

# VALIDATION OF STROKE MIMIC PREDICTION SCALES IN THE EMERGENCY DEPARTMENT

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## BACKGROUND

A third of patients presenting to the Emergency Department (ED) with stroke-like symptoms are, in fact, stroke mimics. This poses a significant diagnostic challenge for time-sensitive treatment decision making, specifically for thrombolysis. Accurate diagnosis of ischemic stroke is critical, as thrombolytic treatment in stroke mimics may result in life threatening harm of intracerebral haemorrhage without any clinical benefit. The use of additional investigative tools to confirm ischemic stroke, such as MRI brain, may not be universally available.

Four stroke mimic prediction scores, using only history and examination findings, have been published. The scores are namely the FABS<sup>1</sup>, simplified FABS (sFABS)<sup>2</sup>, the TeleStroke Mimic (TM)<sup>3</sup> and Khan's score<sup>4</sup> (Table 1).

## AIM

We aim to validate the 4 stroke mimic prediction scores by performing a head-to-head comparison in a single ischemic stroke cohort that was treated with thrombolysis.

## METHODS

We retrospectively reviewed medical records of consecutive patients who were administered intravenous thrombolysis at a single primary stroke centre, between January 2015 and October 2017. All clinical variables required by the 4 stroke mimic prediction scales were simultaneously rated by a single independent rater. Only clinical information available prior to intravenous thrombolysis administration were used to rate the scales, and the rater was blinded to the final diagnosis. The final clinical diagnosis of ischemic stroke or stroke mimic was made by an independent neurologist.

Area under receiver operating characteristics curve (AUROC) were performed and compared among scores. AUROC of at least 0.7 was considered as clinically acceptable.

| Title   | Clinical Variables  | Values   | Indicator   |
|---|---|--|---|
| <b>FABS</b><br>Minimum 0,<br>Maximum 6                        | 1) Absence of Facial Droop<br>2) Age < 50 years<br>3) Absence of Atrial Fibrillation (AF)<br>4) Systolic blood pressure < 150mmHg at presentation<br>5) Presence of Isolated sensory deficit<br>6) History of seizure disorder    | 1 point per variable.                          | Higher the score, <b>more likely</b> a stroke mimic   |
| <b>Simplified FABS</b><br>Minimum 0,<br>Maximum 4             | 1) Absence of Facial Droop<br>2) Age less than 50 years<br>3) Absence of AF<br>4) Systolic blood pressure less than 150mmHg at presentation   | 1 point per variable.                          | Higher the score, <b>more likely</b> a stroke mimic   |
| <b>TeleStroke Mimic</b><br>Minimum: -6,<br>maximum: 6,<br>Nil | 1) Age (per year)<br>2) AF<br>3) Hypertension<br>4) Seizures<br>5) Facial weakness<br>6) NIHSS > 14   | +0.2 per year<br>+6<br>+3<br>-6<br>+9<br>+5    | Higher the score, <b>less likely</b> the stroke mimic |
| <b>Khan's score</b><br>Minimum: 0<br>Maximum: 9               | 1) Age: <50<br>50-70<br>>70<br>2) Presence of hypertension/ hyperlipidemia/ diabetes mellitus/AF: None<br>1 without AF<br>2 or 3 without AF<br>AF<br>History of migraine<br>History of epilepsy<br>History of psychiatric illness | 2<br>1<br>0<br>3<br>2<br>1<br>0<br>2<br>1<br>1 | Higher the score, <b>more likely</b> a stroke mimic   |

Table 1: Clinical components of stroke mimic scores

## RESULTS

A total of 257 patients were administered intravenous thrombolysis over the study period. A total of 17 (6.6%; 95% CI 4.2%-10.3%) stroke mimics were identified. The clinical characteristics of our study population are shown in Table 2. Stroke mimics were younger, more had migraines and history of psychiatric illness, and fewer had hypertension.

