

D-CH03: Pure tone hearing screening

Scope and objectives of clinical task

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

- safely and effectively conduct pure tone hearing screening on a client older than 3.5 years of age.
- if required, apply hearing screening triage and decision-making flowchart tools to support 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.
- Implementation of this CTI by some local services may include protocol-driven processes that support additional information collection about the client's hearing status such as local triaging protocols or procedures. If this is the case, additional training is required e.g. workplace instructions, audit tools and CTIs that support the model.

Clinical knowledge

- The following content knowledge is required by an AHA delivering this task:
 - the purpose and rationale for performing hearing screening as relevant to the client population in the local service model.
 - the process for conducting a hearing screen using an audiometer, including standard room set up, equipment set-up, testing protocol and documentation requirements.
 - basic anatomy of the hearing pathway including the outer, middle and inner ear.
 - relevant processes and protocols related to the local service model e.g. workplace instructions, decision-making flowcharts, intake criteria/triage tools and recording forms.
- 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. Inform the delegating health professional of observations as part of feedback and if part of

the local service model, implement local processes for review by a medical practitioner e.g. inform the client to attend their general practitioner.

- to participate in pure tone screening the client needs to be able to follow instructions consistently. Clients who are younger than 3.5 years of age, are developmentally delayed or have a cognitive impairment will require an alternative screening approach e.g. Transient Evoked Otoacoustic Emissions (TEOAEs). The decision to use an alternative screening strategy is made by the delegating health professional through case-by-case or protocol-driven delegation processes.
- to participate in pure tone screening the client must be able to be conditioned to sound - see the Learning resource. If the client is unable to be conditioned to sound due to poor attention or physical limitations preventing the client from pressing the button or holding blocks/marbles, cease the task and discuss with the delegating health professional.

Equipment, aids and appliances

- The audiometer machine should be checked and be in working order at the beginning of each day. Check cables are connected and working e.g. power cable, client response button. Perform a biological check for each ear at 1, 2 and 4kHz. If the machine is not in working order, outside calibration dates or fails the biological check, cease the task. Locate alternative equipment if available. If no alternative equipment is available, inform the client and carer where relevant, and re-schedule the task. Inform the delegating health professional of equipment problems and implement local processes to have the equipment fixed/replaced.

Environment

- During testing the client should not be able to see the hand presenting the tone. Check the position of the client and the barrier to confirm that sight is obscured. If required, the tester may use their other hand to cover the hand pushing the presentation button. See the Learning resource for an example room layout including barrier position.
- A quiet room is required for a hearing screen. 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 example, 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. This may include additional frequencies to be tested.

2. Preparation

- Place furniture in the required position to conduct a hearing screen - see local workplace instructions.
- Check the machine is in working order - see Safety and quality section.
- For clients aged between 3.5 and 5 years of age collect a play resource, for example marble drop or block stacking game.
- Collect the local hearing screening recording form and pen.

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:
 - for clients aged 3.5 - 5 years or not yet at school:

“We are going to play a game together. I am going to put these headphones on your ears. When you hear a sound, drop a marble (or stack a block onto the mat). I will show you how to play.”
 - for clients aged greater than 5 years old or school age and above:

“I am going to put these headphones on your ears. When you hear a sound, push/click/press the button as fast as you can. It is important that you don’t watch what I am doing so you can either close your eyes or look forwards/away.”
- 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:
 - sitting on a chair (facing forward) next to a desk. A barrier should be in front of the audiometer to prevent the client from seeing the AHA’s hands and the stimulus/presentation button. See the Learning resource section.
 - if a play resource is being used this should be placed on the desk beside the client.
- If a carer is present, the carer should be seated behind and to the side of the client, in a position that is out of the direct view of the client.
- The AHA’s position during the task should be:
 - sitting facing the desks in a position to be able to access the audiometer and observe the client and play resource (if relevant).

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. To avoid confusion when recording information, the right ear is routinely examined first.

3. Set up the audiometer for the initial testing protocol
 - i. Ear: Right
 - ii. Frequency (Hz): 1000Hz
 - iii. Volume (dBHL): 50dBHL
 4. Place the headphones on the client's head. Adjust the size of the headband so that the headphone is sitting directly over each ear.

