



Assessing the Dizziness Patient

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Outline

- Review of the Vestibular System and processes.
- Taking a dizziness focused subjective and history
- Performing an objective bedside examination.
- Performing a Vestibular lab-based examination.
- Bedside clinical reasoning and treatment.
- BPPV management
- Multi-factorial dizziness management
- Prognostics and Outcomes

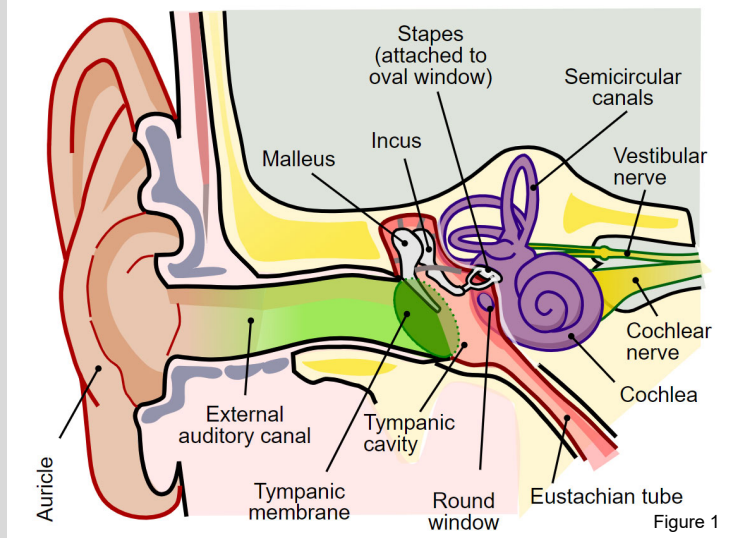
Take-home Messages

- The vestibular system plays an important role in balance and vision stabilization
- Dizziness is an imprecise term that can mean a number of different things
- Identifying the most likely causes of dizziness allows for directed treatment
- BPPV is the most common cause of vertigo from the inner ear
- Vestibular migraine is common
- Vestibular rehabilitation therapy works

A Brief Review

Vestibular System

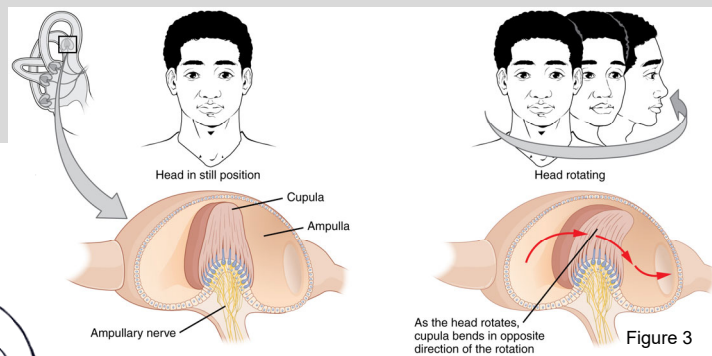
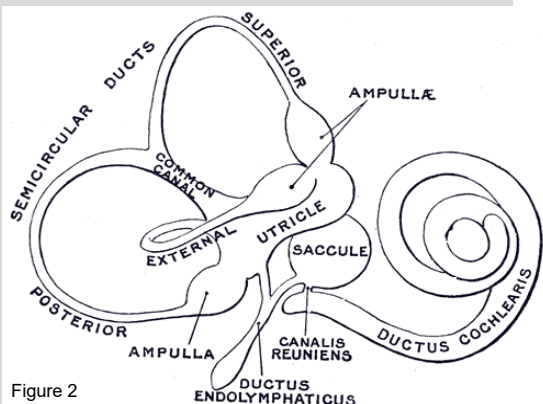
- Evolutionarily ancient inertial sensor
- Senses acceleration from:
 - Head movement
 - Gravity
- This information is used by diverse systems in the body



Vestibular End Organs

Semicircular canals (SCC):

- Lateral/Horizontal
- Superior/Anterior
- Posterior



Encode rotational head movements in the plane of the canal

Vestibular End Organs

Otolith Organs:

- Utricle
- Saccule

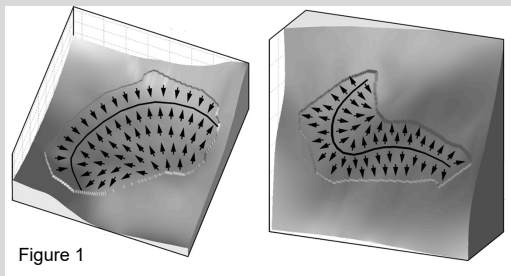
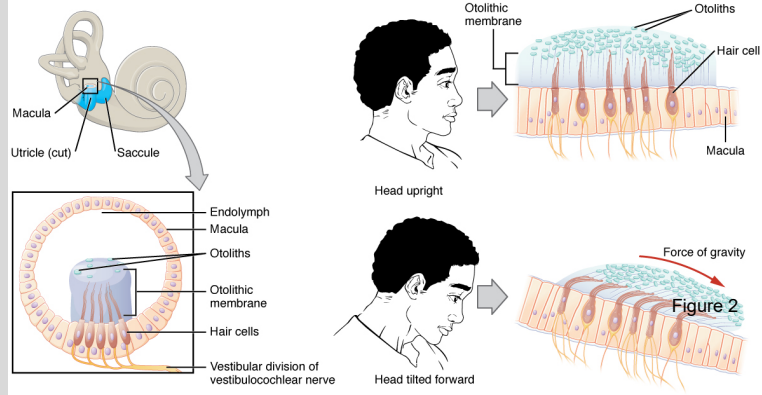


Figure 1



Encode linear acceleration and head tilt (acceleration due to gravity)

