Sensitivity of prehospital stroke scales for different intracranial large vessel occlusion locations

- Table 1: Prehospital stroke scales with corresponding NIHSS items and breakdowns
- Figure 1: Sensitivity of prehospital stroke scales for intracranial ICA occlusions
- Figure 2: Sensitivity of prehospital stroke scales for ICA-T occlusions
- Figure 3: Sensitivity of prehospital stroke scales for proximal M1 occlusions
- Figure 4: Sensitivity of prehospital stroke scales for distal M1 occlusions
- Figure 5: Sensitivity of prehospital stroke scales for M2 occlusions

Item and NIHSS correspondence	RACE ¹	C-STAT ²	PASS ³	G-FAST ⁴	FAST-	FAST-	EMSA ⁷	CG-FAST ⁸	NIHSS-89	3I SS ¹⁰	SAVE ¹¹	FPSS ¹²	sNIHSS-	3 Item NIHSS ¹⁴
					ED⁵	PLUS ⁶							EMS ¹³	
LOC responsiveness - 1a														
0 - Alert									0	0			0	
1 - Rousable to minor stimulation									1	1			1	
2 - Rousable to painful stimulation									2	2			2	
3 - Reflex response/unrousable									3				3	
LOC questions - 1b														
0 – answers correctly		0	0					0	0					
1 – incorrectly answer one question		U							1					
2 – incorrectly answers both		1^	1					1	2					
questions		1/						_						
LOC commands - 1c														
0 – performs both tasks	0*	0							0					
1 - performs one task	1*	1^							1					
2- performs neither tasks	2*	1							2					
Best gaze - 2														
0 - normal	0	0	0	0	0		0	0	0	0	0	0		
1 – partial gaze palsy	1	2	1	1	1		1	1	1	1	1	4		
2 – forced deviation	1	2	1	1	2		T	T	2	2	1	4		
Visual fields - 3														
No visual loss											0	0		
Partial hemianopia														
Complete hemianopia											1	1		
Bilateral hemianopia		1												1
Facial paresis - 4										1				1
0 – normal	0			0		0	0	0	0			0	0	
1 – minor paralysis	1				0				1				1	
2 – partial paralysis				1		1	1	1	2			1	2	
3 – complete paralysis	2			1	1				3				3	
Arm - 5a and 5b									LR				LR	
0 – no drift	0	0	0	0	0	0	0		0 0	0~	0	0~	0 0	0
1 – drift	0	0						0	1 1	1~			1 1	1
2 – some effort against gravity	1]		1	0			2 2				2 2	2
	1	1	1	1		1 #	1	1		2~	1∞	1~		
3 – no effort against gravity	2	1			2	1		Ť	3 3	1			3 3	3
4 – no movement	<u> </u>				<u> </u>	#			4 4				4 4	4
Leg - 6a and 6b													LR	
0 – no drift	0						0			0~		0~	0 0	
1 – drift	-					0#				1~			1 1	
2 – some effort against gravity	1						1**					1~	2 2	
3 – no effort against gravity	2					1#	-			2~		-	3 3	_
4 – no movement						-"							4 4	
Sensory - 8														
0 - normal													0	0
1 - mild-moderate loss		Į.	I										1	1
2 - complete loss													2	2

Table 1. Prehospital stroke with corresponding NIHSS items and breakdowns.

Language & Dysartria - 9 and 10								only 10			9	10	
0 – absent			0	0	0	0	0	0	0	0	0	0	
1 – mild to moderate				1				1			1	1	
2 – severe			1	2	1	2	1	2	1	1	2	2	
3 - mute				2				х			3	х	
Neglect - 11													
0 – absent	0ŧ			0				0					0
1 – extinction in one modality	1‡			1				1					1
2 – extinction in more than one	2ŧ			2				2					2
modality	ZŤ												

^ 1 point if only one of questions and 1 of the commands performed

§ only answers

* if right hemiparesis

[‡] if left hemiparesis

score only if FAST positive

** 1 point if item left ≠ right

~ score highest of four extremities

∞ only scored when asymmetric drift or weakness

RACE: Rapid Arterial oCclusion Evaluation, , C-STAT: Cincinnati Stroke Triage Assessment Tool, PASS: Prehospital Acute Stroke Severity scale, G-FAST: Gaze-Face-Arm-Speech-Time, FAST-ED: Field Assessment Stroke Triage for Emergency Destination, EMSA: Emergency Medical Stroke Assessment, CG-FAST: Conveniently-Grasped Field Assessment Stroke Triage, NIHSS-8: National Institutes of Health Stroke Scale-8, 31 SS: 3-Item Stroke Scale, SAVE: Speech Arm Vision Eyes Scale, FPSS: Finnish Prehospital Stroke Scale, sNIHSS-EMS: shortened NIH Stroke Scale for emergency medical services.

