Clinical care for Veterans with auditory processing concerns

Preliminary data from a retrospective review

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NCRAR
NATIONAL CENTER FOR REHABILITATIVE AUDITORY RESEARCH

Talk Outline

1. What is an Auditory Processing Disorder (APD)?
2. Military-related risk factors for APD
3. Retrospective review methods
4. Clinical assessment of APD across the VA
5. Treatment of APD in the VA
6. Case Studies

APD: a Diagnostic Quandary

Definitions of APD, articulated by various professional organizations, position statements, guidance documents, and research publications differ in terms of:

- Level of detail, specificity
- Inclusion-vs.-exclusion of ‘top-down’ processes
- Peripheral or Central: “CAPD” vs. “APD”
- Attention to developmental vs. acquired etiologies
- Is APD even a diagnosable thing?

- **ASHA, 2005:**

"(C)APD refers to difficulties in the perceptual processing of auditory information in the central nervous system and the neurobiologic activity that underlies that processing and gives rise to the electrophysiologic auditory potentials."

  - Deficits in the neural processing of auditory information in the **CANS not due to higher order language or cognition**….

- **ASHA Practice Portal, 2020:**

"**CAPD is not due to peripheral hearing loss**, which includes conductive hearing loss (i.e., outer or middle ear), sensorineural hearing loss at the level of the cochlea or auditory nerve, including auditory neuropathy and synaptopathy (i.e., hidden hearing loss)."

- **AAA, 2010:**

"(C)APD is defined as dysfunction within the CANS. …several lines of evidence have accumulated over the last 50 years definitively establishing (C)APD as a "true" clinical disorder and documenting the strong link between **well-defined lesions of the central auditory nervous system (CANS) and deficits on behavioral and electrophysiologic central auditory measures**."

- **The National Acoustic Laboratories (NAL) Position Statement on Auditory Processing Disorders:**

APD creates difficulty in listening (i.e. hearing with intent to extract information) (Dillon and Cameron, 2015). From a practical point of view APD usually refers to hearing disorders arising in structures from the cochlear nuclei of the brainstem and higher in the CANS.

- **British Society of Audiology, 2011, 2018**:

"APD is characterized by poor perception of speech and non-speech sounds. It has its origins in impaired neural function, which may include both the afferent and efferent pathways of the central auditory nervous system (CANS), as well as other neural processing systems that provide 'top down' modulation of the CANS. These other systems include, but are not limited to vision and the cognitive functions of language, speech, attention, executive function, fluid reasoning, memory and emotion.

"APD is often found alongside and may contribute to primary disorders of those systems. **APD may thus include both auditory and cognitive elements**. …

"Poor attention and memory are generally present, either as a secondary feature (e.g. fatigue associated with listening demands) or as a primary feature of reported impaired auditory perception."

- **Canadian Guidelines, (CISG) 2012, based upon WHO International Classification of Functioning, Disability, and Health, 2002:**

Emphasize the importance of assessing the functional impact of auditory processing disorder on an individual's ability to function in the context of their broader capabilities and their own environment.

"…a perspective that shifts the focus from cause to impact, from biological dysfunction to an individual's ability to participate fully in his/her own life and in society; it emphasizes the importance of thinking about auditory processing as a part of the construct of cognitive hearing science, which considers the interaction between hearing and cognition."

Definition of APD: "Auditory processing disorder is a generic term for hearing disorders that result from atypical processing of auditory information in the brain. Auditory processing disorder is characterized by persistent limitations in the performance of auditory activities and has significant consequences for participation."

- **New Zealand Guidelines on Auditory Processing Disorder, 2019:**

Also modeled after the WHO ICF Guidelines

"The current understanding of the auditory brain is that there is no clear boundary between central and peripheral auditory function because efferent signals from the brain modulate outer hair cell activity in the inner ear (cochlea)…

"…a requirement of modality-specificity (i.e., affecting audition only and no other senses such as vision) as a diagnostic criterion for APD is not consistent with how processing occurs in the brain. Neuroscience has shown that there are few if any entirely compartmentalized areas in the brain that are solely responsible for a sensory modality."

The ASHA Sig 6 Perspective Battle

Assertion: "…. **APD is not a legitimate clinical entity**. APD does not possess an unambiguous definition (Jerger, 2008), it does not represent a homogeneous patient group (ASHA, 2005), it may or may not represent a limitation for the patient (Dillon, Cameron, Glyde, Wilson, & Tomlin, 2012), it does not facilitate diagnosis (Aetna, 2016; Vermiglio, 2016; Wilson & Arnott, 2013), and it does not facilitate intervention (Bellis et al., 2012; Fey et al., 2012, 2011)."

Vermiglio, A.J. (2018). "The Gold Standard and Auditory Processing Disorder." *Perspectives of the ASHA Special Interest Groups, SIG 6, Vol. 3* (Part 1), ASHA

The ASHA Sig 6 Perspective Battle

Response: Cited the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)…, which states that "the once plausible goal of identifying homogeneous populations for treatment and research resulted in narrow diagnostic categories that did not capture clinical reality, symptom heterogeneity within disorders, and significant sharing of symptoms across multiple disorders" (DSM-5, Introduction, p. 12, lines 31–34; American Psychiatric Association, 2013). The way forward is well stated in the DSM-5, which notes "…a too-rigid categorical system does not capture clinical experience or important scientific observations" and that "… the boundaries between many disorder 'categories' are more fluid over the life course." The DSM-5 recognizes that the fluidity of boundaries across disorders "should permit a more accurate description of patient presentations and increase the validity of a diagnosis" (DSM-5, pp. 5, 25–27, 29–30, 34–35). That APD may have diverse clinical presentations, overlapping symptoms, and comorbidities is consistent with the nature of disorders as described in DSM-5."

Chermak, G. D., Iliadou, V., Bamiou, D. E., & Musiek, F. E. (2018). Letter to the Editor: Response to Vermiglio, 2018,"The Gold Standard and Auditory Processing Disorder". Perspectives of the ASHA Special Interest Groups, 3(6), 77-82.

