



Best Practice Recommendations and Performance Measures

*A supplement to the Canadian Stroke Strategy
Canadian Best Practices Recommendations for Stroke Care
(Update 2008)
Full Publication: CMAJ.ca (December 2nd, 2008)*

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
1: Public Awareness and Patient Education		
1.1: Public awareness and responsiveness	<p>All members of the public should be able to recognize and identify the signs and symptoms of stroke, which include sudden weakness, sudden trouble speaking, sudden vision problems, sudden headache, sudden dizziness (Box 1).</p> <ul style="list-style-type: none"> i. Public education on stroke should emphasize that stroke is a medical emergency, and that immediate medical attention should be sought. All members of the public should know to take the appropriate actions – that is, to call 9-1-1 or their local emergency number [Evidence Level B] ii. Public education should include information that stroke can affect persons of any age – from newborn and children to adults [Evidence Level C] 	<ul style="list-style-type: none"> i. Proportion of the population that can name two or more stroke symptoms. ^{c1} ii. Proportion of the population that can name the three dominant stroke symptoms – sudden weakness, trouble speaking, vision problems. iii. Median time from stroke symptom onset to presentation at an emergency department. ^c iv. Proportion of patients who seek medical attention within 4 hours of stroke symptom onset v. Proportion of emergency medical service (EMS) providers trained in stroke recognition and use of stroke triage algorithms for prioritizing stroke cases for transport within regions. vi. Proportion of the population with a family member who has had a stroke or transient ischemic attack who can name two or more signs and symptoms of stroke
1.2: Patient and family education	<p><i>Note:</i> Patient, family and caregiver education is an integral part of stroke care that should be addressed at <i>all stages across the continuum of stroke care</i> for both adult and pediatric patients. Education includes the transfer of information and skills, and may include additional training components as required to transfer skills for self/patient management for both adult and pediatric stroke patients and their families.</p> <p>Education that is integrated and coordinated should be provided in a timely manner</p>	<ul style="list-style-type: none"> i. Proportion of stroke patients with documentation of education provided for patient, family, and/or caregivers at each stage throughout the continuum of stroke management and recovery. ii. Total time spent on patient/family education during a healthcare encounter for stroke.

¹ The superscript ‘c’ following a recommended performance measure indicates that the performance measure is part of the CSS Core set of stroke performance measures identified at the CSS Information and Evaluation consensus meeting, 2005. Performance measures highlighted in BOLD style are the first line indicators for the associated best practice.

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>across the continuum of stroke care for all patients with stroke or at risk of stroke, as well as their families and caregivers.</p> <ul style="list-style-type: none"> i. Educational content should be specific to the phase of care or recovery across the continuum of stroke care and appropriate to patient, family, and caregiver readiness and needs [Evidence Level B]. ii. The scope of the educational content should cover all aspects of care and recovery, including: the nature of stroke and its manifestations, signs and symptoms; impairments and their impact and management, including caregiver training; risk factors; post-stroke depression; cognitive impairment; discharge planning and decision making; community resources, services, and support programs; and environmental adaptations and benefits [Evidence Level A]. iii. Education should be interactive, timely, up to date, provided in a variety of languages and formats (written, oral, aphasia friendly, group counselling approach), and specific to patient, family, and caregiver needs and impairments. The provision of education should ensure communicative accessibility for stroke survivors [Evidence Level B]. iv. Clinicians and/or teams should develop processes for routine patient, caregiver, and family education in which designated team members are responsible for provision and documentation of education [Evidence Level C]. 	
2: Prevention of stroke		
<p>2.1: Lifestyle and risk factor management</p>	<p>Persons at risk of stroke and patients who have had a stroke should be assessed for vascular disease risk factors and lifestyle management issues (diet, sodium intake, exercise, weight, smoking and alcohol intake). They should receive information and counselling about possible strategies to modify their lifestyle and risk factors [Evidence Level B].</p> <p>Lifestyle and risk factor interventions should include:</p> <ul style="list-style-type: none"> i. <i>Healthy balanced diet:</i> High in fresh fruits, vegetables, low-fat dairy products, dietary and soluble fibre, whole grains and protein from plant sources and low in saturated fat, cholesterol and sodium, in accordance with Canada's Food Guide to Healthy Eating [Evidence Level B]. ii. <i>Sodium:</i> The recommended daily sodium intake from all sources is the 	<ul style="list-style-type: none"> i. The proportion of the population who have identified risk factors for stroke including: hypertension, obesity, history of smoking, low physical activity, hyperlipidemia, diabetes mellitus, atrial fibrillation. ^c ii. The annual occurrence of stroke in each province and territory by stroke type. ^c iii. Proportion of the population who can identify the major risks for stroke, including hypertension, sodium intake, diet, weight, exercise, smoking, and alcohol intake. iv. Proportion of people who are aware of the healthy targets for each stroke risk factor.