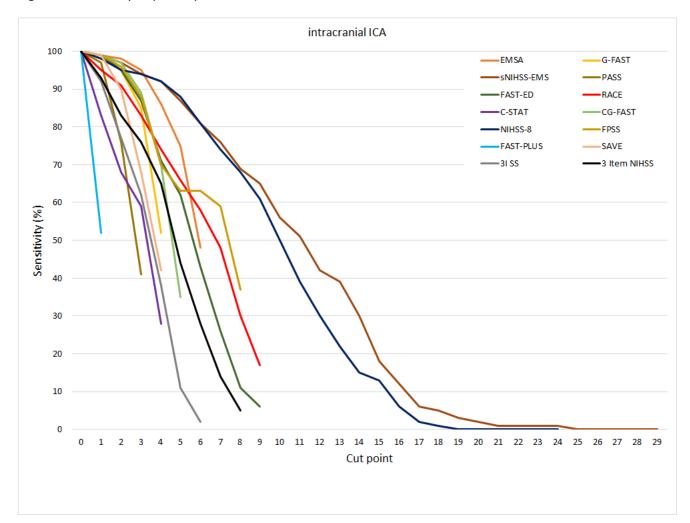


Figure 1: Sensitivity of prehospital stroke scales for intracranial ICA occlusions

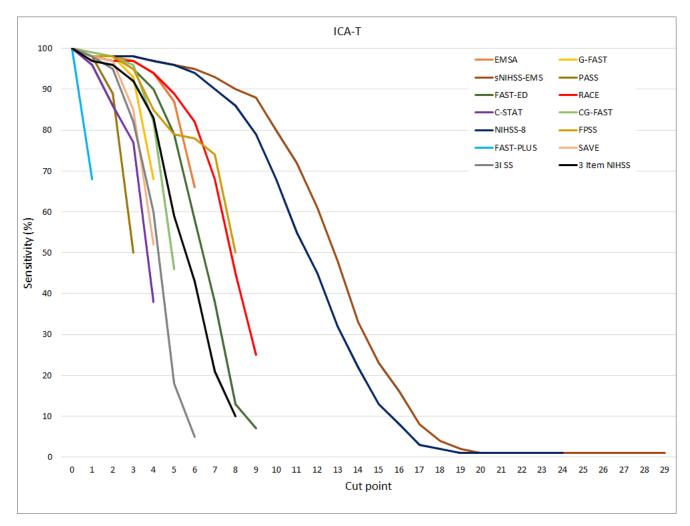
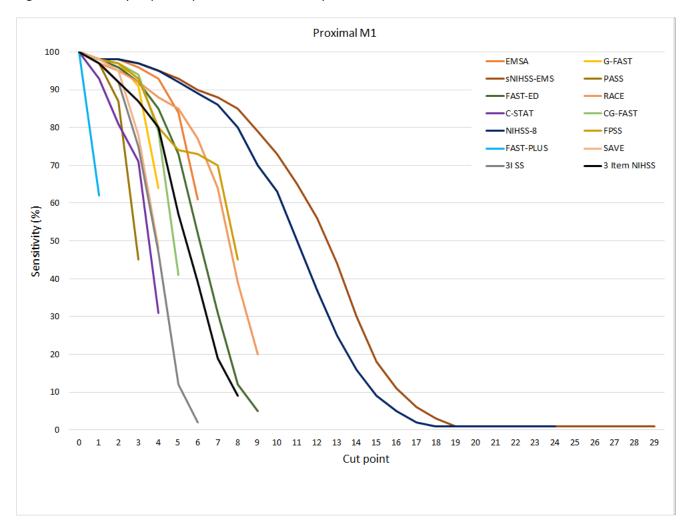
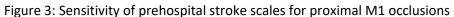


