Canadian Best Practice Recommendations for Stroke Care
(Updated 2008)

Section # 3
Hyperacute Stroke Management
Reorganization of Recommendations 2008

2006 RECOMMENDATIONS:
1. Public Awareness (1)
2. Patient and Caregiver Education (1)
3. Stroke Prevention (7)
4. Acute Stroke Management (8)
5. Stroke Rehabilitation (6)
6. Follow-up and Community Re-engagement (1)

2008 RECOMMENDATIONS:
1. Public Awareness and Patient Education (2)
2. Stroke Prevention (7)
3. Hyperacute Stroke Care (7)
4. Acute Inpatient Stroke Management (2)
5. Stroke Rehabilitation & Community Reintegration (5)
6. Selected Topics in Stroke Management (4)
Canadian Best Practice Recommendations for Stroke Care (2008) Topic Areas

1.0 Public Awareness and Patient Education
   - Public awareness and responsiveness
   - Patient and family education

2.0 Prevention of Stroke
   - Lifestyle and risk factor management
   - Blood pressure management
   - Lipid management
   - Diabetes management
   - Antiplatelet therapy
   - Antithrombotic therapy for atrial fibrillation
   - Carotid intervention

3.0 Hyperacute Stroke Management
   - Emergency medical services prior to hospital arrival
   - Acute management of transient ischemic attack and minor stroke
   - Neurovascular imaging
   - Blood glucose
   - Acute thrombolytic therapy
   - Acute aspirin therapy
   - Management of subarachnoid and intracerebral hemorrhage
Canadian Best Practice Recommendations for Stroke Care (2008) Topic Areas

- **4.0 Acute Stroke Management**
  - Acute stroke unit care
  - Components of acute inpatient care

- **5.0 Stroke Rehabilitation and Recovery**
  - Initial stroke rehabilitation assessment
  - Provision of inpatient rehabilitation
  - Components of inpatient stroke rehabilitation
  - Outpatient and community-based rehabilitation
  - Follow-up and evaluation in the community

- **6.0 Selected Key Topics in Stroke Management**
  - Dysphagia assessment
  - Identification and management of post-stroke depression
  - Vascular cognitive impairment and dementia
  - Shoulder pain assessment and treatment
Recommendation Format

- Best Practice Recommendation
- Rationale
- System Implications
- Performance Measures
- Measurement Notes
- Summary of Current Evidence
Recommendation # 3

Hyperacute Stroke Management
3.0 Hyperacute Stroke Management

- Hyperacute care is defined as the health care activities that take place from the time of first contact between a patient with potential stroke and medical care until the patient is either admitted to hospital or discharged back into the community.
3.0 Hyperacute Stroke Management

- 3.1 Emergency medical services management of acute stroke patients
- 3.2 Acute management of transient ischemic attack and minor stroke
- 3.3 Neurovascular imaging
- 3.4 Blood glucose abnormalities
- 3.5 Acute thrombolytic therapy
- 3.6 Acute ASA therapy
- 3.7 Management of subarachnoid and intracerebral hemorrhage
3.1 Emergency Medical Services
Management of Acute Stroke Patients

- Patients who show signs and symptoms of hyperacute stroke, usually defined as symptom onset within the previous 4.5 hours, must be treated as time-sensitive emergency cases and should be transported without delay to the closest institution that provides emergency stroke care.
3.1 Emergency Medical Services
Management of Acute Stroke Patients

- Immediate contact with emergency services (e.g. 911) by patients or other members of the public is strongly recommended because it reduces time to treatment for acute stroke.
- Emergency medical services dispatchers must triage patients showing signs and symptoms of hyperacute stroke as a priority dispatch.
- A standardized acute stroke diagnostic screening tool should be used by paramedics.
- Out-of-hospital patient management should be optimized to meet the needs of suspected acute stroke patients.
3.1 Emergency Medical Services
Management of Acute Stroke Patients

- Direct Transfer Protocols must be in place to facilitate the transfer of eligible patients to the closest and most appropriate facility providing acute stroke care.
- Direct Transport Protocol criteria must be based on:
  - 1. Both symptom duration and anticipated transport duration being less than the therapeutic window
  - 2. Other acute care needs of the patient
3.1 Emergency Medical Services
Management of Acute Stroke Patients

- History of event including:
  - Time of onset
  - Signs and symptoms
  - Previous medical and drug history

  Must be obtained from the patient or informant

- The receiving facility must be notified of a suspected acute stroke patient in order for the facility to prepare

