Canberra Hospital and Health Services
Clinical Practice Standards
Audiometry Nursing Clinical Practice Standards

Purpose

Audiometry Nursing Clinical Practice Standards, 2015 approved by the Audiometry Nurses Association of Australia (ANAA) provide clinical information on contemporary best practice in the management of hearing assessments being performed by Audiometry Nurses. These standards provide concise information on testing, interpretation, reporting and management of clients with hearing concerns including referral criterion.

Canberra Hospital Health Service (CHHS) endorses the use of this document.

Scope

CHHS Audiometry Nurses are registered Nurses who have undertaken post graduate qualifications that enable them to provide comprehensive assessment and management of hearing disorders.

The Audiometry Practice Standards apply to hearing assessments on toddlers, adolescents and young adults being performed in the Community Health environment by RNs working in the Women’s Youth and Children Community Health Program.

Which area in ACT Health can I contact for more information?

Clinical Nurse Consultant – Central Regional Team, Women Youth & Children Community Health Programs, Phone 6205 5059

Search Terms

Audiometry, Audiometry Nursing, Hearing, Deaf, Otoscopy, Tympanometry, Pure Tone Audiometry
Attachment

Attachment 1 - Audiometry Nursing Clinical Practice Standards

**Disclaimer:** This document has been developed by ACT Health, Canberra Hospital and Health Services specifically for its own use. Use of this document and any reliance on the information contained therein by any third party is at his or her own risk and Health Directorate assumes no responsibility whatsoever.

<table>
<thead>
<tr>
<th>Date Amended</th>
<th>Section Amended</th>
<th>Approved By</th>
</tr>
</thead>
<tbody>
<tr>
<td>19th January 2017</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AUDIOMETRY NURSES ASSOCIATION of AUSTRALIA Inc

AUDIOMETRY NURSING
CLINICAL PRACTICE STANDARDS

2015
AUDIOMETRY NURSES ASSOCIATION of AUSTRALIA Inc

AUDIOMETRY NURSING CLINICAL PRACTICE STANDARDS

TABLE OF CONTENTS

SECTION 1: INTRODUCTION 4
Section 1a: Maintenance of professional standards 5
Section 1b: History taking 6
Section 1c: Infection Control 7

SECTION 2: OTOSCOPY 8
Process 8
Otoscopy examples 9

SECTION 3: TYMPANOMETRY 11
Section 3a: Process 12
Section 3b: Tympanometry Examples: Interpretation & Reporting 12
Section 3c: Acoustic Reflexes 15

SECTION 4: PURE TONE AUDIOMETRY 17
Section 4a: Air conduction audiometry 18
Section 4b: Bone conduction audiometry 19
Section 4c: Masking 20
Section 4d: Free field screening 22
Section 4e: Paediatric screening using PA5 with earphone 24
SECTION 1: INTRODUCTION

These Clinical Practice Standards are designed for use by nurses who have attained post graduate qualifications in Audiology Nursing, and whose aim is to improve the health and wellbeing of children and adults who are affected by hearing health issues.

Hearing loss is categorised into two main forms – conductive hearing loss and sensorineural hearing loss.

Sensorineural hearing loss is caused by conditions associated with the inner ear or central auditory pathway and can occur at any age due to a variety of conditions. For example: illness, trauma, age or congenital factors.

According to the international literature, moderate to profound (>40 dB) bilateral permanent childhood hearing impairment (PCHI) occurs in 1.3 per 1,000 babies. Unilateral PCHI of similar severity occurs in 0.6 per 1,000 babies\(^1\). This suggests that, each year in Australia, approximately 331 children are born with bilateral PCHI, and 174 children are born with unilateral moderate to profound PCHI. This is a total of 551 children each year\(^2\).

All States and Territories in Australia now have a Universal Newborn Hearing Screening (UNHS) program. This provides babies with a hearing screen at birth, diagnostic audiology if a refer result or direct referral is obtained and diagnosed hearing loss within a few weeks of birth. There is then opportunity for early intervention in order to assist in the development of speech and language. Many children who pass the UNHS may have identified risk factors for progressive hearing loss and should have their hearing regularly monitored\(^3\).

Conductive hearing loss has a variety of causes and it has been recognised that at least 50% of all children will develop at least one episode of otitis media during their childhood, with many of these children developing chronic hearing problems. There is a significantly greater prevalence of otitis media among indigenous children in Australia\(^4\). It should be noted that conductive hearing loss is often the result of a disorder of the outer or middle ear. For example: Eustachian tube dysfunction, microtia, otitis media, ossicular disruption, cholesteatoma, etc. Early identification and management of hearing loss in childhood is necessary to enable children achieve optimum speech and language development, learning and social skills.

It has been acknowledged that Aboriginal and Torres Strait Islander populations are susceptible to an increased incidence of otitis media, therefore reference should be made to the ‘Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations’\(^5\) and ‘Chronic Otitis Media and Hearing Loss Practice’\(^6\) in relation to prevention, assessment and management of this condition.

There are many adults in the community who require hearing assessments due to illness or injury, and who are not eligible for services subsidised by the Commonwealth Government Office of Hearing Services. These clients can access hearing services through community health centres or private audiologists / audiometrists.

Audiometry Nurses are Registered / Enrolled Nurses who have undertaken post graduate qualifications that enable them to provide comprehensive hearing assessment and management of hearing disorders. They are generally employed within and provide hearing
services through community health centres, however may be employed in medical practices or private audiology clinics. These Clinical Practice Standards are intended for use by Audiometry Nurses to support their clinical practice.

**USE OF THE STANDARDS**

The standards are intended for use by both novice and expert qualified Audiometry Nurses to complement their knowledge and expertise. Examples of scenarios and clinical pathways are provided for management of a variety of common conditions.

**REVISION HISTORY**

Clinical Practice Guidelines for Nurse Audiometrists 2004
Clinical Practice Guidelines for Nurse Audiometrists revised 2007
Audiometry Nursing Clinical Practice Standards revised 2012

---

**1a: MAINTENANCE of PROFESSIONAL STANDARDS**

Clinical Practice Standards should be maintained by Audiometry Nurses and can be attained by observing the following:

- Current registration with the Nursing Midwifery Board of Australia (Australian Health Practitioners Regulation Authority - AHPRA) as a Registered / Enrolled Nurse, and hold a recognised post graduate qualification in Audiometry Nursing

- Membership of the Audiometry Nurses Association of Australia Inc (ANAA Inc), the professional organisation for audiometry nurses

- Conduct regular hearing clinics. A minimum of 8 hours clinical practice in audiometry nursing per month is recommended

- It is recommended that clinicians should schedule approximately 1 hour appointments in order to complete a full diagnostic hearing assessment including comprehensive history, otoscopy, tympanometry, audiometry, appropriate documentation and planning of appropriate management

- Where the clinician has been absent from audiometry nursing practice for more than 12 months, a review of clinical skills in audiometry should be undertaken with a clinical senior (CNC or CNS2 Audiometry). Ongoing clinical supervision may be required until skill levels meet current standards of professional practice

- Maintain currency of practice by attending the ANAA Inc annual conference at least every 3 years, and / or other relevant professional development in hearing health

- Maintain accreditation as a Clinical Advisor for student Audiometry Nurses by participating in the Clinical Advisor in Audiometry Nursing workshop every 3 years (held in conjunction with the ANAA Inc annual conference). Clinical Advisors in
Audiometry Nursing are encouraged to complete Cert IV TAA14004 (Workplace Training and Assessment) or equivalent

- Practicing audiometry nurses should participate in a clinical review with a clinical senior in audiometry nursing, at least once every three (3) years

### 1b: HISTORY TAKING

Prior to each assessment a comprehensive client history should be undertaken. Using the approved Audiometry History form as a guide, client history is intended to flag risk factors for hearing loss and should include information on the following:

- Reason for referral
- Presenting issues, including but not limited to: suspicion of hearing loss and duration; fullness; pain; discharge; dizziness; mouth breathing; snoring; asthma; allergies; nasal congestion; excessive headaches; impact of loud noise; tinnitus; exposure to environmental tobacco smoke; ability of child to blow nose, noise exposure, risk factors for progressive hearing loss, pre and post op ENT assessment, ototoxic medication, etc.
- Current health status

History taken at the initial consultation should also include the following information:

**For a child:**

- Pregnancy, birth and post natal health information
- Outcome of newborn hearing screening
- Family history of hearing loss
- Speech and language development
- General health and development noting particular risk factors
- History of ear disease
- Behavioural concerns
- Medications past and current
- Infectious diseases and immunisation history
- Previous hearing assessments and outcomes
- Previous Ear Nose and Throat specialist consultations and outcomes
- School performance, learning issues
- Parental/Carer concerns
For an adult:

- Family history of hearing loss or deafness
- General health
- Medications past and present
- History of severe head injuries
- History of noise exposure including type of noise, type of hearing protection used in the past or currently
- Previous hearing assessments and outcomes
- Previous Ear Nose and Throat specialist consultations and outcomes
- Previously prescribed hearing aids and if worn
- Noted hearing problems including difficulty hearing the TV, phone, at meetings, in a car, in groups, generally, feeling that people mumble, smoker, other

Client/carer consent should be obtained for the hearing service to provide copies of the hearing assessment report to relevant agents eg: GP, ENT, school, etc. and form signed and dated by the attending clinician.

