1. Introduction and Who Guideline applies to

These guidelines are provided for Audiologists and other trained professionals undertaking behavioural testing of children when 2 testers are required. This is likely to apply to children with an approximate developmental age of 8 months-4 years or those that are less compliant with single tester appointments. These guidelines will apply predominantly to children seen during a Visual Reinforcement Audiology (VRA) clinic but are also applicable to 2T hearing aid clinic appointments - although some adaptations may be applied when testing children with hearing aids (see Paediatric Hearing Aid guideline documents (To be published).

This guidance is to be used in conjunction with the British Academy of Audiology's (BAA) Quality standards in Paediatric Audiology (2022) document and current British Society of Audiology (BSA) recommended procedures and practice guidance (https://www.thebsa.org.uk/resources/).

- VRA for infants (BSA, 2014)
- Pure tone air-conduction and bone conduction threshold audiometry with and without masking (BSA, 2018)
- Tympanometry (BSA, 2013)
- Acoustics of sound field in clinical audiological applications (BSA, 2019)
- Audiological assessment and hearing aid provision for patients with programmable ventriculo-peritoneal (PVP) shunt (BSA, 2021)
- Clinical application of Otoacoustic Emissions (OAEs) (BSA, 2023)
- Ear examination (BSA, 2022)

It is presumed Audiologists using these guidelines are trained and competent in performing the tests described. Details of how to perform the tests are described in more detail in relevant BSA recommended procedures and therefore this guidance is to be used as a supplement to clarify local requirements and highlight local methodology.

These guidelines do not include guidance on use of the Distraction test as this test is not used routinely in this service and therefore is only recommended to be used by Audiologists competent to do so and will not be used exclusively to make a definitive diagnosis. For further guidance regarding Distraction testing refer to the BSA Assessment Guidelines for the Distraction Test of Hearing (BSA, 2018) document on the BSA resources page (link above).

Referrals to VRA clinics will usually have been received from the UHL Ear, Nose and Throat (ENT) service, Leicester Partnership Trust Community Audiology service or from within UHL Hearing Services. Referrals will have been vetted by a paediatric Audiologist and coded as appropriate for this clinic. Appointments for new referrals will be offered within 6 weeks of the date that the referral was coded. Referrals will be coded weekly and dated before being passed to the administration team for booking.

VRA clinics will be at LRI. 2T hearing aid clinics are held at LRI, Comet Way, Coalville and Hynca Lodge, Hinckley.

2. Guideline Standards and Procedures

Facilities and preparation

Room Preparation

- Switch equipment on and perform stage A calibration checks as per BSA (2018) guideline.
- Ensure all furniture within the 'test zone' is in the correct position as marked. Test zone is the area between the speakers including the child's test position.
- Ensure adequate seating is available, positioned behind the child, for interpreters/additional parents
- Ensure minimal distractions present to the child so toys on display kept to a minimum and room is decluttered.
- Ensure adequate supply of speculae, tympanometry (Tymp)/Otoacoustic Emissions (OAE) tips, insert foam tips, disinfectant wipes and hand gel
- Check room for hazards and minimise risk e.g. trailing wires, loose batteries etc.

Test preparation

- Read referral letter, Practice Navigator (PN) notes, previous audiograms and reports to ensure knowledge of the child and previous history
- Tester 1 and Tester 2 to discuss and agree appointment plan to include how to approach child, likely tests and equipment needed, order of test and role of each tester
- Check interpreter arrived (if relevant)

Tester 1 and Tester 2 (T1 and T2) roles

The roles of the testers will be dependent on the level of skill, confidence and competency of each tester in relation to the requirements of the individual child and test. The role that each tester takes must be clarified before the child is brought into the room to ensure clear communication between testers, child and parents.

T1 is always the tester presenting the stimuli and response reward (VRA) and responsible for accepting/rejecting a response i.e. determining threshold/minimum response levels.
T2 is the tester that interacts directly with the child during the test and provides encouragement/motivation by engaging with the child

Suggested roles are given below;

1. T1 – controls test, documents history on PN notes, writes report and performs session admin
   T2 – introduces testers, checks demographics, takes history, performs otoscopy, tymp, OAE, explains results and discusses and decides management
2. T1 – introduces testers, checks demographics, takes history, controls test, performs otoscopy, tymp, OAE, explains results and discusses and decides management

T2 - documents history on PN notes, writes report and performs session admin

It is preferable for testers to maintain a role throughout a whole clinic session as this is more efficient than alternating roles

Patient introduction and instruction

- Check if parents are happy with any additional observers being present e.g. students.
- If a child has complex needs or is known to be upset during appointments, consider speaking to parents while in the waiting room to assess whether further room adaptations are needed and how to approach the child and test.
- Call child into room, preferably with only 1 accompanying adult but a maximum of 2, and ideally no other children.
- Seat the parent with child on their knee or, if able, on their own chair in front of the parent, ensuring that the child is over the marked test position and additional people are seated behind the child. Pushchairs, bags etc should be outside the test area and should not cause a distraction for the child. The child can stay in their pushchair during the introductions and history if preferable for the child/parent
- Introduce all professionals present in the room
- Identify and document on report the relationship to the child of adults attended.
- Check demographics from PN and amend as required. Minimum information to be checked is child's home address, DoB of child and GP surgery.
- Explain why child is in clinic, take appropriate case history (see appendix A) and document on PN notes +/or in report. If the child is restless then the history can be completed after testing. The history taken should be appropriate for the reason for referral and is taken to help inform T1 and T2 of the questions to be answered during the test and any information relevant to the test or outcome.
- Ask whether the child has had any head surgery to ascertain whether they have a **programmable** ventricular-peritoneal (PVP) shunt and refer to relevant BSA test guidelines if they have (BSA, 2021). A PVP shunt is rare and parents will know if there child has one inserted, a non-programmable shunt does not require test adaptations.
- Briefly explain the test/session plan to the parent to obtain implied consent for tests
- Ensure the child is comfortable before beginning testing e.g. remove coat, nappy change etc
- Some children may get agitated if being held or if expected to stay in one place. If available the child may prefer to sit in a pushchair if the style of this does not create an obstruction between the child's ear and the speaker. In certain cases e.g. some children with ASD, the child may be tested while playing freely within the confines of a play pen, the audiologist should be aware of the impact of the position of the child on the stimulus in such cases

