Ministry of Health and Long-Term Care

Emergency Health Services Branch
5700 Yonge Street, 6th Floor
Toronto ON M2M 4K5
Tel.: 416-327-7909
Fax: 416-327-7879
Toll Free: 800-461-6431

Ministère de la Santé et des Soins de longue durée

Direction des services de santé d'urgence
5700 rue Yonge, 6e étage
Toronto ON M2M 4K5
Tél.: 416-327-7909
Téléc.: 416-327-7879
Appels sans frais: 800-461-6431

Ontario

February 23, 2011

MEMORANDUM TO: Municipal EMS Directors and Managers
First Nation EMS Directors and Managers
CAOs of Upper Tier Municipalities and Designated Delivery Agents
Ornge

FROM: Malcolm Bates
Director
Emergency Health Services Branch

RE: **Training Bulletin, Issue Number 110 – version 1.0**
Revised Paramedic Prompt Card For
Acute Stroke Protocol

I am pleased to present Training Bulletin, Issue Number 110 – version 1.0 which describes the revised Acute Stroke Protocol, version 2.0 and the associated Paramedic Prompt Card.

According to the Heart and Stroke Foundation of Canada, stroke is the third leading cause of death and the leading cause of disability in Canada. The Ontario Stroke System was developed to establish an integrated and coordinated system designed to reduce the incidence of stroke and to improve patient care and outcomes for persons who experience a stroke in the province. Emergency Medical Services are an important partner in the Ontario Stroke System as many patients suspected of having a stroke are transported to hospital by ambulance. As such, paramedics play an important role in stroke care by identifying patients suspected of experiencing an acute stroke and transporting them to an appropriate facility in a timely fashion.

This Training Bulletin includes information regarding the major differences between the current Paramedic Prompt Card for Acute Stroke Protocol (version 1.0) and the revised Paramedic Prompt Card for Acute Stroke Protocol (version 2.0). A copy of version 2.0 has been included for reference purposes.

Also included is a copy of the *Canadian Best Practice Recommendations for Stroke Care - Educational Resource for Ontario Paramedics*. This document was developed by the Canadian Stroke Strategy and provides current information on the assessment and management of patients experiencing an acute stroke and may serve as a valuable resource for paramedics.

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In addition to the Training Bulletin attached in PDF format, the bulletin will be printed by the Branch and made available to you in sufficient quantities so that you may provide every paramedic in your service with a copy. You may distribute the Training Bulletin to your staff in electronic format (e.g. PDF copy) should you wish. The Training Bulletin will also be available on the Land Ambulance Transition website at www.ambulance-transition.com shortly. The Branch will also be producing full and pocket sized laminated Paramedic Prompt Cards in the future that you may distribute to your staff.

Please ensure that your staff is informed of and become familiar with the revised Paramedic Prompt Card for Acute Stroke Protocol, version 2.0, as this protocol will be considered effective as soon as implemented locally but no later than September 1, 2011. This time is provided to allow ambulance services the opportunity to address local issues such as liaising with their Regional Stroke Centre if required.

It should be noted that changes will be made to Dispatch Centre procedures to reflect the expanded time window for onset of stroke symptoms. More information will be forthcoming as that is completed. The dispatch changes will not impact the implementation of the Paramedic Training Bulletin and local use by paramedics of the revised Prompt Card.

If you have any questions, please contact Ms. Cathy Francis, Manager of Education and Patient Care Standards at (416) 327-7843.

Malcolm Bates

Encl.

c: Dr. A. Campeau, Senior Manager, Operations
Senior Field Managers/Field Managers, EHSB
C. Francis, Manager, Education and Patient Care Standards
R. Nishman, Manager, Policy and Operational Assessment
R. Brady, Manager, Investigation Services
M. Hull, Manager, CACC Programs and Standards
L. Colvin, Coordinator, Operational Policy, Land Ambulance Programs
Dr. C. Mazza, CEO, Ornge
N. Sykes, Chair, OBHG
Dr. R. Vandersluis, Chair, MAC
M. Huiskamp, Chair, Education Subcommittee
Regional Training Coordinators
Paramedic Program Coordinators
L. Kelloway, Best Practices Leader, Ontario Stroke Network

Training Bulletin

Revised Paramedic Prompt Card For Acute Stroke Protocol

February 2011

Issue Number 110 – version 1.0

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

Ontario

Training Bulletin, Issue Number 110 – version 1.0

Revised Paramedic Prompt Card For Acute Stroke Protocol

Introduction

According to the Heart and Stroke Foundation of Canada, stroke is the third leading cause of death and the leading cause of disability in Canada. More than 50,000 Canadians suffer a stroke each year with more than 16,000 patient deaths reported as a result of stroke.

Eleven (11) Regional Stroke Centres have been established across the province to implement Ontario's Stroke System. The goal of the Ontario Stroke System is to reduce the incidence of stroke and to improve patient care and outcomes for persons who experience a stroke through education for health care professionals, public awareness and the re-organization of stroke care delivery to ensure timely access to appropriate, high quality care. An important component of the Ontario Stroke System is the designation of Regional Stroke Centres (RSC) and District Stroke Centres (DSC) within each of the regional stroke systems. Regional and District Stroke Centres provide a high standard of specialized acute stroke care for patients that cannot be provided within community hospitals.

A recent enhancement to stroke care in Ontario has been the introduction of "Telestroke" centres across the province. Telestroke centres are hospitals equipped to use live, two-way television and digital image transfer to connect emergency physicians in these smaller institutions with stroke neurologists located at larger urban health care facilities so that they can obtain urgent consultation and management advice for acute stroke patients. This technology makes it possible for more patients to receive highly effective stroke treatment in areas of the province where travel to a stroke centre is not feasible.

Role of Emergency Medical Services in Stroke Care

The Canadian Stroke Network estimates that more than half of patients suspected of having a stroke are transported by EMS. As such, paramedics play an important role in stroke care by identifying patients suspected of experiencing acute stroke symptoms and transporting them to an appropriate facility in a timely fashion. One of the roles of Regional Stroke Centres is to bring together all stakeholders in stroke care, including the prehospital sector, to build networks to develop a consistent approach to stroke care across regions. In areas of the province with a designated stroke centre, paramedics may be authorized in certain circumstances to bypass community hospitals under protocol in favour of a Designated Stroke Centre (Regional, District or Telestroke) where the patient would have access to specialized treatment.

Paramedics are notified by their ambulance service operators when Acute Stroke Protocols have been implemented within their response area. Paramedics in areas of the province where Acute Stroke Protocols have yet to be implemented will continue to transport suspected stroke patients to the closest appropriate hospital or to a hospital as directed by their Central Ambulance Communications Centre/Ambulance Communications Service (CACC/ACS).

Paramedic Prompt Card for Acute Stroke Protocol

In 2004 a Paramedic Prompt Card for Acute Stroke Protocol was developed and distributed to paramedics across the province. This tool was designed to assist paramedics in determining the most appropriate hospital for patients experiencing signs and symptoms of acute stroke. The Paramedic Prompt Card provides paramedics with a quick reference of the indications and contraindications for bypassing a community hospital and transporting patients directly to a Designated Stroke Centre under an approved Acute Stroke Protocol.

