Diagnosing Dizziness: We Are Teaching the Wrong Paradigm!

Dizziness is common and can be caused by scores of diseases and conditions that involve nearly every system in the body. Many causes are trivial, but a substantial minority of dizzy patients presenting to an emergency department (ED) have dangerous, treatable cardiovascular, cerebrovascular, and other diseases. This is classic emergency medicine: we must identify the few patients (with any given complaint) with serious problems among the larger group with benign ones.

However, unlike many chief complaints, dizziness seems to be especially vexing. The approach to patients with dyspnea or chest pain seems more straightforward. Why do most physicians feel more comfortable assessing these patients compared to dizzy ones? It is not just the numerous potential causes of dizziness; this is also true for these other chief complaints. Dyspnea could be due to various pulmonary or cardiac problems, but also from anemia or early sepsis or salicylate toxicity.

I believe that the problem with diagnosing dizziness is that we are taught (and are teaching) the wrong diagnostic paradigm. The traditional paradigm uses “symptom quality”—the type of dizziness that the patient endorses—to drive the subsequent work-up. We are taught to ask, “What do you mean, dizzy?” The patient’s response of “vertigo,” “lightheadedness” or “near faint,” “disequilibrium,” or “other,” then determines the differential diagnosis, testing, and treatment. This symptom quality paradigm dates back to research done 45 years ago.

An important article in 1972, to a modern eye, it has serious methodologic flaws. Over a 2-year period, the authors recruited only 125 dizzy patients who were evaluated in a dizziness clinic. Patients had to be available to return on 4 separate days of testing by a resident. Thirty of the 125 patients were excluded. A single investigator assigned a final diagnosis without any independent verification or long-term follow-up, and of course, brain imaging did not exist back then. The symptom quality approach can only work if three essential components are true: 1) patients reliably and consistently distinguish one type of dizziness from another, 2) patients endorse only one type at a time, and 3) the dizziness type truly correlates with a given list of possible diagnoses. Each of these components is demonstrably false.

When dizzy patients were asked a series of questions about their dizziness type, and then reasked the same questions in a different sequence 10 minutes later, over 50% of patients changed their dizziness type. Many simultaneously endorsed multiple dizziness categories. In other studies, patients with benign paroxysmal positional vertigo (BPPV—the prototypical vestibular disorder, which “should” cause “vertigo”) often endorse lightheadedness (and not vertigo), and 37% of patients with cardiovascular causes of dizziness complain of vertigo (not lightheadedness). Finally, older ED dizzy patients’ use of the term “vertigo” as opposed to “dizziness” or “lightheadedness” does not correlate with a stroke diagnosis.

Using the symptom quality approach in dizziness is akin to diagnosing a chest pain patient by asking, “What do you mean, chest pain?” Although “tearing” suggests aortic dissection, “pressure” myocardial ischemia, and “sharp” perhaps pleural or muscular inflammation, other elements of the history and examination are far more important. Is the chest pain intermittent or persistent? Do eating, exertion, or chest wall movement trigger it? Is it associated with fever and cough or leg pain and hemoptysis? On examination, are there unilateral diminished breath sounds and distended neck veins?

So rather than base the evaluation of a dizzy patient purely on the symptom quality, using this same “timing and triggers” approach (that we use for every other chief complaint) is far more logical. In the same study in which patients changed their dizziness type 50% of the time, they were far more consistent about dizziness timing and triggers. Four timing and triggers patterns emerge:

- Acute vestibular syndrome (AVS)—abrupt onset of persistent dizziness lasting days to weeks. The important differential diagnosis is vestibular neuritis/labyrinthitis versus posterior circulation stroke.
- Chronic vestibular syndrome (CVS)—prolonged dizziness lasting weeks, months, or longer. This is usually due to drug side effects or psychiatric disease but can be due to slow-growing posterior fossa masses.
- Episodic vestibular syndrome (EVS)—intermittent episodes that arise spontaneously (no triggering by

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head or body movement) that usually last minutes to days. The primary differential diagnosis is vestibular migraine versus posterior circulation TIA.

- Triggered vestibular syndrome (TVS)—brief episodes of dizziness usually lasting <1 minute that are triggered by head movement, change in body position, or some other specific event. This is usually BPPV or orthostatic hypotension of any cause.

Posterior circulation stroke patients often present with AVS. Vestibular neuritis (think: Bell’s palsy of the vestibular nerve) or labyrinthitis (if both components of the eighth cranial nerve are involved) are the commoner and more benign causes of AVS. Distinguishing stroke from neuritis or labyrinthitis is crucial so that the underlying stroke mechanism can be diagnosed and so that proper monitoring and treatment can take place.