Note: Right headphone is red and left headphone is blue.
 5. Conduct conditioning. The client must respond to hearing sound twice in a row independently, prior to commencing the hearing screen (step 5). See Safety and quality section.
 6. Conduct hearing screening. At 1000Hz screen the client for positive responses at 50dBHL, 35dBHL and then 25dBHL. The client requires two positive responses at each volume to pass.
 7. If the client does not respond to hearing two positive responses at a specific volume use the 'Up 5 – Down 10' procedure – see the Learning resource section. Determine the volume at which the client can hear two successful responses.
 8. Record the frequency and the lowest volume that the client can hear.
 9. Repeat step 5-8 testing at 4000Hz and then 2000Hz.
 10. Set-up the audiometer for the left ear. Repeat steps 5-9 for the left ear.
 11. When the hearing screening is complete, remove the equipment from the client. Use detergent wipes to clean the equipment including headphones, client response button, play resources and desk surfaces.
 12. 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 headphones fall or move off the ear, pause the test and reposition the headphones.
 - if a client is pre-empting sound or appears distracted or not focused on the listening task, re-instruct the client and repeat conditioning (step 5).
 - to avoid the client becoming conditioned to predictable sound presentation timing, vary the timing between tone presentations so that the client does not know when to expect the tone. For example, present the first sound and count to five, present the second sound and count to eight, present the third sound and count to three.
 - 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 their hearing screen today and their hearing is considered functionally normal and sufficient for speech and language development. However, hearing can change over your lifetime. If concerns arise in the future this should be discussed with a general practitioner."

- “Refer” – “Your child has not passed their hearing screen today. There are many possible reasons for this result. You will need to come back for a review hearing screening 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:
 - under the heading ‘pure tone’ the lowest volume the client could hear at each frequency for each ear tested.
 - if relevant for the local service model, the outcome of the hearing screen including the criteria used and any actions taken, for example:
 - “Overall pass = 25dBHL at all 3 frequencies (1000, 2000 & 4000Hz). Client discharged.”
 - “Overall refer = lowest volume recorded is >25dBHL at 1000, 2000 or 4000Hz (i.e. if >25dBHL at any frequency). Refer to local protocol or processes for outcome.”
 - “Not performed = hearing screening not performed e.g. client is < 3.5 years old, otoscopy screen indicated pain, discomfort, notable discharge. Action taken e.g. informed delegating health professional, client advised to attend general practitioner.”
- 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).
- Kooper R (2008). Screening, Evaluation and Management of Hearing Loss in the School-Aged Child. In Madell JR & Flexer C (Eds). Paediatric Audiology: Diagnosis, technology and management. (p106-111). 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

Assessment: performance criteria checklist

D-CH03: Pure tone hearing screening

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.			
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) Correctly sets up the audiometer for the initial testing protocol.</p> <p>d) Assesses the right ear first unless variance from usual procedure is clinically indicated.</p> <p>e) Correctly places and fits the headphones on the client's head.</p> <p>f) Appropriately conducts conditioning to sound.</p> <p>g) Correctly conducts hearing screening at 1000Hz and 50, 35, 25dBHL and identifies when the client achieves two positive responses.</p> <p>h) If required, identifies the need to use the 'Up 5 – Down 10' procedure and correctly applies it.</p> <p>i) Records the frequency and the lowest volume that the client can hear.</p> <p>j) Repeats step f-i testing at 4000Hz and then 2000Hz.</p>			

k)	Sets up the audiometer for the left ear and repeats steps f-j for the left ear.				
l)	When hearing screening is complete, removes the equipment from the client and correctly cleans and stores it.				
m)	Informs the client and carer of the result.				
n)	If part of the service model identifies and implements any relevant protocol driven actions.				
o)	During the task, maintains a safe clinical environment and manages risks appropriately.				
p)	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: / /
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Scheduled review:

Review date: / /

Pure tone hearing screening: Learning resource

Required reading

- Manufacturer's guidelines for the audiometer available for use in the local service.
- Queensland Health (2019). Deadly Ears Program Children's Health Queensland Hospital and Health Service. (PARROT-C) PE21 Ear and hearing health check 2019. Available through iLearn at: <https://ilearncatalogue.health.qld.gov.au/>

The following modules are relevant for this CTI:

