Predictive Accuracy of the ABCD² Clinical Prediction Rule: A Systematic Review and Preliminary Analysis of Pooled Data

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Introduction

An estimated 1 in 20 people with incident transient ischaemic attack (TIA) have a stroke in the ensuing seven days.[1] The risk of stroke is greatest in the first 24 to 48 hours after TIA with up to half of all subsequent strokes occurring during this time.[2]

There is increasing evidence that early investigation and initiation of currently recommended treatments is associated with a significant reduction in expected stroke events in this group.[3,4]

The ABCD² clinical prediction rule was derived and validated in 2007 to predict an individuals risk of stroke in the days and weeks following TIA. Since in most cases TIAs follow a benign short-term course, the developers of the score premised that by identifying those individuals at highest and lowest risk of stroke, more informed decisions could be made regarding the need for immediate treatment including the need for hospital admission.[5]

Several independent validations of the score have since been published across a variety of different populations and clinical settings.

Objective

To accumulate all available relevant data from validation studies to date to determine the overall predictive value of the ABCD² score.

Methods

Relevant articles were obtained from a literature search which included the following search engines: Cochrane, EMBASE, Science Direct and Pubmed and supplemented by hand searching references of retrieved articles.

Data was collected under three risk strata: low (0-3), intermediate (4-5) and high (6-7) and for clarity a 2-way contingency table was used to calculate stroke rates, sensitivities, specificities and negative predictive value (NPV). Additionally we performed a chi-squared test for trend analysis.

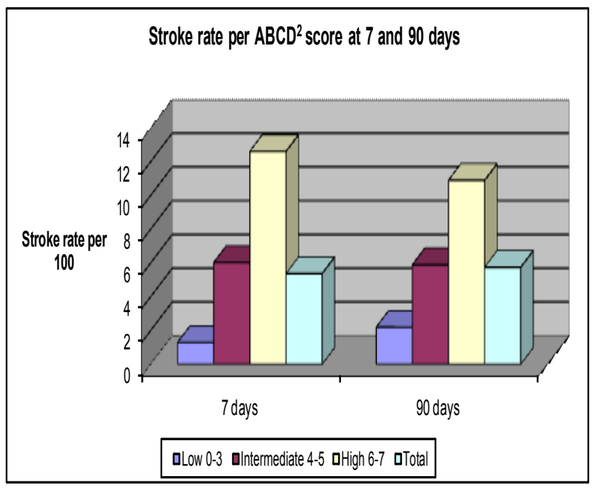
To assess the accuracy of the score, the expected versus observed number of strokes was compared for each study using the derivation study as the predictive model. Review manager 5 from the Cochrane collaboration was used to perform the analysis. Forest plots were produced and the results were expressed as relative risks with 95% CI's using the Mantel-Haenszel statistical method.

Results

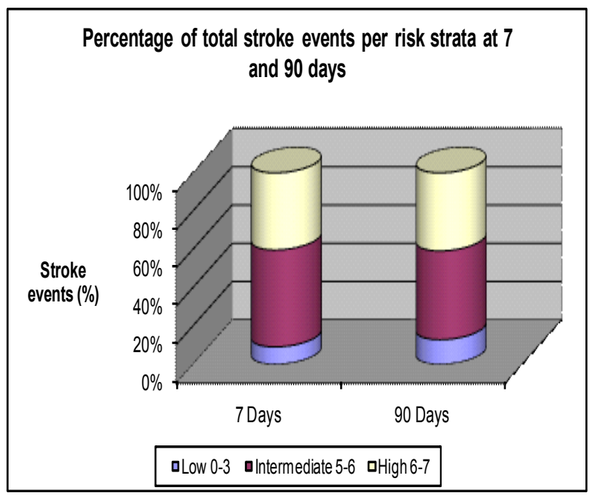
Eight studies with eleven cohorts (n=5360) reported 7 day risk of stroke. Five studies with eight cohorts reported 90 day risk of stroke (n=4992). Four studies had information on both 7 and 90 day risk of stroke. Five cohorts were ED based, two were TIA-clinic based, two were population based and two were based in specialty stroke centres.

