PROCEDURE

Tympanometry

Scope (Staff):	Community health
Scope (Area):	CACH, WACHS

Child Safe Organisation Statement of Commitment

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

This document should be read in conjunction with this disclaimer

Aim

To measure middle ear function by assessing the ear canal volume, middle ear pressure and compliance/admittance of the middle ear.

Risk

Non-compliance with the procedure may result in;

- delay or failure to identify and treat ear conditions, with possible hearing loss, developmental issues, and long-term impacts[1].
- compromising client safety if contraindications to tympanometry are not identified.

Background

Tympanometry is part of comprehensive ear health and hearing screening for children. Screening includes otoscopy (video otoscopy as relevant) and/or audiometry. The ear health and hearing screening schedule for Western Australian children can be viewed in the *Hearing and Ear Health* guideline.

Tympanometry can be used to describe normal or abnormal middle ear function in response to sound and air pressure[1, 2]. Tympanometry is used in conjunction with otoscopy to identify deviations from normal, such as the presence of middle ear fluid, tympanic membrane (TM) perforation and Eustachian tube dysfunction, which all may impact on hearing[1-3]. Otoscopy may not always be possible, particularly for infants. It may be difficult to attain a clear view of the tympanic membrane[4].

Tympanometry provides information about:

- Middle ear pressure refers to the pressure of the air contained within the middle ear. It is determined by the position of the 'peak' of the tympanometric trace along the pressure axis. Normal middle ear pressure values for children aged 6 months and above are *+50 daPa to -200 daPa*[1].
- Compliance/admittance refers to the mobility of the middle ear system. It is determined by the height of the 'peak'. Normal compliance/admittance values for children 6 months and above range from *0.3 to 1.5 ml*. [1]
- Ear canal volume (ECV) is the volume between the probe tip and the tympanic membrane if the tympanic membrane is intact, or the volume of the ear canal and the middle ear space if the tympanic membrane is perforated[5]. ECV varies with age, and the typically normal range for children (over 6 months) is 0.2 to 1.5cc[6, 7]. However, if the peak admittance and pressure are within normal range, ECV is unlikely to be relevant.

Infant ear anatomy differs in many ways to an adult ear. For example, the infant ear has a bony region that is not yet completely formed, resulting in a highly compliant ear canal. Therefore, a higher frequency 1000 Hz probe tone is used for infants under 6 months of age, enabling greater sensitivity to identify middle ear effusion in infants[4, 8-10].

- There is no normal range for compliance/admittance or middle ear pressure peak types for 1000Hz tympanometry[4].
- The normal range of ECV for infants under 6 months of age (corrected) is *0.2 to 0.8 ml*. This range is not considered reliable for the interpretation of tympanographs[4], however it can identify a possible blockage (i.e. very small volume recorded <0.2ml). This should be verified by otoscopy or checking the probe[11].

Key points

- See *Hearing and ear health* guideline for screening schedules for WA children.
- Tympanometry is only to be performed by staff who have completed training approved by CAHS-CH or WACHS.
- Nurses should refer to the Child health and School health Hearing and ear health assessment, review, and referral guides at the end of this document. The guidance incorporates consideration of clinical judgment as well as tympanometry, audiometry, and otoscopy results (if performed).
- Clinical judgement is important to determine actions required for each child, including the following considerations:
    - parent/caregiver responses to screening questions
    - nurse observations
    - child's risk factors and social circumstances
    - otoscopy, audiometry and/or tympanometry results
    - teacher observations, as relevant.

- Consider ear health history and perform otoscopy prior to tympanometry. If any of the following are identified, tympanometry is not to be undertaken:
    - ear pain
    - tympanic membrane is inflamed or bulging
    - tympanic membrane perforation can be seen
    - moist or discharging perforation
    - evidence of discharge or foreign objects in the auditory canal
    - within two months of ear surgery, unless approved by an ENT Specialist
    - client has a programmable Ventriculo-Peritoneal (PVP) shunt[12].
- If the tympanic membrane cannot be seen clearly, tympanometry may assist in identifying a perforation. It may also identify blocked grommets.
- When a child is not willing to have the procedure and staff or parent have concerns, discuss referral options with parent/caregiver.
- If there is evidence that the child is under the care of a relevant health professional, clinical judgement about the need for assessment is required.
- Key health education messages for families, children and school staff are to be provided as appropriate for the audience. See the *Hearing and ear health* guideline for key messages.
- Nurses are to deliver culturally safe services by providing a welcoming environment that recognises the cultural beliefs and practices of all clients.
- All nurses will refer to the Nursing and Midwifery Board AHPRA Decision-making framework in relation to scope of practice and delegation of care to ensure that decision-making is consistent, safe, person-centred and evidence-based.
- Community health staff must follow the organisation's overarching Infection Control Policies and perform hand hygiene in accordance with WA Health Guidelines at all appropriate stages of the procedure.
- Dirty or blocked typmpanometer probes are to be replaced. They are not to be washed, air dried or unblocked manually. The coloured ear tips are single-use only.

Equipment

- Tympanometer with spare batteries:
    - 1000 Hz probe tone for **infants under 6 months**. (Can be used for older children.)
    - 226 Hz probe tone for children 6 months and over.

  Note. Consider using both probes **for infants aged from 6 – 9 months**. If results are discrepant, disregard 226Hz result and only use the 1000Hz results.
- Disposable ear tips of various sizes
- Tympanometry printer (fully charged) and spare paper rolls (as applicable).

