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

- 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)
Prehospital Stroke Severity Scales/Large Vessel Occlusion Scales

National Institute of Health Stroke Scale (NIHSS)

Psychometric Properties of Scales

- Sensitivity:
  - The ability of the test to correctly identify those with a disease
  - Proportion of patients who will have LVO Occlusion based on a positive test result
  - Sensitivity = \# of True Positive \# of True Positives + \# of False Negatives
  - 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 LVO Occlusion
  - Specificity = \# of True Negatives \# of True Negatives + \# of False Positives
  - In general scales with higher sensitivity have lower specificity

- Positive Predictive Value:
  - Probability that the patient with the disease will have a positive test result
  - Probability that the patient with a LVO Occlusion that has a positive test result
  - PPV = \# of True Positive \# of True Positives + \# 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 negative test result
  - NPV = \# of True Negative \# of True Negatives + \# 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
  - Accuracy = \# of True Positives + \# of True Negatives / 100

- Large Vessel Occlusion Scales

- National Institutes of Health Stroke Scale (NIHSS)
Field Assessment Stroke Triage for Emergency Destination (FAST-ED)\textsuperscript{2,3}

- 6 Item Scale
- 5 based on NIHSS Items
- Total possible score = 9
- Score $> 4$ showed likelihood to predict LVO greater than 60%

Psychometric Properties:
- Sensitivity: 0.61
- Specificity: 0.83
- PPV: 0.72
- NPV: 0.82
- Accuracy: 0.79

https://em.umaryland.edu/educational_pearls/3047/

Vision, Aphasia and Neglect (VAN) \textsuperscript{4}

- 3 Item Scale
- Based on 3 NIHSS Items
- Scoring = None
- If arm weakness present PLUS any one of the below = VAN positive – 74%

Psychometric Properties:
- Sensitivity: 1.00
- Specificity: 0.90
- PPV: 0.74
- NPV: 1.00
- Accuracy: 0.92

www.strokevan.com training website

Face, Arm, Speech Test – Vision, Aphasia and Neglect (FAST – VAN)\textsuperscript{5,6}

- Combination of FAST Screening Tool and VAN
- Psychometric Properties:
  - Sensitivity: 0.94
  - PPV: 0.58

Saskatchewan Stroke Program is utilizing FAST VAN for LVO Screening

www.sasksurgery.ca/doc/StrokeCare2018_005.pdf
Los Angeles Motor Scale (LAMS)\(^7\)

- 3 Item Scale
- Based on 2 NIHSS items
- Total Possible Score = 5
- A cut off of ≥ 4 had the best predictive value for detecting LVO
- Psychometric Properties:
  - Sensitivity: 0.81
  - Specificity: 0.89
  - Accuracy: 0.85

Ambulance Clinical Triage for Acute Stroke Treatment (ACT-FAST)\(^8\)

- 3 Step Scale
- If any step is negative, do not proceed with further testing
- Psychometric Properties:
  - Sensitivity: 0.86
  - Specificity: 0.94
  - PPV: 0.80
  - NPV: N/A
  - Accuracy: 0.92

Rapid Arterial Occlusion Evaluation (RACE)\(^9\)

- 5 Item Scale
- All items based on NIHSS Scale
- Total Score = 9
- A cut off point of ≥ 5 had the best predictive value for detecting LVO
- Psychometric Properties:
  - Sensitivity: 0.85
  - Specificity: 0.68
  - PPV: 0.42
  - NPV: 94
  - Accuracy: 0.87
Comparing The Scales

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<tr>
<th>Scale</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive Predictive Value</th>
<th>Negative Predictive Value</th>
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</tbody>
</table>

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 received 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 Telesstroke with stroke neurologists consulting with the paramedics to support decision making
Nationally/Internationally

- Saskatchewan and British Columbia – FAST VAN
- Montreal – LAMS
- Brazil – FAST ED
- Australia – ACT FAST
- Catalonia - RACE

Potential Criteria to Select a Prehospital Stroke Severity Scale

- Sensitivity of scale?
- Specificity of scale?
- Positive Predictive Value and Negative Predictive Value?
- Have educational materials been developed?
- How easy is the scale for Paramedics to use?
- Do the Paramedics support the use of the scale?
- Has the Scale been piloted in Ontario?

“Planning for Prehospital Stroke Severity Tool in Ontario”
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

Questions

mcnicolr@hhsc.ca
References


