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An Interdisciplinary Approach to ***Persistent Postural Perceptual Dizziness (PPPD)*** and ***Functional Gait Disorders (FGD)*** presented in partnership with AVAA

Patricia Elie, AuD

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Patricia Elie is the Vestibular Program Lead at the Miami VA Healthcare System and has been practicing clinical audiology for almost 5 years. Her interests and clinical experiences include telehealth, aural rehabilitation, hearing aid selection and programming, vestibular evaluation and rehabilitation. She graduated from the University of South Florida with a doctoral degree in Audiology in 2018.

Disclaimer

- **Presenter Disclosure**: Financial: Patricia Elie is an employee of the Miami VA Healthcare System. Non-financial: Patricia Elie has no relevant non-financial relationships to disclose.
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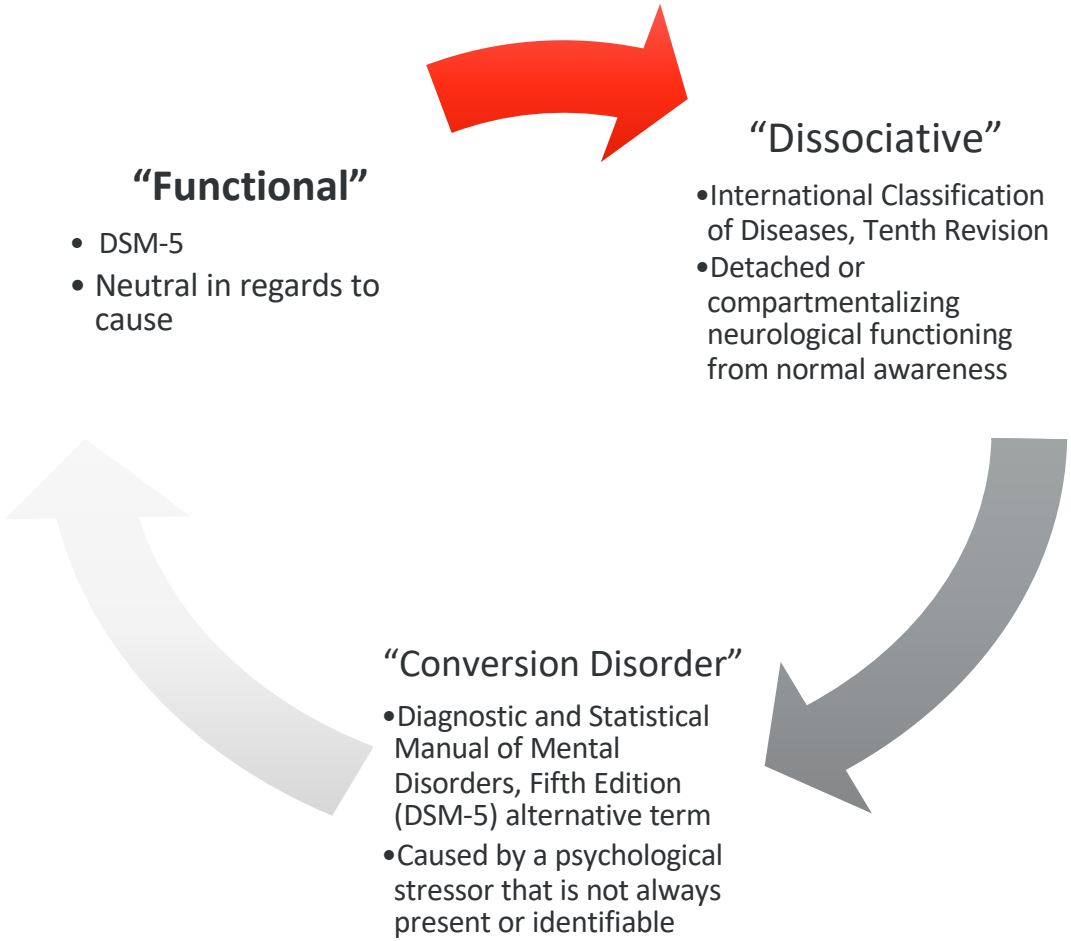
Learning Outcomes

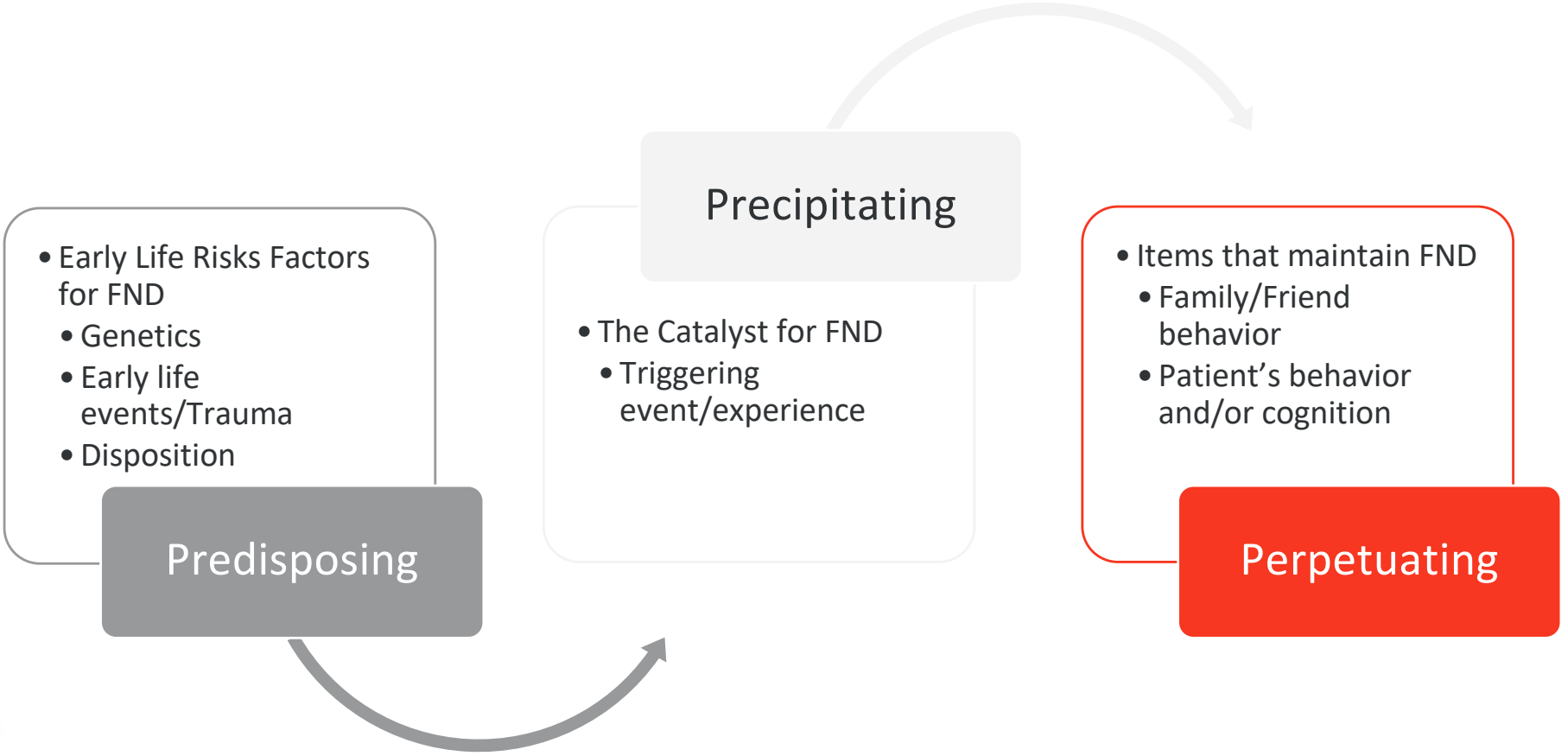
1. Define Functional Neurological Disorders (FND)
2. Identify patients presenting with PPPD and Functional Gait Disorders (FGD)
3. Discuss how to treat and manage patients with PPPD and FGD
4. Explain the importance of interdisciplinary management for patients with FND

Functional Neurological Disorders (FND)



(Espay et al, 2018)

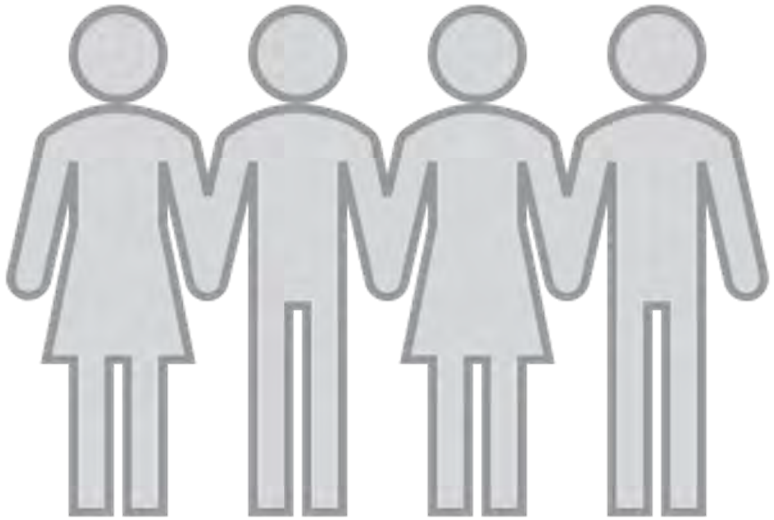
The 3 Ps:


• Early Life Risks Factors for FND
• Genetics
• Early life events/Trauma
• Disposition
Predisposing
Precipitating
• The Catalyst for FND
• Triggering event/experience
• Items that maintain FND
• Family/Friend behavior
• Patient's behavior and/or cognition
Perpetuating

