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Endovascular Treatment for Acute Ischemic Stroke

Where Are We Now?

by

Dr Grant Stotts

Neurologist, Ottawa Hospital

Medical Director, Champlain Regional Stroke Network

On behalf of the OSN Endovascular Treatment Implementation Planning Group

June 1, 2016

Pre-presentation Instructions

- Please keep microphone on mute unless you are asking a question
- The ppt will be available at www.ontariostrokenetwork.ca
- There will be a question and answer period at the end of the presentation
- This presentation is being webcasted and will be archived at: <http://webcast.otn.ca>

Faculty/Presenter Disclosure

- **Faculty:** Dr. Grant Stotts
- **Relationships with commercial interests:**
 - **Grants/Research Support:** None
 - **Speakers Bureau/Honoraria:** None
 - **Consulting Fees:** None
 - **Other:** Site PI, NAVIGATE ESUS

Disclosure of Commercial Support

- **Potential for conflict(s) of interest:**
 - No conflicts of interest are reported by Dr. Stotts for this presentation.

Mitigating Potential Bias

- No potential bias is expected from this presentation.

Presentation Objectives

Presenter:

- Dr Grant Stotts,
Stroke Neurologist, Ottawa Hospital
Champlain Regional Stroke Medical Director
Co-Chair, OSN Endovascular Treatment Planning Group

•Objectives:

- Provide a brief review of the ongoing Endovascular Treatment recommendations for Ontario
- Provide an opportunity to discuss and provide input on implementation considerations to inform planning.
- Provide an opportunity for discussion and Q&A



Outline

1. EVT Background and Update
2. Ontario CT/CTA Imaging Protocol for Acute Stroke
3. Treating Centre Update
4. Transfer Protocol Update
5. Next steps: Considering Regional Approaches



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I. EVT Background and Update

Acknowledgments to Dr. Demchuk, Calgary Stroke Program, for several slides including Hermes Collaboration



Acute Ischemic Stroke: 2 Acute Treatments

- Medical treatment of acute ischemic stroke remains thrombolysis (tPA)
- IV tPA – 11% absolute benefit compared to placebo (NNT = 9)
- **BUT** benefit is significantly less in large artery occlusions
- Some patients unable to receive IV tPA due to contra-indications (e.g. bleeding risk, recent surgery)