In 2005, the Canadian Stroke Network in partnership with the Heart and Stroke Foundation of Canada implemented the Canadian Stroke Strategy (CSS). The goal of the Canadian Stroke Strategy is to support an integrated approach to stroke prevention, treatment and rehabilitation in every province. One of the key platforms to support the goal of the CSS is Best Practice Guidelines and Standards of Care. The CSS has produced the Canadian Best Practice Recommendations for Stroke Care 2010 which includes recommendations for the prehospital management of patients with suspected stroke. The Ministry of Health and Long-Term Care (MOHLTC) Medical Advisory Committee (MAC) has reviewed the prehospital recommendations put forward by the Canadian Stroke Strategy and supported by the Ontario Stroke Network. As a result the MAC has endorsed a revised Acute Stroke Protocol for paramedics in Ontario. These revisions have created the need to update the Paramedic Prompt Card for Acute Stroke Protocol.

Summary of Changes to the Paramedic Prompt Card for Acute Stroke Protocol

The following summary of the revisions to the Paramedic Prompt Card for Acute Stroke Protocol has been developed to assist paramedics in quickly identifying areas where changes have been made to content, and to provide rationale for the changes, where applicable. See Appendix 1.

Indications for Patient Transport to a Designated Stroke Centre

Symptoms of Acute Stroke

The third bullet point of the list of symptoms has been changed to read **"unilateral facial droop"** instead of simply "facial droop". This has been done to be more reflective of the actual symptom that may be present in a patient experiencing an acute stroke.

Time of Onset of Stroke Symptoms to Arrival at a Stroke Centre

The time from which a clearly determined time of symptom onset or the time the patient was "last seen in a usual state of health" to arrival at a Designated Stroke Centre for eligible patients has been increased to **3.5 hours** from 2 hours.

Recent research in stroke care has now determined that patients who are eligible for reperfusion therapy can benefit from this therapy up to 4.5 hours after the onset of their stroke symptoms. As such, the prehospital phase, which starts with symptom onset and includes on-scene management and anticipated transport time by ambulance, must be 3.5 hours or less to allow the hospital sufficient time to complete any required assessments prior to initiating reperfusion therapy. This change meets the recommendations of the ECASS III[1] trial and the Canadian Best Practice Recommendations for Stroke Care 2010[2].

Designated Stroke Centres

A note has been added to the bottom of this section to clarify what is meant by the term "Designated Stroke Centre". Designated Stroke Centres include Regional Stroke Centres, District Stroke Centres and Telestroke Centres.

Contraindications for Patient Transport under Stroke Protocol

Transport Time

The following bullet point has been added to the list of contraindications that would exclude a patient from being transported under Stroke Protocol:

- **Duration of out of hospital transport exceeds two (2) hours**

Extended transport times may increase the risk of potential complications/deterioration for stroke patients. The two (2) hour transport time limit has been included to minimize these risks.

Serum Glucose

The serum glucose level that would exclude a patient from being transported under Stroke Protocol has been decreased to **3.0 mmol/L** from 4.0 mmol/L. This change aligns with the recommendations of the NINDS[3] trial and the Canadian Best Practice Recommendations for Stroke Care 2010[2].

A further change has been made to the serum glucose assessment as it pertains to hypoglycemia patients who respond positively to paramedic management prior to the initiation of transport to the hospital. In cases where a patient may have been initially excluded from transport to a stroke centre because their blood glucose was <3.0 mmol/L, the patient may be considered for transport to a stroke centre if their blood glucose improves to a level of $\geq$3.0 mmol/L following treatment if they continue to exhibit the signs and symptoms of an acute stroke and there are no other contraindications.

Symptoms Improving or Resolving

Language has been added to the Paramedic Prompt Card to provide direction to paramedics if a patient's stroke symptoms resolve prior to paramedic arrival/assessment or during transport to a Designated Stroke Centre.

Prior to Arrival/Assessment

If stroke symptoms resolve prior to paramedic arrival or assessment, the patient is <u>not</u> eligible for transport to a Designated Stroke Centre. The rationale for this is the patient was not assessed by paramedics while symptomatic and the cause of the reported symptoms is therefore less certain.

During Transport

In the event that a patient's stroke symptoms significantly improve or resolve after the decision has been made to transport the patient to a Designated Stroke Centre and transport has been initiated, transport to the Designated Stroke Centre should continue. These patients are at high risk of early recurrence and will benefit from emergent assessment by a stroke/medical expert and possible referral, investigation and management of stroke risk factors and prevention.

Summary

The Ontario Stroke System is an integrated and coordinated approach that is designed to lessen the social and financial impact of this disease on patients and their families. Emergency Medical Services remain an important partner with the Ontario Stroke System and Ontario Stroke Network. The revisions to the Acute Stroke Protocol will enhance the paramedic's ability to ensure that patients experiencing the signs and symptoms of acute stroke are identified promptly and transported to a facility that can provide the most appropriate care for them.

Paramedics are encouraged to review the Acute Stroke Protocol on a regular basis and utilize the Paramedic Prompt Card as a reference tool when managing patients with signs and symptoms of acute stroke. Paramedics may also wish to review the *Canadian Best Practice Recommendations for Stroke Care – Educational Resource for Ontario Paramedics* - that has been included as Appendix 2 with this Training Bulletin. This document, developed by the Canadian Stroke Strategy provides current information on the assessment and management of patients experiencing an acute stroke and may serve as a valuable resource for paramedics.

References

1. Lindsay, MP; Gubitz, G; Bayley, M; Hill, MD; Davies-Schinkel, C; Singh, S; Phillips, S. *Canadian Best Practice Recommendations for Stroke Care (Update 2010). On behalf of the Canadian Stroke Strategy Best Practices and Standards Writing Group. 2010;Ottawa,Ontario Canada: Canadian Stroke Network*

2. European Cooperative Acute Stroke Study Investigators
   Thromolysis with Alterplase 3-4.5 Hours after Acute Ischemic Stroke
   N.Engl J Med 2008; 359:1317-29

3. National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group
   Tissue plasminogen activator for acute ischemic stroke
   N.Engl J Med. 1995; 333:1581-1587

Appendix 1

Paramedic Prompt Card For Acute Stroke Protocol

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

Appendix 2

Care of Suspected Acute Stroke Patients

Educational Resource for Ontario Paramedics

The Canadian Stroke Strategy

la Stratégie canadienne de l'AVC

Canadian Best Practice Recommendations for Stroke Care

Canadian Stroke Network

Réseau canadien contre les accidents cérébrovasculaires

HEART & STROKE FOUNDATION OF CANADA | FONDATION DES MALADIES DU CŒUR DU CANADA

Finding answers. For life.
À la conquête de solutions.

The Canadian Stroke Strategy
La Stratégie canadienne de l'AVC

Canadian Best Practice Recommendations for Stroke Care

Care of Suspected Acute Stroke Patients

Educational Resource For Ontario Paramedics

February 2011 Version 1.0

Canadian Stroke Network
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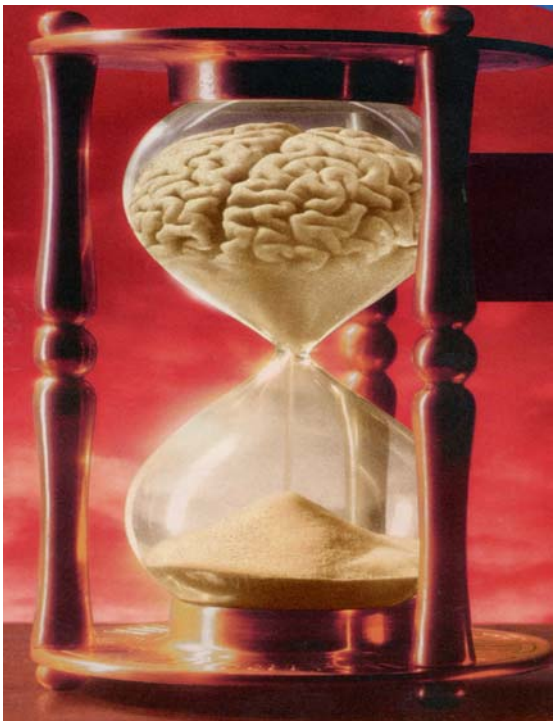

Time is Brain

PRIORITY:
EMS Best Practices Implementation and Uptake

Purpose

- To facilitate the uptake and implementation of the Canadian Stroke Strategy Best Practice Recommendations for the out-of-hospital care of stroke patients by Emergency Medical Services (EMS).
- The goal of this resource is to ensure consistency and standardization of education and on scene assessments and care of suspected stroke patients by paramedics.