1c: INFECTION CONTROL

Local, State and Territory health service policies should be observed in relation to infection control, and manufacturer's equipment guidelines should be observed in relation to cleaning, care and replacement of all re-useable and disposable items.

Otoscope specula are usually single use and therefore disposable. Where it is recommended that items such as tympanometer probe tips should be autoclaved, however where autoclaving facilities are not available, these may be thoroughly washed in warm, soapy water, scrubbed with a fine, clean toothbrush then rinsed and air dried. (Refer to manufacturer’s guidelines and local service policies). Note: where re-usable items are suspected to be contaminated they should be disposed of.

Items such as headphones / headbands, bone conductors and response buttons should be wiped with alcohol free detergent wipes after each client use.

Correct hand hygiene technique should be observed at all times in relation to personal and client care to minimise the possibility of cross infection.
SECTION 2: OTOSCOPY

Purpose:
To visualize the integrity of the ear canal and tympanic membrane to assist in the identification of ear disorders and their management. Identification of the landmarks of the normal tympanic membrane must be attempted. Consideration must be given to identifying the integrity, colour, presence of discharge, wax, ventilating tube or foreign body.13 14 15

OTOSCOPIC EXAMINATION:

- Explanation of procedure to client / carer in age appropriate manner
- Ensure otoscope light source adequate i.e: clear, bright light and adequate magnification
- Select appropriate sized speculum
- Note any anomalies of pinna or other craniofacial anomalies
- Hold pinna in a manner that enables the best view of the tympanic membrane and ear canal without causing discomfort
- Rest the side of your hand against client’s cheek when introducing the speculum to reduce the risk of trauma should there be sudden head movement
- Check ear canal for wax, foreign body (including grommet) or other abnormalities
- Note colour, integrity and location of landmarks of the tympanic membrane, and any abnormalities such as scarring (tympanosclerosis)
- If discharge / infection present, discard and replace speculum before introducing into opposite ear
- Record findings on approved Audiometry Report Form
Some examples of more common conditions that may be seen on otoscopy are included below:

- **Normal (right) tympanic membrane**
- **Otitis externa**
- **Retracted tympanic membrane**
- **Grommet / ventilating tube in situ**
- **Acute otitis media. Inflamed, full tympanic membrane**
- **Dry / safe perforation of tympanic membrane at 4 o’clock**
<table>
<thead>
<tr>
<th>Foreign body in canal</th>
<th>Long term grommet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesteatoma</td>
<td>Wax in canal</td>
</tr>
<tr>
<td>Pus filled middle ear</td>
<td>Exostosis</td>
</tr>
</tbody>
</table>
SECTION 3: TYMPANOMETRY

Overview:

Tympanometry is the measurement of middle ear pressure and the compliance and impedance of the tympanic membrane (TM) when variable air pressures are introduced into the ear canal. The inclusion of tympanometry to the hearing assessment protocol compliments the overall objectives of a hearing assessment. (i.e. visual inspection, hearing thresholds, middle ear function and acoustic reflexes).

There is growing evidence that associates a connection between hearing impairment caused by middle ear disease and delays in the development of speech, language and cognitive skills in children. Tympanometry is very useful to assist identification of otitis media with effusion (OME), which has the potential to cause a conductive hearing loss, as well as the detection of other medically related conditions of the middle ear.

Tympanic mobility in children over 2 years of age and adults is measured using a low frequency 226Hz probe tone, and children under 2 years using a high frequency 1000Hz probe tone (note that this may vary with the equipment used therefore it is recommended that manufacturers guidelines be followed).

Purpose:

Assess middle ear function to assist in determining status of middle ear. Tympanometry forms one part of a hearing assessment, and should be interpreted in conjunction with otoscopy and audiometry.

Essentially, it is measuring:

• The mobility (compliance) or immobility (impedance) of the tympanic membrane
• The air pressure in the middle ear cavity in relation to the air pressure of the external ear known as ‘middle ear pressure’ (MEP)
• The amount of air between the probe tip of the tympanometer, and the tympanic membrane, or middle ear cavity. This is known as the ‘physical volume’ (PV) or ear canal volume

Note that different types of tympanometers will have different ways of expressing the above. Refer to the manufacturer’s guidelines for interpretation of tympanometry results for each instrument.

Tympanometry should include the measurement of acoustic reflexes (refer to section 3c).
3a: **PROCESS:**

- Complete calibration of tympanometer as per manufacturers operating manual
- Explain procedure to client in an age appropriate manner
- Select appropriate sized ear probe tip
- Instruct carer/client that client needs to sit as quietly and as still as possible during this brief procedure
- Position tympanometer probe at entrance to ear canal so it is directed towards the tympanic membrane along the angle of the ear canal. Ensure a seal is obtained
- Complete test (as per operating manual for type of tympanometer in use). Test RIGHT ear first, however if one ear is discharging, test the non-discharging ear first. (Note that a clinical decision should be made as to whether it is medically appropriate to complete tympanometry on a discharging ear)
- Even when the tympanometer has a printer option available, it is useful to plot results onto tympanograph on audiometry report form. When manually plotting tympanogram onto graph, ensure that the shape of the graph is plotted as close as possible to that recorded on tympanometer and that any variance in the normal range of physical volume (PV) is noted
- Record results in appropriate section on report form, including acoustic reflexes and note if the reflexes are contralateral or ipsilateral
- Reporting of results should include interpretation of compliance and middle ear pressure. Physical volume does not require comment unless it is outside the normal values (see examples below)

3b: **TYMPANOMETRY EXAMPLES**

**Interpretation and Reporting**

Note that normal values may vary slightly depending on the suggested parameters of individual instruments. The values described in these Standards are a guide. When reporting on tympanogram results, it may also be useful to note the shape of the tympanogram as well as the actual values.

The following examples are of the three most common variations in tympanometry, however it is important to note other variations.
Example A: NORMAL TYMPANOGRAM (TYPE A)

Normal tympanogram (type A)  Source: Earscan Acoustic Impedance Microprocessor Operating guide 1993. MicroAudiometrics, Florida

Normal values would be:

<table>
<thead>
<tr>
<th>Middle ear pressure:</th>
<th>+50 to -100 daPa (up to -150 daPa in young children)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical volume</td>
<td>&lt; 2.0 mL in young children</td>
</tr>
<tr>
<td></td>
<td>&lt; 2.5 mL in older children and adults</td>
</tr>
<tr>
<td>Compliance:</td>
<td>&gt; 0.2 mL or &lt; 1.5 mL</td>
</tr>
</tbody>
</table>

Supposition
This is a normal (or type A) tympanogram. It is not expected that there would be any associated middle ear pathology with this. A description of this tympanogram would be as follows:
‘Normal compliance and middle ear pressure, shape consistent with normal middle ear function’.

Example B: FLAT TYMPANOGRAM, LOW COMPLIANCE (TYPE B)

Flat or rounded (type B) tympanogram. Source: Earscan Acoustic Impedance Microprocessor Operating guide 1993. MicroAudiometrics, Florida
Values for type B tympanogram:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle ear pressure (MEP)</td>
<td>?</td>
</tr>
<tr>
<td>Compliance (Comp):</td>
<td>&lt; 0.2 mL</td>
</tr>
<tr>
<td>Physical volume (PV):</td>
<td>Normal when tympanic membrane intact. Often &gt; 2.5 ml if tympanic membrane not intact.</td>
</tr>
</tbody>
</table>

**Supposition:**
This is a classic ‘flat’ (or type B) tympanogram. Some pathologies associated with a tympanogram with this shape and values may include the following:
middle ear effusion, thickened tympanic membrane, patent ventilating tubes or perforation (if PV increased). Note there is no readable ‘peak’ on this type of tympanogram, hence the ‘?’ MEP or NP.
Examples of descriptors for this type of tympanogram may be as follows:
• ‘Minimal / reduced / nil compliance, shape consistent with middle ear pathology / effusion’
• ‘Increased physical volume, consistent with patent ventilating tubes / perforation’.