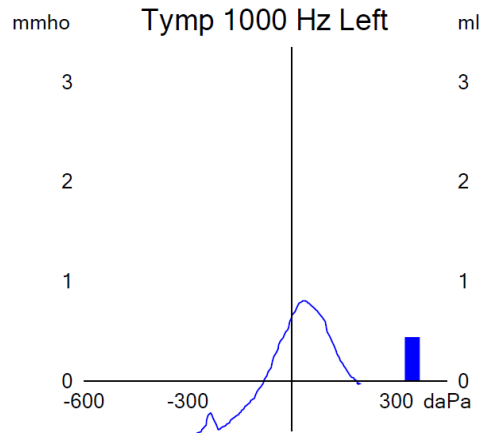
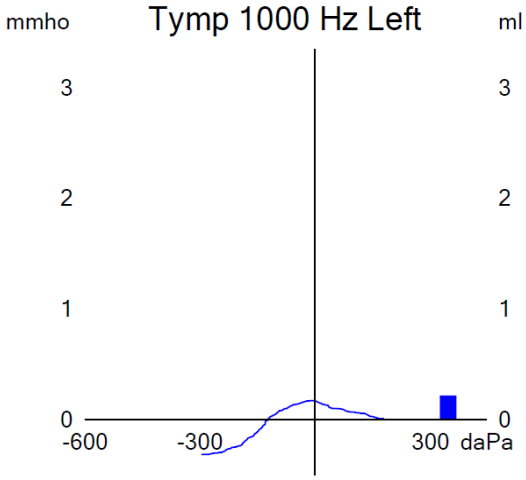
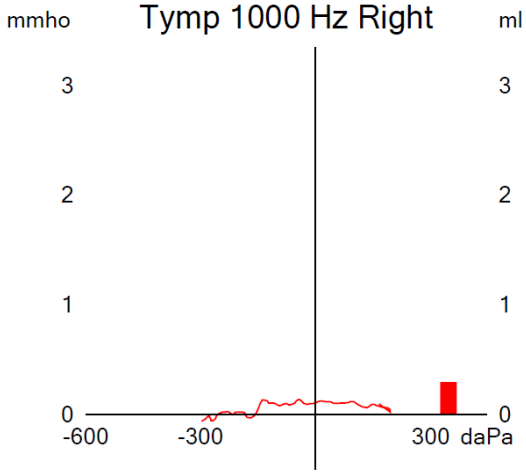
Process

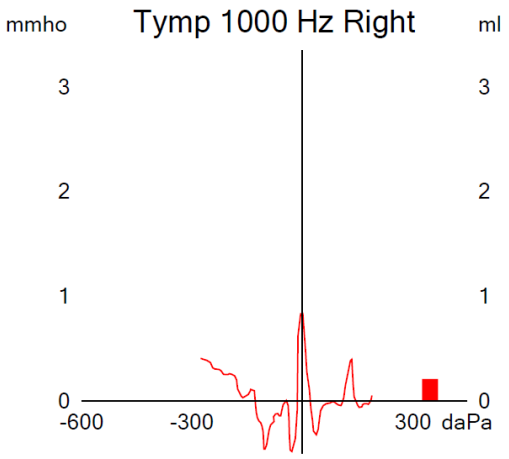
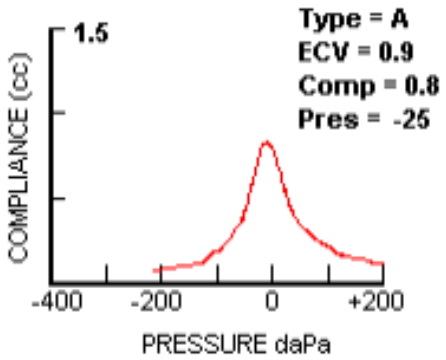
Steps	Additional Information
1. Preparation for screening session • Check the operation of the tympanometers, probe tips and printer before use. • Secure a suitable room with privacy and minimal distractions. • Check health records to obtain relevant health history, if available. • In school settings, ask teacher about any concerns for individual children.	• Refer to the manufacturer's instructions for operation instructions and annual calibration requirements. • If the tympanometer readings fall outside the specified range (see Appendix A), the device must be sent for recalibration before its next use. • CAHS staff refer to the Medical equipment repair, maintenance and calibration workflow for CAHS Community Health for advice on calibration of tympanometers. • In case of a PVP shunt, do not proceed. Refer child to an audiologist, if required.

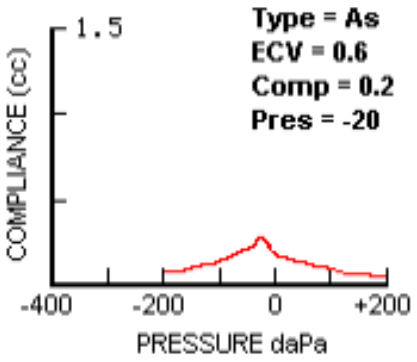
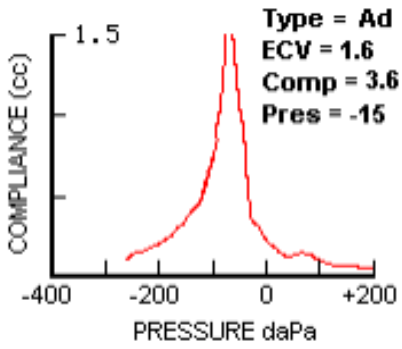
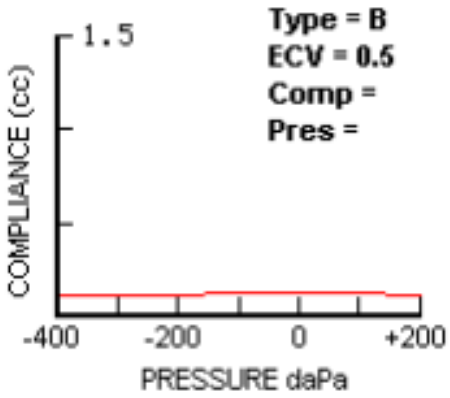
2. Engagement and consent
• Review past and current ear health:
  ○ Check available records
  ○ In child health settings ask parent/caregiver about health history
  ○ In School Entry Health Assessments (SEHA) review parent/caregiver responses in CHS409-1 or CHS409-5.
• In other school-aged contacts review parent/caregiver responses in CHS719.
• Explain the procedure to the child and parent/caregiver if present. Allow time for discussion of concerns.
• Ensure written or verbal parent/caregiver consent is obtained prior to tympanometry.
	• See the *Hearing and ear health* guideline for ear health history guide.
	• When parent/caregivers are present, encourage involvement with the procedure, where possible.

