="checkbox"/> Not required <input type="checkbox"/> 3 months <input type="checkbox"/> 6 months <input type="checkbox"/> 1 year

SURGERY RECOMMENDED		<input type="checkbox"/> NO	<input type="checkbox"/> Too young for surgery
<input type="checkbox"/> Myringoplasty (Tympoplasty Type1)	<input type="checkbox"/> L	<input type="checkbox"/> R	
<input type="checkbox"/> Adenoidectomy			
<input type="checkbox"/> Myringotomy	<input type="checkbox"/> L	<input type="checkbox"/> R	
<input type="checkbox"/> Grommets	<input type="checkbox"/> L	<input type="checkbox"/> R	
<input type="checkbox"/> EUA	<input type="checkbox"/> L	<input type="checkbox"/> R	
<input type="checkbox"/> Exploration of middle ear/ mastoid	<input type="checkbox"/> L	<input type="checkbox"/> R	
<input type="checkbox"/> Removal of Tubes	<input type="checkbox"/> L	<input type="checkbox"/> R	
<input type="checkbox"/> Other procedure			

Signature: _____

Date...../...../.....




CLOSING THE GAP


ENT OPERATION SUMMARY FORM

OPERATION DATE/...../.....	HOSPITAL <input type="checkbox"/> ASH <input type="checkbox"/> GDH <input type="checkbox"/> KH <input type="checkbox"/> RDH <input type="checkbox"/> TCH	PATIENT POST-OP TRANSPORT HOME <input type="checkbox"/> CAR / BUS <input type="checkbox"/> PLANE	PATIENT ID		
		COMMUNITY	NAME	DOB	GENDER
		SPECIALIST:			

PRE-OP EXAMINATION

(¹Marginal refers to any perforation that involves the annulus)

LEFT EAR	EAM	Tympanic Membrane	Perforation Description	PRE-OP DIAGNOSIS
<input type="checkbox"/> NOT ASSESSED L 	<input type="checkbox"/> clear <input type="checkbox"/> wax / debris <input type="checkbox"/> discharge <input type="checkbox"/> foreign body <input type="checkbox"/> otitis externa <input type="checkbox"/> other	<input type="checkbox"/> Intact <input type="checkbox"/> Normal <input type="checkbox"/> Scarred/abnormal <input type="checkbox"/> Dull <input type="checkbox"/> Immobile <input type="checkbox"/> Retracted <input type="checkbox"/> Perforation <input type="checkbox"/> Grommet	<input type="checkbox"/> Central <input type="checkbox"/> Wet <input type="checkbox"/> Serous <input type="checkbox"/> Marginal ¹ <input type="checkbox"/> Purulent <input type="checkbox"/> Attic <input type="checkbox"/> Dry Size: <input type="checkbox"/> pinhole <input type="checkbox"/> <40% of TM <input type="checkbox"/> > 40% of TM <input type="checkbox"/> subtotal / total	<input type="checkbox"/> Normal <input type="checkbox"/> COM <input type="checkbox"/> Healed (intact abnormal) <input type="checkbox"/> Active (purulent d/c) <input type="checkbox"/> Inactive (dry or serous perf) <input type="checkbox"/> Squamous <input type="checkbox"/> Mucosal <input type="checkbox"/> OME <input type="checkbox"/> AOM <input type="checkbox"/> AOM w/perf <input type="checkbox"/> Other.....

