Dizzy but Dangerous; When Vertigo is Actually a Stroke

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Disclosures

- Clinical Advisor and Stock Options: Magnendo Corp
- Unrelated to the subject of this talk

What to do?

- 75 year old male, history of Diabetes and hypertension
- Acute onset vertigo (room-spinning sensation), persistent nausea and difficulty walking.
- No weakness, numbness or speech impediment

- Would you activate a stroke evaluation?

Learning Objectives

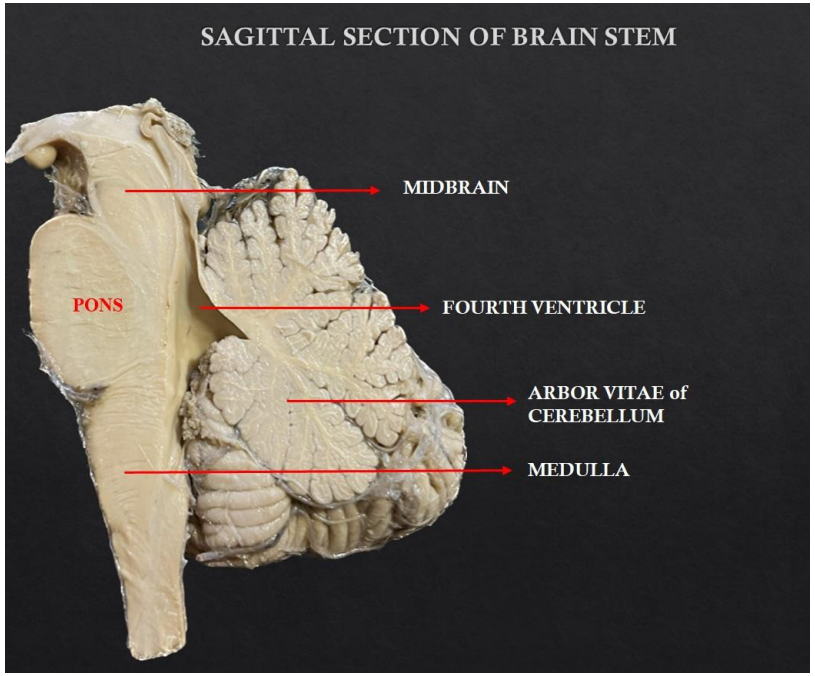
- Recognize key clinical features of posterior circulation stroke and distinguish them from common peripheral causes of acute vertigo.
- Identify bedside “red flags” for central pathology that should raise concern for posterior circulation stroke.
- Apply a structured approach to the dizzy patient to determine when urgent neurologic evaluation and stroke workup are warranted.

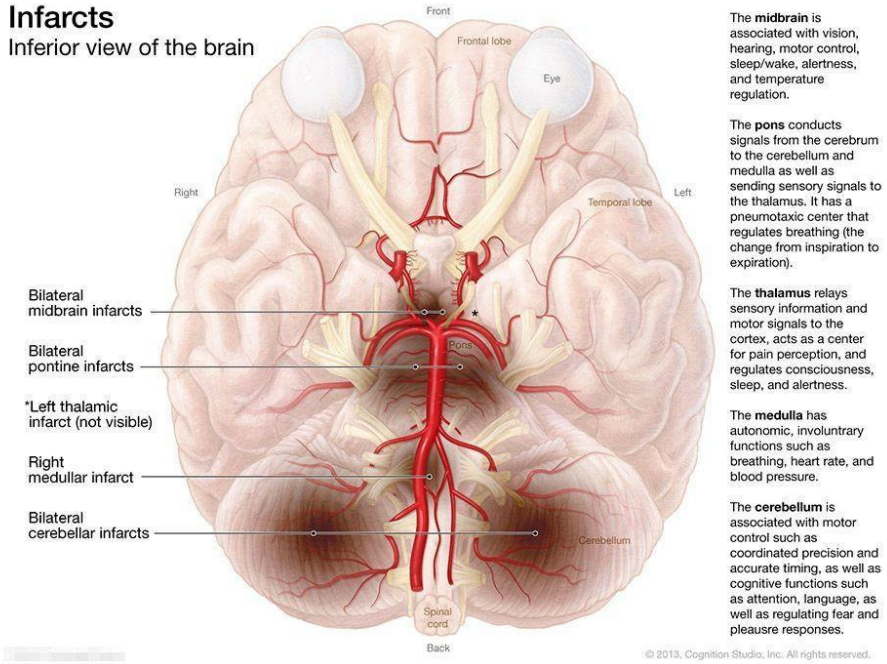
Vertigo and Stroke

- Rare (2-3%) symptom in stroke patients[1]
- Frequent cause of ED visits (4-5% of all ED visits annually)[2]
- When related to AIS, it is a posterior circulation infarct
- These are harder to identify and may be more disabling.

