TOPICS IN VESTIBULAR PHYSICAL THERAPY

VESTIBULAR REHABILITATION SIG

APTA & Academy of Neurologic Physical Therapy

VESTIBULAR HYPOFUNCTION CPG UPDATE

GUEST EDITORS: Holly J. Roberts, PT, PhD, NCS, GCS
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IN THIS ISSUE:

Message from the Chair

Rachel Wellons, PT, DPT, NCS

It was so wonderful to return to CSM. I hope everyone enjoyed the programming and learned as much as I did.

One of the highlights at CSM for me was the presentation of the updated Vestibular Hypofunction Clinical Practice Guideline (CPG). For those of you familiar with the 2016 Vestibular Hypofunction CPG, the updated guideline adds more evidence and higher levels of support for rehabilitation strategies, dosage, and the benefits of supervised vestibular rehabilitation. This issue will highlight application of these guidelines in case studies with articles by ***Wendy Carender, Eric Anson, Diron Cassidy,*** and ***Amy York***. Thank you to ***Amy Yorke*** and ***Holly Roberts*** for guest editing this issue.

I am so thankful for the efforts of ***Courtney Hall, Susan Herdman, Susan Whitney, Eric Anson, Wendy Carender, Carrie Hoppes,*** and other authors and article reviewers for updating the CPG. Unfortunately, on average it takes research about 17 years to reach clinical practice, so to address this problem the Academy of Neurologic Physical Therapy (ANPT) has created a Knowledge Translation Task Force to breakdown research and create educational material so that it is quickly and easily translated to clinicians and integrated into practice. Thanks to members of the taskforce, ***Holly Roberts, Amy Yorke, Diron Cassidy, Linda D'Silva, Liz Dannenbaum, Erin Greenler, Lisa Heusel-Gillig,*** and ***Connie Weglarz,*** who will work over three years to disseminate the Vestibular Hypofunction CPG to all clinicians.

The update and dissemination of the Vestibular Hypofunction CPG fits well with a new initiative of the ANPT: Evidence Elevates. This is a national campaign to collect information about the use of traditional vs. evidence-based approaches in current practice. This task force will create and disseminate resources designed to help adult neuro PTs integrate evidence-based information into patient care which will elevate the profession, practice, and patient outcomes. The Vestibular Rehabilitation Special Interest Group (SIG), like the ANPT, supports the position that PTs should use the best available evidence and research for treatment of adults with neurologic dysfunction.

I worked as a clinician for 8 years before taking a job in academia. Upon entering academia I was expected to complete research, which I had no experience in prior to taking this position. I quickly learned that research **CAN NOT** and **DOES NOT** happen by yourself. Collaborations are key to successful research and as an unexpected bonus, my research collaborators have also turned into friends. To further drive creation of evidence for Vestibular Rehabilitation, the Vestibular Rehabilitation SIG has created a research database so that clinicians, researchers, and academicians can find each other. Please visit our website and enter your information into the database if you are interested in finding research collaborations. If you are a clinician with no experience in research, please do not be intimidated by research. I was once like you and if I can do it so can you! You can use this document to make connections which will help you participate in research, progress your professional development, and hopefully establish friendships.

I am looking forward to a summer filled with family, friends, travel, pool time, and of course some more time to work on my research with collaborators old and new. I hope everyone has a safe and fun summer!

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Introduction: Clinical Practice Guideline for Vestibular Rehabilitation for Peripheral Vestibular Hypofunction Update: From Evidence to Practice

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Peripheral vestibular hypofunction may impact up to 53 million to 95 million individuals in Europe and the United States.(1) Individuals with peripheral vestibular hypofunction experience dizziness, disequilibrium, gait instability, oscillopsia, intolerance of head motion, and reduced quality of life.(2) Furthermore, dizziness and imbalance associated with peripheral vestibular hypofunction are risk factors for falls. Approximately 42% of individuals with bilateral vestibular hypofunction(3) and 30% of individuals with unilateral vestibular hypofunction experience a fall,(4) and individuals with an acute peripheral vestibular hypofunction may be at a higher risk for injury up to a year after onset than their age-matched peers.(5) Recent evidence also suggests that individuals with peripheral vestibular hypofunction exhibit impaired spatial navigation,(6,7) and impairments in the vestibular system may affect executive function, memory, and social cognition.(7,8) With few exceptions, vestibular physical therapy should be offered to individuals who have peripheral vestibular hypofunction.(9)

The Spring/Summer issue of Topics in Vestibular Physical Therapy highlights the recently updated clinical practice guideline for vestibular rehabilitation for peripheral vestibular hypofunction, which was published in the April issue of the Journal of Neurologic Physical Therapy.(9) The updated clinical practice guideline strongly recommends that vestibular physical therapy be offered to individuals with peripheral vestibular hypofunction. Although one third of adults will have vestibular dysfunction requiring medical attention, too few ever reach the clinic of a physical therapist to help them manage their symptoms of gaze instability, motion provoked symptoms, and/or imbalance. Despite strong research supporting vestibular rehabilitation, patients with vestibular hypofunction are not consistently provided with care that aligns with the evidence. Patients are often not offered a referral to see a physical therapist, and when they are, physical therapists do not always have the training and/or expertise to best manage care. In clinics with physical therapists who treat patients with vestibular dysfunction, waiting lists for persons with vestibular hypofunction are often weeks to months, impacting their ability to improve. The Academy of Neurologic Physical Therapy (ANPT) Vestibular Rehabilitation Special Interest Group has worked tirelessly over the last 26 years to ensure up to date information is available and accessible for physical therapists, physicians, and patients. This information is provided free of charge.

The updated clinical practice guideline includes new evidence from an additional 18 randomized controlled trials, 9 prospective and 8 retrospective cohort studies. It provides stronger evidence for providing vestibular physical therapy for individuals with acute, subacute, or chronic unilateral or bilateral vestibular hypofunction and evidence to support early initiation of vestibular physical therapy. Dosage recommendations for gaze stability exercises are updated, and new recommendations for balance exercise dosage are given. Additional updates include support for a variety of modes of balance intervention, stronger recommendations to assist clinicians determine when to stop vestibular rehabilitation, and recommendations on factors that may impact patient outcomes.

In this issue, four case reports illustrate the use of the clinical practice guideline for individuals with peripheral vestibular hypofunction. Wendy Carender applies the clinical practice guideline to a patient with an acute unilateral vestibular hypofunction following a surgical resection of a right vestibular schwannoma. Diron Cassidy and Amy Yorke describe the use of the clinical practice guideline to treat an individual with a subacute unilateral peripheral hypofunction following a right labyrinthitis. Eric Anson and Wendy Carender discuss the use of the clinical practice guideline to guide intervention for a patient with a chronic unilateral vestibular hypofunction with comorbid anxiety, depression, migraine, and motion sensitivity. Finally, Eric Anson demonstrates the use of the clinical practice guidelines to inform the plan of care for an individual with chronic bilateral vestibular hypofunction with complaints of severe imbalance and oscillopsia. All four case reports demonstrate positive outcomes for patients when the recommendations in the clinical practice guideline update are followed. Also in this issue, Erin Greenler provides a review of the article, "A survey of entry-level physical therapy education content for vestibular rehabilitation" by Galgon, et al.

We recognize that just publishing a clinical practice guideline is not enough to change practice. The ANPT appointed a knowledge translation task force to develop and disseminate products to support the implementation of this evidence into practice. Products include a decision algorithm, CPG summaries, patient education and exercise handouts, a physician summary, and an education module on the ANPT Synapse Education Center. These resources can be found at the clinical practice guideline toolbox: https://neuropt.org/practice-resources/anpt-clinical-practice-guidelines/vestibular-hypofunction-cpg.

The mission of the Vestibular Rehabilitation special interest group (VR SIG) is to provide a forum for ANPT members who have a common interest in the promotion of health, wellness, optimal function, and quality of life for individuals with vestibular disorders.(10) We hope that reading the patient case reports in this newsletter encourages therapists to evaluate their own practice and see how implementing this evidence can directly impact patient care. Too many people experience long standing issues secondary to peripheral vestibular hypofunction. How could your patient outcomes be improved by implementing the clinical practice guideline? Working together, we can improve the outcomes for patients with peripheral vestibular hypofunction. What can you do to advocate for the role of physical therapy in helping these patients improve their lives?

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Do you want more?

Link to the ANPT Vestibular Hypofunction CPG Resource Toolbox

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Acute Unilateral Vestibular Hypofunction - Application of the Updated Clinical Practice Guideline for Peripheral Vestibular Hypofunction: A Case Report

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Abstract

Introduction: The 2022 updated Vestibular Hypofunction Clinical Practice Guideline (CPG) supports the initial CPG findings and further defines recommendations to optimize rehabilitation outcomes for individuals undergoing vestibular physical therapy. This case report demonstrates how clinicians can apply and implement the updated Action Statements into clinical practice for a patient with acute unilateral vestibular hypofunction (UVH). Case History: A 53-year-old male with a right vestibular schwannoma was seen for vestibular Physical Therapy (VPT) intervention following surgical resection via translabyrinthine approach resulting in an acute unilateral vestibular hypofunction (UVH). His goal is to return to work as a delivery man. Clinical Findings: Outcome measures performed 2 weeks post-operatively revealed a decline in pre-operative scores including: Dizziness Handicap Inventory (DHI) score of 36/100, Functional Gait Assessment score of 24/30, and a 4-line Dynamic Visual Acuity score. Intervention: The patient was seen for three VPT visits post-surgery over 6 weeks. He was educated in a home exercise program (HEP) consisting of gaze stabilization, habituation and balance exercises as well as a graded walking program which was progressed at each visit. Outcomes: All outcome measures scores were approaching baseline 6 weeks post-operatively and met the criteria for achieving the minimal detectable change (MCD) reflecting good progress towards central compensation. The patient successfully returned to his normal daily activities including driving and work. Conclusion: This case report demonstrates how evidence from the updated 2022 vestibular hypofunction CPG supports VPT intervention for individuals with acute UVH. Early initiation of VPT and supervised intervention may optimize rehabilitation outcomes. Dosage and progression recommendations are provided for gaze stability exercises. Suggestions for implementing the CPG into clinic practice are offered. Future research is imperative for VPT treatment evolution.

