



Dizziness in Aging Population

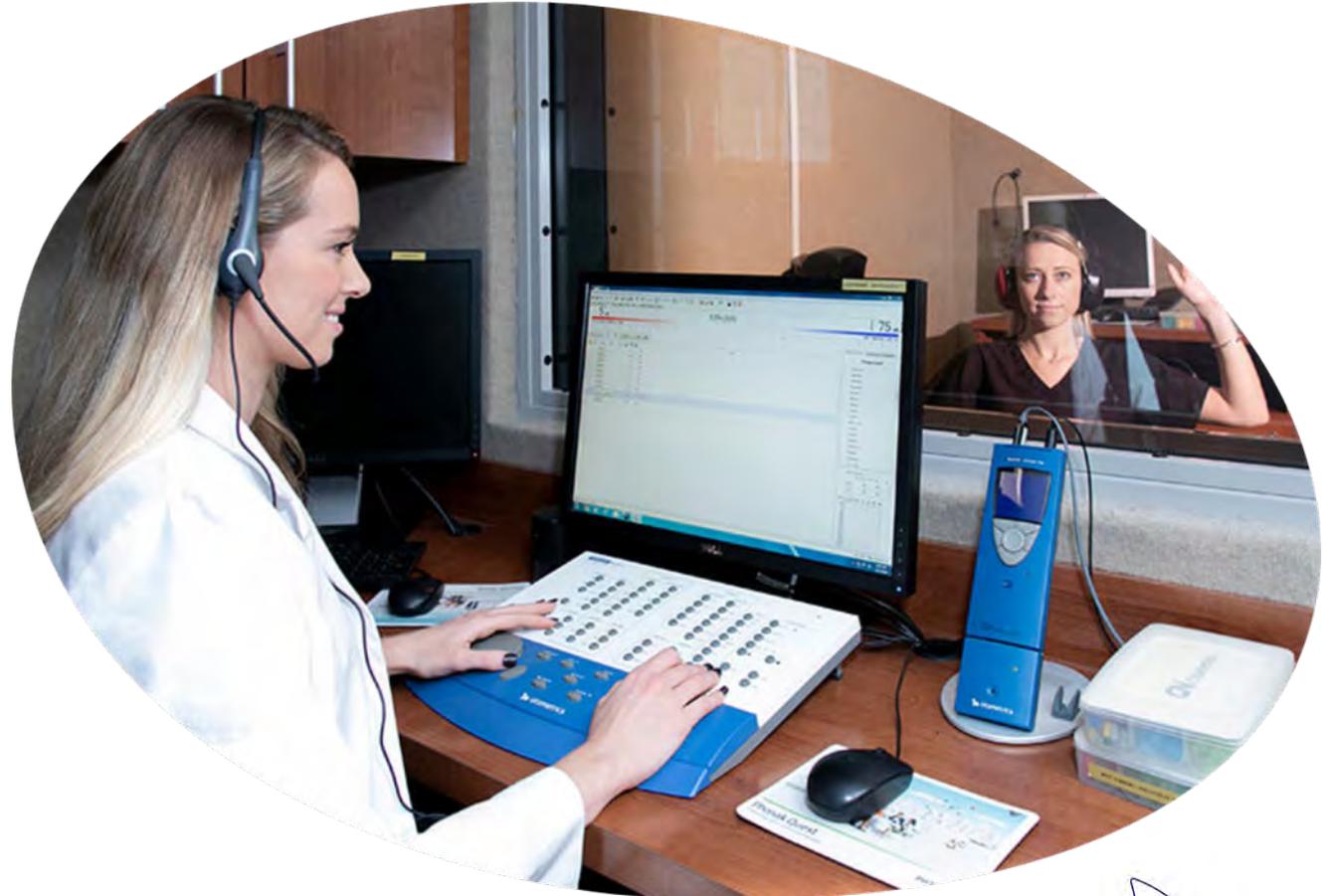
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Audiology

Audiologists are the primary health-care professionals who evaluate, diagnose, treat, and manage hearing loss and balance disorders in individuals of all ages from infants and teens to adults and the elderly.

