Problem. You are called by the nurse to evaluate a 65-year-old woman complaining of dizziness.

Immediate Questions

• A. What is the patient's description of the dizziness?
• B. What are the patient's vital signs?
• C. What are the patient's medications?
• D. What are the onset and duration of the dizziness?
• E. Are there precipitating factors of the dizziness?
• F. Are there other associated symptoms?

A. What is the patient's description of the dizziness?

• Obtain a detailed description of the patient's symptoms → classify dizziness into one of four specific categories; vertigo, pre-syncope, disequilibrium, or lightheadedness

B. What are the patient's vital signs?

• Blood pressure and heart rate should be obtained lying and standing after 1 minute.
• Orthostatic hypotension (a decrease of 10 mm Hg systolic blood pressure) can often be attributed to drugs, volume depletion, or autonomic insufficiency.
• The heart rate increases by 20 bpm (16 bpm in the elderly) in volume depletion, whereas with autonomic insufficiency the heart rate does not change.
• Consider an arrhythmia if the patient is tachycardic or bradycardic or has an irregular rhythm.

B. What are the patient’s vital signs?

• Blood pressure and heart rate should be checked in both arms. A significant difference in systolic blood pressure (> 20 mm Hg) between the two arms may be suggestive of subclavian steal.
• Tachypnea may suggest hyperventilation or anxiety.
• Fever could represent an infectious cause such as meningitis or otitis media.

C. What are the patient’s medications?

• Medications are a common cause of dizziness.
  - Vasodilators, antihypertensives, and tricyclic antidepressants often cause orthostatic hypotension.
  - Digoxin, beta-blockers, and calcium channel blockers (non-dihydropyridine calcium antagonists) can result in bradycardia and varying degrees of heart block.
  - Antiarrhythmics such as quinidine, procainamide, and sotalol can induce ventricular arrhythmias.
  - Aminoglycoside antibiotics (amikacin, gentamicin, streptomycin, tobramycin) and loop diuretics have been associated with ototoxicity and vertigo.
D. What are the onset and duration of the dizziness?

- Sudden onset of vertigo → peripheral vestibular disorder; vertigo that is gradual in onset → central vestibular disorders
- Episodic symptoms → peripheral vestibular disorders; constant symptoms → central vestibular disorders
- Duration of episodes:
  - benign positional vertigo (seconds),
  - transient ischemic attack (minutes to hours),
  - Meniere’s disease (hours)
  - vestibular neuronitis/labyrinthitis (days).

E. Are there precipitating factors of the dizziness?

- Dizziness related to position change can be attributed to vestibular and nonvestibular disorders.
- Positional vertigo is precipitated by changes in head position (turning/tilting head or rolling over in bed) or middle ear pressure (coughing, sneezing, or Valsalva maneuver).
- Postural hypotension is typically associated with a change in position (lying to standing).
- Generally, dizziness associated with exercise or stress is suggestive of a nonvestibular disorder.

F. Are there other associated symptoms?

- Hearing loss and tinnitus indicate a vestibular disorder, usually a peripheral disorder (eg, Meniere’s disease).
- Nausea and vomiting are nonspecific findings often associated with vestibular disorders.
- Focal neurologic deficits usually represent a central nervous system disorder.
- Dyspnea, palpitations, and sweating occur with nonvestibular disorders, such as hyperventilation or cardiac disease.

Differential Diagnosis

Dizziness is a common complaint with an extensive differential diagnosis.

- A common approach is to categorize dizziness as vertigo, pre-syncope, disequilibrium, or lightheadedness.
- In general, the most common causes of dizziness are peripheral vestibular disorders, psychiatric disorders, and pre-syncope.

A. Vertigo

1. Peripheral vestibular disorders.
   - Due to disease of the inner ear or vestibular nerve (CN VIII).
   a. Benign positional vertigo.
      - The most common cause of vertigo. Characterized by brief episodes of severe vertigo that are associated with changes of head position, it often occurs after ear trauma or infection.
   b. Vestibular neuronitis.
      - Sudden onset of severe vertigo associated with nausea and vomiting. Symptoms may persist for hours to days. It usually follows a viral upper respiratory infection.
A. Vertigo

1. Peripheral vestibular disorders.
   c. Labyrinthitis. Similar to vestibular neuronitis except associated with hearing loss.

2. Central vestibular disorders.
   Due to disease of brain stem or cerebellum. Usually, vertigo is not the dominant manifestation of these disorders.

   a. Cerebrovascular disease. Ischemia involving the vertebrobasilar circulation often causes vertigo. Other signs of brain stem involvement such as diplopia, dysarthria, dysphagia, weakness, or numbness usually accompany vertigo due to brain stem ischemia. Cerebellar ischemia typically presents with vertigo and cerebellar signs; however, it may present with only vertigo. Altered mental status may indicate cerebellar infarction or hemorrhage with potential for herniation and progression to coma.

   b. Tumors. Brain stem, cerebellar, and cerebellopontine-angle tumors. Acoustic neuromas, which are benign tumors of the vestibular nerve, are the most common cerebellopontine-angle tumors. Tinnitus and hearing loss are common complaints, whereas vertigo is usually mild or absent.