- Transfer of care from paramedics to receiving facility personnel must occur without delay
System Implications

- Scope of out-of-hospital care is from first patient contact with emergency medical services to the transfer of care to the receiving facility
- Dispatchers training
- Paramedic education
- Direct transport agreements
- Coordinated, seamless transport and disposition
- Communication systems to support access
Performance Measures

- Percentage of suspected stroke patients arriving in the ED who were transported by EMS
- Time from initial call received by emergency dispatch centre to EMS arrival on patient scene
- Time from EMS arrival on patient scene to arrival at appropriate ED
- Percentage of potential stroke patients transported by EMS who received a final diagnosis of stroke or TIA during hospital stay
3.2 Acute Management of Transient Ischemic Attack and Minor Stroke

- Patients who present with symptoms suggestive of minor stroke or transient ischemic attack must undergo a comprehensive evaluation to confirm the diagnosis and begin treatment to reduce the risk of major stroke as soon as is appropriate to the clinical situation.
3.2a Assessment

- Immediate clinical evaluation and additional investigations as required to establish the diagnosis, rule out stroke mimics and develop a plan of care
- Use of standardized risk stratification tool at the initial point of healthcare contact should be used to guide the triage process
- Patients should be referred to a designated stroke prevention clinic or to a physician with expertise in stroke assessment and management
Risk Stratification for Early Stroke Recurrence Following TIA

Factors that Suggest a High Risk for Early Recurrent Stroke Following TIA

CLINICAL FEATURES:
- Symptoms include: Focal weakness, speech difficulties
- Symptoms lasted >10 minutes
- Age > 60
- Presence of diabetes

INVESTIGATIONS:
- Evidence of acute infarct on CT/MRI
- Evidence of carotid artery stenosis

The presence of any of these features suggests a high risk for stroke within days to weeks. All potential stroke patients should be assessed within the time frames defined below.

TIA Triage Categories

<table>
<thead>
<tr>
<th>CLINICAL FEATURES</th>
<th>SUGGESTED TIMELINE</th>
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<tbody>
<tr>
<td>EMERGENT</td>
<td>Immediate medical assessment in ER with brain and carotid imaging capabilities</td>
</tr>
<tr>
<td>URGENT</td>
<td>Initial diagnostic assessment within 1 week of event</td>
</tr>
<tr>
<td>SEMI-URGENT</td>
<td>Admission within 1 month</td>
</tr>
</tbody>
</table>

As recommended by the Canadian Stroke Quality of Care Expert Panel, November 2005.

Clinical Considerations: Patients presenting with other possible TIA symptoms, unilateral sensory changes, visual loss, ataxia or vertigo should be assessed for persistence of symptoms and urgency of referral.

www.heartandstroke.ca/profed
3.2a Assessment

- Patients require brain imaging with computed tomography or magnetic resonance imaging
  - Emergent patients classified at highest risk of recurrent stroke should have neurovascular imaging within 24 hours
  - Those patients classified as urgent should have neurovascular imaging within 7 days
- Patients who may be candidates for carotid re-vascularization should have computed tomographic angiography (CTA), magnetic resonance angiography (MRA) or a carotid duplex ultrasound as soon as possible (within 24 hours for emergent patients and seven days for urgent patients)
3.2a Assessment

- The following should be undertaken routinely:
  - CBC
  - Electrolytes
  - Renal function
  - Cholesterol level
  - Glucose level
  - Electrocardiogram

- Pts. with confirmed cerebral infarction on brain imaging should undergo comprehensive outpatient assessment for functional impairment within 2 weeks including:
  - Cognitive evaluation
  - Screen for depression
  - Determination of fitness to drive
  - Functional assessment for potential rehabilitation treatment
3.2b Management

- All patients with transient ischemic attack or minor stroke not on an antiplatelet agent at the time of presentation should be started on antiplatelet therapy immediately after brain imaging has excluded intracranial hemorrhage.
  - The initial dose of ASA should be at least 160 mg.
  - The loading dose for clopidogrel is 300mg.
3.2b Management

- Patients with transient ischemic attack or minor stroke and >70% carotid stenosis and select patients with acutely symptomatic 50-56% carotid stenosis on the side implicated by their neurological symptoms, who are otherwise candidates for carotid revascularization, should have carotid endarterectomy performed as soon as possible within 2 weeks.
Carotid Artery Disease

Illustration of Carotid Artery Stenosis

http://www.musc.edu/intrad/procedures/cad.shtml
Computerized Tomography Imaging and Angiogram

http://www.musc.edu/intrad/procedures/cad.shtml
3.2b Management

- Patients with TIA or minor stroke and atrial fibrillation should begin anticoagulation using warfarin immediately after brain imaging has excluded intracranial hemorrhage, aiming for a therapeutic INR 2 to 3.