Manage patients with:

- Hearing loss
- Tinnitus/Hyperacusis
- Auditory processing disorders
- Vestibular/equilibrium disorders
- Misophonia



Dizziness

- 3rd most common complaint in outpatient clinics
- But the term “dizziness” is not a differentially diagnosing word
- 4 main categories
 - Vertigo
 - Lightheaded
 - Disequilibrium
 - Presyncope
- Dizziness can mean different things to different people
- Hard to describe
- Impact on quality of life

TABLE 1 *Descriptions of Episodic Vertigo or “Dizziness”**

Vertigo	Bouncing
Unsteadiness	Falling
Imbalance	Swimming
Spinning	Staggering
Floating	Weaving
Fainting	Moving
Lightheadedness	Passing out
Swaying	Tilting
Twisting	Listing
Blurring vision	Rocking
Disorientation	Oscillating
Poor equilibrium	Rolling



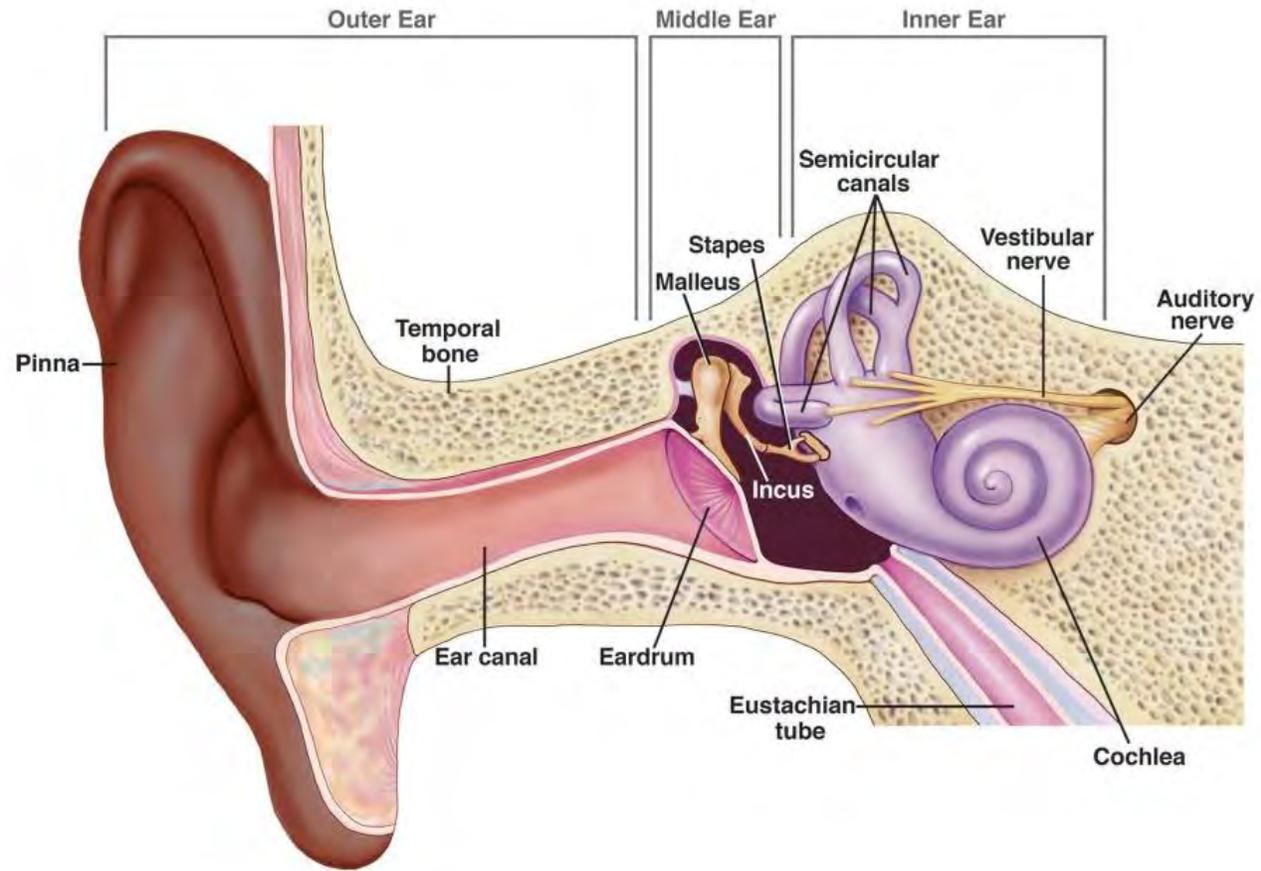
Plus more

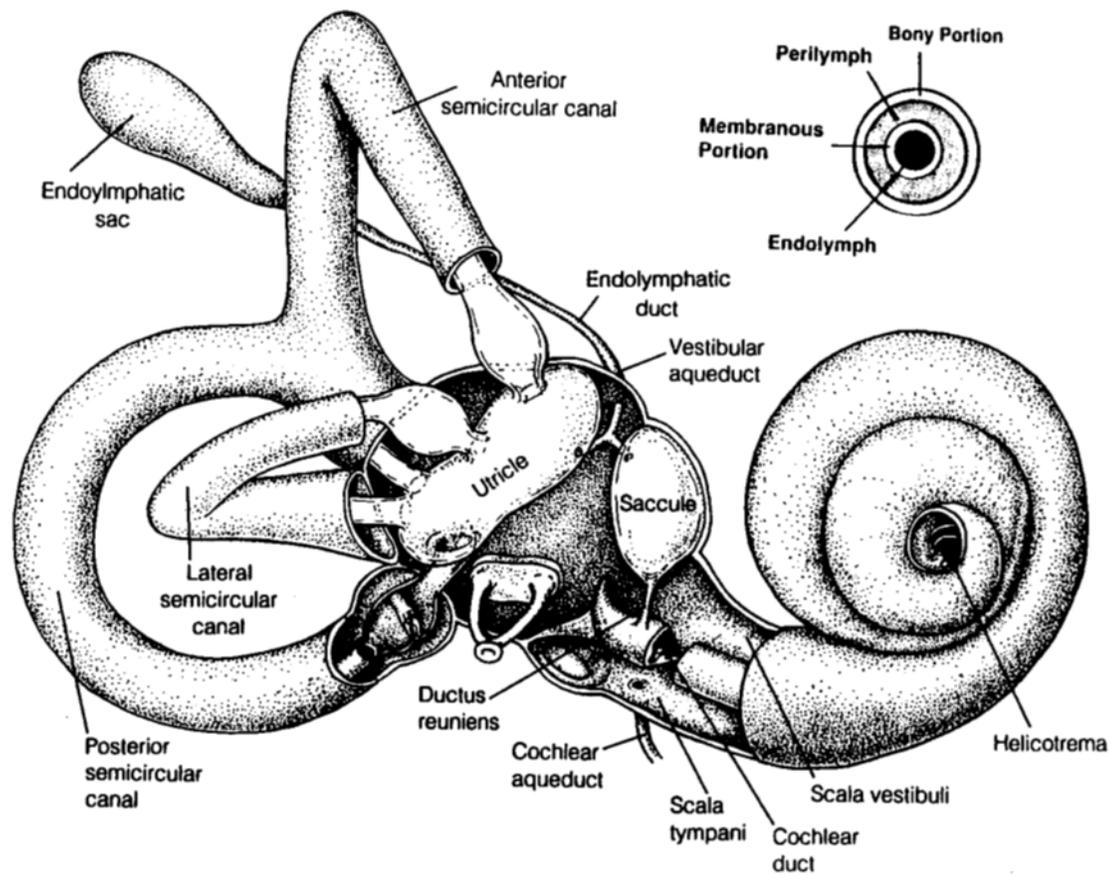
Etiology

(Fernández et al., 2015)

TABLE 1 | Etiology of dizziness and vertigo in the elderly.

Peripheral vestibular	Benign paroxysmal positional vertigo
	Vestibular neuritis
	Bilateral vestibular loss
	Late-onset Meniere's disease or decompensation (2)
	Labyrinthitis
	Occlusion of the anterior vestibular artery (48)
Central nervous system	Vestibular migraine (49)
	Transient ischemic attack of vertebrobasilar artery (50)
	Stroke
	Neurodegenerative disorders (51)
	Downbeat and upbeat nystagmus syndromes (51)
Cardiovascular (2)	Arrhythmia
	Postural hypotension
	Congestive heart failure
	Heart valve failure
Medications (52)	Antihypertensive
	Benzodiazepines
	Hypnotics
	Anxiolytics
	Antiepileptic
Multimodal balance disorder	Presbystasis (10)
Others	Primary and secondary neoplasia (breast and prostate) (53, 54)
	Somatoform vertigo and psychiatric dizziness (55)
	Musculoskeletal system disorders
	Proprioception and somatosensory loss

