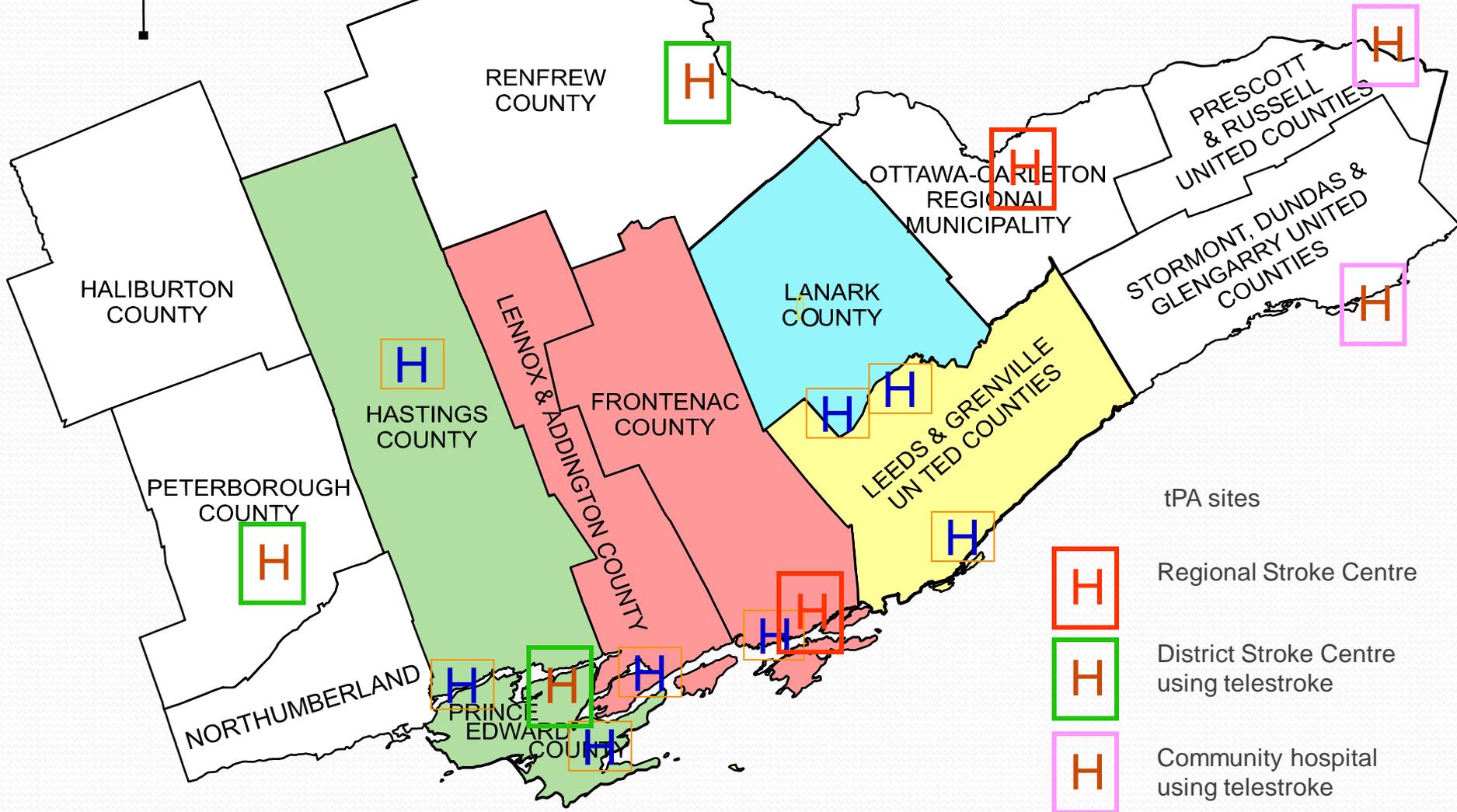


Regional Access to Hyperacute Stroke care: Endovascular Thrombectomy and Thrombolysis



STROKE NETWORK
of Southeastern Ontario

Southeastern Ontario



tPA sites



Regional Stroke Centre



District Stroke Centre using telestroke



Community hospital using telestroke

Context



- Geography and Volumes
- Telestroke
- Transport Models
 - Drip and Ship
 - Mothership
 - Door-in-Door-Out
 - Paramedic Prompt Cards, Screening
- Stroke Protocols: Door to Needle Times under 30 mins
- Imaging Protocols - mCTA
- Local follow up care - repatriation
 - Acute Stroke Unit Care
 - Stroke Prevention Clinic



