

ED patients who are discharged from the ED with a peripheral vestibular diagnosis and subsequently readmitted with an acute stroke is very low, ranging from 0.14%–0.5%.^{28–31}

However, 3.3% of the approximately 130 million ED patients (per year, in the United States) have dizziness (total $n \approx 4.3$ million).⁶ Of those, roughly 82% are discharged (total $n \approx 3.5$ million).⁶ Applying these very low proportions to this very large number suggests that ~5000–17,500 patients per year are discharged with a peripheral vestibular diagnosis then later return with a stroke, some of whom were misdiagnosed at the first visit. A recent study of medicolegal cases related to dizziness reported that of 69 cases of alleged malpractice, 50 (72.5%) occurred in the ED or primary care settings (in roughly equal proportion) related to missed or delayed diagnoses of central nervous system pathology in nearly all (92.8%).³²

Among the subset of dizzy patients with AVS, the most common causes are vestibular neuritis (also referred to as acute unilateral peripheral vestibulopathy) and posterior circulation ischemic stroke; labyrinthitis is an uncommon peripheral cause.^{33–40} Approximately 10%–25% of cases of AVS are due to stroke, the vast majority of which are ischemic.^{8,39} In a study of over 5500 ED patients with dizziness, 27% had a CT scan done and 3% had magnetic resonance imaging (MRI), presumably in an attempt to avoid missing a stroke.⁴¹ Importantly, the sensitivity of CT for early-presenting acute ischemic stroke has been shown to be as low as 10%.⁴²

This low prevalence of stroke among all-comers with acute dizziness, coupled with the very low sensitivity of CT for ischemic stroke, underscores the limited diagnostic utility of CT for patients presenting with dizziness.^{7,8,43–49} Although CT is far more sensitive for intracerebral hemorrhage (ICH), ICH is an uncommon cause of patients presenting with *isolated* dizziness.⁵⁰ In this study of 595 ICH cases, only 13 (2.2%) presented with dizziness and a NIHSS of <2. All 13 patients had focal or global neurological symptoms or signs. Viewed from the opposite perspective, a pooled analysis of 126 AVS patients reported that five (4%) had ICH as a cause but only two of them (1.6%) presented with isolated dizziness.³⁹ As discussed in the implementation considerations, CT may be logical if the dizziness is *not isolated* or is associated with severe headache. However, while a positive CT in that setting is useful, a negative CT should not be reassuring.

In practice, CT is used far more frequently than MRI in the ED to attempt to diagnose or exclude stroke,⁴¹ but the results are rarely helpful.^{12,43} This represents an important knowledge gap among emergency clinicians.⁵¹ Patients with dizziness diagnosed with a benign diagnosis and then discharged from the ED after a negative CT at the index visit were 2.3 times more likely to return with a stroke within 30 days compared to patients who did not have a CT, suggesting that physicians correctly risk stratified for stroke but then relied on CT (the wrong test) to exclude it.⁵² It is clear that some of these patients suffer serious morbidity and mortality from this misdiagnosis,⁵³ but the proportion of misdiagnosed patients who are harmed (due to extension of the initial stroke, developing a second stroke, or complications from posterior fossa edema) has not been systematically studied.

It is worth noting that a decision to order a CT scan (despite its low accuracy) has multiple potential influences.⁵⁴ Evidence from ED clinician surveys suggests that individuals who rely on the traditional dizziness “type” schema for diagnosis are more likely to also rely on CT to rule out stroke, reinforcing that this may partially be a knowledge gap.⁵¹ However, the decision to order neuroimaging is likely also driven by other factors such as overreliance on technology relative to bedside examination,⁵⁵ a culture of blame,⁵⁶ medicolegal fears,^{54,57} or patient preferences.^{54,58}

Although MRI is far more sensitive than CT for acute ischemic stroke,⁴² it, too, has limitations. A meta-analysis found that MRI with diffusion-weighted imaging (DWI) missed 6.8% of ischemic strokes (within the first 72 h) and MRI-DWI-negative strokes were five times more common in posterior circulation events.⁵⁹ In patients specifically presenting with an AVS, early DWI-MRI (within 48 h of symptom onset) misses 10%–22% of strokes.^{36,60–62} and 50% of small-volume posterior fossa strokes, half of which were due to large-vessel disease.⁶²

Thus, dizziness is common, and a nontrivial minority of cases are caused by ischemic stroke. Furthermore, CT (the common “go-to” test in the ED) has poor diagnostic sensitivity for ischemic stroke. Although neuroimaging has its limitations in the diagnostic evaluation of acutely dizzy patients, the bedside examination can be very helpful. In the hands of neuro-otologists, the physical examination can accurately distinguish peripheral from central causes of AVS.^{33,36,38} However, many EDs do not have access to these subspecialists, even via telemedicine. Although systematic reviews and single-institution experience report that emergency clinicians in routine practice do not use these bedside tools, use them in the wrong patients, or perform or interpret the testing incorrectly,^{63–65} accumulating evidence also shows that emergency clinicians can successfully learn and apply these techniques.^{2,3,66}

A critical message of this guideline is that a training program that demonstrates durable skill acquisition needs to be developed and disseminated at scale so that emergency clinicians can become proficient and confident in performing these bedside ocular motor tests. This curriculum will likely need to combine didactic learning with generous use of video examples and real-time observation and feedback on technique either in person or virtually. It is also possible that this could be aided by more routine use of video-oculography (VOG; see “Conclusions and research needs” section for Question 1).

Evidence also shows that emergency clinicians are not using best practices to treat patients with BPPV with bedside canalith repositioning maneuvers such as the Epley maneuver, as recommended by two different BPPV guidelines, by the American Academy of Neurology (Level A recommendation) and the American Academy of Otolaryngology–Head and Neck Surgery (strong recommendation).^{67,68} Not recognizing or properly treating these benign conditions can result in unnecessary resource utilization, falls, injuries, lost work, medication side effects, increased recurrent rate, and diminished effectiveness of delayed therapeutic maneuvers.^{67,69–76} Although less serious than missing a stroke diagnosis, the number of patients affected is far larger. Confidently diagnosing BPPV