Learning Objectives

- To understand the components of the Canadian Stroke Strategy Best Practice Recommendations for Emergency Medical System (EMS) care of suspected acute stroke patients;
- To recognize signs and symptoms of suspected acute stroke patients on scene and to differentiate mimics of acute stroke (hypoglycemia, postictal phase, etc);
- To understand the components of out-of-hospital management of acute stroke patients;
  - To identify the key information and assessments to be done on scene for suspected acute stroke patients;
  - To integrate stroke history and assessment information into the decision-making process for transportation of suspected stroke patients to acute care facilities with the appropriate level of stroke care.
- To understand the key information required as part of EMS documentation and communication with emergency department staff.

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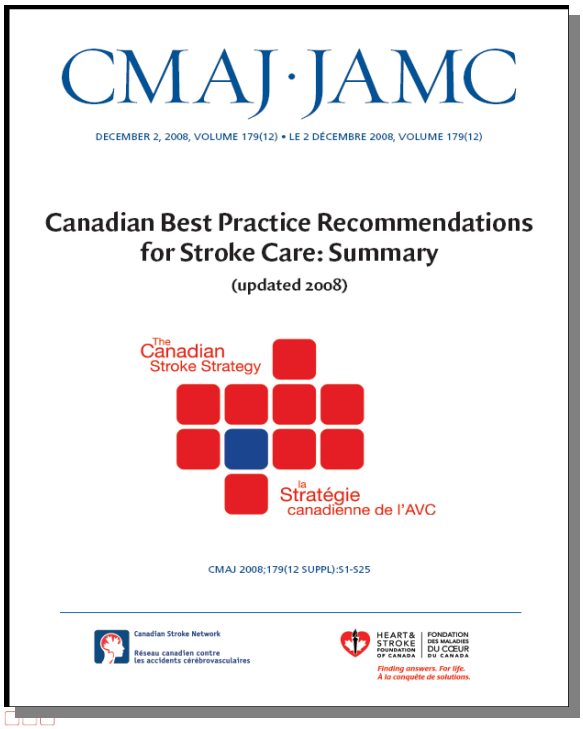
Section One

Development and update process for the Canadian Best Practice Recommendations for Stroke Care



Canadian Stroke Strategy National Platform

Best Practices and Standards

The four goals include:

- To transform stroke prevention and care.
- To develop and disseminate evidence based best practices and guidelines which address the stroke continuum of care.
- To facilitate increased uptake and implementation of best practice recommendations.
- To promote effective knowledge translation strategies related to stroke best practices.

Canadian Best Practice Recommendations for Stroke Care

- Synthesis of best practice recommendations for stroke care across the continuum.
- Address critical topic areas.
- Commitment to keep current with two-year update cycle.
- First edition released in 2006.
- EMS recommendations added in 2008 edition.
- 2010 edition released December 2010;
  - Further refined development process.
  - Increased focus on transitions of care, and rural, remote and northern issues in stroke management.

Background
EMS Stroke Recommendations

- First included in 2008 update of best practices.
- Developed using systematic process:
  - Review of current research and gray literature.
  - Environmental scan of existing EMS practices and protocols for out-of-hospital care of suspected stroke patients.
  - Review of international stroke recommendations for EMS.
  - Extensive consultation with EMS experts across Canada.
  - Development of expert writing group for recommendations.
  - Final review by external consensus panel process.

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Acute Stroke Care
A Shift in the Treatment Paradigm

Time Is Brain

More than half of suspected stroke patients are transported by EMS

- Stroke is treatable
- Short window of opportunity
- Treatment requires stroke expertise and carries a risk
- Organized stroke care improves outcomes

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Best Practice Recommendation 3.2
EMS Management of Acute Stroke Patients

- This recommendation covers management of potential stroke patients between the time of first contact with the local EMS to transfer of care to the hospital, as well as care of suspected or confirmed stroke patients who are being transferred between healthcare facilities by EMS.
- This recommendation is directed to paramedics and those individuals who support EMS, including communications officers and dispatchers.

  * local variations need to be taken into consideration for out-of-hospital time

Best Practice Recommendations (continued)

Patients who show signs and symptoms of hyperacute stroke must be treated as a time-sensitive emergency and should be transported without delay to the closest institution that provides emergency stroke care. [Evidence Level C]

i. Immediate contact with EMS (e.g. 911) by patients or other members of the public is strongly recommended because it reduces time to treatment for acute stroke. [Evidence Level B]

ii. The EMS system must be set up to categorize patients exhibiting signs and symptoms of a hyperacute stroke as a high priority. [Evidence Level C]

iii. Paramedics should use a standardized acute stroke out-of-hospital diagnostic screening tool. [Evidence Level B]

iv. Out-of-hospital patient management should be optimized to meet the needs of suspected acute stroke patients. [Evidence Level A]

v. Direct transport protocols must be in place to facilitate the transfer of eligible patients to the closest and most appropriate facility providing acute stroke care. [Evidence Level C]

Best Practice Recommendations (continued)

vi. Direct transport protocol criteria must be based on (1) the local ED performance which is recommended as being 60 minutes or less; and (2) the out-of-hospital phase, including symptom duration and anticipated transport time, being 3.5 hours or less, and (3) other acute care needs of the patient. [Evidence Level B]

vii. Paramedics should obtain a history of the stroke event, including time of onset, signs and symptoms, and previous medical and drug history from the patient if able or informant when available. [Evidence Level C]

viii. Paramedics must notify the receiving facility of a suspected acute stroke patient in order for the facility to prepare for patient arrival. [Evidence Level C]

ix. Transfer of care from paramedics to receiving facility personnel must occur without delay. [Evidence Level C].

x. Patients who are considered ineligible for time sensitive thrombolytic therapy should be transported to the closest emergency department which provides access to neuroimaging and stroke expertise for assessment and initiation of secondary prevention management. [Evidence Level C]

Implementation of EMS Stroke Best Practices

- Builds on existing training.
- Focuses on key elements most critical in rapid assessment for suspected acute stroke.
- Based on extensive consultation from all key stakeholders involved in out-of-hospital care of acute stroke patients.
- Also recognizes that EMS have standard protocols for all calls they respond to.
- Standardized Paramedic Prompt Card for Acute Stroke Protocol.

Out-of-Hospital Stroke Management

Why Is This Important?

- Acute stroke is a medical emergency and optimizing out-of-hospital care improves patient outcomes.
- EMS plays a critical role in assessment and management.
- Acute interventions such as thrombolytic therapy are time sensitive.

Redirecting ambulances to Stroke Centres facilitates earlier assessment, diagnosis and treatment which may result in better outcomes.