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>Adequate Intake by age. For persons 9-50 years, the Adequate Intake is 1500 mg. Adequate Intake decreases to 1300 mg for persons 50-70 years and to 1200 mg for persons > 70 years. A daily upper consumption limit of 2300 mg should not be exceeded by any age group [Evidence Level B].</p> <p>iii. <i>Exercise:</i> Moderate exercise (an accumulation of 30 to 60 min) of walking (ideally brisk walking), jogging, cycling, swimming or other dynamic exercise 4 to 7 days each week in addition to routine activities of daily living Medically supervised exercise programs for high-risk patients (e.g., those with cardiac disease) [Evidence Level A].</p> <p>iv. <i>Weight:</i> Maintain goal of a body mass index (BMI) of 18.5 to 24.9 kg/m² and a waist circumference of <88cm for women and <102 cm for men [Evidence Level B].</p> <p>v. <i>Smoking:</i> Smoking cessation and a smoke-free environment; nicotine replacement therapy and behavioural therapy [Evidence Level B]. For nicotine replacement therapy, nortriptyline therapy, nicotine receptor partial agonist therapy and/or behavioural therapy should be considered [Evidence Level A].</p> <p>vi. <i>Alcohol consumption:</i> Two or fewer standard drinks per day; and fewer than 14 drinks per week for men; and fewer than 9 drinks per week for women [Evidence Level C].</p>	<p>v. Stroke mortality rates across provinces and territories, including in-hospital or 30 day, and one-year^s</p>
<p>2.2: Blood pressure management</p>	<p>Hypertension is the single most important modifiable risk factor for stroke. Blood pressure should be monitored in all persons at risk for stroke.</p> <p>2.2a. Blood pressure assessment</p> <p>i. All persons at risk of stroke should have their blood pressure measured at each health care encounter, but no less than once annually [Evidence Level C].</p> <p>ii. Proper standardized techniques, as described by the Canadian Hypertension Education Program should be followed for blood pressure measurement (CHEP).</p> <p>iii. Patients found to have elevated blood pressure should undergo thorough assessment for the diagnosis of hypertension following the current guidelines of the Canadian Hypertension Education Program [Evidence Level A].</p> <p>iv. Patients with hypertension or at risk for hypertension should be advised on lifestyle modifications [Evidence Level C]. Refer to recommendations</p>	<p>i. Proportion of persons at risk for stroke who had their blood pressure measured at their last healthcare encounter.</p> <p>ii. Proportion of the population who are aware of hypertension and the risks of high blood pressure.</p> <p>iii. Proportion of the population who have diagnosed elevated blood pressure (hypertension).</p> <p>iv. Proportion of the population with known hypertension who are on blood-pressure lowering therapy.</p> <p>v. Proportion of the population with hypertension who are being treated and have achieved control of their blood pressure within defined targets (as per CHEP guidelines).</p>

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>2.1, "Lifestyle and risk factor management," for details on lifestyle modifications.</p> <p>2.2b. Blood pressure management</p> <p>i. The Canadian Stroke Strategy recommends target blood pressure levels as defined by the Canadian Hypertension Education Program (CHEP) guidelines for prevention of first stroke, recurrent stroke, and other vascular events. See "Rationale," below, for additional information.</p> <p>CHEP 2008 recommendations for management of blood pressure (excerpts used with permission: see www.hypertension.ca/chep for detailed information):</p> <ul style="list-style-type: none"> • For the prevention of first stroke in the general population the systolic blood pressure treatment goal is a pressure level of less than 140 mm Hg [Evidence Level C]. The diastolic blood pressure treatment goal is a pressure of less than 90 mm Hg [Evidence Level A]. • Blood pressure lowering treatment is recommended for patients who have had a stroke or transient ischemic attack to a target of less than 140/90 mm Hg [Evidence Level C]. • In patients who have had a stroke, treatment with an angiotensin-converting enzyme (ACE) inhibitor or diuretic is preferred [Evidence Level B]. • Blood pressure lowering treatment is recommended for the prevention of first or recurrent stroke in patients with diabetes to attain systolic blood pressures of less than 130 mm Hg [Evidence Level C] and diastolic blood pressures of less than 80 mm Hg [Evidence Level A]. • Blood pressure lowering treatment is recommended for the prevention of first or recurrent stroke in patients with nondiabetic chronic kidney disease to attain a blood pressure of less than 130/80 mm Hg [Evidence Level C] <p>ii. Randomized controlled trials have not defined the optimal time to initiate blood pressure lowering therapy after stroke or transient ischemic attack.</p>	<p>vi. Proportion of stroke and transient ischemic attack patients who have received a prescription for blood pressure lowering agents on discharge from acute care.</p> <p>vii. Proportion of stroke and transient ischemic attack patients who have received a prescription for blood pressure lowering agents after assessment in a secondary prevention clinic.</p>

