

D-CH04: Transient Evoked Otoacoustic Emissions (TEOAEs)

Scope and objectives of clinical task

This CTI will enable the Allied Health Assistant (AHA) to:

- safely and effectively conduct Transient Evoked Otoacoustic Emissions (TEOAEs) measurement.
- if in scope for the local service, apply hearing screening triage and decision-making tools to implement the local service model.

VERSION CONTROL

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The CTI reflects best practice and agreed process for conduct of the task at the time of approval and should not be altered. Feedback, including proposed amendments to this published document, should be directed to AHPOQ at: allied_health_advisory@health.qld.gov.au.

This CTI should be used under a delegation framework implemented at the work unit level. The framework is available at:

<https://www.health.qld.gov.au/ahwac>

Please check <https://www.health.qld.gov.au/ahwac/html/clintaskinstructions.asp> for the latest version of this CTI.

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Requisite training, knowledge, skills and experience

Training

- Completion of CTI D-WTS01 When to stop.
- Completion of CTI D-CH01 Otoscopy.
- Mandatory training requirements relevant to Queensland Health/Hospital and Health Service (HHS) clinical roles are assumed knowledge for this CTI.

Clinical knowledge

- The following content knowledge is required by an AHA delivering this task:
 - basic anatomy of the external ear, canal and eardrum.
 - the purpose and rationale for performing TEOAE including risks.
 - the process for conducting TEOAE measurement including equipment set up, client positioning and documentation requirements.
- The knowledge requirements will be met by the following activities:
 - completing the training program/s (listed above).
 - reviewing the Learning resource section.
 - receiving instruction from an allied health professional in the training phase.

Skills or experience

- The following skills or experience are not identified in the task procedure but support the safe and effective performance of the task and are required by an AHA delivering this task:
 - nil.

Safety and quality

Client

- The AHA will apply CTI D-WTS01 When to stop at all times.
- In addition, the following potential risks and precautions have been identified for this clinical task and should be monitored carefully by the AHA during the task:
 - if during the task the client indicates, or the carer is concerned the client is experiencing pain or discomfort in the area of examination, or if an ear canal has notable discharge, a foreign body present or the skin in the auditory pathway is noted to be swollen, broken or inflamed, cease the task and implement local processes for review by a medical practitioner e.g. inform the client to attend their general practitioner.
 - if during examination the client is expected to, or moves their head frequently, or becomes distressed, pause the task. The client may be unable to remain still due to physical, intellectual or other problems. Instruct the carer in the audiology hold position to minimise movement during the task - see Learning resource of CTI D-CH01: Otoscopy. Ensure the client is still prior to commencing the task and inserting the probe tip. If an adequate seal is unable to be maintained after several attempts, cease the task and inform the delegating health professional. Implement local processes for alternative testing, if part of the local service model e.g. diagnostic audiology assessment.

Equipment, aids and appliances

- The TEOAE machine parameters and settings will be determined by the local service e.g. The Healthy Hearing Audiology Diagnostic Assessment Protocol in Queensland Health services - see References and supporting documents.
- The TEOAE machine should be checked and be in working order at the start of every day. Check that the machine is charged and that a range of probe tips are available. A biological check should be performed daily using the local processes.
- Calibration testing should occur as per manufacturer's guidelines. If the machine is not in working order, outside calibration dates or fails the calibration check, cease the task. Locate alternative equipment if available. If no alternative equipment is available inform the client and carer, and re-schedule the task. Inform the delegating health professional of equipment problems and implement local processes to have the equipment fixed/replaced.
- Examination of the ear is required prior to inserting a tip. For example, discharge in the ear canal can indicate risks for the client and may also damage the machine.
- For infection control TEOAE tips are not shared between clients. A clean tip is required for each client. Follow local workplace procedures for management of used tips i.e. sterilisation or single use.

Environment

- A quiet room is required for TEOAE testing. The room does not need to be sound treated but should be located away from significant background noise e.g. roads, staff lunch rooms or high-volume waiting areas.

Performance of clinical task

1. Delegation instructions

- Receive the delegated task from the health professional.
Note: the delegation instruction for this task may be provided directly from a health professional or as part of a local work instruction or clinical protocol. For an example, refer to the Targeted Hearing Screening Protocol Flow Chart and workplace instruction document listed in the Learning resource.
- The delegating allied health professional should clearly identify parameters for delivering the clinical task to the specific client, including any variance from the usual task procedure and expected outcomes.