Vestibular Physiology

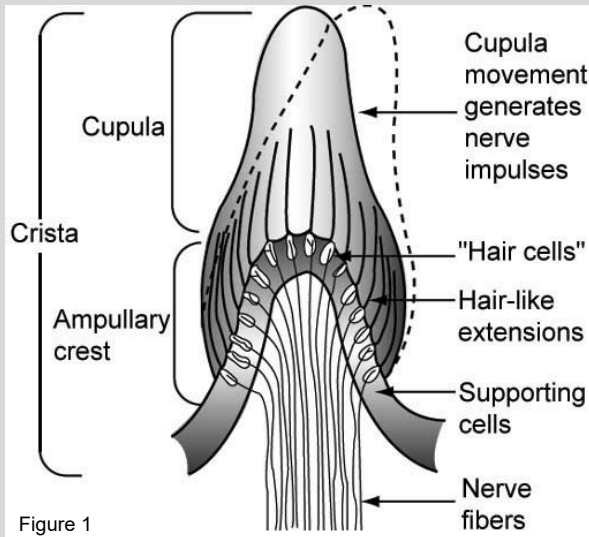
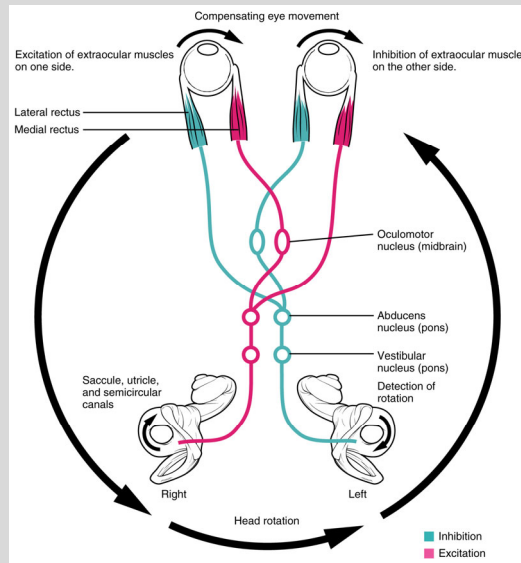


Figure 1

- Vestibular afferent neurons have a balanced non-zero baseline firing rate encoding stationary position
- Head movements towards one side stimulate (increase firing) hair cells in the ipsilateral ear while hair cells in the contralateral ear inhibited (decreased firing)
- Any stimulus that excites a vestibular end organ afferents is interpreted as an excitatory signal (the opposite is also true)
- A disruption in this peripheral pathway can lead to vertigo and imbalance.

Vestibulo-Ocular Reflex: Pairing Vestibular Signaling to Eye Movement Responses



Taking a History

Evaluating the Dizzy Patient

- Dizziness is an imprecise term
 - Imbalance
 - Disequilibrium (vague sense of imbalance or instability)
 - Vertigo (sense of motion)
 - Light headedness
 - Presyncope (near fainting - often light headedness)
- It is important to encourage patients to describe their symptoms without using the terms dizziness and vertigo
 - Focusing on:
 - Symptom onset (sudden vs gradual)
 - Duration and frequency
 - Associated symptoms

Evaluating the Dizzy Patient

Duration	Peripheral	Central
Seconds	Benign Paroxysmal Positional Vertigo (BPPV)	Uncommon
Minutes to Hours	Meniere's Disease	Vestibular migraine; Persistent Postural-Perceptual Dizziness (PPPD)
Days to Weeks	Vestibular Neuritis	Vestibular migraine; Persistent Postural-Perceptual Dizziness (PPPD)
Variable	Superior semicircular canal dehiscence syndrome (SCDS)	Vestibular migraine; Persistent Postural-Perceptual Dizziness (PPPD)
Continuous	Rare	Suggests a central etiology

From Cummings Otolaryngology: Head and Neck Surgery, Seventh Edition. Elsevier Inc. ©2009

When to Refer

- Acute vertigo/dizziness/imbalance with neurologic deficits
 - Dizziness, nausea and vomiting, unsteady gait, and headache
 - Concerning features – ataxia, unilateral weakness, cranial nerve deficits
 - Need for EMERGENCY evaluation to rule out a vertebralbasilar/cerebellar stroke
- Acute vertigo with visible non-direction changing nystagmus at rest
 - Vestibular neuritis or Labyrinthitis (acute vestibular loss and sudden hearing loss)
 - Consider vertebralbasilar/cerebellar stroke
 - Refer to Otolaryngology and/or Audiology - May benefit from steroid therapy
 - Improved outcomes with early intervention and vestibular rehabilitation
- Persistent or Recalcitrant Benign Paroxysmal Positional Vertigo (BPPV)
 - Evaluation and management by a Vestibular Physical Therapist
 - Consider Referral to an Otolaryngologist
- Other: Frequent falls, Other functional impairments, Uncontrolled migraine symptoms



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Examining Bedside

Bedside Clinical Screen

- Neurological screen
- VBI screen
- Oculomotor
- Positional testing (BPPV)
- Peripheral Vestibular
- Balance screen

Cervical Artery Stenosis

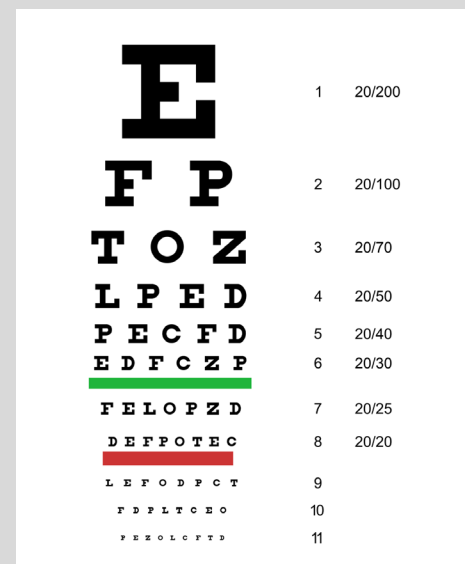
- VBI is an uncommon but serious medical condition caused by a disruption in the vertebrobasilar arterial system.
- The VAT has not been consistently validated and can only screen for suspected VBI
- When clinicians suspect VBI during the subjective examination they should refer the patient for further medical diagnostic testing.



Aishahrani A, Johnson EG and Cordett TK. Vertebral artery testing and differential diagnosis in dizzy patients. *Phys Ther Rehabil.* 2014; 1:3. <http://dx.doi.org/10.7243/2055-2386-1-3>

Oculomotor Screening

- Subjective patient complaints
- Visual acuity
- Ocular fixation
- Smooth pursuits
- Range of Motion
- Saccades
- Optokinetic Nystagmus
- Cover/ uncover test
- Alternate (cross) cover test
- Near point of convergence



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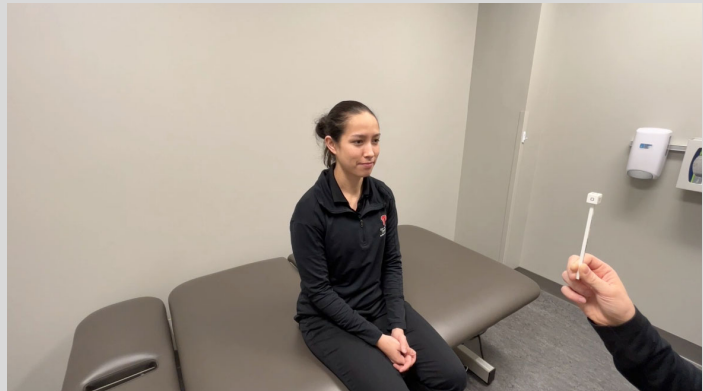
Oculomotor Screening

