

APD & Hearing Devices

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- Shailashree Nanjundiah is not associated with any manufacturer and the pictures shared are only for examples.
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Learning Outcomes

1. Identify candidacy for use of personal hearing devices in APD population
 2. Understand various options of hearing devices as appropriate to APD population
 3. Describe considerations in fitting hearing devices in APD population from the clinical stand point.
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Listening Challenges in Children/Adults with APD

- Competing background auditory distractions
- Decoding multistep directions and ongoing conversations
- Fading memory
- Auditory fatigue
- Temporal processing difficulties (duration pattern recognition, vowel perception, fast processing of spoken language)
- Processing of intonation, stress, pause, etc and pitch changes.
- Auditory discrimination of vowels/consonants, especially fine discrimination of [m/n], [f/s/th], [sh/ch]

Traditional Treatment Approaches

- Buffalo Model therapy
 - Auditory Training and Auditory discrimination tasks
 - Phonemic Blending and Segmentation,
 - Following directions and Sentence repetition task in Noise (APD and Language concerns)
 - Vowel – duration training
 - And any other traditional approach that fits in.
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Types of Personal Hearing Devices

Personal FM systems

Hearing amplification devices

Hearing devices with remote microphone

EduMic (Oticon) with hearing devices

Summary of Findings from Systematic Reviews Regarding the Benefits of Personal Hearing Devices in Persons with APD

STUDY /TECHNOLOGY/ MEASURES	POST INTERVENTION BENEFITS SPEECH IN NOISE	AIDED VERSUS UNAIDED PERFORMANCE	POST INTERVENTION BENEFITS-BEHAVIOR AND ATTENTION	CLASSROOM LISTENING	CONCLUSION
<p><i>Schafer, Kirby & Miller (2020); Johnston et al., (2009)</i> REMOTE MICROPHONE HEARING AIDS</p>	<p>Speech recognition in noise based on Schafer et al, Speech recognition in noise improved by 36% by use of RMHA</p>	<p>Aided performance or speech recognition increased on psychosocial measure, listening comprehension, and electrophysiological measures.</p>	<p>Improvement noted in Psychosocial function on BASC-</p>		<p>Aids can be expensive. Consider binaural fitting hearing aids or receivers, and a microphone.</p>
<p><i>Keith & Purdy (2014)</i> REMOTE MICROPHONE HEARING AIDS 1. Teacher and parent rating 2) Behavior assessment 3) Cortical Auditory Evoked Potentials 4) Phonological awareness test 5) LiSN-S</p>	<p>Use of RMHA, for 8 weeks - improvement noted on LiSN-S test</p>	<p>Improved auditory working memory, sentence recall, non-word spelling, language skills along with traditional therapy</p>	<p>Improved self confidence, less anxiety, reduced fatigue after school, improve emotional and social difficulties</p>	<p>Improved performance in the classroom using binaural mild gain hearing aids</p>	<p>Remote microphone hearing aids benefit most children with APD. Improvement in learning, psychosocial adjustment and positive neuroplastic changes.</p>