Keywords: Clinical Practice Guideline, Acute Unilateral Peripheral Vestibular Hypofunction, Case Report, Vestibular Physical Therapy, Vestibular Rehabilitation
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Introduction

The initial Vestibular Rehabilitation for Peripheral Vestibular Hypofunction Clinical Practice Guideline(CPG) published in 2016 revealed strong evidence that vestibular physical therapy (VPT) provides clear and substantial benefit to individuals with unilateral vestibular hypofunction (UVH) and bilateral vestibular hypofunction (BVH).(1) The updated Vestibular Hypofunction CPG supports the initial recommendations and includes new evidence from 18 Randomized Control Trials (RCT's), 9 prospective and 8 retrospective cohort studies which further supports and defines recommendations to optimize rehabilitation outcomes for individuals undergoing vestibular physical therapy.(2)

The purpose of this case report is to demonstrate how clinicians can apply and implement 5 of the 10 updated Vestibular Hypofunction Clinical Practice Guideline Action Statements into clinical practice for a patient with acute UVH. Gaze stabilization exercise dosage and progression as well as suggestions for CPG implementation will be outlined. This report will also identify some of the gaps in the evidence and future research directions in vestibular rehabilitation for UVH.

Case study presentation

History

A 53-year-old male presented to his primary care physician with the sudden onset of right-sided hearing loss and tinnitus. A brain magnetic resonance imaging (MRI) revealed a right vestibular schwannoma. The patient was referred to Otolaryngology at a large tertiary teaching hospital for further evaluation. Videonystagmography (VNG) using water caloric irrigations revealed a 26% right caloric weakness. VNG is the "gold standard"(3,4) for identifying unilateral vestibular hypofunction: a loss of 25% or greater is considered abnormal at our facility. An audiogram revealed a moderate sensorineural hearing loss at 250-1000 Hz sloping to profound sensorineural hearing loss at 2000-8000 Hz in the right ear and normal hearing in the left ear. The patient met with a neurotologist who provided various treatment options and he ultimately decided to proceed with a translabyrinthine approach for tumor resection. In this surgical approach, vestibular function and hearing are sacrificed with the goal of preserving function of the facial nerve.(5)

The patient presented to VPT two weeks prior to surgery for pre-operative evaluation, education and instruction in a post-operative vestibular exercise program. He had a history of back pain and hypertension. He was married, works for a delivery company and lived three hours away from the medical center. His goal was to return to work approximately eight weeks post-surgery.

Examination

Pre and post-operative outcome measures were performed (Table 1), as recommended by the Academy of Neurologic Physical Therapy (ANPT) (6) as core measures for patients with neurological disorders, including the: Activities Specific Balance Confidence Scale (ABC);(7,8) Functional Gait Assessment (FGA) (9,10); and the 10-meter Walk Test (10-MWT).(11)

Table 1. Outcome Measures

Outcome Measure	Pre-operative[a]	2 Weeks Post-operative	6 Weeks Post-Operative
Activities-specific Balance Confidence scale (ABC)[b,c]	92%[d]	74%	90%[d]
Dizziness Handicap Inventory (DHI)[d]	6/100[d]	36/100	10/100[d]
Dynamic Visual Acuity (DVA)[c]	1-line difference[d]	4-line difference	2-line difference[d]
modified Clinical Test of Sensory Interaction on Balance (mCTSIB)[c]	30/30 Firm, 30/30 Foam[d]	30/30 Firm, 30/7 Foam	30/30 Firm, 30/30 Foam[d]
Functional Gait Assessment (FGA)[b]	29/30[d]	24/30	28/30[d]
Timed Up and Go (TUG)	10.5 sec.[d]	13.2 sec.	11.0 sec.[d]
10-meter Walk Test (10-MWT)[b]	1.25 m./sec.[d]	1.05 m./sec.[d]	1.22 m./sec.[d]

[a]Two weeks prior to surgery
[b]Recommended in the Core Set of Outcome Measures for Adults Undergoing Rehabilitation for Neurologic Conditions[6]
[c]Recommended by the Vestibular Evidence-Based Guide Effectiveness[12]
[d]Within normal range for healthy adults

Additional outcome measures recommended by Vestibular Evidence Database to Guide Effectiveness (VEDGE) (12) used to assess vestibular dysfunction were also administered. These included the Dizziness Handicap Inventory (DHI),(13,14) Clinical Dynamic Visual Acuity (DVA),(15) the modified Clinical Test of Sensory Interaction on Balance (mCTSIB),(16) and the Timed Up and Go (TUG).(17) Pre-operative outcome measures were all within normal limits as would be expected in an active 50 year-old with minimal peripheral vestibular involvement. The declines in outcome measure scores identified 2-weeks post-operative are consistent with an uncompensated, acute, complete unilateral peripheral vestibular hypofunction.

Diagnosis/prognosis

Would this patient benefit from VPT?

Surgical removal of the vestibular schwannoma via a translabyrinthine approach, will result in an acute unilateral vestibular hypofunction. We can look to Action Statement (AS) 1 for the answer which speaks to the effectiveness of vestibular rehabilitation in individuals with acute and subacute unilateral vestibular hypofunction. It states: "Clinicians should offer vestibular physical therapy (VPT) to individuals with acute or subacute unilateral vestibular hypofunction. (Evidence quality: I; Recommendation strength: Strong)"(2). Multiple studies demonstrate improved outcomes in individuals receiving VPT when compared with controls given either no exercise or sham exercise.(18-20) Vestibular physical therapy may result in shorter episodes of care, improved recovery of balance, reduced symptom complaints, improved functional recovery including activities of daily living, reduced fall risk, and improved quality of life.

Interventions

When should VPT be implemented for individuals with acute unilateral vestibular hypofunction?

There is new evidence that supports earlier initiation of VPT, within the first two weeks of acute onset.(21-23) Subjects with acute vestibular neuritis were evaluated in three groups based on timing of initiating active instrumented unilateral (only to the hypofunction side) gaze stabilization exercises (30 minutes twice weekly for four weeks): initiated during the first two weeks after onset (n=10); three to four weeks after onset (n=9); or more than one month after onset (n=9). The late group had significantly higher post DHI Scores compared to the other 2 groups. The group initiating therapy during the first two weeks after onset had significant improvement in their dynamic visual acuity (DVA), and angular VOR gain as well as decreased their percentage of compensatory saccades compared with the other groups, suggesting that the mechanism of improvement may differ with this early, unilateral treatment paradigm. One precaution to consider in the surgical population is the potential for post-surgical risk of brain bleed or cerebrospinal fluid leak which in some cases may delay initiation of VPT intervention.

What kind of exercises should be included in the treatment plan for this patient post-surgery to address the impairments, activity limitations, and participation restrictions identified during the 2-week post-op evaluation?

VPT intervention for vestibular hypofunction typically includes: gaze stabilization exercises (adaptation and substitution), habituation exercises, static and dynamic balance exercises, and walking for endurance.(1,2) We can look to Action Statement 4 to further guide our treatment plan which states: "Clinicians should not offer saccadic or smooth-pursuit exercises for gaze stability to individuals with unilateral or bilateral vestibular hypofunction. (Evidence quality: I; Recommendation strength: Strong)"(2).

Evidence revealed no improvement in motion-provoked dizziness, imbalance or dynamic visual acuity when utilizing saccadic or smooth-pursuit eye movements without head movements compared to gaze stabilization exercises.(24-27)

At the initial visit, the patient was educated in the vestibular exercise program post-operative day 1 in the hospital. He was provided with verbal and written instructions on how to gradually progress the exercises over the next 2 weeks (Table 2). His initial program consisted of: gaze stabilization exercises (VOR x 1, eye-head movements between targets) in sitting; habituation exercises (yaw/pitch head movements) in sitting and a graded walking program beginning with 5 minutes, 3-4 times per day, gradually increasing to 30 minutes daily.

Table 2. Gaze Stabilization Exercise Dosage and Progression

DOSAGE • Acute/Sub-acute: 12 minutes/day • Chronic Unilateral: 20 minutes/day for 4-6 weeks • Bilateral: 20-40 minutes/day for 5-7 weeks
Types: • VOR x 1, VOR x 2 • Eye-Head Movements **Target Distance**: arm's length, 3 meters **Target Background**: plain, conflicting **Target Size**: decrease size as able • near: 14-point font • far: 54-point font **Head Movement**: horizontal, vertical **Head Speed**: gradually increase (goal of 2 Hz)[14], consider using metronome **Posture**: sitting, standing, standing with balance challenge, walking

When considering exercise dosage recommendation, clinicians should look to Action Statement 6b which states: "Clinicians may prescribe weekly clinic visits plus a home program of gaze stabilization exercises including at a minimum: 3 times per day for a total of at least 12 minutes daily for individuals with acute/subacute unilateral vestibular hypofunction (Evidence quality II; Recommendation strength: Weak)(2). The recommendation strength is weak secondary to the fact that the data was extrapolated from the literature. In addition, Action Statement 6a can guide the clinician in prescribing the appropriate dosage of balance exercises. It states: "Clinicians may consider prescribing static and dynamic balance exercises for individuals with acute/sub-acute unilateral vestibular hypofunction; however, no specific dose recommendations can be made at this time (Evidence quality II; Recommendation strength: Expert opinion)"(2).

The patient returned to physical therapy 2 weeks after surgery. Subjectively, he reported good compliance with the home exercise program (HEP). He noted imbalance when walking with quick head or body turns. He had not returned to driving, however he tolerated the 3-hour drive as a passenger. Outcome measures at that time reflected typical findings for an individual with an uncompensated acute unilateral peripheral vestibular hypofunction as noted in Table 1.

His HEP was updated and static and dynamic balance exercises were added to address findings of imbalance and gait instability when walking with head movements. The patient was educated to continue to gradually increase daily activities while following post-operative precautions to not lift more than 10 pounds or bend down. He was encouraged to progress to 30 minutes of walking daily. He was also educated in a safe return to driving plan.

Due to the distance the patient lived from the medical center, he was seen for a virtual VPT visit 4 weeks post-operatively. At that time, he reported that he had returned to driving, performed light household tasks, and walked 30 minutes on most days without difficulty. He denied dizziness with repetitive horizontal or vertical head movements but noted dizziness with body turns. Motion sensitivity screening was completed secondary to his report of dizziness with body turns and revealed mild dizziness, (rated 2/5) lasting less than 10 seconds, provoked by one 180° turn to each side. When demonstrating the VOR x 1 exercise, the patient reported mild oscillopsia at higher head speeds. Balance screening utilizing the mCTSIB revealed his ability to balance for 30 seconds with eyes open and closed on a firm surface and he had progressed to 30 seconds eyes open, 22 seconds eyes closed on a foam surface. The Dynamic Gait Index-4(28) on this date was 11/12, noting mild imbalance when the patient walked with horizontal head turns.

The home exercise program was updated with recommendations to perform habituation exercises that involved 180° progressing to 360° turns while mimicking moving empty boxes around in his work truck. He was educated on how to perform dynamic sway balance exercises on firm and foam surfaces (reaching beyond his base of support to again mimic moving boxes around) as well as how to progress to dynamic VOR x 1 while walking in a hallway in his home. Recommendations also included continuation of a 30 minute daily walking program, while incorporating occasional head movements.

