


---

---

---

---

---

---

---

---

## Session Objectives

- To discuss the Canadian Stroke Best Practices related to Stroke Screening Tools and Stroke Severity Scales.
- To provide an overview of the difference between Prehospital Stroke Screening Tools and Prehospital Stroke Severity Scales.
- To provide an overview of Prehospital Stroke Severity Scales that have been developed including components of the tool and the psychometric properties of each tool.
- To discuss the current state of implementation of Prehospital Stroke Severity Scales Provincially, Nationally and Internationally.
- To discuss the planning that is underway regarding implementation of a Prehospital Stroke Severity Scale within Ontario.




---

---

---

---

---

---

---

---

## Canadian Stroke Best Practice Recommendations (2018)

### 3.2 Paramedic On-scene Management<sup>1</sup>

- EMS personnel should use validated acute stroke out-of-hospital diagnostic screening tools as part of on-scene assessment [Evidence Level B]. [New for 2018]
  - Patients should be screened for **signs of stroke** using a validated stroke assessment tool that includes the components of FAST (Face, Arm, Speech, and Time) [Evidence Level B].
  - Patients who demonstrate any FAST signs should then undergo a second screen using a tool validated to assess **stroke severity**, which may be considered in decisions for transportation destination [Evidence Level B]. [New for 2018].




---

---

---

---

---

---

---

---

## Prehospital Stroke Screening

### Prehospital Stroke Screening Tools

- To screen for signs of stroke.

### Prehospital Stroke Severity Scales

- To assess for stroke severity to identify patients who may be eligible for Endovascular Therapy (EVT).




---

---

---

---

---

---

---

---

## Prehospital Stroke Screening Tools

- ☐ Ontario Prehospital Stroke Screening Scale (OPSS)
- ☐ Cincinnati Pre-Hospital Stroke Scale (CPSS)
- ☐ Face, Arm, Speech Test (FAST)
- ☐ Los Angeles Prehospital Stroke Screen (LAPSS)
- ☐ Melbourne Ambulance Stroke Screen (MASS)




---

---

---

---

---

---

---

---

## Prehospital Stroke Severity Scales

- ☐ Field Assessment Stroke Triage for Emergency Destination (FAST-ED)
- ☐ Vision, Aphasia and Neglect – (VAN)
- ☐ Face, Arm, Speech Test – Vision, Aphasia and Neglect (FAST-VAN)
- ☐ Los Angeles Motor Scale (LAMS)
- ☐ Prehospital Acute Stroke Severity Scale (PASS)
- ☐ Cincinnati Prehospital Stroke Severity Scale (CPSSS)
- ☐ Rapid Arterial occlusion Evaluation (RACE)




---

---

---

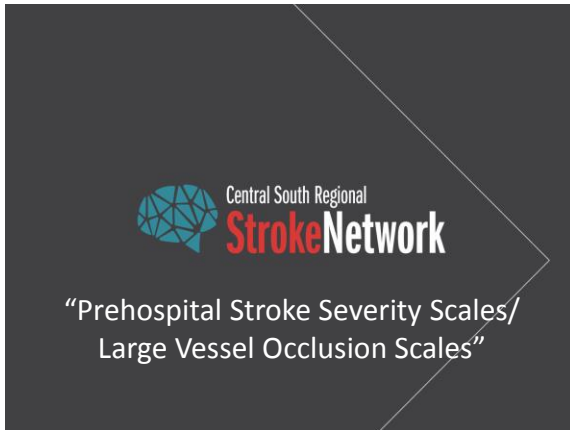
---

---

---

---


---



National Institute of Health Stroke  
Scale (NIHSS)

[illegible]