Test procedures

Type and order of tests

- Tests required will be dependent on previous test results, history and the questions needing to be answered

- The intention should be to obtain as much information as possible at 0.5-4KHz. Information for each ear individually (OAE or inserts), air conduction (AC) (Soundfield/inserts) and bone conduction (BC) thresholds/minimum response levels should be obtained dependent on the time available, attention span of the child and the diagnostic question to be answered.
- Care should be taken to make best use of the test time and child's attention span to obtain as clear a diagnostic picture as possible e.g. obtaining AC and BC results at 2 frequencies is more useful for diagnosis and management than AC only at more frequencies
- Tympanometry to show middle ear status should be attempted for all children unless contraindicated (BSA, 2013).
- A brief explanation of the test should be given before starting, in order to obtain implied consent. Advise parents how to hold their child correctly for the test to ensure that the procedure can be carried out safely and effectively with minimum distress to the child or parent.
- Use of additional tests may be used if needed and if time allows e.g. Distraction or Speech Discrimination testing. These are not expected to be done routinely and should only be performed if needed, if the audiologist is competent to do so and time allows
- Ask the parents about previous compliance of the child when examined e.g. otoscopy. If the child is compliant perform Otoscopy, Tympanometry and OAE first as this will give useful information to guide the behavioural test e.g. if OAE pass in one ear and refer in the other insert testing may be prioritised in the referred ear. If the child is likely not to be compliant then perform behavioural testing first.
- T1 and T2 will discreetly agree whether a VRA of Performance test is to be attempted dependent on theirs and parents subjective assessment of the child, history and previous test experience. If it is unclear whether a child will do a Performance test, this should be attempted first but T1 and T2 must continue to communicate and be ready to change to VRA if required.
- Soundfield testing should be used to condition the child as no knowledge is needed regarding ear specific hearing and also enables use of vibrotactile conditioning if required. Inserts may be used if the Audiologist has sufficient previous knowledge of the child's hearing to be confident that they are conditioning at a sufficiently loud dBSL
- A typical clinic session test order would be as follows;

Otoscopy

⇩

Tympanometry

⇩

OAE (if Tympanometry trace peaked)

⇩

Soundfield conditioning and test

⇩

Insert test (if soundfield within normal limits and OAE not already passed in each ear)

⇩

BC test (if soundfield and/or insert test indicate a hearing loss)

⇩

Insert test (if Soundfield indicated a hearing loss, BC would then be done to confirm type of loss before doing insert testing)

Minimum Response Levels (MRL)/threshold of hearing

Children less than 12 months old are known to only respond to sounds at levels that are slightly louder than adult threshold equivalents i.e a child that responds at an MRL of 25dBHL soundfield may have an actual hearing threshold of 15dBHL. Insert responses for this age group are a MRL at 0.5 and 1KHz up to +15dBHL above threshold and +5dBHL at 2 and 4KHz, no information is available for BC testing.

Minimum response levels (MRL) is the BSA (2019) suggested term to describe responses obtained in children <=12 months rather than the term threshold. Children above 12 months may respond to sounds closer to their true threshold but this will be dependent on the development of the child. As the MRL term is not as commonly known/used by Audiologists, ENT and other professionals and confusion may be caused if using MRL for some age groups and threshold for others. We will use the term threshold but will bear the above information in mind when interpreting the results for parents, reports and will refer to 'normal limits' rather than 'normal hearing' to acknowledge that there may be some variance between minimum response recorded and threshold of hearing.

The following are the dBHL levels accepted as 'normal limits' and will therefore be used as the lowest level routinely tested to in 2 tester clinics. Older children may be tested to quieter levels at the audiologists discretion.

Soundfield – 25dBHL = within normal limits (30dBHL at 500Hz is acceptable)
Inserts – 20dBHL = within normal limits (25dBHL is acceptable at 500Hz)
BC – 10dBHL = within normal limits (15dBHL at 2KHz is acceptable)

Visual Reinforcement Audiometry (VRA)

- Behavioural hearing test typically suitable for children from 8 months – 2 years developmental age if able to sit unsupported and turn their head from side to side.
- If a child has head control but is unable to sit unsupported, the audiologist should ensure that the child is supported sufficiently so that they don't have to put effort into supporting themselves e.g. in pushchair, leaning on parent or lying on parents lap. Care must be taken to ensure that they are still able to move their head and see the reinforcers whilst in this position

- Briefly explain the test procedure to the parent and advise on suitable precautions about cueing the child to any auditory stimulus and keeping distracting noise to a minimum.
- If applicable explain possible limitations of the test relevant to the child e.g. possible affect on results of a child's visual or developmental abilities.