- d'Annunzio, A., Arboix, A., García-Eroles, L., & Sánchez-López, M.-J. (2022). Vertigo in Acute Stroke Is a Predictor of Brain Location but Is Not Related to Early Outcome: The Experience of Sagrat Cor Hospital of Barcelona Stroke Registry. *Biomedicines*, *10*(11), 2830. https://doi.org/10.3390/biomedicines10112830
- Puissant MM, Giampalmo S, Wira CR 3rd, Goldstein JN, Newman-Toker DE. Approach to Acute Dizziness/Vertigo in the Emergency Department: Selected Controversies Regarding Specialty Consultation. Stroke. 2024 Oct;55(10):2584-2588. doi: 10.1161/STROKEAHA.123.043406. Epub 2024 Sep 13. PMID: 39268603; PMCID: PMC11668186.

What is a Posterior Circulation Stroke?





Not all dizziness is the same

	BPPV	Vestibular Neuritis	Posterior Circ Stroke
Onset	Brief episodes, usually triggered by head position	Acute onset, persistent	Sudden onset, persistent or transient if VBI
Duration	Seconds. Usually <1min per episode	Continuous for days, gradually improving	Persistent.
Eye Movements	Characteristic positional nystagmus	Unidirectional, gaze-evoked nystagmus	Direction-changing, vertical or torsional
Gait	Able to walk between episodes	Unsteady but usually able to sit and walk with assistance	May have truncal ataxia, inability to sit or stand unsupported is concerning
Other findings	No focal neurologic symptoms	Nausea, motion intolerance, no FNS	Diplopia, dysarthria, dysphagia, weakness, ataxia, headache
Key clue	Brief, reproducible positional attacks	Continuous syndrome with a peripheral pattern on trained examination. NO FNS	Associated neurologic symptoms. Severe imbalance.

Red flags

- Inability to sit, stand or walk independently
- Double vision, dysarthria, dysphagia, limb weakness or sensory changes
- New severe headache or neck pain
- Abnormal eye movements, especially torsional or vertical nystagmus and vertical misalignment
- Sudden onset, especially with persistent symptoms



Bedside assessment

What to look for and diagnostic pitfalls

Look at the eyes

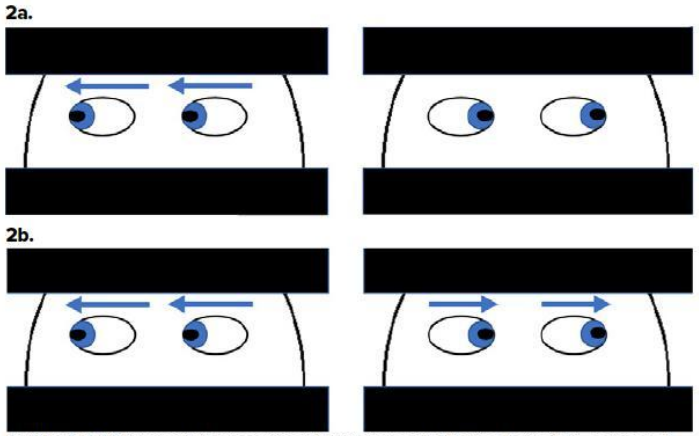


FIGURE 2. Nystagmus that occurs only when looking to the right (2a), compared to nystagmus that changes direction on lateral gaze, a.k.a. bidirectional nystagmus (2b).