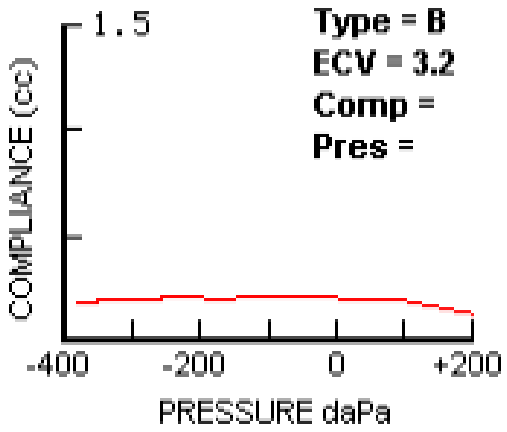
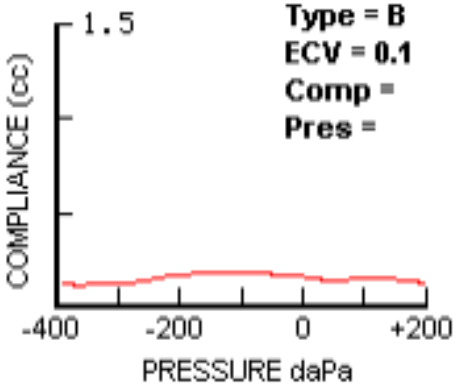
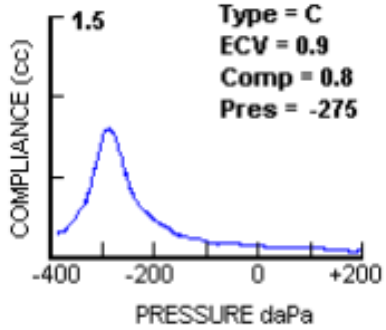
Steps	Additional Information
3. Prior to tympanometry • Otoscopy should be conducted before tympanometry. If any contraindications to tympanometry are present (as listed in key points), do not proceed. • Ask the parent/caregiver to hold the child's head securely against their chest and use their other arm to secure the child's arms and body to stop any sudden movement. • Older children may stand or sit. • To prepare the child for the examination, show the child the tympanometer. • Explain to the child and the parent/caregiver that when the tympanometer probe is inserted into the ear, they will hear a humming sound.	• In some circumstances, especially with younger infants, it may not be possible to see the ear drum with otoscopy. However, it is important to rule out the presence of foreign bodies or discharge from ear before conducting tympanometry. • Tympanometry can proceed when wax or grommets are present, or if the ear canal is narrow or bending. • If otoscopy shows an evident TM perforation, do not perform tympanometry as it will not add any extra information • Ask the child to stay quiet and still during this test. They should not be speaking, sucking or swallowing, as this interferes with the tympanogram recording.
4. Tympanometry procedure • Select an ear tip slightly larger than the external auditory canal[12]. • For infants (0-12 mths), gently pull the pinna down and back with one hand. Use the other hand to insert the probe into the external auditory canal. • For children (over 12mths), gently pull the pinna up and back with one hand. Use the other hand to insert the probe into the external auditory canal. • Create an air-tight seal by gently rotating wrist towards the child's eye, (so screen is on top and visible). • Watch the screen to confirm that a seal has been achieved, and then hold the tympanometer still.	• To obtain a clear view of the screen the examiner needs to be above the level of the tympanometer. • Stabilise hands by keeping one hand on the child's pinna and the other holding the tympanometer. • Discontinue the procedure immediately if there is any evidence of pain. • Use CHS409-2 to record results for SEHA contacts and CHS423 for other contacts prior to entering in electronic records. • Use of printers is determined according to CAHS-CH or local WACHS processes. • Attach paper tympanogram trace to client's paper record and attach a

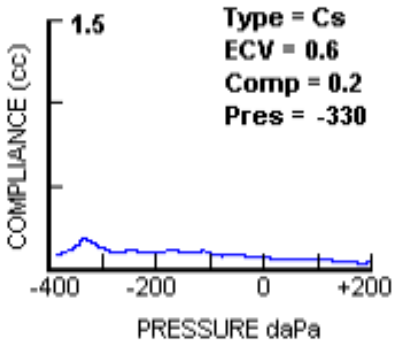
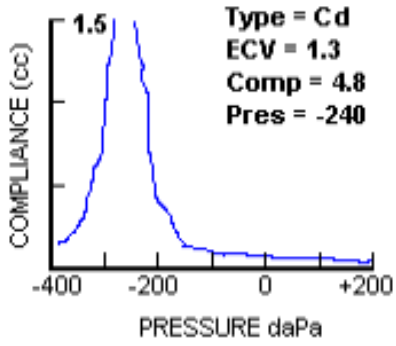
Steps	Additional Information
• If a result is unclear or unexpected, repeat test up to three times. • When the test has been completed, remove ear probe by gently rotating the wrist to break the seal. • Record the measurements (as displayed on the screen) for pressure, compliance/admittance and ear canal volume in case of printer issues. • Repeat procedure with the other ear.	scanned copy to the electronic health record.
5a. Interpreting results: <u>Infants under 6 months</u> (corrected age)[4, 11] There is no normal range for ECV, admittance or middle ear pressure peak types for 1000 Hz tympanograms in this age group. Instead, 1000Hz tympanograms are classified as normal or abnormal based on the presence of a positive peak. A positive peak (at a positive or negative middle-ear pressure) is regarded as normal, whereas a flat or "trough-shaped" (negative) peak is abnormal and suggests middle ear effusion[13]. Results are classified as **Positive peak** - normal or **No peak or negative peak** – abnormal. Examples: **Positive peak** - **normal**	• A very small ECV of less than 0.2ml may indicate a possible blockage, although this should be verified by otoscopy or checking the probe. • Where interpretation of tympanometry readings are equivocal for infants under 6 months, consult PCH or regional audiologist for clarification. ○ For CACH Community nurses - PCH Audiology email: pch.audiology.admin@health.wa.gov.au. • Generic images depicting tympanometry results are included in this document. It should be noted that images may vary depending on the type of tympanometer used. Further, there may be differences in appearance if the image is printed.