Conditioning phase

- Dim the lights for better contrast with reinforcers. At clinics without dimmable lights, it may be possible to turn lights off completely if there is sufficient light from a window or lamp.
- Condition using a 1Khz warble tone soundfield stimulus judged to be supra-threshold (as a guide 75dBHL is suitable for routine testing or 50dBHL above their threshold if a hearing loss

is known/suspected). If the child has a known or suspected hearing loss a different frequency / transducer / level (approx. 50dB above known/suspected threshold) may be used (ear defenders for non patients must be used for soundfield stimulus levels above 80dBHL).

- Use of spinning/flashing light as a visual reward is recommended for children with suspected Autism or other special needs.
- If the child shows no clear sign of being able to hear the stimulus after a **maximum** of 5 auditory presentations then a a vibrotactile sound should be used ((125Hz at 60-70dBHL dependent on the speakers used). Continuing to attempt to condition using a potentially inaudible or quiet level of stimuli may encourage false positive responses and affect the Audiologist's ability to condition to other stimuli. A vibrotactile stimulus will be 'felt' even if the child has a significant hearing loss or is disinterested in auditory stimuli and therefore, if they don't condition using this stimulus then it is more likely to be due to developmental not auditory factors but a hearing loss can't be ruled out, this should be explained to parents
- A clear head turn to the stimulus is the response required. The Audiologist must be careful not to reward a false positive response or a 'vague' response
- For children with significant visual impairment, where possible, consider bringing visual rewards closer and/or removing the perspex screen of the visual reward cabinet (If applicable). If insert or BC testing is being performed then the child can be positioned closer to the screen if the screen isn't movable. Use of other sensory reinforcement, such as air puffs or flashing lights can be used if required.
- Conditioning or testing at a level above 80dBHL should only be done if there is clear evidence that the child has a hearing loss that requires this level of stimulus e.g OAE is absent with peaked tymps and good recording conditions or child responds reliably to vibrotactile stimulus but not auditory plus there is parental/speech or other concern regarding hearing. Ear defenders (foam plugs or headphones) should be used for others present in the room (if sound field is being used).
- The child should demonstrate a minimum of 2 consecutive, clear conditioned responses using an auditory test stimulus (0.5-4KHz warble tone) before reducing the stimulus level to begin MRL testing
- If the child conditions to a vibrotactile stimulus but does not respond to an auditory stimulus at 80dBHL at any frequency then this should be taken as a 'no response' and the reinforcer should not be presented i.e. this is no longer a conditioning phase. The vibrotactile stimuli should continue to be presented in between auditory stimuli to ensure that the child is still conditioned. This may indicate a significant hearing loss if the child continues to respond to the vibrotactile stimulus but not to the auditory stimuli at 80dBHL

Testing phase

- Assume each response may be the last one you get. With this in mind, think about order of testing prior to starting as the clinically more important information should be obtained first.
- The sequence of assessment should be adapted depending on the objectives of the test, compliance and status of the child. Suggested test order:
  1khz -4Khz -500Hz -2khz OR 2khz -500hz - 4Khz-1khz

- The stimulus should be presented when T2 is able to demonstrate holding the child's full attention for an adequate length of time to minimise the risk of a false positive response
- T2 should use the minimum amount of distraction possible to maintain the child's focus at the front whilst not over distracting and therefore becoming more interesting than the reinforcer. T2 should be quiet and ensure that they don't overly interact with the child. Communication from T1 to T2 may be needed if more or less distraction is required.
- Typically infants <12 months can be distracted with a single item or T2's hands/fingers being moved. Their eye tracking is slower than older children and therefore slow, rhythmical toy movement is required to allow them to maintain their focus on the toy.
- Eye contact with the child should be avoided as a younger child may become fixated on T2's face.
- Older children may need toys to be swopped more regularly to maintain attention but care should be taken not to have too many toys on display or for T2 to be too interactive.
- No change to the level of distraction should occur whilst the stimuli is being presented as this may 'release' the child's attention or cue the child and result in a false positive response. A change to the level of distraction may include slowing of toy movement, covering of toy, change in eye contact or stilling/quieting of the distractor. Responses observed should be disregarded if T1 observes or T2 is aware of a change in the level of distraction.
- After a positive response has been obtained and the stimulus/reinforcer stopped, T2 should regain the child's attention using a toy rather than voice. Attention to the front should not be encouraged until the reinforcer has stopped.
- The stimulus must always be present when the visual reward is on
- The otoscope light shone onto T2's hand or through a coloured plastic beaker and moved rhythmically may be more effective than a toy for some children, particularly ASD children, visually impaired or children with other special needs that have little interest in toys.
- T2 should avoid giving the child a toy to hold unless absolutely required. All toys handled by the child should be kept separate from the other toys and will need to be cleaned as per infection control/toy cleaning policy prior to the next patient.
- A bracketing technique should be used to identify MRL as quickly as possible. For a normally hearing child this may be
  75dBHL (conditioning level) – 50dBHL – 25dBHL – 25dBHL (MRL)
  For a hearing loss this may be
  75dBHL (conditioning level) – 50dBHL – 25dBHL (no response) – 35dBHL – 25dBHL(no response) – 30dBHL – 30dBHL (MRL)
- 2 responses out of 3 presentations, without regular false positive responses are needed for this to be recorded as a reliable MRL/threshold.
- The audiologist should not repeatedly present quiet sounds in an attempt to get 2 out of 3 responses. If securing a MRL is difficult, present a sound at a level whereby a very clear response has been previously confirmed with 2 out of 3 consecutive responses obtained (20-30dBHL above current levels or conditioning level) to remind the child of what they are listening for and check that are still responding. If obtaining an MRL to 5dB accuracy is not reliable, obtaining a secure response at 10dB accuracy is preferable.
- False positive responses will be managed by using variable inter-trial intervals, some of long duration or using the reinforcers on both sides to add variation. Withholding the reinforcer

for a short moment may also help to differentiate between checking and real glances; checking glances tend to be short lived