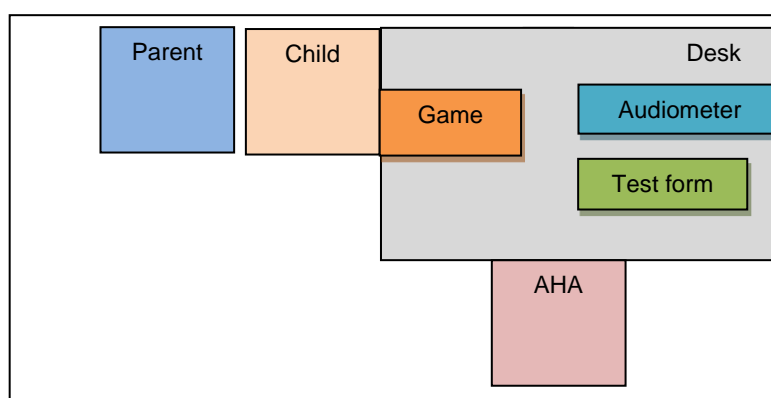
- 5. Ear and Hearing Health Checks
 - Sub section 4: Audiometry
 - Ears and hearing checks – cheat sheet
- Relevant process and protocol documents related to the local service model e.g. workplace instructions, decision-making flowcharts, intake criteria/triage tools and recording forms.

Example local service model documents

- 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

Example hearing screening room layout

Figure 1: Example hearing screening room layout including barrier placement



Conditioning to sound

- Clients are instructed to push/click/press the response button as soon as they hear sound. Sound is presented (approximately 1-2 seconds) at 50dBHL. The client is praised for their performance, for example 'You heard it, good listening'. This is repeated several times. The sound is then presented without tester guidance i.e. independently.
- Young children can be conditioned by using a block or marble placed in their hand with the tester placing their hand over the client's hand and holding the block/marble up to the client's cheek. Sound is presented (as above) and the tester guides the client's hand to place the block/marble onto the board. The client is praised for their performance, for example 'You heard it, good listening'. This is repeated several times. The sound is then presented without tester guidance i.e. independently.

Example for the 'Up 5 – Down 10' procedure (Modified Hughson-Westlake Method)

“Pass”

- In Table 1 (see below) the Right Ear is provided as an example of a pass result.
- The aim is for the client to have positive responses at 50dBHL, 35dBHL and then 25dBHL. Two positive responses at 25dBHL level is required to pass the screen.

“Refer”

- In Table 1 (see below) the Left Ear is provided as an example of a refer result which is obtained using the 'Up 5 – Down 10' procedure (Modified Hughson-Westlake method).
 - the client responds at 50dBHL (tick denotes a positive response from client) so the volume is decreased to 35dBHL.
 - the client does not respond at 35 dBHL (cross denotes no response from the client) so 'Up 5 – Down 10' procedure is implemented, and the volume is increased by 5dBHL to 40dBHL.
 - the client responds at 40dBHL (tick denotes positive response, number 1 indicates that this is the first successful ascending response from the client) so the volume is decreased by 10dBHL to 30dBHL.
 - the client does not respond at 30dBHL (cross denotes no response) so the volume is increased by 5dBHL to 35dBHL.
 - the client does not respond at 35dBHL (cross denotes no response) so the volume is increased by 5dBHL to 40dBHL.
 - the client responds at 40dBHL (tick denotes positive response, number 2 indicates that this is the second successful ascending response). Therefore, for the left ear at 4000Hz the response recorded on the client's record form is 40dBHL and is considered a 'refer' result as it is >25dBHL.

Table 1: Example hearing screening results at 4000Hz using the 'Up 5 – Down 10' procedure

Right Ear (4000Hz)	Left Ear (4000Hz)
<ul style="list-style-type: none"> • 50dB ✓ • 35dB ✓ • 25dB ✓✓ 1 2 	<ul style="list-style-type: none"> • 50dB ✓ • 35dB ✗ (go up 5dB) • 40dB ✓ (drop down 10dB) 1 • 30dB ✗ (go up 5dB) • 35dB ✗ (go up 5dB) • 40dB ✓ 2

Table 1 shows example test results for the Right Ear at 4000Hz, with a lowest recorded reading of 25dB and the Left Ear at 4000Hz, with a lowest recorded reading of 40dB.

Table 2 provides an example of common notations used in recording results.

Table 2: Key for hearing screening example Table 1

Notation	Interpretation
Hz	Hertz – denotes the frequency used to perform testing at
dBHL	Decibels – denotes the volume
√	Positive response from client (i.e. client heard the pure tone and pressed the response button)
X	Client did not respond to the presentation (i.e. did not hear the pure tone)
(1)	First ascending response
(2)	Second ascending response

Learning material adapted with permission from Children's Health Queensland Hospital and Health Service (2017). Deadly Ears. The Ear and Hearing – Training Manual (Draft).