

A Novel Approach to Acute Dizziness in the Emergency Department: A Prospective Validation Study of the 'ATTEST' Algorithm

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Abstract

Background: The objective is to assess the diagnostic performance of the ATTEST bedside algorithm in adults presenting to the emergency department with acute dizziness and to describe the bedside patterns associated with central lesions on diffusion-weighted magnetic resonance imaging. **Material and Methods:** This prospective validation study analyzed thirty-four adults evaluated for acute dizziness. The index test was the ATTEST bedside classification, organized into acute vestibular syndrome, triggered episodic vestibular syndrome, and spontaneous episodic vestibular syndrome, based on symptom timing, triggers, oculomotor findings, and focal neurologic signs. Magnetic resonance imaging with diffusion-weighted imaging served as the reference standard for acute central lesions. **Results:** Eleven of thirty-four patients (32.4%) had acute central lesions. The ATTEST algorithm identified 9 of these cases and missed 2, while 1 false-positive classification occurred among 23 MRI-negative cases. Sensitivity was 81.82%, specificity 95.65%, positive predictive value 90.00%, negative predictive value 91.67%, and overall accuracy 91.18%. Acute vestibular syndrome, gait ataxia, skew deviation, and focal central nervous system findings were more frequent in patients with MRI-positive lesions. **Conclusion:** ATTEST showed high specificity and good overall accuracy for distinguishing central from non-central causes of acute dizziness. Its strongest performance appeared in continuous vestibular presentations with central oculomotor or neurologic signs, but small posterior circulation infarcts remained a potential source of false-negative bedside classification.

Keywords: Dizziness, Emergency Department, Magnetic Resonance Imaging, Stroke, Vertigo.

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INTRODUCTION

Acute dizziness is common in emergency practice, yet separating benign vestibular disease from posterior circulation stroke remains difficult.^[1,2] Symptom quality alone is unreliable, and early magnetic resonance imaging may miss posterior fossa ischemia.^[3-6] Current bedside reasoning therefore emphasizes timing, triggers, eye movement findings, and focused neurologic examination.^[4,5,7] This approach is especially relevant in busy emergency settings, where rapid triage decisions often need to be made before advanced imaging findings are fully informative. The present study evaluated the ATTEST algorithm against diffusion-weighted magnetic resonance imaging and explored the bedside patterns most closely associated with central lesions.^[8-10]

MATERIALS AND METHODS

This prospective validation study was conducted from June 2023 to May 2024 at SDM College of Medical Sciences and Hospital, Dharwad, Karnataka, after obtaining Ethical clearance. The study included thirty-four adults evaluated in the emergency department for acute dizziness. The clinical pathway under study was the ATTEST bedside algorithm,

applied to symptom timing, triggers, oculomotor findings, and focused neurologic examination.

Recorded bedside information allowed classification into acute vestibular syndrome, triggered episodic vestibular syndrome, and spontaneous episodic vestibular syndrome. ATTEST-positive decisions were defined as bedside patterns favoring a central cause, whereas ATTEST-negative decisions favored a non-central cause.

The reference standard was magnetic resonance imaging with diffusion-weighted imaging. Acute infarction on diffusion-weighted imaging was treated as MRI-positive central disease; normal imaging, no acute changes, and old lacunar infarcts were grouped as MRI-negative.

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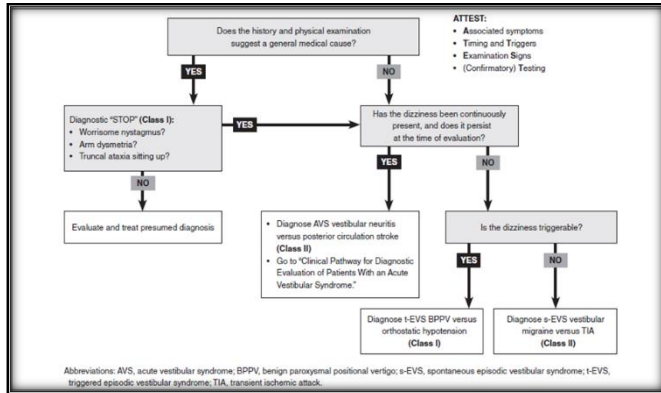


Chart 1: Clinical pathway for the ATTEST approach to emergency department patients with acute dizziness.^[11]

RESULTS

Thirty-four patients were analyzed. Eleven patients (32.4%) had acute magnetic resonance imaging-positive central lesions, whereas twenty-three (67.6%) had no acute lesion on diffusion-weighted imaging. Patients with MRI-positive lesions were older on average, more often male, and far more likely to present with acute vestibular syndrome than triggered episodic vestibular syndrome [Table 1].

