

Primary Care Evaluation of Dizziness

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With a plethora of possible etiologies, dizziness remains a diagnostic and therapeutic challenge for health care providers. This article guides clinicians through a comprehensive approach to evaluating and managing this common but elusive condition.

A 72-year-old man with a history of hypertension, rheumatoid arthritis, and benign prostatic hypertrophy presented to the emergency care unit (ECU) of the VA Salt Lake City Health Care System, Salt Lake City, UT, reporting sudden onset of an intense spinning sensation the day before. It had begun while he was driving his car, and the sensation was so intense that he had pulled the car over and asked his friend to drive. At the time, he was experiencing no other new health problems. When the condition persisted the next day, interfering with his ability to walk, he sought medical attention.

The ECU staff interviewed the patient, who said he had experienced no blurred vision, diplopia, nausea, vomiting, chest pain, dyspnea, palpitations, or urinary symptoms. Physical examination showed normal blood pressure (without orthostatic hypotension), normal cranial nerves II to XII, normal visual fields, and no nystagmus.

Given the sudden onset of his symptoms, the clinicians ordered an urgent computed tomography (CT) scan of the brain. The findings raised suspicion of a neoplasm. Subsequent magnetic resonance imaging (MRI) supported this suspicion, showing strong evidence of a neoplasm

within the medial, parieto-occipital region of the right hemisphere. Brain biopsy revealed glioblastoma multiforme. Shortly after this procedure, the patient was transferred to the care of hospice nurses.

Dizziness is a common problem, particularly among elders. U.S. physicians report more than five million patient visits for dizziness or vertigo each year,¹ and the prevalence in older adults has been reported to exceed 30%.² Since it is widespread, and life threatening etiologies (such as brain tumors) are rare, providers too often may be inclined to dismiss a patient report of dizziness without performing a thorough investigation into its root causes. As the case described here illustrates, however, such reports merit a detailed history, physical examination, and diagnostic testing.

Even when appropriate efforts are made, getting to the bottom of dizziness can be extremely difficult.² Dizziness, as a broad category of sensations, has many diverse etiologies, and patients often have trouble describing their symptoms precisely. These challenges may be amplified in the veteran population, in which chronic diseases that can confound the diagnosis are common. Furthermore, even when the causes are considered benign, chronic dizziness can compound the hazards faced by the large proportion of veterans who already suffer from visual impairment (such as macular degeneration or ret-

inopathy) or diabetic neuropathy by increasing the risk of falls, decreasing physical activity, and impairing social interactions.

In order to help primary care providers build a more comprehensive understanding of this clinical challenge, this article reviews the various subtypes of dizziness and their common causes, describes the key factors involved in evaluating patients who report dizziness, and outlines a comprehensive approach to treatment—all with a particular focus on the geriatric population.

TERMINOLOGY

Understanding the language patients use to describe feelings of dizziness is the first task in getting to the root of the problem. Although the *Merriam Webster Medical Dictionary* defines dizziness specifically as “a sensation of unsteadiness accompanied by a feeling of movement in the head,”³ the term tends to be used generically to describe a range of sensations, including those which are referred to clinically as vertigo and presyncope. In order to pinpoint the subtype of dizziness, the astute clinician must listen closely to the patient’s report, asking questions when necessary to elicit a more detailed description.

Vertigo

True vertigo is the false sensation that the body or the environment is moving. Patients who’ve experienced vertigo commonly describe this phe-

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nomenon as a sensation of spinning, tumbling, or falling (forward or backward) or a feeling that the ground is rolling. The presence of such symptoms suggests a disturbance in the vestibular system.

Presyncope

Presyncopal light-headedness usually is described as a feeling of impending faint. In most cases, it results from diffuse temporary cerebral ischemia, orthostatic hypotension, vasovagal episode, or cardiac arrhythmia.

Disequilibrium

Patients typically describe this sense of postural instability as involving the legs and trunk but not the head. Generally, it's attributed to neuromuscular problems, ototoxicity, peripheral neuropathy, cerebrovascular accident, or cerebellar atrophy.