- Test *without* glasses
- Target should be 16-18 inches from eyes
- Use a visual fixation stick or point of pen
- Assess with best posture with good head alignment
 - Patients with eye misalignment will often turn their heads to self-correct their eye position

Tusa RJ. History and Clinical Examination. In: Herdman SJ, Clendaniel RA, eds. *Vestibular Rehabilitation*. 4e. F. A. Davis Company; 2014. Accessed January 18, 2024. <https://adavispt.mhmedical.com/content.aspx?bookid=1878§ionid=140996133>

Smooth Pursuits

- The coordinated teaming of the eyes to accurately fixate and track a moving target in all positions of gaze, left to right, up and down, and diagonally.
- Have patient follow the target with eyes only.
- Can also look at range of motion.



Tusa RJ. History and Clinical Examination. In: Herdman SJ, Clendaniel RA, eds. *Vestibular Rehabilitation*. 4e. F. A. Davis Company; 2014. Accessed January 18, 2024. <https://adavispt.mhmedical.com/content.aspx?bookid=1878§ionid=140996133>

Saccades

- Small, quick, precise eye movements that switch the direction of gaze between objects.
- Hold targets 8-12" apart
- Have patient look back and forth as fast as they can.

Tusa RJ. History and Clinical Examination. In: Herdman SJ, Clendaniel RA, eds. *Vestibular Rehabilitation*. 4e. F. A. Davis Company; 2014. Accessed January 18, 2024. <https://fadvsvppt.mhmedical.com/content.aspx?bookid=1878§ionid=140996133>

Alignment Screening

Used to assess the alignment of the eyes
(Use a fixation point)

- Cover test
 - Cover 1 eye to see if the uncovered eye moves to focus on the target
 - Report movement of the uncovered eye
- Alternate cover test
 - Have patient look at point while covering an eye for several seconds
 - Then quickly cover the opposite eye for 2 seconds
 - Continue back and forth several times
 - Report movement of eye as it becomes uncovered



Tusa RJ. History and Clinical Examination. In: Herdman SJ, Clendaniel RA, eds. *Vestibular Rehabilitation*. 4e. F. A. Davis Company; 2014. Accessed January 18, 2024. <https://fadvsvppt.mhmedical.com/content.aspx?bookid=1878§ionid=140996133>

Near Point of Convergence

- Functions to aim the eyes toward or away from midline while tracking between near and far visual targets.
- Wearing glasses if needed, bring the object of fixation closer to the nose, ask the patient to tell you when it looks double or splits into 2.
- Measure the distance from bridge of nose to distance they see double.
- <6 cm is normal



Tusa RJ. History and Clinical Examination. In: Herdman SJ, Clendaniel RA, eds. *Vestibular Rehabilitation*. 4e. F. A. Davis Company; 2014. Accessed January 18, 2024. <https://fadavispt.mhmedical.com/content.aspx?bookid=1878§ionid=140996133>

How To: BPPV is suspected → Dix-Hallpike



The head is rotated 45 degrees toward the suspected affected ear.



The patient is rapidly lowered into supine. 45 degrees of rotation is maintained while the neck is brought into 20 degrees of extension.

(+) Test: Torsional, up-beating nystagmus

- Correlates to posterior canal (~80% of BPPV cases)
- Crescendo of signs/symptoms = Canalithiasis
- Sudden onset / non-fatiguing = Cupulolithiasis

¹ Bhattacharya N, Gubbels SP, Schwartz SR, et al. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). *Otolaryngol Head Neck Surg*. 2017;156(3_suppl):S1-S47. doi:10.1177/0194599816689967

How To:

BPPV is suspected, Dix-Hallpike Negative → **Supine Roll Test**



The patient is slowly brought into the supine position with 20 degrees of neck flexion.



The head is quickly turned towards the test ear and the patient's eyes are observed for nystagmus.

(+) Test: Horizontal-beating nystagmus

- Towards ground (bilat) = geotropic / canalithiasis
- Stronger side of nystagmus/symptoms is positive

- Towards ceiling (bilat) = apogeotropic / Cupulolithiasis
- Weaker side of nystagmus/symptoms is positive

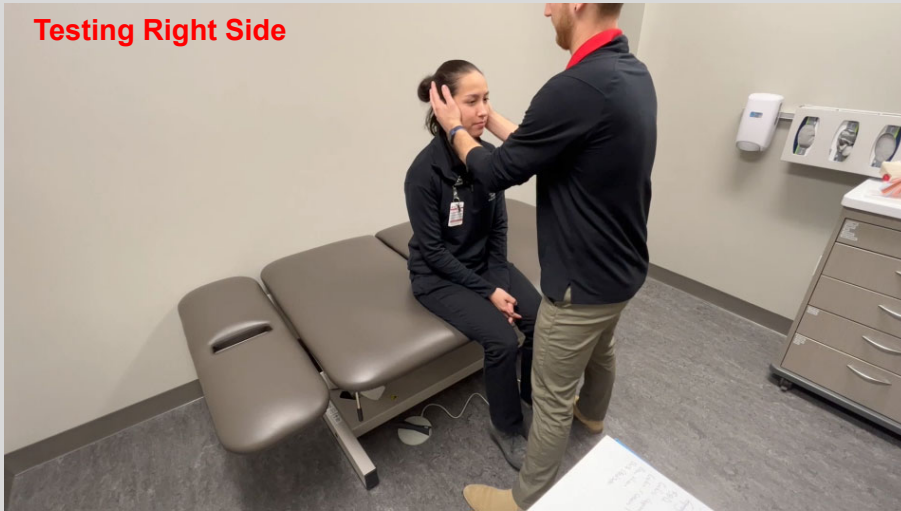
1.Bhattacharyya N, Gubbels SP, Schwartz SR, et al. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). *Otolaryngol Head Neck Surg.* 2017;156(3_suppl):S1-S47. doi:10.1177/0149599816689667

Video References (Dix-Hallpike Test)



