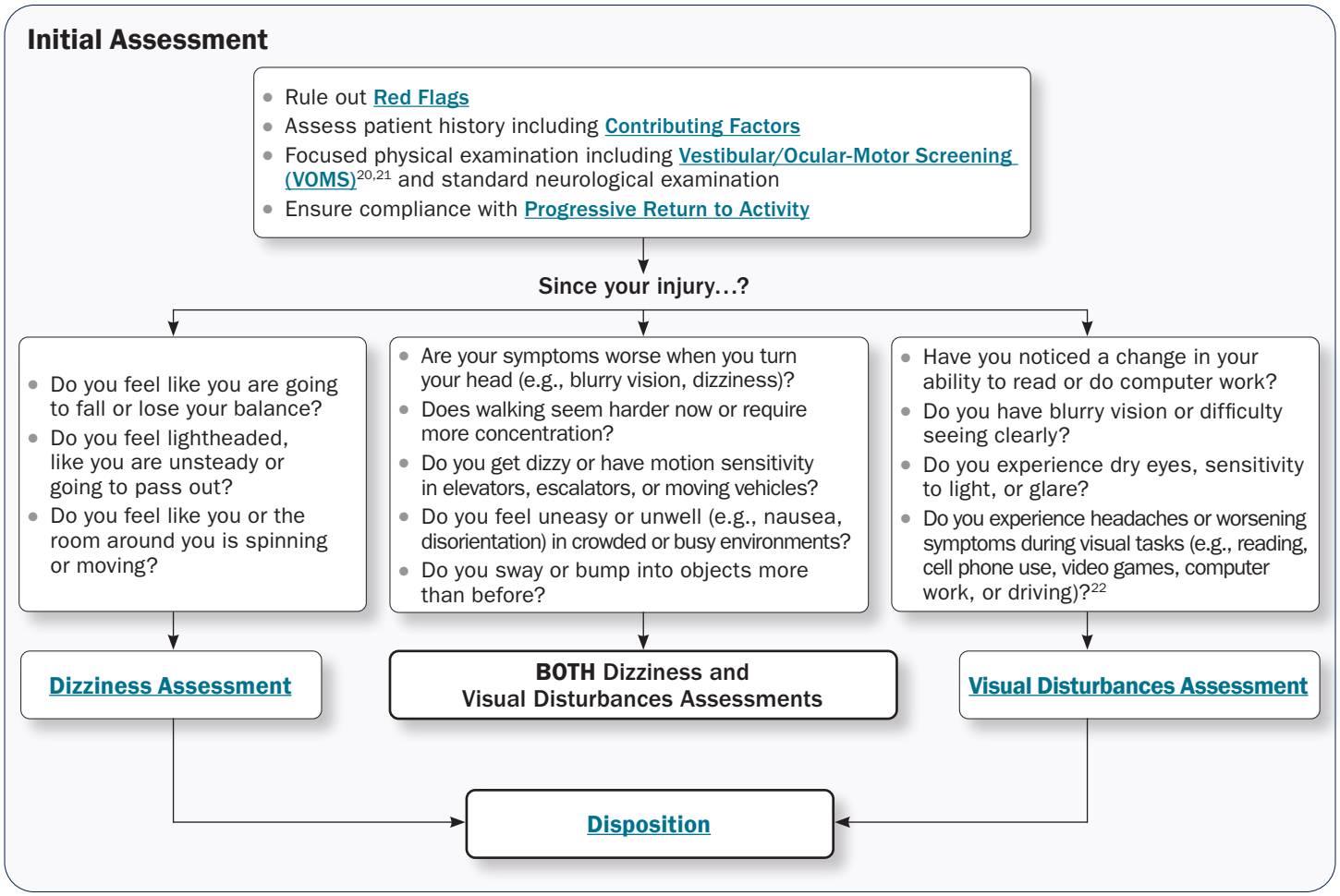
Assessment and Management of Dizziness and Visual Disturbances Following Concussion/Mild Traumatic Brain Injury: Guidance for the Primary Care Manager

This clinical recommendation is intended to assist primary care managers (PCMs) in the Military Health System and Department of Veterans Affairs in the care of service members and veterans with dizziness or visual disturbances following concussion or mild traumatic brain injury (mTBI).