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>It is recommended that blood pressure lowering treatment be initiated (or modified) before discharge from hospital. For patients with nondisabling stroke or transient ischemic attack not requiring hospitalization, it is recommended that blood pressure lowering treatment be initiated (or modified) at the time of the first medical assessment [Evidence Level B].</p> <p>iii. For recommendations on specific agents and sequence of agents, please refer to the current Canadian Hypertension Education Program guidelines.</p>	
<p>2.3: Lipid management</p>	<p>2.3a. Lipid assessment</p> <ul style="list-style-type: none"> i. Fasting lipid levels (total cholesterol, total glycerides, low-density-lipoprotein [LDL] cholesterol, high-density-lipoprotein [HDL] cholesterol) should be measured every 1 to 3 years for all men 40 years or older and for women who are postmenopausal and/or 50 years or older [Evidence Level C]. More frequent testing should be performed for patients with abnormal values or if treatment is initiated. ii. Adults at any age should have their blood lipid levels measured if they have a history of diabetes, smoking, hypertension, obesity, ischemic heart disease, renal vascular disease, peripheral vascular disease, ischemic stroke, transient ischemic attack, or asymptomatic carotid stenosis [Evidence Level C]. <p>2.3b. Lipid management</p> <ul style="list-style-type: none"> i. Ischemic stroke patients with LDL cholesterol of >2.0 mmol/ L should be managed with lifestyle modification and dietary guidelines [Evidence Level A]. ii. Statin agents should be prescribed for most patients who have had an ischemic stroke or transient ischemic attack to achieve current recommended lipid levels [Evidence Level A]. 	<ul style="list-style-type: none"> i. Proportion of the population who report that they have elevated lipid levels, especially low-density lipoprotein. ii. Proportion of stroke patients prescribed lipid-lowering agents for secondary prevention of stroke – either at discharge from acute care, through a secondary prevention clinic or by primary care. iii. Proportion of stroke patients with an LDL-C between 1.8 – 2.5 mmol/L at 3 months following stroke event. iv. Proportion of stroke patients with an LDL-C < 2.0 mmol/L at 3 months following stroke event. v. Proportion of stroke patients with an LDL-C > 2.0 mmol/L at 3 months following stroke event.
<p>2.4: Diabetes management</p>	<p>2.4a. Diabetes assessment</p> <ul style="list-style-type: none"> i. All individuals in the general population should be evaluated annually for type 2 diabetes risk on the basis of demographic and clinical criteria [Evidence Level C] ii. A fasting plasma glucose should be performed every 3 years in individuals > 40 years of age to screen for diabetes [Evidence Level C]. More frequent and/or earlier testing with either a fasting plasma glucose or plasma glucose sample drawn 2 hours after a 75-g oral glucose load should be considered in people with additional risk factors for diabetes [Evidence Level C]. Some of these risk factors include family history, high risk population, vascular disease, 	<ul style="list-style-type: none"> i. Proportion of the population with a confirmed diagnosis of diabetes mellitus (Type 1 and Type II) ii. Proportion of persons with diabetes mellitus presenting to hospital with a new stroke event. iii. Proportion of patients who present to hospital with a stroke who receive a subsequent diagnosis of diabetes mellitus while in hospital for stroke care.

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>history of gestational diabetes, hypertension, dyslipidemia, overweight, abdominal obesity, polycystic ovary syndrome.</p> <ul style="list-style-type: none"> iii. In adults, fasting lipid levels (total cholesterol, HDL cholesterol, total glycerides and calculated LDL cholesterol) should be measured at the time of diagnosis of diabetes and then every 1 to 3 years as clinically indicated. More frequent testing should be performed if treatment for dyslipidemia is initiated [Evidence Level C]. iv. Blood pressure should be measured at every diabetes visit [Evidence Level C]. <p>2.4b. Diabetes management</p> <ul style="list-style-type: none"> i. Glycemic targets must be individualized; however, therapy in most patients with type 1 or type 2 diabetes should be targeted to achieve a glycated haemoglobin (Hb_{A1C}) level ≤7.0% in order to reduce the risk of microvascular [Evidence Level A] and, in individuals with type 1 diabetes, macrovascular complications [Evidence Level C]. ii. To achieve an Hb_{A1C} ≤7.0%, patients with type 1 or type 2 diabetes should aim for a fasting plasma glucose or preprandial plasma glucose targets of 4.0 to 7.0 mmol/L [Evidence Level B]. iii. The 2-hour postprandial plasma glucose target is 5.0 to 10.0 mmol/L [Evidence Level B]. If Hb_{A1C} targets cannot be achieved with a postprandial target of 5.0- 10.0 mmol/L, further postprandial blood glucose lowering, to 5.0 – 8.0 mmol/L, can be considered [Evidence Level C]. iv. Adults at high risk of a vascular event should be treated with a statin to achieve an LDL cholesterol ≤2.0 mmol/L [Evidence Level A]. v. Unless contraindicated, low dose acetylsalicylic acid (ASA) therapy (80 to 325 mg/day) is recommended in all patients with diabetes with evidence of cardiovascular disease, as well as for those individuals with atherosclerotic risk factors that increase their likelihood of cardiovascular events [Evidence Level A]. 	
<p>2.5: Antiplatelet therapy</p>	<p>All patients with ischemic stroke or transient ischemic attack should be prescribed antiplatelet therapy for secondary prevention of recurrent stroke unless there is an indication for anticoagulation [Evidence Level A]</p> <ul style="list-style-type: none"> i. ASA, combined ASA (25 mg) and extended-release dipyridamole (200 mg), or clopidogrel may be used depending on the clinical circumstances 	<ul style="list-style-type: none"> i. Proportion of ischemic stroke/transient ischemic attack patients prescribed antiplatelet therapy on discharge from acute care. ^c ii. Proportion of stroke/transient ischemic attack patients prescribed antiplatelet therapy on