Canadian Stroke Strategy System Implications

Structures required to enable providers to meet best practice recommendations

- These recommendations are referring exclusively to patients with hyper-acute stroke who may be eligible for time-sensitive reperfusion interventions within the therapeutic window. Stroke patients not eligible for reperfusion (do not meet criteria for rapid transport based on standardized screening) should still be transported to and among appropriate facilities;
- Scope of out-of-hospital care is from first patient contact with EMS to the transfer of care to the receiving facility;
- Dispatcher training programs that address stroke;
- Paramedic education that includes stroke assessment and management;
- Direct transport agreements;
- Coordinated, seamless transport and disposition;
- Communication systems to support access.

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Canadian Stroke Strategy Performance Measures

- Time from initial call received by emergency dispatch centre to patient arrival at an emergency department that provides stroke services.
- Percentage of (suspected) stroke patients arriving in the emergency department who were transported by EMS.
- Time from initial call received by emergency dispatch centre to EMS arrival on scene.
- Time from EMS arrival on patient scene to arrival at *appropriate* emergency department.
- Percentage of cases where total out-of-hospital time is less than 3.5 hours from symptom onset to arrival at the emergency department. (performance target is $\geq$ 75%) *
- Percentage of potential stroke patients transported by EMS who received a final diagnosis of stroke or transient ischemic attack during hospital stay (in the emergency department or as an inpatient).

Performance measures have been developed to enable monitoring of the effectiveness of EMS management of suspected stroke patients and aspects of access to and coordination of services for suspected stroke patients.

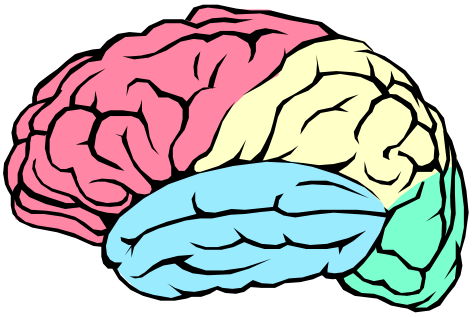
Categories of Stroke Services within Canadian Hospitals (CSS)

- ***Comprehensive stroke centres***
  - Specialized resources and personnel available at all times (24 hours a day, 365 days a year) to provide assessment and management of stroke patients
  - Established written stroke protocols for emergency services, in-hospital care and rehabilitation
  - Ability to offer thrombolytic therapy to suitable ischemic stroke patients; timely neurovascular imaging and expert interpretation; and coordinated processes for patient transition to ongoing rehabilitation, secondary prevention and community reintegration services
  - Access to rapid neurosurgical consultation and neurosurgical facilities onsite, as well as interventional radiology services
  - Have a leadership role in establishing partnerships and providing education to other local hospitals for supporting stroke care services.

Categories of Stroke Services within Hospitals (CSS)

- ***Hospitals with intermediate stroke services***
  - Centres with clinicians who have stroke expertise;
  - Written stroke protocols for emergency services, acute care and/or rehabilitation;
  - Ability to offer thrombolytic therapy to suitable ischemic stroke patients or protocols to transfer appropriate patients to a comprehensive stroke centre;
  - Timely neurovascular imaging and timely access to expert interpretation (e.g. telemedicine);
  - Coordinated processes for patient transition to ongoing rehabilitation and secondary prevention services.
- ***Hospitals without specialized stroke resources***
  - Centres that do not have in-hospital resources such as clinicians with stroke expertise or neuroimaging
  - These centres should have written agreements in place to facilitate timely transfer of stroke patients to higher levels of care as appropriate.

Section Two



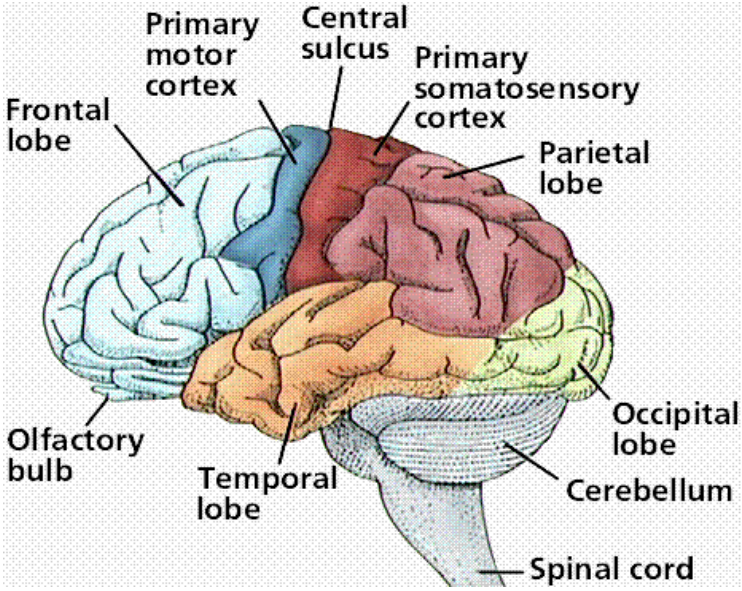
Stroke Review

EMS Stroke Patient Management

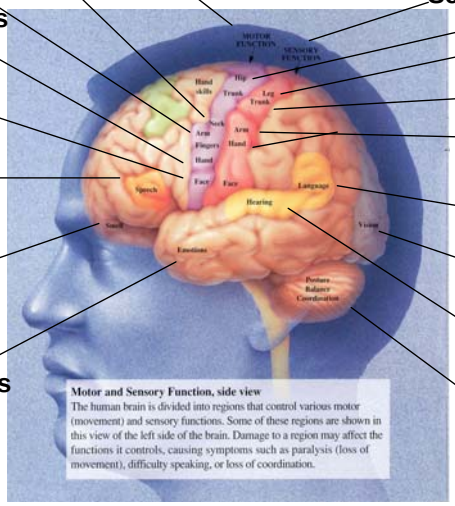
- Cerebral Anatomy and Physiology
- Signs and symptoms of suspected acute stroke
- Acute stroke mimics (hypoglycemia, postictal phase, etc)
- Components of out-of-hospital management of acute stroke patients
  - Key information and assessments to be done on scene for suspected acute stroke patients;
  - Stroke history and assessment information into the decision-making process for transportation of suspected stroke patients to acute care facilities with the appropriate level of stroke care.
- Information required as part of paramedic documentation and communication with emergency department staff.

