INTRODUCTION

A cerebral vascular accident (CVA) or stroke is a lack of blood supply to the brain as a result of either ischemia or hemorrhage. 80% of CVAs are a result of ischemia (embolic or thrombotic) while the remaining 20% tend to be a result of a hemorrhage. At the cellular level, injury is caused by many factors that result in possible dysfunction and death of the cell. This ischemic cascade begins within minutes of the loss of glucose and oxygen supply to the neurons in the brain. As the ischemia continues, resulting edema causes further injury to the surrounding areas, collectively known as the ischemic penumbra. This tissue is dependent on collateral circulation and may still be viable for several hours because of this marginal perfusion. Successful care of the acute CVA patient is reliant on early recognition of the signs and symptoms, priority transport to the appropriate hospital and rapid assessment, diagnosis and treatment. Acute CVA interventions are time sensitive; time is brain.

Transient ischemic attacks (TIA) are a result of a temporary blockage of the neurons' blood supply by an embolus or a thrombus. While the signs and symptoms are similar to ischemic CVA, they tend to subside and improve within a few minutes or hours. Though the signs and symptoms may have improved, a TIA is an important warning sign that indicates high risk of having a CVA.

SAFETY

Be cautious of the patient's ability to swallow and ambulate if motor skills are impaired.

ASSESSMENT

During the assessment of a patient with a potential CVA, a focused medical assessment can help identify possible risk factors and other clinical points to help make the transport decision.

Risk Factors

Risk factors include: previous CVA or TIA, atherosclerotic disease, hypertension, high cholesterol, atrial fibrillation, and coronary artery disease. Other risk factors such as diabetes, tobacco use, increased weight, lack of exercise and alcohol consumption may also be considered. CVA in younger patients are rare, but do occur. Obtain other pertinent information such as recent trauma, illicit drug use, pertinent medical history or use of oral contraceptives.

Time of Onset

Establishment of the onset of symptoms is extremely important for trip destination decisions and definitive management. This information should be obtained from the patient and/or bystanders. Note, the time of onset is considered the last time the patient was seen normal. For example, if the patient has awoken from sleep with symptoms, the onset is the last time the patient was seen without symptoms.

Signs and Symptoms

The signs and symptoms that the patient may present with are dependent on the area of the brain being affected, and may include:

- Hemiparesis or hemiplegia (often on opposite side of lesion)
- Facial droop
- Weakness or numbness
- Dizziness/vertigo
- Dysarthria or aphasia
- Headache
- Vision disturbances (monocular blindness, double vision)
- Nausea and vomiting
- Confusion
- Seizures
- Altered level of consciousness (ALOC)

In hemorrhagic CVA, headache and nausea/vomiting are more likely than in ischemic CVA.

Aphasia may be *receptive*, in which the patient may not understand commands and have confused speech. The exam may include observation for purposeful spontaneous movements or purposeful response to touch or painful stimulus. Aphasia may also be *expressive*, in which the patient understands, but cannot speak normally. These patients will follow commands.

Physical Exam

The physical exam should include:

- Vital signs
- Detailed neurological exam, including sensory changes

- A full head-to-toe secondary exam
- 12 lead ECG
- Blood glucose (**PEP 3 neutral**)
- Oxygen saturation
- Serial GCS assessments

A neurological assessment can help identify areas of weakness and should include the Cincinnati Prehospital Stroke Scale (**PEP 2 supportive**).

The Cincinnati Prehospital Stroke Scale is an assessment tool that paramedics should use to help identify if a CVA may be present. It evaluates three major physical findings:

- Facial droop
- Arm drift
- Speech abnormalities

From this assessment if the patient has one of these three findings ***as a new event*** it shows a 72% probability of an ischemic CVA is present and paramedics should consider it a positive indicator for CVA. All three findings present increases the probability of an acute CVA to more than 85%.

MANAGEMENT

Oxygen Therapy
The goal of oxygen therapy is to prevent hypoxia and minimize the penumbra. Oxygen should be provided to maintain SpO2 of 92% or greater.

Fluid Management
Paramedics should consider inserting an IV lock in these patients. IV fluids should be provided only to manage hypotension **(PEP white),** in accordance with the shock guideline. Fluid administration should be conservative, as to prevent increased intracranial pressure.

Glucose Management
Patients with glucose of less than 4mmol/L may present with CVA-like symptoms and their hypoglycemia should be treated (**PEP 3 neutral**). Alternatively, patients with a true CVA could suffer hypoglycemia, which should be treated. The risk of administering glucose to a CVA patient does not outweigh the benefits of treating hypoglycemia, as hypoglycemia is detrimental to the penumbra.

CVA patients with high glucose readings may also present with stroke-like symptoms and should be managed with fluid administration (i.e., initiate a 500mL bolus and reassess with up to 1000mL).

Seizure Management
Seizure activity is possible in CVA patients, and should be treated as per the seizure guideline.

