Canadian Best Practice Recommendations for Stroke Care

Care of Suspected Acute Stroke Patients

Educational Resource For Ontario Paramedics

February 2011 Version 1.0
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.
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.
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
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
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]
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.
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 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 ≥ 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 into 4 lobes
  - Frontal
  - Parietal
  - Temporal
  - Occipital
Motor & Sensory Function

Motor:
- Arm
- Fingers
- Hand
- Face
- Speech
- Smell
- Emotions

Sensory:
- Neck
- Hip
- Leg
- Trunk
- Arm
- Hand
- Language
- Vision
- Hearing
- Posture
- Balance
- Coordination

The human brain is divided into regions that control various motor (movement) and sensory functions. Some of these regions are shown in this view of the left side of the brain. Damage to a region may affect the functions it controls, causing symptoms such as paralysis (loss of movement), difficulty speaking, or loss of coordination.
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
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])
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.

**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
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
   - Airway, Breathing, Circulatory 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

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<th>Eye Opening (E)</th>
<th>Verbal Response (V)</th>
<th>Motor Response (M)</th>
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<td>5-Oriented</td>
<td>6-Obeys Commands</td>
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<tr>
<td>3-To voice</td>
<td>4-Confused</td>
<td>5-Localize (pain)</td>
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<tr>
<td>2-To pain</td>
<td>3-Inappropriate Words</td>
<td>4-Withdraw (pain)</td>
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<td>1-None</td>
<td>2-Incomprehensible Sounds</td>
<td>3-Flexion (pain)</td>
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<td>2-Extension (pain)</td>
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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 staring 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.
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 #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

- 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 #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

- 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 patient's 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 #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

- 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 #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

- 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 patient's 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

- 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 #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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