Let's not leave out the debate at Ear and Hearing…

Publishing Policy: "…The new policy is that "articles that either implicitly or explicitly assume APD is a single diagnostic characteristic of the auditory system likely will not be considered for publication."

Rationale: "…It has been increasingly argued recently that most if not all cases of childhood "APD" are either better characterized by more commonly recognized learning disorders, especially language disorder (de Wit et al. 2018), or by specific difficulties, for example hearing speech in noise (DeBonis 2015) or spatial hearing (Cameron et al. 2014), that are firmly grounded in psychoacoustics."

"Several scholarly papers … have long argued that, to be a useful construct, APD should produce poor performance that is relatively specific to tasks involving auditory stimuli. They have demonstrated that aspects of acquired APD may satisfy this criterion but that is not the case for developmental APD."

Moore, D. (2018). Guest Editorial: Auditory Processing Disorder. *Ear & Hearing, 39*(4), 617-620.

Let's not leave out Ear and Hearing…

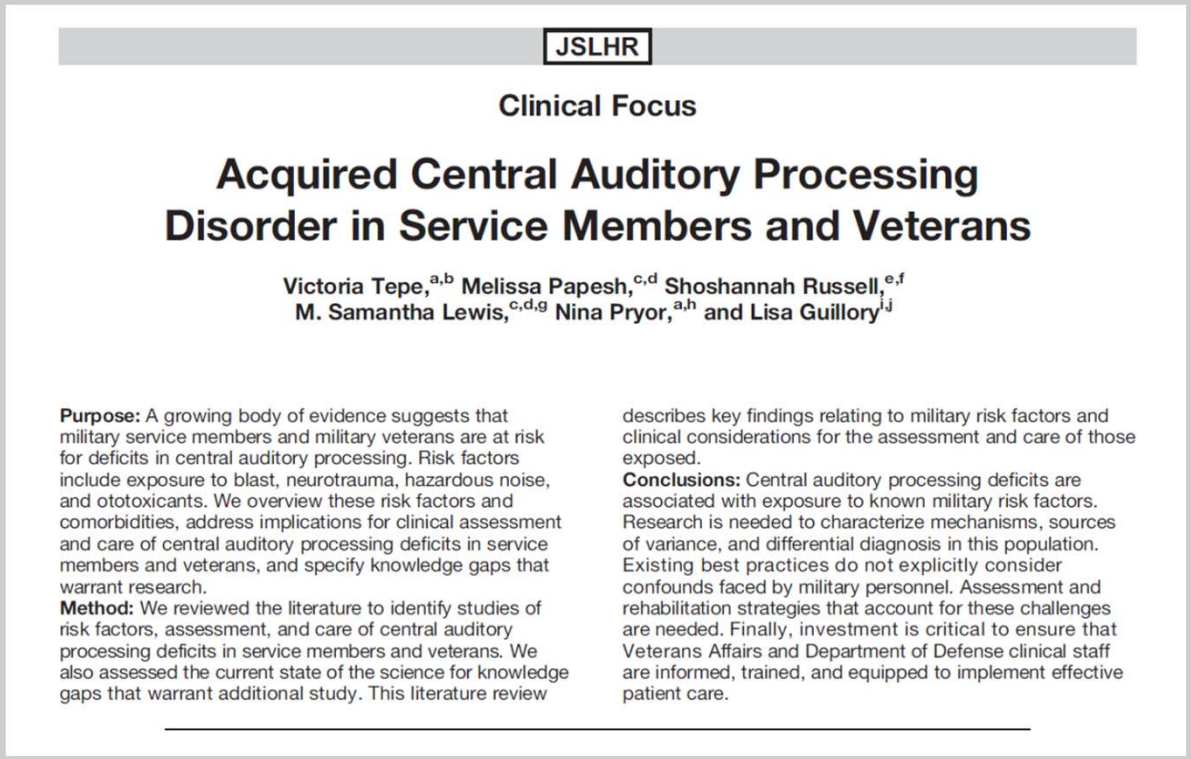
Response: "According to the … DSM-5, a disorder is defined as "a syndrome characterized by clinically significant disturbance in an individual's cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning"(p. 20). Thus, by definition, a disorder is not a "diagnostic characteristic." We provide scientific evidence in this rebuttal that challenges a multitude of Moore's statements and conclusions used to support his opinion and this indefensible editorial policy. We note the considerable adverse consequences of this policy for scientific inquiry and research, dissemination of scientific knowledge, and ultimately good patient care…"

Iliadou, V. V., Chermak, G. D., Bamiou, D. E., Rawool, V. W., Ptok, M., Purdy, S., ... & Musiek, F. E. (2018). Letter to the editor: **An affront to scientific inquiry** re: Moore, DR (2018) editorial: Auditory processing disorder, Ear Hear, 39, 617–620. *Ear and hearing*, *39*(6), 1236-1242.

Auditory Processing and Military Service

- Publication by the VA/DoD Working Group on Auditory Processing Disorders:

Tepe, Victoria, Melissa Papesh, Shoshannah Russell, M. Samantha Lewis, Nina Pryor, and Lisa Guillory. "Acquired central auditory processing disorder in service members and veterans." *Journal of Speech, Language, and Hearing Research* 63, no. 3 (2020): 834-857.



JSLHR

Clinical Focus

Acquired Central Auditory Processing Disorder in Service Members and Veterans

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Purpose: A growing body of evidence suggests that military service members and military veterans are at risk for deficits in central auditory processing. Risk factors include exposure to blast, neurotrauma, hazardous noise, and ototoxicants. We overview these risk factors and comorbidities, address implications for clinical assessment and care of central auditory processing deficits in service members and veterans, and specify knowledge gaps that warrant research.
Method: We reviewed the literature to identify studies of risk factors, assessment, and care of central auditory processing deficits in service members and veterans. We also assessed the current state of the science for knowledge gaps that warrant additional study. This literature review describes key findings relating to military risk factors and clinical considerations for the assessment and care of those exposed.
Conclusions: Central auditory processing deficits are associated with exposure to known military risk factors. Research is needed to characterize mechanisms, sources of variance, and differential diagnosis in this population. Existing best practices do not explicitly consider confounds faced by military personnel. Assessment and rehabilitation strategies that account for these challenges are needed. Finally, investment is critical to ensure that Veterans Affairs and Department of Defense clinical staff are informed, trained, and equipped to implement effective patient care.