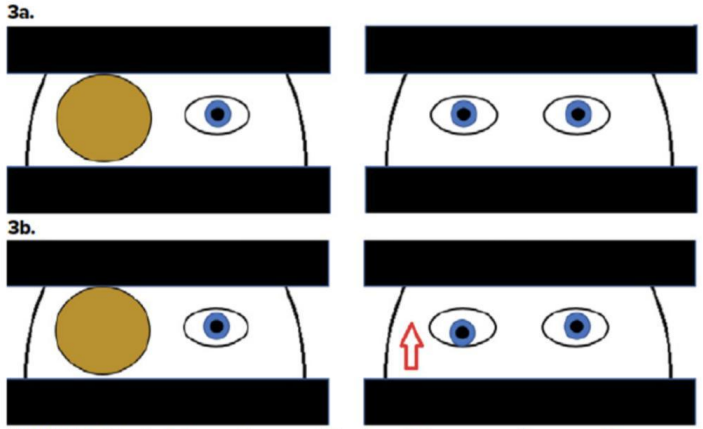
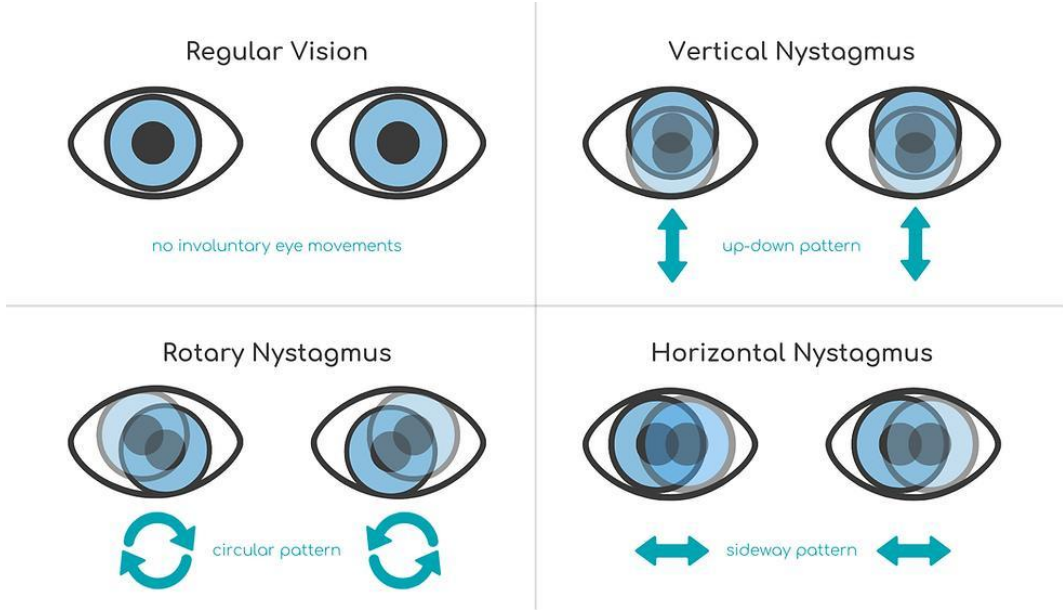
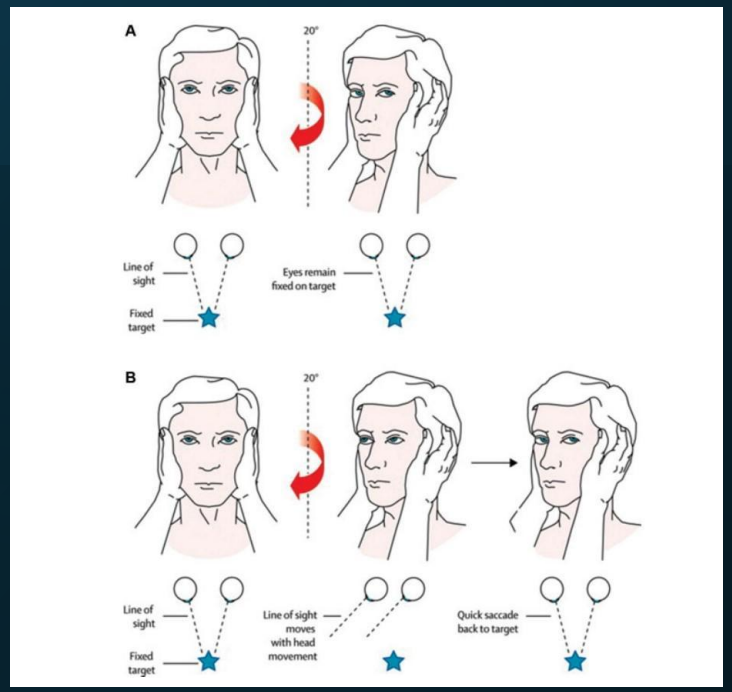


FIGURE 3. A test of skew with no verticla skew (3a) compared to one with a vertical skew that begins to correct when the eye is uncovered (3b).