## Psychometric Properties of Scales

- **Sensitivity:**
    - The ability of the test to correctly identify those with a disease
    - Proportion of patients who will have VVO Occlusion based on a positive test result
    - $\text{Sensitivity} = \frac{\# \text{ of True Positive}}{\# \text{ of True Positives} + \# \text{ of False Positives}}$
  - **Specificity:**
    - Score above 70 – 80% is considered high sensitivity
  - **Specificity:**
    - The ability of the test to correctly identify those without the disease
    - Proportion of patients who do not have Large Vessel Occlusion
    - $\text{Specificity} = \frac{\# \text{ of True Negatives}}{\# \text{ of True Negatives} + \# \text{ of False Positives}}$
  - In general scales with higher sensitivity have lower specificity
  - Increased likelihood of identifying Large Vessel Occlusion but will also identify patients who will not have Large Vessel Occlusion
- **Positive Predictive Value:**
    - Probability that the patient with the disease will have a positive test result
    - Probability that the patient with a Large Vessel Occlusion will have a positive test result
    - $\text{PPV} = \frac{\# \text{ of True Positives}}{\# \text{ of True Positives} + \# \text{ of False Positives}}$
  - **Negative Predictive Value:**
    - Probability that the patient who get negative test who truly do not have the disease
    - Probability that the patient with a NPV =  $\frac{\# \text{ of True Negatives}}{\# \text{ of True Negatives} + \# \text{ of False Negatives}}$
  - **Accuracy:**
    - The ability of a scale to differentiate between those who have the disease and those who do not
    - The probability that the patient will have a LVO and the number of those who do not
    - Of 100 pts tested, 25 have LVO and 75 do not – Accuracy 0.75
- 







## Comparing The Scales

Scale	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Accuracy
FAST- ED	0.61	0.83	0.72	0.82	0.79
FAST - VAN	0.94	--	0.58	--	--
VAN	1.00	0.90	0.74	1.00	0.92
LAMS	0.81	0.89	--	--	0.85
ACT-FAST	0.86	0.93	0.80	--	0.92
RACE	0.85	0.68	0.42	0.92	0.87



Which of these Prehospital Stroke Severity Scales seem more appealing for use in Central South?



“Current State of Prehospital Stroke Severity Scales Implementation - Provincially, Nationally and Internationally”

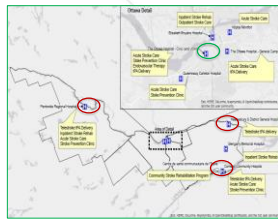
## Southwestern Ontario Stroke Network

- Piloting two Prehospital Stroke Severity Scales to determine feasibility of implementation:
  - Huron County Paramedic Service using LAMS
  - Perth County Paramedic Service using STROKEVAN and LAMS
- Not bypassing centres
- Use Prompt Card to screen for stroke, the LVO tool completed, hospitals pre-notified, paramedics discuss/compare findings with designated stroke centre teams



## Champlain Stroke Network

- Pilot Project to test diverting patients picked up between tPA Centres and EVT Centre:
  - Patient must present within 6 hours of symptom onset
- Three Step Process:
  - Prompt Card Identified Stroke
  - Transport Time is determined (Re-direct to EVT Centre if patient is within 90 minutes and LAMS > 4)
  - Paramedics remain at EVT centre for 30 minutes, if not eligible for EVT, patient taken back to stroke centre where they normally would have presented to receive acute stroke care

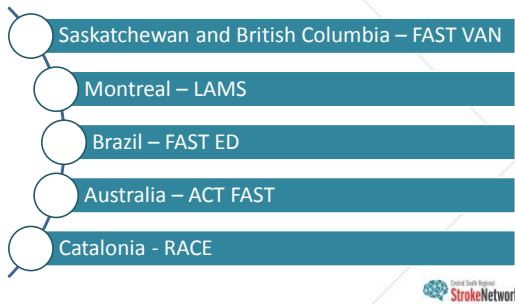


## Alberta Experience

- Alberta has 2 Comprehensive Stroke Endovascular Centres and a number of Primary Stroke Centres
- Using LAMS to divert patients picked up between the Primary Stroke Centre and the EVT Centre:
  - Patient must present within 6 hours of symptom onset and/or be a wake up stroke
  - Patient must have a LAMS >4
- Utilize Telestroke with stroke neurologists consulting with the paramedics to support decision making



## Nationally/Internationally



Central South Regional  
StrokeNetwork

---

---

---

---

---

---

---

---



“Planning for Prehospital Stroke  
Severity Tool in Ontario””