Discuss three key regional planning considerations related to:

- Transport protocols
- Imaging Protocols
- Door-to-Needle Times

Transport Protocols



Transport Protocols

- Normally to the closest appropriate hospital
- Able to redirect or transport to a Designated Stroke Centre* when patients meet the criteria on the Paramedic Prompt Card for Acute Stroke Protocol

*A Designated Stroke Centre is a Regional Stroke Centre, District Stroke Centre or a Telestroke Centre

PARAMEDIC PROMPT CARD FOR ACUTE STROKE PROTOCOL

Indications for Patient Redirect or Transport Under Stroke Protocol

Redirect or transport to a Designated Stroke Centre will be considered for patients who:*

Present with a new onset of at least one of the following symptoms suggestive of the onset of an acute stroke:

- unilateral arm/leg weakness or drift
- slurred speech or inappropriate words or mute
- unilateral facial droop

AND

Can be transported to arrive at a Designated Stroke Centre within 3.5 hours of a clearly determined time of symptom onset or the time the patient was "last seen in a usual state of health".

* **Note:** A Designated Stroke Centre is a Regional Stroke Centre, District Stroke Centre or a Telestroke Centre.

Contraindications for Patient Redirect or Transport Under Stroke Protocol

Any of the following conditions exclude a patient from being transported under Stroke Protocol:

- CTAS Level 1 and/or uncorrected Airway, Breathing or Circulatory problem
- Symptoms of the stroke resolved prior to paramedic arrival or assessment**
- Blood Sugar <3 mmol/L
- Seizure at onset of symptoms or observed by paramedic
- Glasgow Coma Scale <10
- Terminally ill or palliative care patient
- Duration of out of hospital transport will exceed two (2) hours

CACC/ACS will authorize the transport once notified of the patient's need for redirect or transport under the Acute Stroke Protocol.

** **Note:** Patients whose symptoms improve significantly or resolve during transport will continue to be transported to a Designated Stroke Centre.

Basic Life Support Patient Care Standards

Version 3.0

Comes into force December 11, 2017

Emergency Health Services Branch
Ministry of Health and Long-Term Care

Paramedic Prompt Card for Acute Stroke Protocol

This prompt card provides a quick reference of the *Acute Stroke Protocol* contained in the *Basic Life Support Patient Care Standards* (BLS PCS). Please refer to the BLS PCS for the full protocol.

Indications under the Acute Stroke Protocol

Redirect or transport to a Designated Stroke Centre* will be considered for patients who meet ALL of the following:

1. Present with a new onset of at least one of the following symptoms suggestive of the onset of an acute stroke:
 - a. Unilateral arm/leg weakness or drift.
 - b. Slurred speech or inappropriate words or mute.
 - c. Unilateral facial droop.
2. Can be transported to arrive at a Designated Stroke Centre within 4.5 hours of a clearly determined time of symptom onset or the time the patient was "last seen in a usual state of health".

*A Designated Stroke Center is a Regional Stroke Centre, District Stroke Centre or a Telestroke Centre.

Contraindications under the Acute Stroke Protocol

ANY of the following exclude a patient from being transported under the Acute Stroke Protocol:

1. CTAS Level 2 and/or uncorrected airway, breathing or circulatory problem.
2. Symptoms of the stroke resolved prior to paramedic arrival or assessment**.
3. Blood sugar <3 mmol/L***.
4. Seizure at onset of symptoms or observed by paramedics.
5. Glasgow Coma Scale <10.
6. Terminally ill or palliative care patient.
7. Duration of out of hospital transport will exceed two hours.

**Patients whose symptoms improve significantly or resolve during transport will continue to be transported to a Designated Stroke Centre.

*** If symptoms persist after correction of blood glucose level, the patient is not contraindicated.

CACC/ACS will authorize the transport once notified of the patient's need for redirect or transport under the Acute Stroke Protocol.