**EXAMPLE C: INCREASED NEGATIVE MIDDLE EAR PRESSURE (TYPE C)**


Values for a type C tympanogram.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle ear pressure (MEP):</td>
<td>-100 daPa or greater (up to -150 daPa is accepted as normal in young children, depending on the tympanometer used)</td>
</tr>
<tr>
<td>Compliance (Comp):</td>
<td>&gt; 0.2 mL</td>
</tr>
<tr>
<td>Physical volume (PV):</td>
<td>Normal</td>
</tr>
</tbody>
</table>

Supposition:
This is a classic type C tympanogram. The peaked negative middle ear pressure is indicative of Eustachian tube dysfunction. Note that a rounded tympanogram with a negative pressure may indicate a higher probability of resolving or evolving effusion.
A typical descriptor of this tympanogram may be:

‘Normal compliance with increased negative middle ear pressure; shape consistent with Eustachian tube dysfunction / evolving / resolving middle ear effusion’.

EXAMPLES OF OTHER VARIATIONS IN TYMPANOLOGY RESULTS

<table>
<thead>
<tr>
<th>RESULT INDICATES:</th>
<th>POSSIBLE DIAGNOSIS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased physical volume</td>
<td>Perforated tympanic membrane, patent grommet / ventilating tube</td>
</tr>
<tr>
<td>Increased compliance</td>
<td>Flaccid tympanic membrane; ossicular discontinuity</td>
</tr>
<tr>
<td>Low / reduced compliance, normal middle ear pressure</td>
<td>Stiffened tympanic membrane due to scarring, advanced age of client / otosclerosis</td>
</tr>
</tbody>
</table>

3c: ACOUSTIC REFLEXES

The middle ear has an involuntary reflex in response to loud sounds – this causes a bilateral contraction of the stapedius muscles. This reflex alters the transmission of sound through the ossicular chain, like a protective mechanism for the cochlea. Abnormalities of the Cochlea, 7th or 8th Cranial Nerve, lower brainstem or middle ear pathology can influence the presence of a reflex.

Acoustic reflexes (AR) are generally measured with the same immitance instrument immediately after obtaining a tympanogram.

Acoustic reflexes can be measured contralaterally or ipsilaterally. Generally, in audiometry nursing practice, ipsilateral reflex thresholds are measured. This is when the reflex eliciting tone is administered to the same ear where the admittance is being measured. When the reflex eliciting tone is presented to the opposite ear from where admittance is being measured, it is called a ‘contralateral’ reflex.

Acoustic reflexes should be recorded according to the manufacturer’s operating manual for the particular type of tympanometer in use. For example: ‘Earscan’ tympanometers indicate the presence or absence of ipsilateral acoustic reflexes at 105 dB SPL at 1000 Hz and 2000 Hz.

The Earscan provides acoustic reflex screening and indicates presence or absence of reflexes at 1k Hz and 2k Hz only.

Other tympanometers, (for example: ‘Titan’, ‘GSI’ or ‘Otoflex’) may record acoustic reflexes at 500, 1000, 2000 and 4000 Hz using numerical data and are noted at the hearing level (HL) at which the reflex is elicited.

Example 2: Source: Titan tympanometer operating guide 2010

The example on the left indicates that reflexes are elicited as follows:
- 500 Hz: 90 dB HL
- 1k Hz: 85 dB HL
- 2k Hz: 95 dB HL
- 4k Hz: 80 dB HL

Example 3: Source: GSI 38 tympanometer user guide 2010

This example indicates the following ipsilateral reflexes:
- 500 Hz: NR (not recordable)
- 1k Hz: 105 dB HL
- 2k Hz: 95 dB HL
- 4k Hz: 90 dB HL

Notation should be made in the tympanometry report regarding the acoustic reflexes. For example: ‘acoustic reflexes as noted above’ or ‘acoustic reflexes not recorded / absent’.
SECTION 4:  PURE TONE AUDIOMETRY

Purpose:

Audiometry is multi-faceted and is undertaken to determine the hearing thresholds of individual ears and the type of hearing loss. It forms a major part of the hearing assessment. In pure tone audiometry the lowest sound pressure levels (thresholds) for different pure tones (frequencies) that a person can *just* hear are determined. The frequencies measured are those between 250 Hz and 8000 Hz – these being the frequencies related to speech sounds from low to high frequency.

Testing is conducted in a quiet environment, preferably a sound treated booth or room\(^{23}\).

HUGHSON WESTLAKE TECHNIQUE

Audiometry is undertaken using the *Hughson Westlake* technique\(^{24}\):

- Present a pure tone signal of sufficient volume for the client to hear
- The client is required to use a pre agreed response each time the signal is heard
- When client responds, decrease the signal by 10 dB and re-present signal
- Each time client responds decrease signal in 10 dB steps, re-presenting the signal until the client no longer responds
- When client no longer responds, increase signal intensity by 5 dB steps and re-present signal until a response is indicated
- Decrease the signal in 10 dB steps as above and increase in 5 dB steps as above until 2 out of 3 responses are indicated at the same threshold
- This is determined to be the hearing threshold at that frequency
- Record results using accepted symbols on the audiogram
- If a client indicates that they have tinnitus, use a pulsed tone

ACCEPTED SYMBOLS FOR USE IN AUDIOMETRY NURSING (AUSTRALIA)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>Right ear hearing (air conduction)</td>
<td>□</td>
<td>Unmasked bone conduction (either ear)</td>
</tr>
<tr>
<td>X</td>
<td>Left ear hearing (air conduction)</td>
<td>[</td>
<td>Right ear (bone conduction masked)</td>
</tr>
<tr>
<td>•</td>
<td>Right masked air conduction</td>
<td>]</td>
<td>Left ear (bone conduction masked)</td>
</tr>
<tr>
<td>#</td>
<td>Left masked air conduction</td>
<td>□</td>
<td>Free field response</td>
</tr>
</tbody>
</table>

*Note: Symbols endorsed by Audiology Australia are also acceptable.*\(^{25}\)
**4a: AIR CONDUCTION AUDIOMETRY**

Air conduction audiometry is the measurement of hearing thresholds across the entire auditory pathway.

Air conduction is where the sound must travel via the headphone then as energy through the acoustic pathway via the ear canal, tympanic membrane, ossicular chain and then on through the oval window to the cochlea and acoustic nerve to the brain stem. This involves placing headphones over a person’s ears and introducing a pure tone signal at a volume that should be reasonably audible. The volume of the tone is progressively reduced using the ‘Hughson-Westlake’ technique.

**Process:**

- Conduct pre-test check of the audiometer as per manufacturers operating manual
- Explain procedure to client in an age appropriate manner
- Face client to place headphones on their head (red earphone over right ear; blue earphone over left ear) & adjust to ensure speakers are placed over ear canal opening
- Commence testing RIGHT ear (or better ear if known) at 1000 Hz
- Test all available frequencies from 250 Hz to 8000 Hz when possible, however:
  - If client is a very young child with limited concentration commence at 1000Hz, then 4000 Hz in each ear. Test remaining frequencies to the limit of their concentration
  - For children up to 15 years of age test 250, 500, 1000, 2000, 4000 & 8000 Hz
- Where it is known that a person has been exposed to noise, 1500, 3000 & 6000 Hz must be tested
- Where there is a difference of 15dB or more between frequencies, the frequency in between must be tested if available
- Record results using accepted symbols
- Repeat process in opposite ear

**NORMAL VALUES:**

Pure tone audiometry:

- Normal hearing levels: 0 - 20 dB in sound treated conditions
- Mild hearing loss: 21 - 45 dB
- Moderate hearing loss: 46 – 65 dB
- Severe hearing loss: 66 - 90 dB
- Profound hearing loss: 91 dB +
Ambient noise levels: Hearing assessments should ideally be conducted in sound booths or sound treated rooms. Where this is not possible, all efforts should be made to reduce internal and external ambient noise. For example: use of clinical rooms on days where there is minimal activity in the centre; clinics not conducted on days when maintenance or construction is being carried out.