Military-related Risk Factors

- Traumatic Brain Injury & Blast Exposure
- Jet Fuel and Solvents Exposure
- Noise Exposure
- Comorbidities
  - Mental Health Concerns
  - Attention/Cognition Deficits
  - Sleep Disturbances
  - Chronic Pain

These factors should ***definitely*** be ascertained in any Veteran suspected of having an APD via thorough medical chart review and case histories.

Retrospective Review of Veterans Assessed for Auditory Processing Concerns

What: A review of medical records for Veterans who have been evaluated for APD from 2001 through 2020

How: Patients identified based upon the CPT code 92620, “Evaluation of central auditory processing with report; initial 60 minutes” followed by in-depth medical chart review

When: Currently in progress

Why: To learn more about

- This clinical population, including comorbidities
- Current and recent trends in testing and treatment

1). Identify Unique Patients with CPT code 92620

- Organize according to military service discharge date starting with most recent

(n = 29,322)

2). Review medical chart notes and eliminate cases based upon following criteria:

- Less than 3 APD tests administered
- Non-clinical visits
- non-Veteran or non-Service-member patients

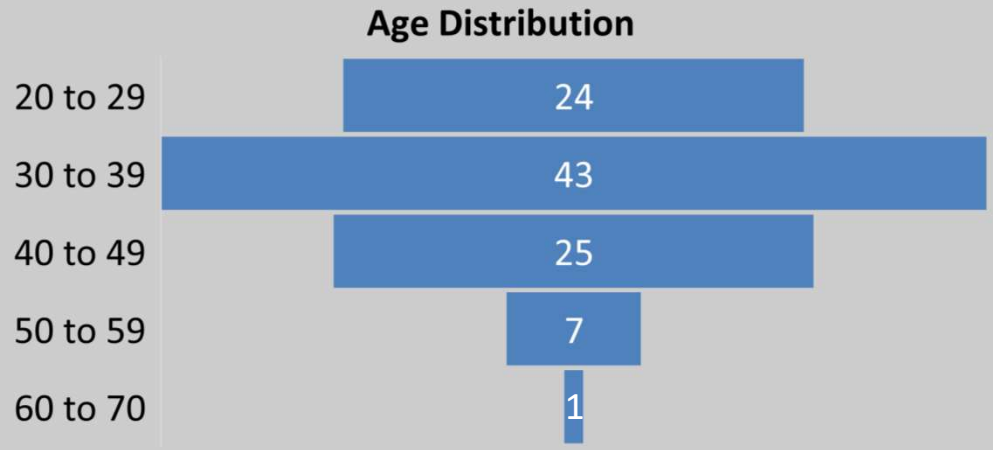
(n = ~7,300)

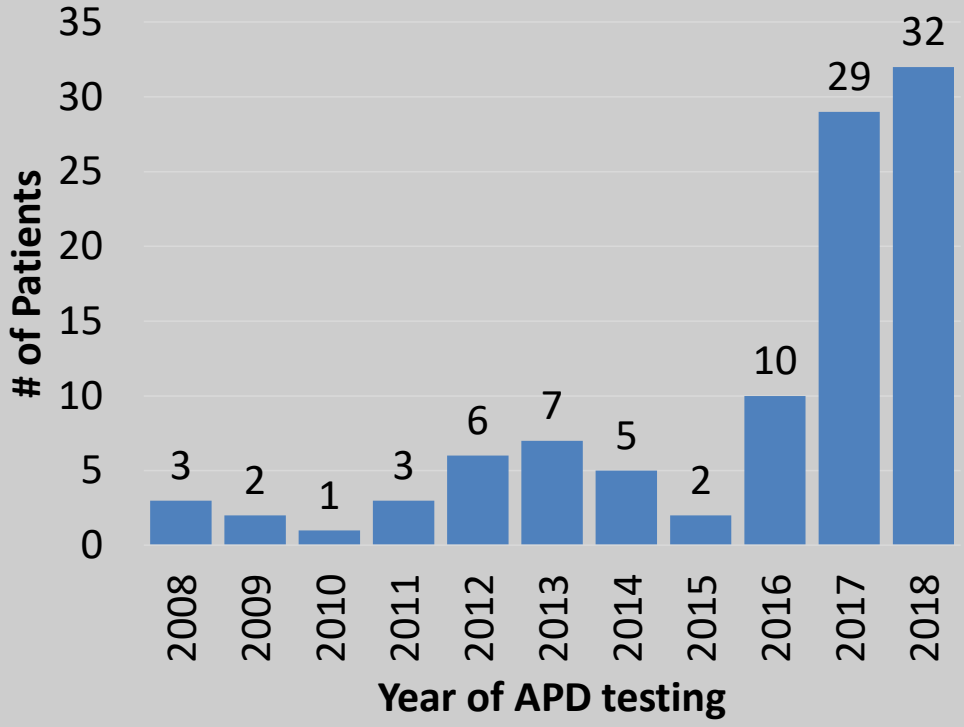
3). In-depth chart review (CPRS, JLV, and ROES) to record information including:

- Patient age and audiometric status
- VA location
- Referral sources
- Auditory complaints
- APD tests administered and test results
- Clinician comments and recommendations
- Patient follow-up from clinical recommendations, including any visits with SLPs and ROES data
- Comorbid conditions that may affect auditory functioning