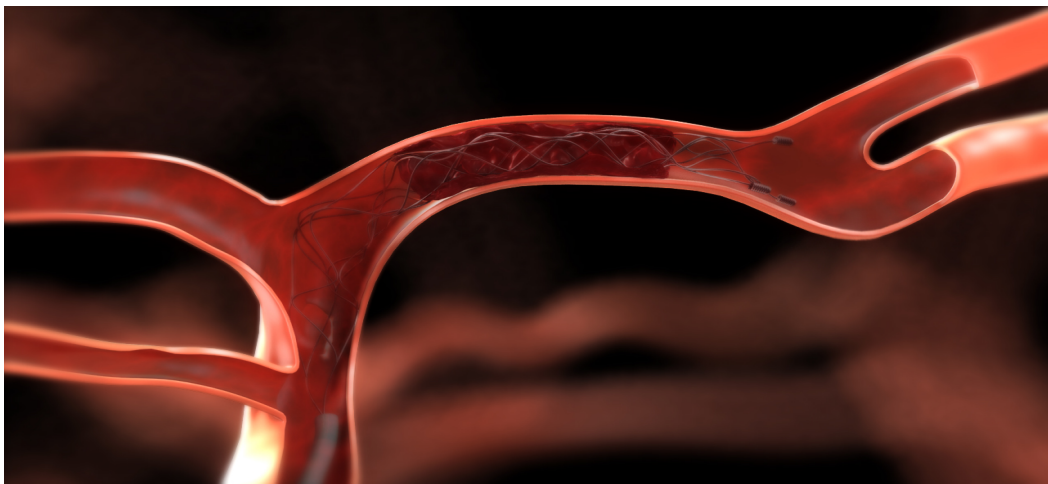


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Endovascular Therapy

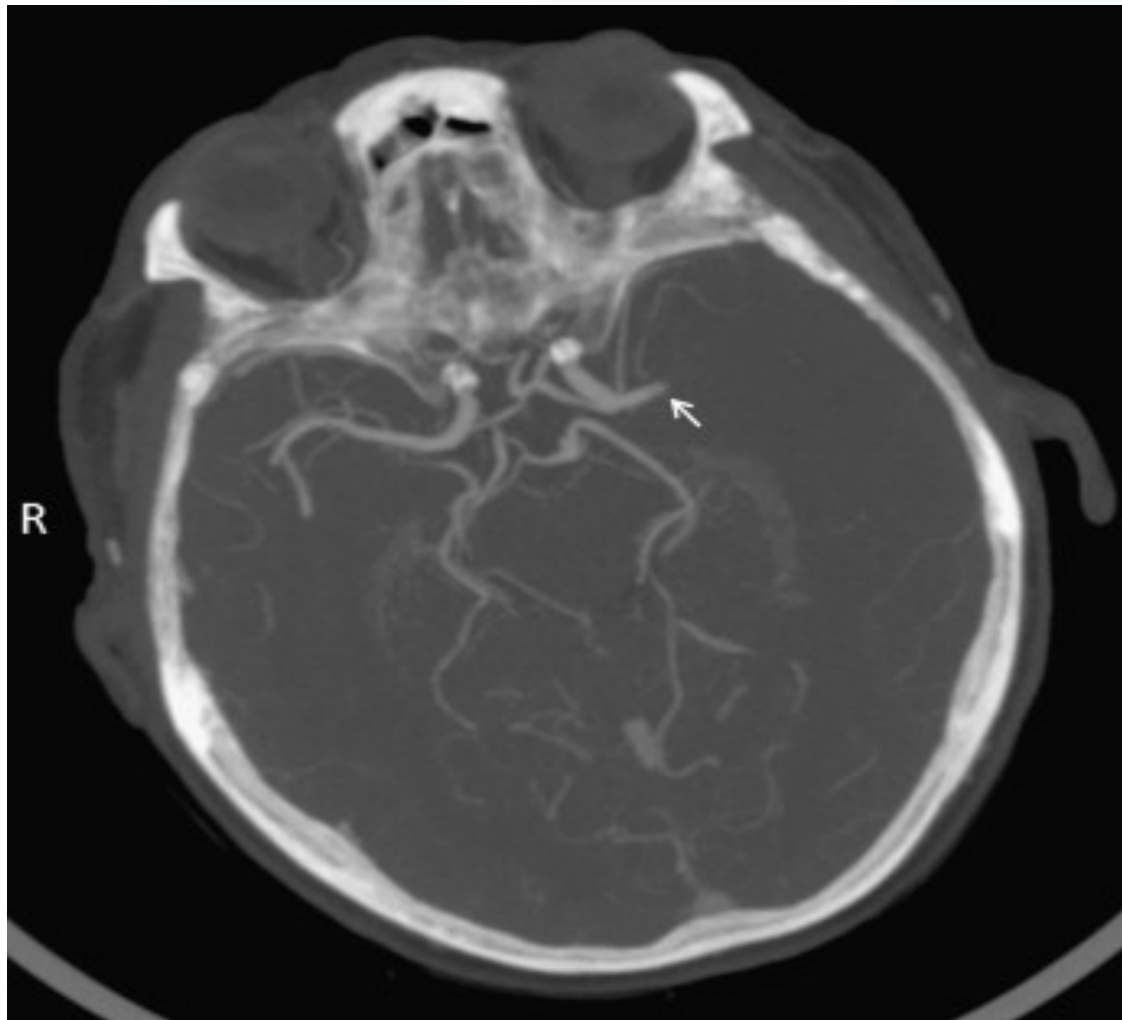
- Procedure usually involves using a catheter and stent, inserted through an artery in the groin to grab the clot and extract it.
- Thromboaspiration devices are also being used for selective cases.



SLIDE COURTESY OF DR. T. KRINGS AND DR. C. LUM

Who Is Eligible for EVT ?

- 20% of ischemic stroke patients
- With or without IV tPA
- Disabling stroke
- Stroke symptoms within 6 hours of time last seen normal
- Large blood vessel blockage with a reachable clot
- Brain tissue that is still alive



Angiographic Outcomes

	Intervention	Control
Final Reperfusion TICI 2b/3 [Angio Core lab determined]	72.4%	---
mAOL 2-3 (at 2-8h CTA) [CT Core lab determined]	---	31.2%
Retrievable Stent Use	86.1%	



Endovascular thrombectomy after large-vessel ischaemic stroke: a meta-analysis of individual patient data from five randomised trials



Mayank Goyal, Bijoy K Menon, Wim H van Zwam, Diederik W J Dippel, Peter J Mitchell, Andrew M Demchuk, Antoni Dávalos, Charles B L M Majoie, Aad van der Lugt, Maria A de Miquel, Geoffrey A Donnan, Yvo B W E M Roos, Alain Bonafe, Reza Jahan, Hans-Christoph Diener, Lucie A van den Berg, Elad I Levy, Olvert A Berkhemer, Vitor M Pereira, Jeremy Rempel, Mònica Millán, Stephen M Davis, Daniel Roy, John Thornton, Luis San Román, Marc Ribó, Debbie Beumer, Bruce Stouch, Scott Brown, Bruce C V Campbell, Robert J van Oostenbrugge, Jeffrey L Saver, Michael D Hill, Tudor G Jovin, for the HERMES collaborators

Summary

Background In 2015, five randomised trials showed efficacy of endovascular thrombectomy over standard medical care in patients with acute ischaemic stroke caused by occlusion of arteries of the proximal anterior circulation. In this meta-analysis we, the trial investigators, aimed to pool individual patient data from these trials to address remaining questions about whether the therapy is efficacious across the diverse populations included.

Published Online
February 18, 2016
[http://dx.doi.org/10.1016/S0140-6736\(16\)00163-X](http://dx.doi.org/10.1016/S0140-6736(16)00163-X)
See Online/Comment/