FND

Incidence

- 4 to 12 per 100,000 population per year
  - 4 to 5 per 100,000 population per year for motor FND
  - 6 to 8.5% of FND is gait FND
- More common in females
  - 60% to 75% of FND patients are females
  - Persistent Postural-Perceptual Dizziness (PPPD): 4 to 1



(Espay et al, 2018; Knight et al 2022;Nonnekes et al, 2020; Staab et al, 2017)

Diagnosing FND

Per DSM 5 precipitating factor is no longer needed for diagnosis with the exception of PPPD

- Difficult to determine and sometimes unidentifiable

Not a diagnosis of exclusion

Positive signs

Not Malingering nor factitious disorder

(Espay et al, 2018; Nonnekes et al, 2020)

Types / "Clinical Features" of FND

- Limb weakness
- Tremor
- Seizures
- Dystonia (muscle spasms)
- Gait disorder
- Facial spasm (eye narrowing or jaw/mouth pulling upward, downward or sideward
- Tics
- Jerk and twitches
- Drop Attacks (sudden fall to the ground without losing consciousness
- Functional sensory symptoms (numbness, pins and needles or feeling a limb is not part of your body)
- Functional cognitive symptoms
- Functional speech and swallowing difficulties
- Persistent postural perceptual dizziness (PPPD)

(Espay et al, 2018)

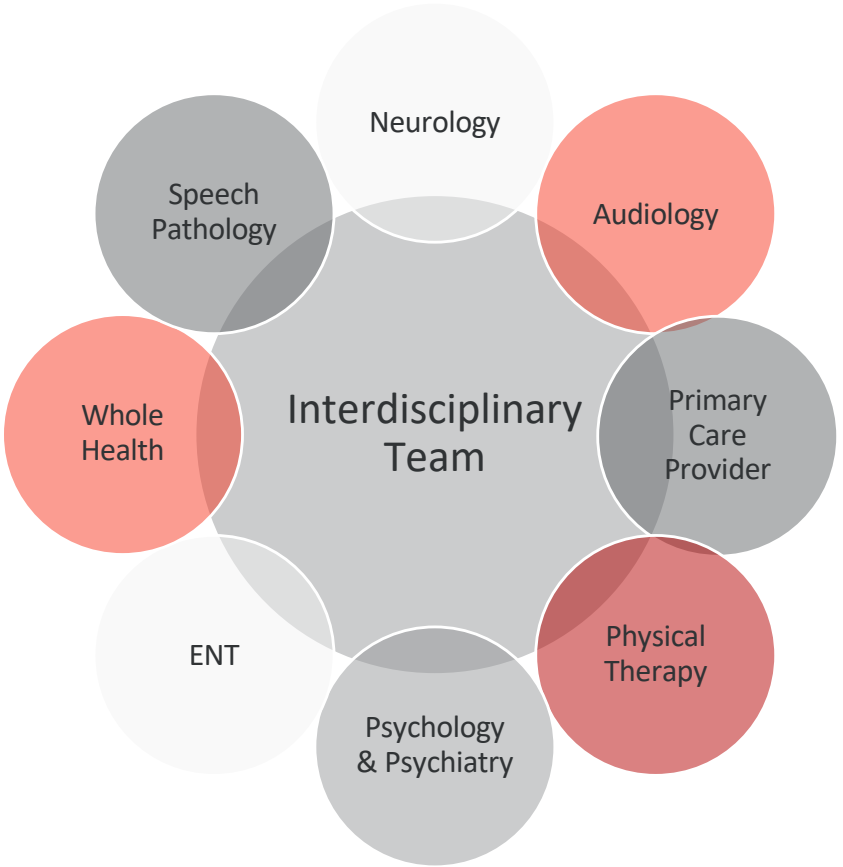
Types/“Clinical Features” of FND

Gait disorder

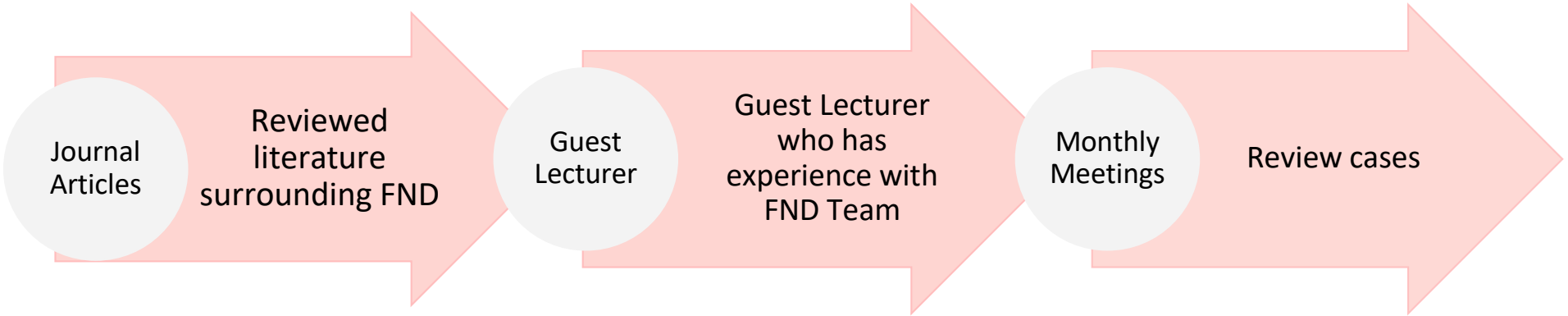
Persistent postural perceptual dizziness (PPPD)

Functional Neurological Disorders (FND) Division

- Established in 2022 at the Miami VA HCS
- First known FND division in the VA



Functional Neurological Disorders (FND) Division



Functional Gait Disorders (FGD)

Functional Gait Disorders (FGD)

- "2 to 20% of patients referred to movement disorders outpatient clinics have a functional movement disorder."
  - 40% have gait abnormalities without any structural damage.
- Can co-occur with organic gait disorders

(Nonnekes et al, 2020)

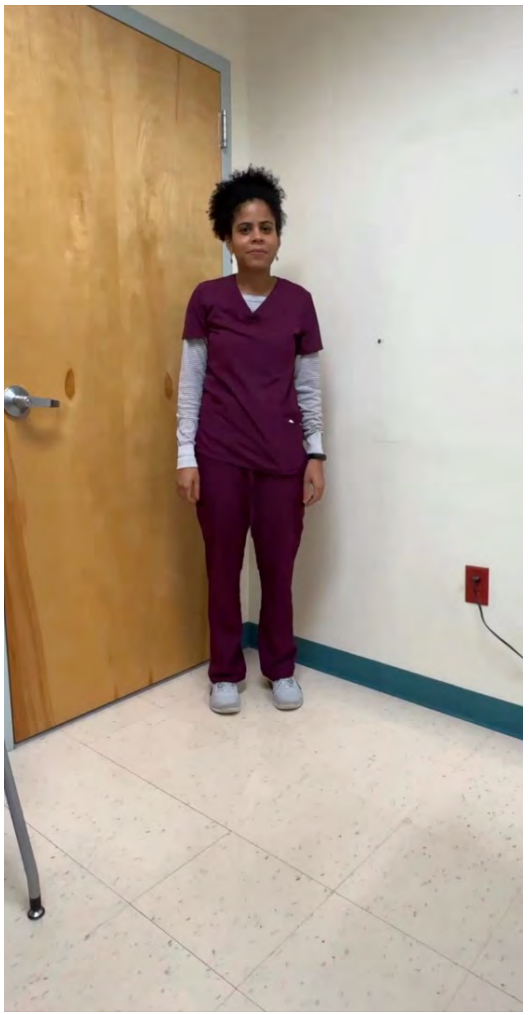
Diagnosing FGD: 7 Signs

1. **Ataxic Gait:** Variability in base of support or inability to walk in a straight line, often, with excessive arm movements and claims of poor balance.
   - **Romberg Test** – Exaggerated Truncal Sway without fall vs Vestibular pathology (VP) where veer to site of lesion
   - **Tandem walking** – No side step, prolonged standing on 1 leg without falling vs organic disorder unable to perform without side step
2. **Spastic Gait:** Scissoring
3. **Weak Gait:** Knees giving way or Trendelenburg gait (weakness).
4. **Antalgic Gait:** Limping
5. **Parkinsonian Gait**: Excessive slowness and start hesitancy
   - **Retropulsion/Pull Test** – Excessive trunk sway without falling or falling backwards, balance is otherwise good except on this test vs organic disorder taking balance corrective steps, severe cases may fall.
6. **Hemiparetic Gait:** Dragging/weakness in one limb
7. **Dystonic Gait:** Anormal posturing of leg or trunk due to muscles contracting involuntarily

(Nonnekes et al,2020)

FGD: Vestibular Application

- Gan's Sensory Organization Performance (SOP) Test
  - Tasking patients during testing to rule out functional gait disorder
    - (e.g., engage in conversation)
    - Look for inconsistencies, such as improvement or worsening of performance
  - Exaggerated truncal sway without falling



(Nonnekes et al, 2020)

Diagnosing FGD

- Look for inconsistencies in organic gait disorders
  - Examples
    - Walks differently when at home with family than in clinic
    - Improves when distracted
    - Visible gait impairments do not affect activity of daily life or mild gait impairments severely affect activities of daily life
    - Sudden worsening of symptoms in the absence of structural damage

(Nonnekes et al, 2020)

Diagnosing FGD

- Look for incongruencies that would not be present in organic gait disorders
  - Examples
    - Delayed symptoms but very minor injury
    - Neurologic examination
      - Buckling gait , but normal quadricep strength
      - Gait improves when performing cognitive task while walking
    - Fall slowly without injuring themselves
- Cannot examine in small room

(Nonnekes et al, 2020)

Case Study 1: Ross

What Mattered Most:

Imbalance Onset:

- 2018 every time he would stand up or get out of bed, he would get dizzy.
- Ross reports that that dizziness was mild, but more recently is getting more severe and accompanied by panic attacks.
- Lost his sister and later his mother in April of 2023
- Notes that he struggles with anxiety, "especially while driving."