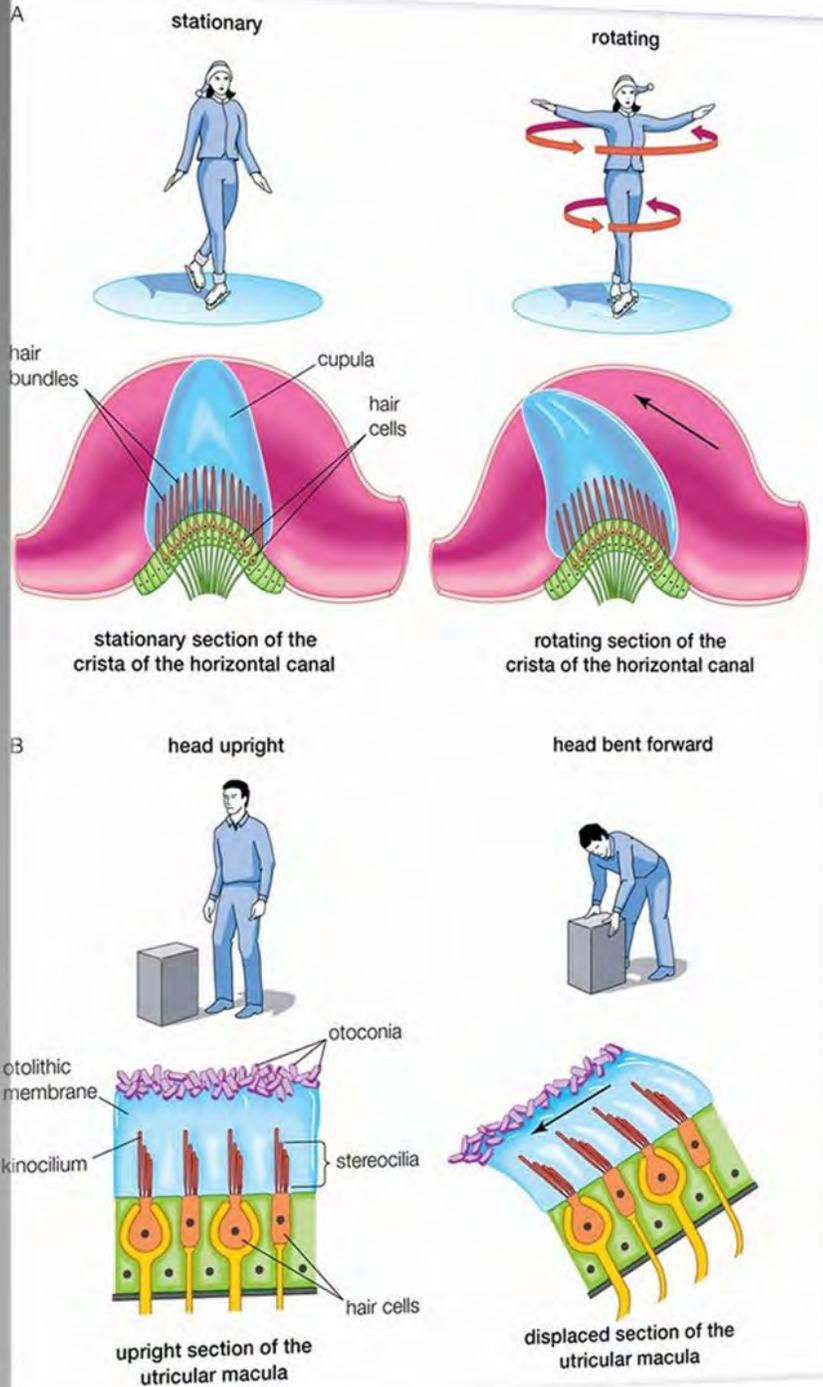




Vestibular Function

Our vestibular system is our motion center

- Angular movement
- Rotation
- Linear acceleration
- Tilt
- Centrifugation



Evaluation Tools

- Audiogram
- Tympanometry and acoustic reflexes
- Videonystagmography (VNG)
- Rotary chair
- Video head impulse test (vHIT)
- Ocular vestibular evoked myogenic potentials (oVEMP)
- Cervical vestibular evoked myogenic potentials (cVEMP)
- Computerized dynamic posturography (CDP)