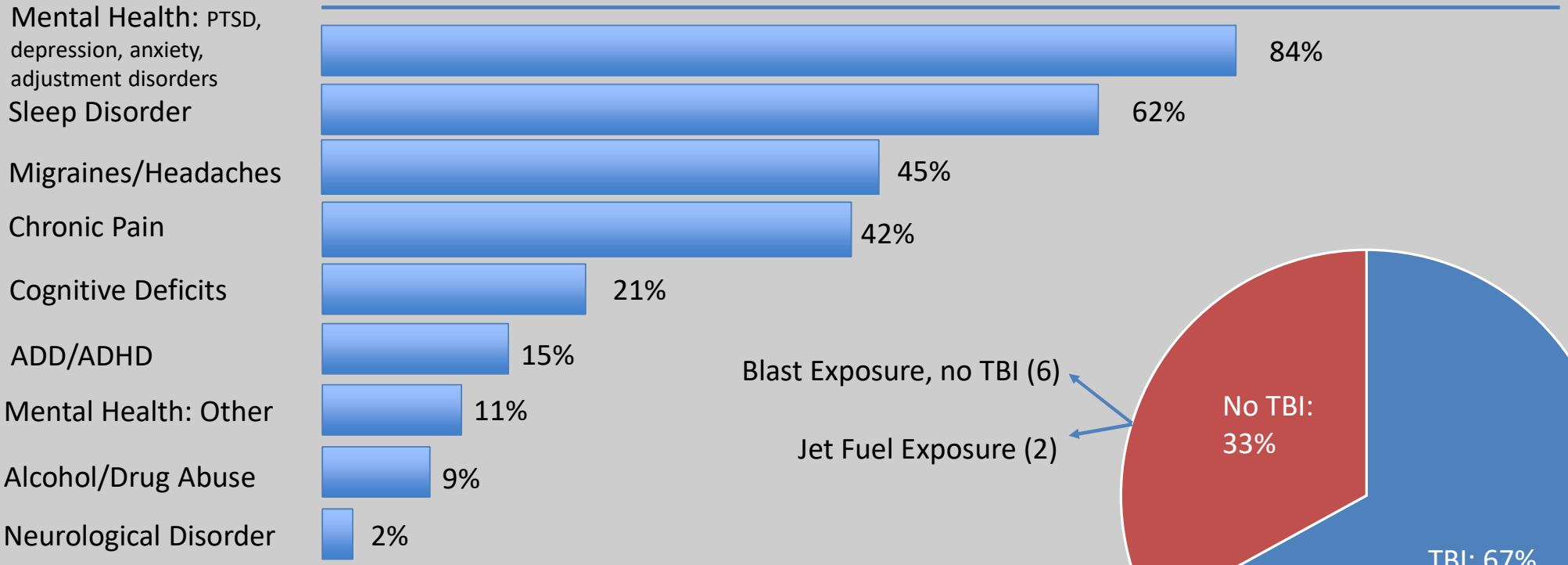
Overview of 1st 100 Case Reviews

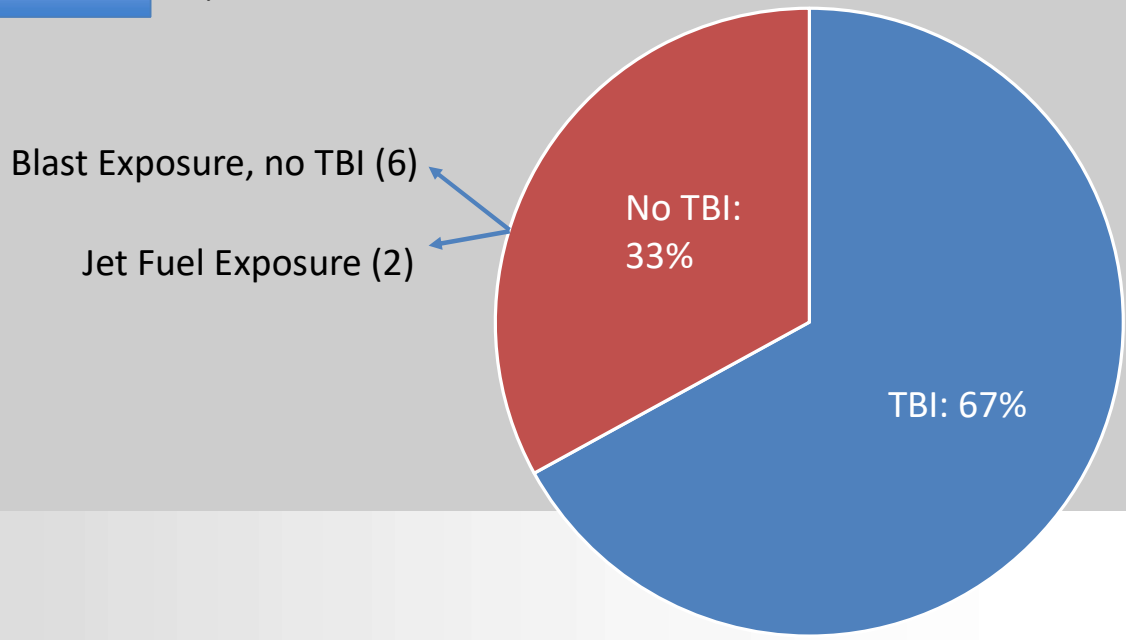
- 32 different clinics
- 81 males; 19 females
- Age range: 20 to 64 years





Comorbid Diagnoses





Referral Sources:	# of Pts.
Self	43
TBI/Polytrauma	20
SLP	14
Not stated	13
PCP	9
Hearing Conservation	1