VNG

Peripheral involvement: Inconclusive could not tolerate vHIT goggles and requested that caloric test be discontinued. Response was measured on the right side

Central involvement: Abnormal gain during tracking, but also had a panic attack during test and could not repeat test.

- **Sensory Organization Performance (SOP) Test**
  - Romberg Eyes Open: Normal
  - Romberg Eyes Closed: Sway
  - Tandem Romberg Eyes Open: Sway
  - Tandem Romberg Eyes Closed: Sway
  - Romberg on foam with eyes open: Sway
  - Romberg on foam with eyes closed: Fall
  - Stepping Fukuda: Abnormal: >45 degree turn to the left

Post headshake nystagmus 3 deg/sec right beat, not accompanied by dizziness

Had panic attacks throughout testing

Case Study 1: Ross

3P's

Predisposing

- Parents separated when he was in 3rd grade.
- Had 7 siblings. Hx of physical abuse by his dad. Mom was 'always working" care giver was the sister who passed in 2023
- When asked about sexual trauma, he gets tearful and shuts down, prefers not to talk about it now

Precipitating

- Loss of mother and sister

Perpetuating

- Depression
- Anxiety/panic disorder

Neurology Finding

Rising from chair: with difficulty, needs to try several times

Posture: examined and normal

Stability: unsteady but able to run

Arm-swing: examined and normal

Turning: shuffling gait for few steps after turning.

Retropulsion: +

Tandem: examined and normal with difficulty

International FND Awareness Day

- https://youtu.be/MbsF1ItZVF0?si=VSbDXu7RUkB81P8J

TREATMENT OPTIONS FOR FGD

FGD Treatment

- Recommended Criteria for Enrollment in Physical Therapy:
  - Patient received/understands diagnosis by a physician
  - Patient ACCEPTS the diagnosis
  - Patient wants help and is able to identify treatment goals

(Nielsen G, et al, 2014)

FGD Treatment

- Education
  - Use appropriate terminology (e.g., “functional”)
  - Acknowledge that symptoms are real
  - Assure that disorder is common
  - Problem with functioning of the nervous system that is not permanent and can be retrained to gain control over movements.
  - Discuss factors that may be contributing to symptoms
    - Physical illness or injury
    - Psychological factors such as anxiety, depression, or trauma

(Nielsen et al, 2014)

FGD Treatment: Physical Therapy

Show patient that normal movements are possible and abnormal movements can stop

- Mirrors or video to provide feedback to patient regarding movement /posture

Re-train movement by distracting

- Distract the patient from cognitively controlling movement
  - Fast, unfamiliar/unpredictable movement
  - Music
  - Cognitive tasks such as math
  - Conversation

Stimulate automatically generated movement.

- Sitting on a therapy ball

(Nielsen et al, 2014)

FGD Treatment: Physical Therapy

Visualization exercises

Therapy Diary to keep track of goals and achievements

Avoid assistive devices (e.g., cane, walker, etc.)

- Can prevent return to normal movement
- Can cause new issues such as weakness or pain

If need to use assistive device due to history of injuries, try to wean off of it

(Nielsen et al, 2014)

Treatment for FGD: Neurobehavioral Therapy (NBT)

Cognitive Behavioral Therapy (CBT)

- Beliefs and thoughts instruct/lead mood and behavior
- Helps patients notice irrational destructive thoughts and replace them with healthier/realistic thoughts.
- Patient is actively participating in therapy
  - Patient to practice techniques at home learned in therapy and has at-home assignments to complete

NBT is CBT for FND

Interdisciplinary Fall Prevention Program

Fall Prevention Education Group

Virtual one-time group class that reviews modifiable risk factors and vestibular disorders that contribute to falls. Education of home modifications to prevent falls.

Individualized Physical Therapy

In person one-on-one physical therapy sessions for fall prevention, gait, balance, power, endurance, and strengthening interventions tailored to patients' needs.

VA Calm Program

VA Calm Program is a 6-week, 90-minute Mindfulness Group that meets Wednesdays from 10:30am-12:00pm virtually. Overview of session topics:

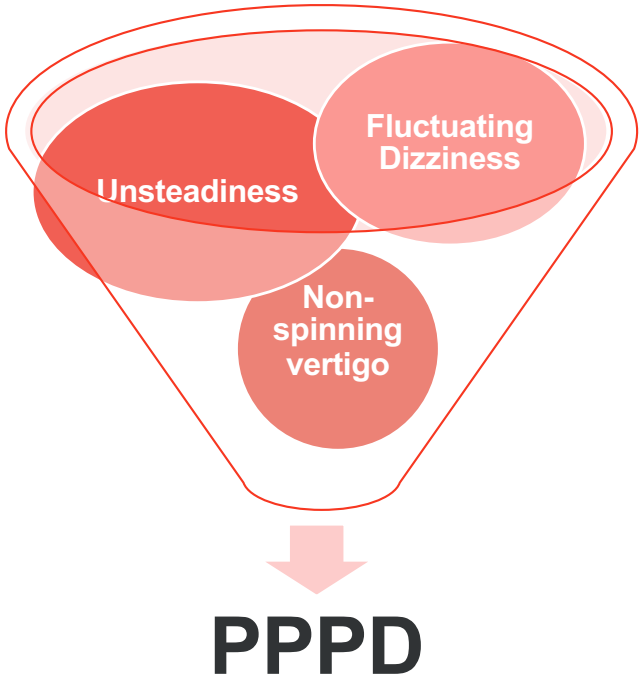
- Session 1: Introduction to Mindfulness
- Session 2: Be Right Where You Are
- Session 3: Our Storytelling Minds
- Session 4: Cultivating Kindness
- Session 5: Willingness to Be with Things as They Are
- Session 6: Moving Forward

Tai Chi

Eight virtual Tai Chi sessions available in both basic and advanced levels for improving Balance, coordination, and muscle strength.

Persistent Postural Perceptual Dizziness (PPPD)

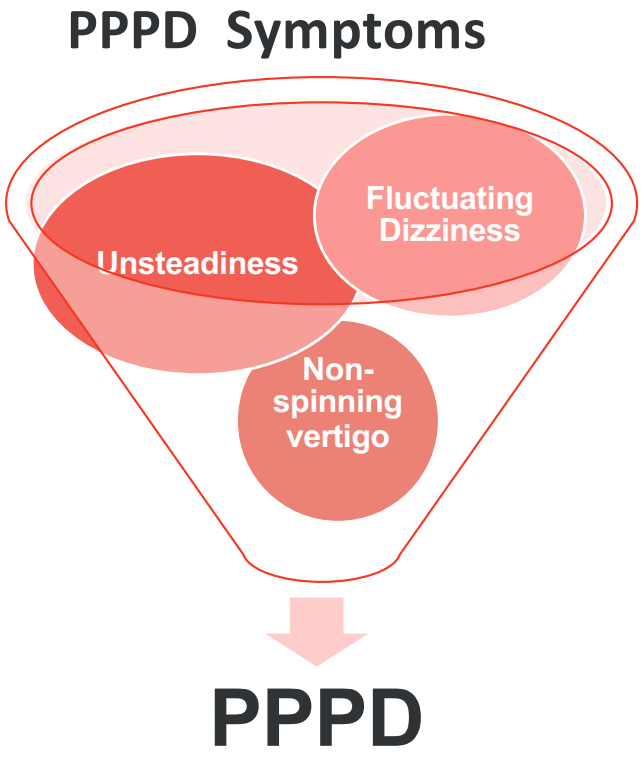
PPPD Symptoms



- Not vertigo
- Feeling like swaying, rocking, bobbing, or bouncing
  - Internal (feeling like they are making these movements)
  - External environment moving
- Unstable when walking or standing

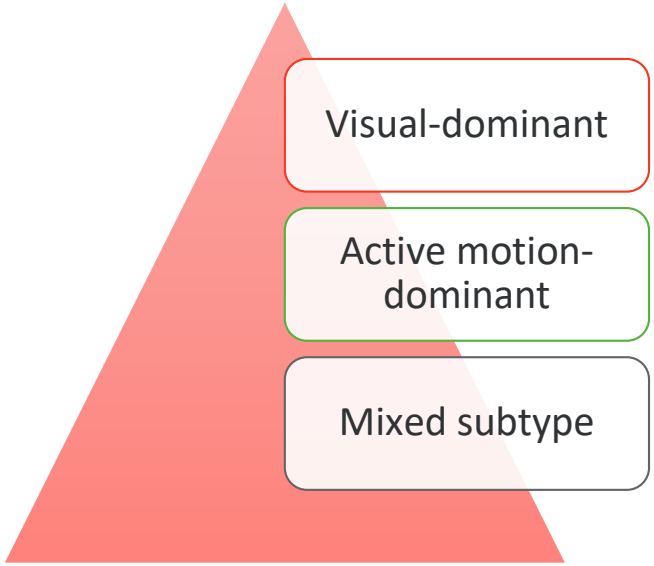
(Staab et al, 2017)