Tarnutzer AA, Edlow JA. Bedside Testing in Acute Vestibular Syndrome—Evaluating HINTS Plus and Beyond—A Critical Review. Audiol Res. 2023;13(5):670–685.

To HINTS or not to HINTS



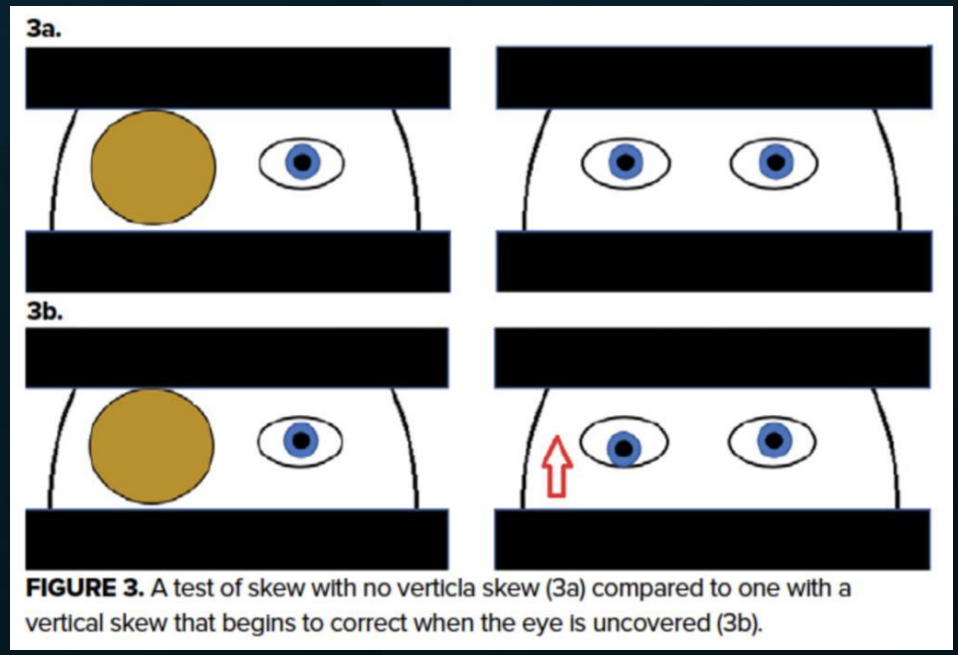


FIGURE 3. A test of skew with no verticla skew (3a) compared to one with a vertical skew that begins to correct when the eye is uncovered (3b).

HINTS, HINTS+

- Only performed in patients with persistent vestibular symptoms
- Only performed by trained clinicians
- It should never be cause of reassurance

HINTS, HINTS+

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CME

GRACE CLINICAL PRACTICE GUIDELINE

Guidelines for reasonable and appropriate care in the emergency department 3 (GRACE-3): Acute dizziness and vertigo in the emergency department

