The Transformative Journey of EVT and its System Implications

Ottawa Stroke Summit

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PRESENTER DISCLOSURE

- **Presenter:** Dr. Dylan Blacquiere

- **Relationships with commercial interests:**
  - **Grants/Research Support:** TOHAMO
  - **Speakers Bureau/Honoraria:** Heart and Stroke Foundation of New Brunswick
  - **Consulting Fees:** AstraZeneca, Abbevie Canada
  - **Other:** Advisory Board, Heart and Stroke Foundation of Canada's Canadian Stroke Best Practice Guidelines

- **Presenter:** Mathieu Grenier

  - **None**

MITIGATING POTENTIAL BIAS

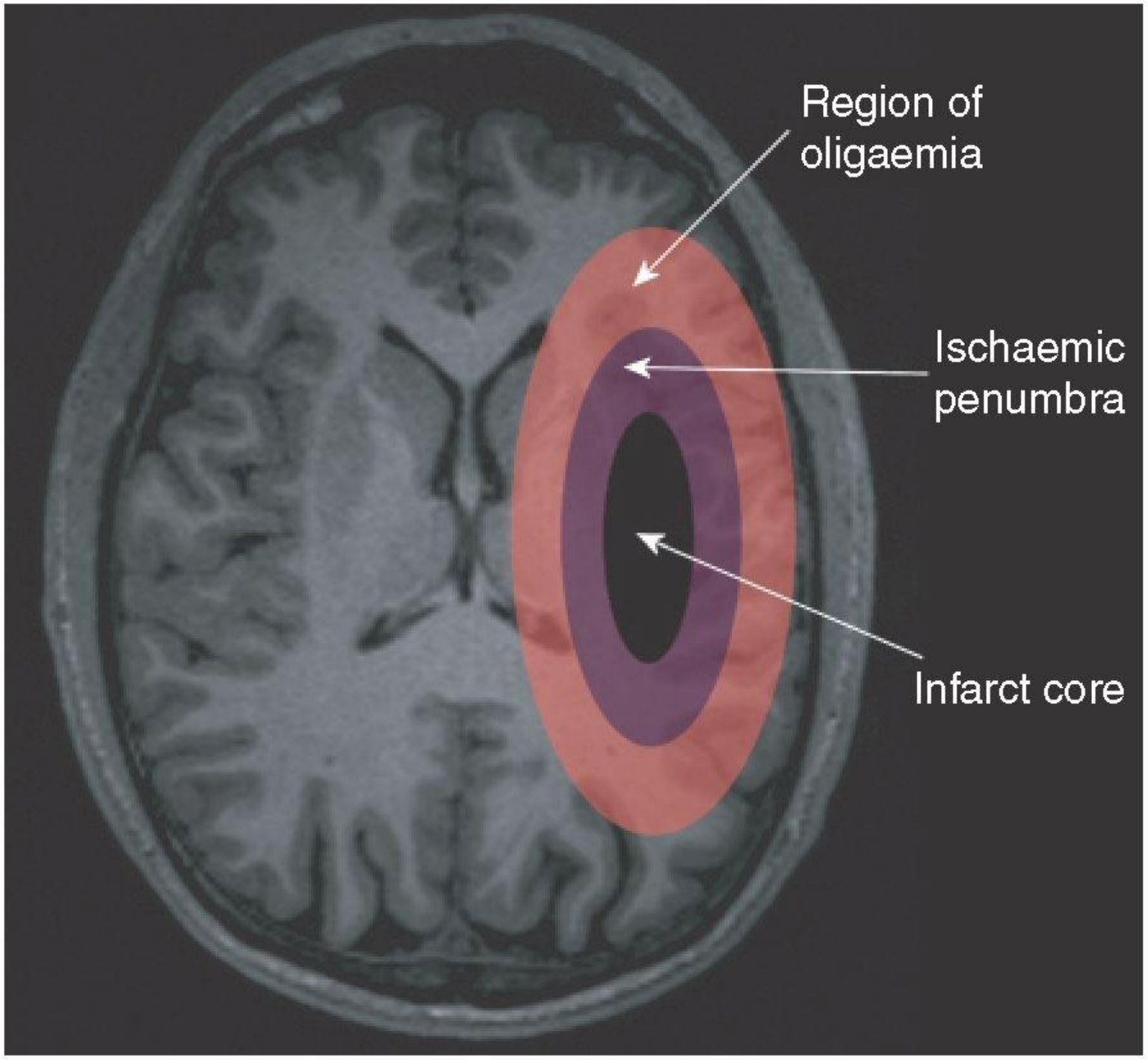
- **Presenter:** Dr. Dylan Blacquiere, Mathieu Grenier

- **Mitigation of conflict:** No direct conflicts with the material being presented. Any recommendations presented will be based upon guidelines developed for the Heart and Stroke Foundation of Canada's Canadian Stroke Best Practice Guidelines

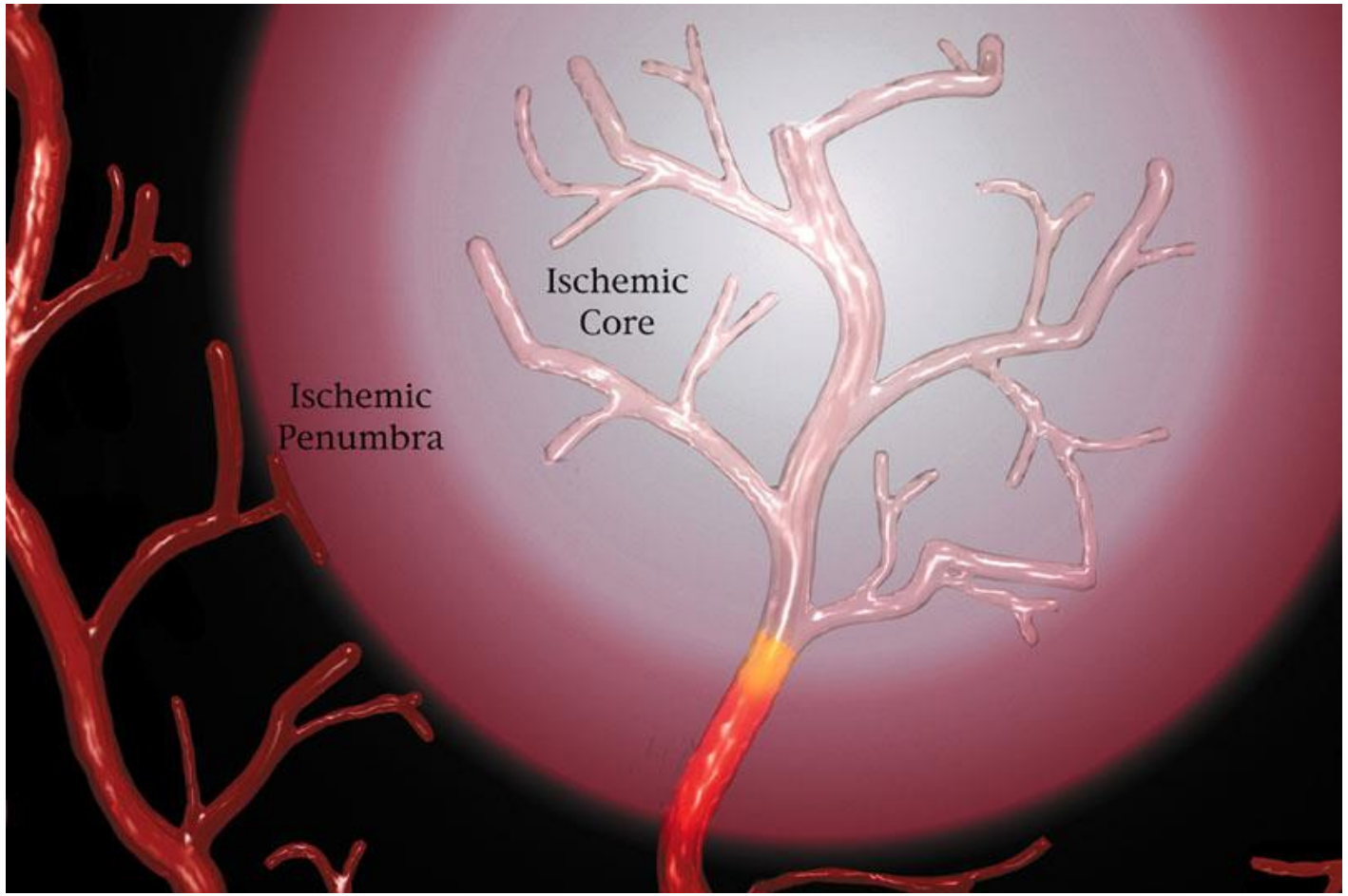
LEARNING OBJECTIVES

1) Examine the historical progression of Endovascular Therapy (EVT) in the context of stroke management.
2) Illustrate the pivotal contributions of paramedic services and emergency department personnel in recognizing, prioritizing, and determining treatment strategies for stroke patients.
3) Review the regional care systems design to bolster efficient decision-making processes in stroke treatment.

Stroke Pathophysiology



Stroke Pathophysiology



- Key concepts

- CORE – below critical perfusion threshold, unsalvageable
- PENUMBRA – has not reached critical perfusion threshold, may be salvageable

- With time, penumbra becomes core if flow is not reestablished

For Every Ten Minutes…

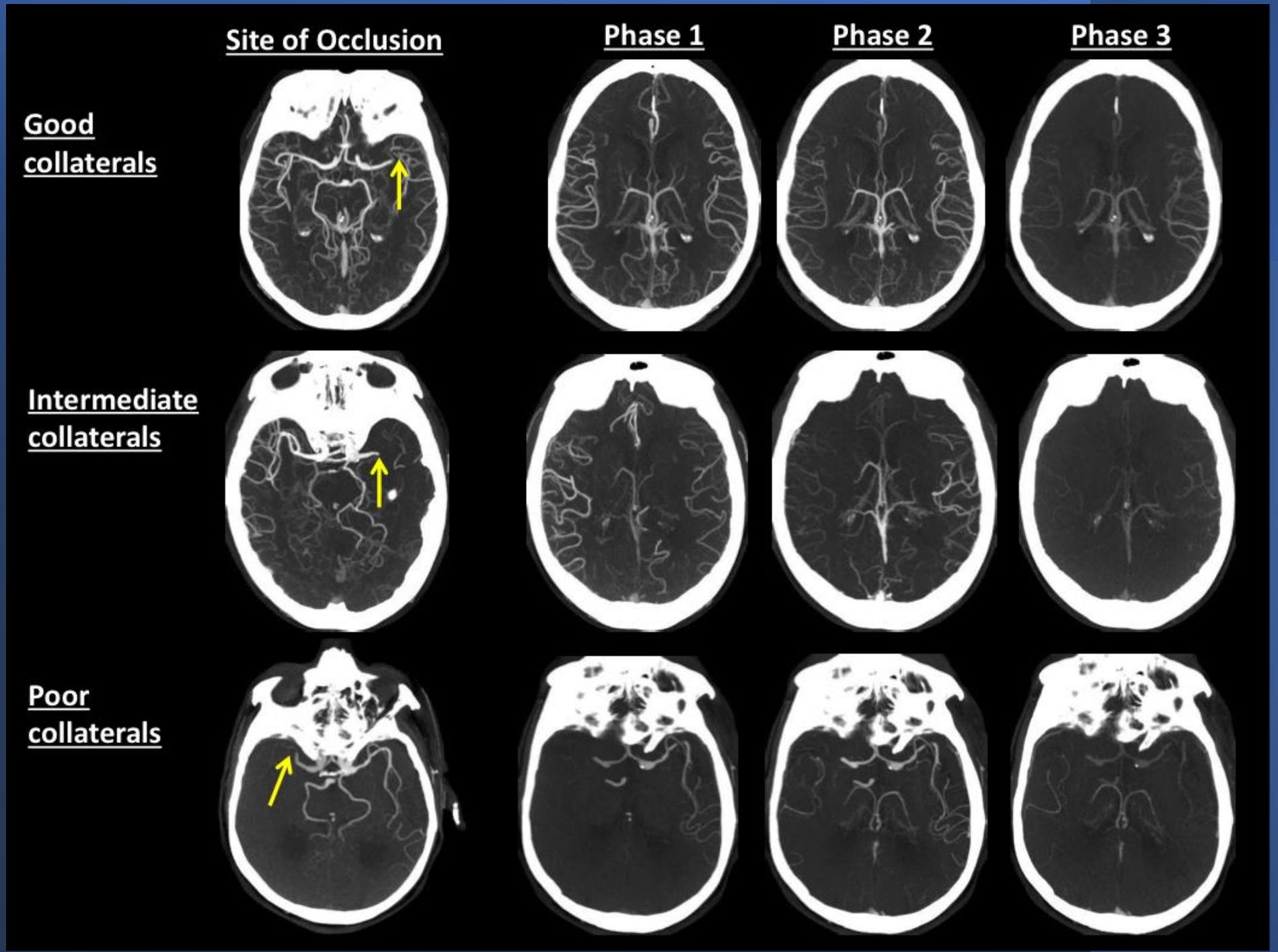
- 19 million neurons
- 140 billion synapses
- 120 km of myelinated fibres
- Loss equivalent to over **7 months** of aging