RIGHT EAR	EAM	Tympanic Membrane	Perforation	Pre-op Diagnosis
<input type="checkbox"/> NOT ASSESSED R 	<input type="checkbox"/> clear <input type="checkbox"/> wax / debris <input type="checkbox"/> discharge <input type="checkbox"/> foreign body <input type="checkbox"/> otitis externa <input type="checkbox"/> other	<input type="checkbox"/> Intact <input type="checkbox"/> Normal <input type="checkbox"/> Scarred/abnormal <input type="checkbox"/> Dull <input type="checkbox"/> Immobile <input type="checkbox"/> Retracted <input type="checkbox"/> Perforation <input type="checkbox"/> Grommet	<input type="checkbox"/> Central <input type="checkbox"/> Wet <input type="checkbox"/> Serous <input type="checkbox"/> Marginal <input type="checkbox"/> Purulent <input type="checkbox"/> Attic <input type="checkbox"/> Dry Size: <input type="checkbox"/> pinhole <input type="checkbox"/> <40% of TM <input type="checkbox"/> > 40% of TM <input type="checkbox"/> subtotal / total	<input type="checkbox"/> Normal <input type="checkbox"/> COM <input type="checkbox"/> Healed (intact abnormal) <input type="checkbox"/> Active (purulent d/c) <input type="checkbox"/> Inactive (dry or serous perf) <input type="checkbox"/> Squamous <input type="checkbox"/> Mucosal <input type="checkbox"/> OME <input type="checkbox"/> AOM <input type="checkbox"/> AOM w/perf <input type="checkbox"/> Other.....

SURGERY DESCRIPTION: [IF THE SURGERY PERFORMED IS DIFFERENT TO THE SURGERY REQUESTED PLEASE INDICATE REASON IN COMMENTS]

Surgery	Ear	Approach	Graft	State of Middle Ear
Myringoplasty <input type="checkbox"/> Revision	<input type="checkbox"/> Left <input type="checkbox"/> Right	<input type="checkbox"/> transcanal <input type="checkbox"/> endaural <input type="checkbox"/> postaural	<input type="checkbox"/> temp.fascia <input type="checkbox"/> cartilage <input type="checkbox"/> cartilage /perichondrium <input type="checkbox"/> fat <input type="checkbox"/> other	<input type="checkbox"/> underlay <input type="checkbox"/> inlay <input type="checkbox"/> onlay <input type="checkbox"/> butterfly <input type="checkbox"/> patch <input type="checkbox"/> healthy <input type="checkbox"/> oedematous <input type="checkbox"/> purulent OC Intact <input type="checkbox"/> Y <input type="checkbox"/> N Mobile <input type="checkbox"/> Y <input type="checkbox"/> N
	Ear	Fluid in ME	Grommet	Comments
Myringotomy	<input type="checkbox"/> Left <input type="checkbox"/> Right	<input type="checkbox"/> None <input type="checkbox"/> Serous <input type="checkbox"/> Mucoid	<input type="checkbox"/> Yes \rightarrow Type <input type="checkbox"/> No	
		<input type="checkbox"/> None <input type="checkbox"/> Serous <input type="checkbox"/> Mucoid	<input type="checkbox"/> Yes \rightarrow Type <input type="checkbox"/> No	

Adenoidectomy	<input type="checkbox"/> Yes <input type="checkbox"/> No	Comments:
<input type="checkbox"/> EUA <input type="checkbox"/> Expl. of ME	<input type="checkbox"/> Left Description: <input type="checkbox"/> Right Description:	
<input type="checkbox"/> Remove tubes	<input type="checkbox"/> Left <input type="checkbox"/> Right	
<input type="checkbox"/> Other	<input type="checkbox"/> Left <input type="checkbox"/> Right	