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>[Evidence Level A].</p> <ul style="list-style-type: none"> ii. For adult patients on ASA, the usual maintenance dosage is 80 to 325 mg per day [Evidence Level A] (CSQCS, VA/DoD), and in children with stroke the usual maintenance dosage of ASA is 3 to 5 mg/kg per day for the prevention of recurrent stroke [Evidence Level C]. iii. Long-term combinations of ASA and clopidogrel are not recommended for secondary stroke prevention [Evidence Level B]. 	<p>discharge from secondary prevention clinic care. ^c</p>
<p>2.6: Antithrombotic therapy in atrial fibrillation</p>	<p>Patients with stroke and atrial fibrillation should be treated with warfarin at a target international normalized ratio of 2.5, range 2.0 to 3.0, (target international normalized ratio of 3.0 for mechanical cardiac valves, range 2.5 to 3.5) [Evidence Level A], if they are likely to be compliant with the required monitoring and are not at high risk for bleeding complications.</p>	<ul style="list-style-type: none"> i. Proportion of eligible stroke and transient ischemic attack patients with atrial fibrillation prescribed anticoagulant therapy on discharge from acute care. ^c ii. Proportion of stroke and transient ischemic attack patients with atrial fibrillation prescribed anticoagulant therapy after a visit to a secondary prevention clinic. ^c iii. Proportion of patients with stroke and atrial fibrillation on aspirin and not prescribed anticoagulant agents. iv. Proportion of patients continuing to comply with warfarin therapy at 3 months, 6 months, and 1 year following initiation of therapy. v. Proportion of patients on warfarin with INR in therapeutic range at 3 months, 6 months, and 1 year following index stroke event.
<p>2.7: Carotid intervention</p>	<p>2.7a Symptomatic carotid stenosis Patients with transient ischemic attack or nondisabling stroke and ipsilateral 70%–99% internal carotid artery stenosis (measured on a catheter angiogram or by 2 concordant non-invasive imaging modalities) should be offered carotid endarterectomy within 2 weeks of the incident transient ischemic attack or stroke unless contraindicated [Evidence Level A].</p> <ul style="list-style-type: none"> i. Carotid endarterectomy is recommended for selected patients with moderate (50% - 69%) symptomatic stenosis, and these patients should be evaluated by a physician with expertise in stroke management [Evidence Level A]. ii. Carotid endarterectomy should be performed by a surgeon with a known 	<ul style="list-style-type: none"> i. Proportion of stroke patients with moderate to severe (70-99%) carotid artery stenosis who undergo a carotid intervention procedure following an index stroke event. ^c ii. Median time from stroke symptom onset to carotid endarterectomy (CEA) surgery. ^C iii. Proportion of stroke patients requiring carotid intervention, who undergo the procedure within two weeks of the index stroke event. iv. Proportion of stroke patients with moderate

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>iii. perioperative morbidity and mortality of < 6% [Evidence Level A]. Carotid stenting may be considered for patients who are not operative candidates for technical, anatomic or medical reasons [Evidence Level A].</p> <p>2.7b. Asymptomatic carotid stenosis Carotid endarterectomy may be considered for selected patients with asymptomatic 60%-99% carotid stenosis.</p> <p>i. Patients should be less than 75 years old with a surgical risk of < 3%, a life expectancy of > 5 years and be evaluated by a physician with expertise in stroke management [Evidence Level A].</p>	<p>carotid stenosis (50-69%) who undergo carotid intervention procedure following the index stroke event.</p> <p>v. Proportion of stroke patients with mild carotid stenosis (<50%) who undergo carotid intervention procedure following the index stroke event.</p> <p>vi. Proportion of CEA patients who experience peri-operative in-hospital stroke, acute myocardial infarction, or death.</p> <p>vii. The 30-day in-hospital post-CEA mortality rates for stroke patients; stratified by carotid occlusion severity.</p> <p>viii. Proportion of patients who undergo CEA within 2 weeks, from 2 – 4 weeks; between 2 weeks and 3 months, and between 3 – 6 months of stroke onset.</p> <p>ix. Proportion of patients who wait > 3 months for CEA or who are cancelled due to long wait times.</p> <p>x. Proportion of patients who experience a subsequent stroke event or death while waiting for CEA.</p>
3: Hyperacute Stroke Management		
<p>3.1: Emergency medical services management of acute stroke patients</p>	<p><i>This recommendation covers management of patients with suspected stroke from the time of first contact with the local emergency medical services to transfer to hospital personnel, as well as care of suspected or confirmed stroke patients who are being transferred between health care facilities by emergency medical services.</i></p> <p><i>This recommendation is directed to paramedics and those individuals who support emergency medical services, including communications officers and dispatchers. It also applies to other first responders (such as emergency medical responders and primary care paramedics) who have received the appropriate training to screen for</i></p>	<p>i. Proportion of suspected stroke patients arriving in the emergency department who were transported by emergency medical services.</p> <p>ii. Time from initial call received by emergency dispatch centre (e.g., 9-1-1 operator) to Emergency Medical Services arrival on patient scene.</p>