- If a child repeatedly gives false positive responses, or ceases responding, the child must be reconditioned.
- Subsequent test frequencies will vary depending on information required; however when changing frequency, present the stimulus at a level judged to be at or above threshold.
- Consider presenting at supra-threshold or re-condition if the child has become distracted and if child doesn't respond, check for response at previously obtained frequency at >=10dB supra threshold.
- If responses obtained are not secure i.e. there were a lot of false positives, a lot of presentations/conditioning in order to obtain 2 repeatable responses, the VRA should be validated by passing an OAE test in at least one ear (preferred validation method) or having 2 similar VRA results from separate appointments.
- T1 must be careful not to 'look for' an expected result e.g. post grommet hearing test may be expected to be within normal levels, trying to match a previously obtained result or parental reports of no hearing concerns. This may lead to expected responses being accepted and unexpected responses/lack of response being explained as due to non-auditory factors e.g attention/false positive response. This may lead to misdiagnosis.
- Other stimuli e.g. narrow band noise should only be used as a last resort as this is not as frequency specific as warble tones. Changing warble tone frequency to retain a child's interest is preferable than using a narrow band stimulus. If narrow band stimulus has been used at MRL/threshold level, this should be recorded when saving the audiogram, in PN notes and on the typed report

Common pitfalls for VRA testing

- Inadequate test set up and communication between testers 1 and 2.
- Not establishing clear responses (conditioning) at supra threshold levels before descending to MRL.
- Incorrect scoring as true responses i.e scoring movement other than a head turn or false positive (checking) responses.
- Distinct or rhythmical phasing of attention by T2 such that response cues are given to the child.
- Use of toys that provides very little or too much engagement for the child and therefore inhibits their responses.
- Not ensuring that the child's attention can be held fully by T2 before presenting stimuli
- Over emphasis on quantity rather than quality of responses.
- Not using time efficiently, spending too long on high intensities.
- Obtaining MRLs with speakers on right and left and interpreting these as providing ear specific information.
- Cues from parents.
- Tester response bias (tester believing child's hearing is normal or matching previous results) leading to lack of objective interpretation of true response v's false positive.

- A lack of interest in the rewards of VRA so they may be better suited to a task the child can engage with (Performance test).
- Not establishing 'definite' responses for a child with many false positive turns.

Performance test

Behavioural hearing test typically suitable from 2 – 5 years developmental age. The child needs to be able to interact and turn take with T2 or parents to obtain accurate results. Performance testing is more engaging and interactive than VRA therefore can maintain the attention/interest of an older or active child for longer than VRA

The conditioning (teaching) and test phase of performance testing follow the same principals as described in the VRA section above. It is the response of the child to the stimuli that differs from VRA as a performance test response is a taught response and therefore requires cooperation of the child. Performance testing describes the test method whereby the child performs a task to indicate a response to the sound

- Choose a performance task suited to the child's dexterity and fine motor skills.
- Ensure the task chosen allows for the response to be clear i.e the response has to be obvious enough to differentiate it from the child general movement/activity
- Demonstrate to the child what you would like them to do at a supra threshold level (75dBHL suggested); repeat a minimum of twice.
- Use gesture and facial expressions, rather than a verbal explanation, to demonstrate the task and to make it appear fun for the child.
- Use simple, single command words and gestures throughout the teaching phase e.g. listen, wait.
- Do the task with the child at supra threshold level; repeat twice as a minimum.
- Allow the child to do the task independently without any clues from Audiologist or parents and ensure that they are responding clearly and consistently before reducing the stimulus level to begin testing MRL's.
- Praise the child after correct responses (during teaching and testing). Praising should be non- verbal if possible (clapping, thumbs up, facial expression) or short verbal praise e.g. well done. This encourages the child to continue.
- If the child gives a false positive response, remove the man from the boat (or equivalent toy) and remind to 'wait' and 'listen'
- Follow the recommended testing procedure as described in the VRA section above for frequencies and ascertaining minimal response level.
- Consider changing the game if the child is getting bored or losing attention. Reconditioning may be required when the task is changed and there is the risk that changing the game may interrupt the flow of the test and the child's cooperation may be lost. The task should therefore not be changed unless the child demonstrates restless behaviours
- All toys handled by the child must be cleaned as per infection control/toy cleaning guidelines in between patients and must not be mixed with clean toys until this has been done.

Ear specific testing

- Ear specific information is needed especially if there is a specific concern or risk factor for one ear, a permanent hearing loss is suspected or where amplification is required.
- Ear specific information can be obtained via OAE or insert testing
- If OAE testing has been passed in each ear prior to the behavioural test, insert testing is not required unless there are specific frequency concerns.