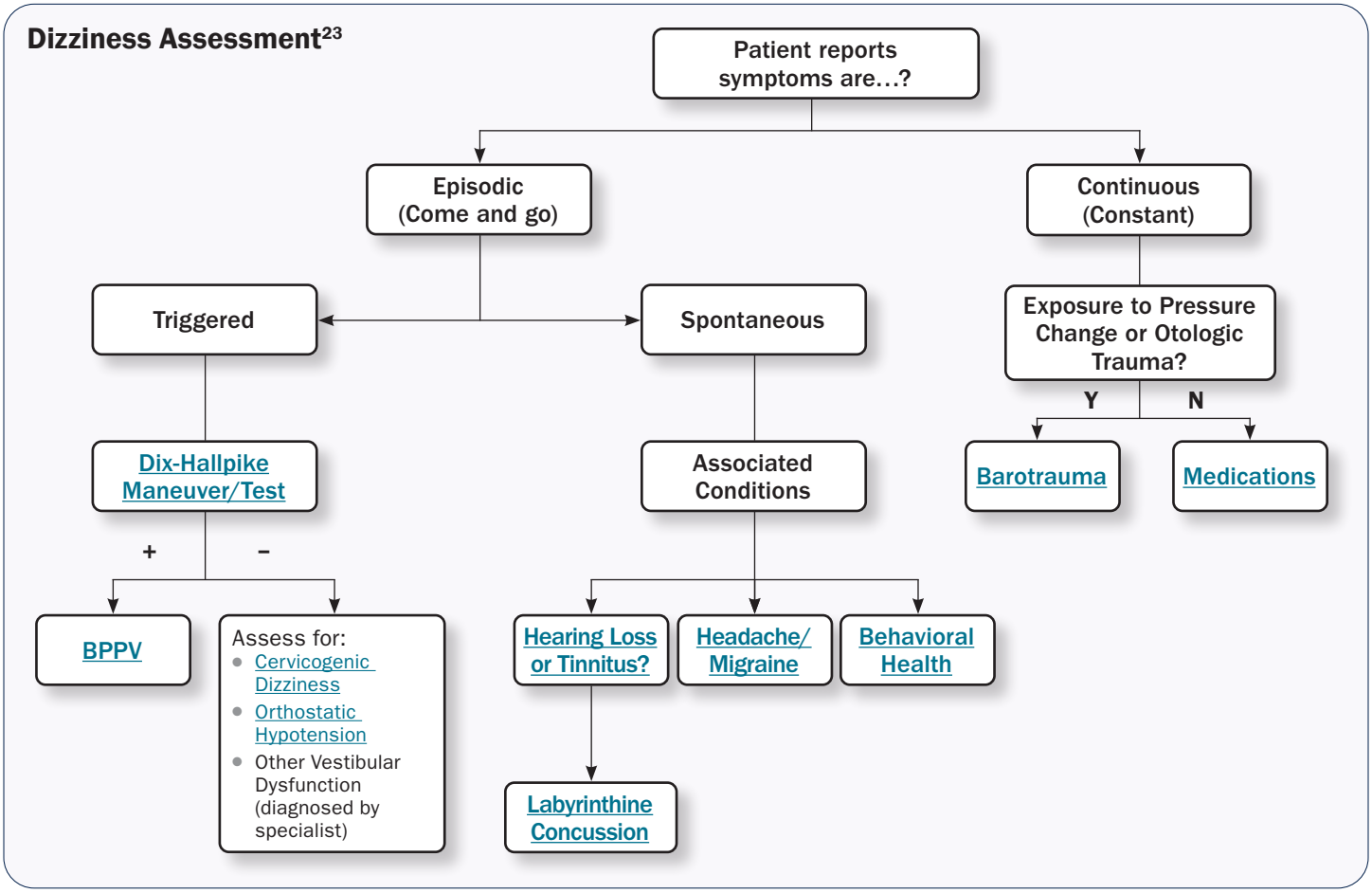
Dizziness and visual disturbances are commonly associated with mTBI and often present with overlapping symptomatology. The incidence of dizziness is estimated to range from 24% to 83% and potentially up to 90% acutely following mTBI.[1-5] Common causes of dizziness secondary to mTBI include peripheral and central vestibular dysfunction.[6,7] Subjective visual disturbances, such as blurry vision, trouble focusing, and photophobia, have been reported in over 87% of service members within one year after TBI.[8] Visual symptoms associated with mTBI are often the result of oculomotor dysfunction, including accommodative dysfunction and convergence insufficiency.[8-19]