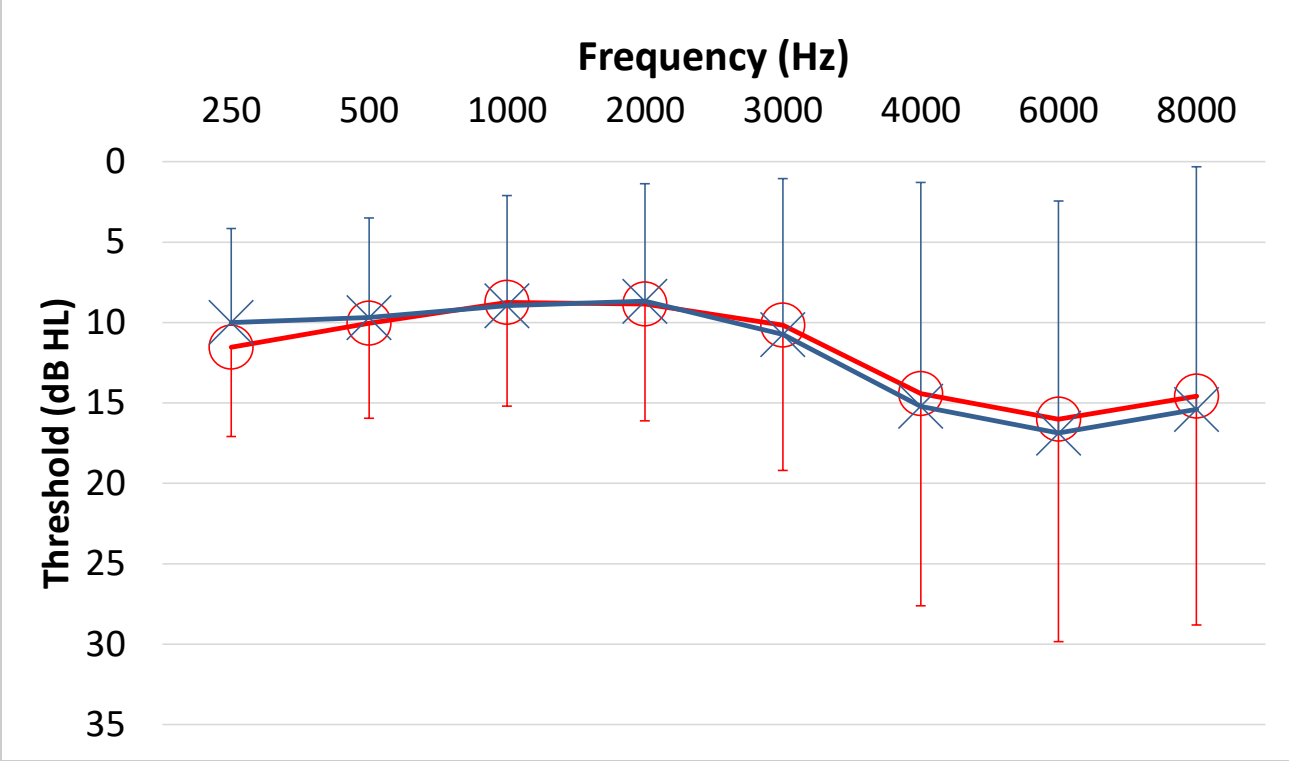
WRS, quiet: Average of 97% Correct

Acoustic Reflexes: Tested in 60% of patients

- 6 patients showed abnormal, absent, or mixed acoustic reflexes

dpOAEs: Tested in 40% of patients

- 26 patients demonstrated expected response
- 14 patients demonstrated abnormal responses in at least one ear



Range:

	250	500	1000	2000	3000	4000	6000	8000
Right	0 to 25	-5 to 20	-5 to 25	-5 to 30	0 to 50	-5 to 75	-5 to 80	-10 to 75
Left	0 to 25	-10 to 25	-5 to 25	-5 to 35	-5 to 65	-10 to 70	-5 to 75	-5 to 75

Patient Self-Reports

- Details regarding specific difficulties are extremely variable among chart notes
- When listed, primary complaints almost always include “difficulty in background noise”, and hearing complaints beyond expectations based upon pure tone thresholds
  - Several accounts include specific instances of difficulties affecting daily life in work, family, and school

- Most commonly used self-report measures include:
  - Hearing Handicap Inventory for Elderly/Adults (HHIE/HHIA) (n = 26)
  - Functional Hearing Questionnaire (FHQ) (n = 9)
  - Abbreviated Profile of Hearing Aid Benefit (APHAB) (n = 7)
  - Other measures used:
    - Client Oriented Scale of Improvement (COSI)
    - Speech, Spatial, and Qualities of Hearing (SSQ)
    - Activities of Daily Living
    - Auditory Inventory Questionnaire

- More than half (n=53) don’t report use of any standard self-report index

APD Assessment: Professional Recommendations

- Include both speech and non-speech tasks
- Assess different levels of the CANS
- Involve a comprehensive test battery that assesses a variety of auditory processes including, but not limited to, the following:
  - sound localization and lateralization
  - auditory discrimination
  - auditory temporal processing
  - auditory pattern processing
  - dichotic listening
  - auditory performance in competing acoustic signals
  - auditory performance with degraded acoustic signals
- Utilize cut-off scores developed from normative and standardization studies, as well as ear advantage scores where available

APD Assessment: Professional Recommendations

- "more" is not necessarily "better," as the test battery's specificity generally decreases as tests are added
  - "…select the minimum number of tests necessary to provide the best overall sensitivity and specificity while, at the same time, assessing a representative sample of the major auditory processes"

- Advocate use of auditory evoked responses, especially including middle latency and late responses (N1, P2, and P300)

- Although governing bodies clearly indicate that it is **audiologists who are tasked with diagnosing (C) APD**, both ASHA and AAA indicate the need for a multidisciplinary approach to rule out alternative explanations for auditory difficulties

APD Assessment in Practice

- Number of test sessions:
  - 1 (n = 73)
  - 2 (n = 20)
  - 3 (n = 6)
  - 4 (n = 1)

- Number of Tests:
  - Average: 6.54, SD: 2.72
  - Median: 6
  - Mode: 6
  - Range: 3 to 15

Test Measures

- Dichotic Digits (n = 61)
  - Most often 2-digit pairs, Free Recall
- QuickSIN (n = 55)
  - Both normal and speeded versions often used
- Pitch/Frequency Pattern Test (PPT/FPT) (n = 49)
  - Several clinics report both verbal and hummed responses
- SCAN measures very popular
  - 48 evaluations included at least one SCAN subtest
  - Most common are Competing Words, Filtered Words, Auditory Figure ground, Competing Sentences, and Time Compressed Speech
- Staggered Spondaic Words (SSW) (n = 44)
  - Methods for scoring varied across sites
- Gaps-in-Noise tests (n = 42)
  - Most often the Musiek version, but also instances of Random Gap Detection Test and the Gap Screening tool available on SCAN