Other subtypes of dizziness

Multisensory dizziness results from the partial loss of multiple sensory systems, as may occur in diabetes mellitus or aging. Physiologic dizziness is a sensory conflict caused by an unusual combination of sensory signals, as can occur in motion sickness and height vertigo. Ocular dizziness is a visual-vestibular mismatch caused by impaired vision, a change in magnification, or oculomotor paresis. Psychophysiologic dizziness results from impaired central integration of sensory signals, as is experienced in anxiety disorder, panic attacks, and phobias.^{2,4}

UNDERSTANDING THE ETIOLOGIES

The major causes of dizziness can be classified generally as peripheral, central, or systemic (Table 1).^{2,4-8} Keeping these categories in mind while eliciting the history, performing appropriate examinations, and gather-

ing screening studies helps in both diagnosing and treating the patient.

Prior research has examined the frequency of causes of dizziness in various populations. In a review of four prospective studies on dizziness, the researchers found three diagnostic groups—peripheral vestibular disorders, multiple sensory deficits, and psychiatric disorders—to account for more than 75% of the final diagnoses.⁴ While this information is helpful in guiding clinical suspicion, it should not blind providers to other causes, some of which may be more prevalent in specific patient groups. For example, while benign paroxysmal positional vertigo (BPPV), a peripheral vestibular dysfunction, is particularly common among elders, this population also is prone to disequilibrium from central vestibular conditions, such as brain stem or cerebellar ischemia.⁹

In a study of 50 patients aged 60 and older with dizziness of long dura-

Three vestibular disorders are frequent causes of peripheral vertigo: BPPV, Ménière syndrome (also referred to as endolymphatic hydrops), and labyrinthitis (also known as neurolabyrinthitis).¹² BPPV is defined by brief attacks of rotational vertigo and rotary-linear nystagmus, which are precipitated by rapid extension and by lateral head tilt toward the affected ear.¹³ Usually, BPPV is caused by abnormal activation of the posterior semicircular canal by calcium carbonate particles, which are normally found in the utricle and saccule.¹⁴ Ménière syndrome is characterized by tinnitus, unilateral sensorineural hearing loss, and vertigo.¹⁵ It is associated with an increase in endolymphatic fluid, which causes a distortion in the entire inner canal system.¹⁵ Labyrinthitis, in which the labyrinth of the inner ear becomes inflamed, may cause acute onset of continuous, usually severe, vertigo that lasts several days or weeks. It frequently fol-

Dizziness can indicate a number of life threatening conditions.

tion (a median of one year), Lawson and colleagues found that 28% had a cardiovascular diagnosis, which was predicted by the presence of syncope ($P < .001$), dizziness described as lightheadedness ($P < .001$), the need to sit or lie down while experiencing symptoms ($P < .001$), pallor with symptoms ($P < .001$), and the precipitation of symptoms by prolonged standing ($P < .05$). Another 18% of patients were found to have a peripheral vestibular disorder, and 14% had a central neurologic disorder. In 22% of the cases, no attributable cause was found.^{10,11}

lows an upper respiratory infection. Labyrinthitis is associated commonly with tinnitus and hearing loss.⁵

Dizziness can indicate a number of life threatening conditions, including arrhythmia; acute ischemic cardiac disease; acute infection, such as pneumonia or sinusitis; transient ischemic attack; cerebrovascular accident; gastrointestinal bleeding; intracranial mass lesion, such as an acoustic neuroma, a subdural hematoma, or a malignant tumor (as in the case of the patient described earlier in this article); and exposure to certain toxins, such as carbon mon-