Outcome

The patient was seen in the clinic six weeks post surgery. He reported that he felt 85% recovered and confident that he was on course to return to work in 2 weeks as planned. All outcome measures scores were approaching baseline and met the criteria for achieving the minimal detectable change reflecting good progress towards central compensation (Table 1). No adverse or unanticipated events occurred during the intervention.

Discussion

Additional Action Statements are pertinent to this case and warrant discussion. Although expert opinion recommends once per week treatment sessions with the overall number of sessions: 2-3 weeks for acute/subacute unilateral, 4-6 weeks for chronic unilateral and 5-7 weeks for bilateral hypofunction, this case was seen for three post-op visits spread over six weeks. As per Action Statement 7, there is strong evidence that clinicians should offer supervised vestibular physical therapy for patients with symptoms due to acute (less than 2 weeks from onset), sub-acute (2 weeks up to 3 months from onset), or chronic (after 3 months) unilateral or bilateral peripheral vestibular hypofunction.(29,30) However, the type and degree or amount of supervision is intentionally vague to allow for clinical judgment and consideration of the patient presentation and co-morbidities and patient values. Evidence suggests VPT is especially important for those over age 50 and this group may benefit more from supervision.(20,31) Clinicians should explore delivery of VPT using technology (telehealth or self-teaching methods) as an alternative for some individuals.(32,33) Since the patient lived a long distance from the medical center, his care was coordinated on the same day with other providers and a virtual visit was utilized to bridge the gap between clinic visits.

When developing a plan of care, the treating therapist should think about the harm, benefit and cost ratios. There is a risk of provoking temporary dizziness, nausea and emesis when exercises are performed during the most acute stages, however, these symptoms are typically temporary. Patients may incur increased cost and time spent traveling associated with in-person, supervised VPT. Some patients may have limited benefit of VPT interventions including but not limited to those patients with frequent vertigo attacks due to uncontrolled Meniere's disease; those with significantly impaired cognitive function may demonstrate poor carryover of learning; and those with severe mobility limitations that impede meaningful application of exercise strategies.

Clinicians can look to Action Statement 8 to guide their decision for stopping VPT intervention (Table 3). "Clinicians may use achievement of primary goals, resolution of symptoms, normalized balance and vestibular function, or plateau in progress as reasons for stopping therapy (Evidence Quality: II; Recommendation strength: Moderate)"(2). Ultimately, the patient decides whether to participate and when to stop. Individuals with moderate to severe cognitive or mobility impairments may need additional treatment sessions. These individuals are often excluded in research, so stopping rules may not be appropriate for them.

Table 3. Guidelines for Stopping VPT(2)

Stop Vestibular Physical Therapy if:
• Symptoms resolution with normalization of balance and/or gait • Goal achievement • Patient preference • Plateau in progress • Non-compliance/non-adherence • Fluctuating, unstable or worsening vestibular symptoms • Medical/psychological comorbidities preventing participation

Future research is imperative for VPT treatment evolution. Research is needed to determine the most effective components of VPT (e.g., gaze stability, balance, or habituation), dosage, and methods of delivering VR (e.g., immersive versus non-immersive devices). Researchers should examine the impact of frequency, intensity, duration, and type of balance and/or GSE on postural control and functional outcomes separately for individuals with acute, sub-acute, and chronic UVH and BVH. Clinicians and researchers can help by clearly documenting the specific dosage parameters (exercise time per session/day, frequency per day/week, duration, and intensity) in medical records and research methodology. To ensure adequate exercise dosage, researchers and clinicians should determine methods to rate both the intensity and the difficulty of gaze stabilization and balance exercises and how to progress individuals in a systematic manner.

LISTEN TO THE PODCAST!

ON THE **UPDATED VESTIBULAR HYPOFUNCTION CPG**

FEATURING: **COURTNEY HALL AND WENDY CARENDER**

Conclusion/clinical implications

This case demonstrates the relative ease with which a clinician can incorporate several of the vestibular hypofunction CPG action statements into their daily clinical practice. Strong evidence indicates that VPT, when appropriately prescribed, can ease symptom burden, shorten episodes of care, reduce fall risk and improve overall quality of life. Early intervention improves outcomes for individuals with acute unilateral hypofunction; clinicians should share this information with referral sources. Other strategies for implementing the CPG are provided in Table 4.

Table 4 - Strategies for Implementing the Clinical Practice Guideline(2)

- Seek training in the use of the recommended intervention approaches
- Build relationships with referral sources to encourage early referral of individuals with vestibular hypofunction
- Build a multidisciplinary clinic or network of health care providers to manage patients with vestibular hypofunction
- Measure outcomes of care using recommended outcome measures across the ICF domains
- Add standard phrases to documentation templates to assist with adherence to the CPG
  - Patient reported doing gaze stability exercises in sitting/standing for ____ minutes, ____ times per day with complaints of ___ (dizziness, nausea, etc) with near/far targets.
- Share the JNPT **Perspectives for Patients**[35] with patients and others who are interested in learning about the management of dizziness and imbalance related to vestibular disorders
- Use patient educational materials developed by the Knowledge Translation Task Force that align with CPG recommendations
  - www.neuropt.org/special-interest-groups/vestibular-rehabilitation/resources

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Sub-Acute Unilateral Vestibular Hypofunction-Application of the Updated Clinical Practice Guideline for Peripheral Vestibular Hypofunction: A Case Report

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Abstract

Introduction: Individuals with subacute unilateral vestibular hypofunction often experience persistent symptoms of dizziness, visual blurring with head movement, and imbalance. The recently updated clinical practice guideline (CPG) for peripheral vestibular hypofunction strongly supports the use of vestibular physical therapy (VPT) to address impairments related to gaze instability, motion provoked symptoms, and balance. The action statements from the updated CPG are relevant to an adult with sub-acute unilateral vestibular hypofunction and provide guidance to the clinical decision-making process.
Case History/Clinical Findings: 49-year-old female presented to outpatient VPT one month after an acute episode of vertigo and hearing loss. Patient was diagnosed with labyrinthitis and reported issues with decreased gaze stability, motion sensitivity and imbalance. The patient was currently taking medications for anxiety and depression. The patient scored a 62/100 on the Dizziness Handicap Inventory (DHI) and 46/100 on the Sensory Organization Test (SOT). Interventions: The patient attended six VPT visits over six weeks set approximately one week apart. The intervention consisted of progressively challenging gaze stability exercises, habituation, and balance exercises along with a home exercise program. Outcomes: Six weeks after the initiation of VPT and 10 weeks after the original vertiginous episode patient scored a 16/100 on the DHI (mild disability) and 75/100 on SOT. It was anticipated the patient would be seen for up to an additional four visits in order to address her reports of motion sensitivity. Conclusion: Several action statements in the updated peripheral vestibular hypofunction CPG support the application of VPT for the treatment of individuals with sub-acute unilateral vestibular hypofunction. Incorporating these recommendations can guide a physical therapist in their decision making on intervention choices, dosage, and factors which may impede progress.

Keywords: Clinical Practice Guideline, Sub-acute Unilateral Peripheral Vestibular Hypofunction, Case Report, Vestibular Physical Therapy, Vestibular Rehabilitation
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Introduction

Labyrinthitis is an inflammation of the membranous labyrinth of the inner ear.(1) The membranous labyrinth contains the otolithic organs (saccule and utricle), semicircular ducts, and cochlear duct.(1) Patients with labyrinthitis report a sudden onset of vertigo, nausea, vomiting, tinnitus, and/or hearing loss and which decreases over a period of 72 hours.(1) Labyrinthitis is most commonly caused by a bacterial or viral infection. Labyrinthitis typically presents in adults age 30-60 years and is twice as common in females.(2) After the acute phase, which may last up to two weeks, patients may be left with persistent vestibular and auditory symptoms which can impact their life.(3) A referral for vestibular physical therapy (VPT) should

be considered for these patients with continued symptoms.(4)

An episode of labyrinthitis can result in a unilateral peripheral vestibular hypofunction, leading to continued reports of dizziness and/or vertigo, visual blurring with head movement, and/or imbalance. The time period of 2 weeks and up to three months following the onset of vestibular symptoms is considered the subacute phase.(4) Recently, the Vestibular Rehabilitation for Peripheral Vestibular Hypofunction: An Updated Clinical Practice Guideline (CPG) from the Academy of the Neurologic Physical Therapy of the American Physical Therapy Association was published.(4) The purpose of this case report is to demonstrate how clinicians can apply and implement several of the action statements from the updated Vestibular Hypofunction CPG for individuals with sub-acute unilateral vestibular hypofunction.

Case study presentation

History

The patient was a 49-year-old female referred to a private outpatient physical therapy clinic for vestibular physical therapy with a diagnosis of right labyrinthitis. The onset of her vestibular symptoms began approximately one month before being seen in outpatient physical therapy. This time period is consistent with a person in the sub-acute stage of peripheral vestibular hypofunction.(4) The patient reported she had excessive “ear popping”, followed on the next day with acute unilateral hearing loss on the right side and severe vertigo. The patient sought care at an urgent clinic and was told she had a middle ear condition. It was recommended by the health care professional to take Sudafed® and Flonase, and she was prescribed meclizine and Zofran for the dizziness and nausea. The patient reported the symptoms of vertigo and nausea gradually reduced over several days; however, the patient was still experiencing symptoms of dizziness and hearing loss. The patient sought care from a chiropractor and after describing her symptoms she was immediately referred to an otolaryngologist. In order to manage the hearing impairment, the physician attempted three intratympanic steroid injections and a course of oral steroids; however, there was no improvement. The otolaryngologist also referred the patient to VPT. The patient’s medical history included depression along with anterior cervical discectomy (2005) and fusion (2014). The patient was currently taking medications for anxiety and depression (Wellbutrin 150 milligrams by mouth once a day, Buspar 15 milligrams by mouth twice a day, Lexapro 10 milligrams by mouth once a day); however, the patient was not taking any medications for her dizziness or nausea.

Examination

A patient with peripheral vestibular hypofunction may present with the report of dizziness and/or vertigo, visual blurring with head movement, and/or imbalance. When a patient with suspected peripheral vestibular hypofunction is evaluated by a physical therapist, assessments will be completed to assist in ruling in/out other vestibular disorders (e.g. benign paroxysmal positional vertigo), to evaluate the function of the vestibular system by competing an oculomotor exam, examine for motion provoked symptoms, and evaluate for imbalance or falls. The updated CPG includes a decision algorithm knowledge tool facilitating clinical decision making for outcome assessment measurements based on patient report.(5) At the initial evaluation (one month after symptom onset), the patient reported dizziness, nausea, and imbalance. More specifically, she identified motion sensitivity when looking up, during quick head motions, bed mobility, bending over, and when walking.