HERMES Collaborators

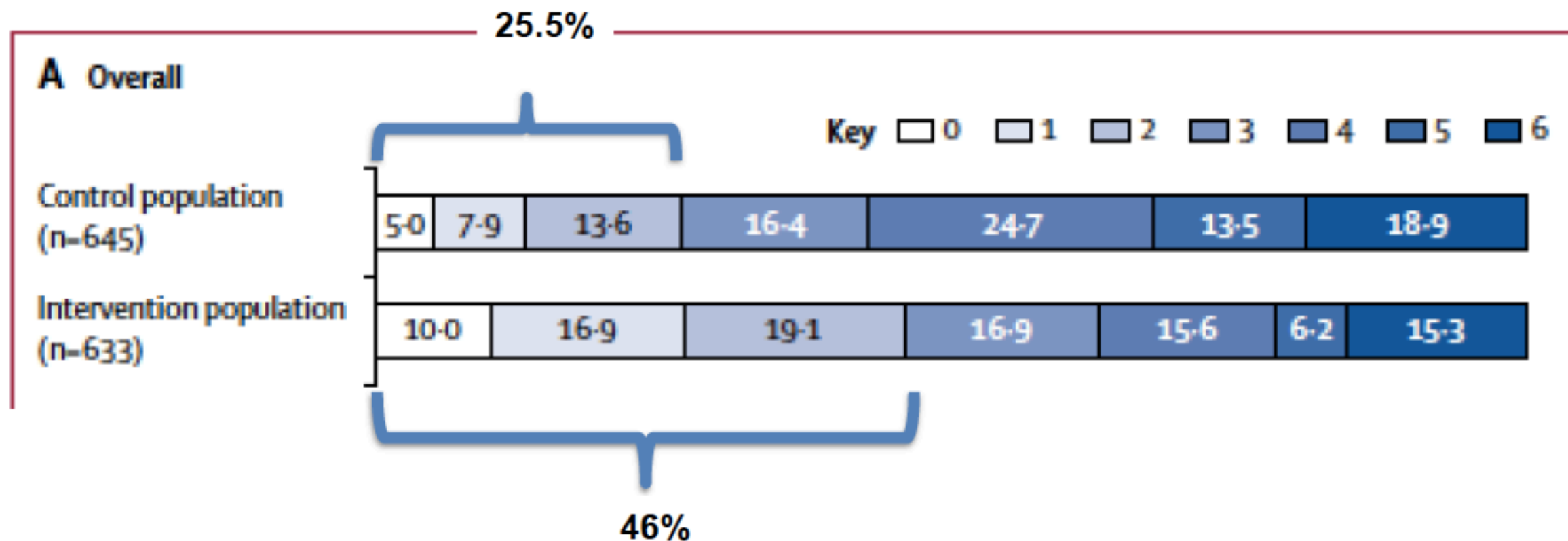
Highly Effective Reperfusion evaluated in Multiple Endovascular Stroke trials (HERMES)





