

Provincial Acute Stroke Patient Referral & Transport Process for Endovascular Treatment (EVT)

An update to the March 20th 2017 Provincial EVT Transport Memo

PURPOSE: *To provide an update on regional access to EVT for select patients with acute ischemic stroke.*

EVT is the mechanical removal of a blood clot in the brain (embolectomy) carried out by specialists with neuro-intervention expertise (e.g. neuroradiologists, neurosurgeons, and neurologists). It is a highly specialized procedure and is performed at a limited number of hospitals in Ontario. (Appendix A)

Time-is-brain in acute stroke treatment and EVT requires rapid triage, assessment and imaging including Computed Tomography (CT) /multiphase CT Angiogram (mCTA) for eligible patients. Eligible patients are those who present with potentially disabling, acute neurological symptoms suggestive of an acute stroke within 6.0 hours of symptom onset (Goyal et al., 2016).¹ EVT may be administered in conjunction with thrombolysis (tPA) or as a stand-alone procedure in the treatment of eligible patients.

A provincial process has been established to support regional access to EVT. Regional access builds on the systems put in place for accessing tPA and considers time, distance, clinical presentation, and imaging (see Appendix B for regional considerations). This process involves local assessment, collaborative identification of EVT candidates, and use of CritiCall Ontario to facilitate referral and transfer.

¹ While the July 2018 update of the Canadian Stroke Best Practice Recommendations for Acute Stroke Management notes that select patients presenting within 6-24 hours of stroke symptom onset may benefit from EVT, there are no changes being recommended to provincial transport protocols at this time. (see Appendix B future considerations). However, patients presenting to a telestroke site between 6-12 hours of stroke symptom onset may be appropriate for telestroke consult when CT/mCTA shows a Large Vessel Occlusion (see [Telestroke Referring Physician Worksheet](#)). Pending consultation this could result in a transfer request for EVT.

Referring Hospitals:

All referring hospitals should have 24/7 access to CT/multiphase CTA (mCTA) to accurately identify potential EVT candidates (see Appendix C and D for responsibilities of referring centres and imaging protocol).

Referring hospitals that deliver tPA without the support of Telestroke, and have identified a potential EVT candidate, will contact CritiCall Ontario at **1-800-668-4357** to request a consultation for EVT, with the ***Stroke Endovascular Team***.

Referring hospitals that use Telestroke to support tPA delivery will contact CritiCall Ontario at **1-800-668-4357** to request a consultation with the ***Telestroke Neurologist*** prior to requesting consultation for EVT.

For hospitals that do not deliver tPA, local/regional processes should be in place to support emergent transport of acute stroke patients to the closest appropriate designated stroke centre.

For more information, refer to CritiCall Ontario's [Endovascular Treatment for tPA Centres Help Sheet](#).

CritiCall Ontario will:

Collect basic patient information from the referring physician or delegate. This information includes:

- Physician's name and College of Physicians and Surgeons of Ontario (CPSO) Number and Hospital site
- The patient's name, date of birth, gender and health card number
- Initial diagnosis and diagnosis specific information such as time of onset
- Whether the case is considered Life or Limb, as outlined in the [Provincial Life or Limb Policy](#) (Ministry of Health and Long Term Care, Dec 2013). (**Note: due to the time sensitive nature of EVT, these cases should be declared as Life or Limb by the referring physician**).

If the request is for **Stroke Endovascular Therapy (EVT)**, CritiCall Ontario will consult the referral mapping provided by the stroke regions through CorHealth Ontario and contact the switchboard at the closest Endovascular Capable Hospital to request the ***Stroke Endovascular Team***.

The switchboard at the endovascular (consulting) hospital is to be familiar with the term "**Stroke Endovascular Team**" and the associated paging process and expectations.

Typically, the Stroke Endovascular Team will include a Neurologist with stroke expertise and a Neurointerventionalist or Stroke EVT Interventionalist.