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Abstract

This third Guideline for Reasonable and Appropriate Care in the Emergency Department (GRACE-3) from the Society for Academic Emergency Medicine is on the topic adult patients with acute dizziness and vertigo in the emergency department (ED). A multidisciplinary guideline panel applied the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach to assess the certainty of evidence and strength of recommendations regarding five questions for adult ED patients with acute dizziness of less than 2 weeks' duration. The intended population is adults presenting to the ED with acute dizziness or vertigo. The panel derived 15 evidence-based recommendations based on the timing and triggers of the dizziness but recognizes that alternative diagnostic approaches exist, such as the STANDING protocol and nystagmus examination in combination with gait unsteadiness or the presence of vascular risk factors. As an overarching recommendation, (1) emergency clinicians should receive training in bedside physical examination techniques for patients with the acute vestibular syndrome (AVS; HINTS) and the diagnostic and therapeutic maneuvers for benign paroxysmal positional vertigo (BPPV; Dix–Hallpike test and Epley maneuver). To help distinguish central from peripheral causes in patients with the AVS, we recommend: (2) use HINTS (for clinicians trained in its use) in patients with nystagmus, (3) use finger rub to further aid in excluding stroke in patients with nystagmus, (4) use severity of gait unsteadiness in patients without nystagmus, (5) do *not* use brain computed tomography (CT), (6) do *not* use routine magnetic resonance imaging (MRI) as a first-line test if a clinician trained in HINTS is available, and (7) use MRI as a confirmatory test in patients with central or equivocal HINTS examinations. In patients with the spontaneous episodic vestibular syndrome: (8) search for symptoms or signs of cerebral ischemia, (9) do *not* use CT, and (10) use CT angiography or MRI angiography if there is concern for transient ischemic attack. In patients with the triggered (positional) episodic vestibular syndrome, (11) use the Dix–Hallpike test to diagnose posterior canal BPPV (pc-BPPV), (12) do *not* use CT, and (13) do *not* use MRI routinely, unless atypical clinical features are present. In patients diagnosed with vestibular neuritis, (14) consider short-term steroids as a treatment option. In patients diagnosed with pc-BPPV, (15) treat with the Epley maneuver. It is clear that as of 2023, when applied in routine practice by emergency clinicians without special training, HINTS testing is inaccurate, partly due to use in the wrong patients and partly due to issues with its interpretation. Most emergency physicians have not received training in use of HINTS. As such, it is not standard of care, either in the legal sense of that term ("what the average physician would do in similar circumstances") or in the common parlance sense ("the standard action typically used by physicians in routine practice").

Gait Test

- Can the patient sit, stand and walk?
  - Can the patient maintain upright trunk while sitting without support?
  - Can the patient remain standing safely, unassisted?
  - Can the patient walk without substantial assistance?

- Truncal instability and inability to walk are red flags. Usually where we draw the line in considering TNK for isolated dizziness

- Protect against falls. Document the deficit. Escalate urgently.

Liu X, et al. Application of bedside HINTS, ABCD2 score and truncal ataxia to differentiate cerebellar-brainstem stroke from vestibular neuritis in the emergency room. Stroke and Vascular Neurology. 2024;9:685–692

Imaging Pitfalls

Non-contrast head CT is all but useless in posterior circulation ischemia

- Sensitivity <30% for central causes of acute vertigo
- Useful to rule out other causes (hemorrhage, tumor)

