

F03: Stroke

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Introduction

An acute stroke is a sudden non-traumatic ischemic or hemorrhagic insult to the brain. Transient ischemic attacks (TIAs) are events that present similarly to an acute ischemic stroke, but resolve completely and spontaneously within minutes to hours. Despite the resolution of symptoms, TIAs are important warning signs that indicate a patient is at high risk for ischemic stroke. The main goals of care include rapid and accurate recognition of stroke symptoms, establishing the time of symptom onset (or the "last seen normal" time, as applicable), and timely transportation to an appropriate stroke center.

Essentials

- To minimize mortality and disability, effective stroke management involves multiple providers and a system of care. Early recognition, appropriate hospital selection, and communication are essential.
- Apply the FAST-VAN exam as part of patient assessment.
 - → [Tool: FAST VAN calculator](#)
- Patients with suspected acute stroke and TIAs should be preferentially transported to stroke care centers, or to an emergency department with CT imaging capabilities.
- "Hot stroke" patients are defined as those with positive FAST screening score, and an onset of symptoms within the last six hours or who woke up with symptoms.
- "Hot stroke" patients whose VAN exam is positive may have a large vessel occlusion that benefits from endovascular thrombectomy (EVT). Regional guidelines may direct these patients to a particular center with EVT capabilities.
- Approximately 15% of all strokes are the result of an intracranial haemorrhage (ICH). These patients are more likely to deteriorate rapidly despite aggressive prehospital care.

Additional Treatment Information

- A negative FAST-VAN exam does not exclude a stroke
- Paramedics should be suspect a hemorrhagic stroke in patients who present with stroke symptoms and:
 - Glasgow Coma Scale <10
 - A history of severe headache
 - Nausea and vomiting
 - Bradycardia and hypertension
 - Unequal pupils
 - Abnormal respiration patterns

Referral Information

Resolved TIAs require transportation to an appropriate stroke center or emergency department for further evaluation.

Interventions

First Responder

- Position the patient: place in position of comfort if possible; otherwise, position as necessary for care
- Manage airway as required
 - → [B01: Airway Management](#)

- Provide supplemental oxygen as required
 - → [A07: Oxygen and Medication Administration](#)

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $\text{SpO}_2 \geq 94\%$
 - → [A07: Oxygen and Medication Administration](#)
- Obtain and document capillary blood glucose measurement. Treat hypoglycemia with oral glucose as patient's condition permits.
 - → [E01: Hypoglycemia and Hyperglycemia](#)
- Obtain and document onset of symptoms, or "last seen normal" time
- Minimize on-scene time
- Notify receiving facility while en route

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access:
 - → [D03: Vascular Access and Fluid Administration](#)
 - Select a site above the level of the wrist
- Enrol in FRONTIER trial, if indicated

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Anesthesia:
 - Phase 1
 - Secure airway if required. Use an appropriate induction strategy and intubation procedure based on patient and environment specificity.
 - **EPOS orders are required for paralytic use.** Post-call consultation permitted for RSI in emergency situations.
 - Phase 2
 - Deep sedation is required. Target RASS -5 without complete or burst suppression.
 - Propofol is the preferred agent for phase 2 anesthesia.
 - Use narcotic analgesia as required.
 - Use EEG-guided anesthesia if appropriate.
 - Maintain neuromuscular blockade as required.
 - **EPOS orders are required for paralytic use.** Post-call consultation permitted for RSI in emergency situations.
- Manage hemodynamic instability:
 - Target MAP greater than 65 mmHg and systolic blood pressure greater 90 mmHg.
 - Crystalloid and/or vasopressor administration may be required.
 - Consider short term [phenylephrine](#) administration.
 - For long term support, consider [norepinephrine](#).
 - For suspected intracranial hemorrhage or subarachnoid hemorrhage in the unconscious patient, maintain blood pressure below 160 mmHg:
 - Consider [labetalol](#).
 - Consider [hydralazine](#).
- Optimize cerebral venous out-flow:
 - Raise head of bed to 30°.
 - Promote venous drainage (e.g., cervical collars, ETT ties loose, trans-pulmonary PEEP of 0 cmH₂O, trans-pulmonary plateau pressure less than 25 cmH₂O).
 - Maintain neck neutrality.
 - If no esophageal balloon in place, set PEEP 5-12 cmH₂O.
 - Decompress stomach if required.
- Mechanical ventilation strategies:
 - BVM with PEEP valve: maintain adequate oxygenation while preserving adequate cerebral venous drainage.
 - Ensure oxygenation goals are being met. ($\text{SpO}_2 > 97\%$, PaO_2 100-150 mmHg.)

- Ensure ventilation goals are being met. (EtCO₂ 35-40 mmHg, PaCO₂ 35-40 mmHg.)
- Minimize Pplats while maintaining ventilation goals.
- Control seizure activity:
 - Consider etiology and patient presentation when selecting appropriate agent:
 - MIDAZOLam
 - Propofol
 - Consider the side effect of hypotension: pressors may be required to maintain hemodynamic goals.
 - Consider the utility of [phenytoin](#) for seizing and seizure prophylaxis. Treat based on the etiology, patient presentation, requirement for neuromuscular blockade, and transport context.
- Monitor for signs of raised ICP and cerebral herniation:
 - Neurological exam findings:
 - Unilateral pupillary dilation considered to be related to a rise in intracranial pressure.
 - Decorticate or decerebrate posturing.
 - Seizure activity.
 - ONSD of < 6 mm.
 - Consider osmotic therapy
 - Hypertonic saline. EPOS orders are required for the use of hypertonic saline.
 - [Mannitol](#).
- Maintain capillary blood glucose between 6-10 mmol/L.
- Arterial or venous blood gas analysis:
 - Adjust mechanical ventilation to ensure adequate oxygenation, appropriate ventilation, and safe ground ventilating parameters.
- Consider anti-emetic administration:
 - [Dimenhydrinate](#)
 - [Metoclopramide](#)
 - [Ondansetron](#)
- Other considerations:
 - Avoid steroid use.

Neurological emergencies or urgencies are considered to be time sensitive, and may require immediate intervention. Minimizing scene times may have significant effects on patient outcomes.

Evidence Based Practice

[Stroke](#)

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [\[Link\]](#)
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [\[Link\]](#)