Research conducted by NAL (National Acoustic Laboratories) is ongoing into the effectiveness of hearing assessments conducted in ambient noise.\textsuperscript{27}

4b: BONE CONDUCTION AUDIOMETRY

Bone conduction is undertaken in conjunction with air conduction audiometry to assist in determining the integrity of the auditory system. This is determined by conduction of sound waves to the inner ear via the mastoid bone, therefore bypassing the middle and outer ear and directly stimulating the cochlea.\textsuperscript{28, 29}

The bone conductor / transducer is placed on the bony skull just behind the ear on the mastoid bone, and is held in place by a headband over the head. The pure tones are felt as vibrations on the skull and stimulate the inner ear via the mastoid bone.\textsuperscript{30} The vibrator is only placed on one side of the skull, usually behind the ear with the better air conduction thresholds. Whilst both ears will receive this vibration due to the transmission across the bony skull, the cochlea that is hearing the best will receive the audible tones at the minimum level. The bone conductor can deliver these tones at 500 Hz to 4000 Hz in most audiometers, however some audiometers may deliver the tones at higher ranges. The range is more limited than air conduction due to the distortion at higher frequencies and intensities. Generally, the bone conduction thresholds are less than or equal to the air conduction thresholds in the better ear.

Process:
- Explain procedure to client in an age appropriate manner
- Face the client and place the transducer on the mastoid bone of the better ear. The vibrator should not touch the auricle, and should be placed under the hair. Ensure the handle does not occlude the outer ear on the opposite side
- Commencing at 1000 Hz test all available frequencies. Test 1000 Hz and 4000 Hz for young children and continue to their concentration limits
- Record results on audiogram using accepted symbols
The purpose of masking is to eliminate crossover hearing (otherwise known as interaural attenuation) in order to determine the true threshold of the test ear. Masking can be used for both air conduction and bone conduction audiometry.

Where there is a significant difference between the unmasked bone conduction and the air conduction thresholds, or a significant difference between the air conduction thresholds of each ear, masking must be used to determine the type of hearing loss. Masking results will determine whether it is a conductive loss – that is, caused by a disorder of the outer or middle ear; or if it is a sensorineural loss – that is, a hearing loss caused by a disorder of the inner ear or the higher acoustic pathway (retro-cochlea) or a mixed loss – a combination of conductive and sensorineural hearing loss.

**AIR CONDUCTION MASKING**

Air conduction masking should be undertaken where possible if:
- There is a difference of 40 dB or more between the air conduction thresholds of both ears
- There is a difference of 40 dB or more between the poorer air conduction and the unmasked bone conduction thresholds

**Process:**
- Explain procedure to client in age appropriate manner
- Determine the test ear and frequencies to be masked
- Introduce narrow band masking noise via the headphone into the non test ear at the unmasked air conduction threshold at that frequency, then add 20dB
- Re-establish the hearing threshold in the test ear commencing at the unmasked level. If no response, increase volume in 5dB increments until client responds
  - When response received, increase masking noise by 10dB and retest
  - Repeat above step x 3
- The third successive response without increasing the threshold in the test ear indicates the plateau has been obtained
  - Turn masking off and record masked air conduction threshold
  - If NO response received following any increase in masking noise, increase tone in 5dB steps until client indicates they can hear it. Repeat above steps
- Record the results on the audiogram using accepted symbols
- The level at which 3 increases of 10dB of masking does not shift the threshold in the test ear is considered the masked air conduction
BONE CONDUCTION MASKING

Bone conduction masking should be undertaken where possible if:

- There is a difference of more than 10dB between the unmasked bone conduction threshold and the air conduction thresholds of either ear\(^{34}\)

Process:

- Explain procedure to the client in an age appropriate manner
- Determine the test ear and frequencies to be masked
- Place bone conductor on mastoid of test ear, taking care not to occlude the non-test ear with the handle of the transducer
- Set bone conduction hearing level at the unmasked bone conduction threshold for that frequency
- Place the insert masker into the ear canal of the non-test ear. Introduce narrow band masking noise into the non-test ear slowly increasing volume until client indicates they can **just** hear it. Add further 20 dB masking noise.
- Re-establish hearing threshold of test ear. If no response increase unmasked tone by 5 dB increments until response indicated
  - Response received → increase masking noise by 10 dB and retest
  - Repeat above x 3
  - The third response is the plateau. Turn masking noise off.
  - Record masked bone conduction result using accepted symbols
  - If NO response indicated, increase tone by 5 dB increments until response indicated. Repeat above.
- The level at which 3 increases of 10dB of masking signal does not shift the threshold in the test ear is the masked bone conduction threshold
4d: FREE FIELD SCREENING

It is important to recognise that infants and toddlers have varying ability to respond to sounds, therefore testing techniques must be adjusted according to their developmental age in order to obtain a valid measure of their hearing. Free field screening does not determine hearing thresholds. This screen may determine hearing in at least one ear, however cannot rule out a unilateral hearing loss.\(^{35}\)

PA5 WITH HEAD TURN RESPONSE: (Visual Reinforcement Audiometry)

Purpose:

Visual Reinforcement Audiometry [VRA] is used when children are able to support their own head and rotate it 180 degrees.\(^ {36}\) When they respond to a given sound by turning their head, they are rewarded. This reward may be a puppet, flashing lights or other, dependent on the child and what equipment is available.

Methods:

- VRA booth with puppets
- PA5 (Paediatric audiometer)

Tones can only be presented down to a minimum of 20 dB, the outer range of normal hearing. This technique is recommended for infants aged approximately 10-24 months corrected age. The aim of VRA is to determine the softest sound down to a minimum of 20 dB, to which the child turns to reliably for 2 out of 3 signals at 1000 and 4000 Hz.\(^ {37} \)\(^ {38}\)

Attempt to screen at 500Hz & 2000Hz if child’s concentration allows.

Catch trial should always be used at some stage during screening. A catch trial involves using the same process, except without audible signal.

Process:

- Observe child’s ability to turn head 180 degrees
- Explain procedure to parent / carer in an appropriate manner
- Place child in high chair / child’s chair or on parent/carer’s lap as appropriate
- Distracter to sit in front of child with a few non audible toys to direct child’s attention to the front during screening
- Instruct distracter to maintain child’s attention without audible sound and not to cue child when the tone is presented
- If using the PA5, the screener sits behind child with PA5 holding it 50 cm behind child’s head and outside child’s peripheral vision
• Condition child to activity:
  o Screener presents either a warble or narrow band tone for 3-5 seconds at sufficient volume to attract child’s attention. For example 60dB at 1000 Hz
  o When child turns toward signal a visual reinforcement is offered. For example: flash lights on PA5, display illuminated puppets, etc
  o If using PA5, engage child in activity as appropriate for age by encouraging him / her to ‘blow out lights’ or ‘touch lights to make them go out’, saying ‘good job!’ or other appropriate encouragement

• Once the screener has determined child has been conditioned, commence screening by introducing tone at 1000 Hz at 40 dB, decreasing by 10 dB after each response and visual reinforcement. Attempt to gain responses at 20 dB

• Record result on audiogram using accepted symbols for free field screening and indicate the type of noise used as a stimulus e.g: ‘narrow band and warble tones used’

• The PA5 can be positioned behind either ear, however it is important to inform carer/parent that the individual ears of the child are not being tested

### A guide for infant responses to free field screening is provided below⁴⁹:

- 9 – 13 months: baby directly locates a sound source 25-35 dB SPL to the side and below
- 13-16 months: toddler localises directly sound signals of 25-30 dB to the side and below; indirectly above
- 16-21 months: toddler localises directly sound signals of 25-30 dB on the side, below and above
- 21-24 months: child locates directly a sound signal of 25 dB at all angles

Note that when using a PA5 (paediatric screening audiometer), the decibel levels vary in 10dB increments. The table above may be used as a guide.

### PA5 requiring PLAY RESPONSE:

Anticipated responses should be appropriate to the developmental / cognitive age of the client. The PA5 with play response can be used with children as young as 2 years of age or for older children / adults with developmental or cognitive delay.

