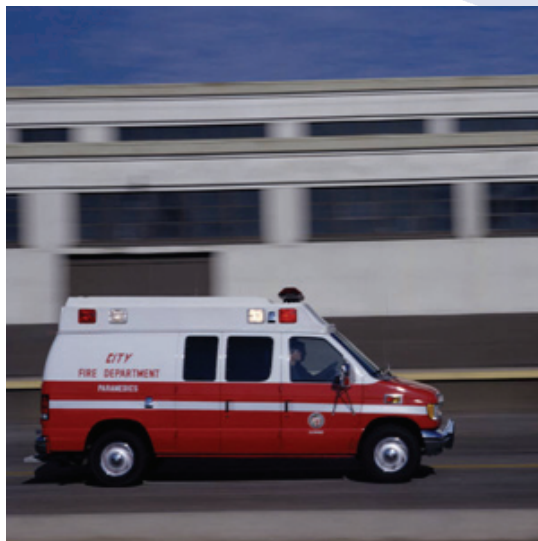


# ALBERTA PROVINCIAL STROKE STRATEGY (APSS)

## Pre-Hospital Care

November 2009



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***We would like to acknowledge the contribution of the following groups:***

Alberta Provincial Stroke Strategy Pillar 2  
Pillar 2 Prehospital Working Group

## 1.0 INTRODUCTION

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Time is brain and a rapid, coordinated and consistent response across the province by EMS will enhance the management of acute stroke and improve health outcomes. Effective emergency response to a potential stroke in the field through appropriate assessment, minimized delays and rapid transport to the most appropriate hospital is critical to ensure that those eligible for thrombolysis or other brain protection therapies have the opportunity to receive those treatments.

The following best practices have been developed by the APSS Pillar 2 Pre-hospital Care Working Group to identify the paramedic's role in assessing, managing and transporting patients with a suspected stroke.

<b>Prehospital Care Component</b>	<b>Protocol/Tool</b>
Rapid recognition and management of suspected stroke to minimize delays to thrombolysis (EMS Dispatch and Paramedics/EMT)	Prehospital Stroke Care Algorithm EMS Stroke Screening Form
Direct Transport to nearest Primary or Comprehensive Stroke Centre	
Early notification of the receiving hospital for stroke team/CT preparedness	Prehospital Stroke Care Algorithm
Most expedient transport to the receiving hospital (Primary/Comprehensive Stroke Centre)	Prehospital Stroke Care Algorithm Hospital to Hospital Transfer Algorithm (patient arrives in ER by private vehicle)
Treatment enroute in ambulance	EMS Stroke Transport Protocol

## 2.0 DIRECT TRANSPORT TO PRIMARY / COMPREHENSIVE STROKE CENTRE and PRE-HOSPITAL CARE RECOMMENDATIONS

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Response in the field involves interactions between EMS dispatch, EMS Responders and the Emergency Department of Primary and Comprehensive Stroke Centres. The **Prehospital Stroke Care Algorithm** supports acute stroke care decision making and management. Stroke is an emergency. While evidence is limited in the stroke literature, key elements of the trauma care systems are applicable to stroke care (designation of primary and secondary trauma receiving sites with capacity for hyperacute treatment; transport protocols; communication among receiving hospitals and EMS; standard treatment protocols and mechanisms to transport patient from remote/rural areas). Studies have shown that trauma systems and direct transport protocols to designated hospitals are effective in reducing morbidity and mortality<sup>1-2</sup>. The Brain Trauma Foundation conducted an exhaustive review of trauma system research showing improved clinical outcomes by transporting head trauma patients to the appropriate receiving site.<sup>3</sup>

Suspected stroke should be treated as an acute event and the nearest emergency unit should be dispatched to the scene with the most rapid emergency response available. In remote rural sites, when stroke is suspected, dispatch should determine the availability of the quickest mode of transportation (ground, air – helicopter, fixed wing) while the initial response unit is on its way to the scene. The dispatchers focus should be to facilitate meeting the patient time to intervention objectives, thus optimizing patient outcome.

EMS Responders on the scene complete the **EMS Stroke Screening Form** to assist with decision making about appropriate transportation, destination and treatment en route to hospital. Patients within the 4.5 hour time window (last seen normal) shall be transported to the nearest Comprehensive or Primary Stroke Centre. Patients within the 4.5-6 hour time window (last seen normal) may still benefit from hyperacute therapy so consult with the Comprehensive Stroke Centre to determine best destination for the patient. Stroke patients who are not considered candidates for hyper-acute interventions should be evaluated at the nearest hospital. Patient transfer to another facility may occur at a later time depending on clinical presentation of the patient and clinical supports available at the receiving hospital (Refer to APSS Inpatient Care document).