Overall Treatment Effect

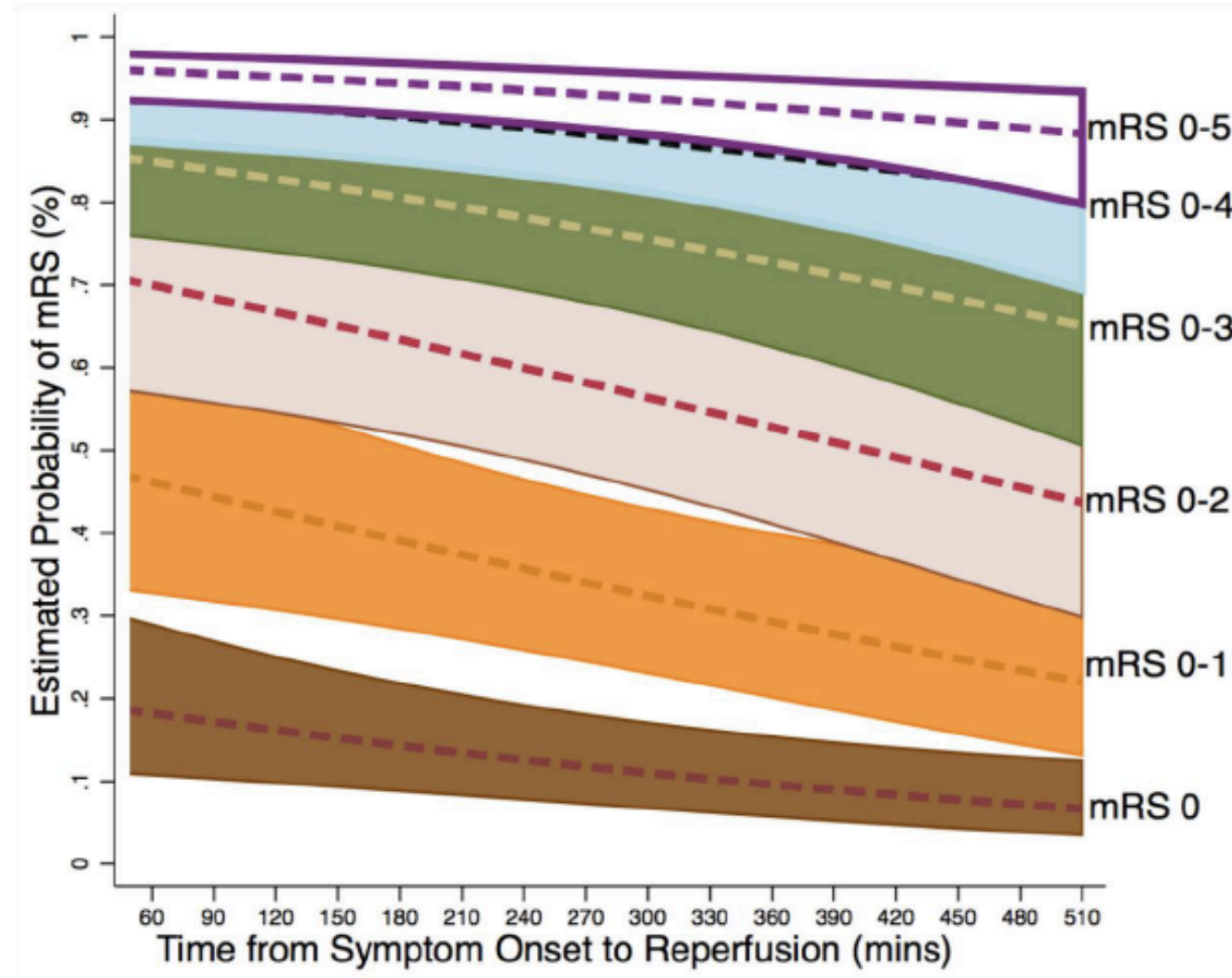
NNT = 2.6





MRS outcome by onset to reperfusion

TIME MATTERS





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II. Imaging Protocol

Drs. Lum, Stotts, Krings, Grynspan

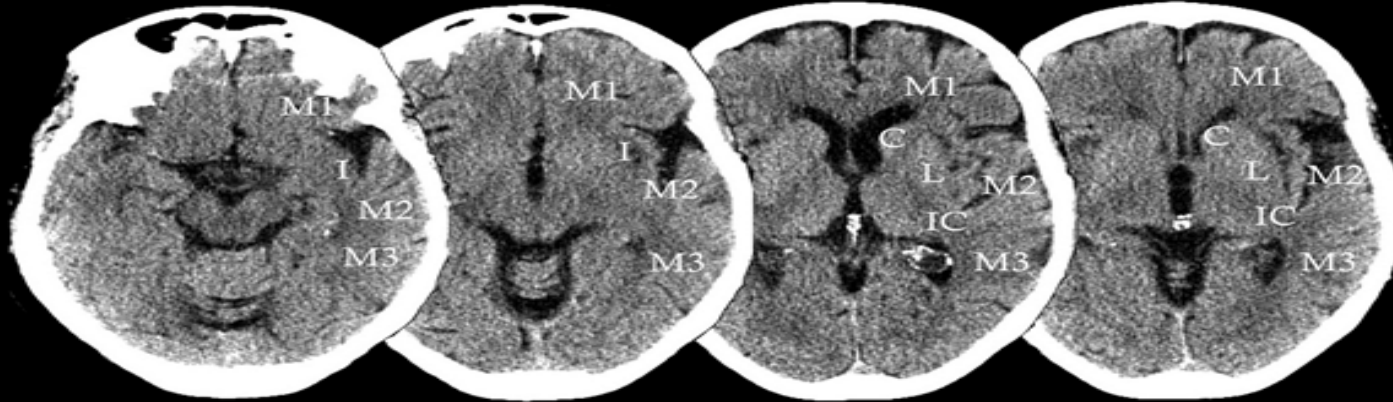
Roger Garnaitis

Linda Kelloway

Imaging Selection Criteria

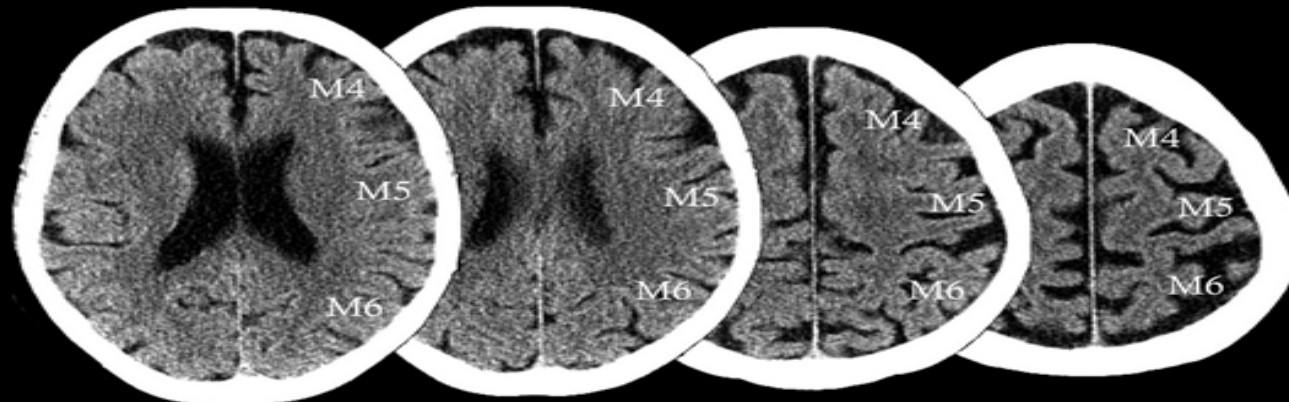
- Improved access to multi phase CT/CTA:
 - *is essential and aligned with CBPR 2015*
 - *recommended for all acute stroke codes*
 - *small to moderate ischemic core is defined by an ASPECTS score of ≥ 6 on non-contrast CT*
- Patients are eligible for EVT with an occluded proximal intracranial artery, which is a target lesion amenable to endovascular treatment including:
 - *ICA terminus, M1, M2-M1 equivalent, basilar artery*
- The presence of good collaterals on multiphase CTA
- Creation of a CT/CTA protocol that can be viewed across all sites

Ganglionic Level



Examine all the images at the ganglionic and supra-ganglionic levels.

Take off 1 pt from 10 for every region that is affected



Supraganglionic Level

ASPECTS

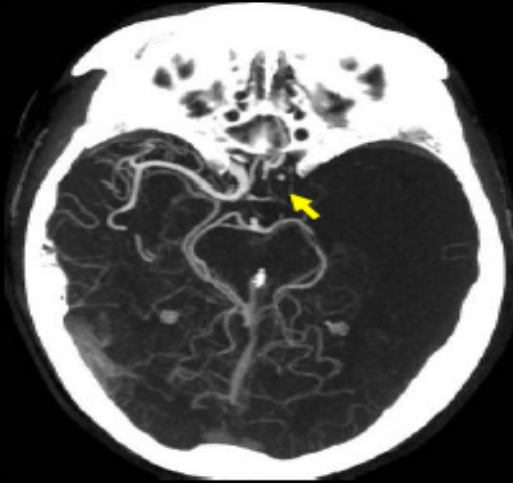
8-10 Small core.