PPPD Characteristics



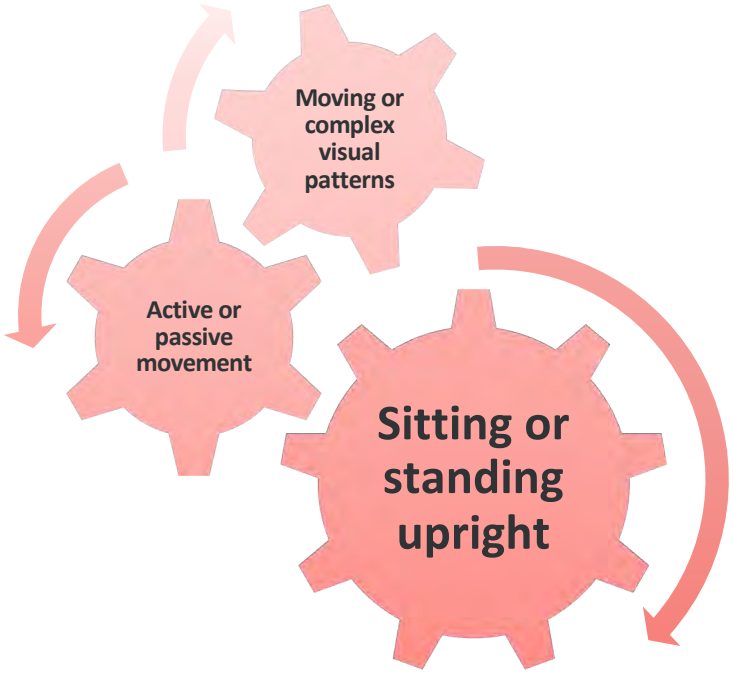
- Dizziness increases with
  - Moving or complex visual patterns
  - Sitting or standing upright
  - Active or passive (riding in a car or elevator, being moved around in a crowd) movement (not direction or position specific)
- Symptoms cause considerable “distress” and “functional impairment”
- Symptoms must last most days (more than 15 of every 30 days) for 3 months or more (Chronic functional vestibular disorder)
- Precipitating factor
  - *“Conditions that cause vertigo, unsteadiness, dizziness, or problems with balance including acute, episodic, or chronic vestibular syndromes, other neurologic or medical illnesses, or psychological distress.”*
- *“Symptoms cannot be better explained by another disease or disorder”*

(Staab et al, 2017)



PPPD Subtypes

PPPD Symptoms



(Yagi et al, 2021)

The Niigata PPPD Questionnaire (NPQ)

- Questionnaire for diagnosing and assessing PPPD severity
- The NPQ does not consist of questions regarding
  - Dizziness, unsteadiness, and non-spinning vertigo
  - The time from onset (>3 months)
  - 15/30 days of a month
- Recommended to be used in addition to case history and not in leu of

Niigata Persistent Postural-Perceptual Dizziness Questionnaire

The purpose of this questionnaire is to identify the difficulties in daily life activities that you may be experiencing due to dizziness. Please indicate your answer by circling the number that best describes the extent to which you have been affected during the past week. If you completely avoid performing any of these actions, circle the number 6.

		None Unbearable
1	Quick movements such as standing up or turning your head	0 1 2 3 4 5 6
2	Looking at large store displays	0 1 2 3 4 5 6
3	Walking at a natural pace	0 1 2 3 4 5 6
4	Watching TV or movies with intense movement	0 1 2 3 4 5 6
5	Riding a car, bus, or train	0 1 2 3 4 5 6
6	Sitting upright in a seat without back and arm support	0 1 2 3 4 5 6
7	Standing without touching fixed objects	0 1 2 3 4 5 6
8	Watching a scroll screen on a PC or smartphone	0 1 2 3 4 5 6
9	Performing activities such as housework or light exercise	0 1 2 3 4 5 6
10	Reading small letters in a book or newspaper	0 1 2 3 4 5 6
11	Striding at a rapid pace	0 1 2 3 4 5 6
12	Riding an elevator or escalator	0 1 2 3 4 5 6

(Yagi et al, 2019)

The Niigata PPPD Questionnaire (NPQ)

- Upright posture/walking :Q3, 6, 7, and 11
- Movement :Q1, 5, 9, and 12 pertained to
- Visual stimulation: Q2, 4, 8, and 10
- Each subscale totals to 24
- All subscales combined totals to 72
- The visual stimulation score of 9/24 subscale had the highest separation between PPPD participants vs controls
- Best Sensitivity = Total NPQ 27
- Best Specificity = Total NPQ 29
- What we currently use:
  - Total score 27 or greater and/or total Visual Stimulation score was 9 or greater

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11	Striding at a rapid pace	0 1 2 3 4 5 6
12	Riding an elevator or escalator	0 1 2 3 4 5 6

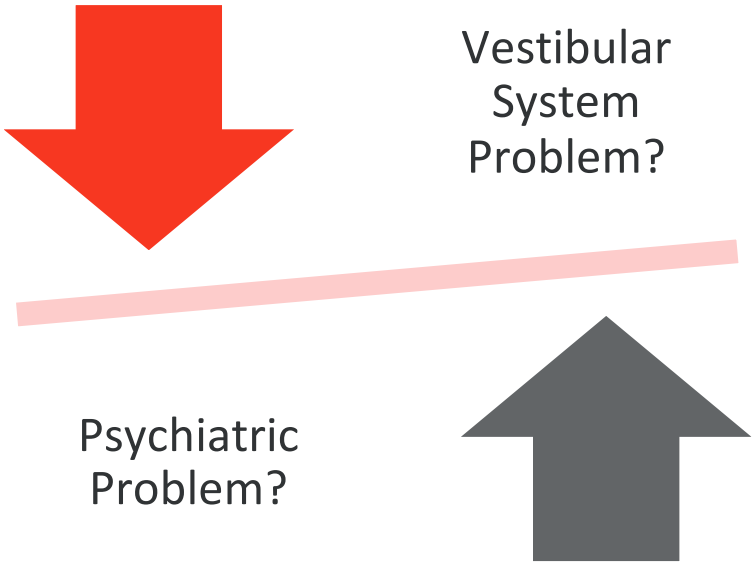
(Yagi et al, 2019)

Persistent Postural-Perceptual Dizziness (PPPD)

- Can often occur following other non-related conditions such as the following:
  - Peripheral or central vestibular disorders (15 to 20%)
  - Vestibular migraines disorders (15 to 20%)
  - Panic attacks (15%) or anxiety (15%)
  - Concussions/neck injuries (e.g., whiplash) 10 to 15%
  - Autonomic disorders (7%)
  - Cardiac dysrhythmias (irregular heartbeat) and adverse reaction to specific drugs (3%)
- Can also occur simultaneously with another disorder

(Staab et al, 2017)

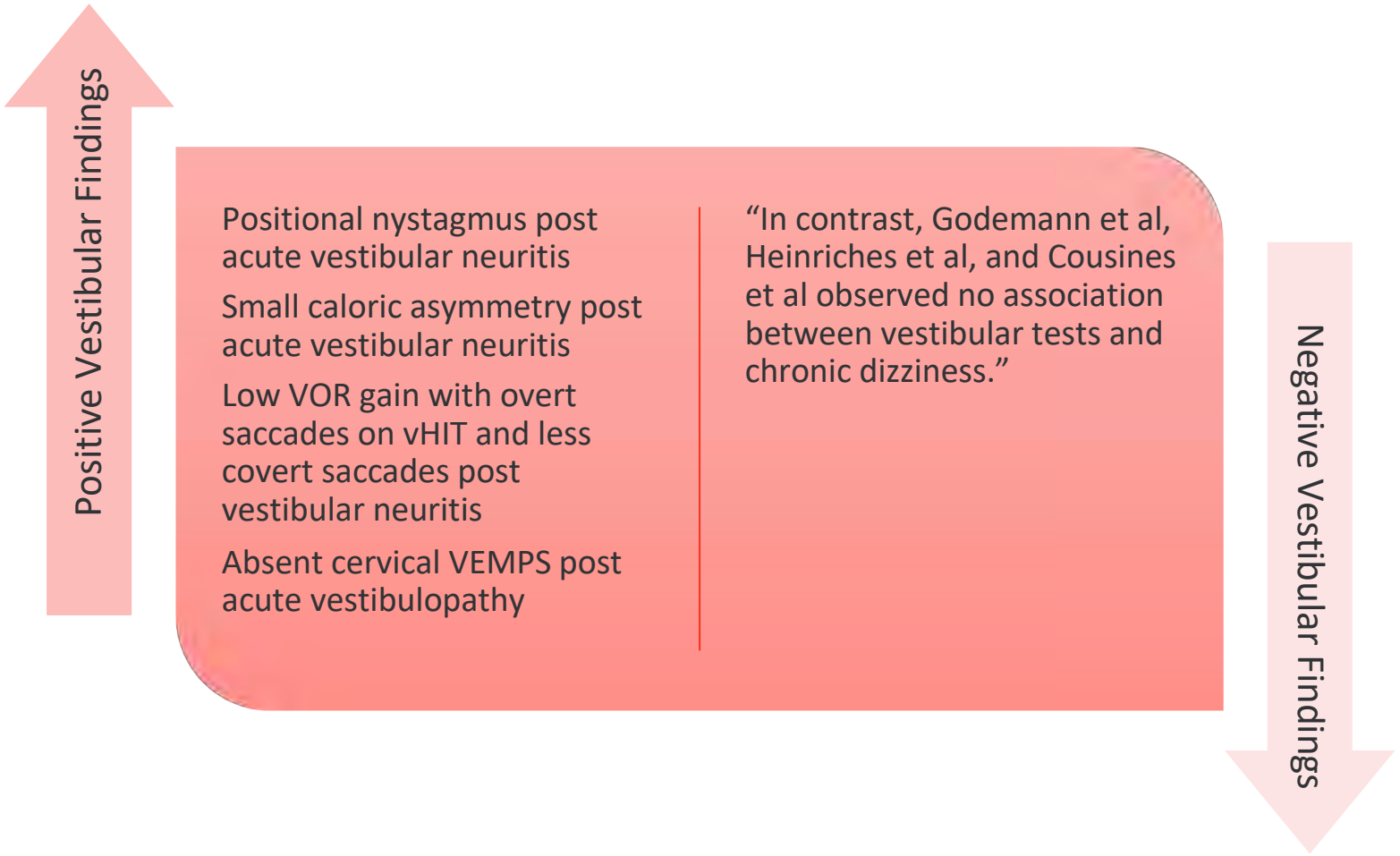
Persistent Postural-Perceptual Dizziness (PPPD)



