

STATISTICAL SIGNIFICANCE

STATISTICS INFORMS STROKE CARE

Statistical analyses based on high-quality clinical trial and registry data promote sound triage policies, efficient use of emergency resources, and better outcomes for stroke patients—especially in rural areas far from specialized care.

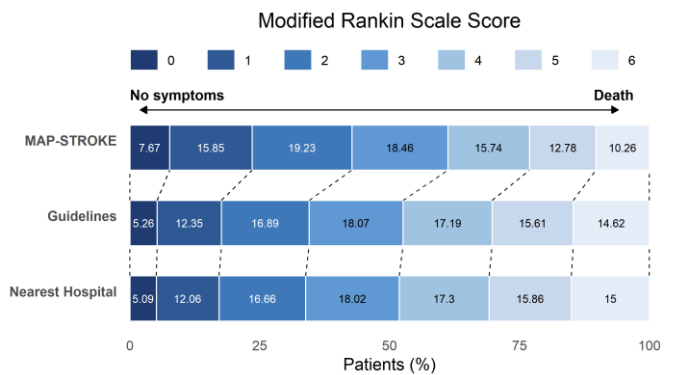
PREHOSPITAL STROKE TRIAGE

Time is brain. Stroke treatment is highly time-sensitive, but the fastest route to a hospital and the best route to the right hospital are often not the same one. Clot-dissolving therapy (tPA) must be given within 4.5 hours and is available almost everywhere, while endovascular therapy (EVT) works up to 24 hours but only at specialized centers.

Predicting stroke subtype: Not every stroke is treated the same way, and the best treatment depends on a diagnosis that cannot be confirmed before the patient reaches a hospital. Statisticians build **diagnostic models** that estimate the probability of large-vessel occlusion (LVO), non-LVO, hemorrhage, or stroke mimic.

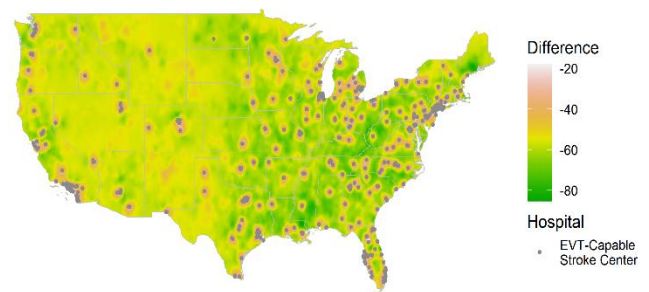
Projecting outcomes under each choice: Disability is commonly summarized on the modified Rankin Scale (mRS). **Statistical models estimate the probability of recovery** for different triage strategies and stroke treatments, helping guide routing decisions based on expected patient outcomes rather than distance or suspected stroke subtype.

The tradeoffs of routing: Routing directly to EVT centers can speed recovery for LVO strokes but may delay time-sensitive therapy for non-LVO and hemorrhagic patients. Statisticians make this tension explicit, so decision-makers see the **full balance of benefits and harms**, not just the headline result.



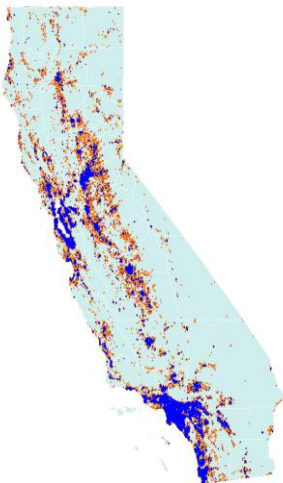
Predicted recovery, rural LVO patients. mRS distribution under model-based triage versus AHA guidelines and nearest-hospital.

Quantifying who benefits, and where: A model-based rule increased the share of rural LVO patients reaching a good outcome by **8.3 percentage points**, driven largely by an estimated 77-minute reduction in time to EVT—concentrated where distances to specialized care are greatest.



Time saved to EVT. Estimated difference in minutes to EVT for LVO patients, MAP-STROKE versus AHA guidelines.

Measuring what is traded away: Sound analysis reports costs alongside gains. The same simulations quantify modest declines in good outcomes for non-LVO and hemorrhagic strokes when routing favors LVO care.



Simulating policy at national scale: To learn what a model-based triage rule would do before deploying it, statisticians run **posterior predictive simulations**: hundreds of millions of realistic stroke events are generated from census data, county incidence stroke rates, and observed onset and transport times, then routed under competing strategies to predict patient outcomes.