Cerebral Cortex

- Divided in to 4 lobes
  - Frontal
  - Parietal
  - Temporal
  - Occipital



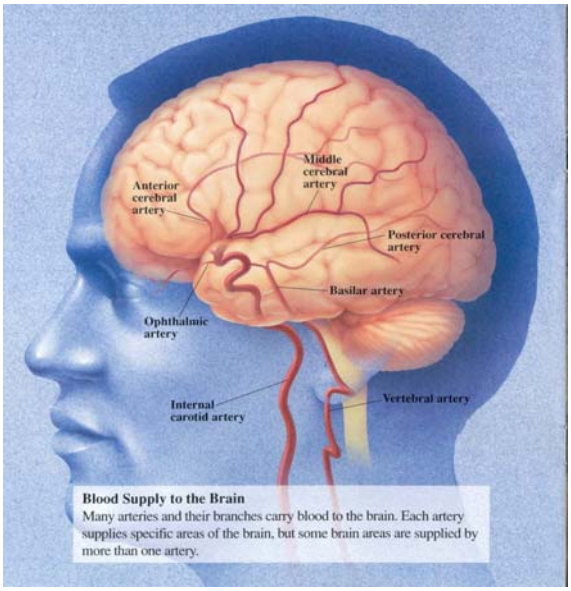
Motor & Sensory Function



Blood Supply to the Brain

- Brain derives its arterial supply from carotid and vertebral arteries which begin extracranially
- Internal carotid arteries and branches supply anterior 2/3 of cerebral hemispheres
- Vertebral and basilar arteries supply posterior and medial regions of hemispheres, brainstem, diencephalon, cerebellum and cervical spinal cord

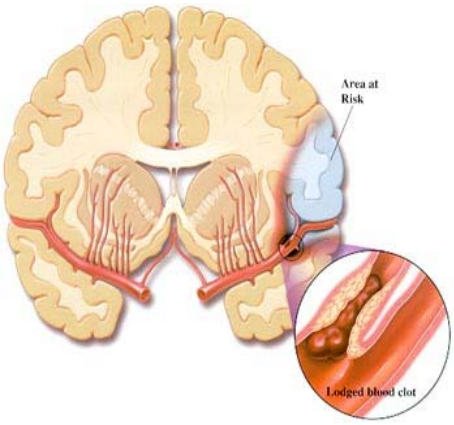
- www.stroke.org



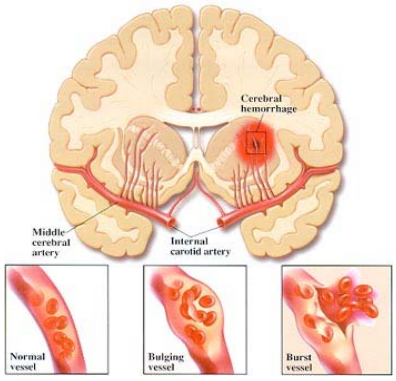
Blood Supply to the Brain
Many arteries and their branches carry blood to the brain. Each artery supplies specific areas of the brain, but some brain areas are supplied by more than one artery.

The Anatomy and Physiology of a Stroke

Ischemic (80%)

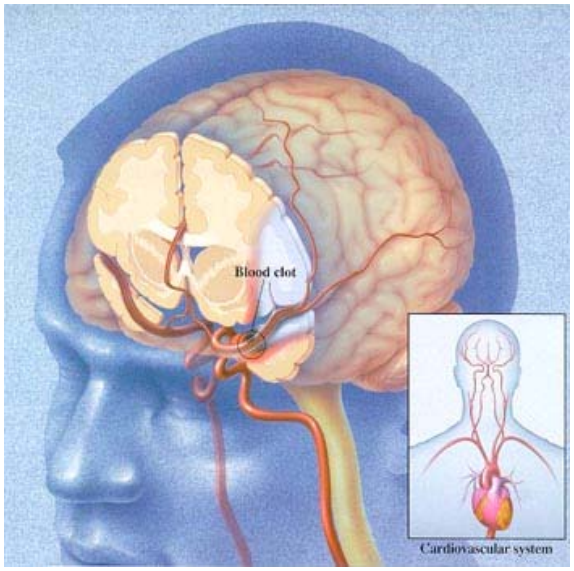


Hemorrhagic (20%)



A Guide to Understanding Stroke, Heart and Stroke Foundation of Canada, 1996

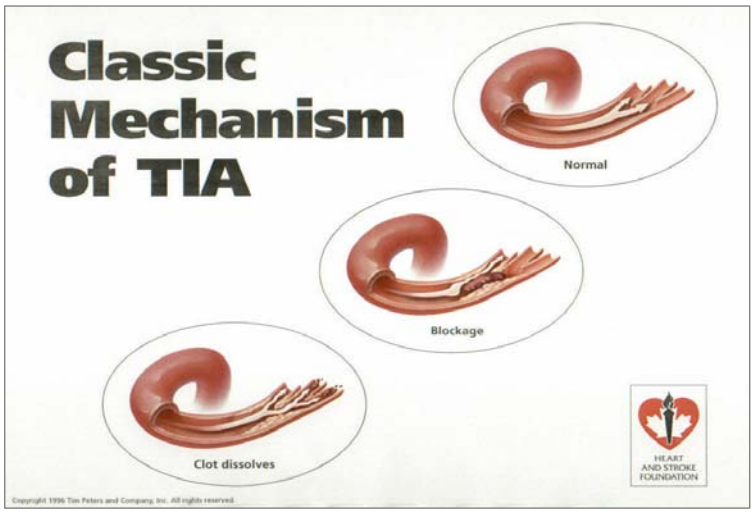
Acute Cerebral Infarction



Approximately 70 - 80% of strokes are caused by cerebral thrombosis or cerebral embolism

Occlusion of cerebral blood vessels leads to brain cell ischemia and infarction

Transient Ischemic Attack (TIA)



TIA is defined as a focal (or at times global) neurological impairment of sudden onset, and lasting less than 24 hours, and of presumed vascular origin, and with full recovery.
(World Health Organization [WHO])

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Warning Signs for Stroke

Weakness - Sudden loss of strength or sudden numbness in the face, arm or leg, even if temporary.

Trouble speaking - Sudden difficulty speaking or understanding or sudden confusion, even if temporary.

Vision problems - Sudden trouble with vision, even if temporary.

Headache - Sudden severe and unusual headache.

Dizziness - Sudden loss of balance, especially with any of the above signs.

www.heartandstroke.com

Left and Right Hemisphere

Left Hemisphere

- Expressive aphasia
- Receptive aphasia
- Global aphasia
- Right sided weakness/sensory loss
- Intellectual impairment- reading, writing, math
- Slow and cautious behavior
- Defects in right visual field- homonymous hemianopsia

Right Hemisphere

- Spatial-perceptual deficits
- Left sided weakness/sensory loss
- Neglect of the affected side
- Distractible
- Impulsive behavior
- Poor judgment
- Loss of flow of speech
- Defects in left visual field- homonymous hemianopsia

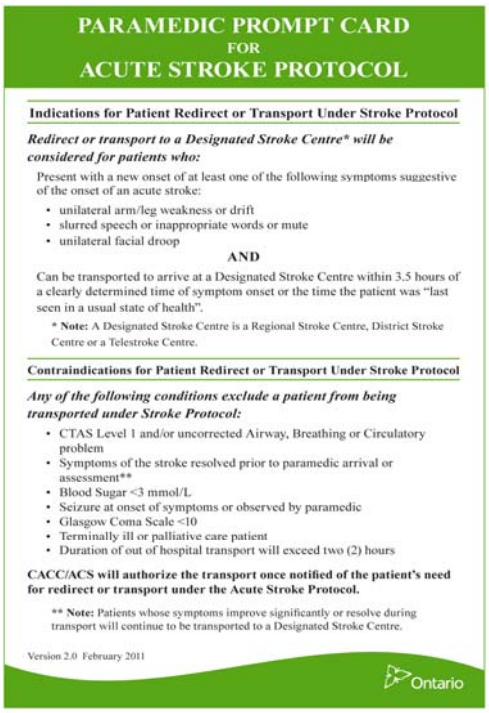
Stroke Mimics

- The following four conditions represent 62% of stroke mimics:
  - Postictal deficit (unrecognized seizure)
  - Systemic infection
  - Tumour/abscess
  - Toxic-metabolic disturbance
- Other mimics:
  - Bell's palsy
  - Peripheral nerve palsies
  - Old stroke
  - Confusion
  - Head trauma
  - Hemiplegic migraine

Paramedic Prompt Card for Acute Stroke Protocol

- Provides paramedics with a quick reference of the indications and contraindications for bypassing a community hospital and transporting patients directly to a designated stroke centre under an approved Acute Stroke Protocol.
- Designed to assist paramedics in determining the most appropriate hospital for patients experiencing signs and symptoms of acute stroke.
- The Ministry of Health and Long-Term Care (MOHLTC) Medical Advisory Committee (MAC) has reviewed the prehospital recommendations put forward by the Canadian Stroke Strategy and has endorsed a revised Acute Stroke Protocol for paramedics in Ontario consistent with these recommendations.