#### Process:

• Ensure play responses are pre-determined and age / developmentally appropriate. For example, instruct and demonstrate to the child / client that you want them to place a toy into a bucket, clap, etc. when they hear the noise
• Screener to sit opposite child with PA5 facing the child and held at a distance of 50cm
• Present sufficiently loud signal (e.g.: 60dB @1k Hz) for 3-5 seconds to attract child's attention. Child is expected to respond within 5 seconds from onset of signal
• Repeat until child is conditioned to respond
• Commence screening at 1K and 4K Hz decreasing volume until the child no longer responds to the signal
• Aim for a response x 2 at 20 dB
• Catch trial should always be used at some stage during screening. A catch trial involves using the same process, except without audible signal

Ideas for engaging the child/client in the process:

• A useful idea is to give each frequency the name of an animal e.g.: 500Hz a frog, 4000Hz a bird, etc
• A method that has been successfully used is to have the child place a toy/peg etc on the face of the PA5 and when the child hears the signal, they place the toy/peg into a container – this method is useful to connect the signal with the action for the child. This may be particularly useful if you are able to progress to using a PA5 with an earphone

4e: PA5 requiring play response - USING EARPHONE

If PA5 free field screening has been successful, the child / client may then be able to progress to screening using the PA5 with earphone. This would then determine the hearing in individual ears rather than free field screening where a unilateral hearing loss cannot be ruled out.

Note that once the earphone is connected to the jack on the PA5, the tones become pure-tone rather than warble, narrow band or white noise.

Process:

• Ensure play responses are pre-determined and age / developmentally appropriate (as above)
• Plug earphone into the jack on the PA5. Distance from the child / client is not relevant as the child / client will hear the tones via the earphone
• Hold earphone over test ear and present signal as described above until valid responses obtained at frequencies tested
• Repeat for other ear
• Record valid responses on the audiogram using accepted symbols
• Note that this is a screen only. The O symbol (right ear) and X symbol (left ear) should be plotted but not joined on the graph
SECTION 5: NEWBORN HEARING SCREENING

Universal newborn hearing screening (UNHS) programs have been progressively introduced throughout Australia and many other countries over the past decade. Research has shown that in Australia, approximately one infant in every 1000 live births will be born with a significant hearing loss – defined as a hearing loss greater than 40dB in the better ear. Universal newborn hearing screening programs aim to detect this hearing deficit, and offer families early diagnosis and appropriate intervention which leads to significantly improved health, education and social outcomes.

Infants who do not pass the UNHS are referred to diagnostic audiology where anomalies in the function of the auditory pathway are detected or diagnosed. It is important to note that this screening does not prevent progressive hearing loss, nor does it detect or prevent a mild hearing loss or conductive hearing loss. UNHS is a non-invasive screening test that takes just minutes to complete, using computerised technology.

Infants that pass their UNHS but are identified at that time with one of more risk factors for progressive hearing loss should have their hearing monitored as per their State or Territory’s protocol/guidelines.

The newborn hearing screening program is known by various names. For example: ‘SWIS-H’ (State Wide Infant Screening - Hearing) in NSW, ‘Healthy Hearing’ program in Queensland, etc.

The following are the screening methods used within Australia:

- Automated Auditory Brainstem Response (AABR)
- Oto-Acoustic Emissions (OAE)

Information related to newborn hearing screening programs can be found by contacting the Health Department in your State or Territory for more information, and the Clinical Practice Guidelines and Policies relevant to each program. Some useful links:

Australasian Newborn Hearing Screening Committee

TAS: http://www.dhhs.tas.gov.au
SECTION 6: CLINICAL PATHWAYS

It is important to note that these pathways are a guide only, and management of all clients must be considered on an individual basis.

6a: RECOMMENDED CLINICAL PATHWAYS: INFANTS and CHILDREN

<table>
<thead>
<tr>
<th>INITIAL ASSESSMENT</th>
<th>ACTION</th>
<th>REVIEW FINDINGS</th>
<th>ACTION</th>
<th>SECOND REVIEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal otoscopy; Normal hearing; Normal middle ear function (MEF) *note: It is preferable to use high frequency tympanometry for children &lt;2yrs</td>
<td>No further action; review if ongoing concern</td>
<td></td>
<td></td>
<td>Review at age 3-4yrs when head phones can be reliably used</td>
</tr>
<tr>
<td></td>
<td>If risk factor/s for progressive hearing loss* State/Local Health Service Policy/Protocol should be followed</td>
<td>Initial hearing assessment at 10-12 months corrected age (* Infants with diagnosed CMV &amp; UNHS pass require 6 monthly hearing monitoring up to age 4yrs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hearing loss identified; normal MEF &amp; normal otoscopy</td>
<td>Refer Audiologist/Australian Hearing Ref refer GP/ENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal hearing; Eustachian tube dysfunction (ETD)</td>
<td>ET patency exercises; Review if continued parental/GP concern</td>
<td>Normal hearing MEF abnormal Otoscopy abnormal</td>
<td>Refer GP/ENT Review 6-8 weeks or on request</td>
<td></td>
</tr>
<tr>
<td>Hearing loss with middle ear pathology (MEP) (Note: masking should be attempted where appropriate to determine type of hearing loss)</td>
<td>ET patency exercises; Review 6-8 weeks</td>
<td>Normal hearing MEF</td>
<td>No further action</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Normal hearing with MEP</td>
<td>Review on request</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Refer GP/ENT</td>
<td>Review on request</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hearing loss with MEP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Refer GP/ENT</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hearing loss; normal MEF</td>
<td>Review on request</td>
</tr>
</tbody>
</table>

ANAA Inc Audiometry Nursing Clinical Practice Standards. (Reviewed May 2015)
**RECOMMENDED CLINICAL PATHWAYS for CHILDREN following HEARING ASSESSMENT**

- **Normal otoscopy**
  - **Normal Hearing**
    - **Normal MEF**
      - **Normal otoscopy**
        - NFA
        - Review if ongoing concern
  - **Hearing Loss**
    - **Normal MEF**
      - **Normal otoscopy**
        - Refer to AH
        - Refer to GP/ENT

- **ET patency exercises + review 6-8 weeks if ongoing concern**
  - **Hearing normal MEF normal Otoscopy abnormal**
    - **Refer to GP/ENT**
    - Review 6-8 weeks or on request

- **Hearing normal MEF Normal**
  - **NFA**

- **Hearing Loss + Middle Ear Pathology**
  - **ET patency exercises**
    - **Review 6-8 weeks**
    - **Refer to GP**

- **Hearing Loss + Middle ear pathology**
  - **Normal hearing + Middle ear pathology**
    - **Refer to AH**
    - **Refer to GP**
    - **Refer to AH**
    - **Refer to GP/ENT**
    - **Review on request**

- **Normal hearing + Normal MEF**
  - **Normal hearing +**
  - **Middle ear pathology**
  - **MEP**
    - **Normal hearing +**
    - **Middle ear pathology**
    - **MEP**
    - **Refer to GP/ENT**
    - **Review on request**

- **Hearing normal**
  - **MEF abnormal**
  - **Otoscopy abnormal**
    - **Refer to GP**
    - **Refer to GP/ENT**
    - **Review on request**

**LEGEND:**
- **Normal Hearing** < or = 20dB
- **Hearing Loss** > 20dB
- **MEF** = Middle Ear Function
- **ET** = Eustachian Tube
- **AH** = Australian Hearing
- **NFA** = No Further Action

**Normal MEF:**
- Compliance > 0.2ml
- MEP = -150 - +50 daPa
- PV < 2ml

ANAA Inc Audiometry Nursing Clinical Practice Standards. (Reviewed May 2015)
Clients of all ages present with a variety of symptoms / history. Some examples may include:

<table>
<thead>
<tr>
<th>INDICATION</th>
<th>ACTION &amp; REFERRAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden hearing loss or sudden onset of tinnitus</td>
<td>Immediate referral to GP/ENT &amp; priority for audiometry assessment</td>
</tr>
<tr>
<td>Family history of hearing loss</td>
<td>Monitor (on individual basis)</td>
</tr>
<tr>
<td></td>
<td>Refer to GP for ENT if changes noted</td>
</tr>
<tr>
<td>Tympanometry = reduced compliance; Audiometry = low frequency conductive hearing loss and depressed 2K bone conduction</td>
<td>Possible otosclerosis</td>
</tr>
<tr>
<td></td>
<td>Refer to GP for ENT referral</td>
</tr>
<tr>
<td>Tympanometry = normal middle ear function</td>
<td>Refer to Office of Hearing Services (if eligible) or private audiologist for hearing aid assessment</td>
</tr>
<tr>
<td>Audiogram = presbycusis (age related hearing loss)</td>
<td>Provide information re Assistive Listening Devices and support agencies</td>
</tr>
<tr>
<td>Asymmetrical hearing loss on any frequencies with or without tinnitus</td>
<td>Refer to GP for ENT opinion to rule out retro-cochlea pathology</td>
</tr>
<tr>
<td>Tinnitus</td>
<td>Information re tinnitus causes and management</td>
</tr>
<tr>
<td></td>
<td>Refer to GP for investigation, ENT referral</td>
</tr>
<tr>
<td>Dizziness, nausea, vomiting, balance disorder, tinnitus</td>
<td>Suspect Ménière Disease, Benign positional vertigo (BPV)</td>
</tr>
<tr>
<td></td>
<td>Refer to GP for investigation, ENT referral</td>
</tr>
</tbody>
</table>
SECTION 7: OCCUPATIONAL HEARING SCREENING

Occupational screening requires a different approach to diagnostic hearing assessment. It is useful to remember that this is a screen only. Refer to the A/NZS 1269 ‘Occupational Noise Management Part 4: Auditory Assessment’ for details relating to technique, reference and monitoring audiometry, interpretation of results and management / referral procedures. These standards are updated periodically.

