Critical Review Form
Clinical Prediction or Decision Rule

PGY-4

van Patot ET, Roy D, Baraku E, Patel K, McIsaac S, Singh R, Lelli D, Tse D, Johns P, Yadav K, Savage DW, Perry JJ, Ohle R. Validation of the Sudbury Vertigo Risk Score to risk stratify for a serious cause of vertigo. Acad Emerg Med. 2025 Mar 11.

Objectives: **"to assess the accuracy of the Sudbury Vertigo Risk Score in a new cohort of patients presenting to the ED with dizziness." (p. 3)**

Methods: **This retrospective multicenter cohort study was conducted in the EDs of three urban Canadian tertiary care teaching hospitals from September 8, 2014, to June 10, 2020. Data were extracted on alert patients 18 years and older with acute vertigo, dizziness, or imbalance assessed by an ED physician. Exclusion criteria were symptom onset >14 days prior, recent head or neck trauma, GCS <15, SBP < 90 mmHg, recent syncopal episode, or active cancer.**

Five trained reviewers collected data from electronic ED records and consultant notes. Inter-rater reliability was established through coding a subset of 20 charts, and reviewers needed a kappa > 0.8 to be validated for independent data abstraction. Outcomes were determined from hospital records and autopsy reports. An adjudication committee, including a stroke neurologist and two emergency physicians, reviewed potential events, with confirmation requiring agreement from at least two members. The primary outcome was a serious diagnosis (stroke, TIA, vertebral artery dissection, or brain tumor) within 30 days.

The study included 4,559 patients (mean age, 78.1 years; 57.8% female) presenting with vertigo, dizziness, or imbalance. CT scans were performed on 36.8%, CT angiographies on 7.7%, and MRI scans on 5.5%. Serious diagnoses were made in 2.3% of patients: 2.0% stroke, 0.1% TIA, 0.1% brain tumor, and 0.04% vertebral artery dissection. Baseline characteristics associated with serious diagnoses included age > 65, previous stroke, hypertension, diabetes, and neurological symptoms. Less associated features included position-triggered dizziness and BPPV diagnosis.

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Guide	Comments
Is this a newly derived instrument (Level IV)?	
Was validation restricted to the retrospective use of statistical techniques on the original database? (If so, this is a Level IV rule & is not ready for clinical application).	No. This was a retrospective validation study on a previously derived clinical decision rule. This validation was performed on a new set of patients separate from (and predating) the validation cohort.
Were all important predictors included in the derivation process?	N/A
Were all important predictors present in significant proportion of the study population?	Yes. Table 1 in the study lists the proportion of patients with and without a serious diagnosis positive for each of the components of the risk score.
Does the rule make clinical sense?	Yes. The rule includes sensible criteria including age, gender, risk factors, neurologic findings, and previous diagnoses related to vertigo (i.e. BPPV). However, the score relies heavily on the presence of neurologic deficits, which would already lean towards a diagnosis of stroke, or a diagnosis of BPPV, which would equates with a diagnosis of peripheral disease. The rule does not appear to be clinically very useful.
Has the instrument been validated? (Level II or III). If so, consider the following:	
Did validation include prospective studies on several different populations from that used to derive it (II) or was it restricted to a single population (III)?	No. This was a purely retrospective validation performed on a group of patients who preceded the derivation cohort. Additionally, validation was performed using patients from the same 3 Canadian teaching hospitals as the derivation cohort (external validity). This is a level III rule.
How well did the derivation/validation study meet the following criteria?	
Did the patients represent a wide spectrum of severity of disease?	Uncertain. This study does not mention the severity of symptoms among patients included in this validation cohort. That can be difficult to quantify as there is no scoring system for vertigo severity.
Was there a blinded assessment of the gold standard?	No. Diagnosis was made by an adjudication committee based on hospital records, autopsy reports, and follow-up. Patients did not all receive the same testing or consultation in the hospital. "Within the study population, 1678 (36.8%) CT scans, 349 (7.7%) CT angiographies, and 253 (5.5%) magnetic resonance imaging scans were performed." (p. 4) Additionally, follow-up was only completed in around 80% of patients. This all puts the findings at risk of partial and differential verification bias.
Was there an explicit and accurate interpretation of the predictor variables & the actual rule without knowledge of the outcome?	Likely no. This was a retrospective study in which clinical predictor variables were extracted from the medical record. It is unlikely that all predictor variables were recorded with a high enough degree of accuracy to allow for reliable interpretation by the abstractors. There is also no way to know whether certain predictors were recorded prior to imaging results or neurology consultation.
Did the results of the assessment of the variables or of the rule influence the decision to perform the gold standard?	Likely yes. While there is no clear "gold standard" test in this study, it seems likely that the presence of absence of predictor variables would have influenced the decision to perform additional imaging such as CT or MRI as well as the decision to obtain neurologic consultation and admit the patient.

How powerful is the rule (in terms of sensitivity & specificity; likelihood ratios; proportions with alternative outcomes; or relative risks or absolute outcome rates)?	• For a score <5, the risk of a serious outcome was 0%, with a sensitivity of 100% (95% CI 96.5% to 100%) and a specificity of 69.2% (95% CI 67.8% to 70.51%). o This corresponds to a LR- of 0 and LR+ of 3.25. • The risk of a serious diagnosis in patients with a score of 5 to 8 was 0.9%. • In those with a score >8, the risk of a serious diagnosis increased to 16.7%. • Using a threshold of >7, the risk score had a sensitivity for a positive finding on CT of 100% (95% CI 94%–100%) and a specificity of 84.2% (95% CI 83.1%–85.2%).
Has an impact analysis demonstrated change in clinical behavior or patient outcomes as a result of using the instrument (Level I)? If so, consider the following:	
How well did the study guard against bias in terms of differences at the start (concealed randomization, adjustment in analysis) or as the study proceeded (blinding, co-intervention, loss to follow-up)?	The authors provide no specifics regarding blinding of investigators and data collectors to imaging results or ultimate diagnoses. The retrospective nature of this study increases the risk of retrieval bias. Patients with missing data were simply excluded from the study, though the authors do not specify how many eligible patients were excluded on such a basis or what their outcomes were. There was no single gold standard applied to all patients with a high risk of verification bias as a result.
What was the impact on clinician behavior and patient-important outcomes?	

Limitations:

1. **This was a purely retrospective validation performed on a group of patients who preceded the derivation cohort. Additionally, validation was performed using patients from the same 3 Canadian teaching hospitals as the derivation cohort (external validity).**

2. **Patients with missing data were simply excluded from the study, though the authors do not specify how many eligible patients were excluded on such a basis or what their outcomes were.**

3. **This was a retrospective study in which clinical predictor variables were extracted from the medical record. It is unlikely that all predictor variables were recorded with a high enough degree of accuracy to allow for reliable interpretation by the abstractors.**

4. **There was no single gold standard applied to all patients with a high risk of verification bias.**

Bottom Line:

This retrospective validation of a clinical decision rule with 7 variables for serious causes of vertigo performed in 3 urban Canadian tertiary care teaching hospitals found that for a cutoff < 5 the sensitivity was 100%. This was a purely retrospective validation in the same hospitals in which the rule was derived. Further validation studies would be necessary to verify these findings and, more importantly, to determine whether this rule has any utility.