   c. Multiple sclerosis. Vertigo is the presenting symptom in about 10% of patients. Up to one-third of patients with multiple sclerosis experience vertigo.

   d. Subclavian steal syndrome. Vertigo and other signs of vertebrobasilar insufficiency occur during arm exercise.

   e. Other central disorders. Temporal lobe seizures, basilar artery migraines, meningitis, Friedreich's ataxia and related heredofamilial disorders, vasculitis.

   e. Ototoxic medications. Aminoglycoside antibiotics, loop diuretics, aspirin, cis-platinum, alcohol.

   f. Other peripheral disorders. Post-traumatic vertigo, acute or chronic otitis media, cholesteatoma, perilymphatic fistula, and acoustic neuroma.
B. Pre-syncope

- A sensation of an impending faint, often described as "nearly fainting."
- Unlike syncope, there is no loss of consciousness.
- Pre-syncope typically lasts less than 1 minute.

1. Vasovagal reaction.
   Common in young patients and usually preceded by diaphoresis, pallor, and nausea. Frequently provoked by stressful, painful, or other noxious stimuli (ie, venipuncture).

2. Orthostatic hypotension.
   Hypovolemia, medications, or autonomic insufficiency.

3. Cardiac disease.
   Arrhythmias, valvular disease, atrial myxoma, cardiac ischemia, tamponade.

   Associated with head turning, tight collars, and shaving.

5. Metabolic.
   Hypoxia, hypoglycemia, hyponatremia, hypokalemia, hypocalcemia.

C. Disequilibrium.

1. Multisensory deficit disorder.
   The most common cause of disequilibrium in the elderly. It is due to any combination of peripheral neuropathy, visual impairment, vestibular disorder, or musculoskeletal disorder (ie, arthritis, cervical spondylosis). Multisensory deficit disorder is often worsened by the patient's fear of falling.

2. Altered visual input.
   The elderly with vision loss and cataracts are prone to gait disturbances, particularly at night or in unfamiliar surroundings.

3. Cerebellar disease.


5. Medications.
   Psychotropics, benzodiazepines, anticonvulsants.

D. Lightheadedness.

1. Psychiatric.
   Frequently nonspecific dizziness is a symptom of an underlying psychiatric disorder, including anxiety, depression, and panic disorder. The dizziness associated with anxiety is frequently associated with hyperventilation.

2. Hyperventilation.
   Dizziness is the most common symptom with hyperventilation syndrome. Dyspnea, palpitations, and paresthesias are associated symptoms. An abnormal pattern of breathing is often not recognized by the patient.
A. Physical examination key points

1. Vital signs. See above Section.
2. Ears.
The external auditory canal should be evaluated for cerumen impaction or foreign body. The tympanic membrane should be examined for evidence of fluid, infection, or perforation. Do a simple assessment for hearing loss through whispered voice or finger rub. If hearing loss is suspected, then distinguish between sensorineural and conductive hearing loss (Weber and Rinne tests). Sensorineural hearing loss is suggestive of Meniere's disease or an acoustic neuroma, whereas conductive hearing loss is often due to middle ear disease interfering with conduction, such as otitis media.

3. Eyes.
Eyes should be examined for nystagmus, which is commonly associated with vertigo. Assess pupils and extraocular muscles for cranial nerve dysfunction, which may be due to a CNS lesion. Do a funduscopic exam to evaluate for papilledema (increased intracranial pressure). A quick check of visual acuity should also be done.

Auscultate for carotid/vertebral bruits, which may suggest possible cerebrovascular disease. Determine whether head and neck movement precipitates dizziness.

5. Cardiac.
Assess cardiac rate and rhythm to determine presence of arrhythmia. Auscultate for heart murmurs suggestive of aortic stenosis or idiopathic hypertrophic subaortic stenosis.

A careful neurologic exam is essential.

b. Cranial nerves.
Cranial nerve abnormalities suggest a CNS disorder. Sensory, peripheral neuropathy, especially of lower extremities, contributes to disequilibrium.

c. Cerebellar.
Observe gait. Evaluate for limb ataxia and gait ataxia.

A. Physical examination key points

3. Eyes.
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Auscultate for carotid/vertebral bruits, which may suggest possible cerebrovascular disease. Determine whether head and neck movement precipitates dizziness.

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• a. Mental status exam. May give evidence of underlying psychiatric disorder. Altered mental status associated with nonvestibular dizziness may be attributed to drug toxicity, metabolic abnormalities, or CNS infection, whereas altered mental status with vertigo is often associated with life-threatening CNS disorders such as cerebellar hemorrhage or infarction.

B. Diagnostic physical tests

1. Nystagmus.
The presence of nystagmus suggests that dizziness is caused by vertigo. It may be the only objective finding in the examination of a patient with vertigo. Nystagmus associated with a peripheral lesion is different from that seen with a central lesion.
B. Diagnostic physical tests

1. **Nystagmus.**
   Peripheral lesions cause only horizontal or rotary nystagmus; central lesions may cause nystagmus in any direction. Vertical nystagmus is seen only with central lesions. Visual fixation tends to suppress nystagmus that is due to peripheral but not central lesions. Changing the direction of gaze does not change the direction of nystagmus with peripheral lesions, but it may change the direction of nystagmus with central lesions.