The Hearing Conservation Audiology Report Forms are suggested for use in Occupational Screening programs (see appendix 3). Client history, results, management and consent should be documented on this form.

Clients undergoing reference audiometry need to be ‘noise free’ for at least 16 hours prior to testing, whilst clients requiring monitoring audiometry should be tested well into a work shift.

- Complete information about past ear disease, any family history of deafness and current/past tinnitus and record in appropriate area on form
- Complete otoscopy and record findings
- Use the Ascending Hughson Westlake Technique (as per A/NZ standard 1269) commencing with right ear
- Test air conduction thresholds of 500Hz, 1000Hz, 1500Hz, 2000Hz, 3000Hz, 4000Hz, 6000Hz and 8000Hz
- Record all results directly onto report form using accepted symbols, except 3000Hz, 4000Hz and 6000Hz – record these in boxes A, C & E for right ear
- Test left ear as above and record results of 3, 4 & 6K in boxes A, C & E for left ear
- Remove headphones for a minute or two and then reposition
- Retest right ear at 3000Hz, 4000Hz and 6000Hz and record results in boxes B, D & F for right ear (below the first test results)
- Retest left ear as above and record in boxes B, D & F for left ear
- Add the results of individual ear results of both 3000Hz (A & B) divide by 2 and record in ‘average box’. Repeat for 4000Hz (C & D) and 6000Hz (E & F)
- Plot this ‘average’ result onto audiogram form
- Add up the results of A B C D E & F of the right ear, divide by 6 and record result in box provided on form. Note that the average of 3K, 4K and 6K of the 2 tests gives an overall decibel loss of those combined frequencies – it is not a percentage of hearing loss
- Repeat for the left ear

- If the test is monitoring audiometry and the results show any of the following differences from the reference audiogram, the client is to be advised to undergo further testing on another day after being free from noise for 16 hours:
  - A shift in average threshold at 3K, 4K and 6K ≥ 5dB
  - A shift in mean threshold ≥ 10dB at 3K and 4K or
  - A change in mean threshold ≥ 15dB at 6K or
  - A threshold shift ≥ 15dB at 500Hz, 1K 1.5K or 2K or
  - A threshold shift ≥ 20dB at 8K

- Where a threshold shift is confirmed, the client is to be referred for a medical opinion
- Write the report, print name and designation and sign the form
- Provide the client with a copy
- Documentation maintained as per local service policy/protocol
NOISE INJURY PREVENTION AND MANAGEMENT

An essential component of any Occupational Hearing Screening program is noise injury prevention and management.

The following issues should be discussed:

- client awareness of noise exposure
- length and degree of noise exposure that causes damage to hearing
- client understanding of hearing protection
- appropriate type of hearing protection for client needs
- essentials of comfortable hearing protection
- dispelling myths re use of hearing protection
- impact of leisure noise and personal noise exposure as well as occupational noise exposure

SECTION 8: REPORT WRITING

Report writing is an important and integral part of nursing practice. Audiometry reports not only provide documented evidence of client assessment, but also become part of a client’s Health Care Record, which documents the process of care delivery.

History and report forms relevant to your State or Territory or those endorsed by your service should be used. Local service policies regarding documentation should be observed.

Basic principles of report writing and documentation:

- Written reports should be accurate, legible and relevant
- Otoscopy – report on what you can see
- Tympanometry – ensure reference is made to compliance, middle ear pressure and physical volume (where relevant). Physical volume is relevant where it is excessive and confirms a perforation, patent ventilation tube, or reduced physical volume such as a wax filled ear canal or foreign body. Reference should be made to shape of the tympanogram where this is significant (for example: ‘low rounded shape consistent with evolving/resolving middle ear pathology’)
- Reference should be made to acoustic reflex responses
- Audiogram report should indicate type and degree of hearing loss. Use of the term ‘normal hearing levels’ is preferable to the term WNL (within normal limits)
- Action / management plan: document appropriate management and referral or review process
- If results are the same for both ears use of the word ‘bilateral’ is acceptable, however where results are different report on results individually. Include the degree (mild, moderate, severe, profound), frequencies affected (low, mid or high), and type (conductive, sensorineural, mixed)
SECTION 9: PROFESSIONAL COMPETENCY STANDARDS FOR NURSES

The performance of Registered and Enrolled Nurses can be grouped into domains of competency as referenced by the Australian Nursing & Midwifery Council (ANMC) 2013. Further information can be found at the following link: http://www.nursingmidwiferyboard.gov.au/Codes-Guidelines-Statements/Codes-Guidelines.aspx#competencystandards

SECTION 10: CLINICAL COMPETENCIES / PRACTICE STANDARDS FOR AUDIOMETRY NURSES

The ANAA Inc has developed a set of clinical skills which should be achieved and maintained in order to practice as an Audiometry Nurse. (Appendix 4)

SECTION 11: HEARING SERVICES CLINICAL PRACTICE REVIEW

PURPOSE:

- A clinical practice review should be undertaken between a clinical senior in audiometry nursing (for example: CNC or CNS2) with the clinician to determine that a best practice approach to the provision of a high quality hearing health service is achieved
- Clinical practice review should be completed at least once every 3 years or more frequently if required

GUIDELINES:

- The environment for testing meets the AS ISO 8253 Acoustics-audiometric test methods (www.nal.gov.au) for maximum acceptable background noise levels, and therefore meets the standards for testing with and without headphones e.g. sound field or bone conduction
- The clinic has the essential equipment necessary for conducting diagnostic hearing assessments including an otoscope, tympanometer with acoustic reflex facility, audiometer with air, bone and masking options, and a paediatric screening audiometer
- The equipment is calibrated annually and is maintained in excellent working order
- The length of appointment time is appropriate e.g. one hour
- Relevant State and Territory health department and local health service infection control and workplace health and safety guidelines are followed
- A reporting mechanism is in place for statistical data collection
- The audiometry nurse maintains professional standards as per Nursing and Midwifery Board of Australia guidelines (www.nursingmidwiferyboard.gov.au) and ANAA Inc recommendations
HEARING SERVICES: CLINICAL PRACTICE REVIEW

Name: ...........................................................................................................................................

Site: ...........................................................................................................................................

Date of review: ..............................................................................................................................

PURPOSE:

A clinical practice review should be undertaken between a clinical senior in audiometry nursing (e.g: CNC or CNS2) with the clinician to determine that a best practice approach to the provision of a high quality hearing health service is achieved. Clinical practice review should be completed at least once every 3 years or more often if required.

GUIDELINES:

- The environment for testing meets the ANSI S3.1 or ISO 8253 for maximum acceptable background noise levels for testing with and without headphones e.g. sound field or bone conduction

- The clinic has the essential equipment necessary for conducting hearing assessments including an otoscope, tympanometer with acoustic reflex facility, audiometer with air, bone and masking options, and a paediatric screening audiometer

- The equipment is calibrated annually and is maintained in excellent working order

- The length of appointment time is appropriate for a diagnostic assessment (e.g. one hour)

- Relevant State and Territory health department and local health service infection control and work, health and safety guidelines are followed

- A reporting mechanism is in place for statistical data collection

- The audiometry nurse maintains professional standards as per professional organisation guidelines
**ISSUES RAISED AT PREVIOUS CLINICAL REVIEW INCLUDED:**

………………………………………………………………………………………………………………………………
………………………………………………………………………………………………………………………………
………………………………………………………………………………………………………………………………
………………………………………………………………………………………………………………………………

**Resolution of previous issues:**  Yes □  No □

If no, explain barriers: ……………………………………………………………………………………………………
………………………………………………………………………………………………………………………………
………………………………………………………………………………………………………………………………

**CLINICAL ASSESSMENT:**

- How often does the audiometry nurse conduct hearing clinics? (recommended minimum 8 hours per month)
  …………………………………………………………………………………………………………………………………

- What is the usual waiting time for a hearing appointment?
  …………………………………………………………………………………………………………………………………

- What process is in place for making appointments?
  …………………………………………………………………………………………………………………………………

- Describe the process at this facility for scheduling appointments:
  …………………………………………………………………………………………………………………………………

- Is one hour allocated for each appointment?
  …………………………………………………………………………………………………………………………………

- Describe how non attendees are followed up
  …………………………………………………………………………………………………………………………………

- Does the testing environment meet the relevant A/NZ Standard?
  Yes □  No □
  Comment: …………………………………………………………………………………………………………………………. 
• Are there Safe Operating Procedures for each piece of equipment?
  Yes □   No □
  Comment: .................................................................................................................................