Destination
Paramedics should recognize the time sensitive nature of CVAs. Proper destination choices are important, as time can have a major impact on outcome (**PEP 2 supportive**). In Nova Scotia, several hospitals are designated as District Acute Stroke Hospitals (DASH). If the total symptom duration and anticipated transport time (collectively, the 'reperfusion interval') to a DASH is less than 3.5 hours, the patient may be a candidate for thrombolytic therapy. The most appropriate destination is a DASH emergency department (ED), which have the capability to administer thrombolytics.

Patients whose reperfusion interval is greater than 3.5 hours should be transported to the nearest ED. Patients that have been identified as a resolving CVA should also be transported to the nearest ED. These patients are not candidates for thrombolytic therapy, although may later be transferred for rehabilitation purposes.

If the patient qualifies for destination bypass to a DASH ED, but requires ongoing resuscitation (e.g. airway management, cardiovascular support), paramedics should consider transport to the closest appropriate ED.

CVA management by EHS and EDs plays an important part of the overall management goals of CVA treatment in Canada, according to the Canadian Best Practice Recommendations. Primary prevention, public awareness, rehabilitation and long-term recovery are also important components of care.

Early Notification
When presented with a suspected CVA, early notification to the receiving facility by the paramedics is imperative to providing adequate time for the emergency department to make the necessary

arrangements to receive the patient. Key information to share during notification include symptoms present, onset time, CTAS and arrival time.

TRANSFER OF CARE

When presenting this patient to the ED staff all relevant information should be provided, including:

- Onset of symptoms (or last seen normal)
- Changes in symptoms
- Stroke scale
- Treatments provided and response

CHARTING

In addition to the mandatory fields, it is important to document the following in the ePCR text fields:

- ✓ Onset of symptoms (or last seen normal)
- ✓ Changes in symptoms
- ✓ Stroke scale

KNOWLEDGE GAPS

More research is needed on potential for administering CVA-specific treatments earlier in the prehospital setting, such as hypertension therapy, anti-platelet therapy and hyperglycemia therapy.

EDUCATION

The use of a common prehospital stroke scale needs to be a focus for education.

QUALITY IMPROVEMENT

Important elements are: [1] documentation of symptom onset (or last seen normal) time, [2] completion of stroke scale, and [3] appropriate destination decision.

REFERENCES

http://www.strokebestpractices.ca

http://www.heartandstroke.ns.ca

http://www.gov.ns.ca/health/ehs/paramedics/EBP.asp

6288.05: STROKE

PEP 3x3 TABLES for STROKE

Throughout the EHS Guidelines, you will see notations after clinical interventions (e.g.: **PEP 2 neutral**).PEP stands for: the Canadian **P**rehospital **E**vidence-based **P**rotocols Project.

The number indicates the Strength of cumulative evidence for the intervention:
1 = strong evidence exists, usually from randomized controlled trials;
2 = fair evidence exists, usually from non-randomized studies with a comparison group; and
3 = weak evidence exists, usually from studies without a comparison group, or from simulation or animal studies.

The coloured word indicates the direction of the evidence for the intervention:
Green = the evidence is supportive for the use of the intervention; **Yellow = the evidence is neutral**;
Red = the evidence opposes use of the intervention;
White = there is no evidence available for the intervention, or located evidence is currently under review.

PEP Recommendations for CVA Interventions, as of 2013/05/09. PEP is continuously updated. See: http://emergency.medicine.dal.ca/ehsprotocols/protocols/toc.cfm for latest recommendations, and for individual appraised articles.

<< Back

Stroke-CVA-TIA

<< Back

Recommendation		RECOMMENDATION FOR INTERVENTION			
		SUPPORTIVE (Green)	NEUTRAL (Yellow)	AGAINST (Red)	NOT YET GRADED (White)
STRENGTH OF RECOMMENDATION FOR INTERVENTION	1 (strong evidence exists)		• ASA/Aspirin		• Hypotension Control • Oxygen
	2 (fair evidence exists)	• Advanced Notice/ Optimal Trip Destination • Stroke Diagnosis Scales	• Hypertension Control		
	3 (weak evidence exists)		• Blood Glucose Control • Magnesium		

6288.05: STROKE

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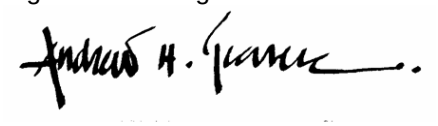
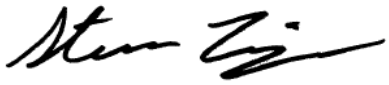
Signature of Program Director 	Signature of Program Document Coordinator 	

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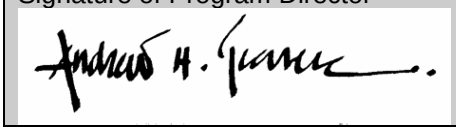
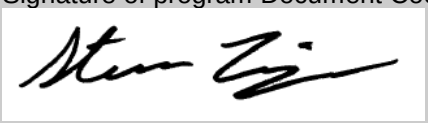
Signature of Program Director 	Signature of program Document Coordinator 	

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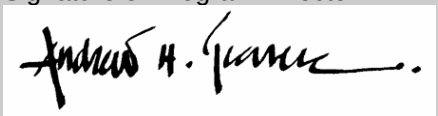
Signature of Program Director 	Signature of program Document Coordinator