Vestibular findings in older adults by age

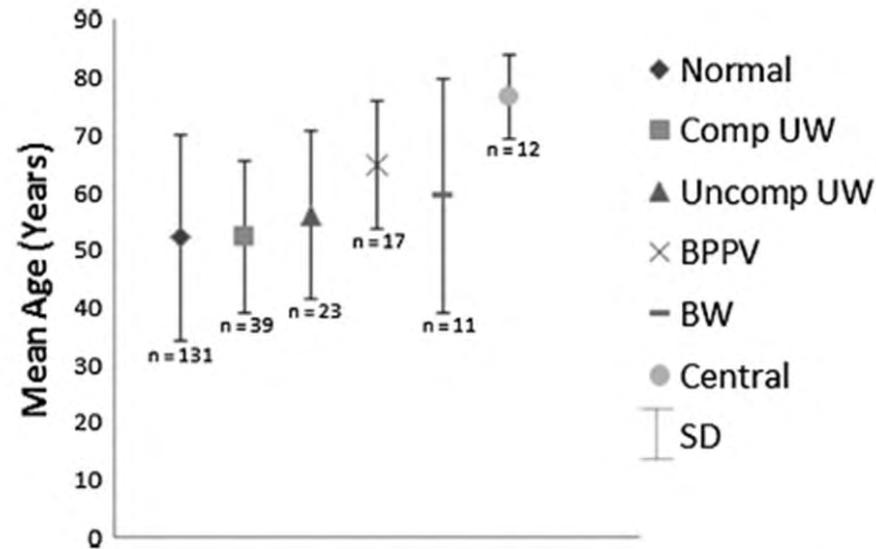


FIG. 1. Mean age of patients for each of the 6 potential vestibular test results. Error bars indicate ± 1 SD. A *diamond* represents those with normal vestibular test findings, a *square* represents those with a compensated unilateral weakness, a *triangle* represents those with an uncompensated unilateral weakness, a *crossed line* represents those with BPPV, a *dash* represents those with a bilateral weakness, and a *circle* represents those with central vestibular findings. BPPV, benign paroxysmal positional vertigo; BW, bilateral weakness; comp, compensated; SD, standard deviation; uncomp, uncompensated; UW, unilateral weakness.

Table 5. Causes of Dizziness in 417 Elderly Patients in Primary Care (Panel Diagnosis)

Characteristic	Major Cause		Minor Cause		Total ^a	
	No.	%	No.	%	No.	%
Contributing causes						
Adverse drug effect	10	2	96	23	106	25
Cardiovascular disease (including cerebrovascular disease)	237	57	66	16	303	73
Locomotor disease	15	4	43	10	58	14
Metabolic or endocrine conditions	3	1	3	1	6	1
Neurological disease (excluding cerebrovascular disease)	12	3	36	9	48	12
Psychiatric illness	41	10	40	10	81	19
Peripheral vestibular disease	60	14	40	10	100	24
Impaired vision	2	0	3	1	5	1
Other causes	3	1	4	1	7	2
Unclear	34	8	–	–	34	8
Total	417	100	331	79	748	179
Contributing causes per patient						
1	126	30				
2	191	46				
3	59	14				
4	6	1				
5	1	0				
Unclear	34	8				
Total	417	100				

Note: Data for each patient were independently reviewed by a family physician, a geriatrician, and a nursing home doctor.

^a Adds up to more than 100%, because more than 1 cause of dizziness per patient is possible.

Dizziness Symptom Profile

- Jacobson, et al (2019)
 - The DSP is a self-report questionnaire designed to generate one or more differential diagnoses that can be combined with the patient's case history and physical examination.
 - Designed so it could also be used by PCPs/PAs/Nurses to better triage patients
 - Subscales:
 - Vestibular migraine
 - Meniere's disease
 - Unspecific unsteadiness
 - Benign paroxysmal positional vertigo (BPPV)
 - Superior canal dehiscence
 - Vestibular neuritis/labyrinthitis
 - Persistent postural-perceptual dizziness (PPPD)

TABLE 3. Final version of the 31-item DSP (top) and the item assignment of individual items to diagnostic groups (bottom)

