



## Introduction

A stroke is a sudden loss of brain function. It is caused by the interruption of flow of blood to the brain (ischemic stroke) or the rupture of blood vessels in the brain (hemorrhagic stroke).

The interruption of blood flow or the rupture of blood vessels causes brain cells (neurons) in the affected area to die. The effects of a stroke depend on where the brain was injured, as well as how much damage occurred.

## Symptoms

- Weakness - Sudden loss of strength or sudden numbness in the face, arm or leg, even if temporary.
- Aphasia - trouble understanding or producing language.
- 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.

## Stroke Treatment

Important advances have been made in stroke treatment. However, these new treatments must be started within a few hours of the onset of symptoms to be effective. That is why it's so important to recognize the warning signs of a stroke as soon as they appear and immediate medical assistance is activated.

Ensure an effort is made to capture the time that the patient was last seen well and communicate this to the EMS Crew.

## Patient Care

Establish a timeline for “last seen normal”

Ensure adequate breathing

Provide appropriate airway management with oxygen

Keep a witness at scene or obtain contact information

Provide comfort measures until EMS arrival

Obtain blood glucose level

Attempt to gather patient’s medications

## Oxygen

Consider oxygen as needed if SpO<sub>2</sub> is less than 94%.

### Etiology

Stroke is the leading cause of adult disability and the third leading cause of adult death. There are two types of stroke: Ischemic stroke and hemorrhagic stroke. An ischemic stroke is defined as brain tissue injury or death because of an interruption of cerebral blood flow due to an arterial occlusion (e.g. embolus, thrombus). A hemorrhagic stroke is caused by a ruptured blood vessel.

Definitive treatment for an acute disabling (“STAT stroke”) is available but must be implemented within 6 hours of the patient’s last seen normal (i.e. patient’s usual state) presentation. Patients who awoke with symptoms may still benefit from hyper-acute therapy. Currently, the most common treatment in Alberta for acute ischemic stroke is intravenous thrombolytic therapy with tissue plasminogen activator (tPA). However, tPA alone is inefficient in achieving revascularization in proximal intracranial occlusion. Endovascular therapy (EVT), a catheter-based intervention facilitated by cerebral angiographic visualization that removes the large stroke-causing clots from the proximal cerebral artery, provides much greater rates of revascularization and good outcomes when compared to IV tPA alone. Additionally, EVT can be provided to patients who cannot otherwise receive tPA due to contraindications. In Alberta, EVT is currently only offered at the two Comprehensive Stroke Centres in Calgary and Edmonton.

### Transient Ischemic Attack

Between 20% and 40% of strokes are preceded by a transient ischemic attack (TIA). TIAs typically last less than an hour, and often only for a few minutes. TIAs are considered a serious warning for an impending ischemic stroke and the risk is highest in the first 48 hours after a TIA. Often referred to as a "mini-stroke", a patient experiencing a TIA may show the same signs and symptoms as a patient experiencing a stroke.

## Interventions

1. Confirm the time the patient was last seen neurologically normal
2. Identify the presence of a stroke syndrome (i.e. red findings present) using the Stroke Screen
3. Assess stroke severity by calculating the Los Angeles Motor Scale (LAMS) score
4. Every effort should be made to identify a witness (e.g. relative, colleague) to accompany the patient to the hospital so that the Stroke Team can verify the patient's history and time of last seen normal

## Intravenous Access

1. Initiate a normal saline IV and infuse at 100 mL/hr (all attempts should be made to initiate an 18 gauge IV in a proximal large vein. This is due to CT requiring a large bore IV and large vein due to the viscosity of the CT contrast)

### Patient Safety Considerations

- Never use IV drip solutions (e.g. D5W, D10W, D5LR) containing dextrose, as hyperglycemia has been shown to contribute to increased neuronal death

## Dextrose

Dextrose is necessary for the normal functioning of undamaged brain tissue. In the presence of suspected head injury or stroke patients, dextrose should initially be administered conservatively by stopping at 12.5 g and retesting the BGL. This is to appropriately correct hypoglycemia for the healthy brain tissue, while sparing the unwarranted side effects from cerebral edema due to excessive dextrose

## Stroke Screen and LAMS

Using the Stroke Screen, assess the patient for the following red findings to identify a stroke syndrome:

- a. Level of consciousness:
  - i. **Responds to pain**
  - ii. **Unresponsive**
- b. Speech:
  - i. **Incomprehensible**
  - ii. **Mute**

## Medical First Response

- c. Arm Strength – have the patient maintain their arms at 90° against gravity for 10 seconds:
    - i. Drifts down
    - ii. Falls rapidly
  - d. Hand Grips:
    - i. No grip
  - e. Leg Strength – have the patient maintain each leg individually at 45° against gravity for 10 seconds:
    - i. Falls rapidly
2. STAT Stroke criteria are positive when the following 3 criteria are met:
- a. The patient's blood glucose level is greater than 3.0 mmol/L
  - b. The interval from when the patient was last seen normal to arrival at the nearest Primary or Comprehensive Stroke Centre is 6 hours or less or patient awoke with symptoms
  - c. One or more red findings are present
3. To determine stroke severity and EVT eligibility, calculate the LAMS score (Note: A score of 4 or greater indicates a severe stroke that may be eligible for EVT):
- a. Facial Smile:
    - i. Normal (0)
    - ii. Droop (1)
  - b. Hand Grips:
    - i. Normal (0)
    - ii. Weak Grip (1)
    - iii. No grip (2)
  - c. Arm Strength – have the patient maintain their arms at 90° against gravity for 10 seconds:
    - i. Normal (0)
    - ii. Drifts down (1)
    - iii. Falls rapidly (2)

## Stroke Centres

1. Primary Stroke Centers are regional hospitals that provide CT scanning with door to CT time less than 20 minutes, tPA administration, and Telestroke links to a Comprehensive Stroke Centre; they may not be available 24/7 due to CT / physician availability. It is important to be aware of the Primary Stroke Centers in your service area
  - a. Brooks – Brooks Healthcare Centre
  - b. Camrose – St. Mary's Hospital
  - c. Cold Lake – Cold Lake Healthcare Centre
  - d. Edmonton – Grey Nuns Hospital

## Medical First Response

- e. Fort McMurray – Northern Lights Regional Health Centre
  - f. Grande Prairie – Grande Prairie Regional Hospital
  - g. High Level – Northwest Health Centre
  - h. Hinton – Hinton Healthcare Centre
  - i. Lethbridge – Chinook Regional Hospital
  - j. Lloydminster – Lloydminster Hospital
  - k. Medicine Hat – Medicine Hat Regional Hospital
  - l. Peace River – Peace River Community Health Centre
  - m. Red Deer – Red Deer Regional Hospital
  - n. Wainwright – Wainwright Health Centre
  - o. Westlock – Westlock Healthcare Centre
2. Comprehensive Stroke Centers are facilities that provide a full range of services including neurosurgical, radiological and endovascular interventions
- a. Calgary – Foothills Medical Centre
  - b. Edmonton – University of Alberta Hospital

**Special Circumstances**

Not applicable

**Patient Experience Considerations**

- MFR and EMS is often the first medical contact for acute stroke patients, thereby playing a pivotal role in the identification and treatment of acute cerebrovascular brain injury.
- Symptoms occur suddenly and the loss of speech, sensation, or balance can be both terrifying and difficult for the patient, family and bystanders. Explain the rationale for using assessment tools such as a stroke protocol and describe any interventions or supportive care that will be provided to the patient and/or family.
- While some stroke patients may be aphasic, hearing and comprehension may be intact so avoid talking around them or over them, and include them in the discussion.