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p><i>stroke and manage potential stroke patients during transfer.</i></p> <p>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 [Evidence Level C].</p> <ul style="list-style-type: none"> i. Immediate contact with emergency medical services (e.g., 911) by patients or other members of the public is strongly recommended because it reduces time to treatment for acute stroke [Evidence Level C]. ii. Emergency medical services dispatchers should triage patients exhibiting signs and symptoms of a hyperacute stroke as a priority dispatch [Evidence Level C]. iii. A standardized acute stroke diagnostic screening tool should be used by paramedics (as per the National Occupational Competency Profile[NOCP]) [Evidence Level B]. iv. Out-of-hospital patient management should be optimized to meet the needs of suspected acute stroke patients [Evidence Level A]. v. Direct transfer protocols should be in place to facilitate the transfer of eligible patients to the closest and most appropriate facility providing acute stroke care [Evidence Level C]. vi. Direct transport protocol criteria should be based on: [1] both symptom duration and anticipated transport duration being less than the therapeutic window and/or [2] other acute care needs of the patient [Evidence Level B]. vii. History of event, including time of onset, signs and symptoms, and previous medical and drug history must be obtained from the patient if able and/or informant when available [Evidence Level C]. viii. Paramedics should notify the receiving facility of a suspected acute stroke patient in order for the facility to prepare for patient arrival [Evidence Level C]. ix. Transfer of care from paramedics to receiving facility personnel must occur without delay [Evidence Level C]. 	<ul style="list-style-type: none"> iii. Time from Emergency Medical Services arrival on patient scene of a suspected stroke patient to arrival at an appropriate emergency department. iv. Proportion of suspected stroke patients transported by Emergency Medical Services who received a final diagnosis of stroke or transient ischemic attack during hospital stay (in the emergency department or as an inpatient). v. Number of suspected stroke patients transported by Emergency Medical Services directly to a comprehensive or intermediate stroke centre and who bypass smaller hospitals during transport. vi. Number of suspected stroke patients transported by Emergency Medical Services directly to a comprehensive or intermediate stroke centre where the EMS personnel provided prenotification of transport to the receiving emergency department

Best Practice Guideline	Recommendation Wording	Performance Measures
<p>3.2: Acute management of transient ischemic attack and minor stroke</p>	<p><i>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.</i></p> <p>3.2a Assessment</p> <ul style="list-style-type: none"> i. All patients with suspected transient ischemic attack or minor stroke should have an immediate clinical evaluation and additional investigations as required to establish the diagnosis, rule out stroke mimics and develop a plan of care [Evidence Level B]. ii. Use of a standardized risk stratification tool at the initial point of healthcare contact – whether first seen in primary, secondary or tertiary care – should be used to guide the triage process [Evidence Level B]. See Table 6. Table 7 iii. Patients with suspected transient ischemic attack or minor stroke should be referred to a designated stroke prevention clinic or to a physician with expertise in stroke assessment and management, or if these options are not available, to an emergency department that has access to neurovascular imaging facilities and stroke expertise [Evidence Level B]. iv. Patients with suspected transient ischemic attack or minor stroke require brain imaging with CT or magnetic resonance imaging (MRI). Emergent patients (those patients classified at <i>highest risk</i> of recurrent stroke) should have neurovascular imaging within 24 hours, and patients classified as <i>urgent</i> should have neurovascular imaging within 7 days [Evidence Level B]. v. Patients who may be candidates for carotid revascularisation should have computed tomographic angiography, magnetic resonance angiography, or a carotid duplex ultrasound as soon as possible (within 24 hours for emergent patients, and 7 days for urgent patients) [Evidence Level C]. vi. The following investigations should be undertaken routinely for patients with suspected transient ischemic attack or minor stroke: complete blood count, electrolytes, renal function, cholesterol level, glucose level, and electrocardiography [Evidence Level C]. vii. Patients with suspected transient ischemic attack or minor stroke with confirmed cerebral infarction on brain imaging should undergo a comprehensive outpatient assessment(s) for functional impairment, which 	<ul style="list-style-type: none"> i. Recurrence of stroke or transient ischemic attack within 30 days, 90 days, and one year following an initial stroke-related event. ii. Time from first encounter with medical care (primary care or emergency department) to neurological assessment by a stroke expert (in clinic or other setting). iii. (a) Time from first encounter with medical care to initial brain imaging (CT/MRI); (b) Time from first encounter with medical care to other vascular imaging (cervical arteries, echocardiogram). iv. Proportion of stroke and TIA patients discharged directly from the emergency department who receive a referral to a stroke prevention clinic for ongoing assessment and management.