Item	Statement	Strongly Disagree	Not Sure			Strongly Agree
1	My dizziness is intense but only lasts for seconds to minutes.	0	1	2	3	4
2	I have had a single severe spell of spinning dizziness that lasted days or weeks.	0	1	2	3	4
3	I have spells where I get dizzy and also have irregular heartbeats (palpitations).	0	1	2	3	4
4	I hear my voice more loudly in one ear compared with the other.	0	1	2	3	4
5	I am unsure of my footing when I walk outside.	0	1	2	3	4
6	I get dizzy when I turn over in bed.	0	1	2	3	4
7	I get dizzy when I am in open spaces and have nothing to hold onto.	0	1	2	3	4
8	I have a roaring sound in one ear only before or during a dizziness attack.	0	1	2	3	4
9	I am depressed much of the time.	0	1	2	3	4
10	I lost hearing in one ear after an attack of spinning dizziness.	0	1	2	3	4
11	I had a big dizzy spell that lasted for days where I could not walk without falling over.	0	1	2	3	4
12	I get dizzy when I sneeze.	0	1	2	3	4
13	There are times when I get dizzy and also have a headache.	0	1	2	3	4
14	I get dizzy when I strain to lift something heavy.	0	1	2	3	4
15	I get a short-lasting, spinning dizziness that happens when I bend down to pick something up.	0	1	2	3	4
16	My hearing gets worse in one ear before or during a dizziness attack.	0	1	2	3	4
17	I had a single constant spell of spinning dizziness that lasted longer than 2–3 days.	0	1	2	3	4
18	When I get a headache, I am very sensitive to sound (I try to find a quiet place to rest).	0	1	2	3	4
19	I get short-lasting, spinning dizziness that happens when I go from sitting to lying down.	0	1	2	3	4
20	I can trigger a dizzy spell by placing my head in a certain position.	0	1	2	3	4
21	I had a spell of spinning dizziness that lasted for days or weeks after I had a cold or flu.	0	1	2	3	4
22	I have a feeling of fullness or pressure in one ear before or during a dizziness attack.	0	1	2	3	4
23	I get headaches that hurt so badly that I am completely unable to do my daily activities.	0	1	2	3	4
24	I have spells where I get dizzy and it is difficult for me to breathe.	0	1	2	3	4
25	I have a sensation of dizziness or imbalance daily or almost daily.	0	1	2	3	4
26	My vision changes before a headache begins.	0	1	2	3	4
27	I am unsteady on my feet all the time.	0	1	2	3	4
28	I am anxious much of the time.	0	1	2	3	4
29	When I cough I get dizzy.	0	1	2	3	4
30	When I get a headache, I am very sensitive to light (I try to find a dark room to rest).	0	1	2	3	4
31	I feel dizzy all of the time.	0	1	2	3	4

History is everything

- Initial vs Current symptoms
- Vertigo- is it really vertigo?
- Duration of the dizziness
- Number of Attacks
- Provocation
- Hearing loss
- Aura
- Facial symptoms
- Family history