This separation was clinically meaningful rather than merely descriptive. Acute vestibular syndrome accounted for 10 of the 11 MRI-positive cases and 8 of the 23 MRI-negative cases, whereas triggered episodic vestibular syndrome predominated in the MRI-negative group. Spontaneous episodic vestibular syndrome appeared only once and was MRI-negative.

Table 1: Demographic and syndrome profile by magnetic resonance imaging outcome

Variable	MRI-negative (n = 23)	MRI-positive (n = 11)	P value
Age, years	52.0 ± 15.6	60.3 ± 9.8	0.072
Male sex	12 (52.2)	10 (90.9)	0.053
Acute vestibular syndrome	8 (34.8)	10 (90.9)	0.003
Triggered episodic vestibular syndrome	14 (60.9)	1 (9.1)	0.008
Spontaneous episodic vestibular syndrome	1 (4.3)	0	1.000
Continuous symptom pattern	9 (39.1)	10 (90.9)	0.008
No positional trigger	9 (39.1)	10 (90.9)	0.008

Data are mean ± standard deviation or n (%). MRI indicates magnetic resonance imaging; DWI, diffusion-weighted imaging; AVS, acute vestibular syndrome; t-EVS, triggered episodic vestibular syndrome; s-EVS, spontaneous episodic vestibular syndrome.

However, that association was less precise in this small sample. Gait ataxia and any focal central nervous system finding showed the clearest bedside separation, appearing in eight versus four and nine versus five patients, respectively [Table 2]

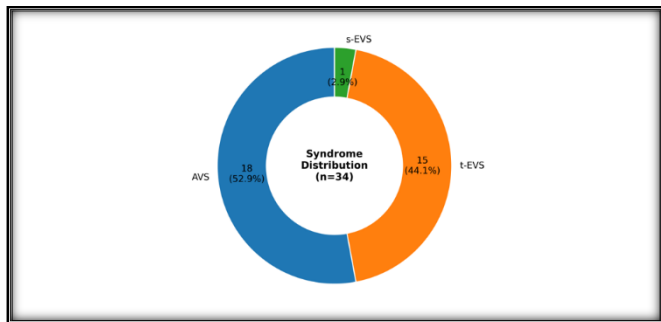


Figure 1: Overall syndrome distribution in the cohort

Donut chart showing the frequency of the recorded dizziness syndromes.

Box plot with individual ages overlaid, comparing MRI-negative and MRI-positive groups. Bedside findings followed a similarly directional pattern. Skew deviation was more frequent in the MRI-positive group, and central-type nystagmus also tended to cluster with acute lesions.

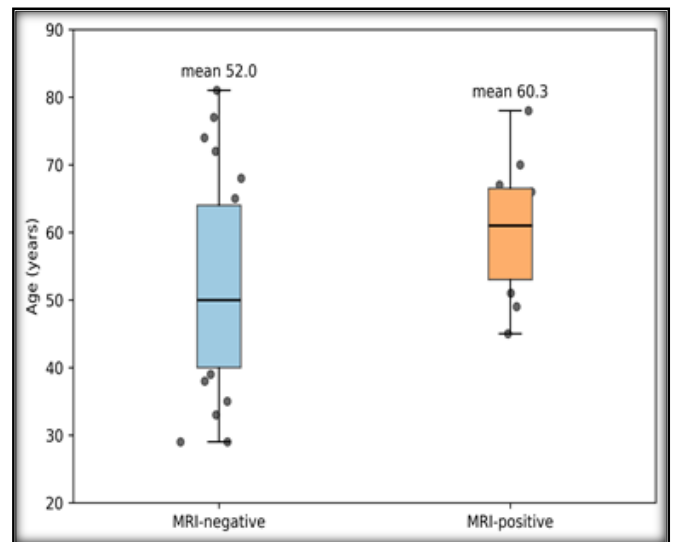


Figure 2: Age distribution by magnetic resonance imaging outcome.