Table 1. Major causes of dizziness^{2,4-8}

Peripheral causes	Central causes	Systemic causes
<ul style="list-style-type: none"> • Benign paroxysmal positional vertigo • Posttraumatic vertigo • Peripheral vestibulopathy <ul style="list-style-type: none"> — Labyrinthitis — Vestibular neuronitis • Vestibulotoxic drug-induced vertigo <ul style="list-style-type: none"> — Aminoglycosides • Ménière syndrome • Inflammatory labyrinthitis <ul style="list-style-type: none"> — Syphilis — Vasculitis • Other focal peripheral disease <ul style="list-style-type: none"> — Otitis media — Cholesteatoma — Tumor 	<ul style="list-style-type: none"> • Brainstem ischemia or infection <ul style="list-style-type: none"> — Multiple sclerosis • Cranial neuropathy with focal involvement of the eighth nerve • Intrinsic brainstem lesions <ul style="list-style-type: none"> — Tumor — Arteriovenous malformation • Seizure disorder in the temporal lobe • Migraine headache • Heredofamilial disorders <ul style="list-style-type: none"> — Friedreich ataxia — Olivopontocerebellar atrophy 	<ul style="list-style-type: none"> • Adverse effects of prescription drugs <ul style="list-style-type: none"> — Anticonvulsants — Hypnotics — Antihypertensives — Analgesics — Tranquilizers • Alcohol • Infectious diseases <ul style="list-style-type: none"> — Meningitis — Pneumonia • Endocrine disease <ul style="list-style-type: none"> — Diabetes mellitus — Hypothyroidism • Vasculitis <ul style="list-style-type: none"> — Drug-induced vasculitis — Giant cell arteritis — Systemic lupus erythematosus • Other systemic conditions <ul style="list-style-type: none"> — Anemia — Paget disease of the bone — Systemic toxins

oxide (Table 2).^{2,4-8} Some metabolic causes of dizziness may be life threatening, such as hypoglycemia, electrolyte disturbances, thyrotoxicosis, and anemia (Table 3).^{2,4-8} Many of these conditions are treatable, but prompt diagnosis is essential. Other important potential causes that are treatable include: psychophysiologic disorders, such as panic attack or acute anxiety; adverse drug effects; migraine headaches; eighth nerve vascular compression; and perilymphatic fistula (Table 4).^{2,4-8,16}

Medical advances have led to the identification of additional causes of dizziness in recent years, such as superior semicircular canal dehiscence. This entity, for which an incidence figure has yet to be established, in-

volves the production of sound- or pressure-induced vestibular symptoms caused by dehiscence of bone over the superior semicircular canal on the floor of the middle cranial fossa.¹⁷ This condition may be treated through a surgical procedure that is relatively straightforward for an experienced ear, nose, and throat (ENT) specialist.

DIAGNOSTIC EVALUATION

A comprehensive approach to evaluation can help clinicians differentiate between peripheral, central, and systemic causes of dizziness. A thorough patient history, detailed physical examination, and appropriate laboratory tests and imaging studies will guide medical providers in diagnosis and treatment.

Essentials of the dizziness examination

The physical examination for patients reporting dizziness—especially elders and those with comorbidities—should include ENT, cardiac, and neurologic evaluations and a check for orthostatic hypotension. A minimal neurologic exam involves the Romberg test, an evaluation of gait, and observation for the presence of nystagmus.⁷

Nystagmus is involuntary rhythmic movement of the eyes. When it is pendular (to-and-fro movements about equal in amplitude and speed), nystagmus usually is due to a problem of central vision. Jerk nystagmus (that which has slow and quick components) is typically a sign of vestibular disease—and, in fact, may be

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Table 2. Life threatening conditions that can cause dizziness^{2,4-8}

- Acute ischemic heart disease
- Acute infection
 - Pneumonia
 - Sinusitis
- Cardiac arrhythmia or ischemia
- Cerebrovascular event
- Gastrointestinal bleeding
- Intracranial mass lesion
 - Acoustic neuroma
 - Subdural hematoma
 - Tumor
- Neurosyphilis (can cause meningovascular disease and general paresis)
- Orthostatic hypotension (can cause falls and fractures)
- Toxin exposure
 - Carbon monoxide poisoning

the only objective sign of vestibular dysfunction.¹⁶ Positional nystagmus and vertigo are produced by a sudden change in head position. The patient with positional vertigo usually reports symptoms that are brought on by such actions as lying back in bed, turning the head while supine, rising from bed, bending over, or looking upward—but are absent while the patient is stationary. The Nylen-Barany maneuver is intended to replicate the patient's symptoms, elicit positional nystagmus, and determine whether the nystagmus is fatigable.^{6,16,17}