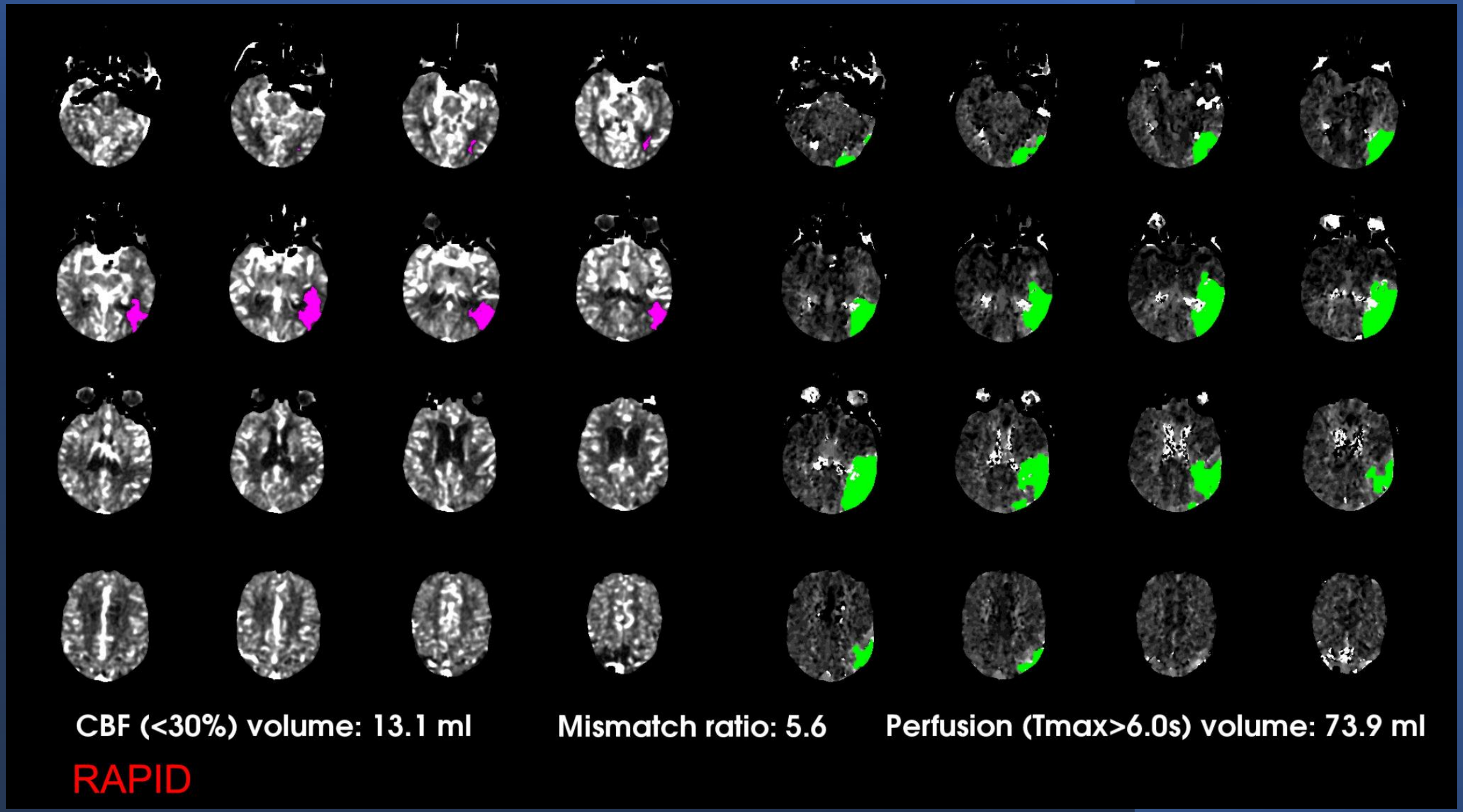
Stroke Therapies

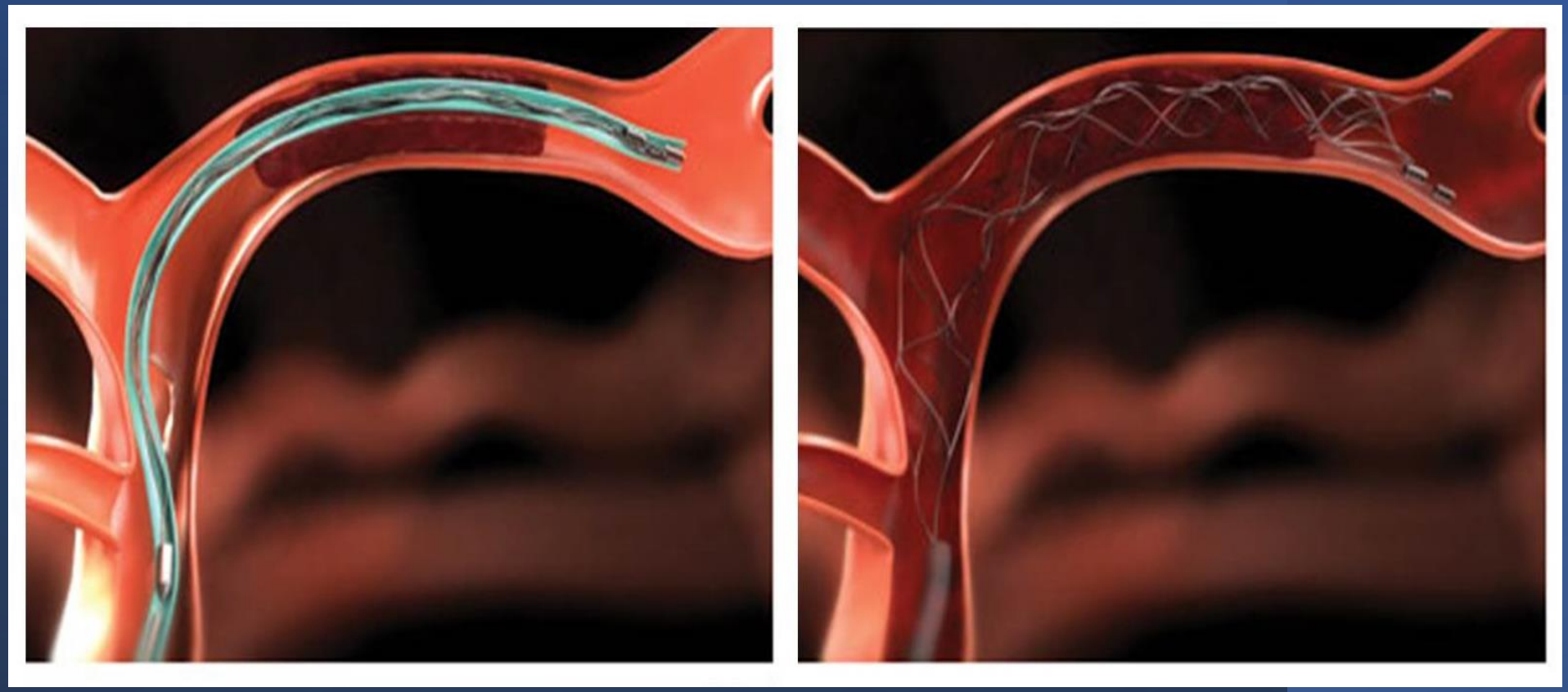
- **Thrombolysis**
  - Tenecteplase (0.25 mg/kg) or alteplase (0.9 mg/kg) given within **4.5 hours** of onset
- **Endovascular Therapy**
  - Direct removal of the clot with catheter angiogram and retrievable stent/aspiration - up to **24 hours from onset** of symptoms in selected cases
- **Best Medical Therapy**
  - Antiplatelets, stroke unit, management of etiologies

Targets for Acute Stroke Therapy

- **Canadian Stroke Best Practices**
- **<60 minutes in 90% of treated patients**
- **Median DTN – 30 minutes**
- **These targets do not reward ambiguity**


Site of Occlusion
Phase 1
Phase 2
Phase 3
Good collaterals
Intermediate collaterals
Poor collaterals


CBF (<30%) volume: 13.1 ml
Mismatch ratio: 5.6
Perfusion (Tmax>6.0s) volume: 73.9 ml
RAPID



EVT – The Background

- TPA – approved for stroke in 1995
- First intraarterial trials – intraarterial thrombolytics – 1998, 1999
- MERCI, Penumbra devices – published 2008
- Generally good rates of recanalization, but relatively high rates of hemorrhage, and outcomes not as good as recanalization seemed to predict

EVT – The Annus Horriblus

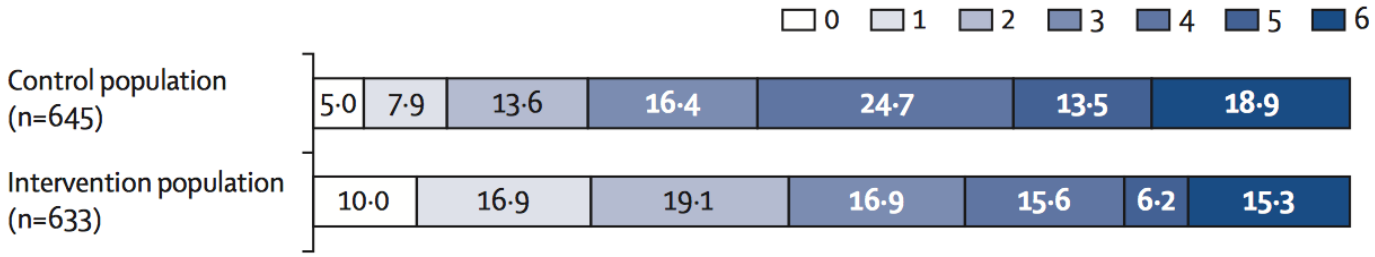
- SYNTHESIS, MR RESCUE, IMS-III – published 2013
- Generally neutral/negative trials
- However, signal in IMS-III that proper selection and earlier recanalization may be associated with better outcomes

EVT – The Annus Mirabilus

- MR CLEAN – positive interventional trial (2015)
- ESCAPE – Canadian trial
- EXTEND IA, REVASCAT, SWIFT PRIME – other trials showing similar results

- Results pooled in the HERMES collaboration (2016)

- Up to 12 hours from symptoms or LSW
- Imaging criteria based on amount of early ischemic changes and presence of at least moderate quality collaterals
- Time based workflow benchmarks
- 60 minute door-to-puncture
- 90 minute door-to-recanalization



Adjusted OR 2·49, 95% CI 1·76–3·53; p<0·0001

The number needed to treat with endovascular thrombectomy to reduce disability by at least one level on mRS for one patient was 2·6

ARR functional independence vs. not: 12%

Lancet 2016; 387: 1723–31

Patient-level data meta-analysis
Five trials, n = 1287

Canadian Stroke Best Practice Recommendations: Hyperacute Stroke Care Guidelines, Update 2015

Leanne K. Casaubon[1,2], Jean-Martin Boulanger[3,4], Dylan Blacquiere[5], Scott Boucher[6], Kyla Brown[7], Tom Goddard[8,9], Jacqueline Gordon[10], Myles Horton[11], Jeffrey Lalonde[12], Christian LaRivière[13], Pascale Lavoie[14], Paul Leslie[15], Jeanne McNeill[10], Bijoy K. Menon[16], Brian Moses[17], Melanie Penn[18], Jeff Perry[19,20], Elizabeth Snieder[20], Dawn Tymianski[1,2], Norine Foley[21], Eric E. Smith[16], Gord Gubitz[7,8], Michael D. Hill[16], Ev Glasser[22], and Patrice Lindsay[2,22]* on behalf of the Heart and Stroke Foundation of Canada Canadian Stroke Best Practices Advisory Committee

4.3 Endovascular therapy

i. Endovascular therapy should be offered within a coordinated system of care including agreements with EMS; access to rapid neurovascular (brain and vascular) imaging; coordination between the ED, the stroke team and radiology; local expertise in neurointervention; and access to a stroke unit for

ii. Endovascular therapy is indicated in patients based upon imaging selection with noncontrast CT head and CTA (including extracranial and intracranial arteries) [Evidence Level A]. *See Appendix S4 for Inclusion Criteria for endovascular therapy*.

iii. Eligible patients who can be treated within six-hours (*i.e.* whose groin can be punctured within six-hours of symptom onset) should receive endovascular therapy [Evidence Level

EVT – The Opening Window

- Ongoing expansion of criteria
- DAWN, DEFUSE-3
  - DAWN – 6-24 hours
    - Stratification based on size of infarct and age of patient
  - DEFUSE 3
    - Core <70 mm
    - Mismatch ratio of 1.8 or more