Other Test Measures

- Words-in-Noise (WIN)
- Masking Level Difference (MLD), 500 Hz tone
- Duration Patterns Test (DPT)
- Time compressed words with and w/o reverberation
- Oldenburg Matrix Test (OMT) standard and w/wo compression and reverberation
- Auditory Continuous Performance Test
- Listening in Spatialized Noise – Sentences (LiSN-S) Test
- Phonemic Synthesis Test
- Competing Environmental Sounds Test
- Dichotic Sentence ID
- Dichotic Synthetic Synthesis Identification
- SPeech Reception In Noise Test (SPRINT)

Electrophysiology Measures

- ABR (n = 9)
- MLR (n = 4)
- LLR/P300 (n = 3)
- Most often, these tests were included following behavioral testing to either rule out auditory neuropathy or to corroborate behavioral results

Patient Performance

25% passed all tests

- Recommendations/Interventions included:
  - Communication counseling/environmental modification (n = 16)
  - Hearing aids/FM system (n = 9)
  - Referral to SLP or TBI group (n = 8)
  - Told of test outcomes only (n = 5)
  - Referral for other auditory/vestibular issue (n = 4)
  - General brain training programs (n = 1)
  - Auditory specific training apps (n = 1)
  - Referral to mental health (n = 1)

3% failed all tests

- Recs included:
  - Communication Counseling (n = 3)
  - Referral to Neurology (n = 1)
  - Referral to SLP (n = 1)
  - Electrophysiological testing (n = 1)

Majority passed some tests and failed others…

APD Diagnosis

ASHA and AAA states that diagnosis of (C) APD requires one of the following:

- Performance deficits of at least two standard deviations below the mean on two or more tests in the battery (Musiek and Chermack, 1997)
- Performance deficits on one test of at least three standard deviations below the mean or when the finding is accompanied by significant functional difficulty in auditory behaviors reliant on the process assessed (ASHA, 2005)
- Failure on all or most tests is considered consistent with a global cognitive disorder as opposed to (C) APD

APD Diagnosis in practice

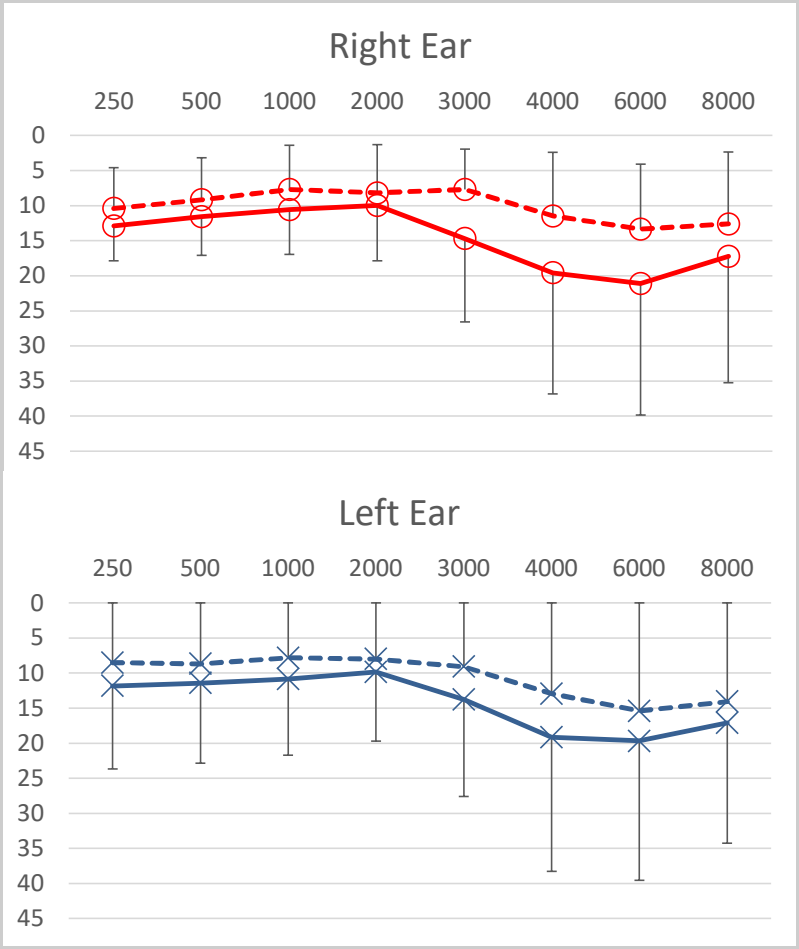
- Varies considerably!
- Some clinicians clearly state the criterion by which they will give a patient an APD diagnosis
- Other clinicians clearly state that they will not give an APD diagnosis, but are performing APD testing to better understand auditory capabilities
- Some clinicians are clearly hard to convince that APD might be present
- Other clinicians give an APD diagnosis based on very few criteria
- APD diagnostic codes used:
  - H93.25: Central Auditory Processing Disorder
  - H93.293/H93.299: Other abnormal auditory perceptions, bilateral or unspecified
  - H91.93: Unspecified hearing loss, bilateral

Treatments, Interventions, & Recommendations by Audiologists

- Majority of patients are at ***least*** provided communication counseling
- Referral to SLP for testing (n = 64)
- Hearing Aids and/or FM System (n = 39)
- Auditory Training (n = 12)
- General Brain Training (n = 5)
- ADA Accommodations letter (n = 3)

Hearing Aids & FM Systems

- Offered to 39 patients; 35 patients accepted
- Who gets hearing aids?
  - Those with slightly poorer hearing thresholds
  - Tinnitus (even non-bothersome!)
  - Those with significant self-reported difficulties (sometimes)
  - Those who did NOT attend a clinic allows hearing aids only based upon pure tone sensitivity
- Mini BTE RICs with domes for almost all patients
  - Most also having streaming devices/apps
  - Most clinicians indicate fitting to NAL/NL2-targets



