

Enhanced Medical Control in the Pre-Hospital Triage of Patients with a Suspected Severe Stroke

Curtis Benesch, MD, MPH

Professor of Neurology and Neurosurgery

Medical Director, UR Comprehensive Stroke Center

University of Rochester School of Medicine and Dentistry



Disclosures

- I currently have no financial disclosures.

Background

- Optimal strategies for the identification and triage of patients with a potential LVO in the prehospital setting are lacking
- Utility of existing scales is limited:
 - Suboptimal sensitivity and specificity of current scales
 - Unfamiliarity within the EMS community
 - Minimal time to administer complex scales in the field
- G-FAST (Face-Arm-Speech-Time Scale + Gaze preference)
 - Cincinnati Prehospital Stroke Scale commonly used by EMS
 - If all elements positive, likelihood of an LVO increased 20-fold

Background

- The Upstate New York Stakeholder Proceedings (June 2016)
 - Regional symposium on prehospital triage and interhospital transfer
 - **Enhancing the role of Medical Control in prehospital triage** was a key recommendation, deemed to have high feasibility and high impact

Hypothesis:

- *Medical Control will ascertain the presence of gaze abnormalities along with the existing CPSS in pre-arrival notification reports by EMS to Medical Control*
- *Use of this algorithm will optimize triage of patients with LVO to an endovascular-capable/comprehensive stroke center*

Background

- Specific Aims:
 - To determine the feasibility of including gaze preference/deviation with the CPSS in pre-arrival notification reports from EMS to Medical Control
 - To determine the accuracy of the Enhanced Medical Control (EMC) algorithm in directing triage to the appropriate stroke center level
 - Sensitivity and specificity of the algorithm
 - Large vessel occlusion by imaging
 - Gaze preference (NIHSS subscale)
 - Impact on EMS diversion
 - Rates of inappropriate diversions vs failure to divert

Methods

- Study involved 8 hospitals in and around Rochester, NY and surrounding counties
 - 2 CSC/thrombectomy-capable centers, 6 PSCs
 - Over 80 EMS transporting agencies across 2 regions
- Education/training of Medical Control and EMS providers:
 - Direct contact with all EM Directors
 - Dissemination of study protocol and expectations via EMS modules/network, including a training video on gaze preference/deviation

Methods

Medical Control will instruct EMS to bypass the original destination in favor of transport to the nearest CSC or EVC-center if the following criteria are met:

- CPSS = 3, gaze preference is present
- Transport time to nearest EVC or CSC is ≤ 30 minutes
- Transport to EVC or CSC does not preclude thrombolytic treatment at nearest PSC or “stroke-ready” facility

Materials

Enhanced Medical Control Stroke Algorithm

Ask the following on all pre-arrival notifications for a suspected stroke and circle responses:

Patient Name:

Date of Call:

Patient DOB:

Time of Call:

What time was the patient last known well?

Time: ____ : ____

Is the Cincinnati Prehospital Stroke Scale positive?

Yes

No

If yes, which of the following are positive?

Facial weakness

(facial droop, asymmetry)

Yes

No

Arm weakness

(arm drifts or cannot move)

Yes

No

Speech abnormality

(slurred, abnormal words, or mute)

Yes

No

Does the patient have a gaze preference or deviation?

(Is the patient looking to one side or unable to follow your finger from one side to the other)

Yes

No

If NO to any, proceed to the nearest stroke center

Complete destination information below

If YES to all of the above

Transport the patient to Strong or RGH, whichever is closest, UNLESS the additional transport time to that facility places the patient outside the tPA treatment window.

Circle the initial destination:

Strong Highland Thompson Noyes Geneva General Soldiers and Sailors

RGH Unity Newark United Memorial Other: _____

Circle the final destination:

Strong Highland Thompson Noyes Geneva General Soldiers and Sailors

RGH Unity Newark United Memorial Other: _____

Results

Data were collected from June 1 – September 30, 2018

Total number of forms completed by Medical Control (n = 224)

CSC/EVC	83.5%
PSC	16.5%

Each subject underwent a brief chart review at each destination hospital (NIHSS, vascular imaging, acute treatment/intervention)

	<u>%</u>
• CPSS (+ one element)	98.7
• CPSS (+ all three elements)	22.3
• Gaze preference or deviation	21.5
• Vascular imaging	66.8
• LVO	17.2
• IV thrombolysis	12.2
• Mechanical thrombectomy	8.6

Results

- Test Characteristics—Full Sample (n=223)

CPSS = 3 + gaze preference

	LVO +	LVO -	
+	8	9	17
-	30	176	206
	38	185	223

Sensitivity: 21%
Specificity: 95.1%

Positive Predictive Value: 47.1%
Negative Predictive Value: 85.4%

Results

- Test Characteristics—Restricted Sample (n=50)
 - CPSS =3, +/- gaze preference

		LVO +	LVO -	
Gaze preference	+	8	9	17
	-	8	24	32
		16	33	49

Sensitivity: 50.0%

Specificity: 72.3%

Positive Predictive Value: 47.1%

Negative Predictive Value: 75.0%

Results

- Test Characteristics—Full Sample (n=223)
 - Gaze preference: EMS vs NIHSS subscale on arrival

		Gaze Pref + NIHSS	Gaze Pref - NIHSS	
Gaze preference EMS	+	23	15	38
	-	32	153	185
		55	168	223

Sensitivity: 41.8%

Specificity: 91.1%

Positive Predictive Value: 60.5%

Negative Predictive Value: 82.7%

Results

- Test Characteristics—Full Sample (n=223)
 - Gaze preference by EMS and LVO +/-

		LVO +	LVO -	
Gaze preference EMS	+	11	27	38
	-	27	158	185
		38	185	223

Sensitivity: 28.9%

Specificity: 85.4%

Positive Predictive Value: 28.9%

Negative Predictive Value: 85.4%

Results

Diversions from Initial Destination (n=12 patients)

Approximately 5% of all pre-arrival notifications

Represents approximately 33% of patients with initial destination of primary stroke center

- 7/12 were diverted with a CPSS + (all 3 elements) and a gaze preference/deviation (4 had + LVO)
- 5/12 were diverted with either partial CPSS or no gaze deviation (2 had + LVO)

Results--Summary

- Widespread adoption of the Medical Control algorithm across all levels of hospital stroke care was lacking
- Utilizing FAST-G in this setting demonstrated high specificity but poor sensitivity in detecting large vessel occlusion
- Although gaze preference/deviation was noted by EMS in 1/5 patients, its presence did not perform well as a screening tool for LVO
- Use of the Medical Control algorithm led to 56% triage accuracy in patients diverted from initial PSC destination

Conclusion

- Gaze preference in prehospital LVO prediction may be limited by inadequate training in EMS providers or poor predictive value in this population
- Future studies will need to explore barriers to adoption of screening strategies for LVO in prehospital care at both the level of Medical Control and EMS

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