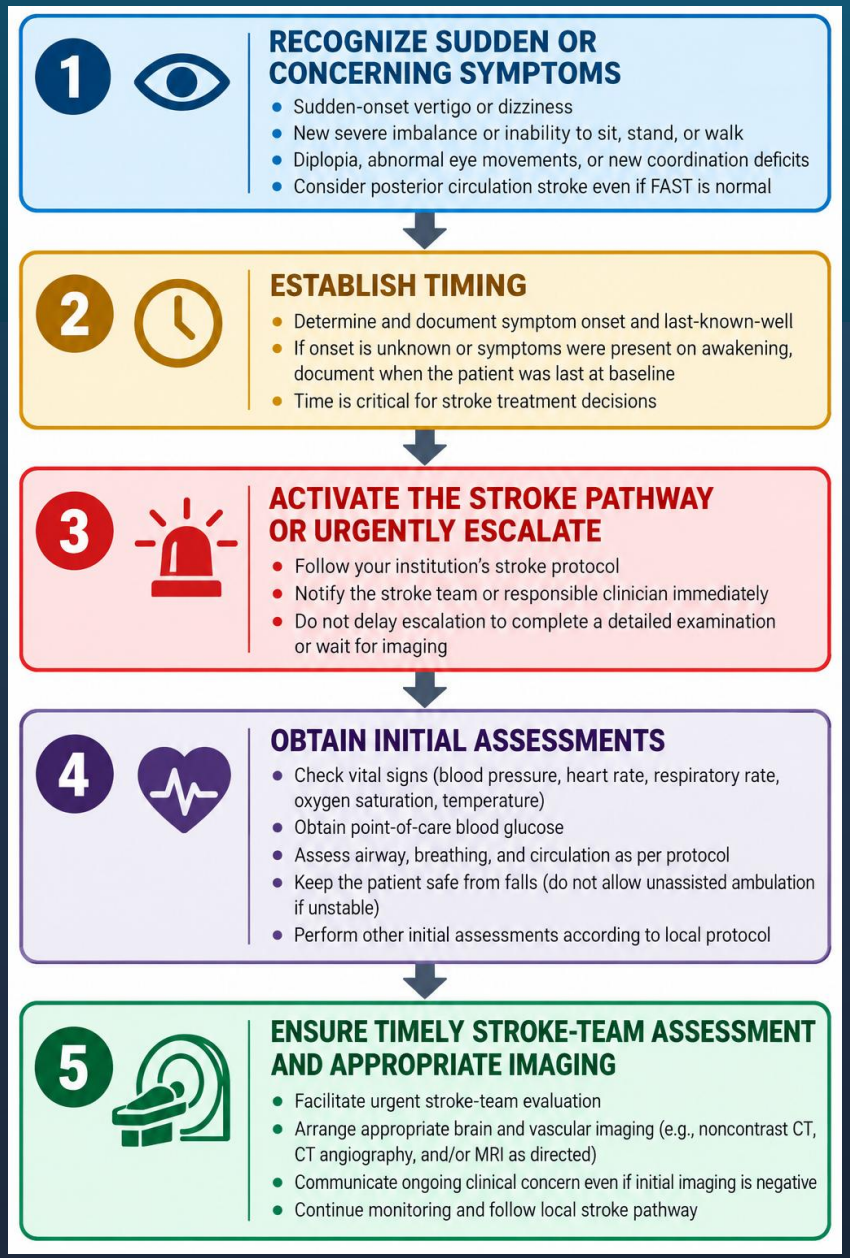
MRI is better, but not infallible

- MRI is more sensitive that CT but early imaging can miss stroke (up to 30% false negative in first 6-12 hours)

Why can early MRI be negative?

- Timing: Ischemic tissue changes may not be conspicuous on DWI
- Size: Small infarcts may fall below the spatial resolution of the scan
- Location: Small brainstem lesions can be difficult to detect

Pelletier J, Koyfman A, Long B. Pearls for the Emergency Clinician: Posterior Circulation Stroke. J Emerg Med. 2023;65:e414–e426.


1
RECOGNIZE SUDDEN OR CONCERNING SYMPTOMS
Sudden-onset vertigo or dizziness
New severe imbalance or inability to sit, stand, or walk
Diplopia, abnormal eye movements, or new coordination deficits
Consider posterior circulation stroke even if FAST is normal
2
ESTABLISH TIMING
Determine and document symptom onset and last-known-well
If onset is unknown or symptoms were present on awakening, document when the patient was last at baseline
Time is critical for stroke treatment decisions
3
ACTIVATE THE STROKE PATHWAY OR URGENTLY ESCALATE
Follow your institution's stroke protocol
Notify the stroke team or responsible clinician immediately
Do not delay escalation to complete a detailed examination or wait for imaging
4
OBTAIN INITIAL ASSESSMENTS
Check vital signs (blood pressure, heart rate, respiratory rate, oxygen saturation, temperature)
Obtain point-of-care blood glucose
Assess airway, breathing, and circulation as per protocol
Keep the patient safe from falls (do not allow unassisted ambulation if unstable)
Perform other initial assessments according to local protocol
5
ENSURE TIMELY STROKE-TEAM ASSESSMENT AND APPROPRIATE IMAGING
Facilitate urgent stroke-team evaluation
Arrange appropriate brain and vascular imaging (e.g., noncontrast CT, CT angiography, and/or MRI as directed)
Communicate ongoing clinical concern even if initial imaging is negative
Continue monitoring and follow local stroke pathway

What to do?

- 75 year old male, history of Diabetes and hypertension
- Acute onset vertigo (room-spinning sensation), persistent nausea and difficulty walking.
- No weakness, numbness or speech impediment
- Patient is able to walk but has vertical nystagmus

- Would you activate a stroke evaluation?

Take Home Messages

- Acute dizziness can be the presenting symptom of stroke
- BE-FAST is a starting point, not a rule out tool
- Severe gait or truncal instability is an important warning sign
- HINTS is useful in selected patients, when performed by trained clinicians
- When stroke is suspected, escalate promptly even if initial imaging is unrevealing

Questions?

Thank you!