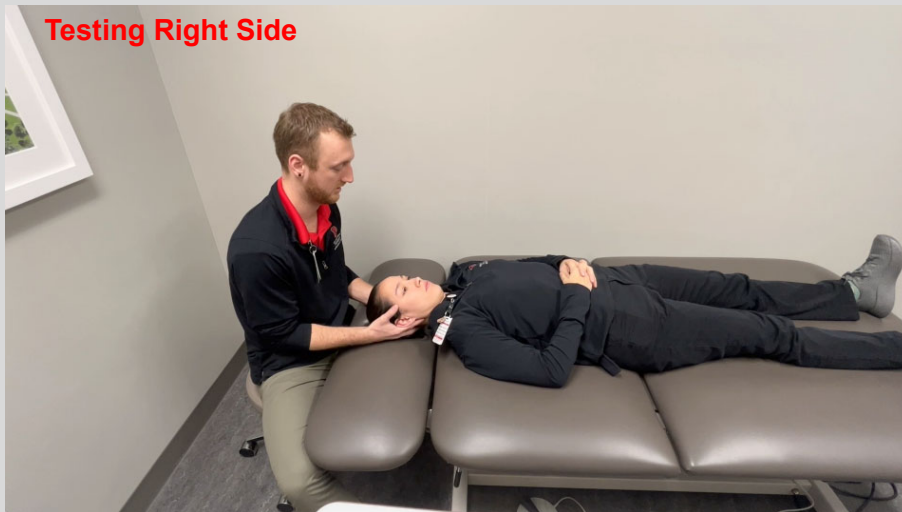
1.Bhattacharyya N, Gubbels SP, Schwartz SR, et al. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). *Otolaryngol Head Neck Surg.* 2017;156(3_suppl):S1-S47. doi:10.1177/0149599816689667

Video References (Sidelying Test)



Cohen HS. Side-lying as an alternative to the Dix-Hallpike test of the posterior canal. *Otol Neurotol*. 2004 Mar;25(2):130-4. doi: 10.1097/00129492-200403000-00008. PMID: 15021771.

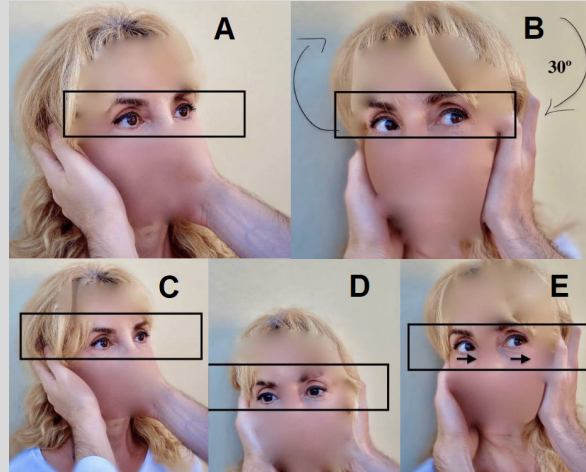
Video References (Roll Test)



1.Bhattacharyya N, Gubbels SP, Schwartz SR, et al. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). *Otolaryngol Head Neck Surg*. 2017;156(3_suppl):S1-S47. doi:10.1177/0194599816686667

Bedside VOR Assessment

Bedside Head Impulse Test (bHIT)



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Screening for Falls

Symptom	Evidence Informed Decision making
Falling	<ul style="list-style-type: none"> VR can reduce falls in persons with vestibular hypofunction and benign paroxysmal positional vertigo (BPPV). One year after performance of the Canalith repositioning maneuver, subjects reported fewer falls than the year prior to repositioning.^{4,5}
Fear of falling	<ul style="list-style-type: none"> Mounting evidence suggests that secondary factors such as fear and anxiety will affect long-term rehab outcomes if persons do not move after a vestibular event. There does not appear yet to be a direct relationship between decreasing people's fear of falling and falls themselves.

Whitney, S.L., Alghadir, A.H. & Anwer, S. Recent Evidence About the Effectiveness of Vestibular Rehabilitation. *Curr Treat Options Neurol* 18, 13 (2016). <https://doi.org/10.1007/s11940-016-0395-4>

Screening for Balance

Symptom	Evidence Informed Decision making
Dysregulated gait (too slow, irregular, veering)	<ul style="list-style-type: none"> Persons walk “en bloc” with trunk and neck stiffness to minimize the amount of head movement during gait. The head/trunk stiffness may be a result of the decreased VOR gain, which will result in visual blurring with head movement. Exercises to increase trunk/head movement are encouraged to improve the VOR gain, to decrease pain from trying to keep the body/head rigid, and to improve overall gait and function.

Whitney, S.L., Alghadir, A.H. & Anwer, S. Recent Evidence About the Effectiveness of Vestibular Rehabilitation. *Curr Treat Options Neurol* 18, 13 (2016). <https://doi.org/10.1007/s11940-016-0395-4>

Screening for Visual Dizziness

Symptom	Evidence Informed Decision making
Complex visual scenes in the periphery increases dizziness and disorientation	<ul style="list-style-type: none"> The newly coined term for this “symptom complex” is persistent postural perceptual dizziness (PPPD).

Whitney, S.L., Alghadir, A.H. & Anwer, S. Recent Evidence About the Effectiveness of Vestibular Rehabilitation. *Curr Treat Options Neurol* 18, 13 (2016). <https://doi.org/10.1007/s11940-016-0395-4>

Specialty (Lab) Diagnostics



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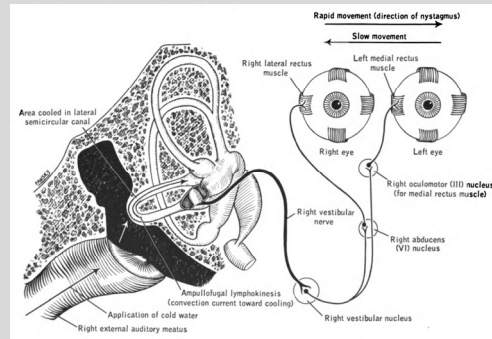
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Vestibular Testing:

Videonystagmography (VNG)

