Intervention and follow-up in children with auditory processing disorders

Karin Neijenhuis, Ph.D. & Jessica de Frel, MA Sc.
Royal Auris Group
Audiological Centre Rotterdam, The Netherlands
k.neijenhuis@auris.nl

Session 17: Children, Divers
Sat 16 May 2009
17.03

Outline

• Auditory processing disorders: definition
• Diagnosis of APD
• Results diagnostical procedure
• Remediation of APD
• Results follow-up
• Conclusion: best practice?

Auditory Processing Disorder (APD)

Difficulties in hearing and speech understanding, despite normal hearing according to standard audiometric measures (pure tone audiometry and speech audiometry in quiet).

These difficulties should be specific to the auditory modality and should not be associated with general processing disorders (e.g., in case of mental retardation).

Neijenhuis, 2003

APD: The role of the SLT

• Screening (with observations, checklists)
• Referral to multidisciplinary team for diagnosis
• Member of multidisciplinary diagnostic team
• Intervention

(see also: DeBonis & Moncrieff, 2008)

Dutch diagnostic instruments for APD

• ‘Nijmegen test battery’ (9 years & older) (Neijenhuis, 2003)
• ‘Eindhoven test battery’ (6 to 12 years) (Simkens & Verhoeven, 2000)
• ‘Auditory tests for pre-school children’ (4 to 7 years) (Stollman et al. 2004; Notten, Neijenhuis, Stollman et al. 2009)
• New! SNAP (combined Dutch tests for auditory processes; 4 to 18 years) (Simkens & Neijenhuis, research in progress)
• CHAPS-NL (Children’s Auditory Performance Scales, translated from Smoski et al., 1998)
• LIFE-NL (Listening Inventory for Education, translated from Anderson & Smallbro, 1998)

Diagnostic Procedure

• Questionnaires: teacher, parents, client
• Audiometry
• Auditory test battery
• Multidisciplinary team
➢ Remediation plan
  1. Environment modification
  2. Auditory training
  3. Compensatory strategies
3-component model; Bottom-up vs. Top-down

Top-down: 3. Compensatory strategies

Bottom-up: 1. Environment modification
2. Auditory training

Clinical research questions: diagnostics and follow-up

- How many clients with presumed APD end up with the diagnosis 'APD'?
- After a period of remediation, what effects can be found on auditory test scores and listening behaviour?
- Which factors could predict these effects?

Population

- 91 clients with auditory complaints, visiting an audiological centre of the Royal Auris Group (4 locations) in the period sept 2005 – feb 2008
- Informed consent
- 55 male, 36 female (60%: 40%)
- Ages from 5 yr – adults (2)
- Follow-up group: n=16 (8 male, 8 female)
- 94% in grades 1-2-3 (primary school)
- Follow-up period 5-16 months (mean: 11 months)

Method

- Mainly description of anamnestic data (ordinal/nominal) and questionnaires (ordinal).
- Auditory test scores are transformed to ordinal scores (percentile categories).
- Results may not be representative for APD population, due to:
  - No 100% informed consent
  - Loss to follow-up
  - Clinical practice: missing values
- However: indications of 'best practice' and suggestions for further research could be found

Diagnostic Categories

(McFarland & Cacace, 1995, 2005)

Three categories of individuals with low scores:
1. Pure APD: low auditory scores, no difficulties in other areas
2. APD-mixed pattern: low auditory scores, other comorbid deficits (like language impairment)
3. Supramodal processing disorder: low auditory scores, due to disturbing factors (fatigue, attention problems, low IQ)
Why follow-up?

- Were suggestions for remediation helpful?
- Unsure of diagnosis, because of comorbid factors, like hearing impairment or attention problems (n=4)
- Does APD still exist?
- Need more advice?

Diagnostic categories: follow-up results (n=16)

<table>
<thead>
<tr>
<th>Diagnostic Category</th>
<th>t1</th>
<th>t2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure APD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>APD-related pattern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supranormal PD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No APD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peripheral hearing impairment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Composite scores

- Words-in-noise
- Filtered speech
- Binaural fusion test
- Dichotic speech test
- Score below p10: 2 points, between p10-p25: 1 point
- Relative composite score = points / subtests

Results: composite scores t1 vs t2

* Significant difference, p<0.05

Auditory training

- 9 out of 16 cases started using FM-systems at t2 (56%)
- Pre-post comparison of LIFE-NL student version (n=4):
  - Still complaints in situations where FM isn’t used (group work, physical education, assembly, lunch, hall)
  - Other (classical) situations scored no complaints anymore
- LIFE teacher version (n=4): Only 1 teacher reported ‘no difference’
Is remediation effective in APD?

- Environment:
  - More recognition of problems
  - Better arguments for FM-system
- Auditory training:
  - Defining effects (or frustrations) of training is important
  - More specific suggestions can be made
- Compensatory strategies:
  - Results of external referral can lead to better definition of strengths and weaknesses

Summary: Clinical research questions

- How many clients with presumed APD end up with the diagnosis 'APD'?  
  - In our clinic, around 50%
- After a period of remediation, what effects can be found on auditory test scores and listening behaviour?  
  - Better auditory scores, listening behaviour still needs attention
- Which factors could predict these effects?  
  - Comorbid disorders (like speech-language) are delaying factors

Conclusions and best practice

- APD is not yet an accepted and validated entity; results from studies are sometimes controversial
- However, there are clients with auditory complaints that can be objectified by questionnaires and auditory tests (and ruling out other possible deficits)
- Literature suggests to treat them:  
  - Early and intensive
  - Broad and comprehensive
  - Bottom-up & top-down
- More follow-up needed

Selected references