Steps	Additional Information
 **Positive peak - normal**  **Negative peak – abnormal**  **Artefact**	• An absent or negative peak is considered an abnormal result. • Interference due to movement, talking, swallowing or sucking causes artefact in the trace and it cannot be interpreted.

Steps	Additional Information
	
5b. Interpreting results: <u>Children 6 months and above</u>[1, 14] The typical ECV range for children is 0.2 to 1.5cc. There is no need to consider ECV measurement when considering Type A and Type C tympanograms[6, 7] Results are classified as follows: **Type A** – Normal middle ear pressure peaks (+50 to -200 daPa), and normal compliance/admittance (0.3 to 1.5 cc). 	For uncertain interpretation of results for children aged 6 months and over, contact CDS or regional audiologist. ○ For CACH Community nurses - CDS Audiology email: CACH_CDSAudiology@health.wa.gov.au **Type A results** Type A tympanograms represent **normal** middle ear pressure and compliance / admittance function. • **Type A** tympanogram result represents a properly functioning Eustachian tube and normal middle ear function. • **Type As** (shallow) tympanogram result with normal ear pressure but reduced compliance/admittance may indicate a stiff middle ear system caused by ossicular fixation with normal middle ear function.

Steps	Additional Information
  **Type B** – No compliance/admittance (no air pressure peaks), described as 'flat' tympanograms. 	• **Type Ad** (deep) tympanogram result with normal ear pressure but increased compliance/admittance indicates a flaccid or hyper-mobile middle ear system. This may suggest an ossicular subluxation or a healed tympanic membrane perforation. **Type B results** Type B tympanograms represent a **deviation** in ear canal volume, middle ear pressure and/or compliance/admittance function.The ear canal volume is relevant when considering Type B tympanograms. Otoscopy results will guide interpretation. • **Type** B result **with normal ECV** usually indicates middle ear effusion. It may also indicate thickened tympanic membrane. • **Type B result with high ECV** indicates a tympanic membrane perforation, or a patent grommet or T-tube.

Steps	Additional Information
	• **Type B result with low ECV** may indicate the probe is blocked by wax or a foreign body or is incorrectly placed against the side of the ear canal.
 **Type C** – Abnormally low middle ear pressure indicating Eustachian tube dysfunction. Examples:	**Type C results** Type C tympanograms represent a **deviation** in ear canal volume, middle ear pressure and/or compliance/admittance function. • **Type C** result with **normal compliance/admittance** but low middle ear pressure indicates a Eustachian tube dysfunction without middle ear effusion.
	• **Type Cs (shallow)** result with reduced compliance/admittance and low middle ear pressure indicates Eustachian tube dysfunction with fluid and air in the middle ear.
	• **Type Cd (deep)** result with increased compliance/admittance and low middle

Steps	Additional Information
 	ear pressure indicates ossicular subluxation or healed tympanic membrane perforation with Eustachian tube dysfunction.

6. Communicate results with parents
• If parent/caregiver present, discuss tympanometry findings including any concerns.
• If parent/caregiver not present:
  ○ Contact to discuss if there are any concerns. Ask about recent illnesses.
  ○ Provide results in writing using CHS409-6A *Results for parents* for SEHA contacts and CHS142 or CHS423A for other contacts.
	• Discuss relevant health education messages with parents/caregiver and with the child.
	• If unable to contact parent/caregiver by phone, follow CAHS-CH and WACHS processes to provide effective communication with family.
	• If hearing concerns are identified, gain permission from parent to discuss results and support strategies with teacher[15].

7. Review and referral • Make a clinical judgement about the need for referral based on screening assessments, observations and other relevant information.	• For results suggesting otitis media and related issues, refer to a medical practitioner. • For results suggesting sensory neural hearing loss or ongoing chronic middle

Steps	Additional Information
• Consider a review in 4-6 weeks in cases of recent upper respiratory tract infection. • Provide referral as indicated to medical practitioner, Ear, Nose and Throat (ENT) clinic, audiologist, speech pathologist or other health practitioner. • Include otoscopy and tympanometry results in referral. Include audiometry results, if conducted. • Discuss and seek consent for referral from parent/caregiver. • For children at risk, follow up with patient/caregiver to determine if support is needed to action the referral.	ear pathology concerns, refer to audiology. • If a caregiver's primary concern is hearing, a referral to audiology is required regardless of the tympanometry result. • If audiometry assessment is normal, referral to audiology is not required. Advise parent to contact service if there are hearing concerns in the future. • Adherence to CAHS-CH and WACHS clinical handover processes is required when handing over a client, or for referral within or outside of the health service. • CAHS CH: The Aboriginal ENT Clinic provides a free specialist ENT service. Include clinic's email in referral: cach.earhealthreferralaht@health.wa.gov.au See clinic information for referral requirements.