Comprehensive Stroke Centres in Calgary and Edmonton are available 24/7. Primary Stroke Centres may or may not be 24/7 due to CT/Physician on-call availability. EMS should contact the Primary Stroke Centre ER for availability of t-PA.

Once a decision has been made to transport to the nearest primary or comprehensive stroke centre for hyperacute treatment, the EMS unit should contact the receiving emergency department, or rapid access line (SARCC or CCL) immediately, once enroute. This allows the receiving hospital to make arrangements for CT preparation, telestroke linkage, and other necessary clinical supports that may need to be put in place.

The **EMS Stroke Transport Protocol** (Appendix 4) assists EMS in the appropriate management of stroke patients en route to hospital.

A copy of the EMS Stroke Screening Form is placed in the health record in the emergency department. Documentation of signs and symptoms and time of onset by EMS personnel are important to assist with appropriate management at the receiving site and to collect the necessary data for process evaluation of APSS.

At times, stroke patients may arrive at hospital in a private vehicle. These individuals need to be evaluated immediately and transported to the nearest Primary or Comprehensive Stroke Center as appropriate. See the **Hospital to Hospital Transfer Algorithm**. Augmentation of BLS transport for a hospital to hospital transfer should be considered to ensure patient safety. Do not delay transfer of the patient for this reason if the patient is stable.

#### TRANSPORT PROTOCOLS FOR AMBULANCE TO NEAREST PRIMARY/COMPREHENSIVE STROKE CENTRE

Regions shall work with local ambulance services to implement hospital direct transport protocols (**Prehospital Stroke Care Algorithm**) to minimize delays to appropriate hyper-acute treatment and provide the most expedient and safest transport to the Primary/Comprehensive Stroke Centre.

Ambulance services adopt an **EMS Stroke Transport Protocol** to ensure appropriate treatment of the potential stroke patient enroute by ground/air ambulance.

#### EMS ASSESSMENT, SCREENING PROTOCOLS AND DOCUMENTATION

Regions shall work with local ambulance services and ER staff to adopt an **EMS Stroke Screening Form** for the rapid recognition of potential stroke patients in the field and in non-primary centre emergency departments.