Differential Diagnosis

To ensure the patient did not have Benign Paroxysmal Positional Vertigo (BPPV), positional testing was completed. Positional testing was negative for BPPV as assessed by right and left Dix-Hallpike (anterior and posterior semicircular canals) and Roll test (horizontal semicircular canals).

Oculomotor Exam

The patient demonstrated normal smooth pursuit and saccades; however, the patient reported a provocation of nausea. The patient reported testing during slow vestibulo-ocular reflex (VOR) testing. When performing the head thrust test, cervical guarding prevented the physical therapist from performing a quick enough head movement to elicit a positive response. VOR cancellation to assess for visual motion sensitivity assessment was deferred secondary to patient report of nausea.

Report of Dizziness and/or Vertigo

The patient reported symptoms of dizziness indicating use of the Dizziness Handicap Inventory. The Dizziness Handicap Inventory (DHI) is a self-report measure of how the patient perceives their symptoms of dizziness are impacting their life.(6) The DHI consists of 25 questions and is scored based on the patient response (always=4, sometimes=2, none=0).(6) A total score can be calculated (0-100) as well as three subscale scores: functional, emotional, and physical.6 Higher scores are indicative of greater perceived handicap due to dizziness. The patient scored a total of 62/100 (functional=20/36, emotional=20/36, physical=22/28). A score of 62 is categorized as severe.(7) In addition to the DHI, the patient did report motion sensitivity upon returning to upright from the head down positions during Dix-Hallpike assessment and in each side-lying position during the Roll test.

Imbalance

The patient reported a sense of imbalance. Sensory Organization Testing (SOT) is used to evaluate postural stability under different sensory conditions. The SOT was completed with this patient on Visit #2. The patient's SOT results (Figure 1) were abnormal with a composite score of 46/100 (expected score of 70/100 based on age and gender). The patient experienced four falls and increased postural sway above age-matched norms was observed in 12 trials. The patient presented with a visual/vestibular pattern deficit.

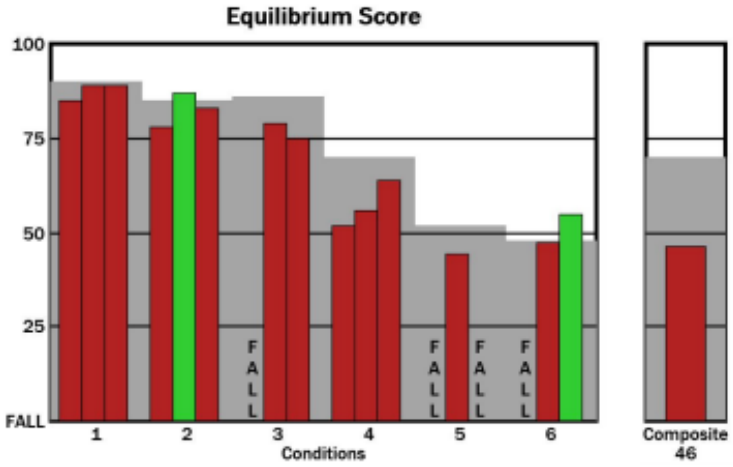

Figure 1: Initial Sensory Organization Test Equilibrium Score Results

Diagnosis/Prognosis

The patient presented with signs and symptoms consistent with subacute unilateral peripheral vestibular hypofunction on the right secondary to an episode of labyrinthitis resulting in motion sensitivity, gaze instability, balance impairments, along with apprehension to movement. The patient's Movement System Diagnosis was Sensory Selection and Weighting Deficit.(8) Action Statements 1 and 7 states clinicians should offer supervised (Action Statement 7) VPT (Action Statement 1) to individuals with acute/subacute unilateral vestibular hypofunction. The plan of care identified this patient was appropriate to receive supervised VPT. It was anticipated the patient would demonstrate improved gaze stability, reduction in motion provoked symptoms, improved balance, and return to prior level of function; however, it was anticipated the patient may need up to 10 visits. Action Statement 9 identifies anxiety and depression as two factors with the potential to modify rehabilitation outcomes and were considered when anticipating the duration of VPT required to reach the patient goals.

Intervention

The plan of care identified working on gaze instability, motion sensitivity, and imbalance. Visit #2 was completed three days after the initial evaluation. Action Statement 6b states clinicians may prescribe weekly clinics visits plus a home exercise program of gaze stabilization exercises for at least 12 minutes daily for individuals with acute/subacute unilateral vestibular hypofunction.(4) Gaze stabilization exercises are designed to promote gaze stability and developed on the VOR.4 VOR adaptation exercises are intended to induce long term changes in the neuronal response to head movements with the goal of reducing symptoms and normalizing gaze stability during head movements.(4) Gaze stabilization exercises require the person to move their head while maintaining focus on a target (VOR x 1) or with the target moving (VOR x 2). VOR adaptation exercises can be done in the yaw (cervical rotation) and pitch (cervical flexion/extension) planes. To promote recovery in a person with vestibular hypofunction, the duration of a single bout of gaze stability exercises is targeted to be between one to two minutes, at a pace where they experience symptoms. At Visit #2, time was spent titrating VOR x 1 exercise with a metronome to 80 beats per minute (bpm) in the yaw plane. The exercise was performed in standing on a firm surface with a plain background. Utilizing a metronome allowed the therapist to dose and track the frequency of head movement. The therapist instructed the patient to complete gaze stability at 80 bpm for at least 45 seconds but not more than 90 seconds (documented as 45-90). Once 90 seconds of gaze stabilization exercise was achieved, the patient was instructed to increase the pacing of the metronome. The patient was instructed to complete VOR x 1 exercise several times per day in order to successfully meet the three times/day for a total of 12 minutes daily recommended dosage for gaze stability (Action Statement 6b).(4)

Visit #3 was completed one week after the initial evaluation and the patient reported an increase in symptoms and dizziness with rolling in bed. Positional testing (Dix-Hallpike and Roll Test) was repeated secondary to the patient's continued report of symptoms when rolling in bed, and was negative bilaterally for nystagmus; however, she did report motion sensitivity to these movements. Habituation exercises are movements which expose a patient to a provocative stimulus (e.g. head movement) and over time, with repeated exposure, leads to a reduction of symptoms (e.g. dizziness).(4) At this visit, habituation exercises were added to the patient's home exercise program and included log rolling and Brandt-Daroff habituation exercises. A review of gaze stabilization exercises was also completed, and the metronome pacing was increased from 80 to 120 bpm. In addition to increasing the frequency of head movement, the patient was instructed to ensure equal distance motion of the head from right to left, maintaining visual contact with the

target at all times, and constant head motion without pausing at the end ranges.

Visit #4 was completed two weeks after the initial evaluation. The patient reported she was feeling better and she was resting an adequate amount between her exercises in order to allow symptoms to resolve. The gaze stabilization exercises were discussed, and the patient was able to increase the metronome to 145 bpm for approximately 60 seconds with a 2-minute rest between sets. Pitch plane motion activities were initiated, and the metronome was titrated to 60 bpm. Gaze stability exercises were progressed to having patient stand on a soft surface with a more complex background. The patient reported significant improvements in motion provided symptoms with only 10 seconds of symptoms when log rolling and mild report symptoms when completing Brandt-Daroff. In order to advance the habituation exercise program, a standing forward flexion exercise (Reach down as if to tie your shoes.) was added to the habituation exercise program. The patient was asked to hold position and then briskly return with and wait for symptoms of dizziness to resolve before initiating the forward lean toward the other side. Specific balance activities were initiated this visit. Action Statement 6a states clinicians may prescribe static and dynamic balance exercises for acute/subacute unilateral vestibular hypofunction; however, currently there are no dosing recommendations. Balance exercises include static or dynamic exercise to optimize functioning of the symptoms underlying postural control.(4) These exercises may include steady state, anticipatory and reactionary balance training, multisensory testing and gait training.(4) Progression of exercises may involve altering sensory input, modifying base of support, head movements, along with the addition of a cognitive task.(4) At this visit, patient completed a variety of balance activities including head turns and nods and hold Romberg with eyes open and closed on a soft surface.

Visit #5 was completed three weeks after the initial evaluation. The patient reported over the last week she had more postural instability and struggled with her exercises. After completing her exercises a few days previous, she had an episode of vertigo and felt more imbalance and dizziness ever since. In order to rule out BPPV, positional testing was repeated with the patient and was negative for nystagmus. After working with the patient, the therapist was unable to determine the source of the new vertiginous episode experienced by the patient. During the session, the gaze stabilization exercises were progressed by increasing the frequency of movement (yaw plane 160 bpm and pitch 135 bpm). VOR cancellation exercises were initiated. The patient and the therapist reviewed the standing forward flexion habituation exercises. In addition, the patient completed balance exercises including standing head turns and head nods while in Romberg position on a soft surface with eyes closed.

Outcome:

The last visit to be included in this case was Visit #6 which was completed six weeks after the initial evaluation and approximately 10 weeks after the initial vertiginous episode. The patient's SOT composite score was 75/100 (improvement of 29 points) and was within normal range for her age and gender (Figure 2). The DHI improved by 48 points to 16/100 indicating mild disability. The patient reported she still had some motion provoked symptoms including looking up, quick head motions, and bending over. The patient was pleased with her progress and is hopeful to get more resolution of her symptoms. Gaze stabilization exercises were advanced to standing on a soft surface with a complex visual background paced at 150 bpm in the yaw plane and 140 bpm in the pitch plane. For the habituation exercises, the patient continued with Brandt-Daroff and standing on soft surface completing head movements with eyes closed. It was anticipated patient would need up to four more visits to meet her goals. At the time of the publication of this case, the patient was still being seen for VPT.

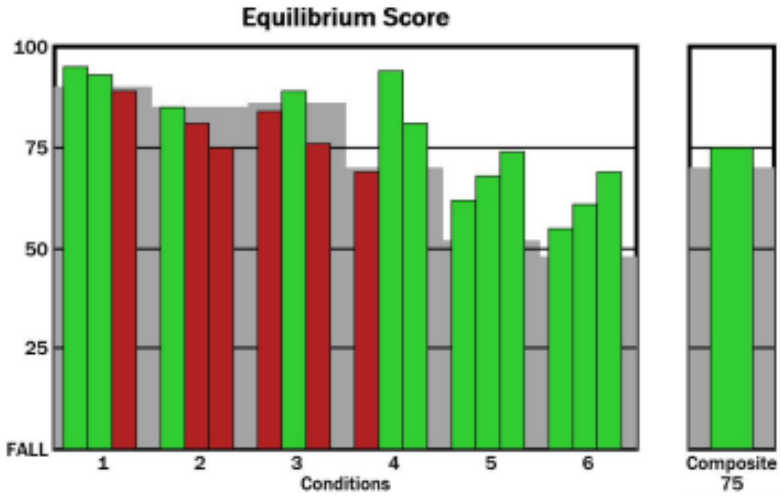

Figure 2: Re-assessment Sensory Organization Test Equilibrium Score Results

Discussion

A patient with sub-acute unilateral peripheral vestibular hypofunction who continues to experience symptoms of visual blurring (gaze instability), dizziness with head movement, and imbalance should receive supervised VPT.(4) Seeing patients during the sub-acute phase after a unilateral peripheral vestibular event is feasible and beneficial.