For hospitals that use Telestroke, a call would precede the request for Stroke EVT, requesting a **Telestroke Neurologist**. CritiCall Ontario will contact the Telestroke Neurologist on-call and connect the referring physician and Telestroke physician for a telephone consultation. CritiCall will disconnect and not be privy to the conversation or telemedicine activation. When EVT is recommended, the Telestroke Neurologist will contact CritiCall Ontario post telemedicine consultation with direction to contact the Stroke Endovascular Team at the designated Endovascular Capable Hospital.

Consulting Physicians:

During consultation, the referring and consulting physicians will work together to determine potential patient eligibility for EVT. The Stroke Endovascular Team, in collaboration with the Telestroke Neurologist when involved, will assess these cases carefully for eligibility for transfer on a case-by-case basis and recommend transfer when appropriate.

If the patient is accepted for transfer, local processes should be in place to ensure that the appropriate teams at the EVT hospital (e.g. Emergency Department) are informed.

Transport:

Confirmed Life or Limb Patients

If after consultation, the patient is confirmed “Life or Limb” (note: all confirmed EVT candidates are considered “Life or Limb”), the CritiCall Ontario agent will facilitate transport in accordance with the provincial One-Number-to-Call (ONTC) process. When making recommendations about the mode of transportation, this process takes into consideration both the complexity of the patient and the distance between the referring and accepting hospital (Appendix E). **It should be noted, however, that this process is not stroke-specific.** Therefore, referring physicians are responsible for confirming the mode of transport recommended by CritiCall. **The physician may choose to over-ride the transport recommendation by requesting their preferred provider/mode of transport** during confirmation with the CritiCall Ontario Call Agent; the CritiCall Ontario agent will then contact the provider of choice.

EVT Specific Transport Information

When geographically appropriate, Land Transfer with local EMS and appropriate medical escort(s) should be utilized to support the timely management of EVT patients and

is the recommended form of transport. Referring/Receiving physicians are encouraged to request local land transport directly during discussions with CritiCall Ontario when, based on their experience, local land transport with medical escort is generally able to expedite the transfer of EVT patients to receiving hospitals. Physicians will be required to confirm the mode of transport with the CritiCall Ontario Call Agent based on their clinical assessment, distance to the receiving hospital and transport availability/ETA provided by CritiCall.

Medical Escort Requirements

A medical escort is required when one of the following conditions is met:

- the patient requires more than saline at 100 cc per hour during transport
- the patient requires mechanical ventilation during transport
- the patient is at risk of deteriorating during transport and may require specialized intervention (e.g. risk of angioedema, seizures, anaphylaxis, reduced level of consciousness)
- the patient is receiving a tPA infusion or the patient has completed a tPA infusion

Note: An escort may be required by some paramedic services in the absence of the above conditions, please review protocols with your local EMS providers.

If the decision is made to transfer by air, the referring hospital should make attempts to have an appropriate medical escort(s) available to transport the patient to the airport or offsite helipad to shorten overall transport time. If appropriate escort(s) are available and it is deemed medically appropriate, Ornge² will make arrangements with the local land ambulance to pick up the patient and escort(s) and transport them to the airport/helipad to meet the aircraft.

Additional Process Information

- Ornge will provide a rapid ETA when contacted by CritiCall Ontario which will be relayed to the referring physician by CritiCall Ontario.
- If the Ornge ETA is not acceptable, CACC/land with an escort will be pursued.

CritiCall will provide an update on transfer times, as received by the selected transport provider, to the referring and receiving hospitals. If CritiCall Ontario has not received a

² Ornge is a nonprofit organization providing air ambulance and medical ground transportation, for people who are critically ill or injured, to hospitals with the necessary services. Ornge operates for the province of Ontario under the direction of the Ministry of Health and Long Term Care.

transport update within 30 minutes of the acceptance of a Life or Limb patient, CritiCall Ontario will contact the transport provider to request an update.

Upon departure from the referring hospital, the transport provider should provide CritiCall with an updated ETA (estimated time of arrival) to EVT hospital. When provided, CritiCall will relay this information to the receiving hospital.³ Regional Stroke Networks should continue efforts in collaboration with their local transport providers to ensure a consistent and reliable ETA pre-notification process to expedite patient care.

