ABSTRACT

AI-Assisted Early Detection of TIA and Minor Stroke in a High-Volume Neurology Outpatient Clinic: A Pilot Mixed-Model Study

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Background:

TIA and minor ischemic strokes often present with fleeting, ambiguous symptoms that are easily obscured by the "noise" of routine outpatient neurology—brief numbness, momentary speech slurring, or non-specific dizziness. In high-volume settings, early recognition depends heavily on clinical instinct, which is prone to fatigue. This study examined whether a lightweight AI-supported triage model could sharpen detection and surface vascular risk sooner without disrupting OPD flow.

Methods:

A mixed retrospective–prospective approach was utilized over three months. Retrospective data from 62 confirmed TIA/minor stroke cases were analyzed to train the model on predictive patterns: transient focal deficits, blood pressure variability, gait disturbances, and short-lived sensory changes. The prospective arm screened 184 consecutive new patients presenting with headache, vertigo, or transient neurological symptoms. An AI tool stratified patients into Low, Moderate, or High vascular risk. Neurologist assessment followed by MRI/MRA imaging served as the gold-standard confirmation.

Results:

Of the 184 screened patients, 16 were eventually confirmed to have TIA or minor stroke via imaging. The model flagged 38 patients as High Risk; this group contained 14 of the 16 confirmed cases.

Performance metrics were as follows:

- **Sensitivity:** 87.5% (14/16 detected)
- **Specificity:** 86%
- **Accuracy:** 86%
- **ROC–AUC:** 0.85

Operationally, the system reduced the average decision-to-imaging interval from **92 minutes to 54 minutes**. Crucially, five patients initially triaged verbally as "likely headache" or "anxiety episode" were reclassified as High Risk by the AI and subsequently confirmed as ischemic events on imaging.

Discussion:

The model's high sensitivity (87.5%) validates its utility as a digital safety net, ensuring subtle vascular signals are not missed during rapid OPD intake. While the specificity (86%) resulted in some false positives, the clinical trade-off is favorable: the system successfully identified high-risk patients who might otherwise have been discharged without imaging.

Conclusion:

A pragmatic AI-driven triage workflow can significantly strengthen early detection of TIA and minor stroke in outpatient neurology. Its integration minimizes missed vascular events and supports faster clinical decision-making in real-world Indian OPD settings.