6-7 Moderate core.

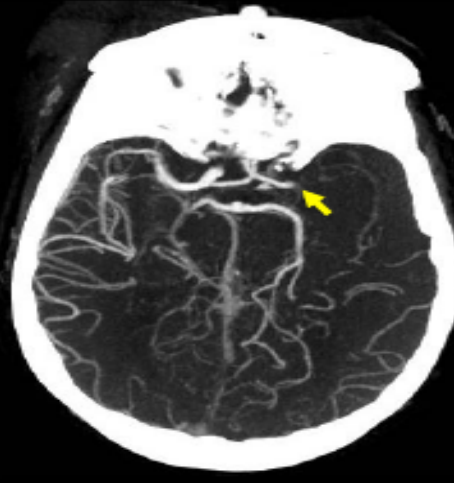
0-5 Large core.

Vascular Imaging – CTA occlusion

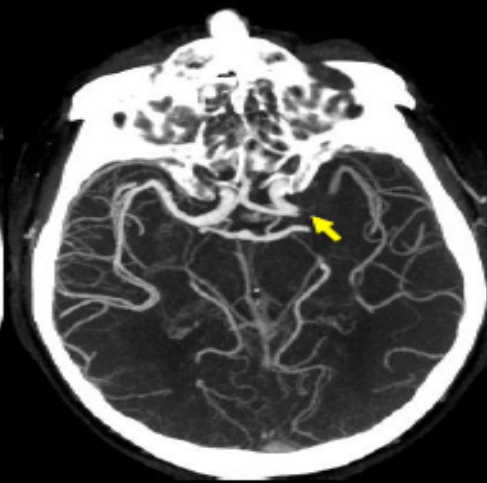
Carotid T



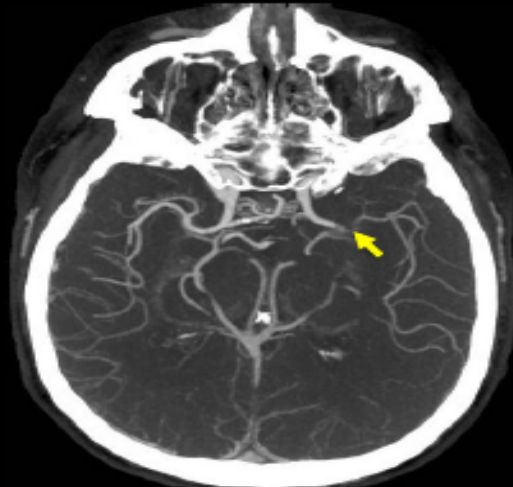
Carotid L



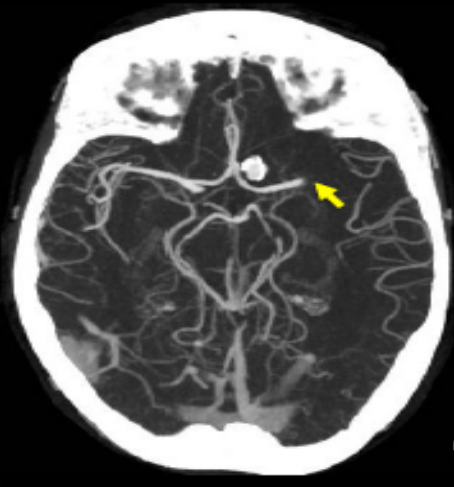
Proximal M1 MCA



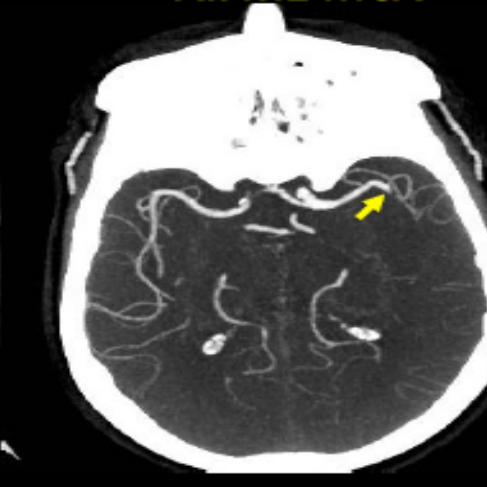
Mid M1 MCA



Distal M1 MCA



All M2 MCA

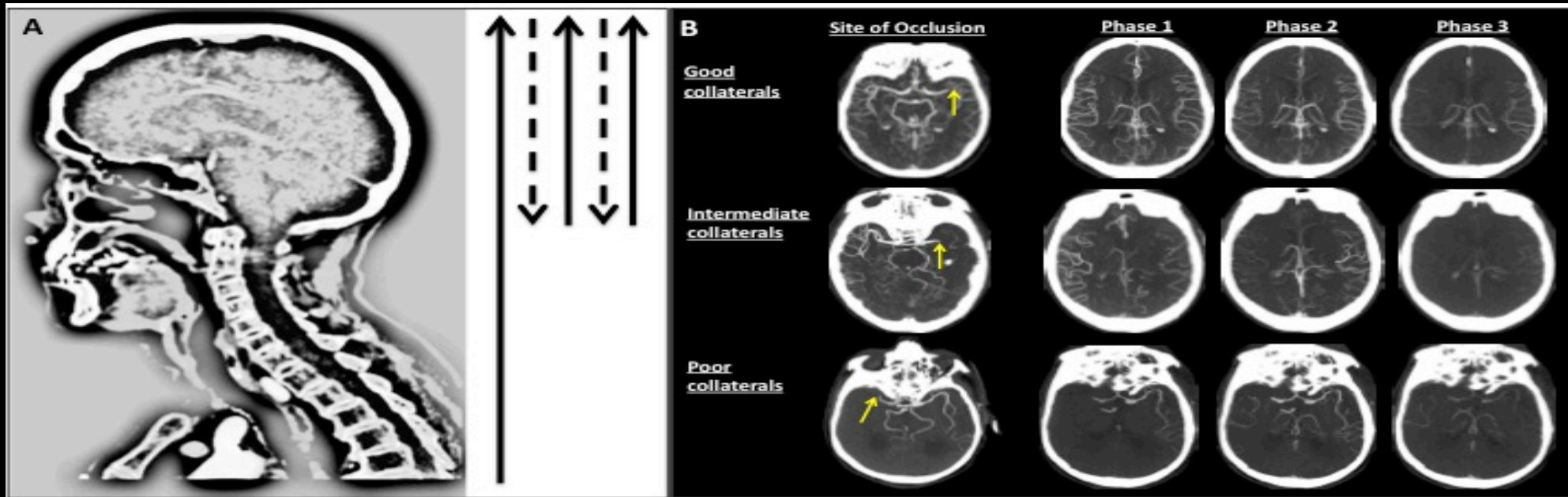


Collapsed axial thick MIP images.

Eligible occlusions for the ESCAPE trial:

- intracranial 'T' or 'L' ICA occlusion
- M1 occlusion
- M1 equivalent (all M2s)

Multiphase CTA



mCTA gives:

1. Easy and reliable assessment of collaterals
2. Very fast acquisition and fully automated image reconstruction
3. Less sensitive to patient motion
4. Easy to learn and interpret

(Radiology. 2015 Jan 29:142256. [Epub ahead of print])



Ontario CT/mCTA Protocol

5 series of images, in the following order:

1. Non-contrast CT Head (axial)
2. CTA neck and head 1.25 – 2 mm (axial)
3. 5 mm MIP Axial CTA head (2nd phase of multiphase)
4. 5 mm MIP Axial CTA head (3rd phase of multiphase)
5. 5 mm MIP Coronal CTA neck and head

Total: Approx. 520 images



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Protocol Testing

Protocol testing through ENITS