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>includes a cognitive evaluation, screen for depression, screening of fitness to drive, as well as functional assessments for potential rehabilitation treatment [Evidence Level B], preferably within 2 weeks [Evidence Level C]. Refer to Recommendation 5.1 “Initial stroke rehabilitation assessment,” and recommendation 5.5, “Follow-up and community reintegration,” for further details.</p> <p>3.2b Management</p> <ul style="list-style-type: none"> i. All patients with transient ischemic attack or minor stroke not on an antiplatelet agent at time of presentation should be started on antiplatelet therapy immediately after brain imaging has excluded intracranial hemorrhage [Evidence Level A]. The initial dose of ASA should be at least 160 mg. For clopidogrel the loading dose is 300 mg. Refer to recommendation 2.5, “Antiplatelet therapy,” for details on long-term antiplatelet therapy. ii. Patients with transient ischemic attack or minor stroke and >70% carotid stenosis and select patients with acutely symptomatic 50%-69% carotid stenosis on the side implicated by their neurologic symptoms, who are otherwise candidates for carotid re-vascularization, should have carotid endarterectomy performed as soon as possible, within 2 weeks [Evidence Level A]. Refer to recommendation 2.7, “Carotid intervention,” for additional details. iii. Patients with transient ischemic attack or minor stroke and atrial fibrillation should begin anticoagulation using warfarin immediately after brain imaging has excluded intracranial hemorrhage, aiming for a target therapeutic international normalized ratio 2 to 3 [Evidence Level A]. Refer to recommendation 2.6, “Antithrombotic therapy in atrial fibrillation,” for additional details. iv. All risk factors for cerebrovascular disease must be aggressively managed, through both pharmacologic and nonpharmacologic means, to achieve optimal control [Evidence Level A]. While evidence for the benefit of modifying individual risk factors in the acute phase is lacking, there is evidence of benefit when adopting a comprehensive approach, including antihypertensives and statin medication (EXPRESS). Refer to recommendations 2.2, “Blood pressure management,” and 2.3, “Lipid 	

Best Practice Guideline	Recommendation Wording	Performance Measures
	<p>management,” for additional details.</p> <p>v. Patients with transient ischemic attack or minor stroke who smoke cigarettes should be strongly counselled to quit immediately, and be provided with the pharmacologic and nonpharmacologic means to do so [Evidence Level B]. Refer to section 2, “Prevention of stroke,” for additional details.</p>	
<p>3.3: Neurovascular imaging</p>	<p><i>Note: This recommendation on neurovascular imaging has been developed by combining 2 separate recommendations from the 2006 edition of Canadian Best Practice Recommendations for Stroke Care: brain imaging and carotid imaging.</i></p> <p>All patients with suspected acute stroke or transient ischemic attack should undergo brain imaging immediately [Evidence Level A].</p> <ul style="list-style-type: none"> i. In most instances, the initial modality of choice is a non-contrast CT scan [Evidence Level B]. ii. Vascular imaging should be done as soon as possible to better understand the cause of the stroke event and guide management decisions. Vascular imaging may include CT angiography, magnetic resonance angiography, catheter angiography and duplex ultrasonography [Evidence Level B]. iii. If MRI is performed, it should include diffusion-weighted sequences to detect ischemia and gradient echo and fluid-attenuated inversion recovery (FLAIR) sequences to determine extent of infarct or presence of hemorrhage [Evidence Level B]. iv. In children, if the initial CT is negative, MRI should be performed to assist with diagnosis and management plans [Evidence Level B]. v. 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 [Evidence Level B]. vi. In pediatric cases, cerebral and cervical arteries should be imaged as soon as possible, preferably within 24 hours [Evidence Level C]. 	<ul style="list-style-type: none"> i. Proportion of stroke patients who receive a brain CT/MRI within 25 minutes of hospital arrival. ** This measure is relevant for potentially eligible tPA patients only and otherwise not relevant ii. Proportion of stroke patients who receive a brain CT/MRI within 24 hours of hospital arrival. iii. Proportion of all stroke patients who receive a brain CT/MRI prior to hospital discharge. ^c iv. Proportion of stroke patients who receive carotid imaging prior to hospital discharge. v. Proportion of patients who do not undergo carotid imaging in hospital who have an appointment booked before discharge for carotid imaging as an outpatient. vi. Median time from stroke symptom onset to carotid imaging.
<p>3.4: Blood glucose abnormalities</p>	<p>All patients with suspected acute stroke should have their blood glucose concentration checked immediately.</p> <ul style="list-style-type: none"> i. Blood glucose measurement should be repeated if they first value is abnormal or if the patient is known to have diabetes. Hypoglycemia should 	<ul style="list-style-type: none"> i. Proportion of patients with blood glucose levels documented during assessment in the emergency department or on the inpatient ward.