Prompt Card Changes

- Time – increased to **4.5 hours** from 3.5 hours
 - CTAS – decreased to **CTAS Level 2** from CTAS 1
(CTAS Level alone has never been and is not a contraindication)
 - Blood sugar $<3\text{mmol/L}$ ***
- ***If symptoms persist after correction of blood glucose level, the patient is not contraindicated**

Other Paramedic Considerations

- Cerebrovascular Accident (CVA, "Stroke") Standard
- General Pediatric Standard
- Oxygen Therapy Standard
 - S_pO_2 vs [High]
- General Pediatric Standard
 - Silent on CVAs
 - CTAS and GCS differ from adult
- Prehospital CTAS v2.0

Stroke Prompt Card does not have an age criteria listed.

Transport Models

Drip & Ship

- Acute Stroke Protocol
- Transport to District Stroke Centre
- Assessment/CT/Consult/EVT candidate
- tPA started
- Transported to Regional Stroke Centre
- Door in & door out protocol

Mother Ship

- Acute Stroke Protocol
- Transport to Regional Stroke Centre with EVT capabilities
- Assessed/CT performed
- tPA started
- EVT performed

The Future - Prehospital Screening?

- EVT availability can potentially change transport decisions
- Patients who have a high probability of having a large vessel occlusion may benefit by being directly transported to a Stroke Centre capable of providing EVT
- Simple screening tool that assigns a score to basic neurovascular assessment findings



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Stroke. 2008 August ; 39(8): 2264–2267. doi:10.1161/STROKEAHA.107.508127.

A Brief Prehospital Stroke Severity Scale Identifies Ischemic Stroke Patients Harboring Persisting Large Arterial Occlusions

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Abstract

Background and Purpose—The Los Angeles Motor Scale (LAMS) is a brief 3-item stroke severity assessment measure designed for prehospital and Emergency Department use.

Methods—The LAMS and NIHSS were scored in under-12-hour acute anterior circulation ischemic stroke patients. Stroke severity ratings were correlated with cervicocerebral vascular occlusion on CTA, MRA, and catheter angiography. Receiver operating curves, c statistics, and likelihood ratios were used to evaluate the predictive value for vascular occlusion of stroke severity ratings.

Results—Among 119 patients, mean age was 67 (± 18), 45% were male. Time from onset to ED arrival was mean 190 minutes (range 10 to 660). Persisting large vessel occlusions (PLVOs) were present in 62% of patients. LAMS stroke severity scores were higher in patients harboring a vascular occlusion, median 5 (IQR 4 to 5) versus 2 (IQR 1 to 3). Similarly, NIHSS stroke severity scores were higher in PLVO patients, 19 (14 to 24) versus 5 (3 to 7). ROC curves demonstrated that the LAMS was highly effective in identifying patients with PLVOs, c statistic 0.854. At the optimal threshold of 4 or higher, LAMS scores showed sensitivity 0.81, specificity 0.89, and overall accuracy 0.85. LAMS performance was comparable to NIHSS performance (c statistic 0.933). The positive likelihood ratio associated with a LAMS score ≥ 4 was 7.36 and the negative likelihood ratio 0.21.

Conclusions—Stroke severity assessed by the LAMS predicts presence of large artery anterior circulation occlusion with high sensitivity and specificity. The LAMS is a promising instrument for use by prehospital personnel to identify select stroke patients for direct transport to Comprehensive Stroke Centers capable of endovascular interventions. (*Stroke*.2008;39:2264-2267.)

Keywords

acute stroke; cerebral infarct; scales; LAMS (Los Angeles Motor Scale); NIHSS

A two-tier regional stroke system of care, comprising Primary and Comprehensive Stroke Centers (CSCs), is being increasingly adopted throughout the United States and the world for efficient emergent management of patients with acute strokes.¹ Primary Stroke Centers provide

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Disclosures

None.