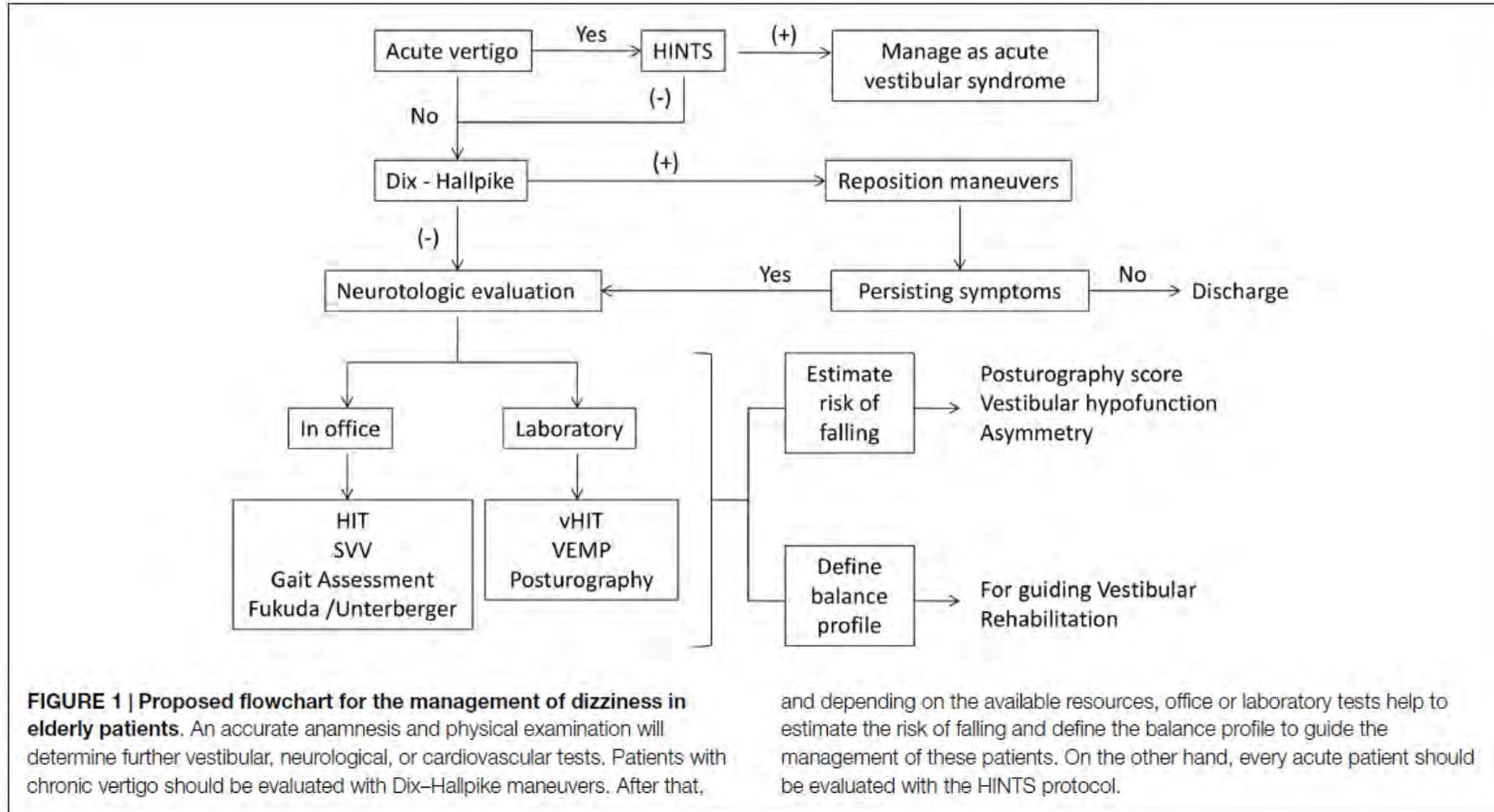
Onset

Acute

Acute

- Sudden onset of vertigo
 - Timing:
 - <1 minute- benign paroxysmal positional vertigo
 - Greater than 20 mins-
 - Meniere's disease- not typical to have an onset in later age
 - Vestibular neuritis
 - Labyrinthitis
 - Stroke
 - Concussion/mTBI

Vestibular or Stroke?



HINTS= Head Impulse, Nystagmus, Test of Skew

- This bedside test has been adopted by many clinics and Emergency Departments
- The combination of tests yields a high sensitivity and specificity of an acute vestibular disorder
 - Kattah, et al (2009) showed 100% sensitivity and 96% specificity for detecting stroke compared to vestibular lesion when used in this battery