Evidence for Benefits of Personal Hearing Devices in Persons with

APD

STUDY /TECHNOLOGY/ MEASURES	POST INTERVENTION BENEFITS SPEECH IN NOISE	AIDED VERSUS UNAIDED PERFORMANCE	POST INTERVENTION BENEFITS- BEHAVIOR AND ATTENTION	CLASSROOM LISTENING	CONCLUSION
<p><i>Stavrinos et al., (2020)</i> REMOTE MICROPHONE HEARING AIDS (LIFE -R, LiSN- S, Test of everyday attention for Children)</p>	<ul style="list-style-type: none"> • No adverse effects on unaided performance of Spatial listening skills (as in due to overreliance of RMHA) • SiN -unaided did not improve significantly with use of RMHA - 	<ul style="list-style-type: none"> • No adverse effects on spatial listening due to prolonged use of RMHA • No significant improvement 	<p>No long term effects from RMHA on attention.</p>	<p>LIFE- R scores significantly improved in challenging acoustic environment 3 mos. ($p < 0.014$) and 6 mos. ($p < 0.016$) of RMHA use from the baseline.</p>	<p>Consider RMHA for children with APD in classroom along with traditional bottom up management approaches</p>
<p><i>Roup et al., (2018)</i> MILD GAIN HEARING AIDS Auditory Processing Questionnaire (APQ) R-SPIN, Gaps in Noise test, SCAN- 3:A, Hearing Handicap Inventory for Adults (HHIA), Dichotic Digit Recognition</p>	<ul style="list-style-type: none"> • Use of Mild Gain Hearing Aids for 4 weeks led to improvements on APQ ($p < 0.05$); HHIA ($p < 0.05$); and on Speech-in-Noise measure ($p < 0.05$) 	<p>Significantly less handicap on HHIA when aided as compared to unaided condition ($p < 0.05$). None of the other measure revealed any differences across the two conditions.</p>	<p>Not studied</p>	<p>Not applicable (young adults recruited)</p>	<p>Adults with hearing difficulties (APD?) with normal hearing sensitivity may benefit with mild gain open fit hearing aids with adaptive directionality and noise reduction.</p>
<p><i>Smart, Purdy & Kelly (2018)</i> PERSONAL FM SYSTEM Auditory Processing Testing; Speech-Evoked Cortical Responses in Noise, LIFE-UK</p>	<p>Use of personal FM system for 20 weeks. Speech in spatial Noise scores improved significantly with FM for easy words ($p < 0.005$) . Impact of noise reduced on CAEP peak latencies with use of FM.</p>	<p>Significant improvement in Frequency pattern Test with FM when compared to baseline ($p < 0.001$)</p>	<p>Teachers' Questionnaires indicate improved attention and behavior.</p>	<p>Teachers reported FM fittings were successful. Improvement in listening, attention and class participation.</p>	<p>Generally FM systems were beneficial.</p>

KEY TAKE AWAY

Use of Remote Microphone hearing aids, Personal FM System, Mild gain amplification devices are all noted to be significantly **beneficial** for some APD clients



Candidacy for Hearing Devices in APD Population

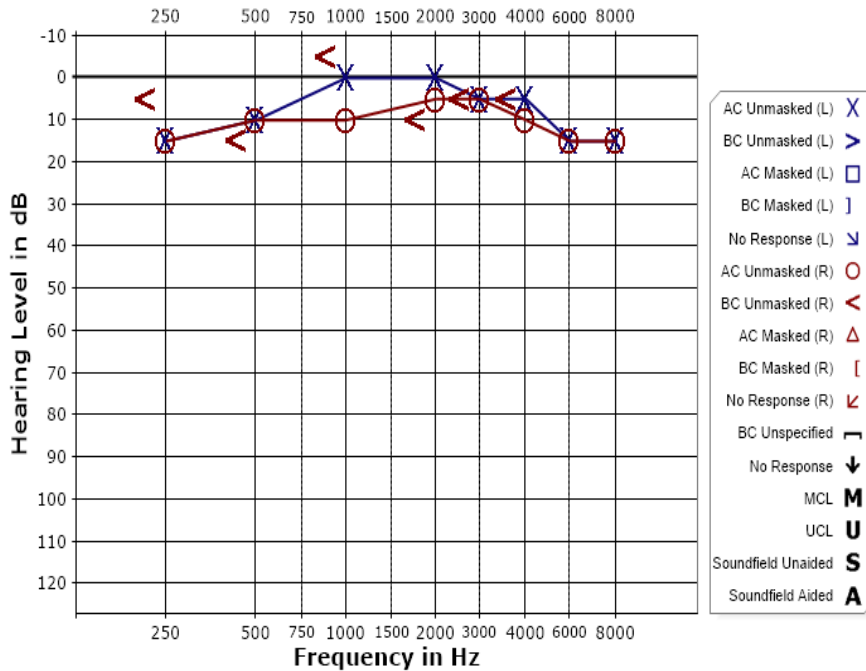
- Long periods of treatment with little resolution
- Poor consistency in receiving treatment
- Experiencing difficulty with auditory processing in various situations
 - At home (with television)
 - Outdoor playgrounds
 - Office meetings for adults
 - Classroom environments
- Patients with a minimal dip in the thresholds at high frequencies or low frequencies.
- Patients with poor word recognition in absence/presence of competing noise
- Patients self-reporting listening difficulties in various listening environments
- Patients with hyperacusis and poor tolerance for noise