2. Preparation

- Collect:
 - TEOAE machine
 - probe tip
 - local recording form.

3. Introduce task and seek consent

- The AHA introduces him/herself to the client.
- The AHA checks three forms of client identification: full name, date of birth, **plus one** of the following: hospital unit record (UR) number, Medicare number, or address.
- The AHA describes the task to the client. For example:
 - “I am going to put this tip into your ears/your child’s ear. Sit nice and still. It won’t take long. This will screen the inner ear.”
- The AHA seeks informed consent according to the Queensland Health Guide to Informed Decision-making in Health Care, 2nd edition (2017). If seeing clients under the age of 18 years this includes Section 3: Informed decision-making for children and young persons for comprehensive information.

4. Positioning

- The client’s position during the task should be:
 - in a supported sitting position e.g. chair, or for a child this may be on the carer’s lap or in a stroller.
- The AHA’s position during the task should be:
 - beside the client in a comfortable position (seated or standing) that allows the machine and client’s ear to be observed.

5. Task procedure

- Explain and demonstrate (where applicable) the task to the client.
- Check the client has understood the task and provide an opportunity to ask questions.
- The task comprises the following steps:
 1. Confirm the client is suitable for the task by checking the client’s otoscopy result is a “pass”. If otoscopy has not occurred as part of the session implement CTI D-CH01 Otoscopy.
 2. Choose the correct probe tip size for the client and fit to the TEOAE - see Learning resource.
 3. Determine if the client will need the audiology hold position - see the Safety and quality section.
 4. To avoid confusion when recording information, the right ear is routinely examined first.
 5. Pull the ear out and backwards and insert the tip carefully into the client’s ear canal, observe for signs of discomfort, and if noted cease the task.
 6. Once the probe tip is inserted in the ear, follow the manufacturer’s guidelines to collect a TEOAE e.g. some machines commence collection automatically and others require a button to be pressed.
 7. When collection is complete, remove the probe and repeat steps 4-6 on the other ear.
 8. Print TEOAE results.
 9. From the printout, identify required recordings for the local criteria parameters. Determine if the result is a “pass” or “refer”. If results are unclear, liaise with the delegating health professional.
 10. If part of the local service model, the AHA implements the local care pathway management plan e.g. informs client and/or carer of the overall hearing screening result.
- During the task:
 - provide feedback and correct errors in the performance of the task including:
 - if the client begins to turn/move their head or speak during the examination, instruct the client to keep still and quiet and provide reassurance e.g. “please keep still and quiet, we are nearly finished”. If movement or vocalising does not cease, remove the probe tip. Determine the

reason the client is moving e.g. pain, discomfort, wanting to see something. Determine the need for the audiology hold position. If able to remain still and quiet resume the task. If problems continue, cease the task and inform the delegating health professional.

- monitoring of the probe seal during measuring. The TEOAE measurement will be inaccurate if a seal is lost. This may occur due to the probe being loose or falling out. If required re-insert the probe tip and continue with measurement collection.
- monitor for adverse reactions and implement appropriate mitigation strategies as outlined in the Safety and quality section above including CTI D-WTS01 When to stop.
- At the conclusion of the task:
 - encourage feedback from the client on the task.
 - provide summary feedback to the client and carer if relevant, emphasising positive aspects of performance. If part of the local service model, inform the client and/or carer of implications of observations. For example:
 - “Pass” – “Your child has passed the hearing screen today. Hearing can change over your lifetime. If concerns arise in the future this should be discussed with your general practitioner.”
 - “Refer” – “Your child has not passed the hearing screen today. There are many possible reasons for this result. You will need to come back for a review appointment (or you will need to see your general practitioner for ongoing management).”
 - ensure the client is comfortable and safe.

6. Document

- Document the outcomes of the task in the clinical record, consistent with relevant documentation standards and local procedures. Include observation of client performance, expected outcomes that were and were not achieved, and difficulties encountered or symptoms reported by the client during the task.
- For this task the following specific information should be presented:
 - recording obtained for each ear tested.
 - if relevant for the local model, the outcome of implementing the local care pathway management plan.
- For protocol driven delegation, the local process may require co-signing and confirmation of the appropriate management pathway by an audiologist before the report can be finalised.

7. Report to the delegating health professional

- Provide comprehensive feedback to the health professional who delegated the task.