To perform the Nylen-Barany maneuver, situate the patient in a sitting position on the examination table with his or her head turned to the right about 45°. Next, quickly lower the patient to the supine position with his or her head hyperextended about 10° over the edge of the table while supporting the head and neck.

Watch for nystagmus for 30 seconds. Repeat these steps with the head turned to the left. If nystagmus occurs, note the characteristics and time of onset (relative to the start of the maneuver), the direction of eye motion, the nature of associated symptoms (such as nausea), and fatigability on repeated testing. Peripheral vertigo usually occurs three to 20 seconds after positional change, lasts less than one minute, and is markedly fatigable with nystagmus that is upward and torsional toward the abnormal ear. Nystagmus of central origin usually occurs immediately, persists longer than one minute, doesn't fatigue with replication, and can change with head position.¹⁶ A similar test, called the Dix-Hallpike, can also be used to evaluate nystagmus.⁵

Vertigo arising from central lesions tends to develop gradually and then become progressively more severe and debilitating. Warning signs of possible central nervous system disease include: the presence of focal neurologic signs, such as diplopia, dysarthria, dysphagia, visual field loss, or hemisensory or hemimotor disturbance; ataxia and nystagmus out of proportion to vertigo; direction changing nystagmus or pure vertical (upbeating or downbeating) nystagmus; and other eye movement abnormalities.^{7,16} The absence of such signs does not necessarily rule out central nervous system problems, however. The patient in the case example, for instance, experienced vertigo arising from a central lesion, but the location and size of the tumor did not lead to nystagmus or other neurologic signs on examination.

It's also important to check for orthostatic hypotension—especially in elderly patients, among whom the condition is common and frequently arises from a combination of several factors, such as the aging process

Table 3. Potentially life threatening metabolic conditions that can cause dizziness^{2,4-8}

- Anemia
- Electrolyte disturbances
 - Dehydration
- Hypoglycemia
- Thyrotoxicosis

and medication effects. Physiologically, this condition occurs when prolonged standing or severe dependent varicosities lead to venous pooling, preventing the return of blood to the heart and lowering cardiac output. If unchecked, this can lead to micturition syncope. When evaluating elders who report dizziness, the presence of orthostatic hypotension combined with a possible cause for volume deficit should raise suspicion for either decreased intravascular volume (due to hemorrhage) or fluid and electrolyte loss (secondary to heat exposure, diuretics, or gastroenteritis).⁶⁻⁸

Laboratory tests and imaging studies

Laboratory tests can help the clinician identify systemic causes of dizziness. Particularly useful tests include: a complete blood count (to check for anemia or infection), metabolic panel (to evaluate the patient for diabetes and dehydration), and thyroid stimulating hormone levels (to identify hypothyroidism and thyrotoxicosis). Because dizziness can be secondary to neurosyphilis, consider the fluorescent treponema antibody-absorbed serologic test; nontreponemal tests may be negative in tertiary syphilis.⁶⁻⁸

The presence of presyncopal light-headedness requires complete cardiovascular diagnostic testing, including

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cardiac stress testing and Holter monitoring—the same procedures that a patient reporting syncope would undergo. Patients with cerebrovascular symptoms should undergo brain imaging and carotid Doppler ultrasound.⁶⁻⁸

Abnormal results of the neurologic exam should prompt imaging tests, such as CT and MRI, as should severe vertigo. In the case example, the examining physician felt that the patient's intense and sudden vertigo warranted an urgent CT scan to rule out stroke and other similar conditions, even though his neurologic exam was normal. This precaution turned out to be wise, since the CT suggested—and a subsequent MRI confirmed—a brain mass. Abnormal imaging results can help the clinician determine whether the patient requires hospital admission or referral to a specialist (such as a neurosurgeon or neurologist).