- The use of insert ear phones should preferably proceed otoscopy (if otoscopy is not performed the use of inserts needs to be on a risk and benefit analysis for individual cases
- Inserts – 20dBHL = within normal limits (25dBHL is acceptable at 500Hz)

- 4khz in each ear is the minimum required as high frequencies are most valuable for speech. Once 4KHz in each is obtained, the usual test sequence is 1KHz – 2KHz – 500Hz. How many frequencies obtained will be dependent on child's attention, time availability and importance of information. 1 and 4KHz gives ear specific information at a low and high frequency and is usually sufficient information.
- If ear specific results are needed but not obtainable via OAE or inserts, localisation can be tested (VRA only) with use of narrow band noise (NBN) at 2 or 4 Khz, a minimum of 30dB above MRL. The child may need to recondition to both sides. An ability to localise does not exclude an asymmetrical hearing loss but can be reported as 'good/poor ability to localise'. As this test has minimal diagnostic value it is not necessary to do this routinely.
- If no ear specific information is obtained, the explanation of the results and report must reflect this.
- If ear specific information is important for diagnostic or management purposes, based on the history and concerns raised, then a further appointment should be made if it is felt that it is likely that another appointment will enable these results to be obtained.
- Rules of masking should be applied for asymmetric hearing losses, as per BSA guideline (BSA, 2018) (>=55dBHL difference masking rules 1 and 3 for inserts), if possible dependent on how secure the unmasked responses and MRL's are. See BSA (2018) pure tone audiometry recommended procedures for additional guidance.
- Masking techniques should reflect the ability of the child but commonly block masking at 40dB above threshold or 30dB if MRL is within normal limits. The audiologist must make it clear when reporting whether masking has been fully, partially or not applied and the implications of this on the diagnosis.

Bone conduction testing (BC)

- Bone conduction testing should be performed to establish type of hearing loss if MRL's are outside normal limits. This would usually be performed before ear specific testing.
- Placing the BC headband with each end positioned behind the child's ears is usually more secure on small heads than positioning the transducer on the mastoid and contralateral side in front of the ear as is usually done for adults
- If the child is not tolerant of the hard band or neoprene soft band, the transducer can be held in place by the parent with clear instruction that the conductor is applied with

moderate force. A note that this has been done must be made if it may have affected the accuracy of the results. T1 and T2 must be vigilant of the parent during testing

- The neoprene softband should be wiped with Distel wipes (or equivalent) after each use
- T2 must ensure that the transducer remains appropriately placed at all times during the test
- Test order will be dependent on the configuration of the suspected hearing loss and is therefore at T1's discretion.

- BC – 10dBHL = within normal limits (15dBHL at 2KHz is acceptable)
- T1 should be aware of the effect of the known BC calibration issues at 2 and 4KHz and the interpretation of the results should therefore be a reflection of the BC responses across the frequency range in conjunction with Tympanometry and 'most likely' audiogram configurations
- BSA masking rule 2 (BSA, 2018) should be applied if a sensori-neural hearing losses is suspected and if possible dependent on how secure the unmasked responses and MRL's are. See BSA pure tone audiometry recommended procedures for additional guidance (2018).
- Masking techniques should reflect the ability of the child but commonly block masking at 40dB above threshold or 30dB above MRL if within normal limits will be applied. The Audiologist must make it clear when reporting whether masking has been fully, partially or not applied and the implications of this on the diagnosis.
- Due to risk of cross masking with bilateral conductive hearing losses and difficulties masking in young children, it is not expected that masking will be applied in the absence of other evidence suggesting a possible sensori-neural hearing loss

Discussion

- Results should be explained clearly to parents with the explanation reflecting the reason for referral and parental concerns
- Management options should be discussed briefly and a management plan agreed with parents. The detail of the management options should only be discussed in enough detail to enable parents to make an informed choice in terms of follow up procedure
- Management options may include the following;
    a. Grommets (refer to ENT if not already under them)
    b. Hearing aids (refer to HSD paed hearing aid service for assessment)
    c. Discharge from HSD
    d. Follow up appointment in HSD – add to pending list
    e. Refer to ENT for Auditory Brainstem Response (ABR) testing under general anaesthetic (If behavioural test results x2 inconclusive or not obtained)
- See Appendix B for clinic outcomes and management decision guidance

Admin process for VRA clinic

- Check list for admin processes – Appendix C
- PN notes description should reflect the clinic/apt type e.g. VRA bank F2F
- Using PN notes template, information should reflect a summary of the clinic session and include relevant information not recorded as part of the typed report. Summary of

concerns/history, tests performed, options discussed, management plan and review date if applicable, should be clearly recorded

- Add child to PN pending list if a diagnostic follow up in HSD required. Clinic type should be 'VRA pending' or '3+ pending' as appropriate. Appointment type should be 'VRA fu, VRA bank fu or 3+ fu, .
- A 'bank child' is a child that needs ongoing follow up (see surveillance pathway guidelines) e.g. ANSD, cCMV, CLP, permanent hearing loss (unaided). Downs syndrome children and unaided permanent SNHL children able to be tested with 1 tester should be re referred to community audiology for surveillance if no further action required from HSD.
- Report with test results, summary of discussion and management plan to be typed
  1. For non ENT referrals - copies to parents, referrer and GP minimum
  2. For ENT referrals – copy to ENT - See 'H drive/paeds/contacts/paediatric report contacts' for report destination addresses and clarification for ENT report destination
- If action is required from another professional e.g. ENT, TOD, Community Audiologist, write a summary of the action required, in bold, at the top of the report making it clear if it's a referral
- For referrals for hearing aid assessment – place a copy of the report in the 'new referrals' tray in the paed hearing aid administrator's office. Write on the report to indicate whether 1T/2T h-aid assessment/fitting and time required for the appointment. If an assessment/fitting appointment has already been booked, note this clearly (handwritten is best) on the report.
- Save report on H drive/paeds/reports *yr,* as surname, 1st name, date of test
- Attach report to PN note
- Print and send reports (paper/email dependent on recipient)
- Complete medical referral and consultation on PN
- Ensure patient is attended on PN

Appendix A – Pre school clinic history taking guide

The questions asked will depend on the age of the infant / child, history already available and reason for referral. Questions below are examples and can be expanded on or additional questions asked as appropriate.