Dizziness and visual disturbances will often resolve within a few weeks following mTBI with Progressive Return to Activity (PRA) and PCM management. However, symptoms may persist and require referral to a higher level of care (e.g., TBI specialty clinic, specialty trained providers). Such referrals, as well as monitoring for the resultant progress of the patient, fall within the purview of the PCM.

This is an interactive document. Please click the links in each box for detailed instructions and additional resources.



Dizziness Assessment[23]



Barotrauma/Alternobaric Vertigo[24-26]

ICD-10 Code for PCMs: Other peripheral vertigo [H81.39]

Clinical Features	Evaluation	Treatment Recommendations	Specialty Referral Guidance
• Vertigo (typically spinning sensation) that occurs seconds or minutes following a drastic change in pressure (e.g., blast exposure, diving, altitude change) • Typically resolves in minutes, but can last hours to weeks • Can be associated with tympanic membrane (TM) perforation • More common after blast-induced TBI	• Eustachian tube function testing • TM perforation and hemotympanum may be visualized on otoscopic exam	• **Non-Pharmacologic:** ▪ Pressure normalization (pinch nostrils and forcibly attempt to exhale with closed mouth) ▪ Typically self-limiting condition ▪ Provide patient with Managing Dizziness Following Concussion/mTBI Fact Sheet • **Pharmacologic:** none	• **Ear Nose & Throat (ENT):** If symptoms are persistent, or associated with TM perforation or hearing loss, immediately refer to ENT to rule out inner ear injury or perilymphatic fistula • **Audiology:** Evaluation and monitoring of hearing loss • **Occupational Therapy or Physical Therapy (with specialized training in vestibular rehabilitation):** Evaluation and management of persistent or recurrent symptoms, including dizziness or functional complaints in balance, gait, or daily activities

Benign Positional Paroxysmal Vertigo (BPPV)[6,28,29]

ICD-10 Code for PCMs: Other peripheral vertigo [H81.39] (used for suspected diagnosis)
ICD-10 Code for PCMs: BPPV [H81.1] (used for confirmed diagnosis)