The VPT strategies implemented with this patient case were consistent with action statements in the peripheral vestibular hypofunction CPG. The patient was seen by a physical therapist for VPT within one month of her original episode of vertigo. Weekly supervised visits were intermixed with a home exercise program of gaze stability exercises and habituation exercises to target the patient's specific impairments and activity limitations. The patient demonstrated significant improvements in perceived handicap secondary to her dizziness and balance as assessed on the SOT demonstrating improved quality of life. Anxiety and depression may negatively impact rehabilitation outcomes and may be the reason that patient continued to need additional visits in order to maximize her recovery.(4) At the time of publication, the patient was still being seen for VPT.

The case presented here highlights the need for additional research and aligns with the recommendations provided by the peripheral vestibular hypofunction updated CPG.(4) Exercises commonly prescribed in VPT integrate the complex sensory and motor aspects of the vestibular system; therefore, it is not clear what are the most effective components (e.g. gaze stability, habituation, or balance) in promoting patient recovery. For example, the patient in this case would complete gaze stability exercises while standing on different surfaces requiring a complex sensory-motor response. Documenting specific parameters for gaze stability exercises, habituation, and balance such as sessions/day, frequency per day/week, duration, and intensity will assist future research in further understanding dosage. The therapist in this case report used a metronome and described the methods (45-90) to document the dosage (intensity and difficulty) of gaze stabilization in order to progress the patient in a systematic matter. Case studies allow for sharing of dosage methods like 45-90 for other physical therapists to consider implementing into their own clinical practice.

Conclusion/clinical implications

Vestibular physical therapy should be offered to patients with sub-acute unilateral peripheral vestibular hypofunction. The updated vestibular rehabilitation CPG can serve to guide physical therapist decision making when determining which interventions to use and at what dosage. In addition, guidance about factors impacting patient prognosis (e.g. anxiety and depression) can be used to justify additional visits. Future research should examine optimal dosage parameters for gaze stability, habituation, and balance exercises in patients with sub-acute unilateral peripheral vestibular hypofunction.

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What are the Vestibular Hypofunction CPG Action Statements?

Watch this video to find out more.

Chronic Unilateral Vestibular Hypofunction - Application of the Updated Clinical Practice Guideline for Peripheral Vestibular Hypofunction: A Case Report

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Abstract

Introduction: Individuals with chronic unilateral vestibular hypofunction (UVH) often experience reduced quality of life along with mobility impairments related to gaze and gait instability. The recently updated clinical practice guidelines for peripheral vestibular hypofunction (CPG) continues to provide strong support for the use of vestibular physical therapy (VPT) to address impairments related to postural control/gait and gaze instability. Action Statements relevant to an adult with chronic UVH from the updated CPG provide clinical decision-making guidance. Case History/Clinical Findings: 47-year-old female with a 9-month history of motion-provoked dizziness, imbalance, and nausea. She had a 68% left caloric weakness and was diagnosed with vestibular neuritis. She presented with comorbid anxiety, depression, migraine, and motion sensitivity. Interventions: The patient attended eight visits over 3 months, with treatment visits gradually decreasing in frequency. Progressively challenging low tech balance exercises for sensory reweighting, and a daily walking program were implemented. Habituation exercises, eventually including optokinetic stimulation, were added as tolerated. She also participated in counseling for cognitive behavioral therapy. Outcomes: The patient demonstrated clinically meaningful improvements on Dizziness Handicap Inventory (improved to 32/100) and Functional Gait Assessment score (improved to 28/30). At discharge, she had resumed light jogging, tennis and had returned to work full time. Conclusion: Several Action Statements in the updated peripheral vestibular hypofunction CPG support the application of VPT for the treatment of individuals with chronic UVH. This case demonstrates that recognition and appropriate intervention for factors that modify recovery from chronic UVH has a positive impact on recovery.

Keywords: Chronic Unilateral Vestibular Hypofunction, Clinical Practice Guidelines, Case Report, Vestibular Physical Therapy
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Introduction

The vestibular system contributes to many aspects of behavior including balance and walking,(1–4) spatial cognition and self-motion perception,(5–9) and gaze stability.(10,11) Unilateral loss of vestibular function (UVH) causes transient vertigo, head motion induced dizziness and oscillopsia, and balance/gait impairments.(12–14) Vestibular physical therapy (VPT) has long been a mainstay treatment approach to address the functional impairments for individuals with UVH.(1,15–19)

The benefit of VPT for individuals recovering from UVH is strongly supported by two Cochrane reviews(20,21) and led to the development of a clinical practice guideline (CPG) for peripheral vestibular hypofunction.(22) The CPG for peripheral vestibular hypofunction was recently updated,(23) supporting the original Action Statements while also presenting several additional Action Statements. The purpose of this case report is to demonstrate how clinicians can apply and implement several of the Action Statements from the updated Vestibular Hypofunction CPG for individuals with chronic UVH (greater than 3 months from symptom onset). Balance exercise dosage and progression guidelines will be outlined. This case report highlights factors that negatively modify outcomes such as anxiety,(24–27) and strategies that were implemented for managing these impediments.(28,29)

Case study presentation

History

A 47-year-old single female presented to an outpatient vestibular physical therapy (VPT) clinic at a large tertiary teaching hospital with a 9-month history of motion-provoked dizziness, imbalance and nausea. Reported symptoms limited her ability to drive on a busy highway, work in retail and participation in recreational activities such as jogging or tennis. She described an initial episode of severe vertigo with nausea, vomiting and imbalance without hearing loss that lasted 2 days. She was evaluated by an Otolaryngologist and the videonystagmography test revealed a 68% left caloric weakness with findings of right beating post-head shaking nystagmus. Vestibular neuritis was suspected, and the patient was prescribed meclizine which she continued to take daily for several months. She participated in VPT at a local clinic 5 months ago with minimal improvement in symptoms. She described performing exercises consistent with saccades/pursuits, VOR X1, and walking with head movements. Her participation in therapy was limited by motion induced nausea. Past medical history included anxiety, depression, migraine, and motion sensitivity dating back to childhood. Migraine headaches were under fairly good control with the patient reporting 1-2 moderate headaches per month.

Examination

Outcome measures as recommended by Academy of Neurologic Physical Therapy (ANPT) as core measures for patients with neurological disorders were performed at the initial evaluation.(30) The patient scored 71% on the Activities Specific Balance Confidence Scale (ABC).(31) Her Functional Gait Assessment (FGA) Score was 25/30 noting that walking with head movements resulted in mild imbalance (below normal for age).(32) Additional outcome measures recommended by Vestibular Evidence Database to Guide Effectiveness used to assess vestibular dysfunction were also administered.(33) The patient's Dizziness Handicap Inventory (DHI) Score was 76/100 indicating a severe self-perceived handicap due to dizziness.(34,35) She demonstrated a 3-line loss on the Clinical Dynamic Visual Acuity (DVA) test (normal ≤ 2 lines).(36) On the modified Clinical Test of Sensory Interaction on Balance (mCTSIB), balancing on a foam surface with her eyes closed was limited to 12 seconds,(37) and the Timed Up and Go (TUG) at 12.3 seconds revealed a slightly elevated fall risk (> 11.1 seconds correlate with higher falls risk).(38)

Diagnosis/prognosis

Clinicians can initiate their clinical decision making by looking at the updated CPG for vestibular hypofunction Action Statement 2 regarding the effectiveness of vestibular rehabilitation for individuals with chronic unilateral vestibular hypofunction. It states: "Clinicians should offer VPT to individuals with chronic

unilateral vestibular hypofunction (Evidence quality: I; Recommendation strength: Strong)"(23). Several studies have reported improved outcomes in individuals with chronic UVH who receive VPT when compared with a control group that is given either no exercise or sham exercise.(39–41) Moderate evidence supports that participation in vestibular exercises result in improved outcomes regardless of time from onset.(40,42,43) Long-term use of vestibular suppressant medication may negatively impact an individual's recovery; therefore, the patient was instructed to contact her physician about stopping or limiting the use of meclizine while participating in VPT.

Interventions

What types of exercises should be included in the plan of care for a patient with chronic UVH?

Clinicians can look to Action Statement 5 which compares the effectiveness of different vestibular rehabilitation modalities to answer this question. It states: "Clinicians may provide targeted exercise techniques to accomplish specific goals appropriate to address identified impairments and functional limitations (Evidence quality: II; Recommendation strength: Moderate)."(23) There is support for a variety of balance training modalities including low technology (foam pads, rocker boards),(44) virtual reality,(44,45) optokinetic stimulation,(41,46,47) platform perturbations,(48,49) and vibrotactile feedback.50 Balance exercises may be more enjoyable and less tiring using virtual reality which may lead to improved exercise compliance.(44) Coupling immersive virtual reality with head movement may provide additional benefit, including reduced symptoms and improved balance.(45) While it remains unclear when or if different types of exercises should be introduced, a lack of harm suggests clinicians may include a variety of exercise modalities to optimize and accelerate recovery of balance function and reduce fall risk.

The patient was seen for a total of eight visits over 3 months; she was seen once per week for the first month, then 2 times per month for the next 2 months. Initial treatment focused on progressively challenging low-tech balance exercises for sensory reweighting for 10 minutes, twice a day, and a daily walking program. Early exercises emphasized somatosensory weighting through slow weight shifts initially with eyes open, then eyes closed. Gaze stabilization exercises were initiated in sitting, with a plain background, and gradually progressed to standing with a complex background. Habituation exercises for desensitization were gradually introduced, and eventually included optokinetic stimulation. See Table 1 for specific examples of exercises as prescribed in this case. She started on Zofran for nausea management and participated in weekly counseling sessions.

Table 1. Exercise Progressions

Category of Exercises	Specific Examples
Balance	• Static balance on firm, progressing to foam surface with eyes closed • Somatosensory weighting through slow weight shifts (medial/lateral, anterior/posterior), initially with eyes open, then eyes closed
Gaze Stabilization (VOR x 1)	• Sitting, plain background, near/far targets, horizontal/vertical head movements • Standing on foam, checkerboard background, near/far targets, horizontal/vertical head movements
Habituation	• Sitting, progressing to standing, then walking with partial to full range of motion horizontal/vertical head movements • 180/360 degree body turns, progress to adding pitch and roll head movements • Optokinetic video viewing in sitting, progress to standing
Walking Program	• Walk on driveway/close to home 5-10 minutes, 2 times per day • Walk in neighborhood 30 minutes daily

What is the recommended exercise dosage for a patient with chronic UVH?