- Change in the functioning of an organ unrelated to structural or cellular deficits (Dieterich & Staab, 2017)
- Change in neural networks (Li et al., 2020)
- Not a psychiatric condition (Staab et al., 2017)

(Staab et al, 2017)

Vestibular Testing



(Trinidade et al, 2023)

TREATMENT OPTIONS FOR PPPD

Vestibular Rehabilitation Therapy Outcomes in Patients With Persistent Postural-Perceptual (PPPD)Dizziness

Nada, Ibraheem, & Hassaan (2019)

Introduction

- PPPD
  - Medication (serotonin reuptake inhibitors) is successful for PPPD patients but has side effects that lead patients to stop medical management
    - Side effects: nausea, physical fatigue
- VRT
  - Helps recover balance, minimize falls and dizziness by reducing hypersensitivity to motion cues and increasing patient's reliance on their natural balance reflexes
  - Exercises include patient movement and movement of stimuli
  - Limited research evaluating VRT affect on PPPD patients

Methods

60 patients between 18 and 45 years old with PPPD

Did not include patients with conditions that could increase fall risk

- Arthritis, foot, visual, cardiovascular, and/or neurological disorders

Patient History: Dizziness provoking sources were categorized as visual, head-related, or body-related factors depending on patients' subjective sensitivity to movement of visual objects, head movement, or body movement

VNG, Bedside Assessments, C-VEMP

DHI at start of study and DHI 6 weeks post VRT

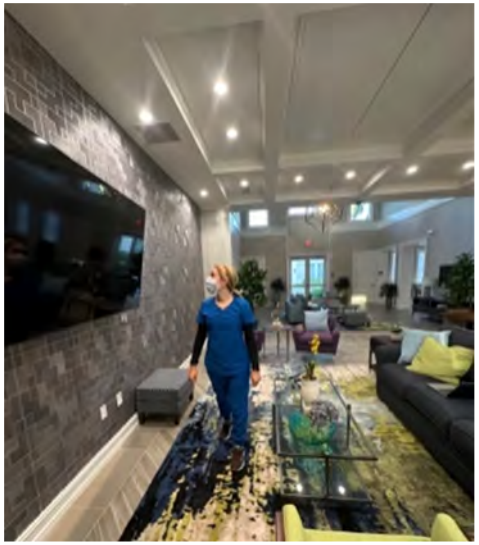
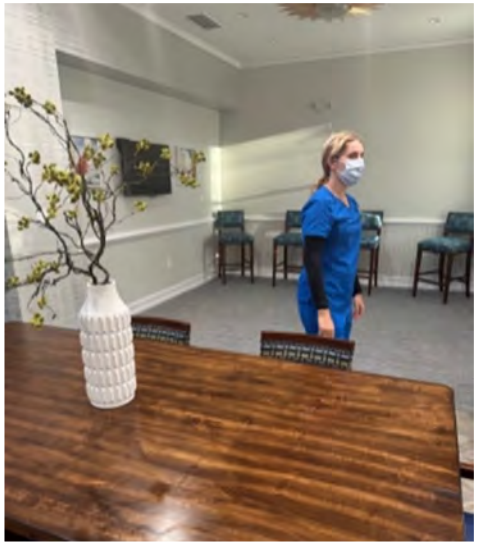
Follow-up was done via WhatsApp daily and clinic visits every 2 weeks

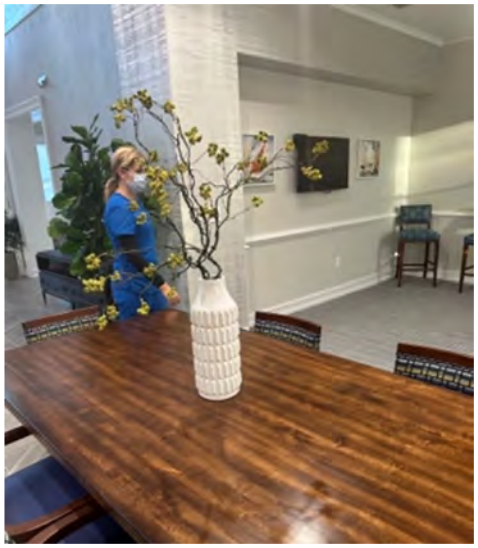
Methods

- 2 Groups of 30 patients each
  - Group 1: Self-guided VRT
    - Patients completed exercises at home and were initially instructed how to perform the exercises correctly
    - Exercises were tailored to patient's complaints and functional limitations
  - Group 2: Received VRT and placebo (vitamins that patients were told minimize dizziness)

Gait Stabilization

- **Goal**: Postural stability both when standing still or moving
- **Exercises**:
- Walking:
  - 10 minutes twice per day 5 meters back and forth
  - May need to gradually increase distance to 5 meters
  - Gradually increase intensity of exercises by modifying the following:
    - Start with flat surface and later move to uneven surfaces
    - First without head movements; later incorporating head movements.
    - Walking backwards
    - Having patient walking around obstacles
- Stairs
  - Have patient step up on a stool and climb down
  - Simulates: climbing stairs
- Sitting
  - Have patient move from standing to sitting position and from sitting to standing position



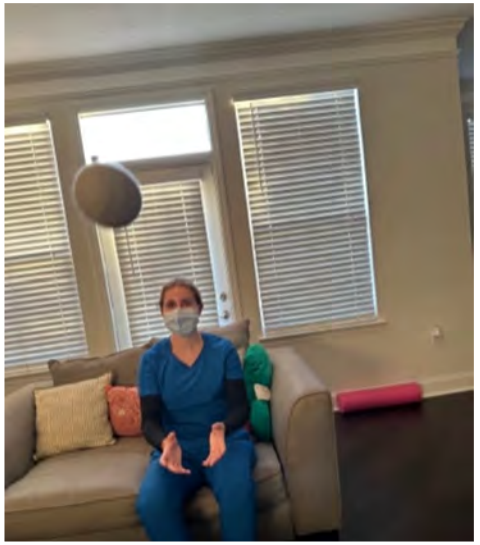
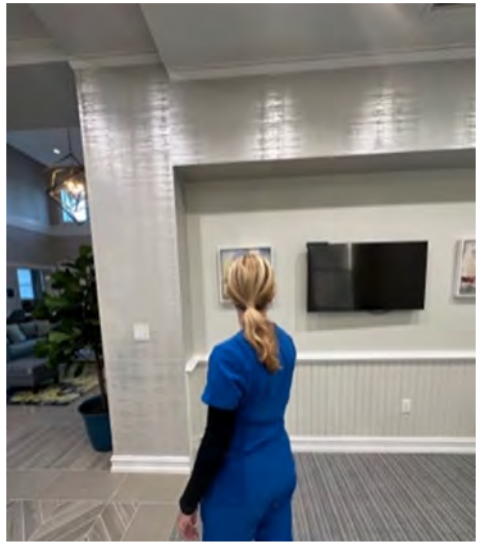
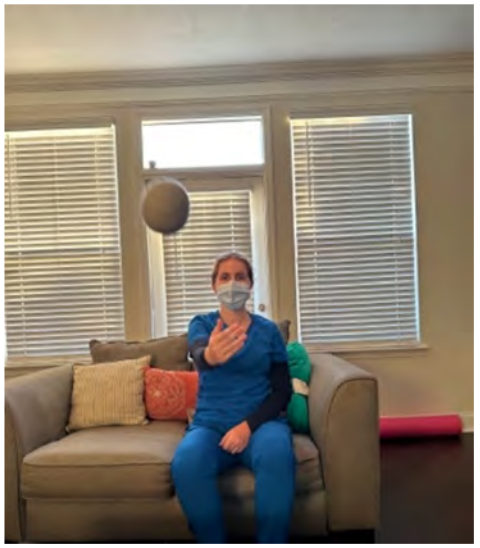
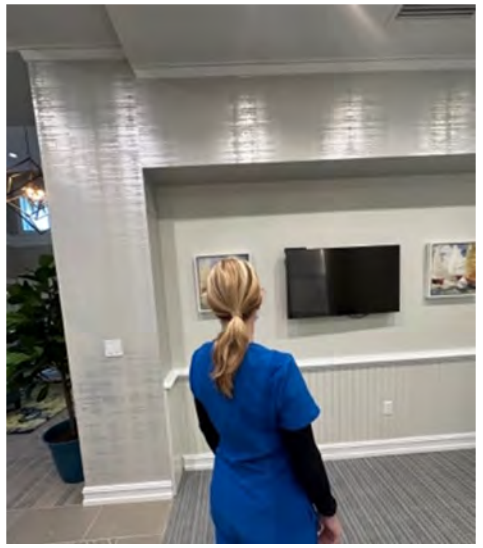
Gait Stabilization

Standing Sway

- Torso moves horizontally (right and left) as head is fixated
- Torso moves horizontally as head moves horizontally
  - Gradually increase intensity of exercises by modifying the following:
    - Starting with wide movements then increasing to narrow movements
    - Increase the rate of movements
    - Increase the complexity of the background