Figure 2: Sensitivity of prehospital stroke scales for ICA-T occlusions





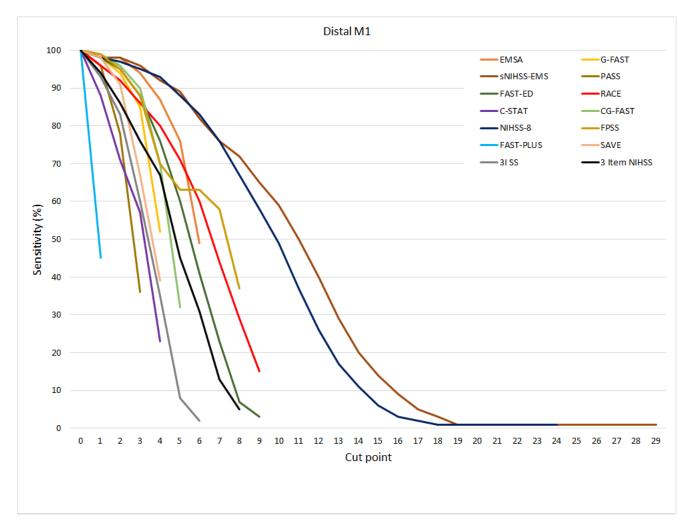


Figure 4: Sensitivity of prehospital stroke scales for distal M1 occlusions

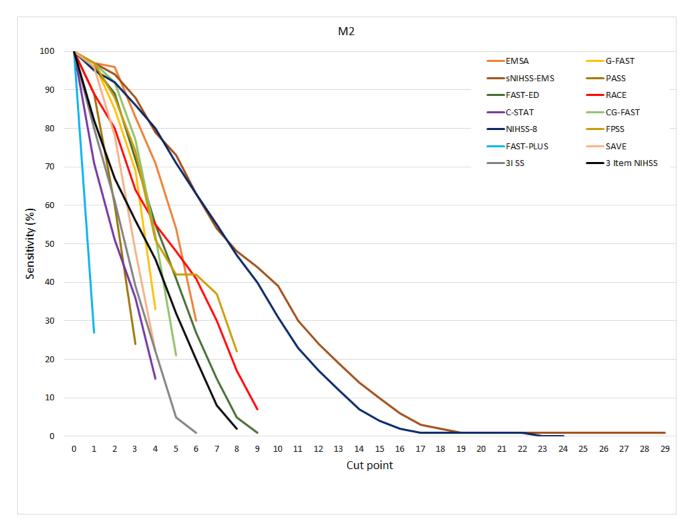


Figure 5: Sensitivity of prehospital stroke scales for M2 occlusions

References

- 1. Perez de la Ossa N, Carrera D, Gorchs M, Querol M, Millan M, Gomis M, et al. Design and validation of a prehospital stroke scale to predict large arterial occlusion: The rapid arterial occlusion evaluation scale. *Stroke*. 2014;45:87-91
- 2. Katz BS, McMullan JT, Sucharew H, Adeoye O, Broderick JP. Design and validation of a prehospital scale to predict stroke severity: Cincinnati prehospital stroke severity scale. *Stroke*. 2015;46:1508-1512
- 3. Hastrup S, Damgaard D, Johnsen SP, Andersen G. Prehospital acute stroke severity scale to predict large artery occlusion: Design and comparison with other scales. *Stroke*. 2016;47:1772-1776
- 4. Scheitz JF, Abdul-Rahim AH, MacIsaac RL, Cooray C, Sucharew H, Kleindorfer D, et al. Clinical selection strategies to identify ischemic stroke patients with large anterior vessel occlusion: Results from sits-istr (safe implementation of thrombolysis in stroke international stroke thrombolysis registry). *Stroke*. 2017;48:290-297
- 5. Lima FO, Silva GS, Furie KL, Frankel MR, Lev MH, Camargo EC, et al. Field assessment stroke triage for emergency destination: A simple and accurate prehospital scale to detect large vessel occlusion strokes. *Stroke*. 2016;47:1997-2002
- 6. Vaclavik D, Bar M, Klecka L, Holes D, Cabal M, Mikulik R. Prehospital stroke scale (fast plus test) predicts patients with intracranial large vessel occlusion. *Brain Behav*. 2018:e01087
- 7. Gropen TI, Boehme A, Martin-Schild S, Albright K, Samai A, Pishanidar S, et al. Derivation and validation of the emergency medical stroke assessment and comparison of large vessel occlusion scales. *J Stroke Cerebrovasc Dis*. 2018;27:806-815
- 8. Gong X, Chen Z, Shi F, Zhang M, Xu C, Zhang R, et al. Conveniently-grasped field assessment stroke triage (cg-fast): A modified scale to detect large vessel occlusion stroke. *Front Neurol*. 2019;10:390
- 9. Demeestere J, Garcia-Esperon C, Lin L, Bivard A, Ang T, Smoll NR, et al. Validation of the national institutes of health stroke scale-8 to detect large vessel occlusion in ischemic stroke. *J Stroke Cerebrovasc Dis*. 2017;26:1419-1426
- 10. Singer OC, Dvorak F, du Mesnil de Rochemont R, Lanfermann H, Sitzer M, Neumann-Haefelin T. A simple 3-item stroke scale: Comparison with the national institutes of health stroke scale and prediction of middle cerebral artery occlusion. *Stroke*. 2005;36:773-776
- 11. Keenan KJ, Smith WS. The speech arm vision eyes (save) scale predicts large vessel occlusion stroke as well as more complicated scales. *J Neurointerv Surg*. 2018
- 12. Ollikainen JP, Janhunen HV, Tynkkynen JA, Mattila KM, Halinen MM, Oksala NK, et al. The finnish prehospital stroke scale detects thrombectomy and thrombolysis candidates-a propensity score-matched study. *J Stroke Cerebrovasc Dis*. 2018;27:771-777
- 13. Purrucker JC, Hartig F, Richter H, Engelbrecht A, Hartmann J, Auer J, et al. Design and validation of a clinical scale for prehospital stroke recognition, severity grading and prediction of large vessel occlusion: The shortened nih stroke scale for emergency medical services. *BMJ Open*. 2017;7:e016893
- 14. Zuckerman SL, Sivaganesan A, Zhang C, Dewan MC, Morone PJ, Ganesh Kumar N, et al. Maximizing efficiency and diagnostic accuracy triage of acute stroke patients: A case-control study. *Interv Neuroradiol*. 2016;22:304-309