• Does the testing environment meet Workplace Health and Safety Standards
  Yes □   No □
  Comment: .................................................................................................................................

• Is there a copy of the current Audiometry Nursing Clinical Practice Standards for the hearing service available?
  Yes □   No □
  Comment: .................................................................................................................................

• Is there a copy of the current Clinical Competencies for Audiometry Nurses available?
  Yes □   No □
  Comment: .................................................................................................................................

• Is there a supply of appropriate Audiometry History and Report forms, including Hearing Conservation forms (where needed)
  Yes □   No □
  Comment: .................................................................................................................................

• Is the equipment checked and calibrated as per operator manual prior to each clinic
  Yes □   No □
  Comment: .................................................................................................................................

ASSESSMENT SKILLS

History taking and interpersonal skills
Comments: .................................................................................................................................
...................................................................................................................................................
...................................................................................................................................................

Otoscopy
Comments: .................................................................................................................................
...................................................................................................................................................
...................................................................................................................................................

ANAA Inc Audiometry Nursing Clinical Practice Standards. (Reviewed May 2015)
Tympanometry
Comments: …………………………………………………………………………………………………………………………….
…………………………………………………………………………………………………………………………………………..
…………………………………………………………………………………………………………………………………………..

Air and bone conduction audiometry
Comments: …………………………………………………………………………………………………………………………….
…………………………………………………………………………………………………………………………………………..
…………………………………………………………………………………………………………………………………………..

Air and bone conduction masking
Comments: …………………………………………………………………………………………………………………………….
…………………………………………………………………………………………………………………………………………..
…………………………………………………………………………………………………………………………………………..

Free field / PA5 screening
Comments: …………………………………………………………………………………………………………………………….
…………………………………………………………………………………………………………………………………………..
…………………………………………………………………………………………………………………………………………..

Audiometry report form including appropriate report writing
Comments: …………………………………………………………………………………………………………………………….
…………………………………………………………………………………………………………………………………………..
…………………………………………………………………………………………………………………………………………..

Interpreting and explanation of results to the client/carer
Comments: …………………………………………………………………………………………………………………………….
…………………………………………………………………………………………………………………………………………..
…………………………………………………………………………………………………………………………………………..

Handouts for clients and other resources
Comments: …………………………………………………………………………………………………………………………….
…………………………………………………………………………………………………………………………………………..
…………………………………………………………………………………………………………………………………………..
Health care record

Comments: 

Clinical notes / data collection

Comments: 

Quality or health promotion activities undertaken in the past 3 years

Comments: 

Professional development activities related to audiometry nursing in the past 3 years

Comments: 

14 FUTURE NEEDS OF THE SERVICE

List what you see as being essential for the continued quality and growth of the hearing service

Environment: 

Resources: 

Educational Needs: 

Professional Support: 
15 COMMENTS

Clinician’s comments:

In relation to your audiometry nursing practice, in what areas do you feel you excel?

......................................................................................................................................................................................................................
......................................................................................................................................................................................................................
......................................................................................................................................................................................................................

What do you (the audiometry nurse) see as the main areas of improvement required in your clinical practice?

......................................................................................................................................................................................................................
......................................................................................................................................................................................................................
......................................................................................................................................................................................................................

How could this be achieved?

......................................................................................................................................................................................................................
......................................................................................................................................................................................................................
......................................................................................................................................................................................................................

Other comments?

......................................................................................................................................................................................................................
......................................................................................................................................................................................................................
......................................................................................................................................................................................................................

Signature: ..................................................   Print name: ..................................................
Date: ..................................................   Designation: ..................................................
Reviewers Comments:

What works well?

What areas could be improved?

How could this be achieved?

Other comments:

Signature: ...........................................   Print name: ...........................................
Date: ............................................   Designation: ..........................................

Manager’s comments:

Signature: ...........................................   Print name: ...........................................
Date: ............................................   Designation: ............................................
## APPENDICES

1. NSW Health Audiometry History form (example only)
2. NSW Health Audiometry Report form (example only)
3. Occupational Hearing Screening Report form (example only)
4. ANAA Inc Clinical Competencies for Audiometry Nurses
### APPENDIX 1:

**AUDIOMETRY HISTORY**

#### Child (Birth to 15 years)

- Pregnancy: [ ] Y/N [ ] N/C/Inuilia/Other
- Newborn Hearing Screening: [ ] Y/N [ ] PASS/REFER
- Family History of Deafness: [ ] Y/N
- Intrauterine Infections: [ ] Y/N [ ] Medications:
- Cranio-Facial Anomalies: [ ] Y/N [ ] Birth weight < 1500g
- Otoscopic Medication > 7 days: [ ] Y/N [ ] Apgar < 7 at 5 mins
- Ventilation > 5 days: [ ] Y/N [ ] Syndrome
- Head Trauma: [ ] Y/N [ ] Jaundice
- Phototherapy: [ ] Y/N
- Other: [ ]
- Speech Development: [ ]
- General Health: [ ]
- Outcome (if known): [ ]

#### Adult (15 years onwards)

- Family History of Deafness: [ ] Y/N
- General Health:
- Medications:
- Hearing Protection now?: [ ] Y/N
- Previous Hearing Assessment?: [ ] Y/N [ ] Date
- Where?: [ ]
- Other: [ ]
- Outcome (if known): [ ]

### Presenting Symptoms:

<table>
<thead>
<tr>
<th>Suspected Hearing Loss</th>
<th>Y/N</th>
<th>Unilateral</th>
<th>R/L</th>
<th>Bilateral</th>
<th>How Long?</th>
</tr>
</thead>
</table>

#### Any of the Following:

- Fullness: [ ] Y/N [ ] Pain
- Excessive Headaches: [ ] Y/N [ ] Nasal Congestion
- Dizziness: [ ] Y/N [ ] Muffling
- Ear Button: [ ] Y/N [ ] Do loud noises hurt the ears?
- Any Tinnitus?: [ ] Y/N [ ] Intermittent/Continuous

#### Other:

- History given by Client/Parent/Carer (name): [ ]
- Consent given by Client/Parent/Carer (name): [ ]
- For this assessment and results being provided to: [ ]
- Signature: [ ]
- History recorded by (print): [ ]

---

**Notes:**
- [ ] Audiology Nurse
- [ ] Student Audiology Nurse

---

**ANAA Inc Audiology Nursing Clinical Practice Standards. (Reviewed May 2015)**
APPENDIX 2:

AUDIOMETRY REPORT

FAMILY NAME
GIVEN NAME
MRN

D.O.B. ______/______/______  M.O.

ADDRESS

LOCATION

COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE

PreSchool: 

Referral Source: GP: SPECIALIST:

Assessment Date / / Time:

Is the person of Aboriginal or Torres Strait Islander origin?