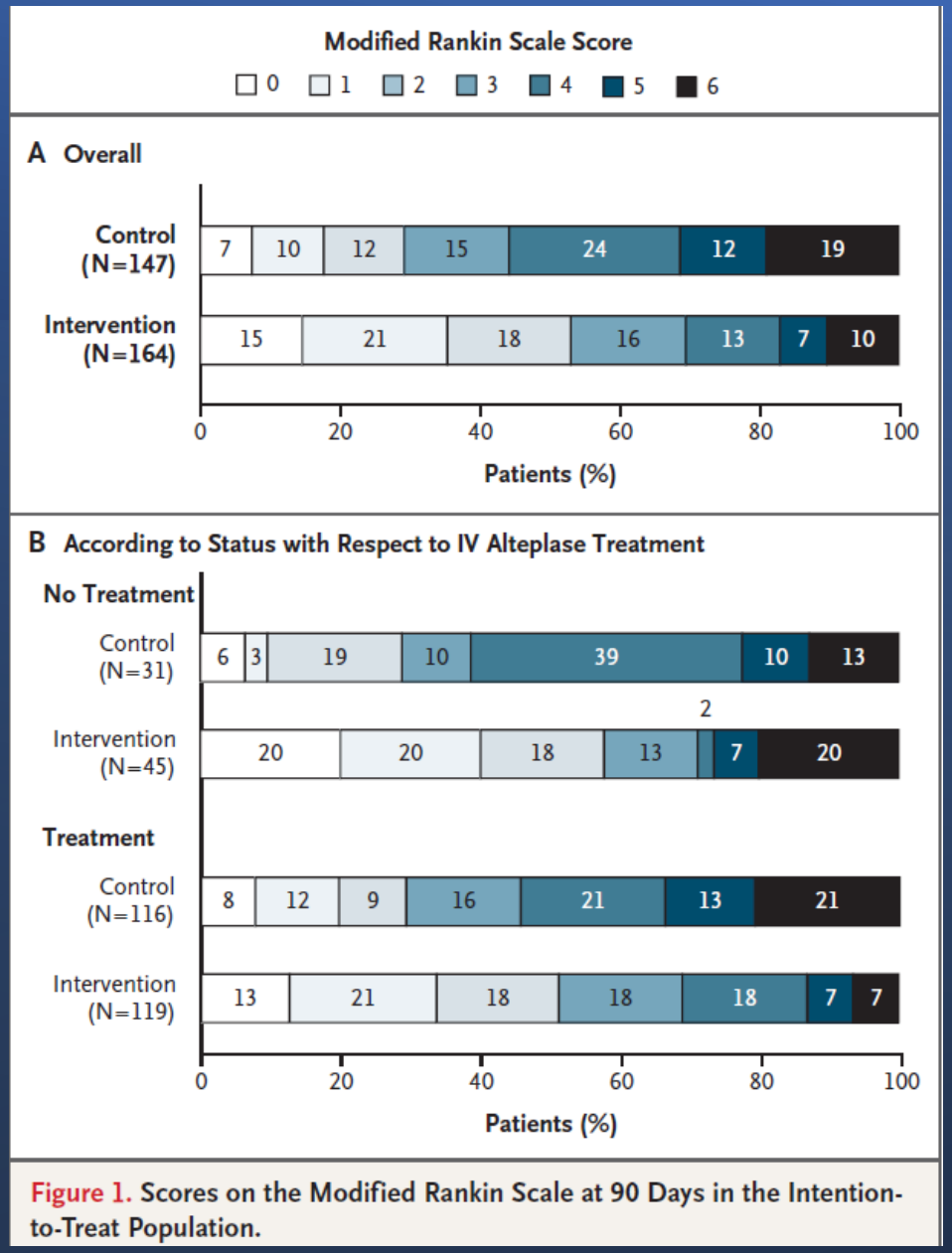


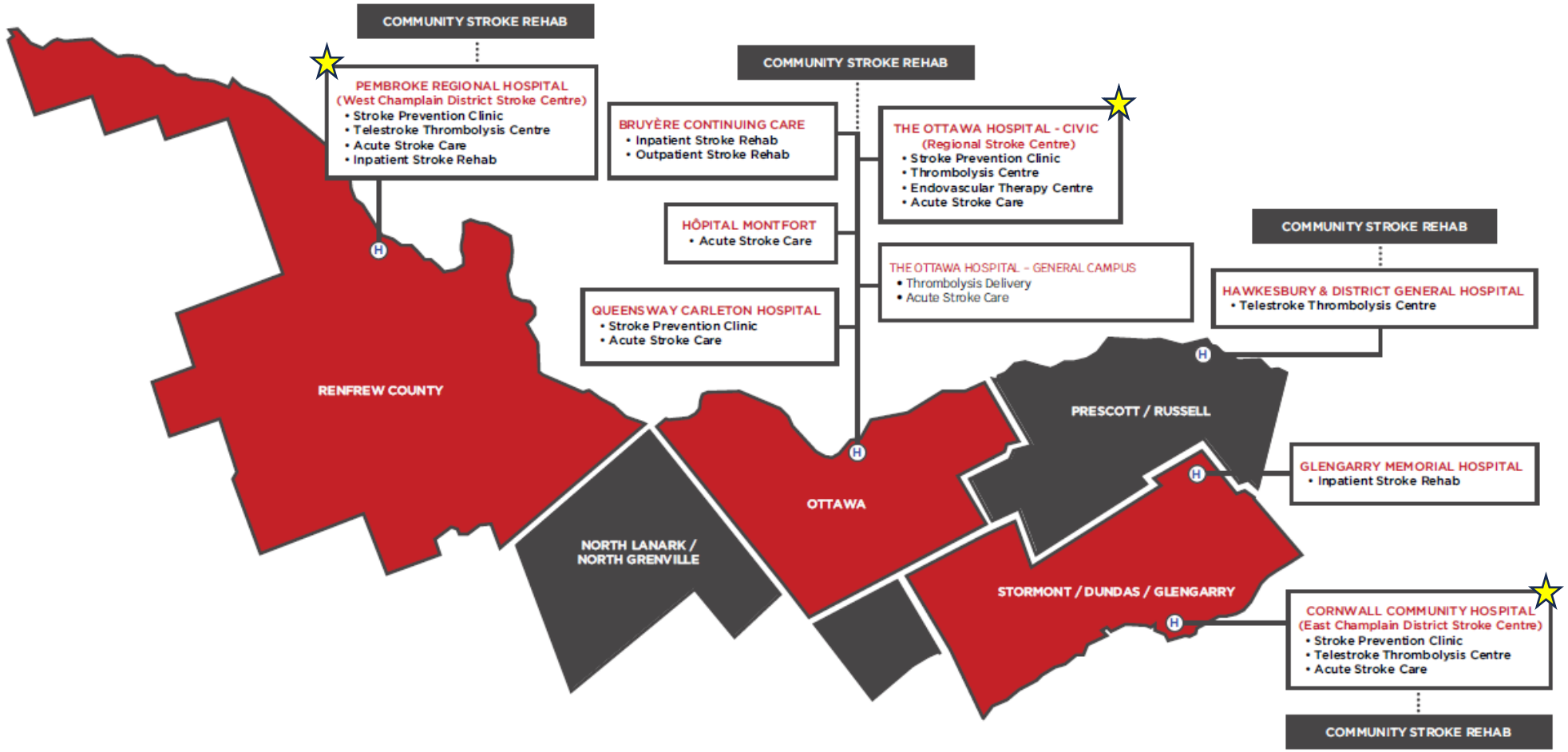
Figure 1. Scores on the Modified Rankin Scale at 90 Days in the Intention-to-Treat Population.

Extended Time Windows

- 0-6 hours – eligible patients are candidates for EVT (as well as thrombolysis if within 4.5 hours)
- 6-24 hours – EVT remains a possibility if **appropriate patient**
  - Wake-up strokes may fall within this as well
  - Ongoing research into extended windows and improved patient selection

THE **CHAMPLAIN** REGION

Champlain region encompasses a large geographical area that includes Renfrew County, the City of Ottawa, Prescott & Russell, Stormont Dundas & Glengarry, North Grenville, and North Lanark and has a population of 1.5 million people. Included in the map below are the main stroke care providers within the Champlain region, along with their respective stroke services.



In the Champlain region, The Ottawa Hospital has been designated by the Ministry as the Regional Stroke Centre (RSC), while Pembroke Regional Hospital and Cornwall Community Hospital have received designation as District Stroke Centres (DSC) in Western and Eastern Champlain respectively. These hospitals bear the responsibility of providing leadership and facilitating the coordination of our regional stroke care system, aligning with stroke service guidelines. As outlined in these guidelines, the RSC and DSCs, in collaboration with CRSN, are tasked with leading, developing, implementing, and integrating stroke care across their respective regions or sub-regions, spanning the entire spectrum of stroke care from promotion and prevention to acute care, rehabilitation, and community re-integration.

The Evolution of Paramedic Stroke Care in Ontario and Canada

- Over 108,000 strokes annually
- **1** every **5 minutes**. (2022)
- Stroke is the **3rd** leading cause of death, and the tenth largest contributor to disability-adjusted life years
- Approximately **2/3** of all patients who seek acute care for stroke arrive at the emergency department by ambulance with paramedic care.

[Saver, J. L. (2006). Time is brain–quantified. Stroke, 37(1), 263-266.](https://doi.org/10.1161/01.STR.0000196957.55928.ab)

Early Paramedic Stroke Care in Ontario and Canada (Pre-2000s)

Prior to the 2000s, paramedics had basic life support training but limited specialized knowledge regarding stroke care.

Paramedics relied on generalized assessment protocols.

Stroke treatment was delayed; only 20-25% of stroke patients arrived at hospitals within the critical window for thrombolysis.

Paramedic were mandated to take the patients to their closest hospital regardless of capability to deal with these patients.

Most stroke patients or families did not recognize stroke symptoms, contributing to longer delays in calling 911.

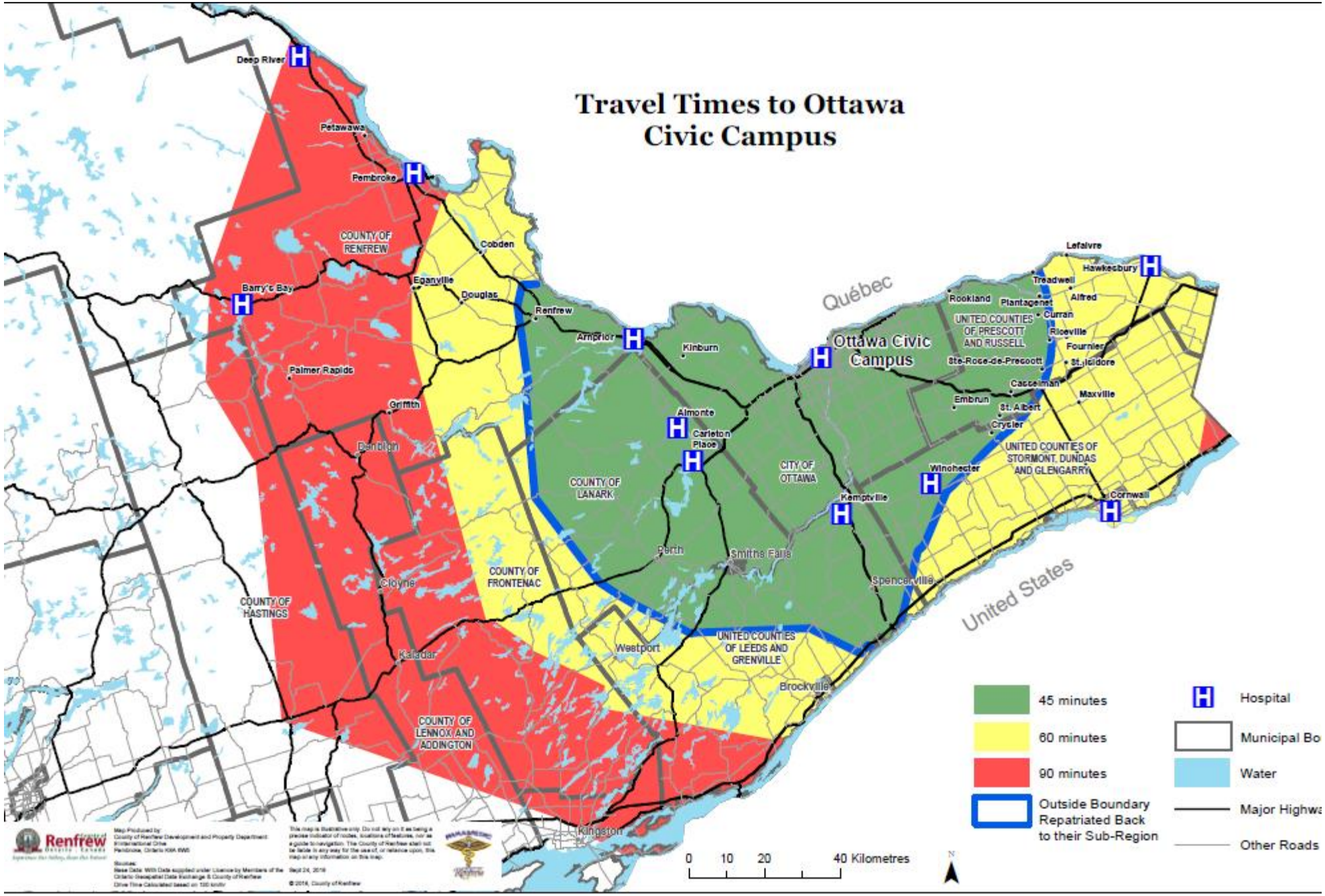
Hill, M. D., & Buchan, A. M. (2005). Thrombolysis for acute ischemic stroke: results of the Canadian Alteplase for Stroke Effectiveness Study.