Initial transfer times, before protocol, of 16 mins

Most recent tests with current protocol: 3 mins



Imaging – Next Steps

1. Continued verification of rapid upload times from a wider variety of centres.
2. Education for District Stroke Centres and other sites potentially transferring for EVT
3. Regional approaches to roll-out may be favoured
4. Webinars will be recorded (ex: Lakeridge)

Imaging Common Questions

1. Is this protocol for all TIA/stroke patients?

No. It is designed for acute stroke patients with disabling deficits.

2. Is the multiphase information useful?

Yes. Ensures accurate assessment of occlusion and collaterals.

3. Is there an excessive increase in contrast and/or radiation exposure?

No – selective post-contrast head views limit contrast and radiation.

“Neurons over nephrons” mantra is reasonable to apply in acute, severe stroke.

Demchuk et al: Stroke 2016, 47, 273-281.

McDonald et al: Radiology 2014, 273, 714-725

Vo .. Lum; AJNR 2015, 36 (12), 2206-2213.



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III. Treating Centres

Drs. Krings, Stotts, Casaubon

Linda Kelloway

Multi-hospital working group



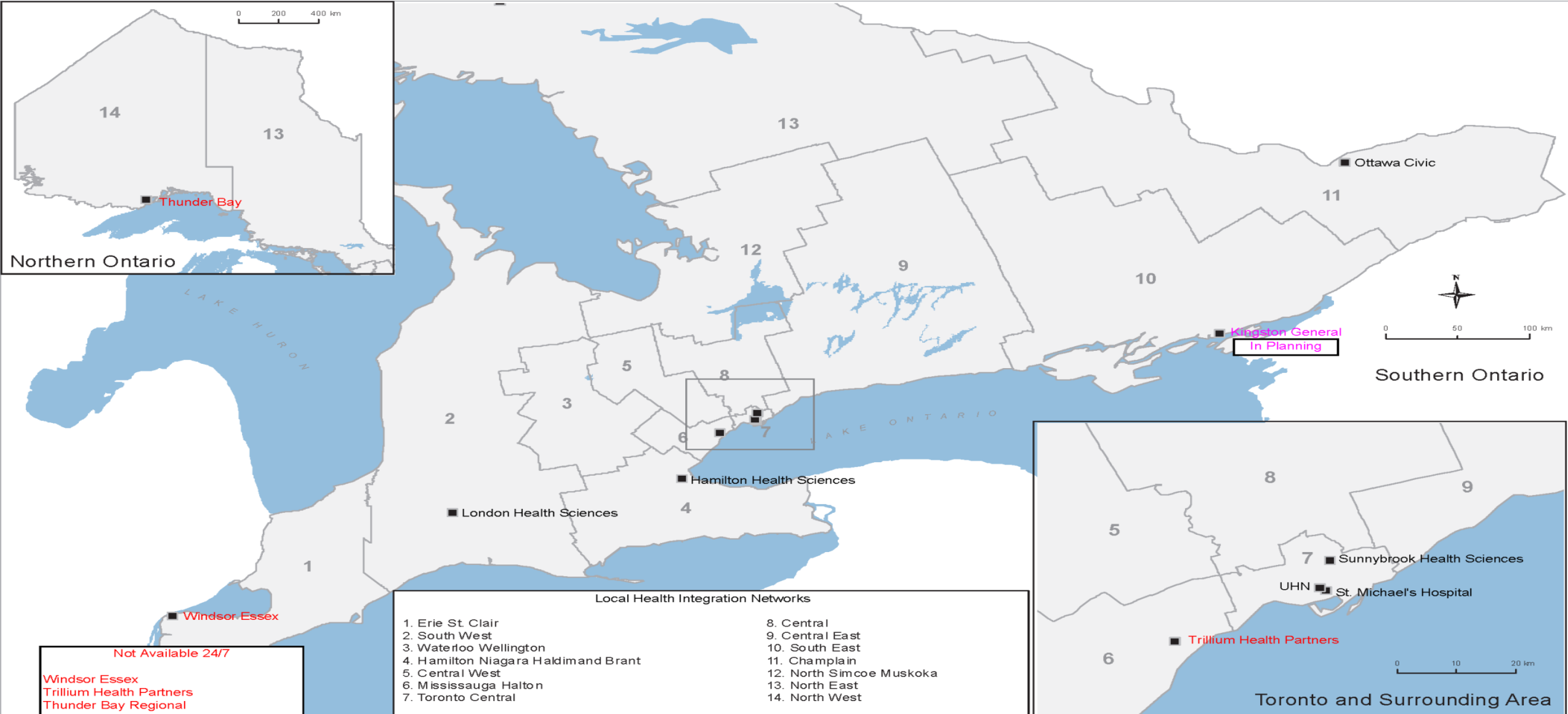
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Now 6 sites functioning 24/7