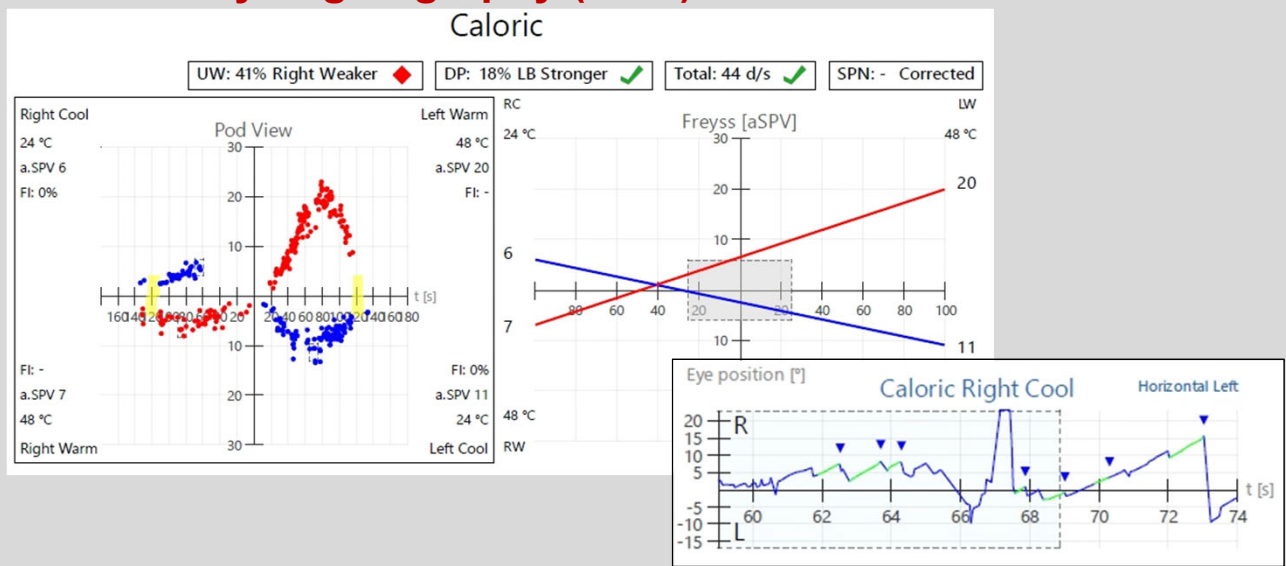
- Video-oculography (VOG)
- Spontaneous Nystagmus (w/o fixation)
- Gaze-evoked nystagmus
- Smooth pursuit, saccades, optokinetic nystagmus
- Positional testing



Caloric reflex testing

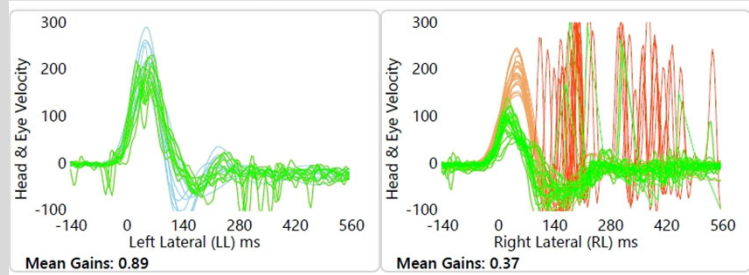
- Tests unilateral HSCC function outside of the physiologic range (low velocity/acceleration).
- Bi-thermal (cool and warm) stimulus

Vestibular Testing: Videonystagmography (VNG) and Caloric Reflex



Vestibular Testing: Video Head Impulse Testing (vHIT)

- High frame rate infrared VOG paired with motion sensors to record eye and head motion during head impulse testing.
- Head impulses are small amplitude, high acceleration/high velocity head movements delivered in the plane of a canal pair (horizontal, RALP, or LARP).



- Results: Gain = maximum reflexive eye velocity / maximum head velocity during the impulse; and presence of refixation saccades

Vestibular Testing: Rotational chair

- Motorized chair that creates whole-body yaw rotations (about the y-axis) to stimulate the HSCCs
- Capable of testing a range of frequencies (often from 0.01 to 0.64 Hz) allowing testing at low to moderately high velocities/accelerations
- Motion stimulus: Sinusoidal (back and forth rotations) and velocity steps (brief acceleration to reach a constant velocity)
- Tests both HSCCs simultaneously (stimulus is below the inhibitory threshold of the contralateral ear)

Vestibular Testing: Vestibular Evoked Myogenic Potentials (VEMP)

- Only quantitative exam of otolith function (but utility has been questioned)
- Record contraction of specific muscle groups in response to a sound or vibration stimulus
- oVEMP: Measures the contraction of the contralateral inferior rectus/inferior oblique muscles due to stimulation of the utricle (innervated by the superior vestibular nerve)
- cVEMP: Measures the contraction of the ipsilateral sternocleidomastoid muscle during stimulation of the saccule (innervated by the inferior vestibular nerve)

Welgampola et al. Neurology Feb 2008, DOI: 10.1212/01.wnl.0000299084.76250.4a



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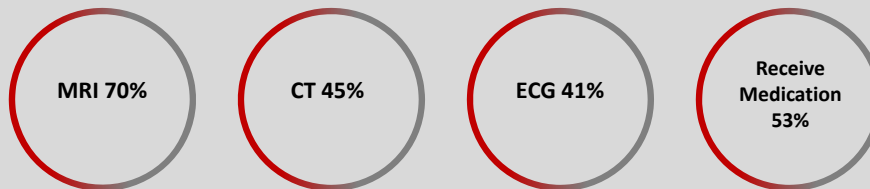
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Clinical Reasoning

Room to Improve:

Timing and Accuracy of Diagnosis

- Average cost to diagnose BPPV is \$2000 and up to 65% of pts undergo unnecessary diagnostic testing.¹



- Additional treatment/testing ordered to diagnose/treat BPPV²

1. West PD, Sheppard ZA, King EV. Comparison of techniques for identification of peripheral vestibular nystagmus. *J Laryngol Otol.* 2012;126(12):1209-1215. doi:10.1017/S0022215112002368
2. Özel HE, Karakuzu AT, Temir H, Alpay M, Özdoğan F, Genç S. Effect of ocular fixation on positional nystagmus in BPPV patients [published online ahead of print, 2022 Apr 19]. *Int J Audiol.* 2022;1-6. doi:10.1080/14992027.2022.2062579

Negative Prognostic Indicators³

- Peripheral neuropathy (decreased distal sensation)
- Migraine
- Cognitive dysfunction
- Anxiety
- Comorbid disease (spinal stenosis, diabetes, renal disease, back/neck pain)
- An inability to move (paralysis, head/neck immobilization)
- Pre-existing eye disorders (strabismus, macular degeneration, glaucoma, cataracts)
- Obsessive-compulsive disorder
- Perfectionistic personality
- A feeling of “fogginess”
- History of motion sensitivity
- Excessive fear of falling
- Excessive fear of movement