Advancements in Stroke Care (2000–2010)

- Ontario became a leader with the launch of a province-wide stroke strategy focusing on improving prevention, treatment, and rehabilitation.
- Establishment of **Regional Stroke Centers.**
- Training Improvements - Paramedics trained to use the **Cincinnati Stroke Scale** as a decision guide for bypass criteria.
- Stroke Protocols Implemented: Paramedics began using the Stroke Bypass Protocol, allowing direct transport to stroke centers instead of the nearest hospital. (with a narrow window **<2 hour**)

Ontario Stroke Network. (2011). Ontario Stroke System.](https://www.ontariostrokenetwork.ca)

- [Adams, H. P. Jr, del Zoppo, G., Alberts, M. J., Bhatt, D. L., Brass, L., Furlan, A., et al. (2007). Guidelines for the early management of adults with ischemic stroke. Stroke, 38(5), 1655-1711.](https://doi.org/10.1161/STROKEAHA.107.181486)

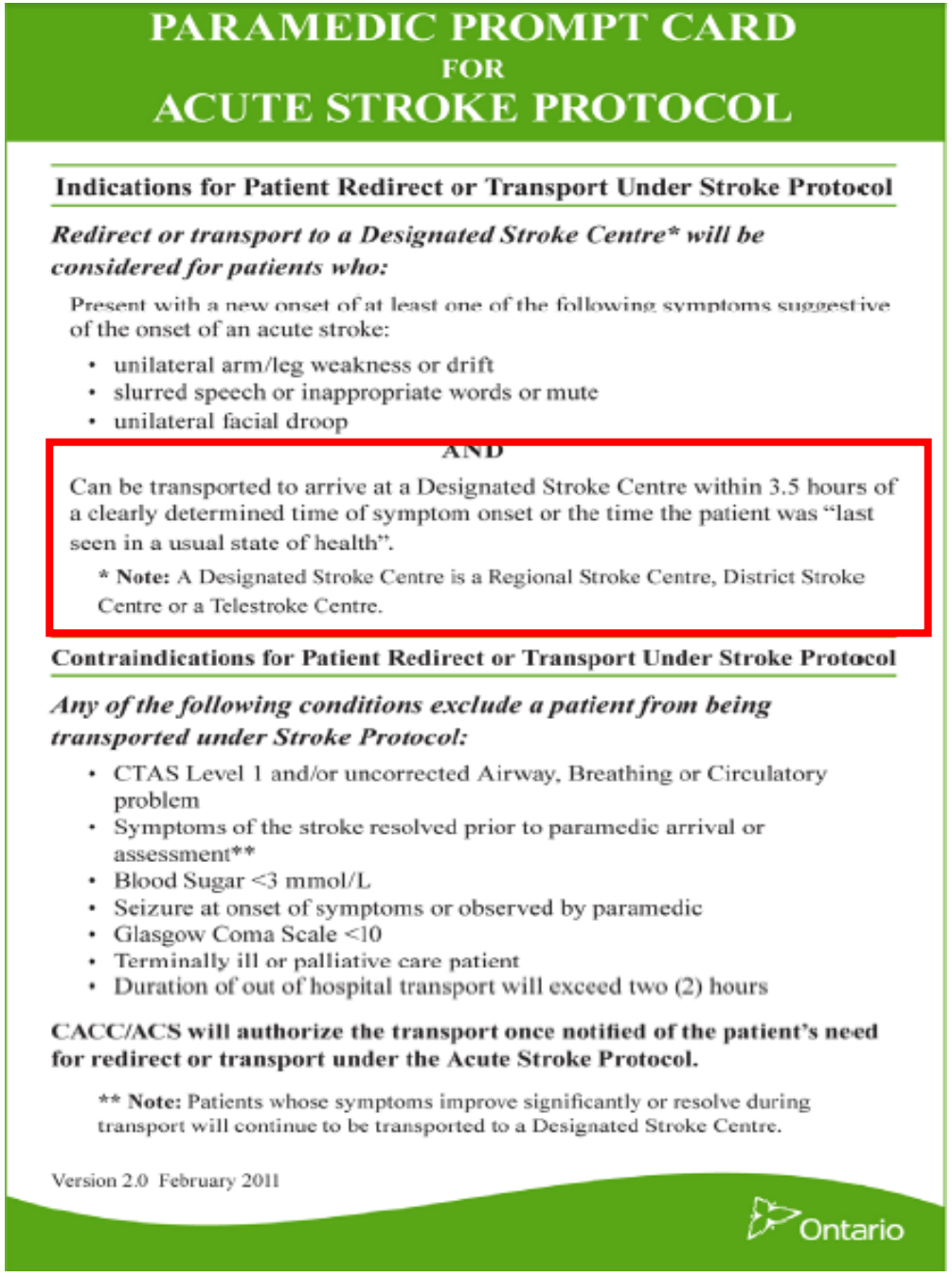

Travel Times to Ottawa
Civic Campus
Deep River
Petawawa
Pembroke
COUNTY OF RENFREW
Cobden
Eganville
Douglas
Barry's Bay
Renfrew
Arnprior
Palmer Rapids
Kinburn
Ottawa Civic Campus
Québec
Lefaivre
Hawkesbury
Treadwell
Alfred
Rockland
Plantagenet
Curran
UNITED COUNTIES OF PRESCOTT AND RUSSELL
Riceville
Fournier
Ste-Rose-de-Prescott
St. Isidore
Casselman
Maxville
Embrun
St. Albert
Crysler
Griffith
Almonte
Carleton Place
Perth
COUNTY OF LANARK
CITY OF OTTAWA
Winchester
UNITED COUNTIES OF STORMONT, DUNDAS AND GLENGARRY
Kemptville
Cornwall
Smiths Falls
Perth
COUNTY OF FRONTENAC
Cloyne
Spencerville
United States
COUNTY OF HASTINGS
Westport
UNITED COUNTIES OF LEEDS AND GRENVILLE
Kaladar
Brockville
COUNTY OF LENNOX AND ADDINGTON
Kingston
45 minutes
60 minutes
90 minutes
Outside Boundary Repatriated Back to their Sub-Region
Hospital
Municipal Bo
Water
Major Highwa
Other Roads
0 10 20 40 Kilometres
N
Renfrew

Expansion of Prehospital Stroke Care (2010–2020)

- In Ontario (2015), the time to treatment for stroke patients dropped from over 180 minutes to less than 120 minutes.
- The **FAST Campaign** was launched nationwide, leading to a 35% increase in public awareness of stroke symptoms and the importance of calling 911.
- Increased awareness resulted in a 30% rise in stroke patients arriving at hospitals within the critical treatment window.
- Paramedics could bypass non-stroke hospitals and transport patients to designated stroke centers. Up to **3.5 hours**

Impact:

- Time to treatment significantly reduced, and the rate of tPA administration increased from **3-5% to 15-20%** in stroke patients.
- Introduction of Stroke Protocols.
- Use of early tools like Cincinnati Stroke Scale to assess patients in the field.



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.

Version 2.0 February 2011

Ontario

Current Paramedic Stroke Care (2018–Present)

- Enhanced Assessment Tools
  - **Nascar Model**: Improve communication between paramedics and stroke teams, reducing door-to-needle time (DTN) by 15-20 minutes.
  - **Telestroke Services**: Paramedics work with hospital team in rural or remote areas to consult Stroke Neurologists through video calls to assess whether Tenecteplase (TNK) should be administered or, if the patient should be transferred to an EVT treating facility.
  - Paramedics now use more advanced stroke screening tools like the Los Angeles Motor Scale (LAMS) Prehospital Stroke Screen and to assess severity.

Acute Stroke Bypass and Additional Partnerships with CRSN

Consultation (2016-2017)

CRSN & CESN discussions on implementation of in-field triage tool to support timely access to EVT at Regional Stroke Centre

Planning & Implementation (2017-2018)

Bypass process designed and approved

In-field triage tool approved

Evaluation & Monitoring (2018-2020)

Working group developed evaluation framework and pilot metrics

E-learning developed by CRSN for paramedics

MOU signed by hospitals and paramedic services

Data outcomes and feedback shared with stakeholders

Pilot began in Champlain region for Acute Stroke Bypass Protocol

Standard of Care (2020)

Acute Stroke Bypass became standard of care in Champlain region 2020

Feedback Loop (2021)

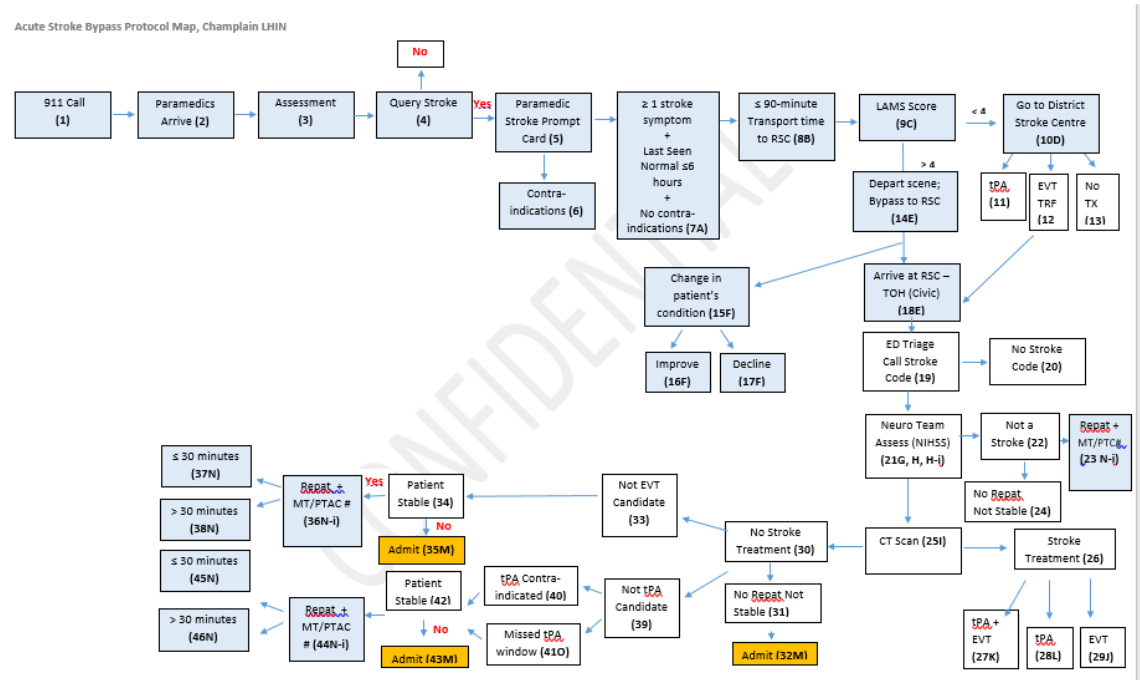
Partnership between RPPEO and CRSN to provide feedback letters to paramedics when patients are bypassed for acute stroke treatment consideration and promote clinical reflective practice

Provincial stroke prompt card updated (BLS PCS 3.3) to include LAMS tool for screening of large vessel occlusions (LVO)

