Critical Review Form
Diagnostic Test

HYPERLINK "http://pmid.us/33171003"Dmitriew C, Regis A, Bodunde O, Lepage R, Turgeon Z, McIsaac S, Ohle R. Diagnostic Accuracy of the HINTS Exam in an Emergency Department: A Retrospective Chart Review. Acad Emerg Med. 2021 Apr;28(4):387-393.

Objectives: **"to assess the frequency of use of the HINTS exam, the characteristics of patients in whom it is applied, and the sensitivity and specificity of the test to detect a central cause for dizziness as it is used by emergency room physicians." (p. 388)**

Methods: **A retrospective medical records review was performed at a tertiary care ED in Ontario, Canada, covering the period from September 2014 to March 2018. Patients presenting with dizziness, vertigo, light-headedness, and/or unsteadiness were identified. Exclusion criteria included departure without being seen, dizziness lasting more than 14 days, recent trauma, GCS less than 15, hypotension (SBP < 90 mmHg), or reported syncope/loss of consciousness.**

During the study period, physicians did not receive specific training on the HINTS exam. Data were extracted by five trained, collecting parameters on presenting illness, associated symptoms, physical exam findings, and imaging orders. Data sources included ED records, consultant notes, and the Institute of Clinical Evaluation Sciences (ICES) database. The primary outcome measured was the diagnostic accuracy of the HINTS exam, i.e. the number of patients with a central HINTS exam and a CNS cause of their diziness (stroke, TIA, brain tumor, MS). Secondary outcomes included the number of dizzy patients fitting AVS criteria who received a HINTS exam, the proportion of potentially inappropriate HINTS applications, and the concurrent use of HINTS and Dix-Hallpike tests for BPPV.

Out of 3,109 patients presenting to the ED with complaints of dizziness, vertigo, unsteadiness, and/or light-headedness, 2,309 met the inclusion criteria. Of these, 39 (1.7%) had signs consistent with AVS and were appropriate candidates for the HINTS exam, but only 14 (36%) actually received the exam. Six patients with AVS (15.4%) were ultimately diagnosed with a central cause for their symptoms, though none of these received the HINTS exam. A total of 450 patients (19.5%) were assessed using the HINTS exam during the study period, with 78% having documentation for all three components.

Guide		Comments
I.	**Are the results valid?**	
A.	**Did clinicians face diagnostic uncertainty?**	Yes. This study included patients presenting to the ED with dizziness in whom the diagnosis (specifically whether there was a central of peripheral cause for symptoms) was unknown.
B.	**Was there a blind comparison with an independent gold standard applied similarly to all patients?** **(Confirmation Bias)**	No. Diagnoses were confirmed via a variety of different modalities, including CT, MRI, neurology consult, or diagnostic codes (differential and partial verification bias). These modalities have different diagnostic accuracies for stroke. Notably, of patients who underwent the HINYTS exam, only 5.8% of patients underwent MRI and more than half had no imaging at all.
C.	**Did the results of the test being evaluated influence the decision to perform the gold standard?** **(Ascertainment Bias)**	Likely yes. This was a retrospective study and hence results of HINTS testing were known to those deciding what additional testing or consultation was indicated. It is likely that those with a positive HINTS test were more likely to undergo additional testing (such as MRI) or receive neurology consultation.
II.	**What are the results?**	
A.	**What likelihood ratios were associated with the range of possible test results?**	● The HINTS exam was used on patients with symptoms consistent with AVS in 14 of 450 HINTS exams (3.1% of the time). o In 87 cases symptoms had resolved. o In 200 cases dizziness was intermittent o 372 patients had no documented nystagmus. o 358 patients had no documented ataxia. ● The HINTS exam was consistent with a central cause of dizziness in 16 of 450 patients (3.6%). None of these were found to have a central cause on further testing: o Specificity 95% (95% CI 94 to 98). ● Among 6 patients who were ultimately found to have a central cause of dizziness, none had a central HINTS exam: o Sensitivity 0% (95% CI o to 39).
III.	**How can I apply the results to patient care?**	
A.	**Will the reproducibility of the test result and its interpretation be satisfactory in my clinical setting?**	Uncertain. This study was not able to assess the interrater reliability of the HINTS exam when used by emergency physicians with no specific training in its performance. Previous studies hance found the interrater reliability of HINTS among emergency physicians to be moderate: kappa 0.46 to 0.73 (Vanni 2015, Henriksen 2018).
B.	**Are the results applicable to the patients in my practice?**	Yes. This study was conducted at a tertiary care center in Ontario, CA. I suspect patients in this study would be similar to those seen in our institution.
C.	**Will the results change my management strategy?**	Yes. This study suggests that the use of the HINTS exam requires a careful understanding of the appropriate patient population in which to perform the testing, as well as training in the performance of the exam.
D.	**Will patients be better off as a result of the test?**	Yes.

Limitations:

1. **Diagnoses were confirmed via a variety of different modalities, including CT, MRI, neurology consult, or diagnostic codes (differential and partial verification bias).**
2. **This was a retrospective study and hence results of HINTS testing were known to those deciding what additional testing or consultation was indicated (ascertainment bias).**
3. **Given the retrospective nature of the study it is unlikely that the data obtained was entirely accurate, including interpretation of portions of the HINTS exam.**
4. **This study was not able to assess the interrater reliability of the HINTS exam when used by emergency physicians with no specific training in its performance.**

Bottom Line:

This retrospective study suggests that without specific training, emergency physicians may not be aware of the specific criteria for patients in whom the HINTS exam may be useful and may not be adept at interpreting the HINTS exam when performed for the evaluation of patients presenting with dizziness.