Hearing Aid Use

- Based upon orders in ROES and/or visits to audiology for hearing aids
- Evidence that at least 15 patients are still regularly using their hearing aids in 2021
- 17 patients don't seem to be using them today
  - 11 of these seemed to wear for at least 2 years
- No data available for 3 patients
- Still awaiting IOI-HA data from DAC

SLP Referrals and Services

- Of 64 SLP referrals from audiologists, 60 patients followed through

- Benefits of SLP referrals:
  - Well-connected with several facets of medical care including neurology and mental health
  - Ability to test for many types of cognitive and communication deficits, including deficits that may affect auditory function more than other sensory systems
  - Ability to provide ongoing care and training on wide range of topics
  - Access to additional options for external aids to improve function

SLP Therapy related to APD

1. SLPs begin by interviewing the patient to get a clear picture of the difficulties they are facing, as well as obtaining medical case history.

2. Next is an assessment of cognition, usually including several aspects of memory and attention.
   - Assessment focuses on understanding areas of strength and weakness, though diagnoses are also made

3. The SLP then works to create program of short-term and long-term goals, including specific recommendations and interventions, designed to improve daily functioning
   - Interventions largely fall into two categories:
     - Therapy/training to improve memory, attention, and/or listening skills and strategies
     - External aids, including training on use in daily life

4. SLP meets with the patient repeatedly to practice skills and determine progress toward goals
   - Therapy ends when goals have been met or when patient and clinician feel that adequate progress has been made

Auditory-Specific Trainings

- LACE: Listening and Communication Enhancement
- Starkey Hear Coach App
- Simon game (temporal pattern training)
- Earobics for Adolesents and Adults
- Constraint Induced Auditory Training (CIAT)
- Informal practice such as incorporating Dichotic Interaural Intensity Difference or practice listening with noise and distractions

Non-Auditory Specific Trainings
(most of which have auditory components)

- Brain HQ
- Luminosity
- Braintrain: Captain's Log Mind Power Builder
- Attention Process Training-III
  - Excellent auditory attention components

SLP Assistive Technologies

- **Electronic Cognitive Devices**: tools or devices that either reduce the cognitive demands of a task or transform the task or environment to match the users' abilities
  - Livescribe pens
  - iPads
  - Apps such as calendars, reminders, notes, and training for memory, attention, and listening

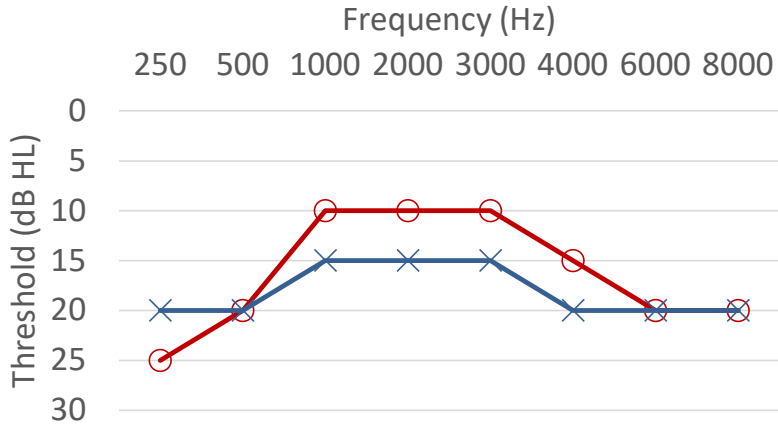
- Assistive Technology Devices available at VA: https://www.prosthetics.va.gov/AssistiveTechnology/Device_Review.asp

Case Study #1: 35 YO male, 2015

Background:
- Served 17 years as Army Ranger
- History of multiple TBIs (multiple MVAs, blast exposures, and a parachuting accident)
- Pt noticed tinnitus and speech understanding difficulties following blast exposure during deployment
- Referred to Audiology by TBI/Polytrauma team

Comorbidities:
- Severe PTSD
- Insomnia
- Major Depression
- Headaches
- Chronic pain (neck, back, shoulder and knee)
- Currently working with SLP for memory and attention deficits
- Actively monitored by TBI/Polytrauma team

Audiometry:
- Excellent WRS in quiet
- Normal tympanometry
- No Reflex or OAE testing
- QuickSIN revealed mild SNR loss (6.5 dB at 65 dB HL)
- Referred for full APD testing due to hearing complaints and mild SNR loss



Case Study #1: APD Evaluation

- Functional Hearing Questionnaire (FHQ) = 32
- Auditory Continuous Performance Test = no errors
- SSW = failed
  - 34 total errors, mostly in right and left competing conditions
- SCAN:
  - GIN screening = normal
  - Filtered Words = normal
  - Auditory Figure Ground = disordered
  - Competing Words, Directed Ear = borderline
  - Competing Sentences = disordered
  - Time Compressed Speech = disordered
  - AFG +8 = disordered
  - AFG +12 = disordered
- Pitch Patterns Test (PPT) = normal

Diagnosis: APD (H91.92)

- Binaural interaction deficit
- Degraded speech perception deficit

Case Study #1: Recs and Outcomes

Recommendations:

- Communication strategies counseling
- Formal and informal auditory training (Pt declined LACE; already 'hooked' on Luminosity)
- Hearing aids with remote mic
  - Mini RICs with phone clip and mini-mic
  - NAL-NL2 targets set

Outcomes:

- Reports he loves hearing aids: "…very pleased with better hearing."
- Regularly returns for hearing checks (hearing is stable), when aids need repair, and regularly obtains new batteries, domes, and wax guards
- Most recent visit to audiology in January 2021 for HA repair

Case Study #1: SLP and other services

- Received care with TBI/Polytrauma team from 2015 through Dec. of 2018
- Sleep problems were improved with use of medication
- Was and is still receiving treatment for severe PTSD

- SLP Services
  - Attended weekly or biweekly therapy sessions from mid 2015 through mid 2018 except during active deployments
  - Specifically focused on *cognitive* abilities
  - Employed lots of apps, games, and several in-person tasks to work on dual tasking, sustained attention, and working memory in both auditory and visual modalities
  - Upon discharge: "…demonstrates significant progress and benefit from speech therapy services. He is scheduled for deployment and feels he is cognitively functioning at a level that is sufficient for duty. He compensates well for difficulties in recall utilizing notes, reminders and to do lists."