#### PREHOSPITAL PROCESS REVIEW AND EDUCATION

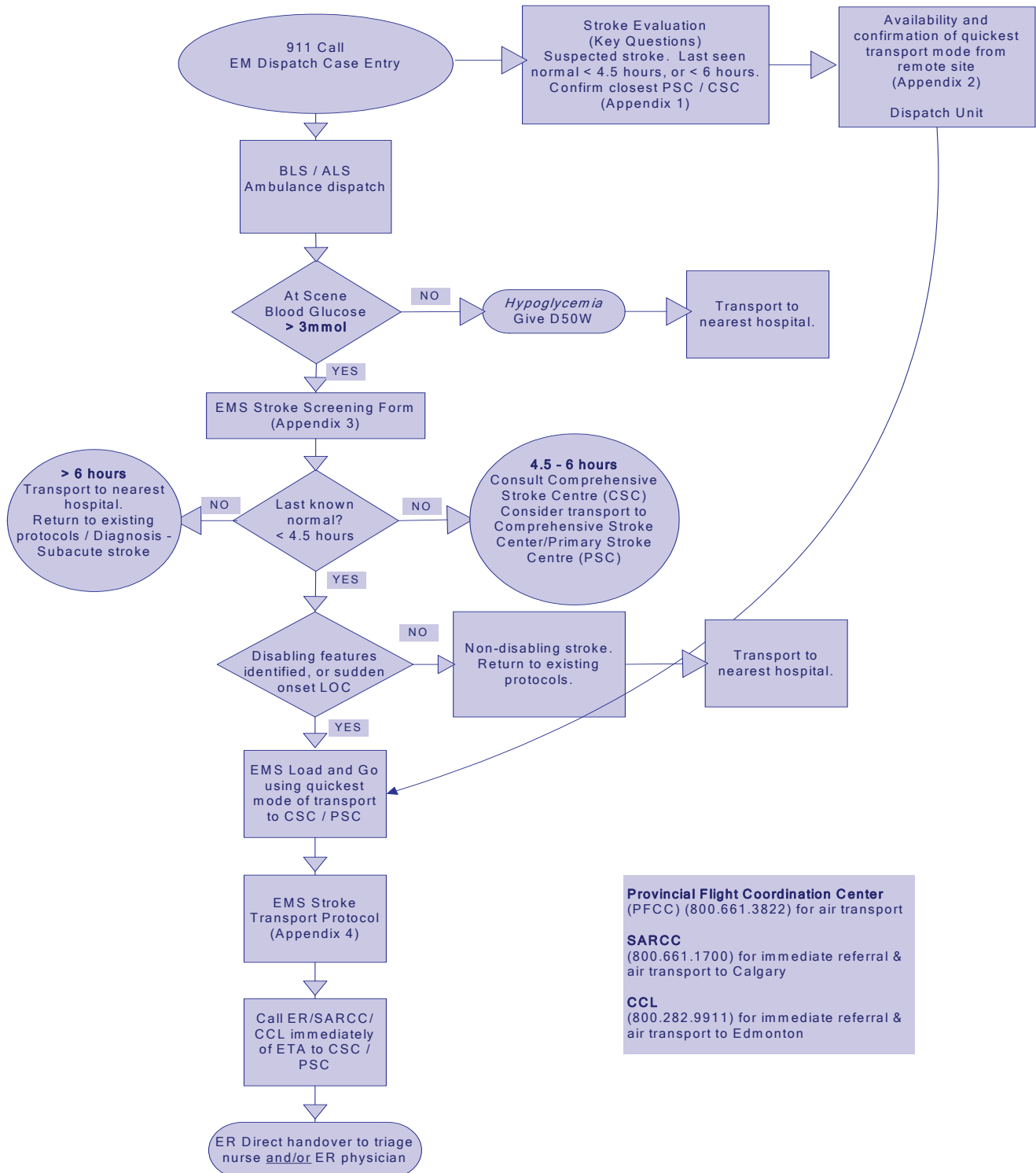
Regions shall collaborate with local EMS to disseminate information about stroke hospital direct transport processes, and stroke recognition and management in the pre-hospital phase.

Stroke onset to door time must be as short as possible to optimize outcomes. All regions / EMS and support agencies shall work together to minimize all delays to appropriate therapy, including thrombolysis.

Regions and local ambulance services shall establish mechanisms to ensure that ongoing operational issues are discussed by EMS personnel, emergency and stroke clinicians and to share ongoing continuing education opportunities.

## 4.0 PROTOCOLS / TOOLS

### 4.1 Pre-Hospital Stroke Care Algorithm



## Prehospital Stroke Care Algorithm Appendices

### Appendix 1

#### Primary Stroke Centre (PSC) Criteria:

- CT scan availability
- Door to CT time less than 20 minutes with pre-alert
- Stroke expertise on-site or available by Telestroke link
- t-PA treatment availability
- Serves all surrounding communities in which it is the nearest PSC

#### Comprehensive Stroke Centre (CSC) Criteria:

- CT scan availability
- Door to CT time less than 20 minutes with pre-alert
- Stroke team on-site
- Neurosurgical expertise on-site
- Neuro-interventionist expertise on-site
- Central hub of stroke neurologist expertise in a telestroke network

### Appendix 2

- Confirms availability of transport modes
- Considers transport options:
  - .-ALS ground EMS
  - .-Helicopter
  - .-Fixed Wing
  - .-Appropriate modes of transport sent prior to EMS arrival as necessary to meet arrival at PSC time criteria

#### Primary Stroke Centre Time Criteria

When considering speed and mode of transport consider the following time goals:  
[Minimize delays to thrombolysis to optimize outcome] (Door = Hospital Door)

Door to CT time      10 – 30 minutes

Door to Needle time   30 – 60 minutes

Onset to Door                      < 2 hours    (Level 1 evidence)  
   2 – 3.5 hours    (Level 1 evidence, no HPB approval)  
   3.5 – 5 hours    (Level 2 evidence, clinical trials ongoing)