Hand ball toss

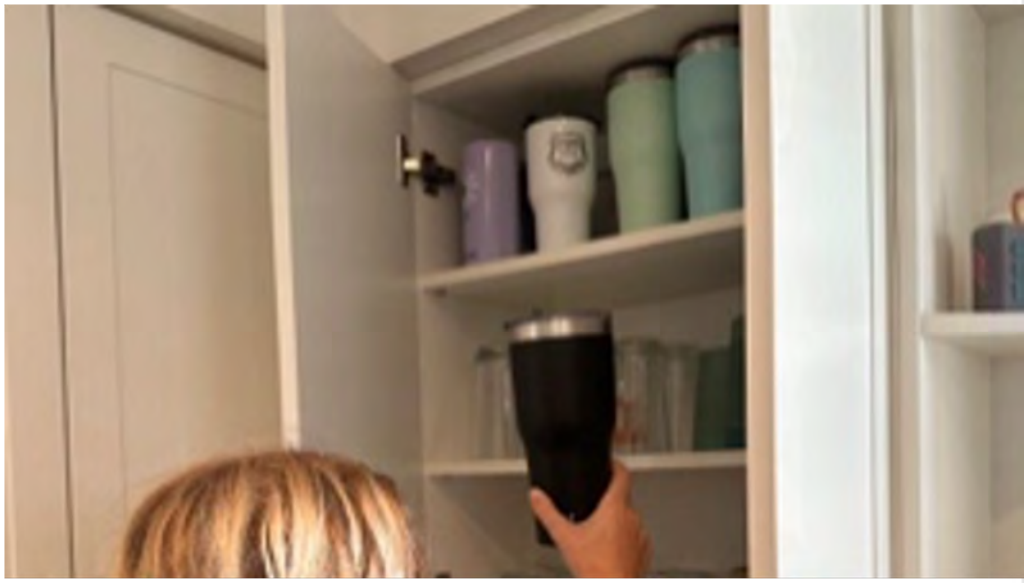
- Involves the following:
  - Eye and hand coordination
  - Center of gravity training
    - Center of gravity is the point between the upper and lower body; therefore, you want to strengthen the upper and lower body
  - Visual tracking
  - Gradually increase intensity of exercises by having additional people join into hand ball toss

Gaze Stabilization

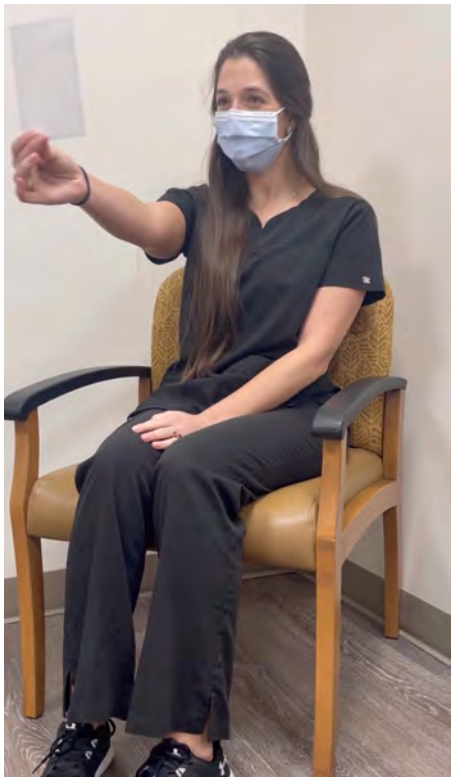
- **Goal:** Improve dizziness by working on gaze instability via habituation
- **Exercises:**

1. **Emptying and refilling a cupboard that is at the level of patient's head once a day**
   a. This exercise requires vertical head movements along with vertical eye movements
2. **Head movements**
   a. Initially, twice daily, 1 minute per session gradually increasing to 5 times daily, 2 minutes per session
      i. This also depends on what the patient can handle.
   b. Head rotations while fixating on a target
      i. VOR x1
      ii. VOR x2
      iii. Linear head movements
         1. Example: Sitting on a bouncing ball
   c. Gradually increase intensity of exercises by modifying the following:
      i. Changing from simple (e.g., blank) to complex backgrounds

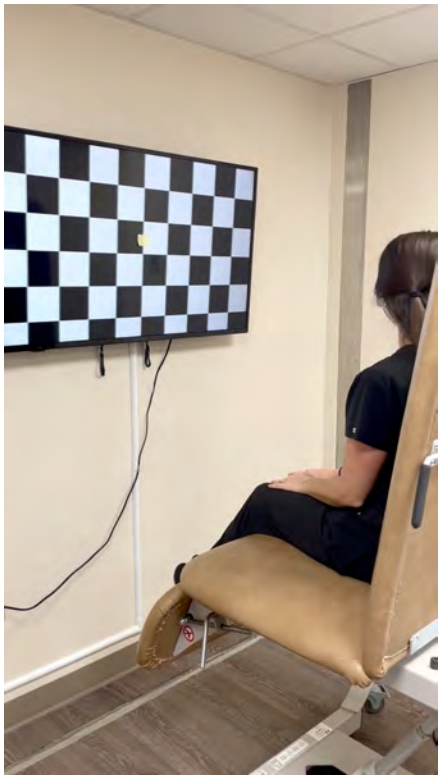


Gaze Stabilization Exercises

VOR X1



VOR X2

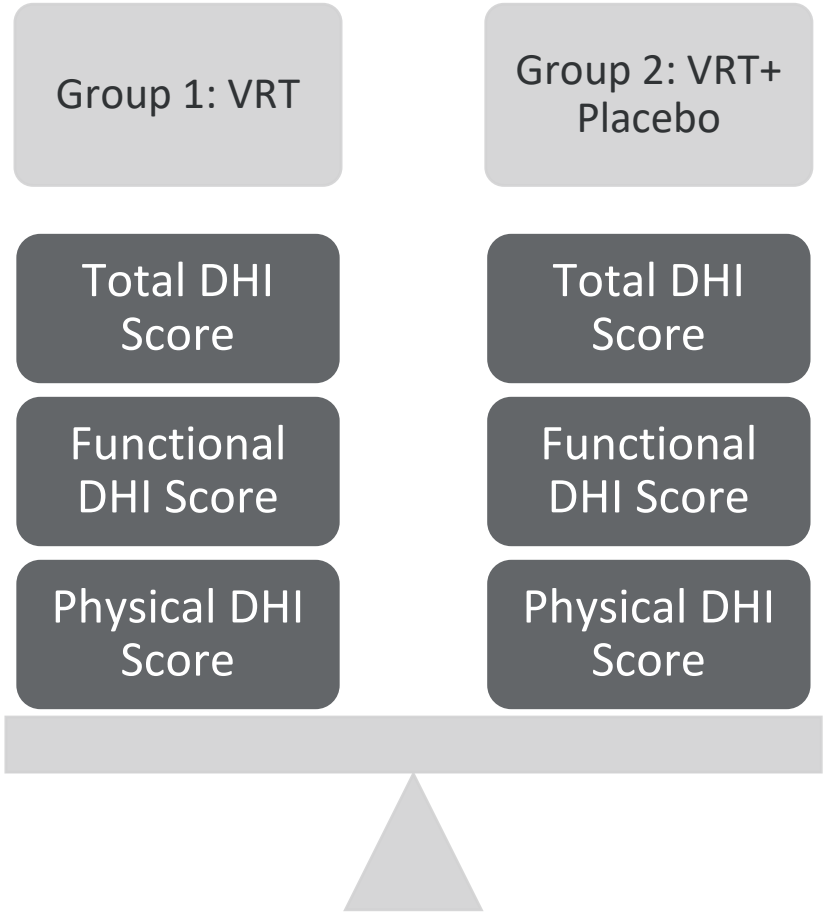


VOR X1 Complex Background

Results: Pre vs Post VRT

Emotional DHI Score

?



Results

No improvement on the emotional subscale of DHI demonstrated how important addressing the emotional component is in addition to VRT

Seeing as performance between both groups on DHI was about the same, it showed no effect of placebo

Patients that benefited from VRT required more customized gaze stabilization exercises

Food for Thought

Outcome measure used
Dizziness Handicap Inventory (DHI)

- Highlights the importance of pre and post issuance of DHI

Limitations

- Excluded patients with co-morbidities

They used DHI subscales

- Functional difficulties, emotion difficulties, and physical difficulties
- Perhaps worth making this distinction as well

VRT Contract

Please identify in the columns below factors that may motivate you to commit to VRT and those that may prove to be obstacles that you know may get in the way of committing to VRT.

Motivating Factors	Obstacles

Miami Vestibular Rehabilitation Therapy (VRT) Contract.

- I understand my diagnosis is consistent with Persistent Postural Perceptual Dizziness (PPPD).
- I am aware that PPPD can often occur following the onset of other disorders and/or can co-occur with other disorders. Therefore, treatment may include addressing associated conditions.
- I understand my diagnosis is now recognized as a Functional Neurological disorder and I have a team of experts at the Miami VA who take care of patients like me.
- I understand that the treatment consist of vestibular rehabilitation therapy (VRT), and the sessions may bring the symptoms transiently.
- I am agreeing to be scheduled for a minimum of three sessions that are 60 minutes in duration.
- I understand that by canceling a session, I am not guaranteed an appointment within the time frame of my original appointment, but would instead be scheduled for next available appointment which could be weeks from original appointment.
- I am aware that I am enrolling in a trial of VRT and that it entails at-home exercises that should be completed in a safe environment and the best outcomes occurs when I practice them at least twice per day beginning with 5 repetitions of each exercise and later increasing to 10 repetitions.
- I understand that I will be scheduled for a select amount of in-person and/or virtual sessions and it is my responsibility to make sure I attend these sessions, cancel and re-schedule a week in advance if I have a conflict with the appointment.
- I agree with the therapy goals established.
- I recognize that relapses in symptoms may occur following the conclusion of therapy; however, I will now be equipped after these sessions with the resources needed to address these relapses should they occur.
- I understand that therapy may result in minimizing dizziness as opposed to eliminating dizziness. I am also aware that there is a chance that no improvement may be noted; however, I agree to proceed with the trial of VRT.
- I agree to keep a journal that documents my dizziness episodes, especially when they occur and what I was doing when they occurred. I understand that this will help me better understand what makes my dizziness worse.