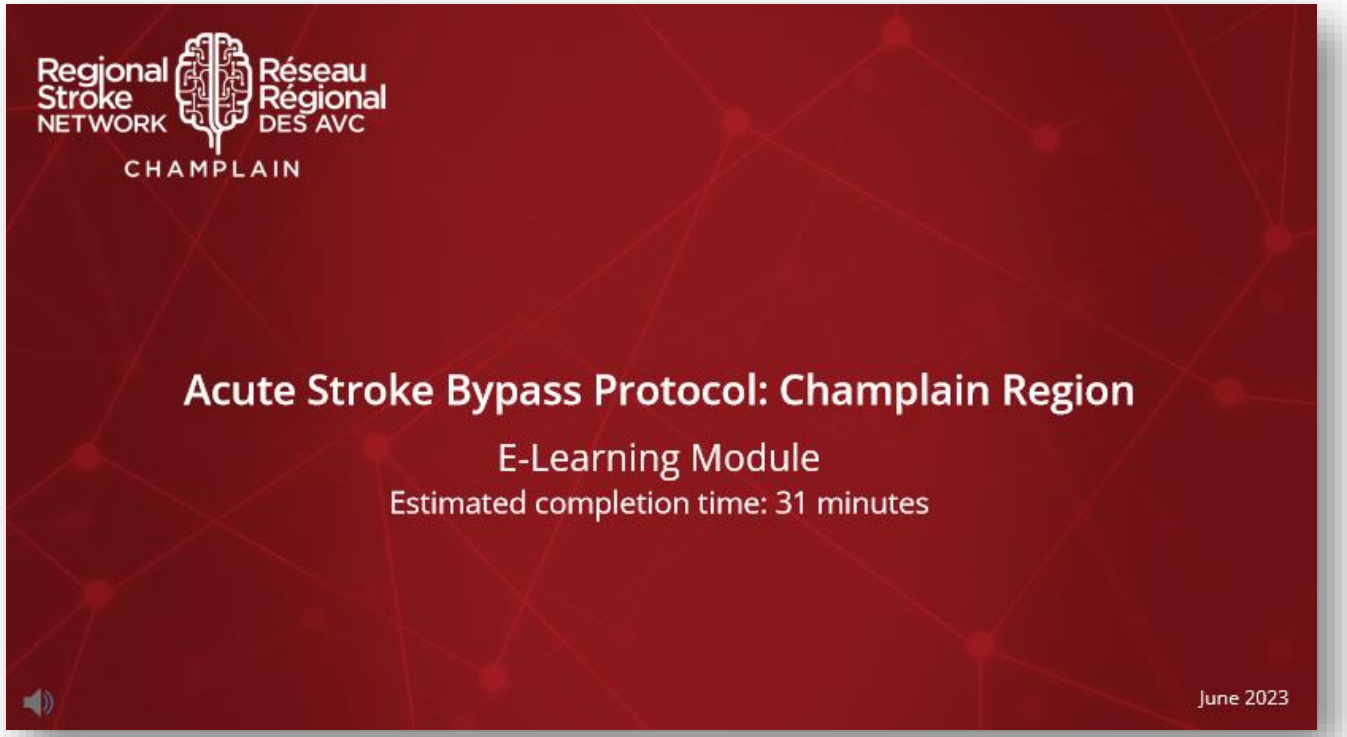
Education & Updates (2022)

E-learning modules and paramedic services algorithms reviewed and updated to reflect new BLS PCS and current processes

Acute Stroke Bypass Protocol Indicators	Definition
A. Time since last seen normal (minutes)	A. Scene Departure Time (ePCR) - Time provided to paramedics by family/friend/patient or N/A
B. Time to Regional Stroke Centre (minutes)	B. 90-minute transport (Yes or No)
C. # of patients bypassed to TOH with LAMS ≥4	C. "Receiving facility" box on ePCR and total LAMS score
D. # of patients transported to District Stroke Centre (DSC) with LAMS <4	D. "Receiving facility" box on ePCR
E. Total time of patient transport to RSC (minutes)	E. Arrive Destination (Truck parked at RSC) - Depart scene (begins when truck is put into gear)
F. # of patients with change in symptoms on transport	F. "Final status" box on ePCR (Deteriorated, Improve, No change)
G. # of patients bypassed to TOH with LAMS ≥4 and NIHSS >4	G. LAMS score (ePCR) and NIHSS (Neurology initial assessment)
H. # of patients bypassed to TOH with LAMS ≥4 and NIHSS ≤4 i. # of patients at TOH but should have been transferred to different hospital	H. LAMS score (ePCR) and NIHSS (Neurology initial assessment)
I. Time of CT scan (minutes)	I. CT report time stamp
J. # of bypassed patients to TOH with LAMS ≥4 and received EVT	J. Neurology consult
K. # of bypassed patients to TOH with LAMS ≥4 and received tPA and EVT	K. Neurology consult
L. # of bypassed patients to TOH with LAMS ≥4 and received tPA	L. Neurology consult
M. # of bypassed patients with no treatment and admitted to TOH	M. Neurology consult
N. # of immediate repatriation of patient post CT with no treatment i. Time of repatriation departure (minutes)	N. ePCR (targeted questions included)
O. # of patients not tPA eligible, outside of 4.5 hours	O. LSN + transport time



LAMS Tool Implementation



- New assessment tool for paramedic the LAMS score
- E-Learning module to support education with paramedics
- Revised and updated June 2023 for paramedic services

LOS ANGELES MOTOR SCALE **(LAMS)**

LARGE VESSEL OCCLUSION (LVO) CLINICAL STROKE SCREEN

CLINICAL ASSESSMENT OF ITEM	DESCRIPTION	SCORE THE AFFECTED SIDE
FACIAL DROOP Instruct patient to smile; show teeth	No facial asymmetry. Normal	0 = ABSENT
	Partial or complete lower facial droop	1 = PRESENT
ARM DRIFT Elevate both arms with palm down, (45 degrees if lying, 90 degrees, if sitting) for 10 second count	No drift. Normal	0 = ABSENT
	Drifts down but does not hit the bed within 10 seconds	1 = DRIFTS DOWN
	Arms cannot be held up against gravity and fall to the bed within 10 seconds	2 = FALLS RAPIDLY
STRENGTH GRIP Have patient try to grasp examiners fingers	Normal	0 = NORMAL
	Weak but some movement	1 = WEAK GRIP
	No movement. Muscle contraction seen but without movement	2 = NO GRIP
	TOTAL LAMS SCORE (0-5)	

NEGATIVE LAMS
LESS THAN 4 (< 4)

POSITIVE LAMS
GREATER OR EQUAL TO 4 (≥ 4)

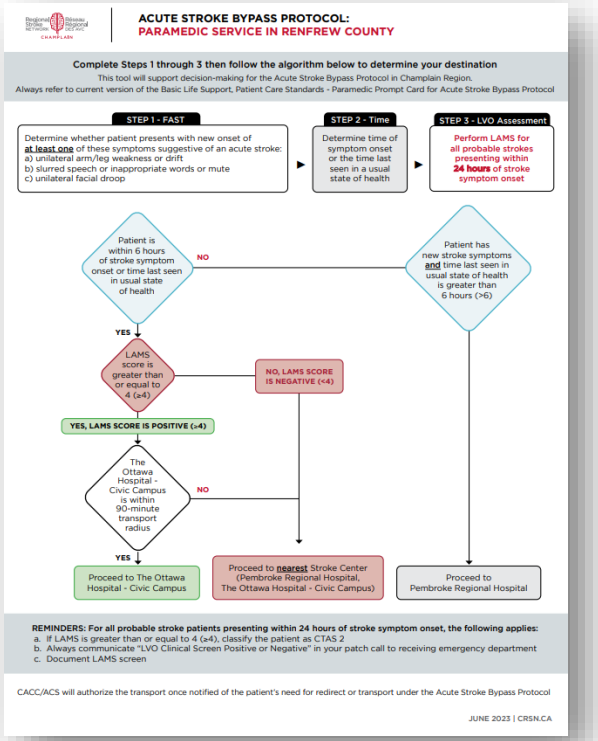
Paramedics will notify the receiving emergency department while enroute of the incoming suspected stroke with the following items:

- LVO clinical screen - Positive or Negative (*Document this score)
- Patient age and sex
- Current condition; medical stability
- Time of onset of symptoms or last known in usual state of health
- Expected time of arrival at receiving hospital

Regional Stroke NETWORK Réseau Régional DES AVC CHAMPLAIN

Llanes, JN et al. (2004). The Los Angeles Motor Scale (LAMS): A new measure to characterize stroke severity in the field. Prehospital emergency care, 8(1), 45-50.

Provincial Stroke prompt card for acute Bypass



ACUTE STROKE BYPASS PROTOCOL:
PARAMEDIC SERVICE IN RENFREW COUNTY

Complete Steps 1 through 3 then follow the algorithm below to determine your destination

This tool will support decision-making for the Acute Stroke Bypass Protocol in Champlain Region.
Always refer to current version of the Basic Life Support, Patient Care Standards - Paramedic Prompt Card for Acute Stroke Bypass Protocol

STEP 1 - FAST
Determine whether patient presents with new onset of **at least one** of these symptoms suggestive of an acute stroke:
a) unilateral arm/leg weakness or drift
b) slurred speech or inappropriate words or mute
c) unilateral facial droop

STEP 2 - Time
Determine time of symptom onset or the time last seen in a usual state of health

STEP 3 - LVO Assessment
Perform LAMS for **all probable strokes presenting within 24 hours of stroke symptom onset**

Patient is within 6 hours of stroke symptom onset or time last seen in usual state of health
NO
Patient has new stroke symptoms **and** time last seen in usual state of health is greater than 6 hours (>6)
YES
LAMS score is greater than or equal to 4 (≥4)
NO, LAMS SCORE IS NEGATIVE (<4)
YES, LAMS SCORE IS POSITIVE (≥4)
The Ottawa Hospital - Civic Campus is within 90-minute transport radius
NO
YES
Proceed to The Ottawa Hospital - Civic Campus
Proceed to **nearest** Stroke Center (Pembroke Regional Hospital, The Ottawa Hospital - Civic Campus)
Proceed to Pembroke Regional Hospital

REMINDERS: For all probable stroke patients presenting within 24 hours of stroke symptom onset, the following applies:
a. If LAMS is greater than or equal to 4 (≥4), classify the patient as CTAS 2
b. Always communicate "LVO Clinical Screen Positive or Negative" in your patch call to receiving emergency department
c. Document LAMS screen

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

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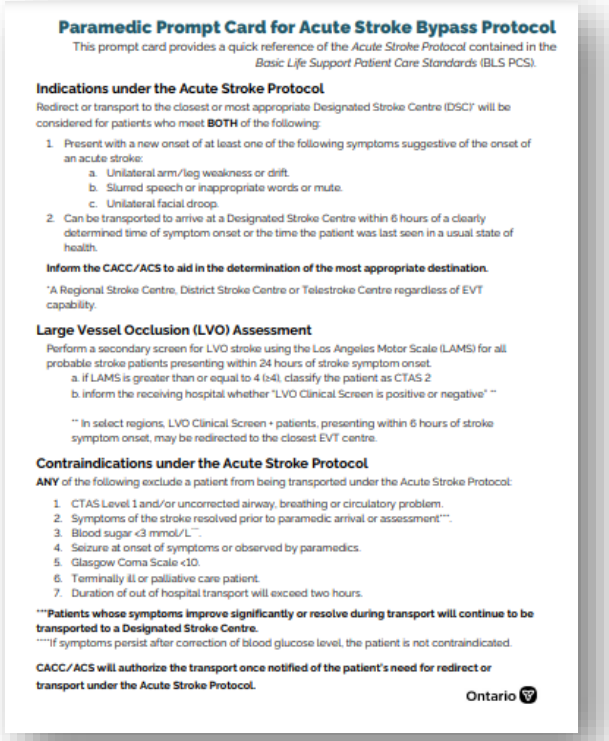


Paramedic Prompt Card for Acute Stroke Bypass Protocol

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

Indications under the Acute Stroke Protocol

Redirect or transport to the closest or most appropriate Designated Stroke Centre (DSC)* will be considered for patients who meet **BOTH** 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 6 hours of a clearly determined time of symptom onset or the time the patient was last seen in a usual state of health.

Inform the CACC/ACS to aid in the determination of the most appropriate destination.

*A Regional Stroke Centre, District Stroke Centre or Telestroke Centre regardless of EVT capability.

Large Vessel Occlusion (LVO) Assessment

Perform a secondary screen for LVO stroke using the Los Angeles Motor Scale (LAMS) for all probable stroke patients presenting within 24 hours of stroke symptom onset.
a. If LAMS is greater than or equal to 4 (≥4), classify the patient as CTAS 2
b. inform the receiving hospital whether "LVO Clinical Screen is positive or negative" **

** In select regions, LVO Clinical Screen + patients, presenting within 6 hours of stroke symptom onset, may be redirected to the closest EVT 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 1 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.