Clinical Features	Evaluation	Treatment Recommendations	Specialty Referral Guidance
• Recurrent, brief (<1 minute) episodes of vertigo (spinning sensation) triggered by specific types of head movements and confirmed by observing predictable nystagmus pattern during a provoking maneuver (e.g., Dix-Hallpike)	• Dix-Hallpike Maneuver/ Test:[30] Posterior canal (most common canal affected in the mTBI patient)[6,29,31] • If Dix-Hallpike does not produce nystagmus but patient is symptomatic, may attempt in clinic or at home canalith repositioning maneuvers based on clinical judgement • Advanced imaging is not recommended in patients who meet diagnostic criteria for BPPV unless additional signs/ symptoms are present (e.g., ataxia, cranial nerve abnormalities, weakness)[31] • Assessment and Treatment of BPPV	• **Non-Pharmacologic:** ▪ Canalith repositioning maneuver by trained provider (e.g., Epley Maneuver)[28,31-33] ▪ Provide patient with Managing Dizziness Following Concussion/ mTBI Fact Sheet • **Pharmacologic:** ▪ Typically not recommended post-mTBI ▪ Note: Use of vestibular suppressants have the potential to worsen concussive symptoms and impede recovery[31,34] ▪ For patients with severe nausea or vomiting with Dix-Hallpike, consider ondansetron 4-8mg PO 30 to 60 minutes prior to canalith repositioning maneuver[31]	• **Occupational Therapy or Physical Therapy (with specialized training in vestibular rehabilitation):** Evaluation and management of: ▪ Patients with persistent or recurrent symptoms ▪ Patients who cannot tolerate repositioning maneuver

Cervicogenic Dizziness (CGD)[35-37]

ICD-10 Code for PCMs: Vertigo of Central Origin [H81.4] (used for suspected diagnosis)
ICD-10 Code for PCMs: Cervical Vertigo [I69.998] (used for confirmed diagnosis)

Clinical Features	Evaluation	Treatment Recommendations	Specialty Referral Guidance
• Episodes of dizziness lasting minutes to hours, typically triggered by changes in cervical spine position or movement • Close temporal relationship with onset of cervical spine symptoms and neck pathology • Characterized by the presence of imbalance, unsteadiness, disorientation, neck pain, and limited cervical range of motion (ROM), and may be accompanied by a headache	• Cervical-spine imaging if indicated • If imaging is negative (or not indicated), full cervical spine examination with attention to symptom provocation with ROM • Cervical Neck Torsion Test	• **Non-Pharmacologic:** ▪ Heat, ice, or cervical spine exercises may help alleviate pain ▪ Provide patient with Managing Neck Pain Fact Sheet • **Pharmacologic:** ▪ Analgesics or anti-inflammatories for cervical pain and stiffness	• **Physical Therapy:** Evaluation and treatment of cervical and vestibular symptoms[27]

Labyrinthine Concussion[2,6,37,38]
ICD-10 Code for PCMs: Other peripheral vertigo [H81.39]

Clinical Features	Evaluation	Treatment Recommendations	Specialty Referral Guidance

• Traumatic peripheral vestibular or inner ear injury after mTBI, typically without skull or temporal bone fracture
• Hearing loss and vestibular symptoms (e.g., vertigo, postural instability, nystagmus) are common and can occur independently
• May have associated sensorineural or conductive hearing loss, as well as associated TM perforation or hemotympanum
• More common after blast-induced TBI
	• TM perforation and hemotympanum may be visualized on otoscopic exam
	• + Weber Test (tuning fork sound lateralizes to the normal ear when placed on top of head)
	  ▪ If sensorineural hearing loss, consider MRI Brain with intra-auditory canals (IACs)
	• + Rinne Test (bone conduction > air conduction)
	  ▪ If + conductive hearing loss, consider CT to rule out skull or temporal bone fracture
	• Romberg Test
	• Examine for spontaneous nystagmus or gaze-evoked nystagmus
		• **Non-Pharmacologic:**
		  ▪ Can be self-limiting
		  ▪ Provide patient with Managing Dizziness Following Concussion/mTBI Fact Sheet
		• **Pharmacologic:**
		  ▪ Consider ondansetron 4-8mg PO PRN for patients with severe nausea or vomiting
			• **Audiology:** Evaluation and monitoring of hearing loss and vestibular dysfunction
			• **Ear, Nose, & Throat (ENT):** Comprehensive middle and inner ear evaluation (e.g., hemotympanum, TM perforation, barotrauma)
			• **Occupational Therapy or Physical Therapy (with specialized training in vestibular rehabilitation):** Evaluation and management of:
			  ▪ Patients with persistent or recurrent symptoms
			  ▪ Patients who cannot tolerate repositioning maneuver

Visual Disturbances Assessment

- For acute symptoms post-injury:
  - Ensure compliance with the Progressive Return to Activity.
  - Visual disturbances often resolve in the acute phase of recovery.
- For persistent or recurrent symptoms despite compliance with the Progressive Return to Activity:
  - Repeat visual disturbance screening questions.
  - Refer the patient to an eye care provider for a comprehensive vision and sensorimotor examination.