Name

Signed

Date

Glossary of audiology data terms

Hearing	Hearing is the sense for perceiving sounds and includes regions within the brain where the signals are received and interpreted.
Otitis media	A condition with any inflammation, fluid or suppurative infection in the middle ear.
Suppurative	Describes pus produced in response to inflammatory bacterial infections.
Eustachian tube dysfunction	Negative middle ear pressure associated with compromised equalisation impeding middle ear function and causing middle ear fluid accumulation.
Acute otitis media	Describes presence of suppurative (infected) middle ear fluid with intact bulging or recent discharge and or bulging eardrum. May have associated symptoms or signs of infection that include discharge, pain, fever, irritability, vomiting or diarrhoea
Otitis media with effusion	The presence of intact eardrum and middle ear fluid without symptoms or signs of infection.
Chronic suppurative otitis media (CSOM)	A persistent suppurative discharge from the middle ear through a tympanic membrane perforation for more than six weeks.
Dry perforation	A CSOM condition that appears as a hole in the eardrum without any evidence of suppurative otitis media (either acute or chronic).
Persistent	A hearing loss or otitis media condition that is demonstrated to have been present for three months or longer.
Otoscopy	The clinical skill of examining the outer and middle ear, including the eardrum, using an otoscope/auriscope.
Tympanometry	An examination to test the condition of the middle ear and mobility of the eardrum and the conduction bones. It is an objective test of middle-ear function and provides a measure of energy transmission through the middle ear.
Audiometry/ pure tone audiometry	The standard technique of testing hearing ability. Pure tone audiometry records a subjective response to threshold (softest) sound stimuli presented through headphone, bone conductor or speaker at discrete frequencies essential for detecting and discriminating speech. Any response deviation from the normal range, at any sound stimuli, in either ear, is described as a hearing loss and the type of hearing loss is diagnosed.
Visual reinforce observation audiometry (VROA)	A hearing assessment technique using specialised sound field facilities that is appropriate for smaller children and babies 9–36 months). When able to sit and turn their heads independently children can be conditioned to repeatedly and reliably respond to frequency specific warble tones, presented via speaker, headphone or bone conductor. This conditioned response is reinforced through provision of a visual reward (puppet) to obtain threshold (softest) measures. Results obtained via speaker (standard test) do not provide separate ear information but determine adequacy of hearing for speech and language development and reflect the better ear.
Hearing loss	Describes any hearing threshold response (using audiometry) outside the normal range, at any sound stimuli, in either ear. Hearing loss in a population describes the number of children who have abnormal hearing. Hearing loss may affect one ear (unilateral) or both ears (bilateral).

Fluctuating hearing loss	Refers to hearing loss that changes significantly over time resulting in inconsistent auditory input. Conductive hearing loss is often associated with fluctuations related to changes in the otitis media condition or the impact it is having on sound conduction through the middle ear.
Hearing impairment	A classification that estimates the degree of handicap associated with hearing loss in the better ear and links to predicted consequences and recommended rehabilitation. Hearing impairment classification applies a graded scale – mild, moderate, severe and profound – based on degree of deviation from normal thresholds in the ‘better ear’ as recorded through audiometry. During data collection it is calculated as a 3 frequency average (3FA) of the threshold of hearing loss (HTL) at 500 Hz, 1000 Hz and 2000 Hz and is only applied to further describe bilateral hearing loss. It is based on pure tone audiometry on the test day and does not account for language, processing, environmental and early onset factors.
Mild hearing impairment	It is predicted to cause problems with hearing some speech components (below threshold), hearing in background noise, hearing over distance, understanding soft voices and understanding non-first (native) language speakers. Speech sounds will easily become inaudible and the listening environment is critical for enabling audibility of speech sounds for oral English, literacy and numeracy. Classroom amplification in combination with appropriate acoustic improvements for noise reduction is demonstrated to benefit mild hearing impairment at school. Individual amplification may also be considered.
Moderate hearing impairment	It is predicted to make most average conversational speech unintelligible, when relying on hearing alone, even in ideal listening conditions. Individuals with this degree of hearing impairment are dependent on complementary information including visual cues (lipreading, body language and hand talk) raised speech volume (amplification) and contextual cues. Moderate hearing impairment has major consequences for speech, language, communication, cognition, literacy, numeracy and auditory processing capabilities.
Severe and profound hearing impairment	Results in all conversational speech sounds being inaudible. Individual amplification is required for language acquisition and some children may use sign language as their main communication mode.
No hearing impairment	Refers to children where the better hearing ear has an average threshold at 500 Hz, 1000 Hz and 2000 Hz that is within the normal range for the test conditions. These children may have unilateral hearing loss or hearing loss at frequencies outside this range.
Sensorineural hearing loss	A deviation of hearing threshold from the normal range attributable to problems in the inner ear or vestibulocochlear nerve.
Conductive hearing loss	Describes a deviation of hearing threshold from normal associated with reduced conduction of sound through the outer ear, tympanic membrane (eardrum) or middle ear including ossicles (middle ear bones).
Mixed hearing loss	Hearing loss that has conductive and sensorineural components combined.

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