The study by Asimos et al (2007) contributed to the heterogeneity of the pooled data due to the method recruitment and a subsequent sensitivity analysis was performed from which the following data is based.

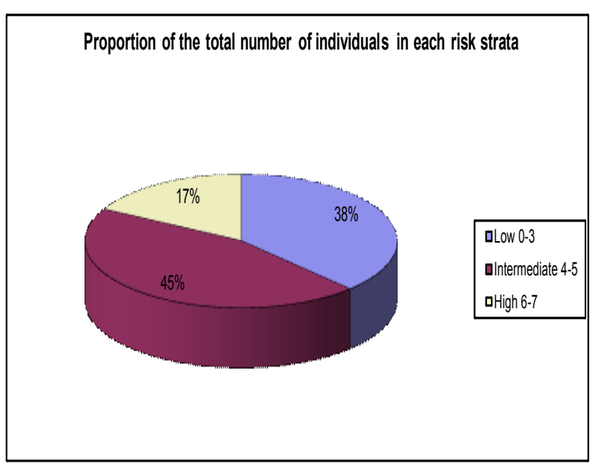
As the trichotomised ABCD² score increased, the rate of stroke increased (p-value <0.0001). The score successfully divided the total group into those at lowest, intermediate and highest risk of stroke at both 7 and 90 days.



Our pooled data show that 9% of the total strokes at 7 days occurred in the low risk group, this group accounted for 38% of the total number of individuals resulting in a stroke rate of 1.3 per 100. A score < 4 had a NPV of 0.987.



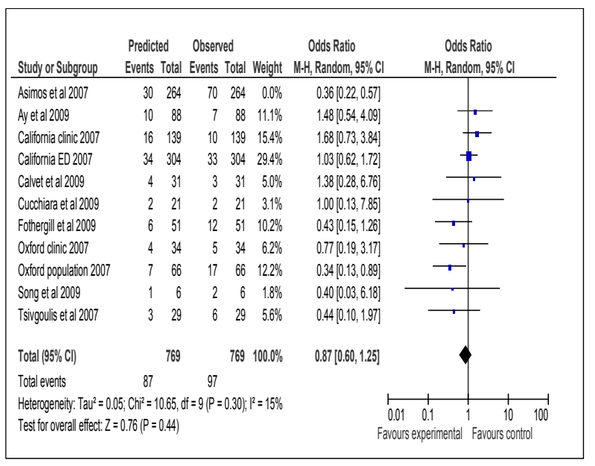
51% and 40% of the total strokes at 7 days occurred in the intermediate and high risk groups respectively. Accounting for 45% and 17% of the total number of individuals this gave respective stroke rates of 6% and 12.6%. A score > 4 has sensitivity of 0.909 and specificity of 0.394.



Relative to the original derivation study, our analysis found that the trichotomised ABCD² score accurately predicted the risk of stroke at 7 days through all 3 strata of risk though with wide CIs. Example at low risk (0-3), RR 1.08, 95% CI (0.58-2.02).

Our analysis showed a relative over-prediction of risk at 90 days in the derivation study across all 3 strata and with wide confidence intervals. Example at high risk (6-7) RR 1.66, 95% CI (0.81-3.41).

Intermediate Risk Group (4-5) at 7 days with Asimos removed



Discussion

The results of this pooled analysis confirm the ability of the ABCD² score to separate those at lowest, intermediate and highest risk of stroke following TIA across a wide range of populations and clinical settings.

The results also show that the score has limitations. For example in the low risk group, although the stroke rate was low at 1.3/100, approximately 9% of the total number of strokes still occurred in this group. The clinician needs to be aware of this risk when making clinical decisions based on the ABCD² score.

References

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