- All risk factors for cerebrovascular disease must be aggressively managed both with pharmacological and non-pharmacological means to achieve optimal control.

- Patients with TIA or minor stroke who smoke cigarettes should be strongly counseled to quit immediately and be provided with both pharmacological and non-pharmacological strategies.
System Implications

- Processes and protocols in place to enable patients with TIA or minor stroke to rapidly access services
- Physicians have training and knowledge to manage patients
- Stroke prevention clinics are accessible
Selected Performance Measures

- Recurrence of stroke or transient ischemic attack within:
  - 30 days
  - 90 days
  - 1 year

- Time from first encounter with medical care (primary care or emergency department) to neurological assessment by a stroke expert

- Time from first encounter with medical care to brain imaging (CT/MRI) and other vascular imaging
3.3. Neurovascular Imaging

All patients with suspected acute stroke or transient ischemic attack should undergo brain imaging immediately

- The initial modality of choice is a non-contrast Computed Tomography scan
- Vascular Imaging should be done as soon as possible to better understand the cause of the stroke event and to guide management
  - Imaging includes: CTA, MRA, catheter angiography and duplex ultrasound
3.3 Neurovascular Imaging

- If MRI is performed, it should include diffusion-weighted sequences to detect ischemia and gradient echo and FLAIR sequences to determine extent of infarct or presence of hemorrhage.
- Carotid imaging should be performed within 24 hours of a carotid territory transient ischemic attack or non-disabling ischemic stroke (if not done as part of the original assessment) unless the patient is clearly not a candidate for carotid endarterectomy.
3.3 Neurovascular Imaging

- In children, if the initial CT is negative, MRI should be performed to assist diagnosis and management plans.
- In pediatric cases, cerebral and cervical arteries should be imaged as soon as possible, preferably within 24 hours.
System Implications

- Initial assessment performed by experienced clinicians
- Timely access to diagnostic services
- Organized system of care across regions to ensure timely access to diagnostic services if not available at the initial hospital
Selected Performance Measures

- Proportion of stroke patients who receive a brain CT/MRI within 25 minutes of hospital arrival (if tPA eligible)
- Proportion of stroke patients who receive a brain CT/MRI within 24 hours of hospital arrival
- Proportion of stroke patients who receive carotid imaging prior to hospital discharge
- Proportion of patients who do not undergo carotid imaging in hospital who have an appointment booked before discharge for carotid imaging as an outpatient
3.4 Blood Glucose Abnormalities

All patients with suspected acute stroke should have their blood glucose concentration checked immediately.

- Blood glucose measurement should be repeated if the first value is abnormal or if the patient is known to have diabetes
- Elevated blood glucose concentrations should be treated with glucose lowering agents
Selected Performance Measures

- Proportion of patients with blood glucose levels documented during assessment in the emergency department or on the inpatient ward.
- Proportion of patients with known diabetes who have blood glucose levels in therapeutic range for that patient.
3.5 Acute Thrombolytic Therapy

All patients with disabling acute ischemic stroke who can be treated within 4.5 hours after symptom onset should be evaluated without delay to determine their eligibility for treatment with intravenous tissue plasminogen activator (alteplase).

- Eligible patients are those who can receive intravenous alteplase within 4.5 hours of the onset of stroke symptoms in accordance with criteria adapted from the NINDS rt-PA Stroke Study and ECASSIII.
3.5 Acute Thrombolytic Therapy

- All eligible patients should receive tPA within one hour of hospital arrival.
- Administration of alteplase should follow the American Stroke Association guidelines.
- In cases where the initial CT shows greater than 1/3 MCA (ASPECTS score < 5), physician judgment and wishes of the patient/family are important considerations in the decision to treat with alteplase.
- For pediatric patients, tPA should only be considered within a clinical research protocol.
- Note: in Canada, alteplase is currently approved by Health Canada for use in adults with acute ischemic stroke within 3 hours of symptom onset (Dec. 2008).
Selected Performance Measures

- Proportion of all *ischemic* stroke patients who receive treatment with alteplase
- Proportion of all *eligible* ischemic stroke patients who receive treatment with alteplase
- Proportion of all thrombolysed stroke patients who receive alteplase within 1 hour of hospital arrival
- Median time from patient arrival in the ED to administration of alteplase (in minutes)
- Proportion of patients in rural or remote communities who receive alteplase through use of telestroke technology
3.6 Acute ASA Therapy

All acute stroke patients should be given at least 160mg of acetylsalicylic acid (ASA) immediately as a one time loading dose after brain imaging has excluded intracranial hemorrhage.