Psychological Factors Affect Outcomes

- Evidence reinforces using cognitive-behavioral techniques (CBT), specifically specialized psychological support, with patients who have anxiety with an emphasis on education and building trust.⁶
- In those with comorbid anxiety and depression, patient with negative affect did not achieve similar subjective and objective outcome measure scores as those with positive affect in vestibular rehab.⁷
- Catastrophizing, hyper-vigilance, higher levels of neuroticism, and lower levels of extraversion may adversely affect rehabilitation outcomes.⁸

BPPV Management

High Level of Evidence

Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update) 2017

- The purpose of this guideline is to improve the quality of care and outcomes for individuals with BPPV.
- The BPPV clinical practice guideline of 2008 was updated in 2017 by a group of experts including physicians, researchers and a vestibular PT specialist. (1). Changes were made following new evidence from two clinical practice guidelines, 20 systematic reviews, and 27 randomized controls, with enhanced emphasis on patient education and shared decision making, as well as expanded recommendations for diagnosis and management of BPPV.⁹

Bhattacharya N, Gubbels SP, Schwartz SR, Edow JA, El-Kashlan H, Fife T, Holmberg JM, Mahoney K, Hollingsworth DB, Roberts R, Seidman MD, Steiner RW, Do BT, Voelker CC, Waguespack RW, Corrigan MD. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). Otolaryngol Head Neck Surg. 2017 Mar;156(3_suppl):S1-S47. doi: 10.1177/0194599816689667. PMID: 28248609.

Diagnosis of BPPV

Action Statement 1a

Clinicians **SHOULD** diagnose posterior SCC BPPV when vertigo associated with torsional, upbeat nystagmus is provoked by the Dix-Hallpike maneuver.

Strength: **Strong Recommendation**

Action Statement 1b

If the patient has a history compatible with BPPV and the Dix-Hallpike test exhibits horizontal or no nystagmus, the clinician **SHOULD** perform, or refer to a clinician who can perform, a supine roll test to assess for lateral semicircular canal BPPV.

Strength: **Recommendation**

Bhattacharyya N, Gubbels SP, Schwartz SR, Edlow JA, El-Kashlan H, Fife T, Holmberg JM, Mahoney K, Hollingsworth DB, Roberts R, Seidman MD, Steiner RW, Do BT, Voelker CC, Waguespack RW, Corrigan MD. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). Otolaryngol Head Neck Surg. 2017 Mar;156(3_suppl):S1-S47. doi: 10.1177/0194599816689667. PMID: 28248609.

Differential Diagnosis and Modifying Factors

Action Statement 2a

Clinicians **SHOULD** differentiate, or refer to a clinician who can differentiate, BPPV from other causes of imbalance, dizziness, and vertigo.

Strength: **Recommendation**

Action Statement 2b

Clinicians **SHOULD** assess patients with BPPV for factors that modify management, including impaired mobility or balance, central nervous system disorders, a lack of home support, and/ or increased risk for falling.

Strength: **Recommendation**

Bhattacharyya N, Gubbels SP, Schwartz SR, Edlow JA, El-Kashlan H, Fife T, Holmberg JM, Mahoney K, Hollingsworth DB, Roberts R, Seidman MD, Steiner RW, Do BT, Voelker CC, Waguespack RW, Corrigan MD. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). Otolaryngol Head Neck Surg. 2017 Mar;156(3_suppl):S1-S47. doi: 10.1177/0194599816689667. PMID: 28248609.

Repositioning Statements

Action Statement 4a

Clinicians **SHOULD** treat, or refer to a clinician who can treat, patients with posterior canal BPPV with a Canalith repositioning procedure

Strength: **Strong Recommendation**

Action Statement 4b

Clinicians **SHOULD NOT** recommend postprocedural postural restrictions after Canalith repositioning procedure for posterior canal BPPV.

Strength: **Strong Recommendation (against)**

Bhattacharyya N, Gubbels SP, Schwartz SR, Edlow JA, El-Kashlan H, Fife T, Holmberg JM, Mahoney K, Hollingsworth DB, Roberts R, Seidman MD, Steiner RW, Do BT, Voelker CC, Waguespack RW, Corrigan MD. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). Otolaryngol Head Neck Surg. 2017 Mar;156(3_suppl):S1-S47. doi: 10.1177/0194599816689667. PMID: 28248609.

Medical Therapy

Action Statement 6

Clinicians **SHOULD NOT** routinely treat BPPV with vestibular suppressant medications such as antihistamines and/or benzodiazepines

Strength: **Recommendation (against)**

Bhattacharyya N, Gubbels SP, Schwartz SR, Edlow JA, El-Kashlan H, Fife T, Holmberg JM, Mahoney K, Hollingsworth DB, Roberts R, Seidman MD, Steiner RW, Do BT, Voelker CC, Waguespack RW, Corrigan MD. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). Otolaryngol Head Neck Surg. 2017 Mar;156(3_suppl):S1-S47. doi: 10.1177/0194599816689667. PMID: 28248609.

Additional Assessments

Action Statement 7a

Clinicians **SHOULD** reassess patients within 1 month after an initial period of observation or treatment to document resolution or persistence of symptoms

Strength: Recommendation

Action Statement 7b

Clinicians **SHOULD** evaluate, or refer to a clinician who can evaluate, patients with persistent symptoms for unresolved BPPV and/or underlying peripheral vestibular or central nervous system disorders

Strength: Recommendation

Bhattacharyya N, Gubbels SP, Schwartz SR, Edlow JA, El-Kashlan H, Fife T, Holmberg JM, Mahoney K, Hollingsworth DB, Roberts R, Seidman MD, Steiner RW, Do BT, Voelker CC, Waguespack RW, Corrigan MD. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). Otolaryngol Head Neck Surg. 2017 Mar;156(3_suppl):S1-S47. doi: 10.1177/0194599816689667. PMID: 28248609.

Education

Action Statement 8

Clinicians **SHOULD** educate patients regarding the impact of BPPV on their safety, the potential for disease recurrence, and the importance of follow-up.

Strength: Recommendation

Bhattacharyya N, Gubbels SP, Schwartz SR, Edlow JA, El-Kashlan H, Fife T, Holmberg JM, Mahoney K, Hollingsworth DB, Roberts R, Seidman MD, Steiner RW, Do BT, Voelker CC, Waguespack RW, Corrigan MD. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). Otolaryngol Head Neck Surg. 2017 Mar;156(3_suppl):S1-S47. doi: 10.1177/0194599816689667. PMID: 28248609.