It is recommended that only a very brief history is taken prior to testing in order to maximise test time available e.g. any parental concern re hearing/speech, ear infections, other medical conditions confirmed/suspected, any head surgery. A more complete history can be taken if a hearing loss is detected with the history then being more targeted dependent on the results obtained.

How are they today?

- Have they been poorly recently?
- Have they had a recent cold?
-

Do they suffer with ear infections?

- When was their last one?
- Do they get discharge from their ear(s)?
- Which side is primarily affected?
- Have they ever seen an ENT Dr regarding this?

Do they suffer a lot with colds / coughs / upper respiratory infections?

What concerns, if any, do you have regarding child's hearing and responses to sounds?

- Do they respond to their name when called?
- Do they respond to their favourite TV programme / music when outside line of vision?
- Do they startle to loud sounds?
- Do they copy sounds?

What concerns, if any, do you have regarding speech and language development? How do they communicate their needs?

- Do they have any single words?
- Are they putting words together?
- Are they clear?
- Do they make a lot of different vocalisations / babble?
- How do they get their needs / wants across? i.e hand gestures, pointing etc
- Are they under a SaLT

Are there any concerns from nursery or any other professional?

How is their understanding / general development?

- Will they follow a simple set of instructions? Give an example
- Can they recognise different animals / body parts / make appropriate animal noises?
- Are they reaching their milestones? i.e sitting / crawling etc?
- Are they under any other health professionals?
-

What concerns, if any, do you have regarding their behaviour?

- How do they socialise / play with other children?
- Are they under a paediatrician

Did they have clear responses on their new born hearing screen?

- If you are unable to check this via S4H – document as 'parents report that….'

Have they had any other hearing assessments?

- Where / when and are you aware of the results obtained?

Is there any family history of permanent hearing loss from a young age?

- Birth mum / biological dad / siblings.

Were there any problems with pregnancy or at birth?

- Prematurity
- Time in NICU
- Jaundice- with blood transfusions.

Have they spent any time in hospital and received treatment for any significant illnesses i.e. bacterial meningitis / cancer

- If so when and what treatment did they receive?
- Did they have any follow up hearing assessments?

Have they got any known/suspected medical conditions

- What is it
- Is it confirmed or being investigated
- Who/where is managing this condition

Any concerns with regards to their eyesight?

- Are you aware of what they can see?

Have they ever been seen by an ENT Team?

- Who did they see? Where did they see them?

Appendix B – VRA clinic outcome/management guide

- Outcome will be dependent on reason for referral and results obtained.
- Outcomes will be decided using audiologists clinical judgement in consultation with parents using the flowchart below to inform the decision.
- Outcome will be logged on PN and report
- Possible outcomes are as follows and should be discussed and agreed with parents using outcome guidance flow chart below;
    1. Discharge from HSD (with or without onward referral)
    2. Refer for hearing aid assessment (HSD)
    3. Refer to ENT (including for ABR under GA) – new ENT referral
    4. Refer back to ENT (already under ENT)
    5. Refer to community audiology (for ongoing monitoring of Bank children able to be tested as a single tester appointment and children with Down Syndrome)
    6. Review in HSD

- For address/contact details for the referrals above, see 'Hdrive/paeds/contact/paediatric report contacts'. Note new referrals to ENT, reports for children already under ENT and those seen at outreach hospitals are sent to different addresses

.

Minimum discharge summary

SF

WNL - 1KHz and 4KHz at <=25dBHL

Satisfactory hearing - 1KHz and 4KHz at <=30dBHL – only acceptable if child very noisy during testing or development/behavioural issues with no parental concern re hearing.

Inserts/headphones

Inserts only (no SF) - 1KHz and 4KHz at 20dBHL bilaterally

SF WNL (as above) + inserts – 4KHz at 20dBHL

OAE CR (Te OAE diagnostic protocol on Titan)

Sweeps >=40

SNR >=6dB at each CR frequency

Minimum Te level >= -5dBSPL at each CR frequency

Overall amplitude of response >=0dBSPL across the CR frequencies

Unreliable behavioural responses – CR >= 3 frequencies bilaterally

Reliable behavioural responses meeting minimum discharge criteria – CR >=2 frequencies bilaterally

Nb/ a **'refer' (NCR) OAE** is when OAE noise level is <= -5dBSPL in the absence of a Te response meeting CR criteria. If the noise level is > -5dBSPL this should be recorded as an **inconclusive OAE** result as this indicates poor recording conditions (usually due to poor probe fit, incomplete recording or audible noise)

Outcome guidance flowchart

Glossary

SF = Soundfield
WNL = within normal limits (see minimum discharge criteria summary)
CR = clear response ((see minimum discharge criteria summary)
BC = bone conduction test results
Bank child = child needing ongoing audiological surveillance due to medical condition - unaided child with a known/suspected SNHL, ANSD, cCMV, CLP, Downs syndrome (see surveillance guidelines)

Bank child?