Head Impulse Test (HIT) or bHIT

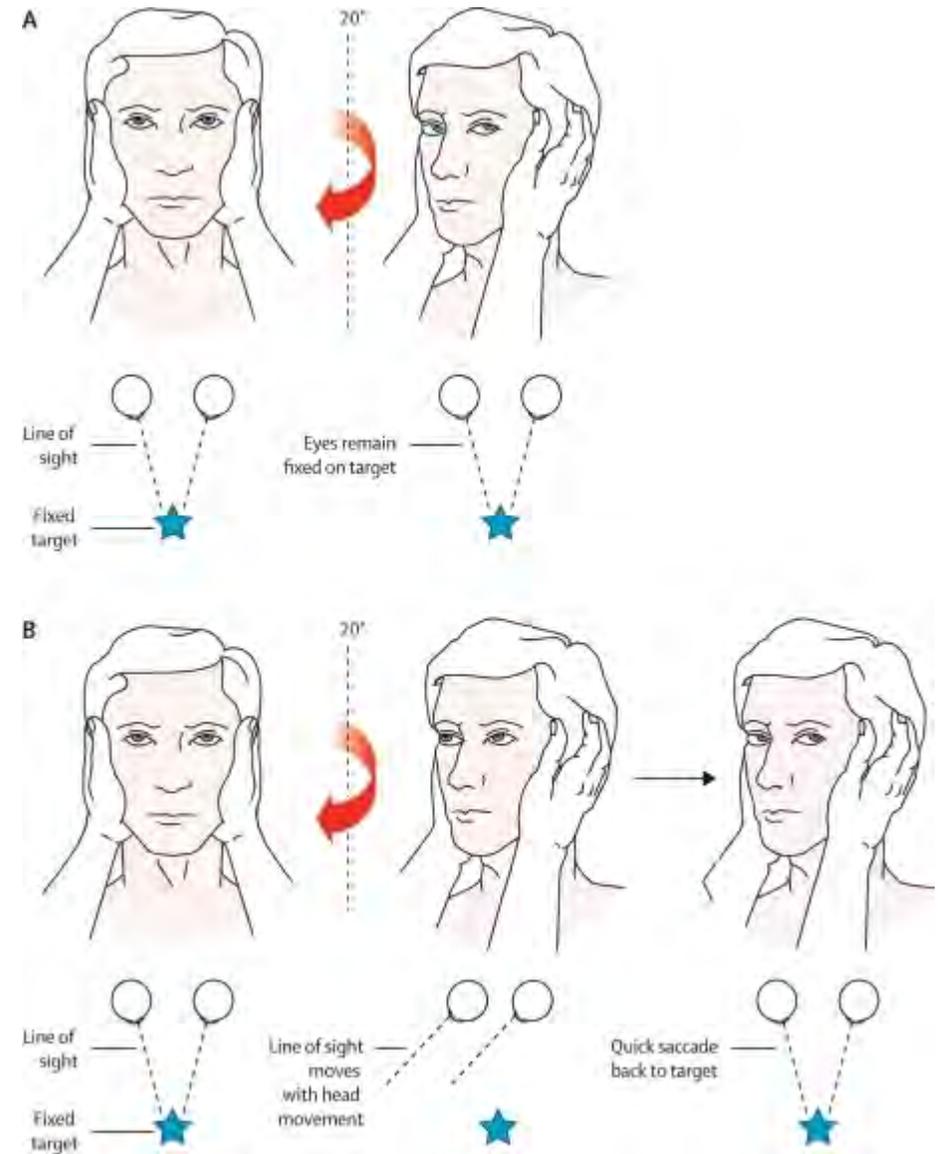
- Indicates unilateral vestibular impairment
 - Compensated slow phase with a corrective saccade (catch-up)
 - Patient stares straight ahead and clinician turns their head in a brief, quick movement
 - If the vestibulo-ocular reflex (VOR) is impaired, there will be a catch-up saccade
 - (Perez & Rama-Lopez, 2003)
- According to Perez & Rama-Lopez (2003), specificity is 97-100%, and sensitivity is 34-39%
- According to Jorns-Haderli et al (2007), when HIT is completed by an expert, sensitivity is 63.3% and specificity is 77.8%. When completed by a non-expert, sensitivity is 71.7% and specificity is 64.2%.

Head Impulse Test (HIT) Technique

- Hold the side of the patient's head
- The patient is instructed to stare at your nose
- Tilt head down 30 deg
- Turn the patient's head 15-20 degrees from midline
- Quickly jerk head back
- The clinician watches the patient's eyes for corrective saccades



Head Impulse



Head Impulse Test (HIT) Results

- Tests the horizontal canal
- If you see a corrective saccade it means the patient has an uncompensated vestibular pathology- can show unilateral and bilateral lesions
- The patient will need a vestibular evaluation and VRT



Nystagmus

- Peripheral

- Alexander's law states that the amplitude of the nystagmus will increase if the gaze deviates to the direction of the fast phase
 - Example- Vestibular Neuritis Right ear (left ok)- get left beating nystagmus
 - Looking straight ahead- left beating nystagmus – fast phase in direction of intact ear
 - Look to the right- nystagmus decreases or eliminates
 - Look to the left- nystagmus increases

- Central

- Vertical nystagmus
- Direction change nystagmus
- Failure of fixation

Test of Skew

- Skew predicts brainstem involvement (Kattah, 2009)
- Then perform as with Alternate Eye Cover Test
 - Alternately cover one eye and then the other
 - If there is a vertical gaze correction with an eye it would be abnormal-central
 - You Observe for quick vertical gaze corrections (abnormal-central)
 - **Dorsolateral medulla**- one eye remains at center, the other deviates up
 - **Midbrain tegmentum**- simultaneous deviation of one upward and the other eye deviates down.

HINTS

- If any one of the 3 shows a central finding, then refer for immediate medical management.

	Peripheral	Central
HIT	Corrective saccade	No saccades
Nystagmus	Alexander's law	Vertical or direction changing
Skew	No deviation	Vertical deviation

Also ask about hearing loss

If peripheral

- Vestibular neuritis
- Labyrinthitis – if hearing loss is involved

- Refer for vestibular testing
- After confirming, vestibular rehabilitation therapy