## APPENDIX 3 - EMS STROKE SCREENING FORM: Directed neuro exam for disabling features/coma

Gather critical information on scene and complete Stroke Screen enroute.			
1. Patient's Last Name	Patient's First Name		
2. History provided by:			
<input type="checkbox"/> Patient	<input type="checkbox"/> Family Member	Name: _____	Telephone Number: _____
<input type="checkbox"/> Other		Name: _____	Telephone Number: _____
3. Who last witnessed the patient neurologically normal?			
		Name: _____	Telephone Number: _____
4. When was the patient <b>last known normal</b> ?			
		Date: _____ (YYYY / MM / DD)	Time: _____ : _____ hrs (Military Time)
SCREENING CRITERIA			
	<u>Yes</u>	<u>Unknown</u>	<u>No</u>
5. Blood glucose level greater than 3.0 mmol/L .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Last known normal less than 4.5 hours ago .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Last known normal 4.5 – 6 hours ago .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PHYSICAL EXAMINATION			
8. Level of consciousness .....	<input type="checkbox"/> Alert	<input type="checkbox"/> Responds to verbal	<input type="checkbox"/> Responds to pain only
Speech .....	<input type="checkbox"/> Normal	<input type="checkbox"/> Slurred	<input type="checkbox"/> Incomprehensible or Mute
Look for obvious asymmetry			
a) Facial smile .....	<input type="checkbox"/>	<input type="checkbox"/> Droop	<input type="checkbox"/> Droop
b) Arm strength .....	<input type="checkbox"/>	<input type="checkbox"/> Drifts down	<input type="checkbox"/> Drifts down
c) Hand grips .....	<input type="checkbox"/>	<input type="checkbox"/> Weak grip	<input type="checkbox"/> Weak grip
d) Leg strength .....	<input type="checkbox"/>	<input type="checkbox"/> Drifts down	<input type="checkbox"/> Drifts down
<b>Note: Any red items checked recommend transport to nearest Primary Stroke Center</b>			
THROMBOLYTIC CRITERIA			
	<u>Yes</u>	<u>Unknown</u>	<u>No</u>
8. On Coumadin therapy at present .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Recent MI within 3 months .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Recent stroke within 3 months .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Recent trauma within 3 months .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Recent surgery within 3 months .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Recent bleeding (including GI) within 3 months .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Recent seizure activity .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### SCREENING CRITERIA

Questions 5 & 6 Yes and one or more **red disabling examination findings** on question 8 are present, then the **EMS t-PA Stroke Screen** criteria is met. As soon as possible, provide an informational patch to the Primary Stroke Center or SARCC/CCL and notify the triage nurse of an **"Acute Disabling Stroke"**. **All acute stroke patients should be transported to the closest Primary, or Comprehensive Stroke Centre for assessment.** If question 7 is yes, consult with Comprehensive Stroke Centre.

Personal information is collected under the authority of Section 32© of the Freedom of Information and Protection of Privacy Act. If you have any questions about the collection and use of this information, please contact the EMS at (XXX) XXX-XXXX.

**Adopted and Modified with permission from Calgary Emergency Services Department**

Event Number
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## APPENDIX 4 - EMS STROKE TRANSPORT PROTOCOL