BPPV Review:¹²

- **Diagnosis:**
 - Diagnosed when nystagmus is provoked during positional tests, such as Dix-Hallpike and supine roll.
- **Treatment:**
 - Particle repositioning maneuvers (PRM) or Canalith repositioning maneuvers (CRM), such as the Epley maneuver, Sémont/Liberatory maneuver, Barbeque roll maneuver, and Gufoni maneuver.
- **Primary Goal of Treatment:**
 - Relocate the dislodged otoconia by performing consecutive movements in the plane of the affected semicircular canal to move the otoconia and relieve the symptoms of BPPV and resolve nystagmus. In maneuvers, otoconia are repositioned from the canals back into the otolith (ie: utricle).

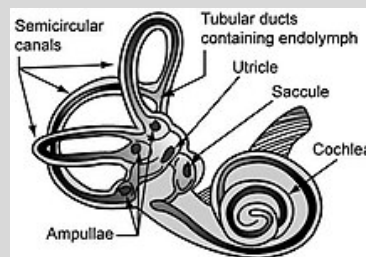


Figure 2: The Vestibular System - semicircular canals and otolith organs

How To:

IF Dix-Hallpike positive → **Canalith Repositioning Maneuver (Epley) – Right Ex.**

Ensure each position is held until symptoms stop + 30 seconds...



1. 45° head rotation towards the affected ear



2. Supine, 20° neck extension, maintain 45° rotation



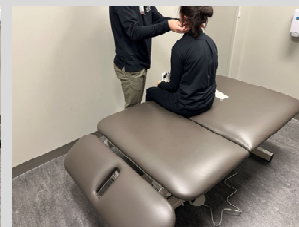
3. Maintain extension, rotate 90° to unaffected ear



4. Side-lying unaffected, head is 45° facing down towards floor



5. maintain 45° rotation while sitting up over EOB



6. Return head to neutral

How To:

Semont/Liberatory Maneuver - To Treat: Posterior SCC Cupulolithiasis (also treats PSC canalithiasis) – right



1. Sit on EOB with head turned 45° towards unaffected ear.



2. Transition to s/l on affected side, maintaining 45° rotation. Remain in place for 2 mins.



3. Quickly transition to s/l on unaffected side, maintaining 45° rotation. Remain in place for 2 mins. Then, sit upright & return the head to neutral.

Herdman SJ, Ciendaniel RA, eds. Vestibular Rehabilitation. 4e. McGraw Hill; 2014. Accessed July 07, 2022. <https://fadavispt.mhmedical.com/proxy.lib.ohio-state.edu/content.aspx?bookid=1878§ionid=140995318>

How To:

Supine Roll Test Positive → **BBQ Roll**¹⁵ (...for canalithiasis of the more symptomatic ear) - Assuming R is affected

Hold each position for resolution of nystagmus + 30-60 sec



1. Positive (+) R Head Roll Test (90° towards affected ear)



2. Head turned to midline



3. Head turned 90° to un-affected ear



4. Prone neutral



5. 90° towards affected ear



6. Return to neutral

1. West PD, Sheppard ZA, King EV. Comparison of techniques for identification of peripheral vestibular nystagmus. J Laryngol Otol. 2012;126(12):1209-1215. doi:10.1177/0002215112027298

Complex Dizziness Management

Dizziness is “Multifactorial”

- Dizziness in older adults should be assessed and treated similarly to other geriatric complexities with a thorough systematic approach.
- Vestibular impairment is frequently a contributing factor but not always the primary cause of dizziness in older people.
- All patients with dizziness and falls should be assessed for vestibular impairment as part of a systematic approach.
- It is very important to identify vestibular pathology to target in rehabilitation. It aids compensation and improves morbidity by reducing symptoms and falls.

Dizziness is “Multifactorial”

- Dizziness Handicap Inventory (DHI) can be used to identify the degree to which older persons are affected by chronic dizziness.
- Study investigated a comprehensive range of medical, psychological, vestibular, and balance- related physiological factors associated with DHI severity and dizziness episode frequency in:
 - 305 people aged 50 years and over with a dizziness complaint.
- Cross-sectional analysis identified the presence of the following as independent and significant factors related to increased DHI in community living adults with dizziness complaints:
 - BPPV
 - increased anxiety symptoms
 - cardiovascular medications
 - poor vestibular and balance functions

Menant JC, Meintrath D, Sturmeke DL, Hicks C, Lo J, Ratanapongleka M, Turner J, Migliaccio AA, Delbaere K, Titov N, Close JCT, Lord SR. Identifying Key Risk Factors for Dizziness Handicap in Middle-Aged and Older People. J Am Med Dir Assoc. 2020 Mar;21(3):344-350.e2. doi: 10.1016/j.jamda.2019.08.016. Epub 2019 Oct 17. PMID: 31631029.

DHI Decision Tree

Findings support the implementation of a multiple profile assessment of dizziness comprising 4 core items:

- Number of cardiovascular medication
- Dix-Hallpike/head-roll test of BPPV
- GAD-7 scale
- Postural sway with eyes closed >6.2 inches).

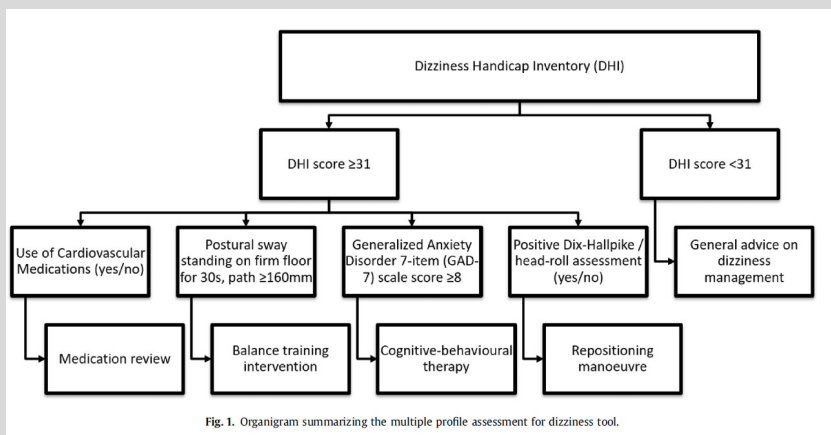


Fig. 1. Organigram summarizing the multiple profile assessment for dizziness tool.