Review the below Primary Care Reference during progressive return to activity or while awaiting appointment with eye care provider.

Post-mTBI Visual Disturbances Primary Care Reference[8-19,39,40]
ICD-10 Code for PCMs: Other Subjective Visual Disturbance [H53.19]

Common Subjective Visual Disturbances	Common Diagnoses (Typically Made by Eye Care Providers)	Evaluation	Treatment Recommendations	Specialty Referral Guidance
• Sensitivity to light • Eye pain • Headaches • Motion sensitivity • Blurry vision or trouble focusing • Trouble following a moving target • Double vision • Comprehension difficulties • Balance and gait problems	• Accommodative dysfunction • Binocular vision disorders (convergence insufficiency is most common) • Saccadic and pursuit impairment • Dry eye • Photophobia • Other visual disturbances	• Standard ocular exam to include visual acuity, extraocular eye movements, visual fields, cranial nerve testing • VOMS	• **Non-Pharmacologic:** ▪ **Take breaks.** Patients should follow the 20/20/20 rule: Every 20 minutes, look at something at least 20 feet away for 20 seconds especially when reading, watching television, or using an electronic device ▪ **Reduce glare.** Instruct patients to use natural light whenever possible. Patients may benefit from temporary use of tinted lenses, computer screen covers, or blue light filters ▪ **Provide patient with** Managing Vision Changes Following Concussion/mTBI Fact Sheet • **Pharmacologic:** ▪ Consider a lubricating eye drop for dry eye symptoms	• **Optometry (with training in TBI if available):** ▪ Comprehensive vision and sensorimotor assessment ▪ Evaluation for vision therapy and specialty lenses • **Occupational Therapy or Physical Therapy (with training in TBI vision rehabilitation):** ▪ Treatment of visual disturbances ▪ Recommendations for functional strategies for living with visual disturbances

Red Flags

Any dizziness symptoms or visual changes indicating a life or vision-threatening condition warrant immediate referral to the Emergency Department (ED), regardless of etiology. For acute evaluation of mTBI, red flags are listed in the MACE 2. If any of the indications below are detected during the neurological exam, physical exam, or VOMS, immediately refer to a higher level of care.

Indications for Immediate Referral	Referral
Abnormal external eye exam (e.g., evidence of infection or hemorrhage)	Eye Care Provider
Abnormal visual behavior (e.g., unexpectedly bumping into things)	TBI Trained Eye Care Provider
Acute visual symptoms (e.g., evidence of trauma, severe eye pain, flashes, floaters, severe photophobia)	Eye Care Provider
Acute onset of hearing loss	ED, ENT, or Audiology
Acute onset of unequal pupils	ED
Acute onset vision loss/visual field deficit	ED, Neurology, or TBI Trained Eye Care Provider
Double vision	Neurology or TBI Trained Eye Care Provider
Persistent drainage or bleeding from ear or nose	ENT or Audiology
TM perforation	ENT

Contributing Factors

Comorbid conditions and medications may contribute to dizziness and visual disturbances, and can be exacerbated by mTBI.