TeleStroke Mimic Score had the highest discrimination for stroke mimic (AUROC = 0.78; 95% CI 0.65-0.9), followed by Khan (AUROC = 0.69; 95% CI 0.55-0.82), FABS (AUROC = 0.42, 95% CI 0.42-0.57) and Simplified FABS (AUROC = 0.43, 95% CI = 0.28 – 0.58). (Figure 1)

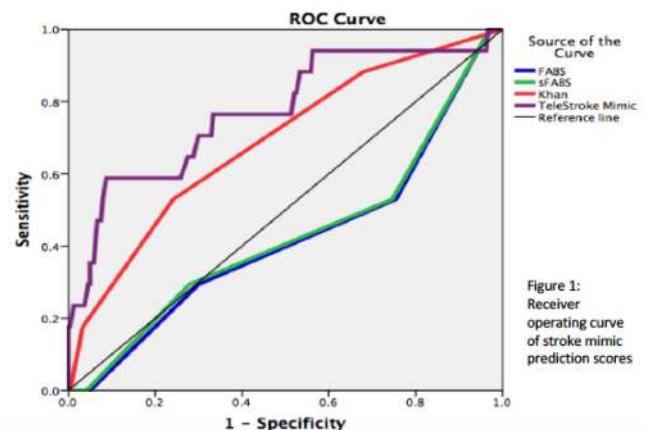
TeleStroke Mimic Score performed significantly better over FABS and Simplified FABS score (p<0.001) but was not compared to Khan's score.

| Clinical Variables                    | Stroke (n = 240) | Stroke Mimic (n = 17) | OR of a stroke mimic (95% CI) | p-value |
|---------------------------------------|------------------|-----------------------|-------------------------------|---------|
| Female, n (%)                         | 81 (33.8%)       | 9 (59.2%)             | 2.21 (0.82-5.94)              | NS      |
| Age, mean (SD)                        | 66 (13)          | 57 (17)               | 0.96 (0.92-0.99)              | 0.014   |
| SBP, mean (SD)                        | 160.0 (28.1)     | 161.4 (33.9)          | 1.00 (0.98 – 1.02)            | NS      |
| DBP, mean (SD)                        | 90.9 (19.8)      | 89.7 (15.3)           | 1.00 (0.97 – 1.02)            | NS      |
| History of Seizures, n (%)            | 2 (0.8%)         | 0 (0.0%)              | 0.93 (0.90-0.96)              | NS      |
| History of Migraine, n (%)            | 2 (0.8%)         | 3 (17.6%)             | 25.6 (3.94-166)               | 0.002   |
| Hypertension, n (%)                   | 146 (60.8%)      | 6 (35.3%)             | 0.93 (0.87-1.00)              | 0.038   |
| Hyperlipidemia, n (%)                 | 101 (42.1%)      | 5 (29.4%)             | 0.97 (0.91-1.03)              | NS      |
| Diabetes Mellitus, n (%)              | 53 (22.1%)       | 5 (29.4%)             | 1.03 (0.94-1.12)              | NS      |
| Atrial Fibrillation, n (%)            | 32 (13.3%)       | 1 (5.9%)              | 0.96 (0.89-1.03)              | NS      |
| History of Psychiatric Illness, n (%) | 7 (2.9%)         | 3 (17.6%)             | 7.14 (1.66-30.30)             | 0.022   |
| NIHSS on presentation, median (range) | 9 (1-32)         | 6 (2-30)              | -                             | NS      |

Table 2: Clinical characteristics of study population

| Score            | Optimal cutoff score | Sensitivity (%) | Specificity (%) | Positive predictive Value (%) | Negative predictive value (%) |
|------------------|----------------------|-----------------|-----------------|-------------------------------|-------------------------------|
| FABS             | 2 or more            | 52.9            | 24.6            | 4.7                           | 88.1                          |
| Simplified FABS  | 2 or more            | 52.9            | 25.4            | 4.8                           | 88.4                          |
| TeleStroke Mimic | 12 or less           | 47.1            | 93.3            | 33.3                          | 96.1                          |
| Khan's Score     | 3 or more            | 52.9            | 75.8            | 13.4                          | 95.8                          |

Table 3: Performance characteristic of Scales to identify stroke mimics



## CONCLUSION

TeleStroke Mimic Score had the highest discrimination for stroke mimics among the 4 scores evaluated.

References:

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