***Non-Life or Limb Patients** - Referring hospitals remain responsible for coordinating transport for all patients that are **not confirmed Life of Limb** during consultation (i.e. not EVT candidates).

Repatriation

As per the [Repatriation Guide](#), developed by Critical Care Services Ontario (February 2014)⁴, the primary priorities for repatriation of patients are timely access to an appropriate level of care, patient safety and quality of care. Patients are to be **repatriated within 48 hours** once deemed medically stable and suitable for transfer. The patient will be repatriated to the “home” hospital as long as the hospital can provide the clinical services required (i.e. stroke unit)⁵. If the “home” hospital cannot provide the services, then the patient should be referred to the “closest to home” hospital that can provide the required services. The receiving hospital must have the services and skills required to provide for the patient’s ongoing plan of care (CCSO 2014).

³ Effective protocols for notification of patient departure and arrival times are important for coordinating efficient care by the stroke teams at referring and receiving hospitals. Options will continue to be explored provincially to optimize this process.

⁴ Repatriation Guide (2014) supersedes Life and Limb policy (2013) repatriation guidelines

⁵ Stroke Units are considered to be the appropriate level of care for patients who have confirmed acute stroke diagnosis and who require admission to acute care. This applies to all acute stroke patients, whether receiving EVT or not (Health Quality Ontario and Ministry of Health and Long Term Care, 2016). Regional processes should be in place to support access to stroke unit care.

References

Critical Care Service Ontario. (2014). Repatriation Guide. Retrieved from <https://www.criticalcareontario.ca/EN/Library/Repatriation/Pages/default.aspx>

Goyal, M. et al. (2016). Endovascular thrombectomy after large-vessel ischemic stroke: a meta-analysis of individual patient data from five randomized trials. *The Lancet*, 387 (10029), 1723-1731. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(16\)00163-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)00163-X/fulltext)

Ministry of Health and Long-Term Care (2013). Life or Limb Policy. Retrieved from <http://www.health.gov.on.ca/en/pro/programs/criticalcare/strategy.aspx>

Health Quality Ontario, Ministry of Health and Long-Term Care. Quality-based Procedures: Clinical Handbook for Stroke (acute and post-acute). Toronto: Health Quality Ontario; 2016 December. 132 p. Available from: http://health.gov.on.ca/en/pro/programs/ecfa/docs/qbp_stroke.pdf

Appendix A

Hospitals performing EVT

EVT Hospitals: 24/7
Hamilton Health Sciences
London Health Sciences Centre
St. Michael's Hospital
Sunnybrook Health Sciences Centre
The Ottawa Hospital- Civic Campus
Trillium Health Partners
University Health Network-Toronto Western Hospital
Kingston Health Sciences Centre
EVT Hospitals: Non: 24/7
Thunder Bay Regional Health Sciences Centre- single interventionist
Windsor Regional Hospital

Appendix B

Recommendations to Support Implementation of the Acute Stroke Patient Referral and Transport Process for EVT

PURPOSE: *To provide recommendations to support provincial and regional implementation of the Provincial Acute Stroke Patient Referral and Transport Process for Endovascular Treatment (within 0-6h of stroke symptom onset)*

Recommendations

- Hospitals with a greater than two (2) hour out of hospital travel time (Appendix F) to an EVT centre may still consider requesting consultation with the Telestroke neurologist and/or Stroke Endovascular Team to determine potential patient eligibility and transport for EVT. The Telestroke neurologist and/or Stroke Endovascular Team should consider the following criteria when making decisions regarding a greater than 2-hour transport:
 - Favorable Imaging:
 - Small to moderate ischemic core (ASPECTS) score >6 on non-contrast CT
 - Large Vessel Occlusion in the anterior or posterior circulation (mCTA)
 - Presence of good pial arterial collateral circulation (mCTA)
 - Moderate to severe stroke
 - Availability of timely transport
 - Risks to the patient associated with increased transport times

Decisions should be made on a case by case basis and a >2 hour transport time should never be an absolute reason for declining a patient for EVT.