Documentation

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

Compliance monitoring

Failure to comply with this policy document may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the *Integrity Policy Framework* *issued pursuant to section 26 the Health Services Act 2016 (WA) and is binding on all CAHS and WACHS staff as per section 27 of the same Act.*

Compliance monitoring methods will include:

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

References

1. Coates H, Kong K, Mackendrick A, Bumbak P, Perry C, Friedland P, et al. Aboriginal, Torres Strait Islander and Pacific Islander Ear Health Manual. Perth: Garnett Passe and Rodney Williams Foundation; 2020.
2. Leach AJ, Morris PS, Coates HLC, Nelson S, O'Leary SJ, Richmond PC, et al. Otitis media guidelines for Australian Aboriginal and Torres Strait Islander children: summary of recommendations. Medical Journal of Australia,. 2021;214(5):228-33,.
3. Rosenfeld R, JJ. S, Schwartz S, Coggins R, Gagnon L, Hackell J, et al. Clinical Practice Guideline: Otitis Media with Effusion. Otolaryngology Head and Neck Surgery. 2016;Vol. 154 (IS) D1-S41.
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5. Interacoustics. Introduction to Tympanometry. 2022.
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9. Petrak M. Tympanometry Beyond 226 Hz - What's Different in Babies? Audiology Online. 2002;Nov 18, 2002.
10. Carmo MP, Costa NT, Momensohn-Santos TM. Tympanometry in infants: a study of the sensitivity and specificity of 226-Hz and 1,000-Hz probe tones. International archives of otorhinolaryngology. 2013;17(4):395-402.
11. Marchant CD, McMillan PM, Shurin PA, Johnson CE, Turczyk VA, Feinstein JC, Murdell Panek D. Objective diagnosis of otitis media in early infancy by tympanometry and ipsilateral acoustic reflex thresholds. The Journal of Pediatrics. 1986;109(October 1986):590-5.
12. British Society of Audiology. Interim Safety Advice to Audiologists on Performing Hearing Tests and Fitting Hearing Aids to Patients with a Programmable Ventriculo-peritoneal Shunt (PVP Shunt): British Society of Audiology; 2019 [Available from: https://www.thebsa.org.uk/interim-safety-advice-to-audiologists-on-performing-hearing-tests-and-fitting-hearing-aids-to-patients-with-a-programmable-ventriculo-peritoneal-shunt-pvp-shunt/.
13. Margolis RH, Bass-Ringdahl S, Hanks WD, Holte L, Zapala DA. Tympanometry in newborn infants--1 kHz norms. Journal of the American Academy of Audiology. 2003;14(September):383-92.
14. Paediatric ENT Services. TympanometryND. Available from: http://www.paediatricentservices.com.au/wp-content/uploads/Tympanometry.pdf.
15. National Institute for Health and Care Excellence. Otitis media with effusion in under 12s. NICE guideline: NICE; 2023.

Related internal policies, procedures and guidelines

The following documents can be accessed in the CACH Clinical Nursing Manual: HealthPoint link or Internet link or for WACHS staff in the WACHS Policy Manual
Hearing and Ear Health
Audiometry
Otoscopy
Factors impacting child health and development

Physical assessment 0-4 years
Universal Contact - School Entry Health Assessment
Universal Contacts – 8 week, 4 months, 12 months, 2 years
The following documents can be accessed in the CACH Operational Policy Manual
Client identification
Consent for services
The following documents can be accessed in the CAHS Infection Control Manual
Hand Hygiene
The following documents can be accessed in the WACHS Policy Manual
Ear tissue spearing, irrigation and ear drop installation procedure
Engagement procedure
Enhanced Child Health Schedule
Related internal CACH resources and forms
Ear health school screening – Consent CHS 719
Ear health assessment CHS 423
Ear health assessment results for parents CHS 423A
Clinical Handover/Referral CHS 663
Hearing and ear health assessment, review, and referral guide – Child health
Hearing and ear health assessment, review, and referral guide – School health
Hearing tests and how to help CDS handout
Referral to Community Health Nurse CHS142
School Entry Health Assessment Parent Questionnaire CHS 409-1
School Entry Health Assessment Results for staff CHS409-2
School Entry Health Consultation for Education Support Students CHS 409-5
School Entry Health Assessment Results for parents CHS 409-6A

Related external resources
Blow-Breathe-Cough Program. Hearing Australia resources for teachers and early childhood educators to promote ear health.
Care for Kid's Ears. Information and resources for parents, early childhood educators, teachers and health professionals. Includes material in several different language groups.
Coates H, Kong K, Mackendrick A, Bumbak P, Perry C, Friedland P, Morrisw P & Chunghyeon. Aboriginal, Torres Strait Islander and Pacific Islander Ear Health Manual. Perth: Garnett Passe and Rodney Williams Foundation, 2020
PLUM and HATS speech resource – Pictures and questions to assist with talking to parents about hearing, speech and language, National Acoustic Laboratories.
Related CACH e-Learning
Aboriginal Cultural eLearning (ACeL) - Aboriginal Health and Wellbeing
CACH Ear Health Module 1: Ear Health Assessment and Hearing Screening
CACH Ear Health Module 2: Otoscopy
CACH Ear Health Module 3: Child Health Tympanometry
CACH Ear Health Module 4: School Health Tympanometry
Related WACHS resources
Child Ear Health Services: Codesign Framework
Ear Health Module 1 – Overview (EHOV EL1) WACHS My Learning
Ear Health Module 2 – Otoscopy (EHOT EL1) WACHS My Learning
Ear Health Module 3 – Tympanometry (EHTT EL1) WACHS My Learning
Ear Health Module 4 – Play Audiometry (EHPA EL1) WACHS My Learning
Ear Health Module 5 – Referrals (EHRE EL1) WACHS My Learning

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

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Reviewer / Team:	Clinical Nursing Policy Team		
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Standards Applicable:	NSQHS Standards:  Child Safe Standards: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10		

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Healthy kids, healthy communities

Compassion | Excellence | Collaboration | Accountability | Equity | Respect

Neonatology | Community Health | Mental Health | Perth Children's Hospital

Government of Western Australia
Child and Adolescent Health Service
WA Country Health Service

Hearing and Ear Health Assessment, Review, and Referral Guide – Child Health

This guide supports decision-making by CACH and WACHS Community Health nurses regarding hearing and ear health assessment, review, and referral. The information in this child health focused resource relates to Universal screening, Universal Plus, and ECHS (WACHS only) assessments of children who are not developmentally able to perform audiometry.

For guidance regarding children who are able to perform audiometry, see the *Hearing and Ear Health Assessment, Review, and Referral Guide – School Health* guide.