Case Presentations

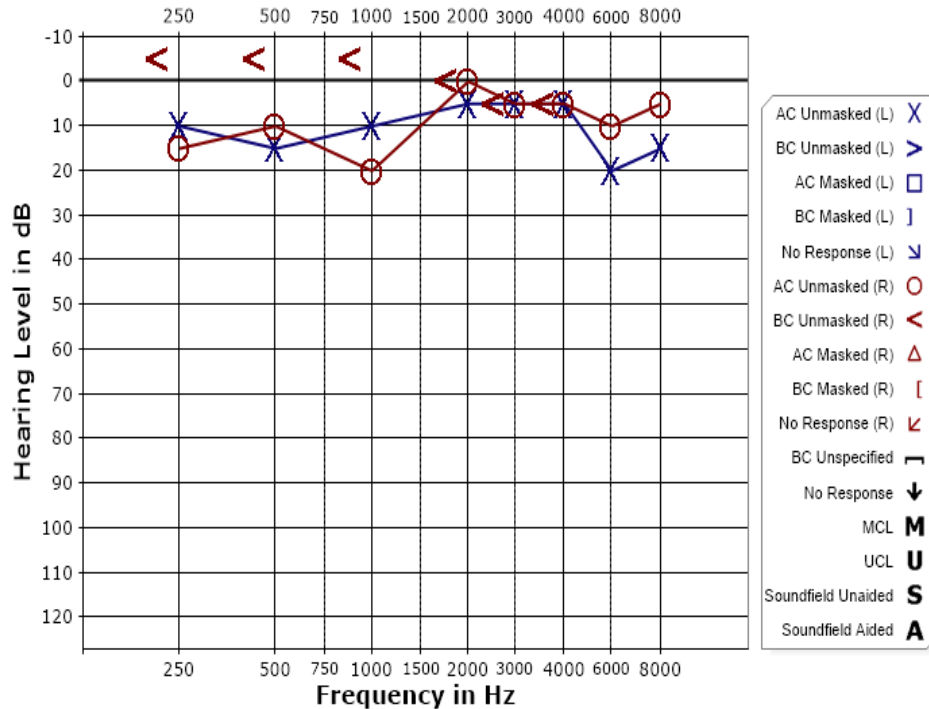
Case Presentation #1: 32-year-old female

- History of OM
- Difficulty tolerating noise
- Poor word recognition in challenging environment



Fit with two MiniRites with low gain receivers, open domes, with adaptive directionality and advanced noise reduction features. Patient reported significant improvement on Hearing Handicap Inventory for Adults. Aided word recognition testing without visual cues improved. Patient reported post fitting that her ability to understand on the phone, television with background noise as well as understanding her children had significantly improved.

Case Presentation #2: 24 year-old adult



- Medical History: Depression, Anorexia, ADHD, head injury from a car accident in 2011.
- Lamictal-for mood elevation, Abilify for improving focus.
- Auditory Processing testing- abnormal SSW, temporal processing
- Fit her with mini rites – with adaptive directionality, noise reduction features maximized for trial of two weeks. Patient reported a great improvement in understanding directions at work, being able to listen without difficulty in a private school over children’s chattering. Self reporting: Patient felt very confident in her work setting, did not need repetition of instructions, was able to follow directions in competing multi-talker noise condition.




Takeaways

Clinical Practice Recommendations and Suggestions

- Use of personal amplification
 - Receiver-in-the-canal open fitting with remote microphone
 - Gain in mid-frequency region for moderate conversational input. 10-15 dBHL gain for high frequencies (4-6 KHz)
 - Use lower gain receivers to ensure no circuit noise is perceived (I try to use less aggressive strategies to fit).
 - Adaptive directionality and noise reduction strategies should be considered for the fitting
- Use of EduMic link (Oticon) to improve signal-to-noise ratio in classroom

Employ Outcome Measure Post-Fitting Hearing Devices

- Use standardized questionnaires tailored to your practice to measure outcomes
 - Measure auditory processing tests pre- and post-remote microphone Hearing Aids-in aided and unaided conditions.
 - Assess speech in noise to measure improvement in aided condition
 - Utilize standardized questionnaires for teachers and parents
 - Note behavioral observations or use standardized scales to measure changes in therapy participation, classroom behavior, attention and performance
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References

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THANK YOU

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