Action Statement 6a can assist the clinician in determining the optimal balance exercise dose for this population. It states: "Clinicians may prescribe static and dynamic balance exercises for a minimum of 20 minutes daily for at least 4-6 weeks for individuals with chronic unilateral vestibular hypofunction (Evidence Quality II; Recommendation Strength: Weak)."(23) This recommendation is extrapolated from the literature since no studies to date specifically examined the role of different doses of balance exercises and the effect of balance dosage on outcomes for individuals with vestibular hypofunction. In order to facilitate improvement in postural control, balance exercises should be of the appropriate intensity and progressively challenging. Clinicians should consider incorporating a patient-reported balance intensity rating scale to assist them in gauging the perceived level of exercise challenge.(51, 52)

Action Statement 6b provides recommendation for the optimal gaze stabilization exercise dosage for treatment of individuals with peripheral vestibular hypofunction. It states: "Clinicians may prescribe weekly clinic visits plus a home exercise program of GSE consisting of a minimum of 3-5 times per day for a total of at least 20 minutes daily for 4-6 weeks for individuals with chronic unilateral vestibular hypofunction (Evidence quality: II; Recommendation strength: Weak)."(23) This recommendation is also extrapolated from the literature.

At the 2-week VPT return visit, there was minimal change in overall symptoms and outcome measure scores. The DHI score remained in the severe range at 68/100. The patient continued to experience imbalance when walking with head movement, scoring 26/30 on the FGA. She demonstrated ongoing difficulty maintaining postural control when relying primarily on vestibular inputs such as when standing on a foam surface with her eyes closed. Motion provoked nausea was significantly limiting the patient's participation in the home exercise program as well as her daily activities and as a result, the patient reported increased anxiety. The patient also demonstrated rapid shallow breathing, hesitancy and stiffening postures consistent with balance-related anxiety when performing the exercises.(53) A valid question at this time is: Should you recommend that this patient continue with VPT? Overall, it is the individual's decision to participate in VPT and when to stop.

Action Statement 10 speaks to the harm/benefit ratio for vestibular rehabilitation in terms of quality of life. It states: "Clinicians should offer vestibular physical therapy to persons with peripheral vestibular hypofunction with the intention of improving quality of life. (Evidence quality: Level I; Recommendation strength: Strong)."(23) To date, no studies have reported significant harm to individuals. Neck pain, motion sickness, and nausea have been reported as side effects of rehabilitation and these can affect quality of life; however, there is sufficient evidence of reduced psychological distress with VPT and potential for additional improvement.

Extensive education was provided at the second visit. To address nausea management, the treating clinician contacted the referring physician and requested a prescription for anti-emetic medication for the patient. Frequent bland meals as well as ginger or peppermint tea were encouraged. In addition, the patient was counseled to increase time between exercises to allow symptoms of dizziness and nausea return to baseline prior to next exercise. The overall goal was for the patient to perform the exercises at an intensity which provoked no more than moderate symptoms (4-6/10) which returned to baseline within a few minutes.

Regarding balance-related anxiety management, the patient was educated to incorporate deep breathing and grounding techniques during and between exercises. More specifically, for the grounding technique, she was educated to pay attention to sensation from feet and noticing (without judgment) body sway with eyes open/closed. She was taught to focus on feeling "rooted" to the ground,(55) and this could be done either in barefoot or while wearing firm soled shoes. She expressed a willingness to reach out to a prior counselor and consider returning to weekly counseling sessions which included Cognitive Behavioral Therapy (CBT).(29)

Outcome

The patient was able to gradually apply learned grounding and breathing strategies into her daily life. She was able to return to work full-time in a small clothing boutique, incorporating breaks into her workday. She resumed light jogging and recreational tennis. She continued to limit long distance driving on busy highways. Her DHI score improved to 32/100 with self-reported improved quality of life. The patient's FGA score was 28/30 (normal for age), with persistent mild imbalance only when walking with horizontal head movements and walking with eyes closed.

Discussion

This case exemplifies that certain comorbidities may affect rehabilitation outcomes. Action Statement 9 states: "Clinicians may evaluate factors that could modify rehabilitation outcomes. (Age: Evidence quality: I; Recommendation strength: Strong; Other Factors: Evidence quality: II; Recommendation strength: Moderate)."(23) Age and gender do not affect rehabilitation potential for improvement.

Certain comorbidities such as anxiety, depression, peripheral neuropathy, migraine, abnormal binocular vision, and abnormal cognition may negatively impact rehabilitation outcomes. Clinicians should consider co-morbidities when setting goals and refer to other healthcare professionals as appropriate. Other ideas for managing comorbidities are listed in Table 2.

Table 2: Patient related factors relevant to this case that may modify VPT outcomes and management strategies

FACTORS THAT MAY MODIFY OUTCOMES	POSSIBLE MANAGEMENT STRATEGIES
Anxiety/Depression	• Incorporate deep breathing and grounding exercises into treatment • Consider implementing Mindfulness and Acceptance Based Interventions [44] • Refer to specialist for counseling and/ or Cognitive Behavioral Therapy
Migraine	• Referral to Neurologist for medical management of migraines • Educate patient in common migraine triggers, improving lifestyle modifications including sleep, hydration, nutrition, activity level
Long term use of vestibular suppressants	Educate patient and primary care physicians/referring physicians that long-term use of vestibular suppressant medication may negatively impact an individual's recovery • Short-term use of low-dose antihistamines in individuals with chronic vestibular disorders may help control symptoms without negative impact on outcomes [45]

The amount of supervision (Action Statement 7) was explored, and the patient agreed to weekly VPT visits initially to gradually modify her HEP while closely monitoring symptoms. Without timely feedback from the supervising physical therapist, individuals may under- or over-comply with the exercise prescription or miss an opportunity to modify the program resulting in either lack of progress/improvement or increased symptoms potentially leading to early withdrawal from VPT.

A recent study by Graham et al found that total DHI scores > 60 (severe handicap) may be useful for identifying the presence of functional and psychiatric comorbidity in patients presenting for evaluation of vestibular and balance complaints.(35) More specifically, Persistent Postural Perceptual Dizziness (PPPD) was associated with DHI scores greater than 60 and anxiety or depressive disorders were associated with DHI scores greater than 60. It is imperative that therapists recognize, screen for, and assist their patients in obtaining treatment for other comorbidities that interfere with rehabilitation.(54)

Future research should investigate factors that positively and negatively impact functional recovery during VPT, including anxiety and depression, cognitive impairment, and the use of medications. Researchers should examine whether the inclusion of psychological support (e.g., cognitive behavioral therapy, counseling, anti-depressant/anxiety medications) as an adjunct to VPT for individuals with anxiety/depression or who have developed persistent postural-perceptual dizziness is effective, and optimal timing for intervention.(29,56)

Conclusion/clinical implication

Several Action Statements in the updated peripheral vestibular hypofunction CPG support the application of VPT for the treatment of individuals with chronic UVH. This case report demonstrates the need for clinicians providing VPT to recognize individuals with chronic UVH who are not following typical recovery trajectories and how to modify exercise intervention as necessary. Emerging evidence suggests that individuals with comorbidities of anxiety and depression may benefit from interventions directed towards optimizing their emotional regulation. The treatment time frame for this individual was longer than the updated recommendations with less frequent visits, but still utilized face-to-face supervision. At discharge, she had returned to many, but not all premorbid activities. She was satisfied with her level of recovery, and continued weekly counseling sessions.

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Bilateral Vestibular Hypofunction - Application of the Updated Clinical Practice Guideline for Peripheral Vestibular Hypofunction: A Case Report

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Abstract

Introduction: Bilateral vestibular hypofunction (BVH) often leads to reduced quality of life and impairments related to a mixture of gaze and gait instability. The updated clinical practice guidelines for peripheral vestibular hypofunction (CPG) continue to provide support for vestibular physical therapy (VPT) addressing impairments related to postural control/gait and gaze instability. This case report applies relevant Action Statements from the updated CPG into clinical practice for an adult with BVH. Case History/Clinical Findings: 78 year-old male with a 4-month history of severe imbalance and oscillopsia. Positive head impulses bilaterally and failure on foam eyes closed suggested BVH. He lived 90 minutes from the VPT clinic. Interventions: He attended four visits over six weeks, with an emphasis on home exercise participation. Gaze stabilization exercises initially performed in sitting progressed to standing. Quiet stance and dynamic weight shifts were progressed to walking with head turns and relatively narrow base of support. Outcomes: The patient demonstrated clinically meaningful improvements on Dynamic Gait Index and for vestibulo-ocular reflex gain to the right. He improved on the Modified Clinical Test of Sensory Interaction in Balance from 35/120 to 94/120 seconds. He reported a noticeable reduction in oscillopsia. Conclusion: Several action statements in the revised peripheral vestibular hypofunction CPG support the application of VPT for the treatment of individuals with BVH. Following this episode of care, he met his goals and made substantial improvements in gaze and gait/balance stability.

Keywords: Bilateral Vestibular Hypofunction, Clinical Practice Guidelines, Case Report, Vestibular Physical Therapy
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Introduction

It has been suggested that the primary purpose of the vestibulo-ocular reflex (VOR) is to stabilize gaze during locomotion, when frequencies of head movement far exceed the compensatory capabilities of pursuit or optokinetic systems.(1–4) Gait and gaze instability have been directly attributed to loss of vestibular function of the VOR.(2,5–8) After bilateral vestibular hypofunction (BVH), common subjective complaints include severe imbalance (worse in the dark) and apparent bouncing or giggling of stationary environmental objects during head motion, known as oscillopsia.(5,9–11)

There is well established literature supporting vestibular physical therapy (VPT) for treating individuals with BVH.(12–16) The recently updated clinical practice guideline (CPG) for peripheral vestibular hypofunction provided yet further evidence to support VPT for BVH and suggests guidance on treatment approaches extrapolated from current literature.(17) The purpose of this case report is to demonstrate the application of the updated peripheral vestibular hypofunction clinical practice guideline to an individual presenting with BVH.

Case study presentation

History

This 78-year-old male presented with a significant loss of balance function overall that started 4 months prior to initial evaluation. He reported a significant medical history consisting of left acoustic neuroma 1999 treated with radiosurgery resulting in complete left sided vestibular weakness. He did not participate in VPT at that time. He survived tongue cancer treated with chemotherapy, radiation and surgery in 2009. Symptoms were noticeably worse particularly when his head moved fast or when he was standing on a dock at the lake with ripples or waves in the water visible to the sides of the dock. He was not able to see the ball after his swing when he plays golf and relies on a partner to watch the flight of his ball. He often staggered but never fell during both backswing and follow through when playing golf. His symptoms presented as constant imbalance any time he was in motion, although to date he had not fallen. He also stated that he was unable to read or see clearly when he walked or rode in a car (driver or passenger). Patient reported that moving fast (head turning or transitional movements like sit to stand) made the symptoms worse. Patient reported that being still or moving very slowly make the symptoms better. He had a trip planned to Europe eight weeks from the initial visit and expressed concern about safety walking on uneven streets. His goals for VPT were: 1) improve balance to safely walk on uneven streets (cobblestone) and 2) be able to return to golf without falling and track his ball in flight.