References and supporting documents

- Children's Health Queensland Hospital and Health Service. Child and Youth Community Health Service. Work Instruction. Hearing Clinic – Secondary Hearing Screening V1.3 (Draft).
- Children's Health Queensland Hospital and Health Service (2014). Child and Youth Health Practice Manual, Statewide Child and Youth Clinical Network – Child Health Sub-Network.p85-89.
- Children's Health Queensland Hospital and Health Service (2017). Deadly Ears. The Ear and Hearing – Training Manual (Draft).
- Prieve B (2008). Otoacoustic Emissions in Infants and Children. In Madell JR & Flexer C. (Eds). Paediatric Audiology: Diagnosis, technology and management. (p123-131). Thieme: New York.
- Queensland Health (2015). Clinical Task Instruction D-WTS01 When to stop.
<https://www.health.qld.gov.au/ahwac/html/clintaskinstructions.asp>
- Queensland Health (2017). Guide to Informed Decision-making in Health Care (2nd edition).
https://www.health.qld.gov.au/_data/assets/pdf_file/0019/143074/ic-guide.pdf.
- Queensland Health (2016). Healthy Hearing Program. Universal Newborn Hearing Screening. 2016 Audiology Diagnostic Assessment Protocol. Version 2.2. Transient Evoked Otoacoustic Emission (TEOAE) Test Protocol. Available at: <https://www.childrens.health.qld.gov.au/wp-content/uploads/PDF/healthy-hearing/hh-audiology-protocol.pdf>

Assessment: performance criteria checklist

D-CH04: Transient Evoked Otoacoustic Emissions (TEOAEs)

Name:

Position:

Work Unit:

Performance Criteria		Knowledge acquired	Supervised task practice	Competency assessment
		Date and initials of supervising AHP	Date and initials of supervising AHP	Date and initials of supervising AHP
Demonstrates knowledge of fundamental concepts required to undertake the task.				
Obtains all required information from the delegating health professional, and seeks clarification if required, prior to accepting and proceeding with the delegated task.				
Completes preparation for the task including obtaining relevant form and materials and ensuring client and environment are prepared for the task i.e. client has glasses or hearing aids, environmental modifications complete.				
Introduces self to the client and checks client identification.				
Describes the purpose of the delegated task and seeks informed consent.				
Positions self and client appropriately to complete the task and ensure safety.				
<p>Delivers the task effectively and safely as per delegated instructions and CTI procedure.</p> <p>a) Clearly explains the task, checking the client's understanding.</p> <p>b) Confirms the otoscopy result is a "pass". If otoscopy has not occurred, implements CTI D-CH01 Otoscopy.</p> <p>c) Chooses the correct probe tip size for the client and fits to the TEOAE.</p> <p>d) Determines if the client will need the audiology hold position. If required, trains the carer in the audiology hold position.</p> <p>e) Assesses the right ear first unless clinically indicated.</p> <p>f) Pulls the ear out and backwards and inserts tip carefully into the client's ear canal observing for signs of discomfort, if noted ceases the task.</p> <p>g) Once the probe tip is inserted in the ear follows the manufactures guidelines to collect TEOAEs.</p> <p>h) When collection is complete, removes the probe and repeats steps f-g on the other ear.</p> <p>i) Prints TEOAE results.</p> <p>j) Correctly determine if results are a pass or refer as per the local criteria.</p>				

k)	Informs the client and carer of the result.				
l)	If part of the service model, identifies and implements any relevant protocol driven actions.				
m)	During the task, maintains a safe clinical environment and manages risks appropriately.				
n)	Provides feedback to the client on performance during and at completion of the task.				
Documents the outcomes of the task in the clinical record, consistent with relevant documentation standards and local procedures.					
Provides accurate and comprehensive feedback to the delegating health professional.					

Comments:

Record of assessment competence:

Assessor name:	Assessor position:	Competence achieved: / /
Scheduled review:		
Review date: / /		

Transient Evoked Otoacoustic Emissions (TEOAEs): Learning resource

Required reading

- Manufacturer's guidelines for the TEOAE machine/s used in the local service.

TEOAE probe tip sizing

- Choice of a probe tip is based on ensuring an adequate seal. If the manufacturer's instructions do not include a sizing chart or guidance on tip size selection, the AHA will need guidance and training on choosing a correct probe tip.