---

---

---

---

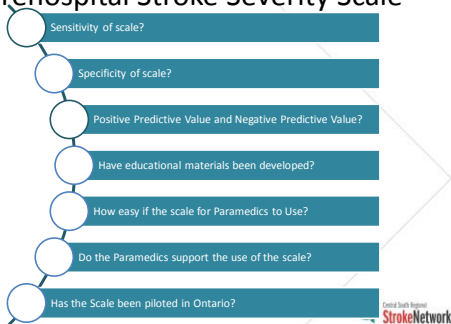
---

---

---

---

## Potential Criteria to Select a Prehospital Stroke Severity Scale



Central South Regional  
StrokeNetwork

---

---

---

---

---

---

---

---



## CorHealth EVT Transport Task Group

- Currently reviewing PreHospital Stroke Severity Screening Tools for Paramedics to provide a recommendation for a tool for Ontario
- Apply criteria to LAMS, FAST-ED, ACT Fast and VANS
- EHS MAC strongly prefers a single recommended tool for the province versus different tools being used in different regions
- Waiting for feedback from the ongoing pilots



Central South Region  
StrokeNetwork

---

---

---

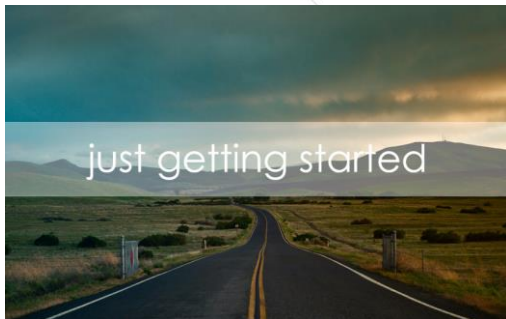
---

---

---

---

---



Central South Region  
StrokeNetwork

---

---

---

---

---

---

---

---

## Questions



mcnicolr@hhsc.ca

Central South Region  
StrokeNetwork

---

---

---

---

---

---

---

---

## References

1. Boulanger et al. (2018) Canadian Best Practice Recommendations for Acute Stroke Management: Prehospital, Emergency Department and Acute Inpatient Stroke Care, 6<sup>th</sup> Edition, Update 2018. International Journal of Stroke, 13(9): 949-984.
2. Powers WJ, Derdeyn CP, Biller J, et al. 2015 American Heart Association/American Stroke Association Focused Update of the 2013 Guidelines for the Early Management of Patients with Acute Ischemic Stroke Regarding Endovascular Treatment: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. Stroke. 2015;46(10):3020-35.
3. Lima FO, Silva GS, Furie KL, et al. Field Assessment Stroke Triage for Emergency Destination: A Simple and Accurate Prehospital Scale to Detect Large Vessel Occlusion Strokes. Stroke. 2016 Jun 30.
4. Teleb, M.S, et al. Stroke vision, aphasia, neglect (VAN) assessment – a novel emergent large vessel occlusion screening tool: pilot study and comparison with current clinical severity indices. J Neurointerv Surg 2016. doi:10.1136/neurintsurg-2015-012131.
5. Wasyliv, S, et al The FAST-VAN Tool for Identifying Large Vessel Occlusion in Acute Stroke: American Academy of Neurology Annual Meeting; April 21-27, 2018; Los Angeles, CA. Abstract P4.



## References

6. Saskatchewan Stroke Strategy. Stroke Care In Saskatchewan 2016 - 2018 – Report of Saskatchewan Stroke Expert Panel . [www.sasksurgey.ca/doc/StrokeCare2018\\_005.pdf](http://www.sasksurgey.ca/doc/StrokeCare2018_005.pdf)
7. Naxliel et al. A brief prehospital stroke severity scale identified ischemic stroke patients harboring persisting large arterial occlusion. Stroke 2008;39(8): 2264-2267.
8. Zhao, H. et al. Ambulance Clinical Triage for Acute Stroke Treatment: Paramedic Triage Algorithm for Large Vessel Occlusion. Stroke 2018;49:945-951. DOI: 10.1161/STROKEAHA.117.019307.
9. Perez de la Ossa N. et al Design and validation of a prehospital stroke scale to predict large arterial occlusion: the rapid arterial occlusion evaluation scale. Stroke. 2014;45(1): 87-91.
10. Zhao, H. et al. Large Vessel Occlusion Scales Increase Delivery to Endovascular Centres Without Excessive Harm From Misclassifications. Stroke. 2017; 48: 568 – 573. DOI: 10.1161/STROKEAHA. 116.016056.