Comorbidities			
Category	**Examples**	**Effects**	**Additional Resources**
Behavioral Health[41-45]	• Acute Stress Reaction or Disorder (ASR, ASD) • Anxiety • Panic disorder • Post-Traumatic Stress Disorder (PTSD)	• Blurry vision • Dizziness • Lightheadedness	• Depression Resources • Primary Care Behavioral Health Clinical Pathways • VA/DOD PTSD and ASR Clinical Practice Guideline (CPG)
Cardiovascular	• Arrhythmias • Dysautonomia • Orthostatic hypotension • Vertebrobasilar insufficiency	• Blurry Vision • Dizziness • Lightheadedness • Syncope • Weakness	• American Heart Association Statements and Guidelines
Headache/Migraine[41,48,49]	• Common migraine and migraine variants such as ocular migraine and vestibular migraine	• Vestibular or visual symptoms may precede or co-occur with migraine headache	• Headache Following mTBI Clinical Recommendation • VA/DOD Headache CPG
Sleep Disturbances	• Obstructive Sleep Apnea • Insomnia	• Disordered sleep can exacerbate visual and vestibular symptoms as well as cognitive deficits and headache	• Sleep Disturbances Following mTBI Clinical Recommendation • VA/DOD Sleep CPG

Medications[50-54]

The following list is not all-encompassing, and focuses on medications commonly prescribed for the treatment of mTBI sequelae and comorbidities. The patient should be asked if there have been any recent changes to their medications—including over-the-counter medications and supplements—to assess the temporal relationship between medication initiation or discontinuation and the onset of symptoms.

Category	Examples	Dizziness and Vision Effects
Analgesics	Opioids, tramadol	Dizziness, orthostatic hypotension
Antidepressants	SSRIs, SNRIs, TCAs, bupropion, mirtazapine, trazodone	Dizziness, orthostatic hypotension, sedation or stimulation TCAs: accommodation difficulties, blurry vision
Anticholinergics, Antihistamines	Dimenhydrinate, diphenhydramine, meclizine, promethazine, scopolamine	Dizziness, orthostatic hypotension Accommodation difficulties, blurry vision, dry eye
Antipsychotics	Olanzapine, quetiapine	Dizziness, orthostatic hypotension Accommodation difficulties, blurry vision
Anxiolytics	Benzodiazepines (e.g., lorazepam), buspirone	Dizziness, drowsiness Benzodiazepines: hypotension, orthostatic hypotension
CNS Stimulants	Dextroamphetamine/amphetamine, methylphenidate, caffeine	Dizziness, stimulation Accommodative difficulties, blurry vision, mydriasis
Migraine Medications (prophylactic and abortive)	Anticonvulsants (e.g., topiramate, gabapentin) Beta-blockers (e.g., propranolol) Serotonin receptor agonists (e.g., sumatriptan)	Dizziness, drowsiness Topiramate: acute myopia and secondary angle closure glaucoma can occur days to one month after initiation Beta-blockers: hypotension, orthostatic hypotension
Muscle Relaxants	Baclofen, cyclobenzaprine, methocarbamol	Dizziness, drowsiness Blurry vision, increased intraocular pressure
Sleep or Sleep-related Medications	Sedative-hypnotics (e.g., zolpidem, eszopiclone), prazosin, melatonin	Dizziness, drowsiness Sedative-hypnotics: vision changes Prazosin: ocular migraine, orthostatic hypotension

Disposition

Dizziness and visual disturbances will often resolve within a few weeks after mTBI with PCM management and Progressive Return to Activity. If symptoms persist or are severely limiting, first refer to a TBI Specialty Clinic, if available. Providers may also use the specialty referral guidance pertaining to specific symptoms and conditions following mTBI provided above. Document disposition in the electronic health record and on the Patient and Leadership Guide with consideration of the functional impact of dizziness and visual disturbances on the service member's ability to perform the mission and the risk of harm to self or others. Certain conditions and medications can affect deployability and restrict duty status. Policies and procedures are service and command specific. Consult duty and deployment standards for your organization when dispositioning patient.