TEOAE testing protocol

Example protocols used in Queensland Health services

- Queensland Government (2018). Healthy Hearing Program. Universal Newborn Hearing Screening. 2016 Audiology Diagnostic Assessment Protocol. Version 2.2. P113-117. Transient Evoked Otoacoustic Emission (TEOAE) Test Protocol. Available at: <https://www.childrens.health.qld.gov.au/wp-content/uploads/PDF/healthy-hearing/hh-audiology-protocol.pdf>
- Children's Health Queensland Hospital and Health Service (2019). Healthy Hearing Targeted Hearing Screening Clinic – Resources. Available by emailing: hearing.screening@health.qld.gov.au
- Queensland Government (2018). Allied Health Assistant Hearing Screen. V4.00 – 10/2018. Available at: https://qhps.health.qld.gov.au/data/assets/pdf_file/0025/2118805/659018.pdf

Example of local test outcome action

- The local service model may include the AHA implementing an action based on criteria in the testing protocol or clinical pathway. An example is shown below using the criteria of “pass” and “refer”.
 - “Pass” criteria – all conditions must be met to achieve a “pass” result. Clients who achieve a “pass” do not need to attend further hearing assessment or medical review and are considered to have functionally normal hearing sufficient for speech and language.
 - Stimulus stability $\geq 80\%$.
 - Waveform repro $\geq 80\%$.
 - at least 3/5 frequencies (must include 1 or 1.41, and 4) must have SN ≥ 6 .
 - minimum TE response amplitude is 0dBSPL.
 - “Refer” criteria – clients who do not meet one or more of the criteria will require further review. Review may include diagnostic audiology or ENT referral. Referrals are made by the general practitioner and be based on local pathway criteria. See example flowchart in Healthy Hearing Targeted Hearing Screening Clinic – Resources above.

Example TEOAE measurement print out

Figure 1: 'Overall Pass' result on screening TEOAEs

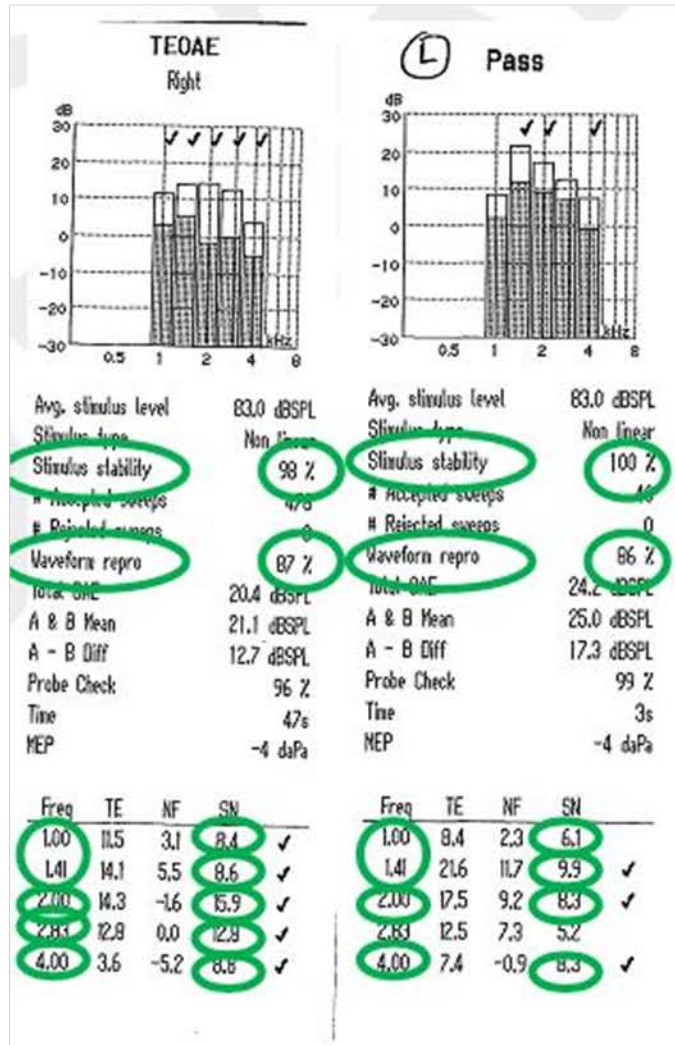
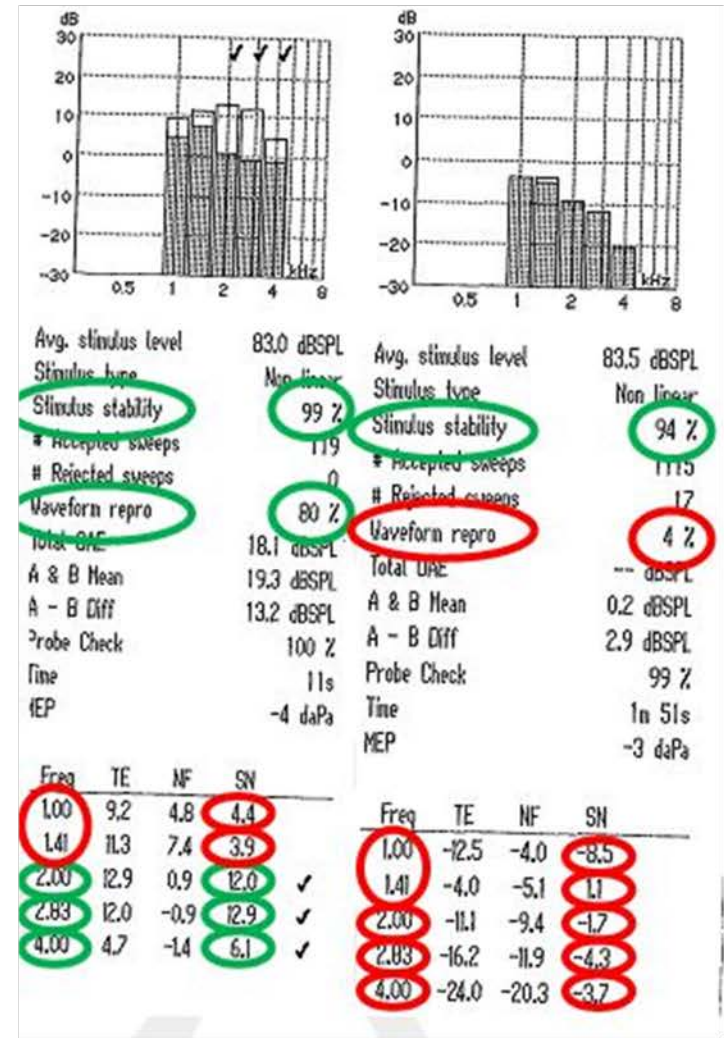