Table 2: Bedside examination profile by magnetic resonance imaging outcome

Variable	MRI-negative (n = 23)	MRI-positive (n = 11)	P value
Skew deviation present	3 (13.0)	4 (36.4)	0.178
Central-type nystagmus*	8 (34.8)	6 (54.5)	0.458
Gait ataxia	4 (17.4)	8 (72.7)	0.005
Any focal CNS finding†	5 (21.7)	9 (81.8)	0.002

* Central-type nystagmus includes gaze-evoked, direction-changing, or vertical nystagmus. †Focal CNS finding includes any non-normal motor, sensory, cranial nerve, gait, or limb coordination finding. MRI: magnetic resonance imaging; CNS: central nervous system.

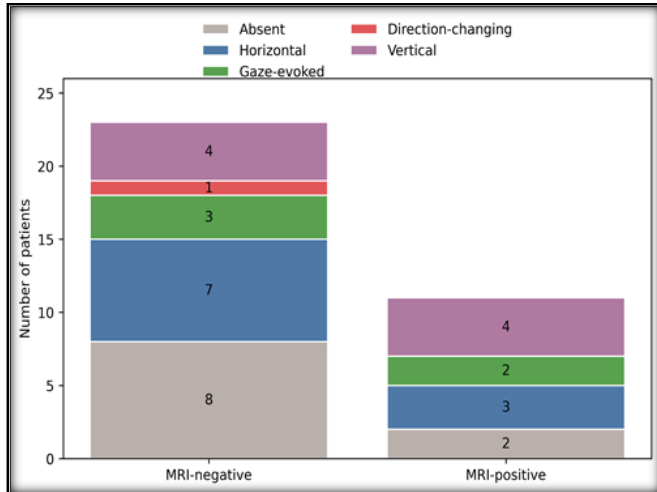


Figure 3. Nystagmus pattern stratified by magnetic resonance imaging outcome

Stacked bars show the distribution of recorded nystagmus patterns across MRI-negative and MRI-positive groups. Horizontal bars summarize the anatomic sites of acute MRI-positive lesions. In magnetic resonance imaging with diffusion-weighted imaging, the ATTEST algorithm yielded 9 true positives, 22 true negatives, 1 false positive, and 2 false negatives. Sensitivity was 81.82% (95% confidence interval, 48.2% to 97.7%), specificity 95.65% (78.1% to 99.9%),

positive predictive value 90.00% (55.5% to 99.7%), negative predictive value 91.67% (73.0% to 99.0%), and overall accuracy 91.18% (76.3% to 98.1%) [Table 3].

ATTEST indicates the study bedside algorithm; MRI, magnetic resonance imaging; DWI, diffusion-weighted imaging; PPV, positive predictive value; NPV, negative predictive value.

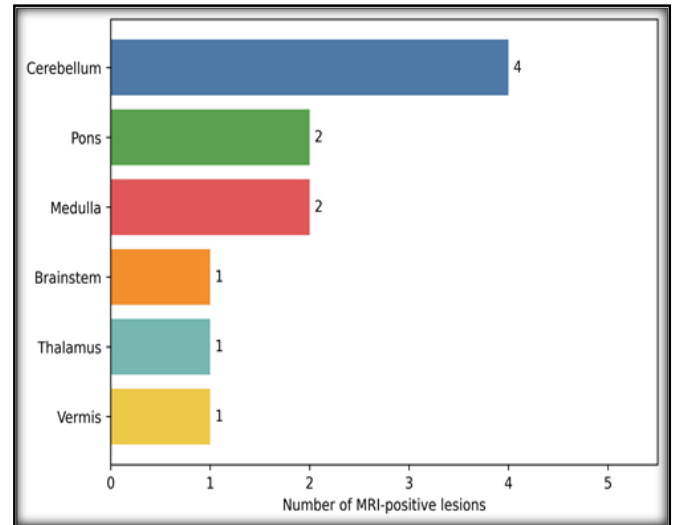


Figure 4: Anatomic distribution of acute magnetic resonance imaging-positive central lesions.