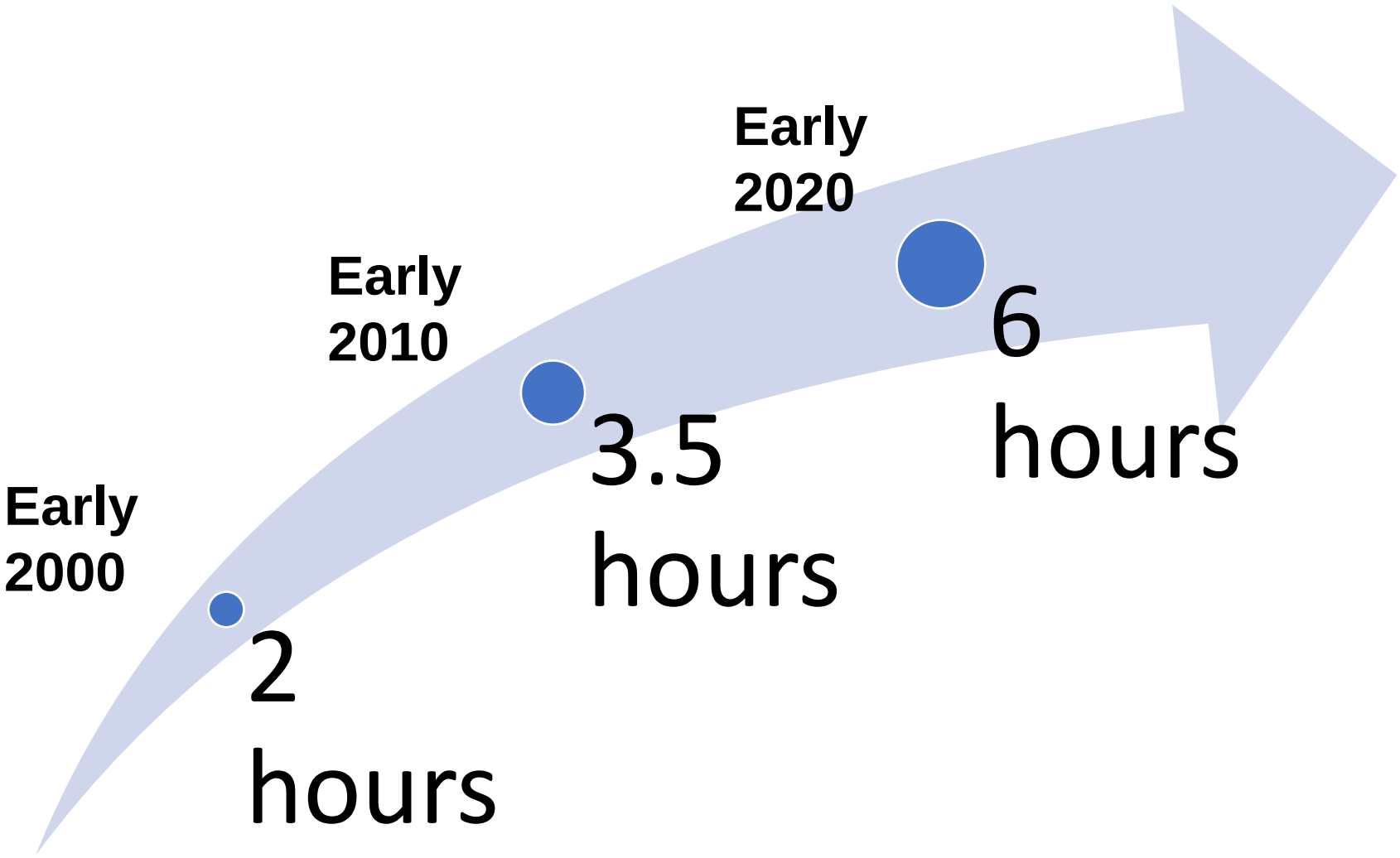
CACC/ACS will authorize the transport once notified of the patient's need for redirect or transport under the Acute Stroke Protocol.

Ontario

Acute stroke Bypass

Acute Stroke Bypass and Redirection Protocol Algorithm
Designed for each service in Champlain region
Reviewed and revised in 2023 to reflect changes in the provincial prompt card

Patient has new symptom onset and is within X hours of last known well for transport decision



Stroke Feedback Letter Partnership (2021)

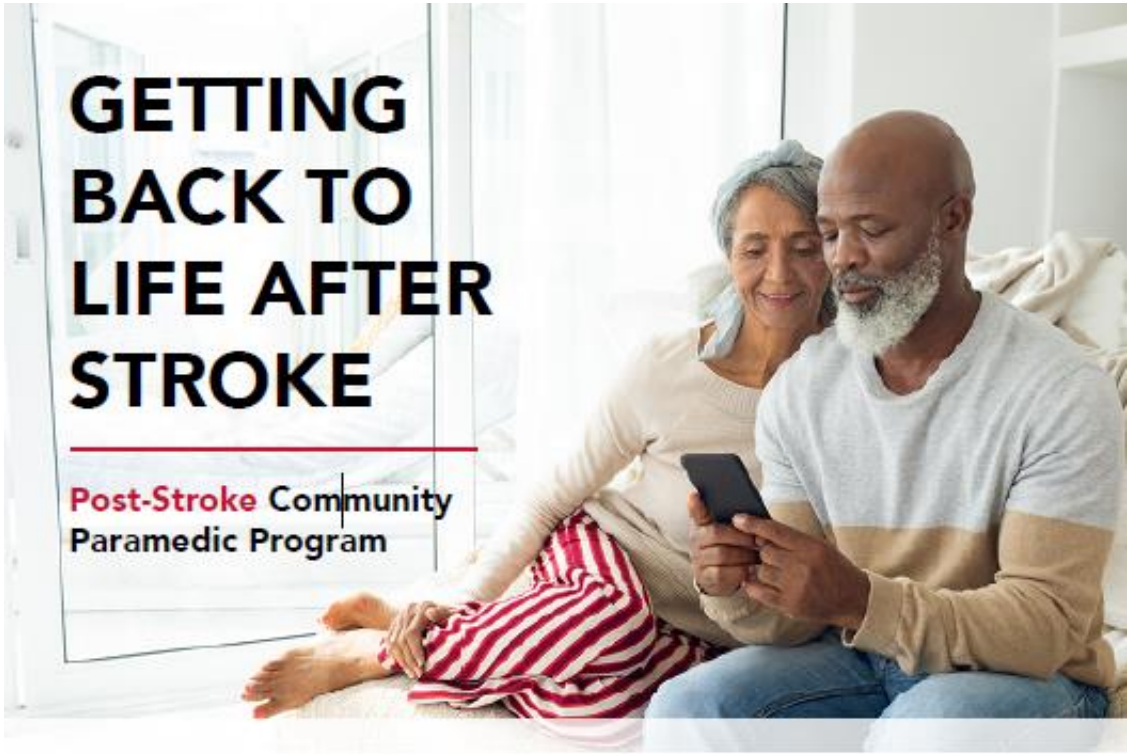
- Stroke outcome letters are sent to paramedics involved in suspected stroke bypass calls with a stroke diagnosis in hospital.
- The purpose of these letters is to provide members with outcome information to facilitate self-reflective practice.
- This may also provide the opportunity to improve triage decisions and confirm clinical suspicions.

REGIONAL PARAMEDIC PROGRAM FOR EASTERN ONTARIO

Regional Stroke NETWORK Réseau Régional DES AVC

CHAMPLAIN

Post-Stroke and TIA Community Paramedicine Program



Program Content

All referrals for TIA and stroke receive support with:

- Stroke risk factors including Hypertension, Diabetes, Atrial Fibrillation and Tobacco Use
- Medication reconciliation

For persons with stroke, additional assessments include:

- Mobility, home safety and activities of daily living
- Communication, mood, cognition and fatigue
- Incontinence, spasticity and pain
- Life after stroke, personal relationships & other challenges

What Will Happen at a Visit?

As part of this program, participants will receive tailored assessments and follow-up based on personal stroke risk factors, with an offer of referral to community resources if needed. Paramedics will communicate with primary care providers to support continuity of care.

The goal is to have visits <1 week, with follow up as needed up to 6 months after returning home following stroke or TIA.

Referral and Contact Information

Who can refer?

Any member of the healthcare team can refer (physicians, nurses, physiotherapists, occupational therapists, social workers, speech language pathologists) or other professional team members.

To refer:

Complete the Community Paramedic post-stroke referral form based on the patient's home address (Referral MUST INCLUDE Discharge Summary and/or Consult notes as well as current medication list)

If you have questions or need more information, please contact:

Renfrew County Community Paramedic service: 1-844-860-2778
Ottawa Community Paramedic service: 613-580-2651
Cornwall, Stormont, Dundas and Glengarry (SDG) Community Paramedic service: 613-930-2787 x2178

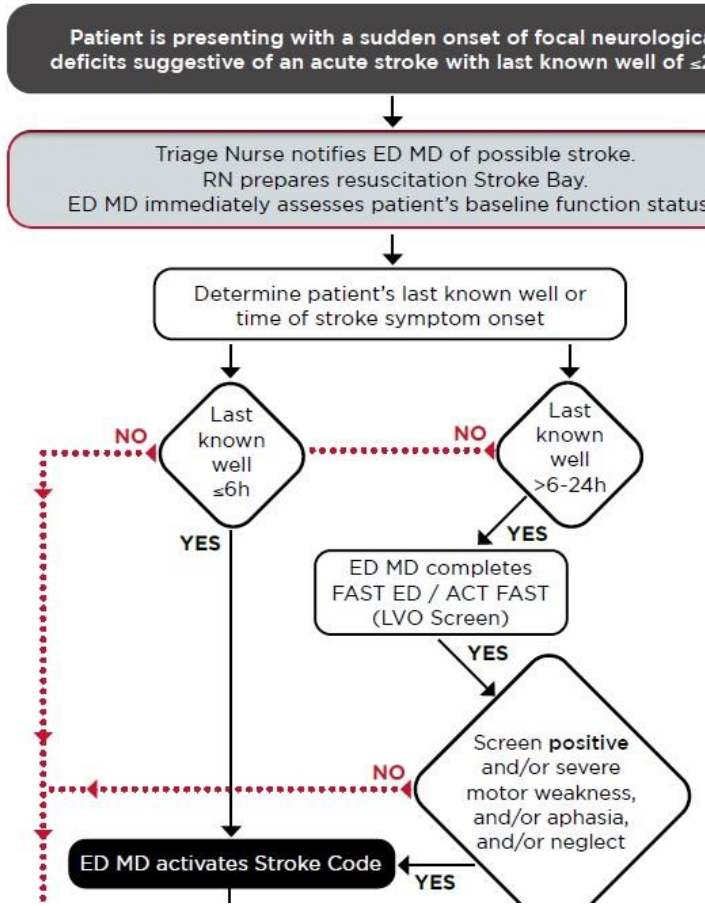
Emergency Department

Stroke Code Algorithms

Regional Stroke Network Champlain | Réseau Régional des AVC | The Ottawa Hospital | L'Hôpital d'Ottawa

DECISION ALGORITHM FOR ACUTE STROKE CODE
TOH CIVIC - EMERGENCY DEPARTMENT

PURPOSE: To support the Emergency Department and Stroke Team in: 1) the immediate assessment of a patient presenting with possible stroke, (2) the Stroke Code process, and (3) the potential treatment of a stroke patient.



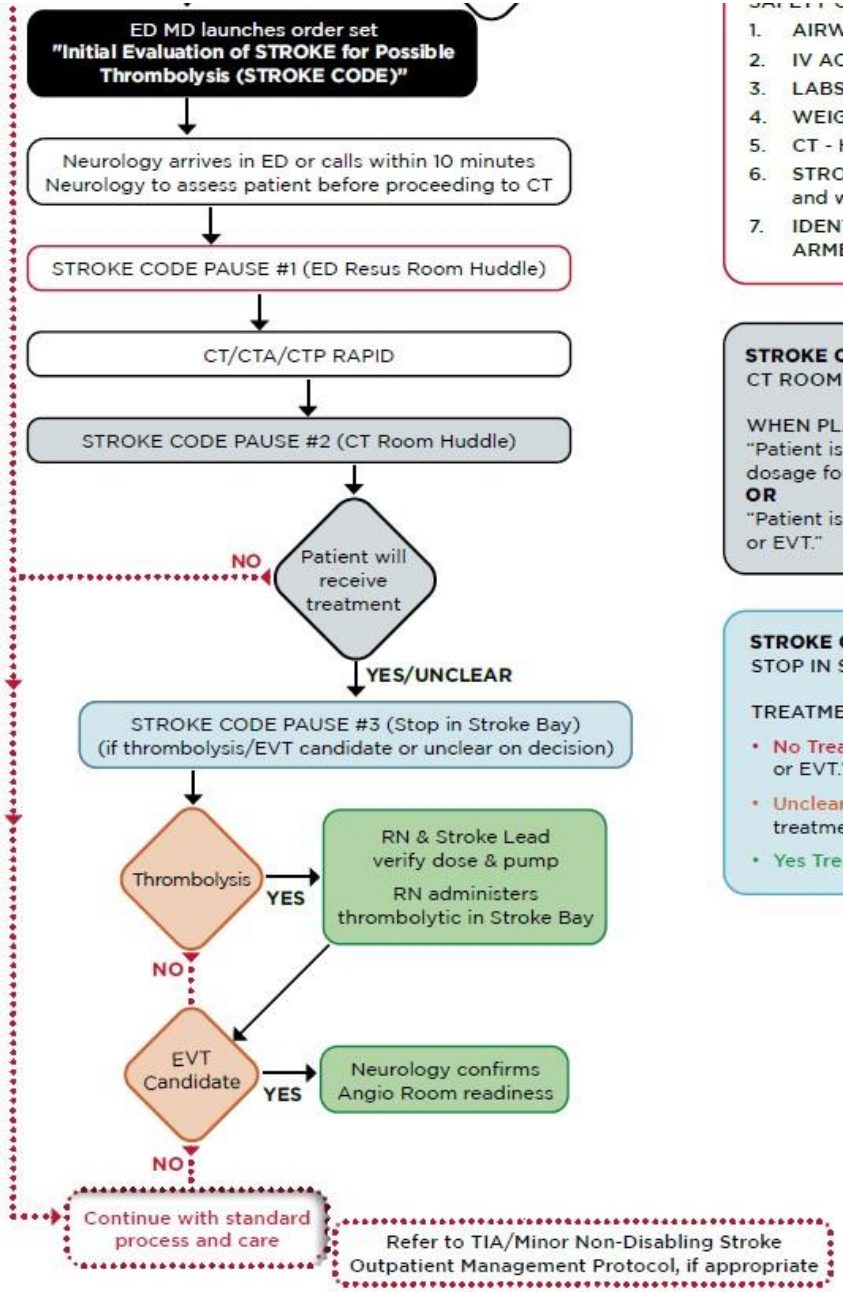
*Patients with severe comorbidities, bed bound, or with severe pre-existing cognitive impairment to a degree where they cannot communicate or recognize family members are NOT candidates for EVT or thrombolysis
Consult Neurology for uncertain cases

STROKE CODE PAUSE #1
ED RESUSCITATION ROOM HUDDLE - Facilitated by Stroke Code Lead

NAMES & ROLES: STROKE CODE LEAD SAYS IT LOUDLY

- **Stroke Code LEAD:** "I am the Sr Resident or Staff Neurologist. I will be the Stroke Code Lead. I will inform Primary ED RN of treatment decision and verify the dose and pump with Primary ED RN."
- **Primary ED RN:** "I am the Primary ED RN. I will provide nursing interventions, bring the stroke box and the IV pump."