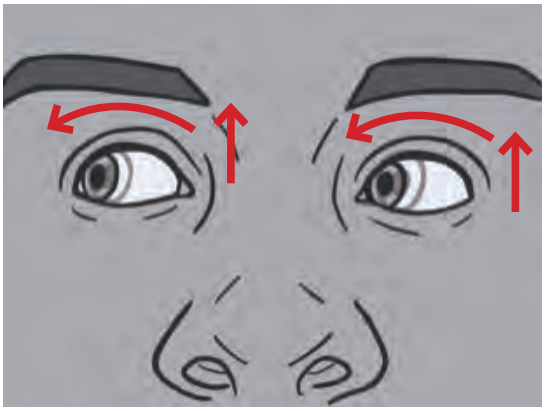
Coding Guidance: For additional guidance refer to ICD-10-CM Coding Guidance for Traumatic Brain Injury or the Hearing Center of Excellence Coding Guidance for Diagnosing Vestibular Disorders in the MHS.

Acronyms	
ASD	Acute Stress Disorder
ASR	Acute Stress Reaction
BPPV	Benign Positional Paroxysmal Vertigo
CNS	Central Nervous System
CPG	Clinical Practice Guideline
CT	Computed Tomography
DOD	Department of Defense
ED	Emergency Department
EHR	Electronic Health Record
ENT	Ear, Nose, and Throat
IAC	Internal Auditory Canal
MACE 2	Military Acute Concussion Evaluation 2
MRI	Magnetic Resonance Imaging
mTBI	Mild Traumatic Brain Injury
OSA	Obstructive Sleep Apnea
PCM	Primary Care Manager
PO	By Mouth
PRA	Progressive Return to Activity
PRN	As Needed
PTSD	Post-Traumatic Stress Disorder
ROM	Range of Motion
SNRIs	Serotonin and Norepinephrine Reuptake Inhibitors
SSRIs	Selective Serotonin Reuptake Inhibitors
TBI	Traumatic Brain Injury
TCAs	Tricyclic Antidepressants
TM	Tympanic Membrane
VA	Veteran's Affairs
VOMS	Vestibular/Ocular-Motor Screening

Appendix A: Dix-Hallpike Maneuver/Test*

The following instructions are for suspected BPPV affecting the right ear. Perform maneuver in the opposite direction if BPPV in the left ear is suspected. Before starting, inform the patient that the maneuver may cause brief vertigo and nausea that should improve with treatment. Visit HCE's YouTube page for a video demonstration of the Dix-Hallpike Maneuver/Test.

Right



A) Stand beside the patient and turn their head 45° to the right. Instruct the patient to keep their eyes open and focused on you.

B) Lay the patient down with their head slightly hanging over the exam table and their neck extended 30°.

C) Keep the patient in this position for 30–60 seconds while you observe their eyes for nystagmus. The latency, duration, and direction of nystagmus should be noted. After the nystagmus resolves or after 60 seconds, guide the patient back to the seated position. Once seated, observe for any nystagmus for another 30 seconds.

D) If upbeating, ipsitorsional nystagmus is elicited, perform a canalith repositioning on the right side (e.g., Epley Maneuver). If it is not, repeat the Dix-Hallpike maneuver on the opposite side.

The typical positive response in patients with posterior canal BPPV (most common type) will be nystagmus that appears with a latency of a few seconds and duration of less than 30 seconds. The nystagmus will be mixed rotary (with the upper pole of the eyes beating towards the affected ear) and vertical. Once the patient is back in the seated position, the nystagmus may recur, but in the opposite direction.

*__Side-lying test__ is a valid alternative to the Dix-Hallpike maneuver for individuals with cervical range-of-motion limitations or other problems that preclude use of Dix-Hallpike maneuver. Visit HCE's YouTube page for a video demonstration of the side-lying test.