An audiologic evaluation can be useful in evaluating vertigo. Typically, there is no audiometric abnormality in the most common forms of peripheral vertigo (BBPV and peripheral

concerns (such as acoustic neuroma) should be made to the audiologist.

For concerns with persistent vertigo, cholesteatoma, or acoustic neuroma, consultation with an ENT specialist is needed. Since the evaluation of central audiovestibular dysfunction requires audiology tests and brain imaging, primary care providers may wish to consult ENT to determine the need for a particular imaging procedure.⁶⁻⁸ An ENT evaluation might include an MRI, electronystagmography (a series of tests that help clarify the type of nystagmus by documenting its characteristics), and posturography (testing a patient's ability to maintain balance). If superior semicircular canal dehiscence is suspected, a high resolution bone-algorithm CT in the coronal plane should be performed.¹⁷

Reviewing the medication profile

After ruling out critical causes of dizziness, adverse drug effects from newly prescribed medications or drug interactions must be considered. A population-based, cross-sectional

Table 4. Other treatable conditions that can cause dizziness^{2,4-8}

- Acute anxiety or panic attack
- Acoustic neuroma
- Adverse drug reactions
- Benign paroxysmal positional vertigo
- Carotid sinus syndrome or vasovagal conditions
- Cervical osteoarthritis
- Physical deconditioning
- Depression
- Eighth nerve vascular compression
- Hypertension or hypotension
- Hypoglycemia
- Infection
- Migraine headache
- Perilymphatic fistula
- Superior semicircular canal dehiscence

Resources such as pharmacists, pharmacologists, and electronic references can help primary care providers identify potential drug interactions that could cause dizziness. In VA medical centers, for instance, the computerized patient record system automatically alerts the user to polypharmacy and critical drug interactions as prescriptions are entered into the system.

PROGNOSIS

Research at the neurology clinic of the University of California, Los Angeles showed that, among 116 geriatric patients aged 70 and older, who were evaluated consecutively for dizziness, the mean duration of symptoms was 36.2 months.⁹ For geriatric patients who, in all likelihood, are being treated already for other chronic diseases, an average of three years of dizziness can be burdensome as well as increase the risks of falls and injuries substantially. In the study of chronic dizziness by Lawson and colleagues

A population-based, cross-sectional study published in 2000 revealed a strong correlation between dizziness and the number of medications the patient was taking.

vestibulopathy). There are, however, typical patterns of hearing loss in acoustic neuroma (high-frequency), Ménière syndrome (low-frequency), and a variety of middle ear disorders.^{5,16} At VA medical centers, where there is usually a high demand for audiology services, requests for urgent

study published in 2000 revealed a strong correlation between dizziness and the number of medications the patient was taking, which persisted after adjustment for several relevant markers and indicators of illness.¹⁸ Polypharmacy is particularly prevalent among elderly patients.¹⁹

described earlier, 46% of the patients reported syncope or falls.¹⁰

Some research has suggested that dizziness might be part of a syndrome, rather than a single symptom, in some geriatric patients. In a study of 1,087 community living patients who were at least 72 years old, Tinetti and Williams found that 261 (24%) reported dizziness. Of these, 146 (56%) described several different sensations, and 193 (74%) reported multiple triggering activities. This, combined with the multiplicity of etiologic factors, led the authors to speculate that “dizziness may be a geriatric syndrome, similar to falling, delirium and incontinence.”¹⁸

Interestingly, two population-based studies have found that dizziness is not an independent predictor of institutionalization, death, or functional decline.^{10,11} Nevertheless, even “benign” dizziness can take its toll. Researchers have found that many people with dizziness who are given a good prognosis report symptom-related fears, depressed mood, or great impairment of daily activities.^{8,20,21}