Figure 2: 'Overall Refer' result on screening TEOAEs as pass criteria not met (circled in red)



Example Tympanometry 226Hz training tool

Questions: Tympanometry 226Hz

AHA name:			
Trainer/assessor name:			
Task being assessed:		Tympanometry	
Date of assessment:			
		Satisfactory response	
		Yes	No
Q1.	<p>a) Is Otoscopy required to be completed before performing Tympanometry? Yes/No.</p> <p>b) If Otoscopy is discontinued due to the child indicating pain or discomfort, notable discharge or the skin is broken or inflamed should Tympanometry be performed? Yes/No.</p>		
AHA answer		<input type="checkbox"/>	<input type="checkbox"/>
Q2.	<p>What document is used to determine the Tympanometry Types (A, B or C)?</p> <p>a) NHS Newborn Hearing Screening Program Guidelines</p> <p>b) Healthy Hearing Program - Tympanometry (226Hz) Test Protocol</p> <p>c) American Speech-Language-Hearing Association Protocols</p>		
AHA answer		<input type="checkbox"/>	<input type="checkbox"/>

Q3.	What documentation is required to be provided with the AHA Hearing Screen Form for review by an audiologist? a) No additional information required b) Point of care form (with patient label) with the right and left ear Tympanometry type (A, B or C) hand written on it c) Point of care form (with patient label) with a copy of the right and left ear Tympanometry raw data attached		
AHA answer		<input type="checkbox"/>	<input type="checkbox"/>
Q4.	a) Using Tympanogram Classification Table on page 128 Healthy Hearing Program - Tympanometry (226Hz) Test Protocol. Correctly classify the following raw data on tympanometry results on the attached Point of Care forms 1-5. (provide 5 de-identified printouts) NB: Protocol is to stick RE, then LE results on POC form but also review the data to see if it has been correctly applied.		
AHA answer		<input type="checkbox"/>	<input type="checkbox"/>
The candidate's underpinning knowledge was:	Satisfactory <input type="checkbox"/>	Not Satisfactory <input type="checkbox"/>	
Feedback to candidate:			
AHA signature:			
Assessor signature:			