Paramedic Prompt Card for Acute Stroke Protocol



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

1. EMS Arrival on scene and Initial Assessment

- ***52% of suspected stroke patients arrive to hospital by ambulance***
  (Canadian Institute for Health Information [CIHI]-2008)
- ***Currently, time from last seen normal to emergency department arrival ranges from 1.7 to 8.0 hours***

1. **Patient condition on EMS arrival to scene**

- **A**irway, **B**reathing, **C**irculatory status

"ABCs" Stable?

If not, transport without delay to closest, most appropriate hospital

2. Initial history and medical information

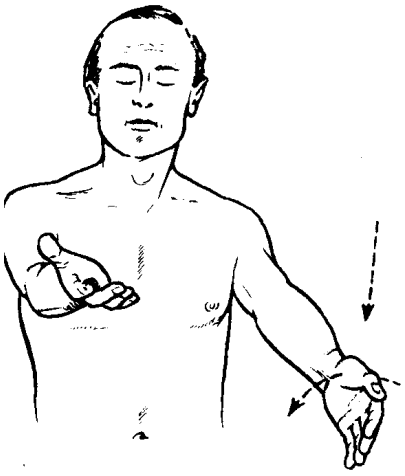
- Last seen normal (LSN) date and time (i.e. last stroke symptom-free time, symptom onset time)
  - Witnessed
  - Unwitnessed
    - Stroke on wakening? When did patient go to sleep relative to time of call to EMS?
- Palliative status
- **DOCUMENTATION** of these elements is **critical!!!**

3. Physical assessment specific to stroke

❑ Current stroke signs and symptoms

- **Patient has new onset of at least *one* of the following:**
  - ♦ unilateral arm/leg weakness or drift
  - ♦ slurred speech or inappropriate words or mute
  - ♦ unilateral facial droop

Physical Assessment: Arm and Leg



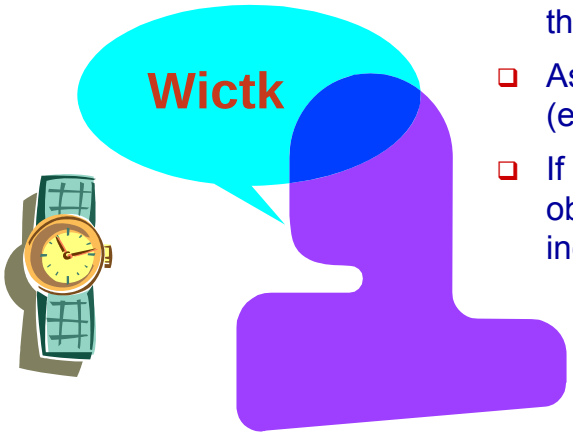
Assessment for arm drift:

- Have the patient hold both arms out in front for 5 seconds. If one arm drifts or falls before the 5 sec. count, or the patient is unable to move one arm, they fit the inclusion criteria.

Assessment for Leg Weakness:

- Have the patient lift leg at 30 degrees and hold for 5 seconds. Repeat with other leg.
- Compare the two sides. If one leg drifts or falls before the count, or the patient is unable to move one leg, they fit the inclusion criteria.

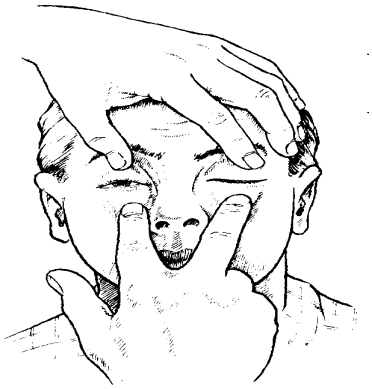
Physical Assessment: Speech



Assessment for Speech Difficulties

- Ask the patient to name 3 objects you show them (e.g. pen, watch, ring).
- Ask the patient to repeat a simple sentence (e.g. "It is sunny today".)
- If the patient is unable to repeat all the objects, or repeat the sentence they fit the inclusion criteria.

Physical Assessment: Facial Droop



- Ask the patient to:
  - Smile
  - Show his/her teeth
  - Grimace
  - Stick out tongue

Are the left and right sides symmetrical?

4. Additional Assessments

- Presence of seizures
- Blood glucose levels: <3 mmol/L
- Glasgow Coma Scale: <10

Eye Opening (E)	Verbal Response (V)	Motor Response (M)
4-Spontaneous	5-Oriented	6-Obeys Commands
3-To voice	4-Confused	5-Localize (pain)
2-To pain	3-Inappropriate Words	4-Withdraw (pain)
1-None	2-Incomprehensible Sounds	3-Flexion (pain)
	1-None	2-Extension (pain)
		1-None

Pediatric Considerations

- Stroke occurs at ALL ages
- Pediatric stroke rate is 4-6 per 100,000. In neonates it may be as high as 1 per 4000
- Types of stroke in children:
  - There are two types of ischemic stroke:
    - A stroke caused by a blood clot in an artery is called arterial ischemic stroke (AIS);
    - A stroke or brain swelling caused by a blood clot in a vein is called cerebral sinovenous thrombosis (CSVT).

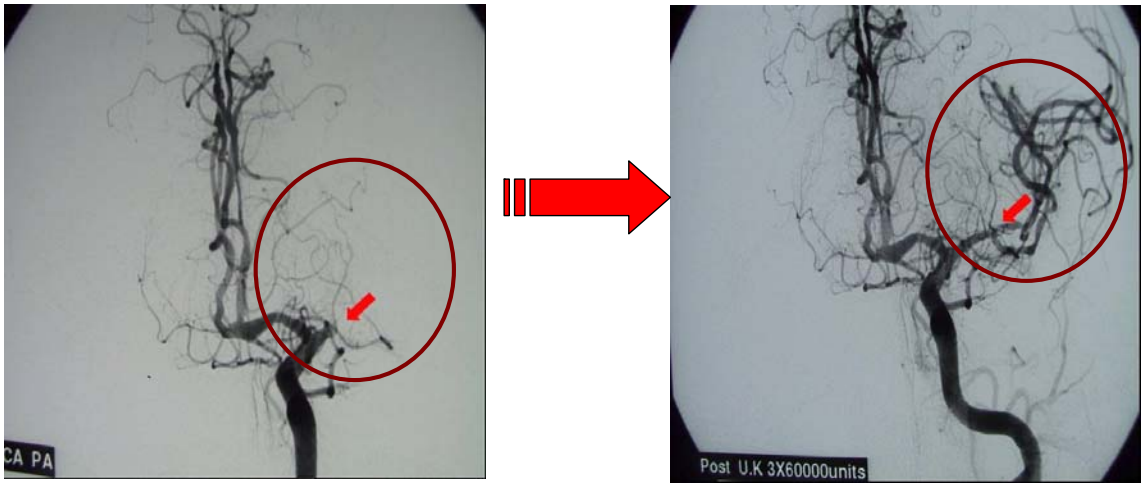
Pediatric Stroke Presentation

- The most common effect of stroke is weakness of one side of the body (hemiplegia).
- However, may also present with:
  - Unilateral facial droop
  - Speech may be affected
  - Visual disturbances
  - Abnormal balance and/or coordination
  - Headache with or without vomiting
  - Dizziness (room is spinning)
- Stroke due to CSVT may:
  - Show signs of distress.
  - Seizures (twitching of the face, arms or legs, or starring spells).
  - extreme trouble staying awake and alert during the day outside of normal sleeping time.
- *Signs of a stroke may be difficult to recognize in a young child, depending on the child's age and stage of development*