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	ii. be corrected immediately [Evidence Level B]. Elevated blood glucose concentrations should be treated with glucose-lowering agents [Evidence Level B]	ii. Proportion of patients with known diabetes mellitus who have blood glucose levels in therapeutic range for that patient.
3.5: Acute thrombolytic therapy	<p>All patients with disabling acute ischemic stroke who can be treated within 4.5 hours after symptom onset should be evaluated <i>without delay</i> to determine their eligibility for treatment with intravenous tissue plasminogen activator (alteplase).</p> <ul style="list-style-type: none"> i. 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 National Institute of Neurological Disorders and Stroke (NINDS) rt-PA Stroke Study and the Third European Cooperative Acute Stroke Study (ECASS III) (see Box 3) [Evidence Level A]. ii. All eligible patients should receive intravenous alteplase within 1 hour of hospital arrival (door-to-needle time <60 minutes) [Evidence Level C]. iii. Administration of alteplase should follow the American Stroke Association guidelines: total dose 0.9 mg/kg with 10% (0.09 mg/kg) given as intravenous bolus over 1 minute and the remaining 90% (0.81 mg/kg) given as an intravenous infusion over 60 minutes [Evidence Level A]. iv. Features on the initial CT brain scan of an otherwise alteplase-eligible ischemic stroke patient that modify the response to treatment remain poorly defined. Some of the trials of alteplase excluded patients with severe hemispheric stroke if the initial CT scan showed early signs of infarction involving more than one-third of the territory of the middle cerebral artery (i.e., a score of less than 5 on the Alberta Stroke Program Early CT Score [ASPECTS]). In clinical practice, the decision to treat such a patient with alteplase should be based on the clinical judgment of the treating physician, and the wishes of the patient and family, until such time as additional data from randomized controlled trials are made available [Evidence Level B]. v. There remain situations where there are sparse or no clinical trial data to support the use of thrombolytic therapy: pediatric stroke, stroke in patients over the age of 80 years, adults who present within the first few hours of onset of an acute ischemic stroke but do not meet current criteria for treatment with intravenous alteplase, and intra-arterial thrombolysis. In clinical practice, the decision to use alteplase in these situations should be based on the clinical judgment of the treating physician, and the wishes of 	<ul style="list-style-type: none"> i. Proportion of all ischemic stroke patients who receive acute thrombolytic therapy (tPA). ^c ii. Median time from patient arrival in the emergency department to administration of acute thrombolytic agent (in minutes). iii. Proportion of all thrombolysed ischemic stroke patients who receive acute thrombolytic therapy (tPA) within one hour of hospital arrival. ^c iv. Proportion of patients in rural or remote communities who receive thrombolysis through the use of telemedicine/ telestroke technologies (as a proportion of all ischemic stroke cases in that community, and as a proportion of all telestroke consults for ischemic stroke cases). v. Proportion of patients with symptomatic secondary intracerebral hemorrhage following acute thrombolysis.

Best Practice Guideline	Recommendation Wording	Performance Measures
	<p>the patient and family, until such time as additional data from randomized controlled trials are made available [Evidence Level A].</p> <p><i>Note: In Canada, alteplase is currently approved by Health Canada for use in adults with acute ischemic stroke within 3 hours after the onset of stroke symptoms. Exemptions may apply; e.g., a "Letter of No Objection" from Health Canada is required for clinical trials examining the use of intravenous alteplase for other treatment protocols.</i></p>	
<p>3.6: Acute ASA therapy</p>	<p>All acute stroke patients should be given at least 160 mg of ASA immediately as a one-time loading dose after brain imaging has excluded intracranial hemorrhage [Evidence Level A].</p> <ul style="list-style-type: none"> i. In patients treated with recombinant tissue plasminogen activator, ASA should be delayed until after the 24-hour post-thrombolysis scan has excluded intracranial hemorrhage [Evidence Level A]. ii. ASA (80-325 mg daily) should then be continued indefinitely or until an alternative antithrombotic regime is started [Evidence Level A]. Refer to recommendations 2.5, "Antiplatelet therapy," and 2.6, "Antithrombotic therapy in atrial fibrillation," for further details on antiplatelet therapy and anticoagulation. iii. In dysphagic patients, ASA may be given by enteral tube or by rectal suppository [Evidence Level A]. iv. 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 ASA therapy at dose of 3-5 mg/kg should be used [Evidence Level A]. 	<ul style="list-style-type: none"> i. Proportion of ischemic stroke and TIA patients who receive acute aspirin therapy within the first 48 hrs following a stroke event. ii. Median time from stroke onset to administration of first dose of aspirin in hospital.
<p>3.7 Management of subarachnoid and intracerebral hemorrhage</p>	<ul style="list-style-type: none"> i. Patients with suspected subarachnoid hemorrhage should have an urgent neurosurgical consultation for diagnosis and treatment [Evidence Level B]. ii. Patients with cerebellar hemorrhage should have an urgent neurosurgical consultation for consideration of craniotomy and evacuation of the hemorrhage [Evidence Level C]. iii. Patients with supratentorial intracerebral hemorrhage should be cared for on a stroke unit [Evidence Level B]. 	<ul style="list-style-type: none"> i. Proportion of hemorrhagic stroke patients treated on an acute stroke unit. ii. Proportion of total time in hospital spent on an acute stroke unit. iii. Proportion of hemorrhagic stroke patients who receive a neurosurgical consult while in hospital. iv. Proportion of patients with hemorrhagic stroke who are discharged to: their place of residence, or inpatient stroke rehabilitation,