Factors requiring consideration include tympanometry, audiometry and otoscopy results (if performed), responses to the hearing surveillance questions, parent/caregiver/teacher concerns, and the client's hearing and ear health risk factors, general observations, individual health, and social circumstances. Thorough consideration and documentation of all these factors will lead to appropriate referrals when concerns are identified. **Note that clinical judgement may override the guidance listed below.**

Nurses will conduct hearing and ear health screening in accordance with the *Hearing and ear health* guideline and *Audiometry*, *Otoscopy*, and *Tympanometry* procedures in the Clinical Nursing Manual.

Concerns regarding hearing and/or speech and language development and risk factors for hearing and ear health may be identified during Universal screening or may be the reason for a Universal Plus assessment. See *Hearing and ear health* guideline, p. 4 and 5 for signs and risk factors for poor hearing and ear health, and Table 3 for screening questions and observations. The presence or absence of concerns identified from hearing and ear health surveillance questions, general observations, or parent/caregiver feedback is indicated as 'Concerns' or 'No concerns' in the tables below.

Contents

Table Legend

Return to Universal or ECHS hearing and ear health screening
Review required, and for referral to GP if indicated
Referral required

Table 1 - WA children under 6 months: Universal, ECHS, and Universal Plus assessments					
	Surveillance questions, general observations, parental concerns	**Otoscopy**	**Audiometry**	**Tympanometry**	**Outcomes**
INITIAL	**No concerns**	Not performed	N/A	Not performed	• Continue with Universal or ECHS hearing and ear health screening pathway
	Concerns	Unable to perform	N/A	Unable to perform	• Attempt assessment again in 4-6 weeks
		Normal	N/A	Normal	• Refer to GP for referral to Audiology if concerns with hearing
		Abnormal	N/A	Normal	• Review in 4-6 weeks • Refer to GP if indicated
		Normal or Abnormal	N/A	Abnormal	• Review in 4-6 weeks • Refer to GP if indicated
	Note: If the NEWBORN HEARING SCREEN (NBHS) was not performed, or if the infant failed their first NBHS and has not attended the follow-up appointment, advise parent/caregiver to contact the WA NBHS Program Coordinator on: Ph - 6456 0037.				
REVIEW	**Concerns**	Unable to perform	N/A	Unable to perform	• Refer to GP for referral to Audiology
	Concerns resolved	Normal	N/A	Normal	• Continue with Universal or ECHS hearing and ear health screening pathway
		Abnormal	N/A	Normal	• Refer to GP
		Normal or Abnormal	N/A	Abnormal	• Refer to GP
	Concerns	Normal	N/A	Normal	• Refer to GP for referral to Audiology if concerns with hearing
		Abnormal	N/A	Normal	• Refer to GP and suggest referral to Audiology if concerns with hearing
		Normal or Abnormal	N/A	Abnormal	• Refer to GP and suggest referral to Ear, Nose and Throat (ENT) services

Table 2 - Aboriginal children and children with risk factors under 6 months: Universal, ECHS, and Universal Plus assessments

	Surveillance questions, general observations, parental concerns	Otoscopy	Audiometry	Tympanometry	Outcomes
INITIAL	**Concerns or no concerns**	Unable to perform	N/A	Unable to perform	• Attempt assessment again in 4-6 weeks
	No concerns	Normal	N/A	Normal	• Continue with Universal or ECHS hearing and ear health screening pathway
	Concerns	Normal	N/A	Normal	• Refer to GP and suggest referral to Audiology for hearing concerns
		Abnormal	N/A	Normal	• Review in 4-6 weeks • Refer to GP if indicated
		Normal or Abnormal	N/A	Abnormal	• Review in 4-6 weeks • Refer to GP if indicated
	Note: If the NEWBORN HEARING SCREEN (NBHS) was not performed, or if the infant failed their first NBHS and has not attended the follow-up appointment, advise parent/caregiver to contact the WA NBHS Program Coordinator on: Ph - 6456 0037				
REVIEW	**No concerns**	Unable to perform	N/A	Unable to perform	• Continue with Universal or ECHS hearing and ear health screening pathway
	Concerns	Unable to perform	N/A	Unable to perform	• Refer to GP and suggest referral to Audiology for hearing concerns
	Concerns resolved	Normal	N/A	Normal	• Continue with Universal or ECHS hearing and ear health screening pathway
		Abnormal	N/A	Normal	• Refer to GP
		Normal or Abnormal	N/A	Abnormal	• Refer to GP
	Concerns	Normal	N/A	Normal	• Refer to GP and suggest referral to Audiology if concerns with hearing
		Abnormal	N/A	Normal	• Refer to GP and suggest referral to Audiology if concerns with hearing
		Normal or Abnormal	N/A	Abnormal	• Refer to GP and suggest referral to ENT services

Table 3 - WA children from 6 months age until developmentally able to perform audiometry: Universal, ECHS, and Universal Plus Assessments

	Surveillance questions, general observations, parental concerns	Otoscopy	Audiometry	Tympanometry	Outcomes
INITIAL	**No concerns**	**Not performed**	N/A	**Not performed**	• Continue Universal or ECHS hearing and ear health screening pathway
	Concerns	Unable to perform	N/A	Unable to perform	• Attempt assessment again in 4-6 weeks.
		Normal or abnormal	N/A	Type A	• Refer to Audiology • Refer to GP if indicated
		Normal or abnormal	N/A	Type B normal	• Review in 4-6 weeks • Refer to GP if indicated
		Abnormal	N/A	Type B high volume	• Grommet in-situ and patent: No review required. If concerns about hearing, advise follow-up with their ENT service provider. • Perforation: No review required. Refer to GP unless perforation is documented and long-standing.
		Normal or Abnormal	N/A	Type B low volume	• Reposition tympanometer and test again as probe may be against wall of ear canal • Refer to GP for removal of wax or foreign body if present • Review 1-2 weeks post-removal of wax or foreign body
		Normal or Abnormal	N/A	Type C	• Review in 4-6 weeks • Implement Blow, Breathe, Cough program • Refer to GP if indicated
REVIEW	**Concerns**	Unable to perform	N/A	Unable to perform	• Refer to GP if indicated • For referral to Audiology if concerns with hearing
	Concerns resolved	Normal	N/A	Type A	• Return to Universal or ECHS hearing and ear health screening pathway
		Abnormal	N/A	Type A	• Refer to GP if indicated
		Normal or Abnormal	N/A	Type B normal	• Refer to GP • For referral to Audiology