Stroke Code Algorithms



1. AIRWAY - Are we satisfied with the AIRWAY?
2. IV ACCESS - Do we have IV ACCESS?
3. LABS - Has BLOODWORK been ORDERED and SENT?
4. WEIGHT - Do we have a WEIGHT?
5. CT - Has CT been ORDERED? Is CT READY? Which CT?
6. STROKE BOX AND IV PUMP - Do we have STROKE BOX and working IV PUMP?
7. IDENTIFICATION AND BELONGINGS - Are ID STICKERS, ARMBAND and BELONGINGS with patient?

STROKE CODE PAUSE #2
CT ROOM HUDDLE

WHEN PLAIN CT COMPLETES - LEAD SAYS IT LOUDLY
"Patient is not a bleed. We need to confirm patient's weight and dosage for thrombolysis in case we decide to treat."
OR
"Patient is a bleed. We aren't going to treat with thrombolysis or EVT."

STROKE CODE PAUSE #3
STOP IN STROKE BAY

TREATMENT DECISION - LEAD SAYS IT LOUDLY

- No Treatment - "We aren't going to treat with thrombolysis or EVT."
- Unclear - "We are unsure whether we will proceed with treatment, Primary ED RN and patient can return to resus"
- Yes Treatment - "We will be proceeding with ..."

JUNE 2022 | CRSN.CA

Vascular Localization - LVO

Pembroke Regional Hospital

ACT-FAST STROKE SCREEN: DETECTING A LARGE VESSEL OCCLUSION (LVO)

DATE/TIME LAST KNOWN WELL: _____

SELECTION CRITERIA

1. **Sudden onset** of focal neurological deficits suggestive of acute stroke **with last known well of less than or equal to 24 hours**
2. Patient does **NOT** have severe pre-stroke impairments, comorbidities, or is not already palliative with end-of-life care
3. Patient has significant **persisting** neurological deficits

**For more details see Decision Algorithm for Acute Stroke Assessment, Consultation, and Transfer Pembroke Regional Hospital*

STEP 1

ARM (one sided arm weakness)

- Position both arms at 45° from the horizontal with elbows straight and ask patient to hold rock steady
- Vocally encourage the patient to hold up if arm begins to fall
- Test may be repeated if unsure the first time

☐ POSITIVE
☐ NEGATIVE

RIGHT ARM WEAK ···· **POSITIVE**

If just one arm falls completely to stretcher within 10 seconds of being held up

Test as positive for patient who is uncooperative or does not follow command **only if** you clearly witness minimal or no movements in one arm and normal spontaneous movement in the other

Test negative if both arms are similarly weak or testing is clearly affected by shoulder problems or pain

···· **LEFT ARM WEAK**

IF STEP 1 POSITIVE, PROCEED TO STEP 2

STEP 2

IF RIGHT ARM WEAK IN STEP 1

CHAT (severe language deficit)

Ask patient to repeat
"You can't teach an old dog new tricks"

OR

Ask patient to perform tasks:
- "Make a fist"
- "Close and open your eyes"

☐ POSITIVE
☐ NEGATIVE

POSITIVE

If mute, speaking incomprehensively, unable to follow simple commands

Use family / friend to translate if language barrier and do not assume they are mute. If this is not possible, you may use a positive shoulder tap test instead to progress

IF LEFT ARM WEAK IN STEP 1

TAP & GAZE (gaze & shoulder tap test)

GAZE
- Stand on patient's weak side
- Observe if the patient has consistent and obvious gaze preference of both eyes away from the side of weakness - if so, the **test is POSITIVE**, otherwise do TAP

TAP
- Tap the patient twice on the shoulder and call their name

POSITIVE

If gaze preference (both eyes) to RIGHT

OR

If patient does not quickly turn their head and their eyes to quickly focus on and notice you

This tests for severe gaze preference and hemi-neglect. It is acceptable to simply observe an obvious gaze preference away from the weak side from the end of the stretcher

IF STEP 2 POSITIVE, your patient has screened positive on the ACT FAST LVO screen

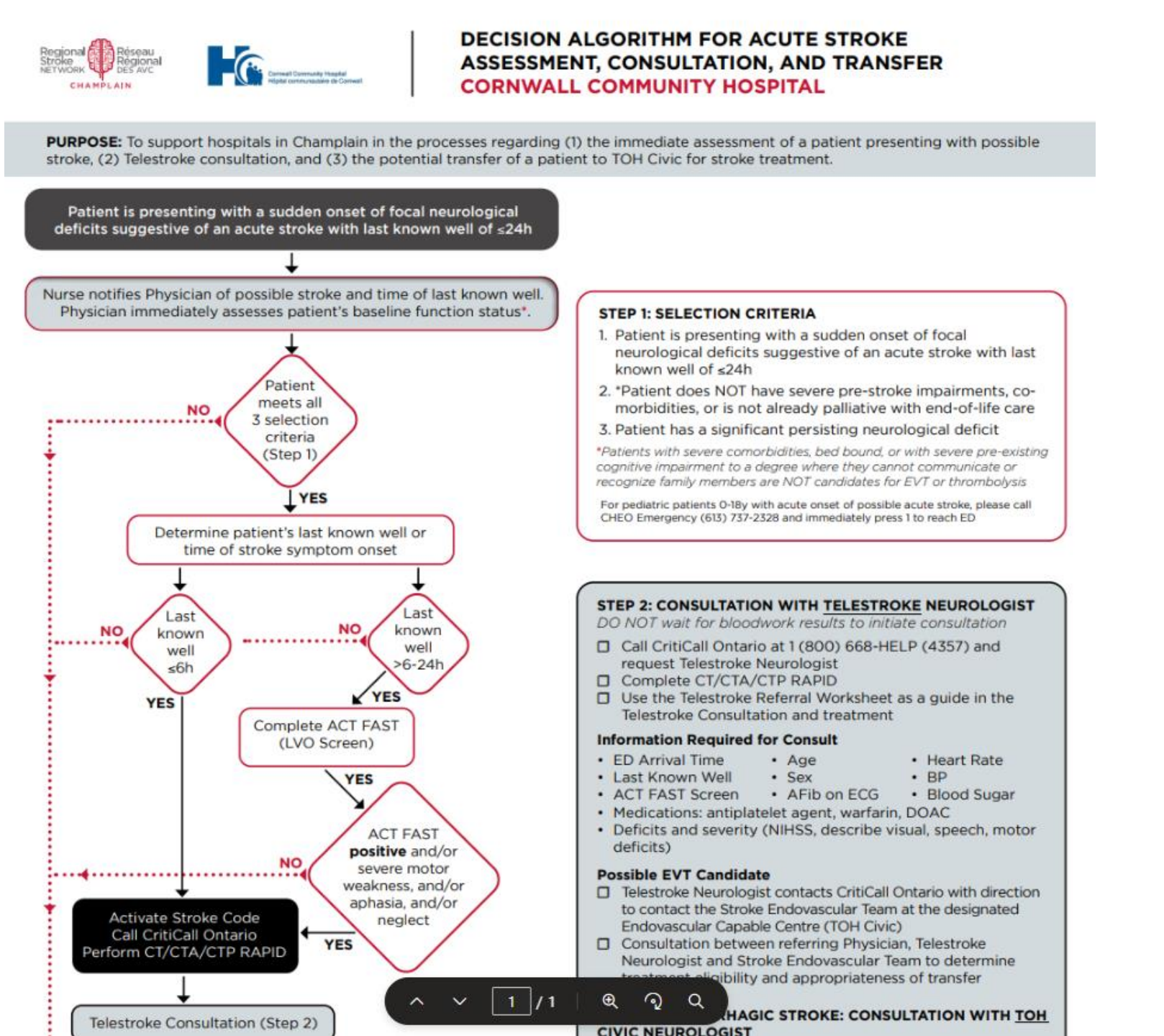
STEP 3

Activate or continue code stroke, if ACT FAST positive and/or severe motor weakness, and/or aphasia and/or neglect

Physician Signature: _____ Date: _____ Time: _____

SEPTEMBER 2023

Stroke Code Algorithms



Regional Stroke Network Champlain | Réseau Régional des AVC | Cornwall Community Hospital

DECISION ALGORITHM FOR ACUTE STROKE ASSESSMENT, CONSULTATION, AND TRANSFER
CORNWALL COMMUNITY HOSPITAL

PURPOSE: To support hospitals in Champlain in the processes regarding (1) the immediate assessment of a patient presenting with possible stroke, (2) Telestroke consultation, and (3) the potential transfer of a patient to TOH Civic for stroke treatment.

Patient is presenting with a sudden onset of focal neurological deficits suggestive of an acute stroke with last known well of ≤24h

Nurse notifies Physician of possible stroke and time of last known well. Physician immediately assesses patient's baseline function status*.

Patient meets all 3 selection criteria (Step 1)
NO
YES

Determine patient's last known well or time of stroke symptom onset

Last known well ≤6h
NO
YES

Last known well >6-24h
NO
YES

Complete ACT FAST (LVO Screen)
YES

ACT FAST **positive** and/or severe motor weakness, and/or aphasia, and/or neglect
NO
YES

Activate Stroke Code
Call CritiCall Ontario
Perform CT/CTA/CTP RAPID

Telestroke Consultation (Step 2)

STEP 1: SELECTION CRITERIA

1. Patient is presenting with a sudden onset of focal neurological deficits suggestive of an acute stroke with last known well of ≤24h
2. *Patient does NOT have severe pre-stroke impairments, co-morbidities, or is not already palliative with end-of-life care
3. Patient has a significant persisting neurological deficit

**Patients with severe comorbidities, bed bound, or with severe pre-existing cognitive impairment to a degree where they cannot communicate or recognize family members are NOT candidates for EVT or thrombolysis*

For pediatric patients 0-18y with acute onset of possible acute stroke, please call CHEO Emergency (613) 737-2328 and immediately press 1 to reach ED

STEP 2: CONSULTATION WITH TELESTROKE NEUROLOGIST

DO NOT wait for bloodwork results to initiate consultation

- ☐ Call CritiCall Ontario at 1 (800) 668-HELP (4357) and request Telestroke Neurologist
- ☐ Complete CT/CTA/CTP RAPID
- ☐ Use the Telestroke Referral Worksheet as a guide in the Telestroke Consultation and treatment

Information Required for Consult

- ED Arrival Time
- Last Known Well
- ACT FAST Screen
- Age
- Sex
- AFib on ECG
- Heart Rate
- BP
- Blood Sugar
- Medications: antiplatelet agent, warfarin, DOAC
- Deficits and severity (NIHSS, describe visual, speech, motor deficits)