Physical Therapy Examination

Patient-reported and performance-based outcome measures used during the examination included: the Activities Specific Balance Confidence Scale(ABC);(18) Dynamic Gait Index (DGI);(19,20) the Dizziness Handicap Inventory (DHI);(21) the modified Clinical Test of Sensory Interaction on Balance (mCTSIB);(22) the oscillopsia visual analog scale (oVAS);(12) the Oscillopsia Functional Index (OFI);(11) an oscillopsia severity score (Osc Severity);(23) and the visual vertigo analog scale (VVAS).(24,25) Patient reported and performance based outcomes are presented in Tables 1 and 2.

Table 1. Patient-reported outcome measures and scores at the initial evaluation and discharge from vestibular physical therapy

Measure	Initial Score	Discharge Score	Clinical Interpretation
Dizziness Handicap Index	36	14	Range 0-100 Mild dizziness handicap: 0-33; Moderate dizziness handicap: 34-66; Severe dizziness handicap: >67[51] MDC = 17[21]
Activities Specific Balance Confidence scale	71.9%	93.1%	Range 0-100 Scores <67 increased fall risk[52]
Oscillopsia Functional Index scale	27	11	Range 0-125 Healthy 95%CI = 8.8–15.3[11]
Oscillopsia visual analog scale	3.2	1.4	Range = 0-10[12] (higher scores are worse)
Oscillopsia severity scale	2.4	1.9	Range = 1-5 (higher scores are worse)
Visual Vertigo Analog Scale	20.4	2.4	Range = 0-100 (higher scores are worse)

Abbreviations: MDC – minimum detectable change

Table 2. Balance and gait measures and scores at the initial evaluation and discharge from vestibular physical therapy.

Balance/Gait/Gaze Measure	Initial Score	Discharge Score	Clinical Interpretation
Dynamic Gait Index	14	21	Scores <19 increased fall risk[20] MDC = 4[53]
Modified Clinical Test of Sensory Interaction in Balance	35 sec	94 sec	Range = 0-120 sec (sum of FLEO, FLEC, FOEO, FOEC; longer is better)
FLEO	30 sec	30 sec	Normal = 30 sec
FLEC	5 sec (fall)	30 sec	Normal = 30 sec
FOEO	0 sec (fall)	30 sec	Normal = 30 sec
FOEC	0 sec (fall)	4 sec	Normal = 30 sec
VOR Gain			
Right	Near: 0.11 Far: 0.22	Near: 0.38 Far: 0.51	Normal = 1.0
Left	Near: 0.0 Far: 0.21	Near: 0.16 Far: 0.21	Normal = 1.0

Abbreviations: FLEO= floor eyes open, FLEC = floor eyes closed, FOEO = foam eyes open, FOEC = foam eyes closed, MDC = minimum detectable change, VOR = lateral semicircular canal vestibulo-ocular reflex
sec = seconds

He presented with normal oculomotor examination including pursuits and saccades. Refixation saccades were present during bilateral clinical head impulse testing for both near (approximately 0.5 meters) and far (approximately 2 meters) targets.(26,27) Subsequent video head impulse testing further demonstrated low vestibulo-ocular reflex (VOR) gain for both lateral semicircular canals, see Table 2.(28)

Diagnosis/prognosis

The initial working diagnosis for this individual was BVH. This diagnosis was further supported by his initial failure on the foam eyes closed test.(22,29) Prognosis for improvement was good supported by several recent studies;(30–32) however, the patient was not expected to achieve the same level of improvement as an individual with unilateral hypofunction.

Plan of Care

Relevant to examination and intervention for this patient is Action Statement 3: effectiveness of vestibular rehabilitation in adults with BVH. It states that there is strong evidence that clinicians should offer VPT to adults with BVH. This action statement strongly supports VPT for this individual, with strong evidence for improvements in balance, gaze stability, and quality of life.(12,17,33–35)

The updated CPG strengthened the support for supervised VPT in Action Statement 7: effectiveness of supervised vestibular rehabilitation.It states that there is strong evidence that clinicians should offer supervised vestibular physical therapy to individuals with BVH.(17) Action statements 6a and 6b are relevant to the duration of VPT and the activities to be included in a VPT program for BVH. Expert opinion suggests that individuals with BVH will benefit from at least 6-9 weeks of balance exercises and weak evidence supports 5-7 weeks of gaze stability exercises.(17) The patient attended a total of 4 face to face visits over a 6-week period for exercises consisting of both gaze stabilization to address concerns of oscillopsia and balance.

Interventions

Initial gaze stabilization exercises (X1 viewing, eye-head movements between targets) were performed in sitting due to profound imbalance with head motion during standing and walking. Gaze stability exercise dosage was gradually increased to 3 to 5 times per day for a total of 20 to 40 minutes based on patient tolerance. Initial balance activities included Romberg position eyes closed in a corner for quiet stance, eyes open anterior/posterior weight shifting at the ankles and medio-lateral weight shifting at the hips. Mini-squats in front of a chair with eyes closed and repeated sit-to-stand with eyes closed were selected to encourage increased proprioceptive weighting during dynamic movements.

The patient returned one week later for the second visit. At that time, gaze stabilization activities were progressed to standing with a progressively narrowed base of support. He continued X1 viewing and eye-leading-head exercises and remembered target exercises were added. He was performing gaze stability exercises 5x daily for 20 to 30 minutes. Full range yaw/pitch head turns were added to Romberg stance activities with eyes open/closed. At this visit, he also practiced standing on foam with his eyes open, emphasizing feeling in control of his body sway rather than trying to minimize body sway. He was encouraged to focus on sensations from his leg muscles and joints. New dynamic activities introduced at this visit included: tandem/inline walking, walking with pitch/yaw full range head rotation, and slow lunge walking. Mini squats were progressed to performance on foam with his eyes open and changing his head position to look at different targets (up/down/right/left). The home exercise program was modified to include head turns with eyes closed mini squats with feet on firm floor and walking with head turns, progressing to narrow stride stance for standing with head turns.

The patient returned for his third visit two weeks later. He reported a single brief episode of perceived visual world rotation in roll (roll vection) lasting several seconds. Roll vection is the illusion of motion in the frontal plane. Immediately following this episode, he stopped golfing and participating in home exercises. He also reported increased anxiety and fear of repeated unprovoked roll vection. He also demonstrated poorer postural control on foam with an increase in high frequency sway suggesting co-contraction consistent with balance-related anxiety.(36) Action statement 9 becomes relevant to his care at this point. It states that clinicians may evaluate factors that could modify rehabilitation outcomes, such as anxiety.(17) He was examined for benign paroxysmal positional vertigo (BPPV) as sparing of the inferior vestibular nerve would allow positional vertigo symptoms such as BPPV to occur despite BVH.(37–39) Positional testing was negative. The reported roll vection was thought to be related to visual motion sensitivity because watching waves at the lake resulted in similar sensations. Although there is mixed evidence examining the impact of anxiety on recovery from peripheral vestibular hypofunction,(30,40) the treating physical therapist felt that symptom- related anxiety was interfering with activity participation. Some authors have reported that anxiety was not significantly higher for individuals with BVH.(41) Others highlight the relationship between visual vertigo and anxiety.(42) This individual presented with BVH plus elements of visual vertigo which may explain the anxiety interference demonstrated here.

The patient was reassured that exercise participation was unlikely to cause that sensation. He was willing to trial his previous home exercises while supervised in the clinic as a way to reinforce the lack of association between his roll vection sensation and VPT participation. Verbal cues emphasizing relaxation and grounding, attending to motion sensations in leg muscles and joints, and reassurance that controlled body sway is normal were consistently provided throughout the visit. No new exercises were introduced

and he was agreeable to resuming his existing home exercise program and follow up in four weeks.

On his return four weeks later, the patient denied any other adverse reactions or events. He acquired a foam cushion for his home exercises. At this point, gaze stabilization exercises were progressed to include near, intermediate, and far distances. Full range pitch/yaw head rotation was added to sit to stand activity with eyes open and feet on a firm surface. Sit to stands on foam with progression from feet parallel to feet in stride stance with eyes open were added this visit. He was explicitly instructed not close his eyes while performing sit to stand exercise with feet on a cushion for safety concerns, despite small improvement in balance ability on foam with eyes closed. At this point he was participating in balance activities twice daily for 15-20 minutes per session. This dosage is consistent with the expert recommendations in Action statement 6a for twice daily balance exercise sessions.(17)

Outcome

Overall, the patient reported good progress and he felt his balance was much improved. He was surprised that he regained the ability to read street signs while driving. His oscillopsia overall was improved (see Tables 1 and 2). He reported that since starting vestibular rehabilitation his average golf score was about 10 points lower and he no longer lost his balance when hitting the ball. He occasionally was able to find and track his ball during flight, but still relied on a partner to ensure he continued to play the correct ball. It is interesting to note that in addition to reduced oscillopsia symptoms, he experienced a marked increase in VOR gain for the right lateral semicircular canal as shown in Figure 1. He also demonstrated significantly earlier recruitment of refixation saccades in response to leftward head impulses.

