Validation of Hearing Aid Fitting Aided Speech Testing
Accurate hearing assessment
Selection of physical and electroacoustic elements of the h.aids
Verification that the specified prescriptive targets have been achieved
Validation of the device effectiveness in daily life
  * Parent Questionnaires
  * Aided Speech Testing
Feedback from DHB Audiologists

* Would like to do aided speech testing but.....
  * Not sure what tests to use?
  * What level should you test at?
  * What is a good score?
15.3 Outcome measures

Validation of the fitting must be done using a combination of questionnaires (LittleEARS®, PEACH), behavioural reports from the family and whānau and age appropriate aided speech perception testing (see Appendix 10).
Appendix 10: Verification and validation tools

- aided speech perception tests (at least one test must be used):
  - 0–3 years:
    - Monitored live voice speech detection via audiometer
    - Macquarie Pediatric Sentence Identification Test (MPSI) in quiet
    - Kendall Toy Test monitored live voice via audiometer
    - VRA with calibrated frequency specific speech phonemes
  - 3–6 years:
    - Monitored live voice speech detection via audiometer
    - Macquarie Pediatric Sentence Identification Test (MPSI) in quiet
    - Kendall Toy Test monitored live voice via audiometer
    - NUCHips
    - Hearing in noise test – children (HINT-C)
    - CVC words.
The aim of providing hearing aids is to improve functional auditory capacity to enable kids to participate fully in all aspects of communication.

Children need to hear:
- Across the frequency range
- Normal conversation
- Soft conversation (incidental hearing)
- In noisy environments
Speech Intelligibility Index

- SII – tool to determine how well you have fitted to target
- SII – represents the proportion of speech that is heard by the listener through his/her h.aids
- SII – based on the HTL and the aided speech spectrum
- Helps audiologist/parents to conceptualise the proportion of speech that is available to the child at different speech input levels
Aided speech testing can provide valuable information about how a child is using hearing to discriminate and comprehend speech and language.

How well are children hearing

- Across the frequency range?
- Normal conversation?
- Soft conversation?
- In noisy environments?
Hierarchy of Speech testing

**Auditory Behaviours:**
- LittleEars, Peach
- VRA – MLV, freq-specific speech phonemes

**Closed Set Identification:**
- KTT (pre-recorded recommended)
- PSI, ESP, Ling

**Open Set Identification:**
- BKB-SIN
- CVC words
- LNT, Ling

Adapted from Eisenberg et al., 2006
# Aided Speech Testing

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Speech detection thresholds</th>
<th>Speech discrimination</th>
<th>Speech recognition in quiet</th>
<th>Speech recognition in noise</th>
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</table>
| < 3 years | • Frequency specific speech phonemes VRA (/ah/ /f/ /sh/ /s/)  
                      • Recorded or live voice SPANZ Ling sounds*  
                      • Cortical Auditory Evoked Potential testing | • Recorded Ling sounds (discrimination) | • ESP | |
| 3-5 years | • Speech phoneme detection in soundfield  
                      • Recorded SPANZ Ling sounds*  
                      • Cortical Auditory Evoked Potential testing | • MLV /sh/ vs /s/ * | • Recorded SPANZ or live voice KTT  
                      • SPANZ or live voice PSI sentences  
                      • LNT | Although not standardised KTT in noise e.g. verifying FM |
| >5 years | • Speech phoneme detection in soundfield  
                      • Cortical Auditory Evoked Potential testing | • MLV /sh/ vs /s/ * | • Normalised SPANZ CVC phoneme scores  
                      • KTT or PSI if speech production poor | • BKB-SIN |
| 6+ years | • Speech phoneme detection in soundfield  
                      • Cortical Auditory Evoked Potential testing | • UWO Plurals test | • CVC words  
                      • CNC words 25-word list [if word score <40% then CI candidate] | • LISN-S (with correction for hearing loss)  
                      • Quick SIN (or BKB SIN if Quick SIN too advanced) |
To assess daily functioning

- Normal conversational level (CVC at 45-50dBHL*)
- Soft conversational level (CVC at 35-40dBHL)
- Normal conversation in noise (+5SNR)
  - Noise needs to be realistic (speech babble)

*consider CI assessment criteria
Suggested Scoring – speech recognition (Madell et al 2010)

* Excellent  90-100%
* Good       80-89%
* Fair       70-79%
* Poor       <70%
The key to selecting materials for speech perception testing is to select materials that are linguistically appropriate for the child, that is, that are neither too easy nor too hard.

“Frequently, I notice that the tests used are too easy for the child” Madell, 2011
Selecting Speech Materials

Administer test at 50 dBHL

- If score is >50 % and < 75 % test at 35 dB and 50 dB +5 SNR
- If score is >75 % administer more difficult test at 50 dBHL

If score on difficult test is < 50 % STOP

If score on difficult test is >50-75 % test at 35 dB and 50 dB +5 SNR
Would like to do aided speech testing but.....

- Not sure what tests to use?
  - Consider age and language abilities of child
- What level should you test at?
  - Needs to reflect the levels important for children
- What is a good score?
  - Have high expectations
  - If not achieving consider different/additional technology, ?CI referral