Menant JC, Meintrath D, Sturmeke DL, Hicks C, Lo J, Ratanapongleka M, Turner J, Migliaccio AA, Delbaere K, Titov N, Close JCT, Lord SR. Identifying Key Risk Factors for Dizziness Handicap in Middle-Aged and Older People. J Am Med Dir Assoc. 2020 Mar;21(3):344-350.e2. doi: 10.1016/j.jamda.2019.08.016. Epub 2019 Oct 17. PMID: 31631029.

Acute Dizziness in Older Adults¹⁴

- Workup needed as dizziness secondary to cardiovascular causes (myocardial infarction, arrhythmia) may present with vertiginous symptoms alone.
- Most common presentation of cardiovascular dizziness is presyncope.
- Pre-syncope dizziness feeling arises because of a temporary decrease in blood supply to the brain, leading to cerebral hypoxia.
- Can be due to cardiac causes (dysrhythmias or aortic stenosis), noncardiac causes (postprandial hypotension, vasovagal episodes, orthostatic hypotension, medications).

Acute Dizziness in Older Adults¹⁴

- Identify dysfunctional elements of the overall balance system that can be improved with treatment, to reduce the dizziness handicap and improve the patient's overall ability to function.
- Majority of older dizzy patients have 2 or more causes or contributing factors, so clinicians should apply a structured, systematic diagnosis-oriented approach to identifying all the contributing factors, with a focus on those that are amenable to treatment.
- Important not just to find a "cause" but to identify contributory factors.

Acute Dizziness in Older Adults¹⁴

- Modifiable risk factors for an unfavorable course of dizziness are anxiety, depression, impaired mobility, and polypharmacy.
- Systematically explore the medical history, dizziness characteristics and domains of causes:
 - duration, onset, frequency, provoking circumstances, and associated symptoms
 - cardiovascular, locomotor, metabolic, neurologic, psychiatric, visual, and vestibular disease
- Longitudinal rehabilitation using objective measures and aiming for “improvement in function rather than outright cure” is the recommended approach.

Scope of Care and Outcomes

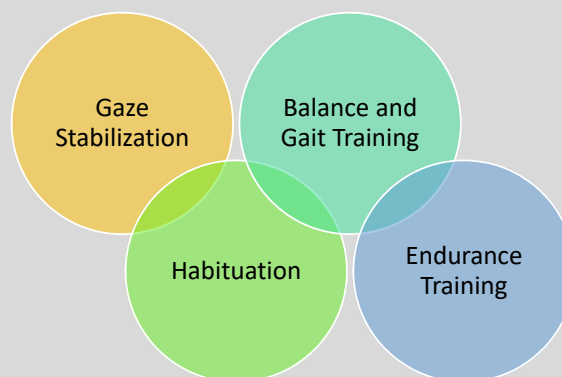
Vestibular Rehab Scope of Care

Common conditions and impairments seen in Vestibular/Neuro Rehabilitation:

- Dysfunctions of the inner ear
 - BBPV (benign paroxysmal positional vertigo)
 - Vestibular Neuritis (Unilateral/Bilateral Vestibular Hypofunction)
 - Labrynthitis
 - Meniere's disease
- Vestibular Migraine and other migraine-related dizziness
- Persistent Postural Perceptual Dizziness (PPPD)
- Cervicogenic Dizziness/Headache
- Neurological disorders, specifically diseases of the brain, spinal cord and nerves that include a dizziness or a balance component
- Ataxia, Parkinson's disease, and other movement disorders
- Surgically removed brain tumors
- Traumatic and non-traumatic brain injuries including concussion with dizziness.
- Autonomic disorders (POTS)
- Mal De Debarquement

Principles of Rehabilitation

- Additional Principles of Rehab include:
 - 4 domains of functional recovery from vestibular insult.



Hall CD, Herdman SJ, Whitney SL, Anson ER, Carender WJ, Hoppes CW, Cass SP, Christy JB, Cohen HS, Fife TD, Furman JM, Shepard NT, Ciendaniel RA, Dishman JD, Goebel JA, Meldrum D, Ryan C, Wallace RL, Woodward NJ. Vestibular Rehabilitation for Peripheral Vestibular Hypofunction: An Updated Clinical Practice Guideline From the Academy of Neurologic Physical Therapy of the American Physical Therapy Association. *J Neuro Phys Ther.* 2022 Apr 1;46(2):116-177. doi: 10.1097/NPT.0000000000000382. PMID: 34864777; PMCID: PMC8920012.

Diagnostic Accuracy

- Accurate diagnosis = optimal functional recovery.³
- The prescription of inappropriate vestibular exercises or exercises that are too difficult/easy will delay functional recovery.³
- Anxiety, panic attacks, or depression associated with the vestibular disorder, indicate need for referral to psychiatrist or psychologist.³
- Central vestibular dysfunction may have better outcomes if rehab is combined with pharmacotherapy, especially those with migraine dizziness.⁴
- Diagnosis and laboratory findings are very important in determining prognosis, yet even with the same diagnosis/lab findings, the presenting symptoms and functional limitations are variable from person to person.⁵

Factors Affecting Outcomes



Negative factors that affect recovery timeline include:

Migraines, sensory loss, visual comorbidities, cognition, sensitivity to motion, psychologic factors, and comorbid central pathology.³



Comorbid dysfunction of the visual or proprioceptive systems will complicate rehabilitation.³



Ocular misalignments may also negatively affect recovery time after vestibular injury.³



Persons with complete bilateral loss will have lifetime complaints of oscillopsia and gait dysfunction.³

Setting Expectations

Diagnosis	Expected Benefit
Unilateral Vestibular Loss (Vestibular Neuritis, labyrinthitis, Schwannoma Removal)	Level A Evidence – Supervised Vestibular therapy
BPPV	Level A Evidence – Supervised assessment and Canalith repositioning maneuvers
Bilateral Vestibular Loss	Level A Evidence – Supervised Vestibular Therapy

Clinical Pearls

- Care should be comprehensive with individualized treatment plan that considers the patient's vestibular function, medical/social history, and functional capacity.
- Advancements in timing and dosage of treatment can aid prognosis and decrease costs incurred by the patient.
- Specialty testing and collaboration needed for multifactorial dizziness.
- High levels of evidence for the value in Vestibular Rehabilitation in common dizziness conditions.
- Negative prognostic indicators can delay but not prevent recovery. Multidisciplinary collaboration improves outcomes in complex cases.