- Regional planning for access to Acute Stroke EVT should consider the following:
 - The importance of rapid triage, assessment and brain vascular imaging (including multiphase vascular imaging to assess site of occlusion, access, and status of intracranial collateral supply) of acute ischemic stroke patients who are potential candidates for EVT.
 - All hospitals with potential to transfer to an EVT Centre should establish rapid communication protocols, facilitated through CritiCall Ontario.

- Designated Stroke Centres able to provide intravenous thrombolysis (tPA) should establish protocols to rapidly initiate thrombolysis in eligible patients prior to transfer, optimizing their ‘door in-door out’ time.
- Development of regional protocols to support access to tPA and subsequent transfer for EVT (i.e. a “drip and ship” process).
- Development of ‘walk-in’ protocols to support access to tPA/EVT for patients that may present at non tPA delivery hospitals.
- Development of protocols to support access for patients who may develop a stroke while already admitted to hospital for another reason.
- Development of repatriation agreements with local hospitals with stroke units for ongoing stroke management.

Future Considerations

- Where designated (tPA) hospitals are greater than a two-hour out of hospital travel time to an EVT hospital by either air or land ambulance (Appendix F), capacity planning may be required to enhance access to EVT for patients living in these regions. This capacity planning should consider:
 - The optimal geographic location of new EVT sites and the potential impact that adding new sites would have on the current infrastructure. Ideally new locations would involve the expansion of services at current tPA thrombolysis centres, leveraging and augmenting their current infrastructure and personnel.⁶
 - Expanding Telestroke services to support interventional teams in hospitals distant from a Stroke EVT hospital.
- Establishment of processes to support streamlined access to EVT, which may include
 - Agreements to bypass or redirect away from tPA sites within 1 hour of an EVT treating centre to promote direct access to EVT and minimize delays in door to puncture and door to reperfusion times for EVT eligible patients.
 - Paramedic screening to identify large vessel occlusion stroke.

Prior to implementation of the above processes to support streamlined access to EVT, further research evidence and evaluation of the impact on current system resources is required.

- Further adaptation of the system to emerging evidence regarding an expanded EVT treatment time window. On July 19th 2018, the Heart and Stroke Foundation of

⁶ A standardized process including a readiness assessment and clinical/business proposal template exists for a hospital considering expansion of stroke services and is available through CorHealth Ontario.

Canada released the updated Canadian Stroke Best Practice Recommendations for Acute Stroke Management. In this update “highly selected patients with larger vessel occlusion who can be treated with EVT within 24 hours of symptom onset and those patients with stroke discovered on awakening should receive EVT (Level A evidence)”. Further assessment and understanding of the increased demands and/or gaps with respect to system resources will be necessary to appropriately plan and build capacity to accommodate this new best practice. Consideration will be given to:

- access to appropriate imaging/screening for eligible patients,
- transports to and from (i.e. repatriation) designated and non-designated hospitals,
- procedure delivery and post procedure care (i.e. critical and stroke unit care), and
- quality improvement and reporting needs.

Appendix C

Referring/Receiving Hospital Responsibilities

Referring Hospital Responsibilities

- Access to 24/7 CT/mCTA
- ED Stroke Protocol assessment completed within a target time of 30 minutes of patient arrival (including CTA)
- Implementation of the provincial Multiphase CTA Protocol (Appendix D)
- Door to CT/mCTA imaging < 15 minutes; Imaging should be completed together
- Utilization of Telestroke to support identifying eligible patients wherever possible
- If patient has received tPA or if tPA is infusing and/or the patient is unstable, it is the expectation of the referring hospital to arrange appropriate health-care provider accompaniment with the stroke patient. (Accompaniment is not needed for cases involving transport via Ornge Advanced Care Paramedic (ACP(f) or Critical Care Paramedic (CCP(f) crews; if an Ornge SA Primary Care Paramedic (PCP (f) aircraft will be utilized then a medical escort will be required)
- If patient status changes after EVT site acceptance, processes should be in place at the referring hospital to update the EVT hospital before proceeding with transfer. Specifically, the EVT hospital should be made aware of any changes in medical status and/or changes in level of consciousness that occur after the consultation has taken place. Changes in patient status may nullify the transfer.