The difficulty in making this distinction leads to misdiagnosis.

We have incomplete knowledge about the frequency and reasons for misdiagnosis of stroke in dizzy patients, but here is what we do know: about 10% of patients with cerebellar stroke present with symptoms that mimic vestibular neuritis. A posterior stroke patient can have a NIH stroke scale of zero. Of elderly ED patients presenting with dizziness who had an ultimate diagnosis of stroke, the emergency physician made a wrong diagnosis in 35% of cases. In another study of all patients discharged from a California ED with a benign dizzy diagnosis, 1 in 500 were readmitted with a cerebrovascular diagnosis in the ensuing months (much higher than the readmission rate for cardiovascular diagnoses). In a German ED, neurologists made incorrect diagnoses in dizzy ED patients in 44% of cases.

I believe that the common link in all these studies is that doctors are using the wrong diagnostic paradigm to diagnose dizzy patients. Using the traditional paradigm, distinguishing stroke and nonstroke causes of AVS is also expensive. Academic Emergency Medicine recently published a study showing that the financial cost for ED patients with AVS is rising over time, in part driven by neuroimaging. The overwhelming majority of the imaging is by CT, whose sensitivity for posterior circulation stroke is low and (as we see when increasing numbers of patients) getting lower.

Is the answer to perform more MRIs? MRI is clearly a better test for posterior circulation stroke, but it is expensive and often unavailable, and it too misses as many as 12% of posterior circulation strokes in the first 48 hours. Real-time neurology consultation is also often unavailable. Hospital admission (the most expensive of all these steps) will become increasingly discouraged with attempts to ratchet down health care costs. So the answer may be more MRIs (and fewer CTS), but it only makes sense if we target which patients may benefit from MRI.

Research shows that increasing age, focal neurologic signs, and “imbalance” or “ataxia” (not “vertigo”) correlate with an increased likelihood of finding a serious central nervous system cause in acutely dizzy ED patients. One study suggested that higher ABCD2 score (originally developed as a risk assessment tool for predicting stroke in TIA patients) predicted higher likelihood of a stroke etiology in dizzy patients. Given the original intent of the score, this is not surprising.

In this issue of Academic Emergency Medicine, Newman-Toker and colleagues report that “HINTS” better predicted stroke etiology of dizzy patients than the ABCD2 score. HINTS is a battery of bedside oculomotor tests—Head Impulse test (HIT), dangerous Nystagmus, and Test of Skew. The study was performed by neurootologists. Although the use of HINTS has not been validated in the general setting, I have been using these tests for several years, and believe that emergency physicians can learn how to perform and interpret them. Preliminary work also suggests that goggles with infrared sensors can automate the interpretation of the HINTS tests. It is not surprising that physical examination, which directly tests brainstem and cerebellar function, should better predict a stroke compared to the ABCD2 score, which is based on blood pressure and historical and epidemiologic data.

Practitioners should be aware of one caution regarding the HIT. Unlike most tests (in which a “positive” response is the pathologic or “bad” result), a positive HIT signifies a peripheral cause and is a “reassuring” finding. It is therefore important that doctors only use the HIT in patients with AVS. If one were to perform the HIT on a patient with appendicitis, or with dehydration or dizziness from a benzodiazepine, it would likely be “negative,” that is, worrisome for stroke. This brings us back full circle to the concept of timing and triggers. The timing and triggers category not only suggests a differential diagnosis, but also guides the testing and the interpretation of those tests. The HIT should only be done in the population of patients with AVS.

I have found in routine practice that this new paradigm based on timing and triggers allows me to more frequently make a specific diagnosis in dizzy patients compared to the traditional symptom quality approach. I call this new approach ATTEST:

A—Associated symptoms (are there co-chief complaints or abnormal vital signs that suggest a given diagnosis or group of diagnoses, e.g., dizziness plus fever, cough, and sputum production?).

TT—Timing and Triggers (using history, define the timing and triggers category as above, just as you would for a patient with chest pain; these categories will inform the differential diagnosis and therefore the high-yield elements of the physical examination and subsequent testing).

ES—Exam Signs (use the physical examination including a neurologic examination, testing the gait, and using the HINTS exam to try to clarify the diagnosis).

T—Testing (there will be many cases in which diagnostic ambiguity persists where other tests will be necessary, such as to rule out a pulmonary embolism or a cerebellar stroke).

Although the ATTEST approach has not been systematically tested or validated, I believe that it is more consistent with our current state of knowledge. I also believe that emergency physicians can learn it and that using this paradigm will help take the “vexing” out of
diagnosing dizzy patients in the ED. Armed with a more logical algorithmic approach, physicians will not only be more accurate in their diagnoses, but derive more satisfaction in the process.

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