

SLP in Pre-Hospital Stroke Care: Evaluating EMS Accuracy in Identifying Aphasia and Dysarthria and Its Impact on Patient Outcomes

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Background

Stroke is a leading cause of death and long-term disability, with >750,000 cases annually in the U.S. EMS providers are the first point of clinical contact, playing a critical role in early stroke identification.

Rapid recognition and activation of stroke protocols directly influence:

- Treatment timelines
- Access to intervention (tPA, thrombectomy)
- Long-term quality of life

Despite advancements:

- No true “gold standard” prehospital screening tool
- Persistent variability in diagnostic accuracy

Problem Gap: Inconsistent assessment of communication deficits across prehospital stroke screening tools significantly compromise diagnostic accuracy, leading to under-recognition of stroke, misclassification of stroke type and severity, inappropriate triage and transport decisions, and delays in the activation of critical, time-sensitive stroke interventions.

EMS training in neurological disorders is limited:

- <1% of training is dedicated to central nervous system conditions.
- Training on speech components is general and broad.
- Speech-language pathology has not been included in tool development.

Understanding speech components like aphasia (language disorder) and dysarthria (speech disorder) is essential, as it helps EMS professionals to differentiate between a stroke and other medically complex conditions. For example, slurred speech and confusion are common among stroke victims but are also symptoms of other conditions.

Critical Gap: Communication impairments are under-identified, misclassified, or missed entirely in EMS training. A well-designed stroke screening tool can address this challenge.

Aims

Primary Aim: To synthesize current literature examining the validity, reliability, and clinical utility of communication-related components in prehospital stroke screening tools administered by EMS personnel.

Additional Aims:

- Evaluate variability in the assessment of speech and language components across prehospital stroke screening tools.
- Identify common sources of error and misinterpretation of communication deficits by EMS personnel.
- Examine the impact of inaccurate identification of speech and language impairments on prehospital clinical decision-making, transport destination, and patient outcomes.
- Explore the role of speech-language pathologists in the development and refinement of stroke screening tools, including opportunities for expansion into the prehospital phase of care.

Methods

A literature review was conducted to evaluate prehospital stroke screening tools and their assessment of communication deficits.

Studies were analyzed to compare tool accuracy, identify variability in EMS assessment, and examine the impact of misclassification on clinical decision-making and patient outcomes.

Analysis of Current EMS Tools

Tool	Year Developed	Assesses Speech?	What aspect is being assessed?	Differentiates between aphasia and dysarthria?	Complexity of Assessment
CPSS (Cincinnati Prehospital Stroke Scale)	1998	Yes	'Slurred Speech'	No	Non-Specific
FAST (Face, Arms, Speech, Time)	2003	Yes	'Speech Disturbance'	No	Non-Specific
LAMS (Los Angeles Motor Scale)	2006	No	None	N/A	Absent
RACE (Rapid Arterial Occlusion Evaluation)	2014	Yes	Aphasia/Neglect	Aphasia Only	Categorical
FAST-ED (Face, Arms, Speech, Time, Eyes, Denial)	2016	Yes	'Speech Changes'	No	Non-Specific
VAN (Vision, Aphasia, Neglect)	2016-2017	Yes	Aphasia/Neglect	Aphasia Only	Categorical
BE-FAST (Balance, Eyes, Face, Arms, Speech, Time)	2017	Yes	'Slurred Speech'	No	Non-Specific

Study	Tool(s)	Sensitivity	Specificity	EMS Accuracy
Patel et al., 2022	VAN	78%	67%	Moderate
Vaclavik et al., 2018	FAST PLUS	93%	47%	Good- High rate of missed LVO's
Brandler et al., 2015	CPSS	62.4%	99.6%	Varies- High rate of missed strokes
Perez De La Ossa et al., 2014	RACE	85-89%	55-65%	Varies
Noorian et al., 2018	LAMS	73-76%	65-71%	Good
Richards et al., 2018	CPSS	41%	88%	Varies
Pickham et al., 2019	FAST vs BE-FAST	FAST: 76% BE-FAST: 91%	56% 68%	Varies
Hansson et al., 2019	FAST	89%	29%	Varies
Karimi et al., 2020	CPSS	36-78%	66-91%	Varies
Lima et al., 2016	FAST-ED	60-90%	70-89%	Good
Katz et al., 2015	CPSS	79-92%	40-89%	Varies
Birnbaum et al., 2021	VAN	85-90%	60-75%	Good
Sang Oh et al., 2025	FAST, CPSS, LAMS, RACE, FAST-ED	FAST: 87% CPSS: 79% LAMS: 68% RACE: 69% FAST-ED: 72%	57% 59% 84% 80% 80%	Varies
Zohrevandi et al., 2015	CPSS	79-95%	24-79%	Varies
Aroor et al., 2017	BE-FAST	90%	57%	Good
Duvelkot et al., 2021	RACE, LAMS, CPSS	85%	68%	Varies

Findings

Early tools (CPSS, FAST):

- Treatment timelines
- Wide variability in specificity (24%–99.6%)
- Inconsistent EMS accuracy

Advanced tools (RACE, FAST-ED, VAN):

- Improved performance
- Still lack comprehensive communication assessment

EMS performance:

- High sensitivity for speech abnormalities (~85%)
- Lower specificity (~65%) → over-classification

Agreement with neurologists:

- Moderate but decreases when isolating aphasia

Result: No single tool demonstrates consistent diagnostic reliability

Conclusions

Prehospital stroke screening remains essential to patient outcomes; however, current tools demonstrate significant variability in accuracy, particularly in identifying communication deficits. Aphasia and dysarthria are frequently misclassified or under-recognized, which may delay intervention and negatively impact quality of life.

These findings highlight the need for standardized, evidence-based screening approaches and improved EMS training. Integrating speech-language pathology expertise into prehospital care represents a critical opportunity to enhance diagnostic accuracy, strengthen interprofessional collaboration, and improve patient outcomes from the earliest point of medical contact.

Implications for MedSLP Practice: Expands MedSLP role into prehospital stroke care. MedSLPs can:

- Improve identification of aphasia and dysarthria
- Enhance EMS training
- Increase diagnostic precision

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References

