Use of pneumatic otoscopy and tympanometry in diagnosis of middle ear disease: the GP perspective

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Use of Pneumatic Otoscopy and Tympanometry in diagnosis of middle ear disease: The GP perspective

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Outline

• Background to our study
• Study design
• Results
• Conclusions
Otitis media (OM)

• **Definition**
  • middle ear inflammation with effusion present
  • includes disorders on a continuum from acute otitis media (AOM) to otitis media with effusion (OME)

• **Why is OM an important clinical issue?**
  • A common cause of childhood illness / GP consultations
  • Serious complications include hearing impairment and chronic suppurative otitis media and longer term impact on education, social circumstances and quality of life
  • More common in Aboriginal and Torres Strait Islander children
Otitis Media: Diagnosis

• Acute Otitis Media and Otitis Media with Effusion

• Both diagnoses require determination of presence/absence of middle ear effusion

• Role of pneumatic otoscopy and tympanometry

Key Action Statement 1C: Clinicians should not diagnose AOM in children who do not have middle ear effusion (MEE) (based on pneumatic otoscopy and/or tympanometry).
Evidence Quality: Grade B. Strength: Recommendation.

Lieberthal et al. Pediatrics 2013;131;e964; originally published online February 25, 2013
Pneumatic Otoscopy
Tympanometry
Challenges in diagnosis of OM

• The population

• The procedures
Not sure if it’s a perforation?

This is a left TM. Type A tym
Tympanogram: middle ear pressure and compliance within the norms.

Hearing test showed: within normal limits.

Evidence of old scarring.
Is this a perforation?

Right ear - Type B tymp with ecv at 1.6
Teenager (13 years old, male)

No
Hearing – within normal limits.
Is this a perforation?

Left ear - Type B tymp with ecv at 3.0
Teenager (13 years old, male)

Yes
Hearing – mild conductive loss.
Training in Post Graduate Context

- **Adult learners** learn best through **interactive** workshops delivered through **multiple modes** of instruction with **opportunities to practice**.

- **Multimodal training**, using a mix of interactive and didactic teaching, provides best evidence for **behaviour change** and learning in postgraduate continuing education.
Aim of our study

• To evaluate effectiveness of a 3-hour multimodal interactive training workshop re GP use of Pneumatic Otoscopy (PO) and tympanometry (TYM)

• Following addition of PO and TYM to standard otoscopy, to assess whether diagnosis and management of middle ear disease changed, and

• To determine acceptability to GPs of adding PO and/or TYM to standard otoscopy.
To answer the research questions…

- Pre and post workshop questionnaire
- In-practice crossover trial – GPs used 2\textsuperscript{nd} technique (PO or TYM) after standard otoscopy for children aged 6 mo to 6 yrs:
  - Post standard otoscopy questionnaire
  - Repeated after either TYM or PO.
  - Assessed change in diagnostic certainty and management using chi square and logistic regression.
- Interview regarding acceptability and usefulness of PO and TYM
The intervention

- 23 GPs recruited via newsletter advertisement to participate in a 3 hour Multimodal, ‘Hands on’ Workshop

- 13 of those GPs enrolled in a subsequent study to investigate the usefulness of TYM and PO in general practice.
Process

Recruitment to workshop
23

Enrolled in Crossover study
13

Step 1 Routine Otoscopy
335 examinations

Tympanometry
Step 2
190

Pneumatic Otoscopy Step 2
145
Results: Cross Over Trial

• 13 GPs in total agreed to start study
  – 9 GPs did more than 10 examinations

• 335 ear examinations done in total
  – 190 examinations using TYM for step 2
  – 145 examinations using PO for step 2

• No significant differences between PO and TYM study arms at step 1
Findings: Diagnostic uncertainty

• The use of TYM and PO is particularly helpful when there is uncertainty in the initial diagnosis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Increased likelihood of change in Dx</th>
<th>Sig p value</th>
<th>95% CIs</th>
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</thead>
<tbody>
<tr>
<td>Step 1 Dx of ‘Unsure’</td>
<td>21.6</td>
<td>&lt;.0001</td>
<td>4.2 - 110.1</td>
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</table>
Frequency of diagnoses

- Step 1
- PO step 2
- Step 1
- TYM step 2

Legend:
- NAD
- unsure
- AOM
- OME
- other
Findings: Change in planned follow up

- No significant change in immediate management
- Addition of second technique significantly changed the follow up plan

\[ \chi^2 (36, N = 275) = 855.57, \ p < 0.001 \]
Effect on follow up plans

• **Addition of TYM**
  - ↓ no planned F/U from 51% to 44%
  - ↓ GP review 1 wk from 34% to 29%
  - ↑ GP review 1 month from 9% to 16%
  - ↑ GP review 3 months from 3.1% to 7%

• **Addition of PO**
  - O No change in no planned F/U or 3 month f/u
  - ↓ GP review 1 wk from 25% to 20%
  - ↑ GP review 1 month from 5% to 9%
Addition of pneumatic otoscopy—the effect on follow up plans

- Step 1: Follow up plans
- Step 2: Follow up plans

<table>
<thead>
<tr>
<th>Follow-up Plan</th>
<th>Step 1</th>
<th>Step 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not required unless patient</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td>concerned</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP review 1 day</td>
<td>3</td>
<td>3.3</td>
</tr>
<tr>
<td>GP review 1 week</td>
<td>22</td>
<td>17</td>
</tr>
<tr>
<td>GP review 1 month</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>GP review 3 months</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Referral audiologist</td>
<td>1.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Referral ENT specialist</td>
<td>0.7</td>
<td>0.7</td>
</tr>
</tbody>
</table>
Addition of tympanometry-the effect on follow up plans

- Not required unless patient concerned: 52%
- GP review 1 day: 1.3%
- GP review 1 week: 34%
- GP review 1 month: 9%
- GP review 3 months: 6%
- Referral audiologist: 0.5%
- Referral ENT specialist: 2%

Step 1: Follow up plans
Step 2: Follow up plans
Findings: Interviews

- Either technique acceptable to most GPs
  - Patient acceptability very high with both
  - Increased time to GP confidence with PO
  - Several study GPs declined to use PO

- TYM strongly preferred over PO
  - Cost barrier prohibitive for most

- Uncertainty as to value of increased detection of OME in a GP setting
Conclusion

• Use of TYM and PO increased GP confidence in diagnosis of OM in children

• Use of TYM increased the likelihood of planned GP f/u after ear assessment

• TYM was more acceptable to GPs, however cost barriers at present are likely to prevent uptake
Thanks to our GP collaborators and their patients and to Jean Tsembis and John Curotta who assisted with the workshop.

UWS Department of General Practice
Did dx change in step 2 for either TYM or PO?

Chi square

Logistic regression controlled for

• diagnostic technique used
• whether examination was for screening or diagnosis
• order of technique done by GP
• GP characteristics (yrs since graduated, gender)
Recommendations for follow up: OME

• hearing testing recommended when OME ≥ 3 months, or at any time that language delay, learning problems, or a significant hearing loss is suspected

• children not at risk should be re-examined at 3-6 month intervals until the effusion is no longer present (as long as no hearing loss identified or structural abnormalities of the eardrum or middle ear suspected)
Why don’t we detect at-risk drinkers?  
A qualitative study of general practitioner beliefs and attitudes

Dr Michael Tam
Thank you