Table 3 (continued) - WA children from 6 months age until developmentally able to perform audiometry: Universal, ECHS, and Universal Plus Assessments

REVIEW	**Concerns resolved**	Normal or Abnormal	N/A	Type B high	• Refer to GP
			N/A	Type B low	• Refer to GP
			N/A	Type C	• Refer to GP if indicated
	Concerns	Normal or Abnormal	N/A	Type A	• For referral to Audiology if concerns with hearing • Refer to GP if indicated
	Concerns	Normal or Abnormal	N/A	Type B normal	• Refer to GP • For referral to Audiology if concerns with hearing
			N/A	Type B high	• For referral to Audiology if concerns with hearing • Refer to GP for concerns about recent perforation • **NOTE:** No need to review or refer patent grommets
			N/A	Type B low	• Refer to GP • For referral to Audiology if concerns with hearing
			N/A	Type C	• Refer to GP • For referral to Audiology if concerns with hearing

Table 4 - Aboriginal children and children with risk factors from 6 months age until developmentally able to perform audiometry: Universal, ECHS, and Universal Plus Assessments

	Surveillance questions, general observations, parental concerns	Otoscopy	Audiometry	Tympanometry	Outcomes
INITIAL	**Concerns or no concerns**	Unable to perform	N/A	Unable to perform	• Attempt assessment again in 4-6 weeks
	No concerns	Normal	N/A	Type A	• Continue Universal or ECHS hearing and ear health screening pathway
	Concerns	Normal	N/A	Type A	• For referral to Audiology if concerns with hearing
	Concerns or no concerns	Abnormal	N/A	Type A	• Review in 4-6 weeks • Refer to GP if indicated
		Normal or Abnormal	N/A	Type B normal	• Review in 4-6 weeks • Refer to GP if indicated
		Abnormal	N/A	Type B high volume	• Grommet in-situ and patent: No review required. If concerns about hearing, advise follow-up with their ENT service provider. • Perforation: No review required. Refer to GP unless perforation is documented and long-standing.
		Normal or Abnormal	N/A	Type B low volume	• Reposition tympanometer and test again as probe may be against wall of ear canal • Refer to GP for removal of wax or foreign body if present • Review 1-2 weeks post-removal of wax or foreign body
		Normal or Abnormal	N/A	Type C	• Review in 4-6 weeks and refer to GP if indicated • Implement Blow, Breathe, Cough program
REVIEW	**No concerns**	Unable to perform	N/A	Unable to perform	• Continue with Universal or ECHS hearing and ear health screening pathway
	Concerns	Unable to perform	N/A	Unable to perform	• Refer to Audiology if concerns with hearing • Refer to GP if indicated
	Concerns resolved	Normal	N/A	Type A	• Return to Universal or ECHS hearing and ear health screening pathway
		Abnormal	N/A	Type A	• Refer to GP if indicated
		Normal or Abnormal	N/A	Type B normal	• Refer to GP and Audiology
			N/A	Type B high	• Refer to GP

Table 4 (Continued) **-** Aboriginal children and children with risk factors from 6 months age until developmentally able to perform audiometry: Universal SEHA screening, ECHS, and Universal Plus assessments

REVIEW	**Concerns resolved**	Normal or Abnormal	N/A	Type B low	• Refer to GP
			N/A	Type C	• Refer to GP if indicated
	Concerns	Normal	N/A	Type A	• Refer to Audiology if concerns with hearing
		Abnormal	N/A	Type A	• Refer to GP • Refer to Audiology if concerns with hearing
		Normal or Abnormal	N/A	Type B normal	• Refer to GP • Refer to Audiology if concerns with hearing
			N/A	Type B high	• Refer to Audiology if concerns with hearing • Refer to GP for concerns about recent perforation • **NOTE:** No need to review or refer patent grommets
			N/A	Type B low	• Refer to GP • Refer to Audiology if concerns with hearing
			N/A	Type C	• Refer to GP • Refer to Audiology if concerns with hearing

CACH Referral information

GP referral is generally required to access ENT clinics and PCH Audiology. Nurses should familiarise themselves with local hearing and ear health services, and their referral requirements.

In their referral to the GP, nurses may suggest a further referral if indicated to PCH ENT clinic, PCH Audiology, or Aboriginal ENT clinic. Include the referral email address if known.

Audiology

PCH Audiology can provide services for clients aged under 6 months.

CDS Audiology provides services to clients aged 6 months and over. See Child and Adolescent Health Service | CAHS - Referrals and eligibility

See CDIS User Guide for Recording Referrals

AHT Ear Health Services

Visit the Aboriginal Health Team page for information about the ear health services they provide. The team can be contacted to enquire about further support for Aboriginal children and families.

Speech Pathology (when indicated)

Refer to Speech Pathology for concerns about speech/language development.

For CDS Speech Pathology referrals, see Child and Adolescent Health Service | CAHS - Referrals and eligibility

See CDIS User Guide for Recording Referrals

Private service providers

Parents may prefer to access private Audiology, Speech Pathology, or ENT specialist medical services.

For private Audiology and Speech Pathology services, direct the referral to the parent's preferred service provider. See CDS resource The right services for your child for professional websites that list some private allied health service providers.

WACHS referral information

Referral options for hearing and ear health concerns differ across regional WA. WACHS staff are advised to be familiar with the services and referral options in each region and location. Consider WACHS Child Development Services, WACHS Ear Health teams, GPs, Nurse Practitioners, Aboriginal Medical Services, private services providers and non-government agencies that provide services for hearing and ear health concerns.