5. Thrombolytic Therapy

- tPA (tissue plasminogen activator)
- Dissolves blood clots
- In patients with stroke
  - 30% benefit significantly from treatment
  - 60% do not show major changes with treatment
  - 10% may have a complication associated with treatment (usually bleeding)
- Time window for receiving tPA has been increased to 4.5 hours from symptom onset (ECASS III)

Acute Stroke Thrombolysis



As with Heart Attacks, "Brain Attacks" can be treated with tPA to dissolve blood clots and restore blood flow.

6. Assessments for Contraindications to tPA

- CTAS 1 and/or uncorrected Airway, Breathing or Circulatory problem
- Symptoms of the stroke resolved prior to paramedic arrival or assessment**
- Blood Sugar <3.0 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

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

Goal of Acute Stroke Protocol For Paramedics

Patients who show signs and symptoms of hyper-acute stroke must be treated as a time-sensitive emergency and should be transported without delay to the closest acute care facility that provides emergency stroke care.

7. Transportation Decisions

- ***Time is Brain*** – need for efficiency and minimizing time from on-scene arrival to transport to a stroke centre.
- The recommended total time from symptom onset to reperfusion for eligible patients, is usually defined as 4.5 hours. This is broken into 2 phases: pre-hospital and ED.
  - The pre-hospital phase, which starts with symptom onset, and includes on-scene management and anticipated transport time, should be less than 3.5 hours*.
  - The current evidence shows that emergency department phase should be less than 60 minutes.

* Duration of out of hospital transport must not exceed two (2) hours

Transportation Decisions (continued)

- Direct transport protocol criteria must be based on (1) the local ED performance which is recommended as being less than 60 minutes; and (2) the out-of-hospital phase, including symptom duration and anticipated transport duration, being less than 3.5 hours and/or (3) other acute care needs of the patient.
- Transport to closest/designated stroke centre (comprehensive or intermediate).
- Manage patient in accordance to applicable patient care standards (BLS/ALS).
- Prenotification to the destination emergency department of a suspected acute stroke in transport.

8. Additional Transportation Considerations

- Patients who are not considered potentially eligible for time-sensitive reperfusion should be transported to the closest appropriate emergency department.
- Patients with symptoms that resolve prior to paramedic arrival on scene may not require medical redirect to an acute stroke centre, but should be assessed emergently.
- Those patients whose symptoms resolve after paramedic assessment or during transport should continue on medical redirect to a stroke centre.
- It is important to request that a family member accompany the ambulance to the hospital so that they could provide vital information. In the absence of a person being present, verify the contact number of a family member and/or decision-maker.

"Yes" to all = meets criteria = transport

- ✓ Time lapse from symptom onset <3.5 hours
- ✓ "ABCs" stable?
- ✓ Stroke symptoms are not rapidly improving/resolved?
- ✓ Is blood sugar ≥3mmol/L?
- ✓ Patient did not have a seizure at onset?
- ✓ Patient is conscious? (GCS ≥10)
- ✓ Patient is not terminally ill or palliative?
- ✓ Ambulance transport time <2 hours.

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Paramedic Transport Decisions

- If "yes" to all listed criteria, patient may be eligible for acute tPA. Acute stroke transport protocol should be initiated.
- Transport CTAS level 2 to nearest Designated Stroke Centre.
- Notify receiving ED that the patient is being transported under Stroke Protocol. Include last seen normal time.
- Consider blood glucose (**do not** delay transport to achieve).
- Provide treatment in accordance to applicable standards.

8. Transfer of Care to the Emergency Department

- Transfer of care to the ED staff should be done without delay
- Communicate to receiving staff in addition to the minimum requirements outlined in the *BLS Patient Care Standards*:
  - LSN time
  - Symptoms on arrival to scene
  - Changes in symptoms on scene or during transport
  - Family member present or available
- **Documentation** should be completed and a copy of ambulance call report (ACR) left with the ED staff.
  - Include: LSN time, indicate whether another hospital was bypassed, note whether stroke protocol initiated

Case Studies

What would you do when you arrive on scene?

Case Study #1

- You respond to a private residence for a reported unconscious male.
- On arrival you are met by a person who identifies himself as a co-worker of the patient. He had stopped by to pick up his friend to drive him to work at 08:00 hr, but when his friend did not answer the door he became concerned and peered through the window.
- He could see the patient lying motionless on the kitchen floor still in his pyjamas and proceeded to call 911 immediately. He then broke a window to enter the home and found his 58 year old friend unconscious.
- The friend reports that one week ago the patient had complained of a brief period of right sided weakness that lasted less than an hour while he was at work. The friend states that the patient did not seek medical attention at that time.
- You suspect that the patient may be experiencing an acute stroke and continue with your assessment and management of the patient.

Case Study #1 – Specific Stroke Assessment

- **ABCs**
  the patient's airway is clear, he is breathing with a respiratory rate of 14, radial pulse present at 64 bpm
- **Neuro**
  - patient responds to loud voice and painful stimulus by moving left arm and leg; no movement observed from right arm or leg; speech consists of low moans to stimuli (GCS = 10)
  - pupils equal and reactive
  - no seizures observed
- **Blood Glucose**
  - 4.5 mmol/L
- **LSN Time**
- Unknown
- You prepare to transport the patient to the hospital. A community hospital is 15 minutes away. You recall that a Designated Stroke Centre is approximately 40 minutes away.

Case Study #1 - Management and Transport

- **Prehospital Management**
  - *Describe the management that would provided for this patient.*

- **Transport Considerations**
  - *Does this patient meet the criteria to be transported directly to a Designated Stroke Centre?*

Case Study #2

- You respond to a private residence for an unknown problem. On arrival, you are met by a woman who identifies herself as the daughter of the patient.
- The woman explains that she stopped by on her way home from work to check on her father, who lives alone. When she spoke to him by telephone before she left work he said that he was not feeling well. His speech was clear at that time. She also states he is a very healthy 76 year old with just some high blood pressure.
- When she arrived 30 minutes after the call, she found him sitting in his favourite chair, awake but unable to speak clearly, unable to move his left arm, or get out of the chair. You reassure her and proceed to the patient.

Case Study #2 – Specific Stroke Assessment

- **ABCs**
  - airway clear; breathing spontaneously, RR 24; radial pulse present at 96 bpm; BP 184/100
- **Neuro**
  - You observe the left side of his face is drooping; he is trying to make sounds that are not interpretable; he is able to move his right arm and leg spontaneously, but not able to move his left arm or leg to command or in response to painful stimuli (GCS = 12).
  - Pupils equal and reactive.
  - No seizures observed.
- **Blood Glucose**
  - 5.0 mmol/L
- **LSN Time**
  - 53 minutes from onset of symptoms until paramedic arrival on scene.
- You prepare to transport the patient to the hospital. A community hospital is 10 minutes away. You recall that a Designated Stroke Centre is approximately 50 minutes away.

