Definitions

- **Vertigo**
  - The sensation of self-motion (of head/body) when no self-motion is occurring or the sensation of distorted self-motion during an otherwise normal head movement\(^1\)

- **Dizziness**
  - The sensation of disturbed or impaired spatial orientation which does not necessarily include a false or distorted sense of motion\(^1\)

- **Unsteadiness**
  - Feeling of being unstable while seated, standing, or walking without a particular directional preference\(^1\)

Classification

- Better to categorize vestibular conditions where vertigo, dizziness and unsteadiness are prominent symptoms by triggers, duration, associated symptoms, recurrent or first attack as opposed to symptom quality. Patients have been shown to be inconsistent in their report of symptoms\(^2\), and diagnostically, the symptom quality should not be overemphasized – e.g., non-specific dizziness or lightheadedness may represent a stroke; vertigo may be caused by cardiac arrhythmia, orthostatic hypotension, medication toxicity, etc.

- **Classify by episodic or continuous, duration, triggers\(^3\)**
  - **Episodic, positional**
    - BPPV
    - Orthostatic hypotension
    - Central positional vertigo
      - Positional vertigo and nystagmus related to a posterior fossa lesion, with symptoms and signs atypical for BPPV (apogetropic and positional downbeating are common patterns)\(^4\)
  - **Episodic, spontaneous**
    - Seconds to minutes
      - Vestibular paroxysmia
      - Super canal dehiscence syndrome (SCDS)
    - Minutes to hours
      - Vestibular migraine
      - Meniere's disease
  - **Acute, continuous – spontaneous**
    - Peripheral vestibulopathy (vestibular neuritis)
    - Central vestibulopathy
      - Stroke/TIA>demyelination or Wernicke's
  - **Chronic**
    - Bilateral vestibular loss
    - Persistent postural perceptual dizziness (PPPD)

- **Use Triage-TITrATE-Test method\(^5\)**
  - **Triage**
    - Medications
    - Toxicity
    - Metabolic
    - Cardiac
    - Psychiatric
○ Timing
  ▪ Episodic
  ▪ Acute
  ▪ Chronic

○ Triggers
  ▪ Positional
    ● BPPV
  ▪ Head-motion induced
    ● Vestibulo-ocular reflex (VOR) deficit (unilateral or bilateral vestibular loss)
    ● Vestibular migraine with head motion intolerance
  ▪ Visually-induced
    ● Vestibular migraine
    ● PPPD
  ▪ Sound-induced
    ● Tullio phenomenon in SCDS
  ▪ Valsalva-induced
    ● SCDS
    ● Cervicomedullary lesion (e.g., Chiari)
  ▪ Orthostatic dizziness or vertigo
    ● Orthostatic hypotension

○ Targeted exam
  ▪ Spontaneous, episodic
    ● History
  ▪ Positional, episodic
    ● Orthostatics
    ● Dix-Hallpike, supine roll test
  ▪ Acute, continuous
    ● Head Impulse, Nystagmus, Test of Skew or HINTS6, 7
      ○ HINTS should be used in the acute vestibular syndrome (AVS, acute prolonged vertigo, spontaneous nystagmus, nausea/vomiting, imbalance)
      ○ Cannot rely on HINTS in patients with BPPV (no spontaneous nystagmus, normal VOR) or other episodic conditions including Meniere’s, vestibular migraine (again, normal VOR during and in between attacks)
      ○ Cannot rely on HINTS in patients with TIA/stroke whose symptoms have resolved8
  ▪ Chronic, continuous
    ● Neurologic exam, emphasis on ocular motor signs, gait evaluation

