Hearing Screening in Primary Care

And why you need a Tympanometer

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Audiologist Southern District Health Board
Screening Goals

- To differentiate between those with a problem and those without
- Decide on appropriate onward referral
- Management of middle ear problems in children and adults
- Detecting adults with acquired hearing loss

Important: Parental concern in the absence of m.e. probs in children referral to Audiology
Adult Hearing Screening

Older adults:

- Gradually acquire their hearing loss
- Often lack insight into their communication problems
- May suffer relationship problems, isolation and depression
Tools:

- Tympanometry
- Audiometry
- Bay screener
- HHIE-S
- Online screening tests
<table>
<thead>
<tr>
<th>ITEM</th>
<th>YES (4 pts)</th>
<th>SOMETIMES (2 pts)</th>
<th>NO (0 pts)</th>
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<tbody>
<tr>
<td>Does a hearing problem cause you to feel embarrassed when you meet new people?</td>
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<td>Does a hearing problem cause you to feel frustrated when talking to members of your family?</td>
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<td>Do you have difficulty hearing when someone speaks in a whisper?</td>
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<td>Do you feel handicapped by a hearing problem?</td>
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<td>Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbors?</td>
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<td>Does a hearing problem cause you to attend religious services less often than you would like?</td>
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<td>Does a hearing problem cause you to have arguments with family members?</td>
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<td>Does a hearing problem cause you difficulty when listening to TV or radio?</td>
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<td>Do you feel that any difficulty with your hearing limits or hampers your personal or social life?</td>
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<td>Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?</td>
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**RAW SCORE** ______ (sum of the points assigned each of the items)

**INTERPRETING THE RAW SCORE**

<table>
<thead>
<tr>
<th>Raw Score Range</th>
<th>Probability of Hearing Impairment</th>
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<tbody>
<tr>
<td>0 to 8</td>
<td>13% (no handicap/no referral)</td>
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<tr>
<td>10 to 24</td>
<td>50% (mild-moderate handicap/refer)</td>
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<tr>
<td>26 to 40</td>
<td>84% (severe handicap/refer)</td>
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Next step?

- **Hearing Therapist**
  - Free Govt funded service
  - Hearing screening, support and advice

- **Hearing Association**
  - Support organisation

- **Private Audiology Services**
  - Hearing assessment, Hearing aid fitting
  - Audiologists who are members of NZ Audiological Society
  - Govt subsidy

- **Public Audiology**
  - Limited or no access for adults
Public Health Hearing Screening Initiatives in NZ

- Universal Newborn Hearing Screening and Early Intervention
- B4 School Check
Newborn Hearing Screening

- Free for all babies in NZ
- Began in 2007
- Automated Otoacoustic Emissions and/or Automated Auditory Brainstem Response testing
- Performed by trained screeners
- Babies pass or are referred to Audiology
Goal of Newborn Hearing Screening

Early detection of permanent hearing loss and intervention to allow best access to language

- Offer hearing screening to all eligible babies by 1 month of age
- Diagnostic audiology by 3 months
- Provide intervention by 6 months
  - Hearing Aids through Audiology
  - Early intervention from Ministry of Education
Well Child Hearing Screening

- Part of the B4 School check
- At 4 years prior to school or 1st year of school if not tested at 4.
- By Vision and Hearing Technicians
- Screening hearing test
- Plus tympanometry if does not pass
GP role

- Children are referred to their GP if they do not pass both the audiogram and tympanogram for:
  - Followup tympanometry
  - If OME persists, ENT
  - If OME resolves hearing should be rescreened by VHT’s

Note: Children who fail hearing screening and pass tympanometry are referred to Audiology
Assumptions Underlying the B4 School Check

- All GPs have access to tympanometry
- Does NOT assume the GP will refer directly to Audiology or ENT, but:
  - Many GP Practices don’t have a tympanometer
  - Staff who use it may require upskilling/training
- So today is about learning how to use a tympanometer and what it tells you.
What does tympanometry do?

- Gives an objective measure of middle ear function.
- A useful adjunct in the diagnosis and follow-up of middle ear disease.
- Provides appropriate onward referral information to Audiology and ENT:
  - Appropriate triage
  - History you provide assists with setting a priority for surgery
How does Tympanometry work?

- Measures sound reflected off the ear drum during pressure change
- Therefore tells us how well sound is being passed through the middle ear to the cochlear

- Tympanometer
  - Produces a tone at 226Hz
  - Pumps pressure positive and negative relative to normal atmospheric pressure
  - Microphone measures sound reflected back
What can be detected by Tympanometry

- Otitis Media with Effusion
- Eustachian tube dysfunction
- Perforated TM
- Ventilation Tubes
  - Patent
  - Blocked or out
Tympanometry

- Key variables on the screen are:
  - Admittance or Compliance: *how much the eardrum moves*
  - Ear canal volume: *The physical space between the tip of the probe and the tympanic membrane.*
  - Peak pressure: *relative to normal atmospheric pressure*
Tympanogram categorisation

- Tympanograms are then categorised as A, B or C
  - The shape of the tympanogram
  - The numerical values on the tympanometer
- These different types relate to different middle ear pathologies
Tympanometry Norms

When the numbers on the tympanometer fall within the range below middle ear functioning is normal.

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<tr>
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<th>Adults</th>
<th>Children</th>
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<tr>
<td>Ear Canal Volume</td>
<td>0.6 -1.5</td>
<td>0.4 – 1.0</td>
</tr>
<tr>
<td>Peak pressure</td>
<td>Greater than -100</td>
<td>Greater than -100</td>
</tr>
<tr>
<td>Eardrum movement (admittance or compliance)</td>
<td>0.3 – 1.4</td>
<td>0.2 – 0.9</td>
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</table>
Type A - Normal

- Normal middle ear pressure
- Normal eardrum movement
- Normal ear canal volume

- Normal middle ear
Type C- Eustachian Tube Dysfunction (or resolving OME)

- Excessive negative middle-ear pressure
- Normal or reduced compliance
- Normal ear canal volume

- Eustachian tube dysfunction, initiation or resolution of middle-ear fluid
- "Sniffling" children
Type B - Otitis Media with Effusion

Type B (normal volume)

- “Flat”
- No compliance or pressure peak indicated
- Normal ear canal volume

- Middle-ear fluid
Type B – patent grommet or perforation

Type B (increased volume)

- “Flat”
- No compliance or pressure peak indicated
- Increased ear canal volume

- Perforated TM
- Patent P.E. Tubes
How to tell what sort of Type B

Look for the ECV (Ear Canal Volume) value.
Steps to a good measurement

- Otoscopy to check for any obstruction in the ear canal
- Tips must seal the ear canal to allow the pump to change pressure
  - Throw out those old tips
  - Consider single use tips
- Talking, crying, moving will effect the measurement
Hands on Section

- Try using the tympanometers
- Find the peak pressure
  - What does this number tell you
- Find the number that tells you how much the ear drum moves.
- Find the ECV value.
  - What does this number tell you
Pricing

- Otowave approx $3,500
- Interacoustics MT10 approx $5800
- Interacoustics Titan approx $6300