MANAGEMENT ISSUES

In order to provide the best care for patients with dizziness, it's important to take an active approach that, ideally, is based on the category and the specific etiology of dizziness. While some of the underlying causes of dizziness, once identified, can be managed successfully with established therapies, others are more elusive. And for the relatively large percentage of patients with chronic symptoms in whom a precise cause is not identified, treatment may be particularly challenging. One indication of the lack of progress in treating chronic, refractive dizziness is the fact that a recent review article on dizziness published in a major journal discussed the use of such unproven,

nontraditional remedies for dizziness as acupuncture, ginger root, and rocking chair therapy.²

If laboratory testing indicates a systemic cause of dizziness (such as anemia or hypothyroidism), the condition should be treated appropriately. Orthostatic hypotension is often a symptom of dehydration, which

sants (such as antihistamines and anticholinergics), antiemetics, or sedatives. Keep in mind, however, that elderly patients may be more susceptible to the sedating effects of all of these medications.

Psychological causes of dizziness, such as panic attacks, can be debilitating and shouldn't be overlooked.

Many people with dizziness who are given a good prognosis report symptom-related fears, depressed mood, or great impairment of daily activities.

may require intravenous fluids. Cardiology studies (such as electrocardiography) may reveal arrhythmias, which require appropriate treatment and possible hospital admission.^{4,16,17}

If the history and examination are consistent with BPPV, further evaluation and treatment by specialists may be required. At the Salt Lake City Health Care System, physical therapists will accept urgent referrals of patients with the probable diagnosis of BPPV for evaluation and treatment with positional exercises if needed. Since BPPV is caused by canalith displacement, maneuvers that reposition these canaliths, such as the traditional Epley maneuvers, are an important component of treatment.²² In addition, patients with BPPV or chronic dizziness from other causes usually benefit from vestibular rehabilitation, which traditionally is performed by physical therapists—though some facilities have primary care nurses who have been trained specifically to provide these services.²³ Treatment of significant vertigo can include medications such as labyrinthine suppres-

Generally, they can be treated successfully with antidepressants.¹⁶

Patients with undiagnosed vertigo or suspected otologic involvement should be referred to an ENT specialist. These specialists can diagnose and surgically treat unusual causes of vertigo—such as superior semicircular canal dehiscence. Canal dehiscence is treated surgically by resurfacing with calcium phosphate bone cement.¹⁷ Patients with evidence of neurologic causes, such as multiple sclerosis or a tumor (as in the case example), require prompt consultation.

Regardless of the etiology, patients troubled with chronic dizziness may benefit from a battery approach to management.^{6,12} For the primary care provider, this can include one or more of the following:

- evaluating the patient's medication regimen;
- teaching the patient vestibular exercises;
- referring the patient to physical therapy for both disequilibrium therapy and motor strengthening exercises;

- referring the patient for an occupational therapy evaluation to determine the necessity of home safety devices, such as bathroom railings and night-lights;
- referring the patient to an optometrist or ophthalmologist for an evaluation of visual function;
- assessing the need for treatments aimed at maintaining adequate cardiovascular perfusion, such as compression stockings to avoid venous pooling in patients with varicose veins or venous insufficiency;
- educating the patient on strategies for preventing dehydration, such as replacing caffeine with water;
- assessing the patient for and treating psychological problems; and
- telling patients about web sites such as the National Institute on Deafness and Other Communication Disorders (www.nidcd.nih.gov) and about using search engines to find educational materials and national organizations for Ménière syndrome, tinnitus, and acoustic neuroma.

A PROACTIVE APPROACH

In the 21st century, there is much we still have to learn about the origins and nature of dizziness. As technology continues to advance, however, we can expect to have an expanding armamentarium of diagnostic tools at our disposal. Further research must be encouraged and results must be analyzed in order to build a stronger foundation for consensus guidelines. In the meantime, primary care providers should thoroughly evaluate each patient with dizziness, using a comprehensive approach to discover the etiology and develop an appropriate treatment plan. In this way, we can decrease the hazards faced by patients who experience dizziness,

as well as improve their physical and emotional well-being. ●

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