LAMS

- Los Angeles Motor Scale (LAMS) is a brief 3-item stroke severity assessment measure designed for prehospital and ED use
- LAMS score ≥ 4 predicts the presence of large anterior circulation occlusion with high sensitivity and specificity

The Los Angeles Motor Scale (LAMS)

Facial Droop

Absent	0
Present	1

Arm Drift

Absent	0
Drifts down	1
Falls rapidly	2

Grip Strength

Normal	0
Weak grip	1
No grip	2

Drip & Ship

- Door in & door out protocols required for EVT candidates
 - Paramedic crew waits at hospital
- Telestroke consult time
- “Life & Limb” – Land ambulance vs ORNGE
- Improved “Door to Needle” times
- Escorts required from sending facility if tPA running

Repatriation

- Returning patients to the hospital that they would normally go to
- Impact on Frontenac Paramedic Services for patients at KGH
- Possibility to repatriate with local PS crew when patient is ready and an ambulance is in Kingston and able to take the patient
- Deployment Plan changes
- CACC involvement

Imaging Protocols



CT AND ENDOVASCULAR THROMBECTOMY

Organizing the CT Department for
Multiphase CTA Stroke Protocol

MULTI-PHASE CTA STROKE PROTOCOL DEVELOPMENT

- ◉ Senior CT tech has always been a key member of the Stroke Protocol team.
- ◉ Imperative to include the CT team in EVT planning from the outset.
- ◉ KGH CT senior used the Calgary multi-phase protocol and worked closely with the neuro-radiologist to develop the protocol for KGH
- ◉ CT senior requires time to complete this.
- ◉ For referring sites, the province has developed a much reduced protocol.

CT TECHNOLOGIST TRAINING

Keys to successful implementation of new protocols for the CT staff:

- ⦿ Ensure a very clear and robust multiphase CTA protocol has been created and tested.
- ⦿ Comfort level at KGH was reasonable after completing 2 or 3 cases.
- ⦿ Practice makes perfect: Need to perform the protocol on a fairly regular basis to maintain comfort level and skill, so using the protocol on the majority of the stroke patients ensures the technologists become skilled and comfortable with the protocol quickly.

CT SUITE PATIENT FLOW

- ⦿ Critical for success: CT department must be able to respond quickly
- ⦿ As soon as CT suite is notified of a stroke case, immediately complete any other CT case in progress and free up the suite.
- ⦿ Other cases may need to be delayed.
- ⦿ Communication with waiting out-patients explaining a potential delay, or re-scheduling inpatients and communicating to the floors may be necessary.

CT SUITE DYNAMICS

- ⦿ During an acute stroke protocol the CT suite quickly becomes filled with many members of the stroke team.
- ⦿ The suite is even busier when a patient is being assessed for eligibility for EVT.
- ⦿ CT technologists only have one chance to get this scan right. A mistake can make this a non-diagnostic scan; it cannot be done a second time if an error occurs.
- ⦿ Important to minimize distractions, noise, chatter in immediate vicinity of CT tech.

KEY DECISION POINTS IN THE CT SUITE

- ⦿ The un-enhanced head CT will determine if there is a hemorrhage. If so, the scan is ended as the patient is not a candidate for tPA or EVT.
- ⦿ A clot sign may be easily identifiable on the unenhanced scan.
- ⦿ If no bleed the technologist proceeds to the multiphase CTA protocol as directed by the physician (MRP would vary at KGH or QHC)

KEY DECISION POINTS IN THE CT SUITE AT KGH

- ◉ CT technologist completes the scan. For the full KGH EVT mCTA protocol, the stroke patient is in CT suite for 10-15 minutes on average.
- ◉ Neurologist makes decision at time of mCTA as to candidacy for EVT - based on pathology and physiology demonstrated on multiphase scan.
- ◉ Patient generally returns to ED as soon as CT scan is complete, proceeds to thrombolysis if indicated and then if eligible, to EVT in Interventional Radiology.
- ◉ The CT technologist completes the required steps to send the images to PACS.
- ◉ At KGH, it takes 11 minutes to send these 1600 images to PACS with our present equipment.
- ◉ Note: Number of images at referring telestroke site such as QHC would be much less than this.

SUCCESS FACTORS

- ⦿ Well established CTA protocol created prior to implementing.
- ⦿ Ensuring CT staff are involved early in the plan to implement EVT (or to refer to EVT)
- ⦿ Training of all CT technologists in the department on the protocol
- ⦿ Monitoring and discussing each multiphase CTA protocol case through the learning phase with the technologists
- ⦿ Minimize distractions for CT Tech
- ⦿ Perform multiphase CTA on the majority of the Stroke Protocol patients as a standard

Door-To Needle Times

<https://www.youtube.com/watch?v=Un0HienMwnU>



Other Considerations ?

- Telestroke in Brockville
- Repatriation
- Training



www.strokenetworkseo.ca