The ABCD, California, and unified ABCD^2 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 GP/FP/Primary care ★★★★★★☆ Neurology ★★★★★★☆ Internal medicine ★★★★★☆☆

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

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, USA and family practices and specialist clinics in Oxfordshire, UK.

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

Description of prediction guide: The ABCD^2 score was generated in the 2 original derivation cohorts by multivariate 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 ABCD^2 score (range 0–7) was a summation of 5 independent risk predictors: Age (≥60 y = 1), Blood pressure (systolic ≥140 mm Hg or diastolic ≥90 mm Hg = 1), Clinical features (focal weakness = 2, speech impairment without focal weakness = 1), Duration of symptoms (≥60 min = 2, 10–59 min = 1), and Diabetes = 1.

Outcomes: 2, 7, and 90 day risk of 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 ABCD^2, ABCD, and California risk scores did not differ for prediction of 2, 7, or 90 day stroke (AUROC curve 0.62–0.83 *v* 0.62–0.81 *v* 0.60–0.79). For the ABCD^2 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 ABCD^2 score classified 34%, 45%, and 21% of patients as low (score 0–3), moderate (score 4–5), and high (score 6–7) risk of stroke, respectively.

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CONCLUSION

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

Abstract and commentary also appear in ACP Journal Club.

Commentary

Identification of patients at highest and lowest risk of stroke may allow effective yet costly or risky investigations, interventions, and hospital admissions 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 of stroke at 7 days and the California score to predict risk of stroke at 90 days.

In the study by Johnston *et al*, both scores were externally validated (generalisable) for predicting stroke risk at 2, 7, and 90 days in 4 independent cohorts of patients with TIA. Moreover, the study showed that a new unified score, ABCD^2, based on 5 clinical factors had somewhat greater predictive value. The validity of the ABCD^2 score is also supported by other studies that identified increasing age, limb weakness, and diabetes as risk factors of stroke after TIA.[1-2] Some aspects of the ABCD^2 score (eg, unilateral weakness, speech impairment, and prolonged duration TIA) probably have prognostic value because they improve the diagnosis of TIA from non-TIA disorders (eg, 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 ABCD^2 score (eg, frequent TIAs, symptomatic large artery disease, and new ischaemic lesions on brain imaging), the new ABCD^2 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 prioritised for immediate evaluation, targeted intervention, and perhaps inpatient observation to minimise their risk of future stroke and maximise 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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1 Streifler JY, Eliasziw M, Benavente OR, *et al*. The risk of stroke in patients with first-ever retinal vs hemispheric transient ischemic attacks and high-grade carotid stenosis. North American Symptomatic Carotid Endarterectomy Trial. *Arch Neurol* 1995;**52**:246–9.
2 Hill MD, Yiannakoulias N, Jeerakathil T, *et al*. The high risk of stroke immediately after transient ischemic attack: a population-based study. *Neurology* 2004;**62**:2015–20.

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

Risk group (score)	2 day stroke		7 day stroke		90 day stroke	
	Prevalence	LR	Prevalence	LR	Prevalence	LR
Low (0–3)	1.0%	0.26	1.2%	0.21	3.1%	0.31
Moderate (4–5)	4.1%	1.1	5.9%	1.1	9.8%	1.1
High (6–7)	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.