○ Test
  ▪ Tailored neuroimaging, lab testing, etc

## Common vestibular conditions and their defining characteristics

<table>
<thead>
<tr>
<th>Vestibular Disorder</th>
<th>Trigger(s)</th>
<th>Duration</th>
<th>Diagnosis</th>
<th>Treatment</th>
<th>Distinguishing Feature(s)</th>
</tr>
</thead>
</table>
| BPPV – Posterior Canal (PC) | Triggered by looking up, down; laying to seated or seated to laying, rolling over in bed | <60 seconds | Dix-Hallpike – upbeat-torsional nystagmus (towards lowermost or affected ear) | Epley, Semont | -Around 90% of BPPV (AC-BPPV <5%)  
-Single Epley is 80% effective 9  
-Four treatments on the same day 90% effective 9 |
| BPPV – Horizontal Canal (HC) | Triggered by looking right or left, rolling over in bed | <60 seconds | Supine roll testing – geotropic (canalithiasis); apogeotropic (cupulolithiasis) | BBQ roll (immediate efficacy 69%), Gufoni (immediate efficacy 61%) | -Around 10% of BPPV  
-Geotropic – nystagmus stronger towards affected side  
-Apogeotropic – nystagmus weaker towards affected side  
-When cannot lateralize HC-BPPV, bow and lean test 11, 12 |
| Vestibular Paroxysmia 13, 14 | Exertion/ hyperventilation, positional, spontaneous | Seconds> minutes, many times/day | Hyperventilation-induced nystagmus common, neurovascular contact with CISS or FIESTA images, abnormal ipsilateral ABR | Carbamazepine/ oxcarbazepine, less commonly clonazepam, baclofen, gabapentin, acetazolamide can be helpful | -Neurovascular contact can be causal or coincidental  
-Medication trial can be diagnostic and therapeutic when uncertain |
| Superior Canal Dehiscence Syndrome (SCDS) 12 | Loud noises (Tullio phenomenon 15), changes in pressure | Seconds> minutes | Lowered threshold to elicit VEMPs (ocular, cervical), CT temporal bone, supra-normal bone conduction thresholds with an air-bone gap on audiogram | Surgery when SCDS is symptomatic | -Autophony is common – e.g., hearing the heartbeat, eye movements, foot steps, other internal noises |
| Meniere’s 16 | Caffeine, alcohol, sodium or spontaneous | 20 minutes-12 hours | Fluctuating low-mid frequency SNHL, aural symptoms, two or more vertigo attacks, may have drop attacks, abnormal calorics with intact HIT and vHIT is typical 17 | Sodium restriction, diuretics, betahistine, intratympanic (IT) steroids, IT gentamicin or vestibular nerve section in refractory cases 18 | -Thought to be due to “hydrops” or distension of the endolymphatic space within the membranous labyrinth  
-There’s no other cause of low frequency hearing loss that may improve 8 |
| Vestibular Migraine (VM) 19 | Typical migraine triggers | Minutes/ hours> seconds | Recurrent vertigo, current or previous migraine history, one or more symptoms during >50% of attacks - headache, photo/phonophobia, aura | Venlafaxine, tricyclics, beta blockers, calcium channel blockers, topiramate, among others 3 | -Underdiagnosed  
-When subjective aural symptoms (without low-mid frequency SNHL) and recurrent vertigo are present, VM is more likely than Meniere’s  
-Motion sensitivity is common  
-When untreated, commonly evolves into PPPD (see below) 20 |
| Peripheral AVS (Vestibular Neuritis [VN]) 6, 21 | Spontaneous | >24 hours | HINTS exam  
1+ HIT  
2) Unidirectional horizontal-torsional nystagmus  
3) Skew deviation absent | Anti-emetics for <3 days (to prevent delaying normal compensation), steroids may hasten recovery, no role for anti-virals unless Ramsay-Hunt, vestibular rehabilitation | -Preceding viral illness is common  
-Patients may experience one or several episodes of dizziness/vertigo in the day(s) leading up to the prolonged vertigo – however, TIA’s leading up to stroke should be considered |
| Central AVS 6, 21 | Spontaneous | Duration depends on | HINTS exam  
1+ or negative HIT | Anti-emetics for <3 days (to) | -Labyrinthine ischemia via internal auditory artery (from AICA) may be |

### Bilateral Vestibular Loss

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
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<tbody>
<tr>
<td>Oscillopsia occurs with head movements (walking, riding on a bumpy road)</td>
<td>Chronic Loss of VOR bilaterally - +bedside or video HIT, bilateral caloric hypofunction or with rotational chair testing</td>
</tr>
<tr>
<td>Persistent, but wax and wane</td>
<td>Vestibular rehabilitation, vestibular prosthetic devices</td>
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### Persistent Postural Positional Vertigo (PPPVD)

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<th>Symptom</th>
<th>Cause</th>
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<tbody>
<tr>
<td>Complex visual stimulation, worse when upright and with sudden movements</td>
<td>Persistent, but wax and wane</td>
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<td>&gt;3 months of dizziness, unsteadiness, nonspinning vertigo, more days than not</td>
<td>SSRI (sertraline, citalopram), SNRI (venlafaxine), cognitive behavioral therapy, psychoeducation, vestibular rehabilitation (e.g., habituation exercises)</td>
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</tbody>
</table>

**BPPV**=benign paroxysmal positional vertigo; **CISS**=constructive interference in steady state; **FIESTA**=fast imaging employing steady state acquisition; **ABR**=auditory brainstem response; **VEMP**=vestibular evoked myogenic potential; **SNHL**=sensorineural hearing loss; **HIT**=head impulse test; **vHIT**=video HIT; **AVS**=acute vestibular syndrome; **AICA**=anterior inferior cerebellar artery

### References