2. **Nylen-Barany (Hallpike-Dix) maneuver.**
   This maneuver helps to differentiate peripheral positional vertigo from central vertigo. The physician moves the patient from a sitting to a supine position, with the head rotated 45 degrees to one side and hanging off the table at 45 degrees. The patient is then observed for vertigo and nystagmus. The maneuver is repeated with the head turned to the other side.

   With peripheral positional vertigo (benign positional vertigo), the maneuver produces vertigo and rotary nystagmus after a latency of 2-20 seconds, which diminishes in intensity within 30 seconds and fatigues with repetitive testing. Variation of these features often indicates a central disorder.

3. **Romberg test.**
   The patient stands with feet together, without support from the arms. Monitor the patient with his eyes open and then closed. Pronounced imbalance with eyes closed compared with eyes open suggests proprioceptive impairment. A positive Romberg test is common with disequilibrium.

4. **Hyperventilation maneuver.**
   The patient hyperventilates for 2-3 minutes. Monitor for reproduction of dizziness.

C. Laboratory data

1. **Complete blood count.** To R/O anemia or infection.

2. **Glucose.** To R/O hypoglycemia.

3. **Serum electrolytes.** To R/O hypokalemia or hypocalcemia.

4. **Thyroid function tests.** If hypothyroidism is suspected.

5. **Urine drug screen/drug levels.** If illicit drug use or drug toxicity is suspected.

6. **Serologic test for syphilis (RPR/VDRL).** If tertiary syphilis is suspected.
D. Special tests

1. Brain imaging.
   Not all patients with dizziness need neuroimaging. If a patient's findings on exam are suggestive of a CNS disorder, neuroimaging is indicated. MRI is more sensitive than CT in diagnosing posterior fossa lesions and acoustic neuromas.

2. Electronystagmogram.
   Testing of vestibular function by evaluating nystagmus. This test is able to confirm nystagmus when the physical examination is equivocal. It detects peripheral and central vestibular disorders and should be considered when the cause of vertigo is uncertain.

3. Audiometry.
   Should be considered with hearing complaints or with hearing loss on examination. It may help with the diagnosis of peripheral vertigo (ie, Meniere's disease or acoustic neuroma).

   Very sensitive in the detection of acoustic neuromas.

5. Electroencephalogram.
   If seizures are suspected.

6. Lumbar puncture.
   If meningitis or multiple sclerosis is suspected.

7. Electrocardiogram.
   To rule out arrhythmia.

8. Telemetry/Holter monitor/event recorder.
   Useful in the evaluation of suspected arrhythmias.

   If valvular heart disease or atrial myxoma is suspected.

Plan - A. Vertigo.

- The management of central vertigo usually requires treatment of the underlying cause. The therapeutic goal of peripheral vertigo is to provide symptomatic relief from the vertigo as well as the nausea and vomiting. Most of the causes of peripheral vertigo are not life threatening, and most episodes subside with conservative therapy (drug therapy and physical therapy).

1. Drug therapy.
   a. Antihistamines, Meclizine (Antivert), 12.5-25 mg PO Q 6 hr; dimenhydrinate (Dramamine), 50 mg PO Q 6 hr; diphenhydramine (Benadryl), 25-50 mg PO/IM/IV Q 6 hr.
   b. Anticholinergics, Scopolamine (Transderm Scop), 0.5 mg/patch Q 3 days.
   c. Phenothiazines, Prochlorperazine (Compazine), 5-10 mg PO/IM/IV Q 6 hr; promethazine, 25-50 mg PO/IM/IV Q 6 hr.
   d. Benzodiazepines, Diazepam (Valium), 2-40 mg PO/IM/IV Q 6 hr.
Plan - A. Vertigo.

2. Physical therapy.
Vestibular rehabilitation often promotes recovery in patients with peripheral vertigo. Patients with vertigo tend to avoid head motion, which actually prolongs symptoms. Physical therapy forces them to perform exercises that may decrease the duration and severity of vertigo.

Surgical intervention is reserved for refractory cases of vertigo. Endolymphatic shunts and labyrinthectomies have been performed for disabling cases of Meniere's disease.

Plan - B. Pre-syncope.

1. Vasovagal syncope
   - Assume recumbent position
   - Avoid precipitating situation
   - Consider head-up tilt-table testing

2. Orthostatic hypotension
   - Correct volume contraction
   - Treat GI bleeding, if present
   - Change position slowly

3. Cardiac syncope
   - Treat arrhythmia, ischemia

Plan - C. Disequilibrium

1. Treat any underlying treatable disorders.
2. Correct vision if indicated.
3. Advise to use cane or walker when indicated.
4. Consider physical therapy.
6. Avoid sedating medications.

Plan - D. Lightheadedness

1. Treat any underlying psychiatric disorder (ie, give anxiolytics or antidepressants).
2. Supportive psychotherapy.
3. Teach relaxation techniques.
4. Teach breathing techniques to relieve symptoms.