Table 3: Diagnostic contingency table and performance of the ATTEST algorithm against magnetic resonance imaging with diffusion-weighted imaging

	MRI-positive	MRI-negative	Total
ATTEST positive	9	1	10
ATTEST negative	2	22	24
Total	11	23	34
Index	Estimate (%)	95% confidence interval	
Sensitivity	81.82	48.2 to 97.7	
Specificity	95.65	78.1 to 99.9	
Positive predictive value	90.00	55.5 to 99.7	
Negative predictive value	91.67	73.0 to 99.0	
Accuracy	91.18	76.3 to 98.1	

Table 4: Count data used for figure construction

A. Overall syndrome distribution		
Syndrome	Count	
Acute vestibular syndrome	18	
Triggered episodic vestibular syndrome	15	
Spontaneous episodic vestibular syndrome	1	
B. Nystagmus distribution by imaging outcome		
Nystagmus Pattern	MRI-negative	MRI-positive
Absent	8	2
Horizontal/other	7	3
Gaze-evoked	3	2
Direction-changing	1	0
Vertical	4	4
C. Lesion site distribution among magnetic resonance imaging-positive cases		
Lesion site	Count	
Cerebellum	4	
Pons	2	
Medulla	2	
Brainstem	1	
Thalamus	1	
Vermis	1	

DISCUSSION

This cohort suggests that the ATTEST pathway can function as a practical bedside screen when acute dizziness is being sorted in the emergency department. Its strongest feature here was specificity, with only one false-positive result, while overall accuracy remained above ninety percent. That pattern matters clinically because indiscriminate overcalling of central disease may amplify imaging and admission burden, whereas undercalling stroke carries greater harm.^[6,10]

The sensitivity observed in this cohort, 81.82%, was lower than the near-perfect sensitivity reported in expert-performed HINTS work and lower than the high sensitivity reported in the original STANDING validation study.^[6,7] That gap is not unexpected. Bedside neuro-otologic pathways are strongly influenced by syndrome selection, examiner training, and lesion anatomy. Meta-analytic work has shown that diagnostic performance varies meaningfully with clinician background and posterior fossa lesion location.^[8,9]

The pattern within this cohort is also instructive. Central lesions clustered most strongly with acute vestibular syndrome, continuous symptoms, absence of a positional trigger, gait ataxia, and focal central nervous system findings. Those signals are consistent with modern timing-trigger frameworks and emergency dizziness reviews that emphasize syndrome-based reasoning rather than reliance on symptom quality alone.^[4,12-14]

The two false-negative cases deserve special attention. One involved medullary infarction, and the other a small cerebellar infarct. Both are plausible miss patterns in real emergency care because posterior circulation strokes may present with incomplete or evolving bedside signs, especially early after symptom onset. Contemporary guidance therefore supports trained bedside testing, but does not regard any single bedside pathway as a substitute for magnetic resonance imaging when the clinical picture remains concerning.^[8,13,15]

The single false-positive case should not be dismissed as a simple algorithm failure. A central-appearing oculomotor pattern with normal magnetic resonance imaging may reflect genuine over-triage, incomplete bedside documentation, or early diffusion-weighted imaging insensitivity in selected posterior circulation strokes.^[6,13,15] A modest false-positive rate may be acceptable if it helps keep the miss rate lower and channels imaging toward patients with stronger bedside concern.

There is also a systems implication. Neuroimaging for dizziness is common, but its diagnostic yield is uneven across care settings.^[10,13] A pathway such as ATTEST is most useful when it improves bedside discrimination without promoting false reassurance. The most defensible reading of this study is therefore pragmatic: ATTEST appears promising as a front-line decision aid, but not as a stand-alone rule-out test. This study has clear limitations. The sample was small, confidence intervals were wide, and external validation was not available. Inter-rater reliability, blinded adjudication, follow-up outcomes, and treatment timelines were not examined. Study period, institutional identifiers, and ethics approval details should be added before submission. Even so,

the internal pattern of findings was coherent enough to support cautious interpretation as a preliminary prospective validation report.