Receiving / Treating Hospital Responsibilities

- Consistent access to a stroke endovascular team including a neurologist with stroke expertise and neurointerventionalist/ stroke EVT interventionalist (24/7 coverage preferred)
- Implementation of a streamlined process for accessing the *Stroke Endovascular Team* for CritiCall referrals
- Neurointerventionalist/stroke EVT interventionalist should have ≥ 1 year experience in stroke interventions and supra-aortic procedures
- Adequate volume of cases to maintain level of expertise - recommended >20/year/centre
- Access to a designated critical care and stroke unit and interprofessional team for post-procedure care
- Expertise with stroke imaging interpretation
- Biplane angiography suite (strongly recommended)
- Retrievable stents +/- thromboaspiration devices
- Strong repatriation agreements with referring hospitals who must also have stroke units

Appendix D

Standard Imaging Set for EVT Consultation

Reformatted scans are derived from 0.5 or 0.6 mm axial images. Do not send these thin axial images.

The following images, in this order, should be sent to the ENITS server:

1. Non-enhanced CT head

- a. Axial 3 mm images
- b. Coronal 3 mm images
- c. Sagittal 3 mm images

2. CTA neck & head

(acquired from aortic arch to the vertex, peak bolus and ~ 10 second delays)

- a. First phase
 - i. Axial 2 mm (head and neck)
 - ii. Coronal 5 mm MIP (head and neck)
 - iii. Sagittal 5 mm MIP (head and neck)
 - iv. Axial 30 mm MIP (head only)
- b. Second phase (delay)
 - i. Axial 2 mm (neck and head)
 - ii. Axial 30 mm MIP (head only)
- c. Third phase (delay) [optional]
 - i. Axial 30 mm MIP (head only)

Appendix E

CritiCall One-Number-to Call Process

CritiCall Ontario facilitates transport in accordance with the provincial One-Number-to-Call (ONTC) process. This process relies on distance to the receiving hospital and determining the level of care required during transport based on the following three questions:

1. Does the patient require more than saline at 100 cc per hour during transport?
2. Does the patient require mechanical ventilation during transport?
3. Is the patient at risk of deteriorating during transport and may require specialized intervention?

If the answer to one of the above questions is yes, a clinical escort will be required.⁷

The mode of transportation will be determined using the following criteria:

- **Short distance transfers (under 50 km)** – Referral to Central Ambulance Communication Centre (CACC)/land; Note - if a clinical escort is required, but the referring site is unable to make these arrangements, Ornge will be contacted.
- **Medium distance transfers (50 to 150 km)** - will be automatically referred to Ornge.
- **Long distance transfers (greater than 150 km)** - will be automatically referred to Ornge

Additional Process Information

- Ornge will provide a rapid ETA when contacted by CritiCall Ontario which will be relayed to the referring physician by CritiCall Ontario.
- If the Ornge ETA is not acceptable, CACC/land with an escort will be pursued

⁷ A clinical escort is required for patients at high risk of potential deterioration (i.e. Angioedema, seizures, anaphylaxis, reduced level of consciousness). An escort is required if patient is receiving tPA infusion or if patient has completed the tPA infusion.

Appendix F

Designated Centres with a >2 hour (total out of hospital) door to door transport time to an EVT hospital by air or land ambulance.