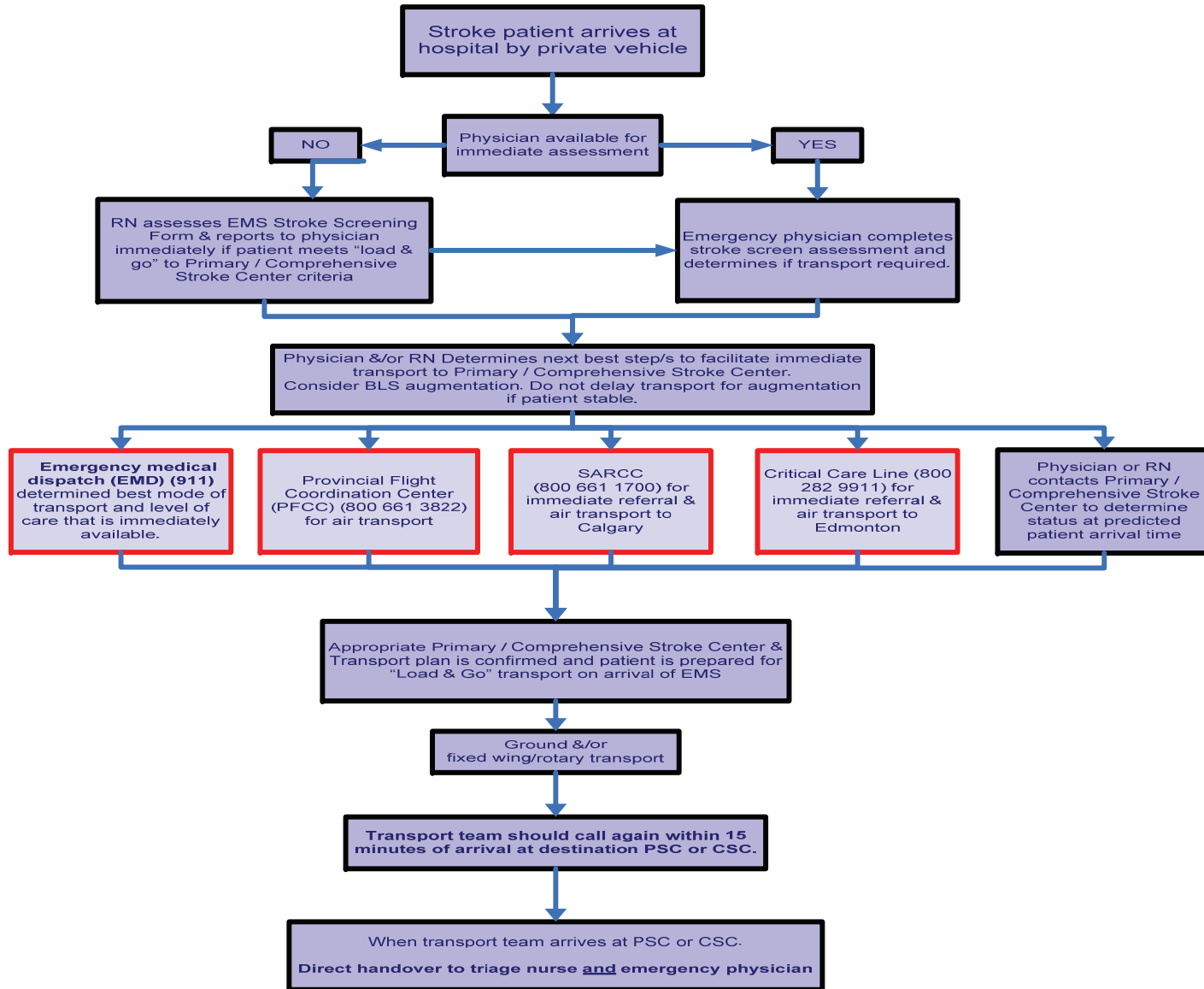
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1. Standard modes of airway, breathing and circulation management. Monitor any interventions which may lower blood pressure excessively. Low blood pressure results in low brain blood flow and additional brain injury.
2. Begin an intravenous of Normal Saline with an 18 - or 20 gauge catheter and run the solution at 100 mL/hr. **Never use solutions containing Dextrose.** Dextrose solutions have been shown to contribute to increased neuronal death. If time, insert second 18 gauge IV.
3. Optimal to maintain head of bed supine to 30 degrees, unless contraindicated.
4. Oxygen administration should be guided by oxygen saturation levels. Goal is to maintain an oxygen saturation greater than 95%. As a general rule, oxygen via a nasal cannula at 5 L/min is preferred. Some evidence to suggest hyperoxia (high flow oxygen) protects brain from ischemia.
5. Key physical examination findings focus on a directed neurological examination as listed below:
  - a) Level of consciousness using AVPU:
    - A - alert
    - V - verbal
    - P - painful
    - U – unconscious
  - b) Assess for any speech impairment or difficulty in communicating (slurred speech).
  - c) Assess for facial droop.
  - d) Assess for arm weakness:

Have the patient maintain their arms at 90 degrees against gravity bilaterally. The patient should hold their arms out 90 degrees from their body for a count of 10 seconds. Identify any drift or drop in arm strength.
  - e) Assess for leg weakness:

Have patient maintain their legs at 45 degrees against gravity bilaterally. The patient should hold their legs out 45 degrees from their body for a count of 10 seconds. Identify any drift or drop in leg strength.
6. Draw bloods if local protocols allow.
7. Observe for seizure activity. Determine history of seizure disorder and treat as per seizure protocols as indicated.
8. Blood Pressure Management if local protocols allow. Contact destination stroke centre for advice:
  - If blood pressure greater than 220 mmHg systolic or greater than 120 mmHg diastolic
  - If blood pressure less than 80 mmHg systolic
9. If an underlying dysrhythmia protocol is present, go to the appropriate dysrhythmia protocol and treat simultaneously.
10. Provide information patch to destination stroke centre immediately, to allow stroke team to prepare for arrival and for CT scan to be readied/ CT tech to be called in.
11. Upon arrival to destination stroke centre. Report to triage nurse and/or on duty emergency physician immediately.

## 5.0 HOSPITAL TO HOSPITAL TRANSFER



## 6.0 REFERENCES

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