Appendix B: Epley Maneuver

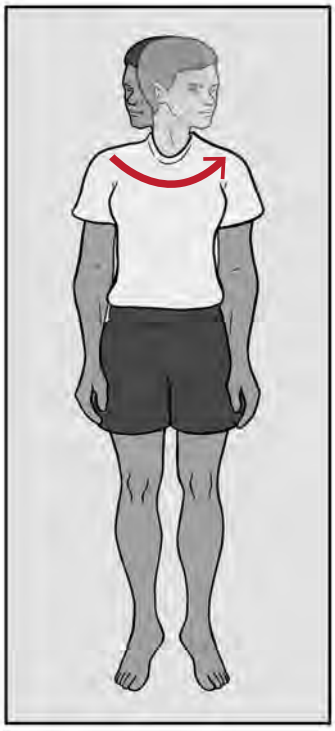
Repeat this maneuver daily until symptoms have resolved. Visit HCE's YouTube page for a video demonstration of the Epley Maneuver (right side).

Right

1) Sit on the bed and turn your head 45° to the right.

Lie back quickly.

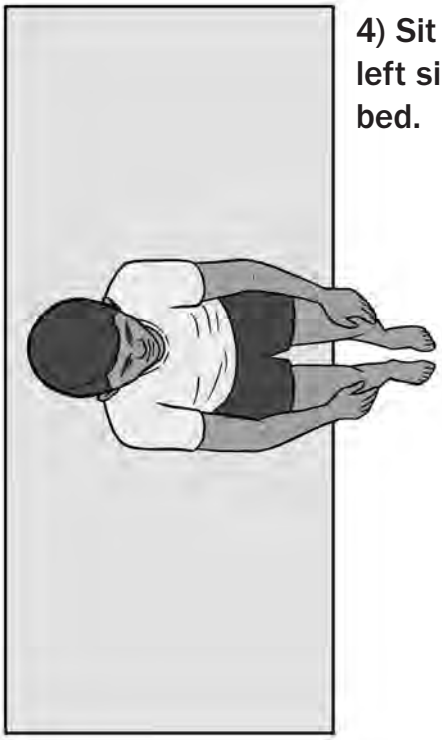
Wait for 30 seconds.



2) Turn your head 90° to the left without raising it.

Wait for 30 seconds.

3) Turn your body and head 90° to the left.



4) Sit up on the left side of the bed.

Appendix B: Epley Maneuver

Repeat this maneuver daily until symptoms have resolved. Visit HCE's YouTube page for a video demonstration of the Epley Maneuver (left side).

Left

1) Sit on the bed and turn your head 45° to the left.

Lie back so that your head is slightly extended.

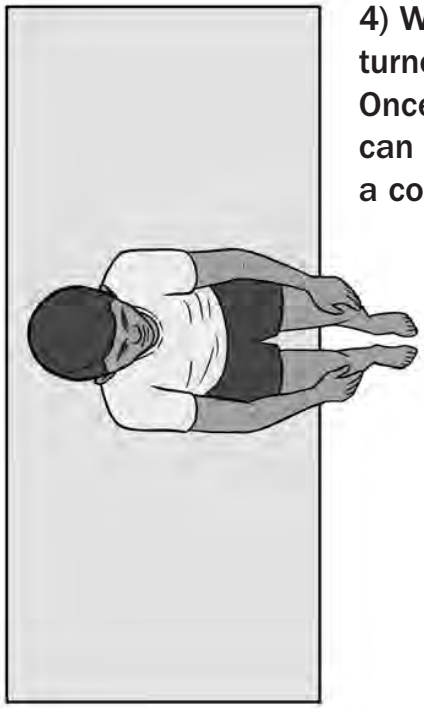
Wait here for 30-60 seconds.

2) Turn your head so that it is now facing 45° to the right.

Wait here for 60 seconds.

3) Roll onto your side and keep your head turned towards the right, such that your eyes are now facing down towards the floor.

Wait here for 60 seconds.



4) While keeping your head turned to the right, sit up. Once you are sitting up, you can turn your head to a comfortable position.

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