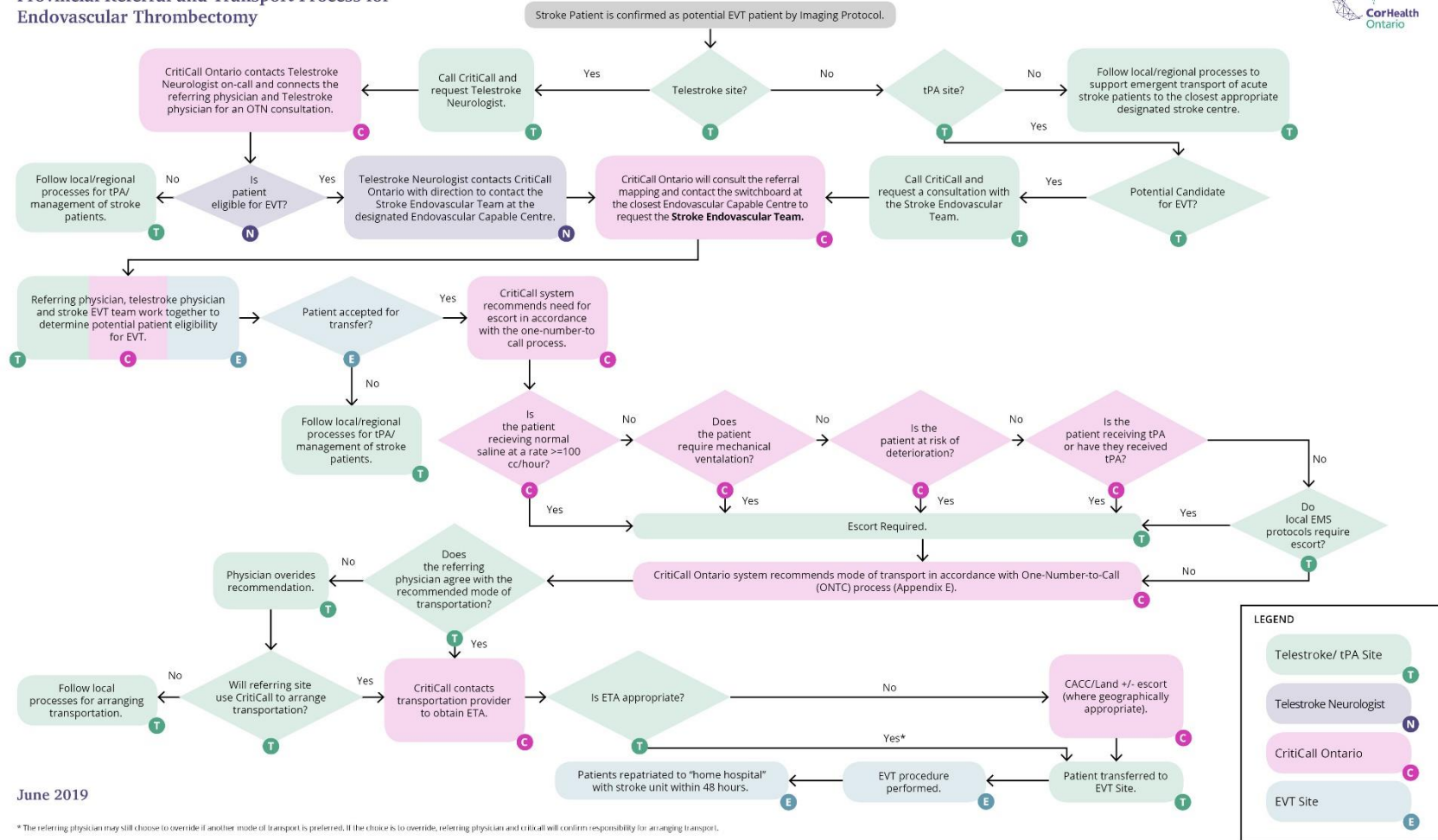
Organization	
Dryden Regional Health Centre* (TC)	Sioux Lookout Meno Ya Win Health Centre* (TC)
Fort Frances (La Verendrye Hospital)* (TC)	Timiskaming Hospital (New Liskeard) (TC)
Health Sciences North Sudbury (RSC/TC)	Timmins and District General Hospital (DSC/TC)
Lake of the Woods District Hospital (Kenora) * (TC)	Thunder Bay Regional Health Sciences Centre (when not able to provide on-site) (RSC)
Sault Area Hospital (DSC/TC)	North Bay Regional Health Centre (DSC/TC)

TC -Telestroke Centre; DSC -District Stroke Centre; RSC -Regional Stroke Centre

*When Thunder Bay Regional Health Sciences Centre is operating, these hospitals are within 2 hours of an EVT hospital

Appendix G

Provincial Referral and Transport Process for Endovascular Thrombectomy



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* The referring physician may still choose to override if another mode of transport is preferred. If the choice is to override, referring physician and CritiCall will confirm responsibility for arranging transport.