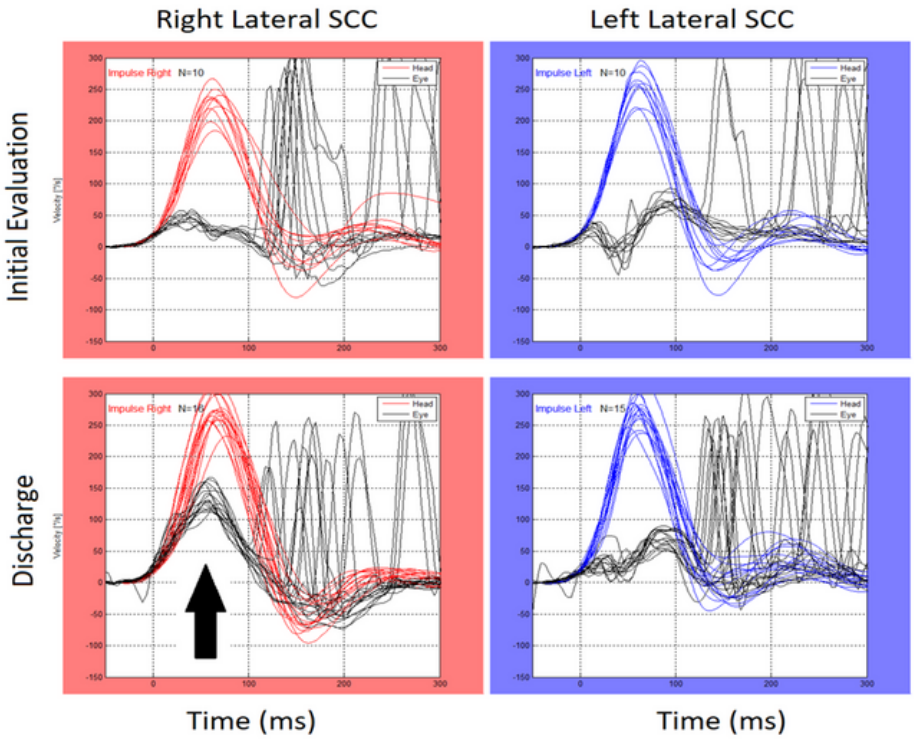

Figure 1. Pre and Post VPT video head impulse tests. Top row corresponds to the initial evaluation, lower row corresponds to the discharge visit. Left column (red outline) corresponds to rightward impulses, right column (blue) corresponds to leftward impulses. Colored lines (red/blue) represent head velocity and black lines represent eye velocity. Note the increase in slow phase eye velocity for rightward impulses observed at discharge (black arrow). Note also the overall earlier onset of saccades with leftward impulses at discharge. Taken together this suggests a mechanistic interpretation for reduced oscillopsia via increased VOR gain (right) and improved saccadic recruitment (left). VOR gain values reported in Table 2.

Improvements on the DHI, DGI, and ABC all exceeded minimum detectable changes and represented functional improvements. His Oscillopsia Functional Index scale score improved to within the range of scores for healthy individuals.

Action statement 8 provides insight for when to stop VPT: clinicians may use achievement of primary goals, resolution of symptoms, normalized balance and vestibular function, or plateau in progress as reasons for stopping therapy.(17)The patient and physical therapist agreed that he had achieved his goals, had substantial improvement in his symptoms, and likely improved his balance close to his potential. He was no longer concerned about his scheduled trip to Europe, and he indicated a plan to continue his home exercises indefinitely. He was discharged to self-management at that time with instructions to maintain his current home exercise program.

The patient followed up with a letter after returning from his trip to Europe. He experienced no falls or concerns related to his balance ability. Oscillopsia was worse on the cobblestone streets, and better on pavement. He indicated that his plan was to continue his exercises daily.

Discussion

It has long been known that VPT was beneficial for individuals with BVH,(12,43,44) with recent studies continuing to provide strong support.(31) This patient case highlights the application of the updated CPG action statements to the care of an individual with BVH. Specifically, face to face supervision turned out to be important for this individual to move past an episode of symptom-related anxiety that interfered with both home exercises and general activity participation.(40,45)

This case also provides a small window of mechanistic insight for reduction of oscillopsia symptoms in cases of BVH. Figure 1 demonstrates both an improvement in VOR gain to the right and a change in the recruitment pattern of refixation saccades with head movements to the left. The presence of refixation saccades has been shown to depend on visual signals during head motion.(46,47)The relative sparsity of refixation saccades after leftward impulses at the onset of VPT suggests maladaptive low head velocity activities with insufficient visual error signals since the original unilateral vestibular hypofunction in 1999 (radiosurgery for left acoustic neuroma). This suggests adaptive saccades and an improved (although still dysfunctional) VOR contributed to symptomatic improvements,(48) consistent with other studies of individuals with unilateral hypofunction.(49,50) Although speculative, the dramatic improvement in right lateral canal VOR gain (245% increase for near and 138% increase for far targets) may suggest an age related decline in function with preserved neural plasticity rather than a disease state such as neuritis. This case also highlights the importance of including substitution and traditional gaze stabilization exercises for individuals with BVH as demonstrated by video head impulses.(32) Additional research is needed to optimize the dosage and type of exercises beneficial for this population, currently supported by evidence ranging from expert opinions to weak support.

Conclusion/clinical implication

This case demonstrates the utility of the revised CPG for peripheral vestibular hypofunction as applied to an individual with BVH. Importantly, close follow-up and support is important for a subset of individuals with BVH as demonstrated by the negative impact this individual experienced due to symptom-related anxiety. Per the CPG, the daily home exercise quantity was also higher for this individual with BVH than would be prescribed for an individual with unilateral hypofunction.

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The VR SIG Newsletter is interested in sharing your clinical experience and can provide mentorship to help you write your case up. Contact: Anne Galgon at galgonanne56@gmail.com

Article Review: A Survey of Entry Level Physical Therapy Education Content for Vestibular Rehabilitation

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Vestibular rehabilitation (VR) is an area of physical therapy practice that has continued to expand and evolve, leading to an increased demand for therapists with expertise in the management of a variety of vestibular disorders. Currently, there is not a standardized guideline for entry level physical therapy education programs for vestibular content, nor is there a standard for the level of knowledge or proficiency that entry level students should achieve upon graduation. The purpose of this study was to 1) understand the depth and breadth of the VR content included in DPT curriculum, 2) determine PT educators' perception of what aspects of VR examination and intervention techniques are considered essential 3) understand the expected performance of entry level DPT students in managing vestibular patients. This information may allow entry level DPT programs to compare curriculums, as well as allow clinical centers to have more clear expectations of the knowledge base of entry level physical therapists, and may help develop areas of continuing education needs for practicing clinicians. (1)

In 2016, the Vestibular Special Interest group of the APTA Academy of Neurologist PT commissioned a survey on vestibular rehabilitation education in entry level DPT programs. After a successful pilot study, the survey was revised prior to being sent out to 229 of 235 CAPTE accredited PT programs. The survey included 3 parts: 1) demographic and program specific information, 2) content areas that were or should be included in the curriculum, broken down into five topics: Foundational Knowledge, Diagnosis, Examination, Intervention and Clinical Decision-making, and 3) the programs' rating of expected level of clinical VR performance for new graduates. A total of 149 content items were surveyed. Each content area was rated on a scale indicating whether the student had been exposed to the material, and if exposed, if and how their knowledge was assessed as follows: not exposed, exposed not assessed, assessed cognitive, assessed cognitive and psychomotor. The full survey, as well as additional data tables not printed with the article, are available as supplemental digital content.

Out of 229 surveys sent, 99 responded (43.2% response rate), 89 of which were complete. Responses from incomplete surveys are included in the data.

Depth and Breadth of VR Content Already Taught:

Sixty six of the 149 content items were assessed cognitively or cognitively and psychometrically by at least 80% of respondents, including 10 of 15 foundational science items, 10 of 23 diagnosis items, 22 of 58 exam items, 2 of 11 self-reported outcome measures, 9 of 22 intervention items, and 13 of 15 clinical decision-making items. No instrumented items were assessed cognitively or cognitively and psychometrically by 80% of the respondents. Forty of the 149 content items were assessed as exposed. Respondents reported that students were assessed or exposed to all non-instrumented tests for falls, gait, or balance.

Educators Perception of Essential content:

More than 90% of respondents rated unilateral hypofunction, posterior canal canalithiasis and cupulolithiasis, vestibular neuritis, labyrinthitis, bilateral vestibular hypofunction, and horizontal semicircular

canal canalithiasis as essential for entry level practice. In contrast, less than 50% of respondents rated the following diagnostic categories essential for entry level practice: anxiety related dizziness, superior canal dehiscence, and persistent postural perceptual disorder. Many examination and intervention techniques were rated as essential by >90% of the respondents, however instrumented tests were less frequently rated as essential. All clinical decision making items were rated as essential, except for use of billing codes. There were weak correlation between total items rated as essential and number of hours spent on VR education

Expected Performance of Entry level grads:

Most respondents expected new graduates to perform at the intermediate (40.24%), or advanced beginner (28.05%) in vestibular assessment and treatment upon graduation. Three themes were identified in open ended comments about expected level of performance at graduation. Participants felt that clinical education experience is an important factor for gaining ability to manage vestibular patients. Additionally, several respondents commented that VR is a speciality and graduates would need more training and mentorship upon graduation. And finally, respondents felt that new graduates should be able to recognize when to refer a patient to a clinician with vestibular expertise or medical provider.

This research describes the survey results of vestibular content currently taught at entry level physical therapy programs. It demonstrates variability of vestibular content provided, both in contact hours, as well as expected level of proficiency upon graduation. There was minimal association between the number of items that responders rated as essential and the reported instructional hours provided to students. The results did show consistency between items that were rated as essential and the method of assessment. If the item was essential, then it was assessed both cognitively and psychometrically. Although participants noted that vestibular hypofunction and BPPV are essential to be taught to entry level students, this study shows that they may not be exposed to diagnoses such as concussion, vestibular migraine of persistent postural perceptual dizziness, which may not truly reflect what is being seen in clinics.

A clear theme that was noted was that it is important for a new graduate to be able to discriminate between a central and peripheral pathology, as well as understand when to refer a patient to a specialist. Although some components of ocular motor exam were rated as less important, these skills may be critical to the differential diagnosis, for example the cover/uncover test and cross cover test. The results of the survey and comments support that entry level education prepares students with rudimentary knowledge and skill in VR, and new graduates should be able to manage patients with simple, but not complex vestibular conditions.

Galgon AK, Roberts HJ, Littmann AE, Heusel-Gillig LL, Dransfield L, Plishka CM, Wrisley DM. A survey of entry-level physical therapy education content for vestibular rehabilitation. *Journal of Physical Therapy Education*. 2022;36(1):65-75.

Are you interested in writing a literature review?

The VR SIG Newsletter can provide mentorship to help you contribute.
Contact: Anne Galgon at galgonanne56@gmail.com

Thank you

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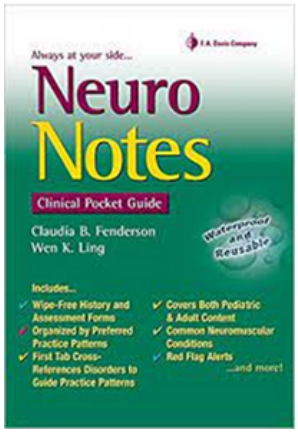
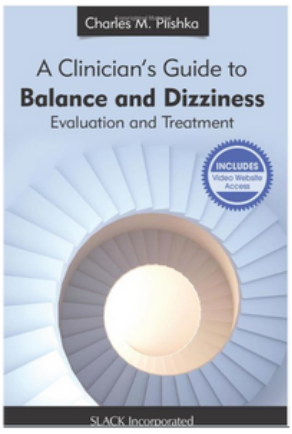


Charles Plishka



Susan Herdman