Hamilton will provide 24/7 coverage effective today.

EVT Centres in Ontario June, 2016



Current EVT Centres

WITH 24/7 COVERAGE

1. London Health Sciences
2. Ottawa Hospital
3. St Michael's Hospital
4. Sunnybrook Health Centre
5. Toronto Western Hospital
6. Hamilton Health Sciences

WITHOUT 24/7 COVERAGE

1. Thunder Bay Regional Health Centre
2. Trillium Health Partners
3. Windsor Regional Hospital
4. Kingston General – in planning



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EVT Centres

- Ongoing efforts to increase centre capacity.
- Initiation of new centres will take more time and resources.



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EVT Centres - Funding

- Efforts to ensure funding are continuing.
- Current revisions to clinical handbooks are on hold from MOH.
- We will continue to prepare guidelines – progress slowed slightly with Cardiac Care Network amalgamation.
- Interim funding requests have been put forward by 5 treating sites.



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IV. Transfer Protocols

Drs. Mandzia, Silver, Stotts, Prpic

Linda Kelloway

Desmond Bohn (Criticall)



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- Several changes have been accepted for the Provincial Paramedic Prompt Card
- Now incorporated into Basic and Advanced Care Standards

EMS/Patient Transport

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

EMS Provincial Prompt Card

- Time window to transport patients extended to arrival at an EVT treating site by 4.5 hours
- Time window will not be extended for regions without EVT access.
- A 2 hour maximum transport time still applies in keeping with current thrombolysis transport times.
- Hypoglycemic patients should still be transported to a stroke centre if their stroke symptoms continue after glucose administration.



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Patient Transfer Time Verification

OSN currently partnering with Criticall, Ornge and EMS to identify sites within 2 hour transfer window to EVT centres

Clinical emphasis should still involve rapid thrombolytic treatment – generally through Telestroke.

Transfer Process

- Transfers for EVT should still be initiated through Criticalll.
- Treating sites require their telecommunications departments to have an appropriate response to: “Stroke Endovascular Team”
- This particularly applies to telestroke initiated cases.
- It is recognized that regional enhancements to this response may be developed.
- Criticalll has been open to optimizing their system for this purpose.

Transfer Common Questions

Straight to EVT centre or stop at district stroke centre?

Need to weigh factors including time to treatment and volumes at treating sites.

What is a reasonable door in/door out time?

Door to needle -> 30 mins is the goal for major centres

Door to transfer -> 45 mins reasonable?