Government of Western Australia
Child and Adolescent Health Service
WA Country Health Service

Hearing and Ear Health Assessment, Review, and Referral Guide – School Health

This guide supports decision-making by CACH and WACHS Community Health nurses regarding hearing and ear health assessment, review, and referral. The information in this school health focused resource relates to Universal SEHA screening, Universal Plus, and ECHS (WACHS only) assessments of children who are developmentally able to perform audiometry.

For guidance regarding children who are not yet developmentally able to perform audiometry, see *Hearing and Ear Health Assessment, Review, and Referral Guide – Child Health*.

Factors requiring consideration include tympanometry, audiometry and otoscopy results (if performed), responses to the hearing surveillance questions, parent/caregiver/teacher concerns, and the client's hearing and ear health risk factors, general observations, individual health, and social circumstances. Thorough consideration and documentation of all these factors will lead to appropriate referrals when concerns are identified. **Note that clinical judgement may override the guidance listed below.**

Nurses will conduct hearing and ear health screening in accordance with the *Hearing and ear health* guideline and *Audiometry*, *Otoscopy*, and *Tympanometry* procedures in the Clinical Nursing Manual.

Concerns regarding hearing and/or speech and language development and risk factors for hearing and ear health may be identified during Universal screening or may be the reason for a Universal Plus assessment. See *Hearing and ear health* guideline, p. 4 and 5 for signs and risk factors for poor hearing and ear health, and Table 3 for screening questions and observations. The presence or absence of concerns identified from hearing and ear health surveillance questions, general observations, or parent/caregiver feedback is indicated as 'Concerns' or 'No concerns' in the tables below.

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Return to Universal or ECHS hearing and ear health screening
Review required, and for referral to GP if indicated
Referral required

Table 1 - WA children - developmentally able to perform audiometry:

	Surveillance questions, general observations, parental concerns	Otoscopy	Audiometry	Tympanometry	Outcomes
INITIAL	**Concerns or no concerns**	Unable to perform	Unable to perform	N/A	• Attempt assessment again in 4-6 weeks. • Consider having parent present at next screen
	No concerns	Normal	Normal	N/A	• Return to Universal or ECHS hearing and ear health screening pathway
	Concerns or no concerns	Unable to perform	Unable to perform	N/A	• Attempt assessment again in 4-6 weeks. • Consider having parent present at next screen
		Not normal	Normal	N/A	• Review in 4-6 weeks • Refer to GP if indicated
		Normal or Abnormal	Abnormal	N/A	• Review in 4-6 weeks • No tympanometry at this stage • Advise parent/school that child currently has hearing loss • Refer to GP if indicated
REVIEW	**Concerns**	Unable to perform	Unable to perform	Unable to perform	• Refer to Audiology • Refer to GP if indicated
	Concerns resolved	Normal	Normal	N/A	• Return to Universal or ECHS ear health screening pathway
	Concerns	Normal	Normal	N/A	• Refer to GP for ongoing concerns
	Concerns or no concerns	Normal	Abnormal	Type A	• Complete 500Hz and 2000Hz as expanded screen is required • Refer to Audiology for possible risk of sensory neural hearing loss. Include all results in referral to enable priority appointment
		Normal or Abnormal	Normal	Type Bs – all Type C	• Refer to GP
			Abnormal	Type Bs – all Type C	• Complete 500Hz and 2000Hz as expanded screen is required • Refer to GP • Refer to Audiology

Table 2 - Aboriginal children and children with risk factors - developmentally able to perform audiometry:

	Surveillance questions, general observations, parental concerns	Otoscopy	Audiometry	Tympanometry	Outcomes
INITIAL	**Concerns or no concerns**	Unable to perform	Unable to perform	Unable to perform	• Attempt assessment again in 4-6 weeks. • Consider having parent present at next screen
	No concerns	Normal	Normal	Type A	• Continue Universal or ECHS screening pathway
	Concerns	Normal	Normal	Type A	• Refer to GP for ongoing concerns
	Concerns or no concerns	Normal or Abnormal	Abnormal	Normal or abnormal	• Review in 4-6 weeks • Advise parent/school that child currently has hearing loss • Refer to GP if indicated
		Abnormal	Normal	Normal or abnormal	• Review in 4-6 weeks • Refer to GP if indicated
		Normal or Abnormal	Normal	Type B normal volume	• Review in 4-6 weeks • Refer to GP if indicated
		Abnormal	Normal or Abnormal	Type B high volume	• Grommet in-situ and patent: No review required. If concerns about hearing, advise follow-up with ENT service provider. • Perforation: No review required. Refer to GP unless perforation is documented and long-standing.
		Normal or Abnormal	Normal or Abnormal	Type B low volume	• Reposition tympanometer and test again as probe may be against wall of ear canal • Refer to GP for removal of wax or foreign body if present • Review 1-2 weeks post-removal of wax/foreign body
		Normal or Abnormal	Normal or Abnormal	Type C	• Implement Blow, Breathe, Cough program • Review in 4-6 weeks • Refer to GP if indicated
REVIEW	**No concerns**	Unable to perform	Unable to perform	Unable to perform	• Refer to GP if indicated
	Concerns	Unable to perform	Unable to perform	Unable to perform	• Refer to Audiology • Refer to GP if indicated
	No concerns	Normal	Normal	Type A	• No further action required
	Concerns	Normal	Normal	Type A	• Refer to GP for ongoing concerns
		Abnormal	Normal	Type A	• Refer to GP
	Concerns or no concerns	Normal or Abnormal	Normal	Type B's or C	• Refer to GP
			Abnormal	Type A	• Complete expanded screen 500Hz and 2000Hz as required • Priority referral to Audiology as results may suggest a sensory neural hearing loss.
			Abnormal	Type B's or Type C	• Complete 500Hz and 2000Hz as expanded screen is required • Refer to GP and Audiology

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