YES
SF results WNL + OAE's CR or inserts WNL
See surveillance guidelines for specific condition variations;

- Review 3 monthly – 2 yrs
- 6 monthly 2-4yrs.
- Downs syndrome – discharge HSD and ref to community audiology unless aiding needed.
- Unaided SNHL - Discharge to community audiology when thresholds established and able to be tested accurately
- cCMV/ANSD/CLP (see surveillance guidelines)

NO
SF results WNL + OAE's CR or inserts WNL= DISCHARGE

SF WNL, No inserts or OAE's obtained

No parental/professional concern – review as above

Parental/professional concern regarding unilateral hearing loss – consider more regular review if appropriate

SF WNL no inserts or OAE's obtained

Discharge

- If ENT referral or
- if no parental concern or history indicating possible unilateral loss – parents to be informed as to limitations of test (on report) or
- if parental concerns or history indicating possible unilateral loss but parent and audiologist agree that ear specific information unlikely to be obtained due to child compliance

Offer Review – if parental concerns or history indicating possible unilateral loss

SF/ inserts = hearing loss
<u>Conductive loss</u>

ENT referral
Discharge (ENT will review results and action management as required)

Other referral
Mild loss, no parental concern – review x 1 in 3-6 months

Mod loss or parental concern – review x 1 in 8-12 weeks

If loss present on review offer;

- ENT referral
- H-aid + ENT referral

SF/ inserts = hearing loss
<u>SN/mixed loss</u>

ENT referral
<u>Hearing loss confirmed;</u>
Offer h-aid and
Action late diagnosis pathway and
Results to ENT for aetiological investigation as required

<u>Hearing loss needs confirming:</u>
Review x 1 <= 6weeks

Other referral
Mild loss, no parental concern or results need confirming – review x 1 <=12 weeks

>= Mod loss or parental concern

- Review x 1 <=6 weeks
- Offer h-aid
- Action late diagnosis pathway hearing loss confirmed

If loss present on review offer;

- ENT referral
- H-aid + ENT referral
- Action late diagnosis pathway

Behavioural results not obtained, unreliable or inconclusive

ENT referral
OAE pass bilaterally – discharge
OAE not completed/refer - review <=6 weeks

Other referral
OAE not completed;

- No parental concern – review 8-12 weeks
- Parental/professional concern – review <=6 weeks +/- referral to ENT for ABR GA

OAE pass bilaterally;

- offer review x 1 in 3-6 months. Discharge if parents decline review after discussing limitations of test results obtained and document discussion in report.

OAE refer (with peaked tymps)

- review <=6 weeks +/- referral to ENT for ABR GA

If no conclusive results on review offer;

- OAE pass – discharge as above
- OAE not completed/refer bilaterally - referral to ENT for ABR GA
- If ABR GA referral declined -1 further review <=3 months as agreed with parents but discuss likelihood and implications if results not obtained i.e. h-loss can't be ruled out as reason for initial concern and risks if delay h-loss diagnosis

Appendix C – paediatric diagnostic administration process checklist

This checklist may be used by the audiologist to ensure that all processes are completed. The appropriate column should only be ticked when fully completed

Date of clinic _____ Clinic type _____

Pt initials	Medical referral and consultation	Attend or DNA	PN Notes	Report typed	Report printed	Report Saved	ENT emailed	Added to Pending list	Ref for h-aid

Additional comments or things to do

3. Education and Training

No training is required for current staff.

New staff to the department or to the paediatric team will require a period of supervision dependent on their experience and skill level. The peer review process will be undertaken before they are able to work unsupervised.

3. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Tester 1 and 2 will be peer reviewed separately, based on the role undertaken during the observed tests. Communication between T1 and T2 will also be observed and feedback given	Peer review process	Head of Paediatric Audiology	New starter after initial supervisory period. All applicable paediatric staff every 2 years	Required actions to be given to audiologist by the peer reviewer and recorded on peer review document
Room prepared appropriately and plan for appointment	Peer review process	Head of Paediatric Audiology	As above	Required actions to be given to audiologist by the peer reviewer and recorded on peer review document
Introduction of adults present and demographic details checked as appropriate	Peer review process	Head of Paediatric Audiology	As above	Required actions to be given to audiologist by the peer reviewer and recorded on peer review document
Appropriate level of history taking	Peer review process	Head of Paediatric Audiology	As above	Required actions to be given to audiologist by the peer reviewer and recorded on peer review document
Appropriate diagnostic tests undertaken with appropriate technique, security of responses and interpretation of results	Peer review process	Head of Paediatric Audiology	As above	Required actions to be given to audiologist by the peer reviewer and recorded on peer review document
Appropriate explanation of results for the family/child and related to their concerns as identified in the history	Peer review process	Head of Paediatric Audiology	As above	Required actions to be given to audiologist by the peer reviewer and recorded on peer review document

Appropriate explanation of management/follow up options and action plan agreed with family/child	Peer review process	Head of Paediatric Audiology	As above	Required actions to be given to audiologist by the peer reviewer and recorded on peer review document
Documentation complete	Peer review process	Head of Paediatric Audiology	As above	Required actions to be given to audiologist by the peer reviewer and recorded on peer review document

5. Supporting References

British Society of Audiologists (2019) Acoustics of sound field in clinical audiological applications
British Society of Audiologists (2018) Assessment Guidelines for the Distraction Test of Hearing
British Society of Audiologists (2021) Audiological assessment and hearing aid provision for patients with programmable ventriculo-peritoneal (PVP) shunt
British Society of Audiologists (2023) Clinical application of OAE
British Society of Audiologists (2022) Ear examination
British Society of Audiologists (2018) Pure tone air-conduction and bone conduction threshold audiometry with and without masking
British Society of Audiologists (2013) Tympanometry
British Society of Audiologists (2014) VRA for infants

6. Key Words

VRA; Paediatric testing; Hearing test; Children; Hearing assessment

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) Sheena Hartland – Head of Paediatric Audiology	**Executive Lead** Hazel Busby-Earle - Consultant
Version 1.2 **Details of Changes made during review: Addition of appendix regarding PVP shunt** **Version 2** **Minor additions and alterations to test methodology** **Revamp of outcome measures for clarity**	