Multimodal Treatment of Persistent Postural-Perceptual Dizziness

Axer et al (2020)

Treatment Options for PPPD

Cognitive Behavioral Therapy (CBT)

- Information about dizziness
- Address assumptions/thoughts/moods regarding dizziness
- Exposure to "feared stimuli"
- Re-focusing of attention
- Coping strategies
- Self-observations
- Relaxation techniques

Vestibular Rehabilitation Therapy(VRT)

Compensation – brain learning and changing the functioning of central neural networks.

Substitution – stimulates functional symptoms

- (e.g., visual/somatosensory) vs non functioning inputs, vestibular weakness)

Adaptation – Correcting errors in visual vestibular and balance systems and re-adjusted

Habituation – Reduce responsiveness to motion in order to reduce dizziness

Selective Serotonin Reuptake Inhibitors (SSRI)

- Medical management of anxiety and depression
- Medications: sertraline and fluvoxamine

Study Methods

- N = 657 patients
- Prospective data (longitudinal study) collection (June 2013- March 2017)
- Monday – Friday, 7 hour/day of therapy
- 8-10 people in therapy sessions
- Interdisciplinary Team
  - Nurse, Neurologist, Psychologist, Physical therapist
- Follow-up Questionnaires 6 months post treatment
- Questionnaires utilized
  - Vertigo Severity Scale (VSS)
    - Vestibular- balance VSS-V subscale & autonomic- anxiety (VSS-A)
  - Hospital and Anxiety and Depression Scale (HADS)
- Used visual analog scale ranging from 0-10 to quantify intensity and distress due to dizziness

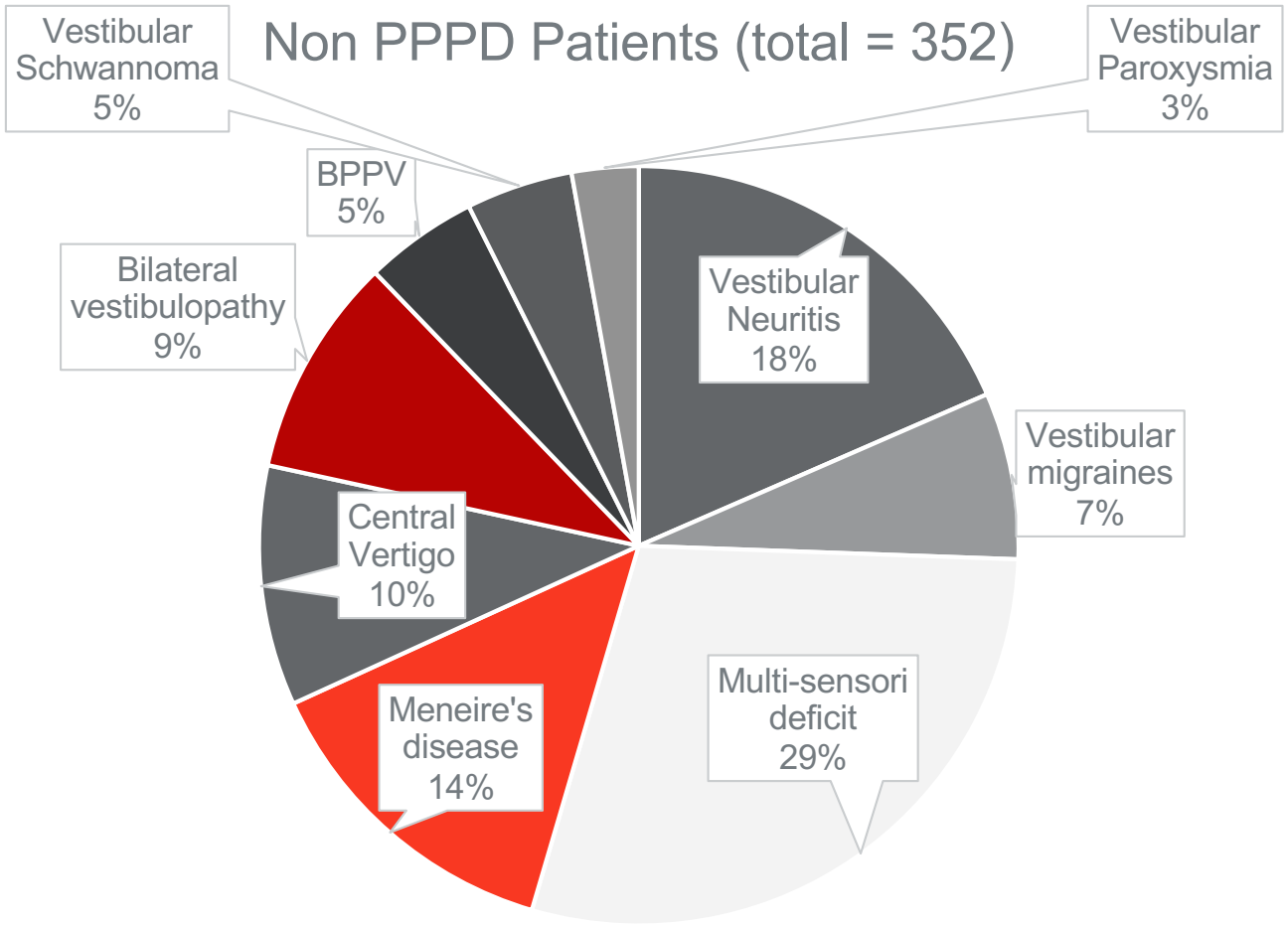
Study Methods

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8-9	Welcome Introduction	Health Education	Individual Psychologist or Neurologist	Individual Psychologist or Neurologist	Individual Psychologist or Neurologist
9-10:30	Physiotherapy	Physiotherapy	Physiotherapy	Physiotherapy	Physiotherapy
10:30-12	CBT Group	CBT Group	CBT Group	CBT Group	Jacobson's progressive relaxation
12-13	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break
13-14	Individual Session with Psychologist and Neurologist	Individual Session with Psychologist and Neurologist	Individual Session with Psychologist and Neurologist	Individual Session with Psychologist and Neurologist	CBT Group
14-15	Jacobson's progressive relaxation	Jacobson's progressive relaxation	Jacobson's progressive relaxation	Jacobson's progressive relaxation	Discharge
15-16	Individual Session with Psychologist and Neurologist	Individual Session with Psychologist and Neurologist	Individual Session with Psychologist and Neurologist	Team Visit	

Results

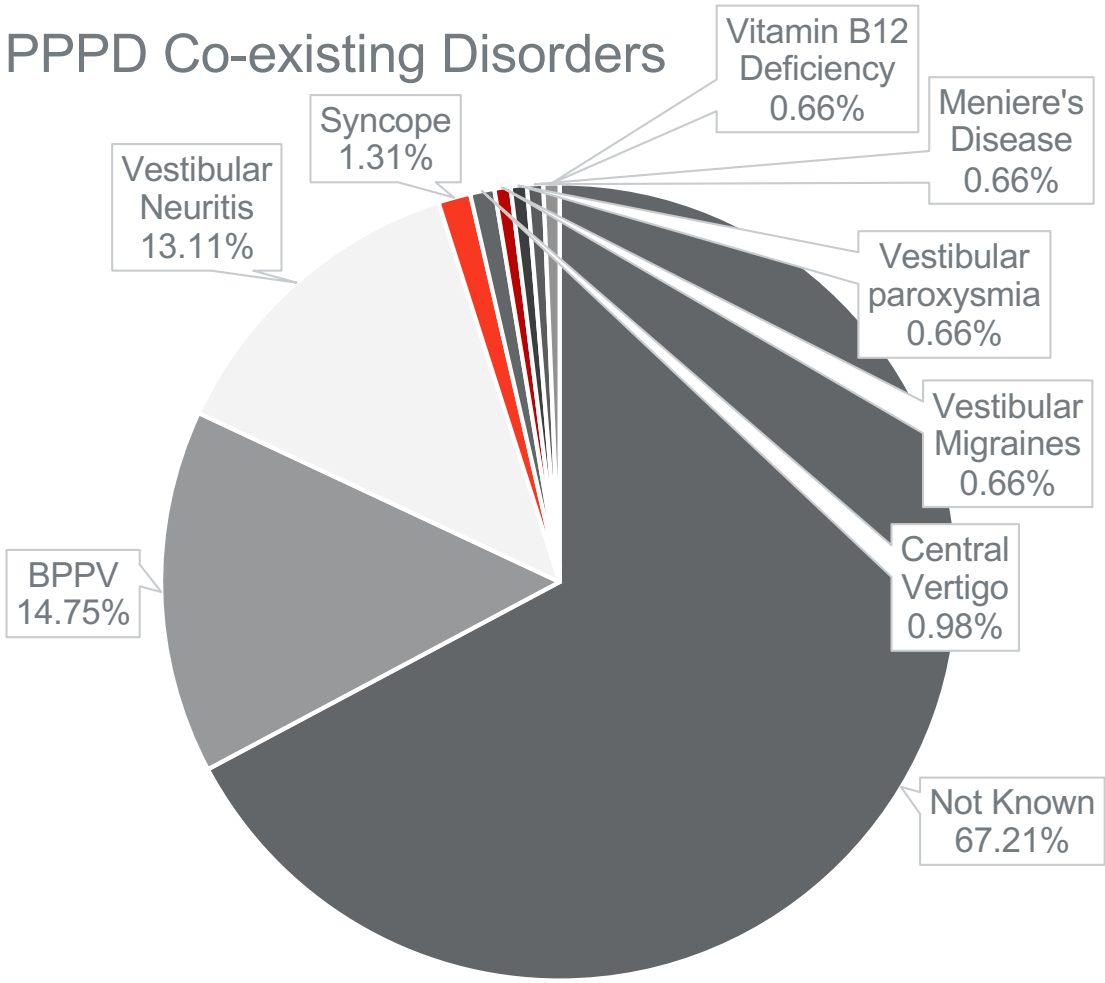
Participant Demographics

- Mean age of total 657 patients is 57.5 years old (60% female, 40 % male)



Results

- PPPD: Mean age 50 years old, 61% female and 39% male
  - 305/657, 46.4% met criteria for PPPD
  - Triggering/Co-existing disorders found in 1/3 of PPPD patients
    - BPPV
    - Vestibular neuritis
- PPPD patients compared to non PPPD patients were:
  - Younger and had more distress due to dizziness
  - Had higher scores on VVS, VSS-A, and HADs anxiety



Results

418/657, 63.6% completed a follow-up questionnaire 6 months after attendance of the therapy

- 183 PPPD patients
- 235 patients with other somatic diagnoses.