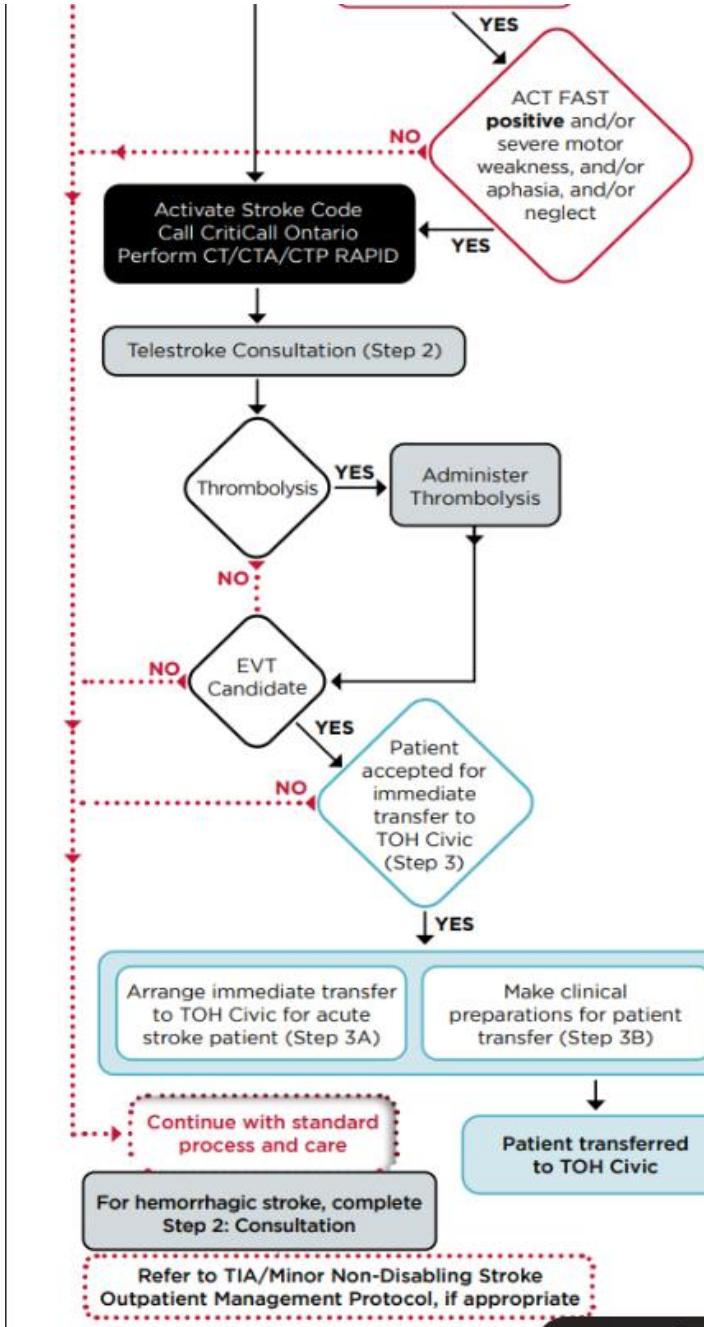
Possible EVT Candidate

- ☐ Telestroke Neurologist contacts CritiCall Ontario with direction to contact the Stroke Endovascular Team at the designated Endovascular Capable Centre (TOH Civic)
- ☐ Consultation between referring Physician, Telestroke Neurologist and Stroke Endovascular Team to determine treatment eligibility and appropriateness of transfer

HAGIC STROKE: CONSULTATION WITH TOH CIVIC NEUROLOGIST

1 / 1

Stroke Code Algorithms



- Last Known Well
- Sex
- BP
- ACT FAST Screen
- AFib on ECG
- Blood Sugar
- Medications: antiplatelet agent, warfarin, DOAC
- Deficits and severity (NIHSS, describe visual, speech, motor deficits)

Possible EVT Candidate

- ☐ Telestroke Neurologist contacts CritiCall Ontario with direction to contact the Stroke Endovascular Team at the designated Endovascular Capable Centre (TOH Civic)
- ☐ Consultation between referring Physician, Telestroke Neurologist and Stroke Endovascular Team to determine treatment eligibility and appropriateness of transfer

OR FOR HEMORRHAGIC STROKE: CONSULTATION WITH TOH CIVIC NEUROLOGIST

- ☐ Physician calls Regional Stroke Center (TOH Civic Campus) at 613-798-5555 ext. 15555
- ☐ Physician states "I am calling from Cornwall Community Hospital and need a stat page to Neurologist covering stroke"
- ☐ The decision to transfer a patient will be made in collaboration amongst the referring Physician and TOH Neurologist

STEP 3: TRANSFER

Complete activities A & B in parallel to avoid unnecessary delays in patient transfer

A) Arrange immediate transport to TOH Civic

- ☐ CritiCall Ontario Agent will work with referring hospital to arrange immediate patient transport **OR** notify Paramedic Dispatch directly that stroke patient is "critical" and "ready now" for transport. Have MT number when you contact Paramedic Dispatch
- ☐ Escort only required if active medication or unstable.

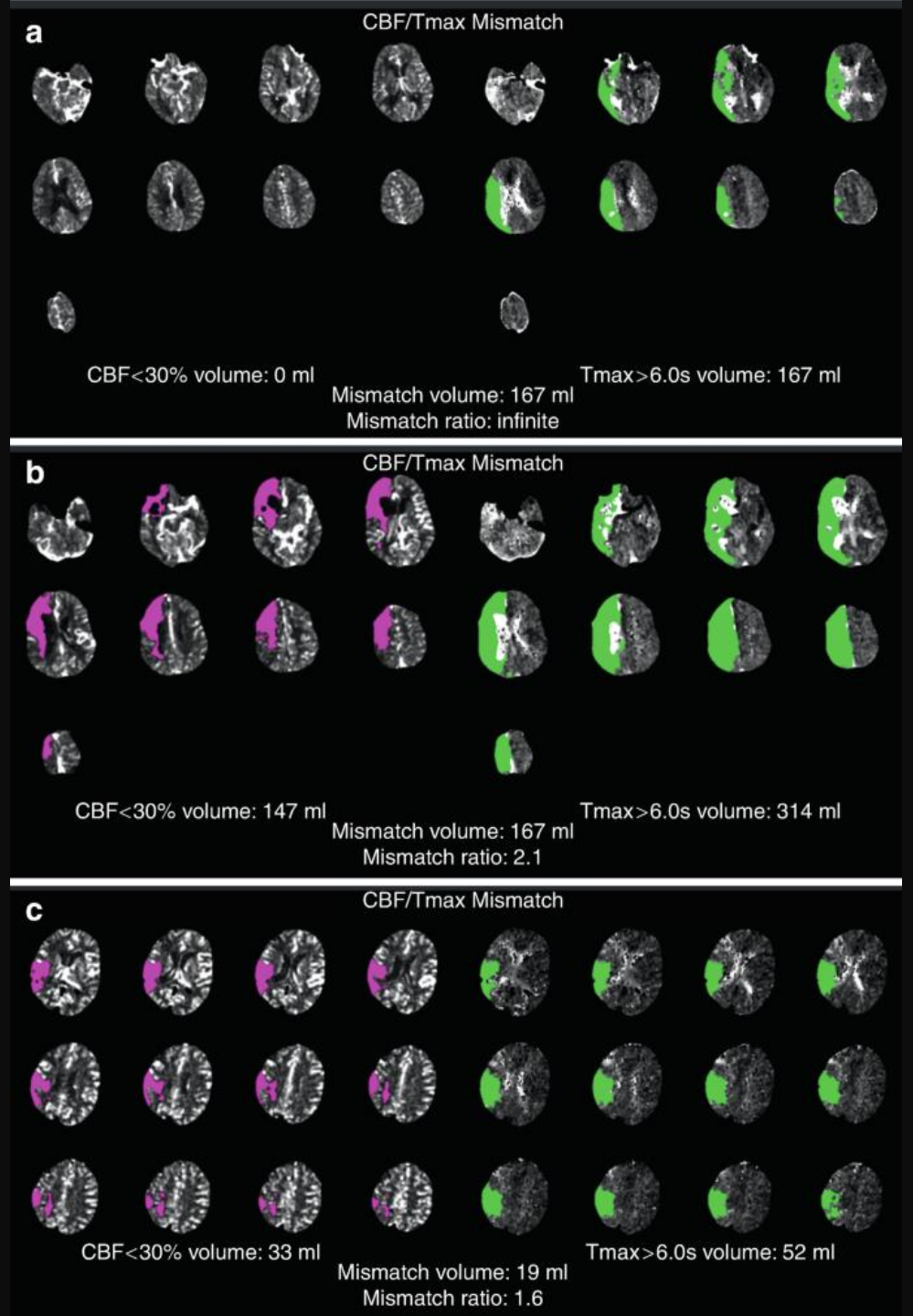
B) Clinical preparation for transfer

- ☐ Insert two 18-gauge IVs
- ☐ Insert indwelling urinary catheter
- ☐ Change patient into hospital gown. Send clothes with patient
- ☐ Keep NPO
- ☐ Obtain contact information for patient, family/witness and send with the patient in ambulance
- ☐ **Patient Transfer Note** should include: time of onset, glucometer reading, vital signs, brief documentation of neurological deficits, family/witness contact info

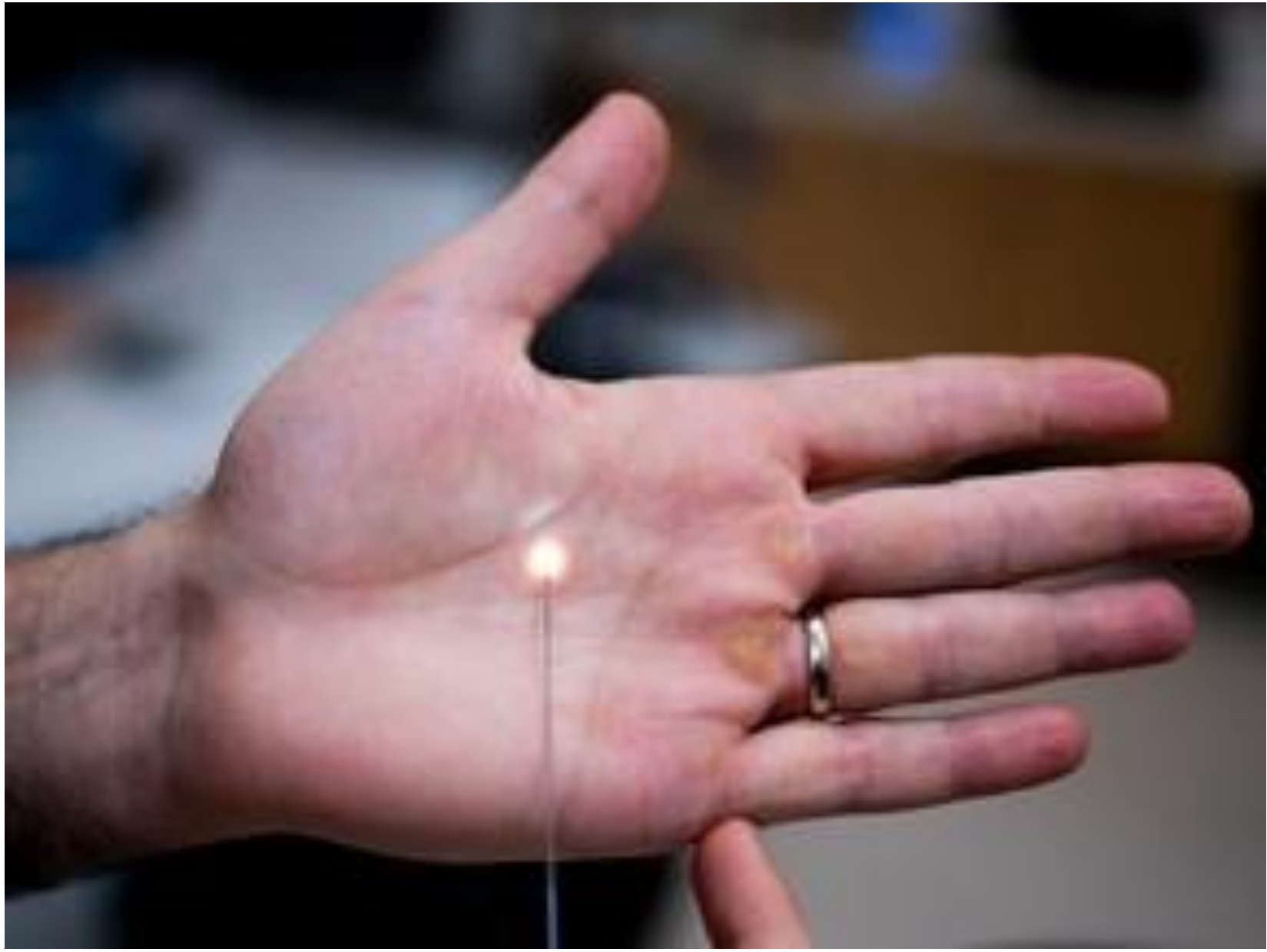
Any relevant information can be faxed to TOH Civic ED 613-761-4337

Future EVT Directions

- Large Core
- Medium Vessel Occlusions
- Who benefits from treatment?



Future EVT Directions



Future EMS Directions

The Transformative Journey of EVT and its System Implications

Ottawa Stroke Summit

September 27, 2023

Dr. Dylan Blacquiere MD MSc FRCPC

Medical Director, Champlain Regional Stroke Network

Division of Neurology, Department of Medicine, TOH

Mathieu Grenier MaL ACP

Deputy Chief of Community Program, County of Renfrew Paramedic Service