The ABCD, California, and unified ABCD2 risk scores predicted stroke within 2, 7, and 90 days after TIA

Johnston SC, Rothwell PM, Nguyen-Huynh MN, et al. **Validation and refinement of scores to predict very early stroke risk after transient ischaemic attack.** Lancet. 2007;369:283-92.

Clinical impact ratings: GIM/FP/GP ★★★★★☆ Neurology ★★★★★☆

QUESTION

In patients with transient ischemic attack (TIA), how does a new unified risk score (ABCD2) compare with the previously developed ABCD and California scores for predicting 2-, 7-, and 90-day risk for stroke?

METHODS

Design: 6 cohort studies: 2 derivation cohorts (California emergency department [ED] and Oxford population) and 4 independent validation cohorts (California ED, California clinic, Oxford population, and Oxford clinic).

Setting: EDs and primary care clinics in the San Francisco Bay Area, California, United States, and family practices and specialist clinics in Oxfordshire, England, United Kingdom.

Patients: 1916 patients (78% > 60 y of age, 52% women) for derivation and 2893 patients (76% > 60 y of age, 53% women) for validation who were diagnosed with TIA by the initial treating doctor.

Description of prediction guide: The ABCD2 score was generated in the 2 original derivation cohorts by multivariable logistic regression analysis of individual risk factors from the ABCD and California scores. The risk score with the greatest area under the receiver-operating characteristic (AUROC) curve for 2-day stroke was selected. The unified ABCD2 score (range 0 to 7) was a summation of 5 independent risk predictors: age ($\geq$ 60 y = 1), blood pressure (systolic $\geq$ 140 mm Hg; diastolic $\geq$ 90 mm Hg = 1), clinical features (focal weakness = 2; speech impairment without focal weakness = 1), duration of symptoms ($\geq$ 60 min = 2; 10 to 59 min = 1), and diabetes = 1.

Outcomes: 2-, 7-, and 90-day risk for stroke.

MAIN RESULTS

Overall, 3.9%, 5.5%, and 9.2% of patients had stroke within 2, 7, and 90 days of TIA, respectively. The ABCD2, ABCD, and California risk scores did not differ for prediction of 2-, 7-, or 90-day stroke (AUROC curve 0.62 to 0.83 vs 0.62 to 0.81 vs 0.60 to 0.79). For the ABCD2 risk score, the prevalence and likelihood ratios for 2-, 7-, and 90-day stroke in the 2 derivation and 4 validation cohorts combined are in the Table. In all 6 cohorts, the ABCD2 score classified 34% of patients as low (score 0 to 3), 45% as moderate (score 4 to 5), and 21% as high (score 6 to 7) risk for stroke.

CONCLUSION

The ABCD, California, and unified ABCD2 risk scores had similar accuracy for predicting stroke within 2, 7, and 90 days after a transient ischemic attack.

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Prevalence and likelihood ratios (LRs) for stroke at 2, 7, and 90 days after a transient ischemic attack using the unified ABCD2 risk score*

Risk group (score)	Stroke at 2 d		Stroke at 7 d		Stroke at 90 d	
	Prevalence	LR	Prevalence	LR	Prevalence	LR
Low (0 to 3)	1.0%	0.26	1.2%	0.21	3.1%	0.31
Moderate (4 to 5)	4.1%	1.1	5.9%	1.1	9.8%	1.1
High (6 to 7)	8.1%	2.2	12%	2.3	18%	2.1

*LR defined in Glossary and calculated from data in article. Results combined from 2 derivation and 4 validation cohorts.

COMMENTARY

Identification of patients at highest and lowest risk for stroke may allow effective yet costly or risky investigations, interventions, and hospitalization to be targeted to those at highest risk and presumably most likely to benefit. 2 prognostic scores have been proposed: the ABCD score to predict risk for stroke at 7 days and the California score to predict risk for stroke at 90 days.

In the study by Johnston and colleagues, both scores were externally validated (generalizable) for predicting risk for stroke at 2, 7, and 90 days in 4 independent cohorts of patients with TIA. Moreover, the study showed that a new unified score, ABCD2, based on 5 clinical factors had somewhat greater predictive value. The validity of the ABCD2 score is also supported by other studies that identified increasing age, limb weakness, and diabetes as risk factors for stroke after TIA (1, 2). Some aspects of the ABCD2 score (e.g., unilateral weakness, speech impairment, and prolonged duration TIA) probably have prognostic value because they improve the diagnosis of TIA from the presence of non-TIA disorders (e.g., syncope or migraine). The other features that are important vascular risk factors (increasing age, high blood pressure, and diabetes) are likely to be relevant to the cause of future stroke.

Although additional risk factors not collected from the derivation cohorts might augment the predictive accuracy of the ABCD2 score (e.g., frequent TIAs, symptomatic large artery disease, and new ischemic lesions on brain imaging), the new ABCD2 score is the most externally valid prediction tool currently available. It is ready for use in clinical practice and can be used to triage patients into low- (1% 2-d risk), moderate- (4%), and high-risk (8%) groups. Patients classified at high risk should be prioritized for immediate evaluation, targeted intervention, and perhaps inpatient observation to minimize their risk for future stroke and maximize their chances of access to early thrombolysis (and thereby improved survival free of handicap) should a stroke occur in the next few days.

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