Both PPPD and non PPPD group had significant changes pre and post therapy on

- VSS, HADS anxiety, intensity, and distress

Trend noted where PPPD showed more improvement than non PPPD group, but only significant change noted in VSS-A

Take Home Message

- Interdisciplinary approach to managing PPPD patients
- “Avoidance behavior, unfavorable thoughts, fears, and anxious self-inspection are processes that may further sustain symptoms and lead to significant distress or functional impairment.”

gammaCore (nVNS)

- PPPD patient have hyperactive autonomic nervous system resulting in:
  - Nausea
  - Vomiting
  - Increased heart rate
  - Sweating
- Post 4 weeks of treatment resulted in:
  - Improvement in quality of life
  - Reduction on Hospital Anxiety and Depression Scale (HADS) Depression Score
  - Improvement noted on standing on foam with eyes open posturography condition

Permission granted from gammaCore Marketing team to use Image.
Image from: https://www.gammacore.com/how-to-use-gammacore/

(Eren et al, 2018)

Case Study 2: Phoebe

Occupation

- Vice President of her company
- 10+ years. She has never taken a day off, but was recently fired from her job because she has had to take off multiple days due to her dizziness

BPPV

- CRMs performed, but since resolved, Phoebe sleeps upright and avoids all head and body movements out of fear that she will cause BPPV to re-occur.

Meniere's disease

- Been stable and under control up until last year
- Phoebe reported having a severe Meniere's Disease episode last year and has noticed that since then, she has been having a new dizziness sensation, an "off-kilter/ unsteady sensation" that has been constant and has occurred daily since last year
- She emphasized that the Meniere's disease symptoms and the "off/kilter sensation" are very different
- Meniere's Disease episodes have become more frequent and since the onset of BPPV and off-kilter dizziness, she finds that she is very anxious because she is constantly concerned that the dizziness is going to occur

New Unsteady Sensation

- Phoebe reported that she doesn't really leave her house and has hired a cleaning person because of her dizziness
- New dizziness sensation increases with complex visual patterns, moving from sitting to standing, horizontal and vertical head and body movements

Case Study 2: Phoebe

Patient is known to	• ENT and Neurology
How does she describe her dizziness?	• Non-vertigo: “Off-kilter/ unsteadiness”
What items increases the dizziness?	• Increases with complex visual patterns, moving from sitting to standing, horizontal and vertical head and body movements.
Precipitating/Catalyst factor(s)?	• Meniere's disease
Co-morbidities?	• Anxiety
Onset of symptoms	• Last year
Amount of episodes in one month	• 31 days

Case Study 2: Phoebe

- NPQ
  - Phoebe presented with the following:
    - Total score: 61
    - Subcategories Scores:
      - Upright posture/walking score: 14
      - Movement Score: 13
    - Visual Stimulation score: 24
- Dizziness Handicap Inventory (DHI)
  - Scores: DHI: 92/100, 54 or greater Severe Handicap

Case Study 2: Phoebe

- The Hospital Anxiety and Depression Scale (HADS)
  - Anxiety score: 17
  - Depression score: 18
- Dizziness Symptom Profile (DSP)
  - The results of the DSP indicated a positive endorsement of 60% or greater for:
    - Unsteadiness (81%)
    - Persistent postural perceptual dizziness (PPPD) (65%)
    - Benign paroxysmal positional vertigo (BPPV) (85%)
    - Vestibular migraine (60%)

Thank you!

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Functional Gait Disorders

Resource Videos

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7455329/

Nonnekes J, Růžička E, Serranová T, Reich SG, Bloem BR, Hallett M. Functional gait disorders: A sign-based approach. Neurology. 2020 Jun 16;94(24):1093-1099. doi: 10.1212/WNL.0000000000009649. Epub 2020 Jun 1. PMID: 32482839; PMCID: PMC7455329.

References

- Staab, J. P., Eckhardt-Henn, A., Horii, A., Jacob, R., Strupp, M., Brandt, T., & Bronstein, A. (2017). Diagnostic criteria for persistent postural-perceptual dizziness (PPPD): Consensus document of the committee for the Classification of Vestibular Disorders of the Bárány Society. Journal of Vestibular Research, 27(4), 191-208.
- Axer, H., Finn, S., Wassermann, A., Guntinas-Lichius, O., Klingner, C. M., & Witte, O. W. (2020). Multimodal treatment of persistent postural–perceptual dizziness. Brain and Behavior, 10(12), e01864.https://www.sralab.org/rehabilitation-measures/vertigo-symptom-scale
- Eren OE, Filippopulos F, Sönmez K, Möhwald K, Straube A, Schöberl F. Non-invasive vagus nerve stimulation significantly improves quality of life in patients with persistent postural-perceptual dizziness. J Neurol. 2018 Oct;265(Suppl 1):63-69. doi: 10.1007/s00415-018-8894-8. Epub 2018 May 21. PMID: 29785522.
- Holdgate A, Asha S, Craig J, Thompson J. Comparison of a verbal numeric rating scale with the visual analogue scale for the measurement of acute pain. Emerg Med (Fremantle). 2003 Oct-Dec;15(5-6):441-6. doi: 10.1046/j.1442-2026.2003.00499.x. PMID: 14992058.
- Mohan H, Ryan J, Whelan B, Wakai A. The end of the line? The Visual Analogue Scale and Verbal Numerical Rating Scale as pain assessment tools in the emergency department. Emerg Med J. 2010 May;27(5):372-5. doi: 10.1136/emj.2007.048611. PMID: 20442167. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.858.8853&rep=rep1&type=pdf
- https://midsouthpain.com/10-different-types-pain-scales-measure-pain-levels/
- Shepard, N. T., & Jacobson, G. P. (2016). *Balance function assessment and management, Second Edition*. Plural Publishing.
- Yagi C, Morita Y, Kitazawa M, Nonomura Y, Yamagishi T, Ohshima S, Izumi S, Takahashi K, Horii A. A Validated Questionnaire to Assess the Severity of Persistent Postural-Perceptual Dizziness (PPPD): The Niigata PPPD Questionnaire (NPQ). Otol Neurotol. 2019 Aug;40(7):e747-e752. doi: 10.1097/MAO.0000000000002325. PMID: 31219964; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6641087/ PMCID: PMC6641087.
- https://www.neurosymptoms.org/en_GB/symptoms/fnd-symptoms/dizziness-including-pppd-persistent-postural-perceptual-dizziness/
- Nada EH, Ibraheem OA, Hassaan MR. Vestibular Rehabilitation Therapy Outcomes in Patients With Persistent Postural-Perceptual Dizziness. Annals of Otology, Rhinology & Laryngology. 2019;128(4):323-329. Trinidade, A., Cabreira, V., Goedoi:10.1177/0003489418823017Vestibular Rehabilitation Therapy Outcomes in Patients With Persistent Postural-Perceptual Dizziness - Ebtessam H. Nada, Ola A. Ibraheem, Mohammad R. Hassaan, 2019 (sagepub.com)
- Nonnekes, J., Růžička, E., Serranová, T., Reich, S. G., Bloem, B. R., & Hallett, M. (2020). Functional gait disorders: a sign-based approach. *Neurology*, *94*(24), 1093-1099.
- bel, J. A., Staab, J. P., Kaski, D., & Stone, J. (2023). Predictors of persistent postural-perceptual dizziness (PPPD) and similar forms of chronic dizziness precipitated by peripheral vestibular disorders: a systematic review. *Journal of Neurology, Neurosurgery & Psychiatry*.
- Yagi C, Morita Y, Kitazawa M, Yamagishi T, Ohshima S, Izumi S, Takahashi K, Horii A. Subtypes of Persistent Postural-Perceptual Dizziness. Front Neurol. 2021 Apr 16;12:652366. doi: 10.3389/fneur.2021.652366. PMID: 33935950; PMCID: PMC8085253.
- Yagi C, Morita Y, Kitazawa M, Nonomura Y, Yamagishi T, Ohshima S, Izumi S, Takahashi K, Horii A. A Validated Questionnaire to Assess the Severity of Persistent Postural-Perceptual Dizziness (PPPD): The Niigata PPPD Questionnaire (NPQ). Otol Neurotol. 2019 Aug;40(7):e747-e752. doi: 10.1097/MAO.0000000000002325. PMID: 31219964; PMCID: PMC6641087.
- Staab, J. P., Eckhardt-Henn, A., Horii, A., Jacob, R., Strupp, M., Brandt, T., & Bronstein, A. (2017). Diagnostic criteria for persistent postural-perceptual dizziness (PPPD): Consensus document of the committee for the Classification of Vestibular Disorders of the Bárány Society. *Journal of Vestibular Research*, *27*(4), 191-208.
- Trinidade A, Cabreira V, Goebel JA, Staab JP, Kaski D, Stone J. Predictors of persistent postural-perceptual dizziness (PPPD) and similar forms of chronic dizziness precipitated by peripheral vestibular disorders: a systematic review. J Neurol Neurosurg Psychiatry. 2023 Nov;94(11):904-915. doi: 10.1136/jnnp-2022-330196. Epub 2023 Mar 20. PMID: 36941047.

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