Case Study #2 - Management and Transport

- **Prehospital Management**
  - *Describe the management that would provided for this patient.*

- **Transport Considerations**
  - *Does this patient meet the criteria to be transported directly to a Designated Stroke Centre?*

Case Study #3

- You respond to a call for a 38 year old woman who was previously well then suddenly collapsed and is unable to move her left side. Her husband recognized the signs and symptoms of stroke from a TV ad and called 911.
- You arrive on scene and find the woman conscious, lying on the floor, with left sided facial droop, and unable to move her left arm or leg. Her speech is slurred and partially understandable.
- Her husband reports that she was on a 20 hour flight from Europe the week before, and earlier in the day she reported feeling "funny" and having what seemed like a momentary loss of concentration with dizziness and disorientation.
- In the ambulance she starts to move her left hand and arm, but cannot lift her arm off of the stretcher or make a fist.

Case Study #3 – Specific Stroke Assessment

- **ABCs**
  - airway open and patent; breathing spontaneously, RR 24; radial pulse 96.
- **Neuro**
  - On arrival unable to move left arm or leg, right arm and leg moving spontaneously; facial droop noted on left side; able to attempt to follow commands; speech slurred and difficult to understand (GCS = 13).
  - Pupils equal and reactive.
  - No seizure activity observed or reported by husband.
- **Blood Glucose**
  - 4.0 mmol/L
- **LSN Time**
  - 28 minutes from onset of symptoms to paramedic arrival.
- You decide to bypass the closest hospital to transport the patient to the Designated Stroke Centre 30 minutes away.

Case Study #3 - Management and Transport

- **Prehospital Management**
  - *Describe the management that would provided for this patient.*

- **Transport Considerations**
  - *This patients symptoms appear to be resolving . A such, should the receiving facility be changed to the closest hospital instead of the Designated Stroke Centre?*

Case Study #4

- You respond to a call to a grocery store where it is reported that an older woman has collapsed in the store.
- When you arrive on scene a witness reports that the patient was in the produce section when she suddenly collapsed. The witness went over to help her and the patient complained of a sudden onset very severe headache that was getting worse.
- You quickly assess the patient hand find that the patient's level of consciousness has decreased significantly over the last 10 minutes.

Case Study #4 – Specific Stroke Assessment

- **ABC's**
  - airway open, breathing spontaneously, RR 6; radial pulse 68
- **Neuro**
  - On arrival you find that the patient only responds to painful stimuli by moaning and by extending her left arm and leg. No movement is noted in her right extremities. The patient does not open her eyes (GCS =5).
  - Right pupil is normal; Left pupil is dilated.
  - No seizure activity observed or reported witnesses.
- **Blood Glucose**
  - 5.5 mmol/L
- **LSN Time**
  - 38 minutes from the time of her collapse to paramedic arrival.
- You prepare to transport the patient to the hospital. A community hospital is 10 minutes away. You recall that a Designated Stroke Centre is approximately 20 minutes away.

Case Study #4 - Management and Transport

- **Prehospital Management**
  - *Describe the management that would provided for this patient.*

- **Transport Considerations**
  - *Does this patient meet the criteria to be transported directly to a Designated Stroke Centre?*

Case Study #5

- You respond to a private residence for a 56 year old male who has experienced a sudden onset of slurred speech.
- On arrival at the scene you are met at the front door by the patients wife. She reports to you that while watching the television with her husband she noticed that suddenly he began to slur his speech. She further reports that he has been previously healthy except for hypertension and high cholesterol for which he takes medication daily.
- You find the patient sitting in a chair in the living room in no apparent distress.

Case Study #5 – Specific Stroke Assessment

- **ABC's**
  - airway open and patent, breathing spontaneously, RR 12; radial pulse 90; B/P 142/92
- **Neuro**
  - Eyes are open; appears alert but somewhat agitated; attempts to speak but speech is slurred; obeys commands; no extremity deficits noted. (GCS = 15)
  - pupils equal and reactive
  - no seizures observed by wife or paramedics
  - **Blood Glucose**
  - 5.2 mmol/L
- LSN time to EMS arrival on scene 20 minutes
- You prepare to transport the patient to the hospital. A community hospital is 30 minutes away. You recall that the Designated Stroke Centre is approximately 2½ hours away.

Case Study #5 - Management and Transport

- **Prehospital Management**
  - *Describe the management that would provided for this patient.*

- **Transport Considerations**
  - *Does this patient meet the criteria to be transported directly to a Designated Stroke Centre?*

Case Study Answer Keys

Case Study #1 – Answer Key

- **Prehospital Management**
  - Administer high concentration oxygen.
  - Initiate rapid transport.
  - Keep patient movement to a minimum; provide comfort and reassurance.
  - Position patient in the recovery position.
  - Continually observe and manage the patient's airway.

- **Transport Considerations**
  - This patient must be transported to the closest appropriate hospital.
  - Patient is excluded from transport to the Designated Stroke Centre as there is no clearly defined time of onset of stroke symptoms.

Case Study #2 – Answer Key

- **Prehospital Management**
  - Administer high concentration oxygen.
  - Initiate rapid transport.
  - Keep patient movement to a minimum; provide comfort and reassurance.
  - Continually observe and manage the patient's airway as necessary.

- **Transport Considerations**
  - Patient meets the indications of the Acute Stroke Protocol and has no contraindications. The patient needs to be transported to the Designated Stroke Centre.

Case Study #3 – Answer Key

- **Prehospital Management**
  - Administer high concentration oxygen.
  - Initiate rapid transport.
  - Keep patient movement to a minimum; provide comfort and reassurance.
  - Continually observe and manage the patient's airway as necessary.

- **Transport Considerations**
  - Even though the patient's condition is improving and her symptoms appear to be resolving, according to the Acute Stroke Protocol, she should continue to be transported to the Designated Stroke Center since these patients are at high risk of early recurrence and will benefit from emergent assessment by a stroke/medical expert and possible referral, investigation and management of stroke risk factors and prevention.

Case Study #4 – Answer Key

Prehospital Management

- Ventilate the patient with high concentration oxygen.
- Initiate rapid transport.
- Keep patient movement to a minimum; provide comfort and reassurance.
- Continually observe and manage the patient's airway as necessary.

Transport Considerations

- This is an unstable patient requiring ventilation and has a GCS of 5. This CTAS Level 1 patient needs to be transported to the closest hospital for further resuscitation.

Case Study #5 – Answer Key

- **Prehospital Management**
  - Administer high concentration oxygen.
  - Initiate rapid transport.
  - Keep patient movement to a minimum; provide comfort and reassurance.
  - Continually observe and manage the patient's airway as necessary.

- **Transport Considerations**
  - Even though the patient meets the indications for transport to a Designated Stroke Centre, the ambulance transport time would be 2½ hours. As such, the patient must be transported to the closest hospital. Ambulance transport time must not exceed two (2) hours to a Designated Stroke Centre.

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- Contributions to the content and case studies were received from the Emergency Health Services Branch Education and Patient Care Standards Section of the Ontario Ministry of Health and Long Term Care, and from Karen Stevens RN working with the British Columbia Stroke Strategy

Additional Information

For additional information on stroke care and the Canadian Stroke Strategy, you may wish to visit:

- www.canadianstrokestrategy.ca
- www.canadianstrokenetwork.ca
- www.heartandstroke.ca