- In patients treated with t-PA, ASA should be delayed until after the 24 hour post-thrombolysis scan has excluded intracranial hemorrhage.

- ASA (80-325 mg daily) should then be continued indefinitely or until an alternative antithrombotic regime is started.
3.6 Acute Aspirin Therapy

- In dysphagic patients, ASA may be given by enteral tube or by rectal suppository.
- In pediatric patients, initial treatment with low molecular weight heparin should be considered and continued until vertebral artery dissection and intracardiac thrombus is excluded. If neither is present, switch to acute aspirin therapy at dose of 3-5 mg/kg.
Selected Performance Measures

- Proportion of ischemic stroke patients who receive acute ASA therapy within the first 48 hours following a stroke event
- Median time from stroke onset to administration of first dose of ASA in hospital
3.7 Management of Subarachnoid and Intracerebral Hemorrhage

- Patients with suspected subarachnoid hemorrhage should have an urgent neurosurgical consultation for diagnosis and treatment.
- Patients with cerebellar hemorrhage should have an urgent neurosurgical consultation for consideration of craniotomy and evaluation of the hemorrhage.
- Patients with supratentorial intracerebral hemorrhage should be cared for on a stroke unit.
Selected Performance Measures

- Proportion of hemorrhagic stroke patients treated in an acute stroke unit
- Proportion of total time in hospital spent on an acute stroke unit
- **Percentage of hemorrhagic stroke patients who receive a neurosurgical consult while in hospital**
- Proportion of hemorrhagic stroke patients discharged to their place of residence, inpatient stroke rehabilitation, complex continuing care or long-term care
- Mortality rate for subarachnoid and intracerebral hemorrhage at 30 days in hospital
Implementation Tips

- Form a working group - consider both local and regional representation
- Assess current practices using the Canadian Best Practice Recommendations for Stroke Care Update (2008) Gap Analysis Tool
- Identify strengths, challenges, opportunities
- Identify 2-3 priorities for action
- Identify local and regional champions
Implementation Tips

- Identify professional education needs and develop a professional education learning plan
- Consider local or regional workshops to focus on acute stroke management
- Access resources such as Heart and Stroke Foundation, Provincial Contacts
- Consult with other strategies for lessons learned, resources
Coordination of stroke care makes a difference ...

You're doing well, Jim. If we hadn't been able to get that clot-busting drug into you when we did, we might not be seeing this kind of recovery.

Your balance is better, the physio is helping to get your legs working again.

And... the movement you've regained in your hands is remarkable!

I'm speechless!
Resources

- American Association of Neuroscience Nurses
  - [http://www.aann.org](http://www.aann.org)
- American Stroke Association
  - [http://www.strokeassociation.org](http://www.strokeassociation.org)
- Brain Attack Coalition
  - [http://www.stroke-site.org](http://www.stroke-site.org)
- Canadian Association of Neuroscience Nurses
  - [www.cann.ca](http://www.cann.ca)
- Canadian Hypertension Education Program
- Canadian Stroke Strategy
  - [www.canadianstrokestrategy.ca](http://www.canadianstrokestrategy.ca)
- European Stroke Initiative
  - [http://www.eusi-stroke.com](http://www.eusi-stroke.com)
Resources

- Heart and Stroke Foundation
  - www.heartandstroke.ca/profed
- Heart and Stroke Foundation of Canada
  - http:ww2.heartandstroke.ca/Page.asp?PageID=24
- Internet Stroke Centre
  - http://www.strokecenter.org
- National Institute of Neurological Disorders and Stroke
- National Stroke Association
  - http://www.stroke.org/site/PageServer?pagename=HOME
- Scottish Intercollegiate Guidelines Network
  - http://www.sign.ac.uk
- StrokeEngine
  - http://www.medicine.mcgill.ca/strokengine
www.canadianstrokestrategy.ca
www.cmaj.ca
http://heartandstroke.ca/profed