



ORIGINAL RESEARCH PAPER

Emergency Medicine

IMPLEMENTATION OF THE ASTRAL SCORE IN THE EMERGENCY DEPARTMENT OF D.Y. PATIL HOSPITAL, NAVI MUMBAI

KEY WORDS: Ischemic Stroke, ASTRAL Score, Emergency Medicine, Outcome Prediction, mRS

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ABSTRACT Ischemic stroke remains the leading cause of adult disability and a major contributor to mortality in India. Timely prediction of outcomes is critical to guide treatment intensity and counseling. The ASTRAL Score (Acute Stroke Treatment Registry and Analysis of Lausanne) is a validated tool to estimate 3-month prognosis in acute ischemic stroke. We conducted a prospective observational study at DY Patil Hospital, Navi Mumbai, including 47 patients. The ASTRAL Score demonstrated excellent predictive power with an AUC of 0.88 and good calibration. These results support its use in Indian emergency departments for early risk stratification and informed decision-making.

INTRODUCTION

Stroke is the second leading cause of death worldwide and a significant contributor to long-term disability, particularly in low- and middle-income countries like India. The increasing prevalence of hypertension, diabetes, sedentary lifestyles, and tobacco use has contributed to a rise in ischemic stroke cases. In India alone, stroke incidence is estimated at 145 per 100,000 population, with many patients presenting late and receiving delayed interventions.

Early outcome prediction is essential in triaging patients, allocating ICU resources, and initiating timely interventions like thrombolysis. Clinical scoring systems such as the NIH Stroke Scale (NIHSS), iScore, and DRAGON have been used, but many require advanced imaging or are cumbersome in acute settings.

The ASTRAL Score, first developed in Lausanne, Switzerland, provides a simple, integer-based prediction model using readily available clinical data at admission. It incorporates six variables: age, baseline NIHSS score, time from symptom onset to admission, presence of visual field defect, aphasia, and decreased consciousness.

The present study aimed to evaluate the predictive performance and calibration of the ASTRAL Score in an Indian tertiary emergency setting, where such tools can significantly streamline early prognostication.

MATERIALS AND METHODS

Study Design: This study was a prospective observational study conducted to assess the applicability of the ASTRAL Score in a real-world Indian setting. By tracking outcomes over a four-month period, we aimed to gather data on the effectiveness of the score in predicting outcomes for ischemic stroke patients in the emergency room.

Duration: The study took place over four months, from January 2025 to April 2025, ensuring that enough cases were included to provide meaningful insights.

Location: The research was conducted at DY Patil Hospital, Navi Mumbai, in the Emergency Room (ER) of a tertiary care hospital. The hospital has a well-established reputation for treating stroke patients and has a specialized neurology department capable of handling acute neurological emergencies.

Sample Size: The study included 47 patients who met the inclusion criteria. Although this is a relatively small sample, it still offers valuable preliminary data that could inform future, larger studies.

Inclusion Criteria:

- Patients aged 18 years or older.

- Diagnosed with acute ischemic stroke, confirmed by neuroimaging (CT or MRI).
- Presented within 24 hours of symptom onset.

Exclusion Criteria:

- Patients with hemorrhagic stroke, as confirmed by imaging.
- Patients with conditions that mimic stroke, such as seizures or hypoglycemia.
- Patients with Transient Ischemic Attacks (TIAs) or who presented after 24 hours of symptom onset.

RESULTS

The study included 47 patients with a median age of 68 years, reflecting the typical age group affected by ischemic stroke. Of the participants, 55% were male, which aligns with global trends where men are more likely to suffer from ischemic stroke at younger ages. Most strokes were located in the Middle Cerebral Artery (MCA) territory, a common site for ischemic events due to its extensive blood supply to vital brain areas.

Table 1. NIHSS Distribution

NIHSS Category	Score Range	Number of Patients	Percentage
Minor Stroke	0–4	10	21.3%
Moderate Stroke	5–15	22	46.8%
Moderate to Severe Stroke	16–20	9	19.1%
Severe Stroke	21–42	6	12.8%
Total	—	47	100%

Regarding outcomes, 47% of patients experienced poor functional recovery, defined as a modified Rankin Scale (mRS) score greater than 2, indicating moderate to severe disability. This result is consistent with existing literature, where the proportion of patients with poor outcomes typically falls within the same range (47–49%).

Table 2. Metrics Calculated

Metric	Value
AUC (Area Under Curve)	0.88
True Positives (TP)	19
False Positives (FP)	3
True Negatives (TN)	22
False Negatives (FN)	3
Sensitivity (Recall)	86.4%
Specificity	88.0%
Positive Predictive Value	86.4%
Negative Predictive Value	88.0%
Accuracy	87.2%

The ASTRAL Score, which was used to predict 3-month outcomes, demonstrated excellent discriminatory power, with an Area Under the Curve (AUC) of 0.88. This suggests that the ASTRAL Score accurately differentiates between patients

likely to experience good or poor outcomes, corroborating findings from the original Swiss study, which reported an AUC of 0.87. Additionally, the Hosmer-Lemeshow test yielded a p-value of 0.39, indicating that the model was well-calibrated and provided a good fit to the data from this cohort.

DISCUSSION

The results of this study suggest that the ASTRAL Score is a reliable tool for predicting long-term outcomes in patients with acute ischemic stroke in an Indian emergency department setting. The high AUC of 0.88 supports its utility in distinguishing between patients who are likely to experience favorable or poor outcomes, similar to the results reported in the original Swiss cohort. The rate of poor outcomes in our cohort (47%) is in line with global studies, which commonly report poor functional outcomes in a similar range.

The ASTRAL Score includes essential clinical parameters—age, NIHSS score, time from symptom onset, presence of aphasia, and consciousness level—all of which have been shown to correlate with stroke severity and functional recovery. The ability of the ASTRAL Score to predict outcomes based on these factors underscores its potential role in guiding clinical decision-making, particularly in emergency departments where timely intervention is critical. Identifying high-risk patients early can help in prioritizing treatment and tailoring interventions accordingly, potentially improving patient outcomes.

However, the study has several limitations. The small sample size of 47 patients and the single-center design restrict the generalizability of our findings to the broader Indian population. Additionally, the brief duration of the study, which only tracked 3-month outcomes, limits the ability to assess long-term recovery. Further studies involving larger, multi-center cohorts are necessary to confirm the broader applicability of the ASTRAL Score in diverse clinical settings.

CONCLUSIONS

The ASTRAL Score demonstrated strong prognostic accuracy in predicting 3-month outcomes for patients with acute ischemic stroke, with an AUC of 0.88, which is comparable to international benchmarks. Its ability to accurately predict outcomes makes it a valuable tool for early risk stratification in acute ischemic stroke cases. This can facilitate resource prioritization and inform clinical decisions regarding patient management. While the findings are promising, further research involving larger, multi-center studies is needed to validate the ASTRAL Score's performance across different Indian populations. This will help refine stroke care protocols and potentially guide national stroke management strategies, ultimately improving patient outcomes across the country.

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