Emerging Themes Regarding Transfers

Optimize initial transfer to EVT centre for appropriate patients

- Strategies have included a separate EMS scale for EVT

- Needs to be balanced with volumes seen at comprehensive centres

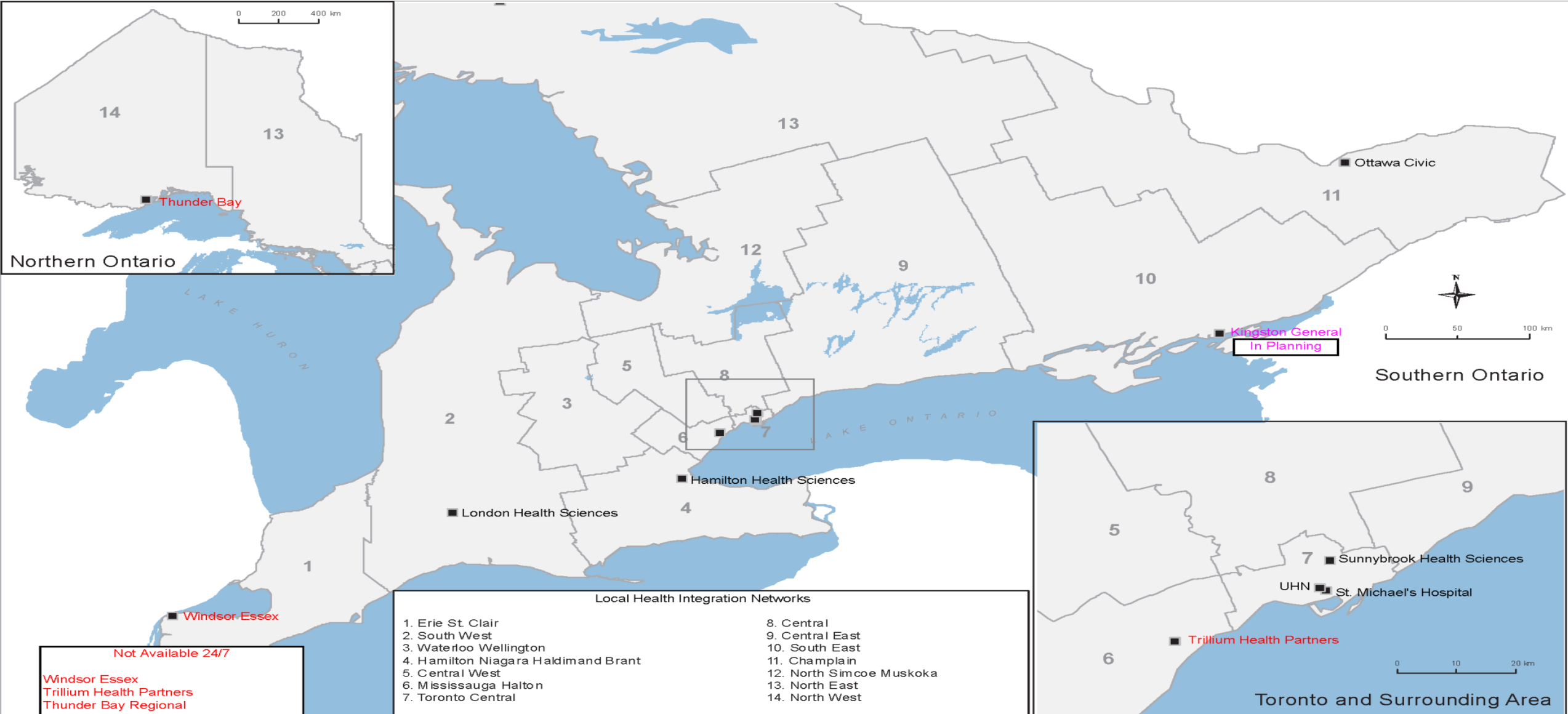
Communication is a key element

- Between referring and accepting site as well as EMS

Minimize Door In/Door Out times

- Short transfer times are necessary for success.

EVT Centres in Ontario June, 2016





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V. Regional Approaches

In addition to provincial strategies



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Need for regional approaches

Multiple factors mandate that regional systems will need to be developed:

- EMS coverage
- Distance and number of referring sites.
- Stroke team compositions.



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Regional EVT Working Groups

Coordination of:

- EMS systems (urban and rural)
- Radiology
- ED communications
- Repatriation agreements

Regional EVT Working Groups

Ontario strategies can be used as a template

CT/CTA protocol can be used by all sites.

EMS prompt card can be adapted locally.

OSN webinars will be archived.

OSN personnel can be contacted for assistance.



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Conclusions

Conclusions

- Evidence for EVT continues to accumulate.
- EVT and thrombolysis are time-dependent therapies.
- A CT/mCTA protocol is being rolled out.
- Funding discussions are ongoing.
- Transfer protocols will require regional approaches.
- Regional issues may require local solutions (with OSN assistance).

Name	Organization	Role
Dr Timo Krings	University Health Network-Toronto Western Hospital	Interventional Neuroradiologist, Co-Chair
Dr Grant Stotts	The Ottawa Hospital	Stroke Neurologist,Co-Chair
Dr Cheemun Lum	The Ottawa Hospital	Interventional Neuroradiologist
Dr Sachin Pandey	London Health Sciences-	Interventional Neuroradiologist
Dr Victor Yang	Sunnybrook Health Sciences	Neurosurgery
Dr Vitor Pereira-	University Health Network	Neurosurgery
Dr Walter Montanera	St Michael's Hospital	Interventional Neuroradiologist
Dr Laurie Morrison	St Michaels Hospital	Emergency Medicine
Dr Leanne Casaubon	University Health Network	Stroke Neurologist,OSN Best Practice Champion
Dr Rick Swartz	Sunnybrook Health Sciences	Stroke Neurologist
Dr Frank Silver	University Health Sciences	Stroke Neurologist (Telestroke)
Dr Jennifer Mandzia	London Health Sciences	Stroke Neurologist
Dr Al Jin	Kingston General Hospital-	Stroke Neurologist
Dr Jason Prpic	Chair EHS MAC	Base Hospital Medical Director, Emergency MD,
Beth Linkewich	North and East Toronto Stroke Network	Regional Program Director
Jacqueline Willem	South East Toronto	Regional Program Director
Rhonda McNicoll-Whiteman	Hamilton Health Sciences	Clinical Nurse Specialist- Stroke Best Practice Coordinator
Caterina Kmill	North West Ontario Stroke Network	Regional Program Director
Denise St. Louis	Windsor Regional Hospital	District Stroke Coordinator
Gina Tomaszewski	Acute Care Best Practice Coordinator	SWO Stroke Network
Linda Kelloway	Best Practice Leader	Ontario Stroke Network

Thank You!