☐ No
☐ Yes, Aboriginal
☐ Yes, Torres Strait Islander
☐ Yes, both Aboriginal and Torres Strait Islander

Presenting Problems (Reason for Referral):

AUDIOTRAGRAM

FREQUENCY IN HERTZ

-10
-20
0
10
20
30
40
50
60
70
80
90
100
200
300
400
500
600
700
800
900
1000
1100

HEARING LEVEL IN DBS AS DEC 9860-2002

20
40
60
80
100
120
140
160
180
200

TYMPANOGRAM

PRESSURE IN mm H2O

5.0
4.0
3.0
2.0
1.0
0.5

IPS/CONTRA
AUSTIC REFLX THRESHOLD

Stimulus 1kHz 2kHz 4kHz 8kHz Probe R Probe L

FREE FIELD

RIGHT EAR

LEFT EAR

MEP dBPe dBPe dBPe dBPe

PV dB dB dB dB

COM dB dB dB dB

COM dB dB dB dB

ACOUSTIC REFLEX THRESHOLD

Syndrome

Hearing Assessment Results:

Otoscopy (Right) ☐ Normal / Other
Otoscopy (Left) ☐ Normal / Other

Tympanometry:

Audiogram: (Freefield Only) ☐ Age appropriate responses cannot rule out unilateral loss

Action: ☐ Results and Explanations to: ☐ Copy to:

☐ No further Action at this time / Review on request

☐ Refer to:

Consent given by Client/Parent/Carer (Name) ___________________________ (Signature)________________________

to this assessment and actions as above at date _____ / ____ / ____ Assessment conducted by (print) ________________________

Signature ___________________________ ☐ Audiometry Nurse ☐ Student Audiometry Nurse

Original - Medical Record Copy - Parent/carer Copy - LMO/ENT specialist/school/other referring agent

NSW Health AUDIOMETRY REPORT FORM - 100314.pdf

12/03/2014 11:58:21 AM

ANAA Inc Audiometry Nursing Clinical Practice Standards. (Reviewed May 2015)
APPENDIX 3:

HEARING CONSERVATION AUDIOMETRY REPORT FORM

AUSTRALIAN / NEW ZEALAND STANDARD 1269:4:2005

Name: ___________________________ M/F ___________ Unit No: ___________ Site: ___________

Address: ___________________________ Post Code: ___________________________

Date of Birth: ___________________________ Age: ___________ Years of current employment: ___________

Referral/Source/Employer: ___________________________ Time of Test: ___________________________

Reference/Monitoring Audiometry: ___________________________

Hearing Protectors Worn: □ Nil □ Plugs □ Earmuffs □ Either □ Both

Use of Hearing Protection: □ Often □ Seldom □ Never □ Not applicable

Noise Exposure History: ___________________________

Noise Exposure over past 16 hours: ___________________________

Audiometer: ___________________________

Date of last Calibration: ___________________________

Audiogram: ___________________________

3000Hz 4000Hz 6000Hz A to F + 6

Right 1 2 A B C D E F [ ] [ ] [ ] [ ] dB

Average A + B = 2 C + D = 2 E + F = 2

Left 1 2 A B C D E F [ ] [ ] [ ] [ ] dB

Average A + B = 2 C + D = 2 E + F = 2

AIR CONDUCTION Unmasked: right O left X

Audiometric Interpretation: ___________________________

Otoscopy (Right) □ Normal / Other

Otoscopy (Left) □ Normal / Other

Past history of ear problems: Yes/No ___________________________

Family History of Deafness: Yes / No Tinnitus: Yes / No Intermittent / Continuous How Long? ___________________________

Audiogram: ___________________________

Threshold shift since last screening on ___________________________

If yes, which frequency/s ___________________________

Right and/or Left ear/s ___________________________

Referral: Yes / No To Whom: ___________________________

□ Results explained and copy given to Client □ Hearing conservation education given to Client

Action Plan: ___________________________

Client Agrees / Disagrees to the release of audiometric results to ___________________________

Client Signature ___________________________ Date: ___________________________

Tester: ___________________________ Signature: ___________________________ Designation: ___________________________

ORIGINAL
Appendix 4:

CLINICAL COMPETENCIES
for

AUDIOMETRY NURSES

Name: .................................................................

Site: .................................................................

Date: .................................................................

These competencies may be assessed in conjunction with the ANAA Inc
Clinical Practice Review *(ANAA Inc Clinical Practice Standards 2015)*
CLINICAL COMPETENCIES for AUDIOMETRY NURSES

The professional organisation for audiometry nurses, the Audiometry Nurses Association of Australia Inc, has developed a set of seven (7) Clinical Competencies which must be achieved by students in audiometry nursing, and maintained by practicing audiometry nurses. These competencies should be used in conjunction with the ANAA Inc Clinical Practice Standards for Audiometry Nurses (2015).

The clinical competencies include the following categories:

1: practices effective communication
2: provides comprehensive hearing assessments
3: record, interpret, report and explanation of results to client / carer
4: understanding of newborn hearing screening programs
5: case management in consultation with client / others
6: maintenance of equipment and environment
7: professional and clinical issues

Competency 1: Practices effective communication

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Competent Y/N</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishes and maintains rapport with client / carer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses age / developmentally appropriate language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observation of client / family throughout assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shares all relevant information with client / carer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtains informed consent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provides appropriate explanation of procedures and results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses culturally appropriate language and approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeks peer support / supervision for complex situations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Competency 2: Provides comprehensive hearing assessments

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Competent Y/N</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducts comprehensive history taking / interview – child</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conducts comprehensive history taking / interview – adult</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Otoscopy - function and safe use / technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Otoscopy - accurate description of observations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tympanometry - function and safe use / technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tympanometry - interpretation and description of results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tympanometry - identifies and records presence / absence of acoustic reflexes and understands their relevance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure tone audiometry (air conduction) – Hughson Westlake technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure tone audiometry (air conduction) – plotting of results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure tone audiometry (bone conduction) – Hughson Westlake technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure tone audiometry (bone conduction) – plotting of results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masking (air conduction) – rules of masking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masking (air conduction) – technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masking (air conduction) – plotting of results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masking (bone conduction) – rules of masking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masking (bone conduction) – technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masking (bone conduction) – plotting of results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free field screening – VRA / PA5 technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free field screening – VRA / PA5 plotting of results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hearing screening using PA5 with earphone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manages challenging behaviours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses developmentally appropriate testing / screening techniques</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates Audiometric Weber – use and limitations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates knowledge of occupational screening standards and procedures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Competency 3: Record, interpret, report and explanation of results to client / carer

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Competent Y/N</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of appropriate clinical forms for hearing clinic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accurate plotting and recording of results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of appropriate symbols</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accurate interpretation of all findings including masking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Written report using appropriate terminology which reflects results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate explanation of results to client / carer - culturally acceptable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Competency 4: Understanding of newborn hearing screening programs

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Competent Y/N</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explains the difference between AABR and OAE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observes newborn hearing screening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates knowledge of risk factors associated with progressive sensorineural hearing loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates knowledge of follow up process for infants and children with risk factors for progressive hearing loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Competency 5: Case management in consultation with client / others

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Competent Y/N</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recalls client for review if appropriate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refer client to other agencies / disciplines / organisations as appropriate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provides client / carer with appropriate hearing health resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advocates on behalf of client</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses other strategies to optimise client outcomes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Competency 6: Maintenance of equipment and environment

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Competent Y/N</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment check prior to commencing clinic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual calibration requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use and limitations of all equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge and understanding of relevant standards for audiometric testing environment and equipment calibration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Troubleshooting / problem solving</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Competency 7: Professional and clinical issues

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Competent Y/N</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adherence to local and State workplace health and safety policies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adherence to relevant infection control policies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethical and legal considerations in all aspects of client care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adherence to all relevant local policies and procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practices in accordance with recommended professional and national nursing standards including audiometry nursing clinical practice standards and competencies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Clinician’s name: ............................................. Designation: ......................
Signature: ......................................................
Date: ..........................................................

Assessor’s name: .............................................Designation: ......................
Signature: ......................................................
Date: ..........................................................

*Further information relating to these clinical competencies should be directed to the executive committee of the Audiometry Nurses Association of Australia Inc*
This page has been intentionally left blank
Acknowledgements and appreciation is extended to all the Audiometry Nurses who offered their valuable time and expertise in their specialty for input into developing and reviewing these practice standards.


2 Medical Services Advisory Committee (MSAC) 2007, Universal neonatal hearing screening assessment report, Reference 17, Commonwealth of Australia.


5 Australian Government Department Health and Ageing, 2010, Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations

6 Audiology Australia, 2012. Chronic Otitis Media and Hearing Loss Practice


8 ANAA Inc www.anaa.asn.au

9 Australian Health Practitioners Registration Agency www.ahpra.gov.au

10 ANAA Inc www.anaa.asn.au

11 NSW Health Audiology History form (see appendix)

12 Local, State and Territory Infection control guidelines accessed as per local service policies


14 Black B. (ud) An introduction to ear disease, Smith Kline Beecham (Aust) Pty Ltd

15 Northern J.L. and Downs M.P 2014, Hearing in Children, 6th edition, Lippincott Williams & Wilkins, Philadelphia

16 Saunders, Michael. MD. FRCS. www.entbristol.co.uk (Acknowledgement and appreciation for use of otoscopy tutorial)


23 Australian Standards ISO 8253.2-2009 Acoustics – Audiometric test methods