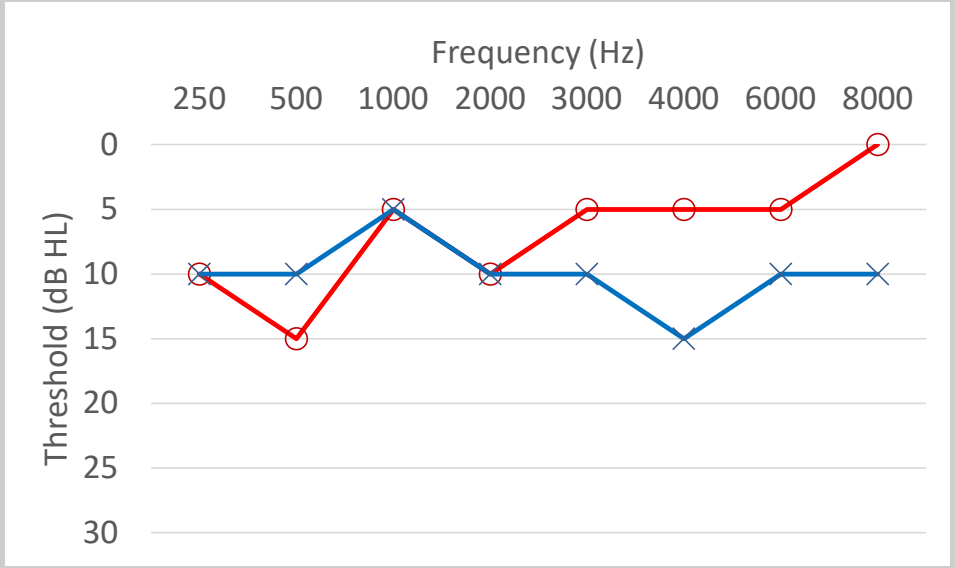
Case Study #2: 35 YO male, 2017

Background

- Blast exposure and multiple TBIs
- Self-referred to audiology with perceived hearing loss, esp. in right ear, in 2012, 2015, and 2017 when finally given APD referral
- Feels auditory problems began following blast exposure

Comorbidities

- PTSD
- Anxiety
- Chronic pain



Audiometry

- Immittance testing normal
- Reflexes present
- No OAEs
- Excellent WRS in quiet
- “Not a candidate for hearing aids based upon pure tone thresholds”

Case Study #2: APD visit

- APHAB scores indicate he feels he has extreme difficulty communicating, esp in background noise
- Testing:
  - MLD = normal (14 dB)
  - QuickSIN standard = mild loss (5 dB SNR loss)
  - QuickSIN speeded = abnormal (5.5 dB SNR loss)
  - Oldenburg Matrix Test standard = normal
  - SCAN subtests:
    - Auditory Figure Ground, 0 dB SNR = normal, but R ear advantage
    - Filtered Words = normal, but R ear advantage
    - Competing Words, Directed Ear = normal, but L ear advantage
    - Competing Words, Free Recall = normal
    - Competing Sentences = disordered, but L ear advantage
    - Time Compressed Speech = normal, but R ear advantage

Diagnosis: "results mixed" though was given APD diagnosis (H93.25)

- "He did have difficulty with background noise and dichotic listening, however, not to the severity that he perceives."
- "Ear advantage pattern is not a typical pattern and may indicate a non-organic basis"

Recommendations:

- Refer to SLP for further testing and treatment options

Case Study #2: SLP Services

Diagnoses = **CAPD (H93.25)**, Cognitive Communication Deficit (R41.840), Attention and Concentration Deficit (R41.840)

- Consistently reported that his auditory concerns were top-of-mind, and each visit related difficulties in various auditory situations
  - Causing significant disruptions at home and at work
- Attended 23 therapy sessions over a 1-year period
- Therapy focused on:
  - Auditory training with LACE, Constraint Induced Auditory Training, APT training, and informal listening-in-noise practice
  - Use of memory compensation strategies
  - Use of external aids such as SmartPen, and apps including reminders, notes, calendar, etc.
  - Exercises to increase working memory skills
  - All therapy sessions heavily focused on auditory processing skills

Case Study #2: Outcomes

- Completed a lot of listening practice at home (especially LACE), and noted “becoming able to focus more easily and can better tune out background noise”

- APHAB scores indicate he feels his hearing ability has improved, especially his ease of communication, though scores still indicate severe perceived communication difficulties

- Returned to audiology again in 2018 stating “…it is hard to hear in groups, hear children correctly, and I have an inability to process audio from competing speech" in his daily life, and "I have an inability to focus on individual conversations, hear in group settings, take direction from multiple people" in his occupational work environment

Limitations

- Major Bias: Results only represents data from clinics that are willing/able to devote time and resources to creating and implementing and APD protocol
  - Significant underestimate of number of patients who might seek or benefit from APD testing

- Bound by what clinicians place in medical record notes
  - Considerable variability!
  - Possible that additional factors are considered that don't make it into the medical records
  - Not always clear what criteria are for diagnosing, determining test battery, or rehabilitation options

Hopes for the (near?) future…

- Continued and expanded collaboration between SLPs and AuDs for patients with auditory processing concerns
- Increased use of both standardized self-report data as well as in depth interviewing of patient difficulties
- Development of VA guidelines for what tests should be administered during APD evaluation, as well as increased education on test administration and interpretation
- Continued and expanded use of hearing assistive devices for patients with auditory processing concerns, despite normal hearing sensitivity
- A way to readily inform service providers that these patients may have more difficulty with auditory information

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Questions? Comments? Thoughts? Please email me!

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