CONCLUSION

In adults presenting to the emergency department with acute dizziness, the ATTEST algorithm demonstrated 81.82% sensitivity, 95.65% specificity, and 91.18% overall diagnostic accuracy for identifying central lesions on diffusion-weighted magnetic resonance imaging.

The pathway performed best in patients with acute vestibular syndrome, continuous symptoms without a positional trigger, gait ataxia, and focal neurologic findings. It may help prioritize imaging in resource-limited settings, but bedside assessment should remain integrated with clinical judgment when a posterior circulation stroke is still suspected.

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Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Drachman DA, Hart CW. An approach to the dizzy patient. *Neurology* 1972;22(4):323-34.
2. Newman-Toker DE, Hsieh YH, Camargo CA, et al. Spectrum of dizziness visits to US emergency departments: cross-sectional analysis from a nationally representative sample. *Mayo Clin Proc* 2008;83(7):765-75.
3. Newman-Toker DE, Cannon LM, Stofferahn ME, et al. Imprecision in patient reports of dizziness symptom quality: a cross-sectional study conducted in an acute care setting. *Mayo Clin Proc* 2007;82(11):1329-40.
4. Edlow JA, Gurley KL, Newman-Toker DE. A new diagnostic approach to the adult patient with acute dizziness. *J Emerg Med* 2018;54(4):469-83.
5. Newman-Toker DE, Edlow JA. TiTrATE: a novel, evidence-based approach to diagnosing acute dizziness and vertigo. *Neurol Clin*. 2015;33(3):577-99.
6. Kattah JC, Talkad AV, Wang DZ, et al. HINTS to diagnose stroke in the acute vestibular syndrome: three-step bedside oculomotor examination more sensitive than early magnetic resonance imaging diffusion-weighted imaging. *Stroke* 2009;40(11):3504-10.
7. Vanni S, Pecci R, Edlow JA, et al. Differential diagnosis of vertigo in the emergency department: a prospective validation study of the STANDING algorithm. *Front Neurol* 2017;8:590.
8. Shah VP, eSilva LOJ, Farah WH, et al. Diagnostic accuracy of the physical examination in emergency department patients with acute vertigo or dizziness: a systematic review and meta-analysis for GRACE-3. *Acad Emerg Med* 2023;30(5):552-78.
9. Tarnutzer AA, Gold D, Wang Z, et al. Impact of clinician training background and stroke location on bedside diagnostic accuracy in the acute vestibular syndrome: a meta-analysis. *Ann Neurol* 2023;94(2):295-308.
10. Adams ME, Karaca-Mandic P, Marmor S. Use of neuroimaging for patients with dizziness who present to outpatient clinics vs emergency departments in the US. *JAMA Otolaryngol Head Neck Surg* 2022;148(5):465-73.
11. Edlow JA. The timing-and-triggers approach to the patient with acute dizziness. *Emerg Med Pract* 2019;21(12):1-24.

12. Edlow JA, Carpenter C, Akhter M, et al. Guidelines for reasonable and appropriate care in the emergency department 3 (GRACE-3): acute dizziness and vertigo in the emergency department. *Acad Emerg Med* 2023;30(5):442-86.
13. Shah VP, Oliveira JESL, Farah W, et al. Diagnostic accuracy of neuroimaging in emergency department patients with acute vertigo or dizziness: a systematic review and meta-analysis for the guidelines for reasonable and appropriate care in the emergency department. *Acad Emerg Med* 2023;30(5):517-30.
14. Kerber KA. Vertigo and dizziness in the emergency department. *Emerg Med Clin North Am* 2009;27(1):39-50.
15. Saber Tehrani AS, Kattah JC, Kerber KA, et al. Diagnosing stroke in acute dizziness and vertigo: pitfalls and pearls. *Stroke* 2018;49(3):788-95.