Title of P&G Document Being Reviewed: Insert Details Below:		Yes / No / Unsure	Comments
1.	**Title and Format**		
	Is the title clear and unambiguous?		
	Does the document follow UHL template format? *If no document will be returned to author*		
2.	**Consultation and Endorsement**		
	Complete the consultation section below		
3.	**Dissemination and Implementation**		
	Complete the dissemination plan below		
	Have all implementation issues been addressed?		
4.	**Process to Monitor Compliance**		
	Ensure that the Monitoring Table has been properly completed.		
5.	**Document Control, Archiving and Review**		
	Ensure that the review date and P/G Leadis identified.		
6.	**Overall Responsibility for the Document**		
	Ensure that the Board Director Lead is identified		

1. OVERVIEW

2. **EQUALITY IMPACT ASSESSMENT**

		Comments	
1.	**What is the purpose of the proposal/ Policy**	To standardise practice between clinicians and provide guidelines for practice	
2.	**Could the proposal be of public concern?**	No	
3.	**Who is intended to benefit from the proposal and in what way?**	Audiologists as it provides guidance for the diagnostic testing of children and patients/family as it provides standardisation of practice	
4.	**What outcomes are wanted for the proposal?**	Standardised diagnostic testing practice, outcome decisions and documentation	
		Yes/No	**Comments**
5.	**Is there a possibility that the outcomes may affect one group less or more favourably than another on the basis of:**		
	Race	No	
	Ethnic origins (including gypsies and travellers)	No	
	Nationality	No	

		Comments	
	Gender	No	
	Culture	No	
	Religion or belief	No	
	Sexual orientation including lesbian, gay and transsexual people	No	
	Age	No	
	Disability - learning disabilities, physical disability, sensory impairment and mental health problems	No	
6.	Is there any evidence that some groups are affected differently?	No	
7.	If you have identified that some groups may be affected differently is the impact justified E.g. by Legislation: National guidelines that require the Trust to have a policy, or to change its practice.	n/a	
8.	Is the impact of the proposal / policy likely to be negative?	No	
9.	If so can the impact be avoided?	n/a	
10.	What alternatives are there to achieving the proposal/ policy without the impact?	n/a	
11.	Can we reduce the impact by taking different action?	n/a	

If you have identified a potential discriminatory impact; please ensure that you do a Full Impact Assessment.

If you require further advice please contact Service Equality Manager on 0116 2584382.

3. CONSULTATION SECTION

(To be completed and attached to Policy and Guidance documents when submitted to the UHL Policy& Guidelines Committee)

Elements of the Policy or Guidance Document to be considered (this could be at either CMG/Directorate or corporate level or both)	**Implica-tions** (Yes/ No)	**Local or Corpor-ate**	**Consul-ted** (Yes/ No)	**Agree with P/G content** (Yes/No)	**Any Issues** (Yes / No)	**Comments / Plans to Address**
Education (ie training implications)	NO					
Corporate & Legal	NO					
IM&T (ie IT requirements)	NO					

Clinical Effectiveness	NO					
Patient Safety	NO					
Human Resources	NO					
Operations (ie operational implications)	NO					
Facilities (ie environmental implications)	NO					
Finance (ie cost implications)	NO					
Staff Side/ (where applicable)	NO					
Any others	N/A					

Committee or Group (eg CMG/Directorate Board) that has formally reviewed the Policy or Guidance document	**Date reviewed**	**Outcome / Decision**
MSS	15/09/23	Authorised pending inclusion of Glossary

Lead Officer(s) (Name and Job Title)	**Contact Details**
Hazel Busby-Earle (Consultant)	hazel.busby-earle@uhl-tr.nhs.uk

Please advise of other policies or guidelines that cover the same topic area:

Title of Policy or Guideline:
See references

4. IMPLEMENTATION AND REVIEW

Please advise how any implications around implementation have been addressed:	
Financial	NO
Training	NO
REVIEW OF PREVIOUS P&G DOCUMENT	
Previous P&G already being used? Yes	**Trust Ref No:**
If yes, Title: Paediatric 2 tester diagnostic clinical guidance	**n/a**

Changes made to P&G? Yes	**If yes, are these explicit** Yes **If no, is P&G still 'fit for purpose?** n/a
Supporting Evidence Reviewed? Yes / No?	**Supporting Evidence still current?** Yes / No?

5. DISSEMINATION PLAN

DISSEMINATION PLAN			
Date Finalised:	**Dissemination Lead (Name and contact details)** **Sheena Hartland, Head of Paediatric Audiology**		
To be disseminated to:	**How will be disseminated, who will do and when?**	**Paper or Electronic?**	**Comments**
HSD Paed Team	**Staff Meeting. Shared drive.**	**Electronic.**	

CATEGORY 'C' POLICIES OR GUIDELINES ONLY **CMG/Directorate Approval Process**:	
CMG Approval Committee:	MSS
Date of Approval:	
Copy of Approval Committee Minute to be submitted with request to upload into Policy and Guideline Library	

GLOSSARY

ABR - Auditory Brainstem Response

AC - Air Conduction

ASD - Autism Spectrum Disorders

ANSD - Auditory

BAA - British Academy of Audiology

BC - Bone Conduction

BSA - British Society of Audiology

cCMV - Congenital cytomegalovirus

CLP - Cleft lip & palate

ENT - Ear Nose & Throat

F2F - Face to face

FU - Follow-up

GP - General Practitioner

MRL - Minimum Response Levels

NBN - Narrow Band Noise

OAE - Otoacoustic Emissions

PN - Practice Navigator

T1 - Tester 1

T2 - Tester 2

TBP - To be published

TOD - Teacher of the Deaf

Tymp - Tympanometry/Tympanometer

VRA – Visual Reinforcement Audiology