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
		or Complex Continuing Care, or Long Term Care following hospital discharge. v. 30-days in hospital mortality rate for subarachnoid and intracerebral hemorrhage.
4: Acute Inpatient Stroke Care		
4.1: Stroke unit care	Patients admitted to hospital because of an acute stroke or transient ischemic attack should be treated in an interdisciplinary stroke unit [Evidence Level A]. <ul style="list-style-type: none"> i. A stroke unit is a specialized, geographically defined hospital unit dedicated to the management of stroke patients [Evidence Level A]. ii. The core interdisciplinary team should consist of people with appropriate levels of expertise in medicine, nursing, occupational therapy, physiotherapy, speech-language pathology, social work and clinical nutrition. Additional disciplines may include pharmacy, (neuro)psychology and recreation therapy [Evidence Level B]. iii. The interdisciplinary team should assess patients within 48 hours of admission and formulate a management plan [Evidence Level C]. iv. Clinicians should use standardized, valid assessment tools to evaluate the patient's stroke-related impairments and function status [Evidence Level B]. v. Any child admitted to hospital with stroke should be managed in a centre with pediatric stroke expertise and/or managed using standardized pediatric stroke protocols [Evidence Level B]. 	<ul style="list-style-type: none"> i. Number of stroke patients treated on a stroke unit at any time during their in-patient hospital stay for an acute stroke event as a Proportion of total number of stroke patients admitted to hospital. ^c ii. Proportion of total time in hospital for an acute stroke event spent on a stroke unit. iii. Proportion of stroke patients discharged to their home or place of residence following an inpatient admission for stroke. iv. Proportion increase Telehealth/ telestroke coverage to remote communities to support organized stroke care across the continuum
4.2: Components of acute inpatient care	<p><i>Risk for venous thromboembolism, temperature, mobilization, continence, nutrition, and oral care should be addressed in all hospitalized stroke patients. Appropriate management strategies should be implemented for areas of concern identified during screening. Discharge planning should be included as part of the initial assessment and ongoing care of acute stroke patients.</i></p> <p>4.2a Venous Thrombo-Embolic Prophylaxis All stroke patients should be assessed for their risk of developing venous thromboembolism (including deep vein thrombosis and pulmonary embolism).</p> <p>Patients considered as high risk include patients with inability to move one or both lower limbs and those patients unable to mobilize independently.</p> <ul style="list-style-type: none"> i. Patients who are identified as high risk for venous thromboembolism should 	<ul style="list-style-type: none"> i. Proportion of stroke patients admitted to hospital who experience any post-stroke complication while in hospital. ii. Length of stay for stroke patients admitted to hospital and discharged alive. iii. 30-day in-hospital mortality rate for all admitted stroke patients. iv. Proportion of admitted stroke patients prescribed venous thrombo-embolism prophylaxis while in hospital v. Proportion of patients with a documented elevated temperature during hospital stay who are treated with antipyretics in hospital

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>be considered for prophylaxis provided there are no contraindications [Evidence Level B].</p> <ul style="list-style-type: none"> ii. Early mobilization and adequate hydration should be encouraged with all acute stroke patients to help prevent venous thromboembolism [Evidence Level C]. iii. The use of secondary stroke prevention measures, such as antiplatelet therapy, should be optimized in all stroke patients [Evidence Level A]. iv. The following interventions may be used for patients with acute ischemic stroke at high risk of venous thromboembolism in the absence of contraindications: <ul style="list-style-type: none"> a. low molecular weight heparin (with appropriate prophylactic doses per agent) or heparin in prophylactic doses (5000 units twice a day) [Evidence Level A] b. external compression stockings [Evidence Level B]. v. For patients with hemorrhagic stroke, nonpharmacologic means of prophylaxis (as described above) should be considered to reduce the risk of venous thromboembolism [Evidence Level C]. <p>4.2b Temperature</p> <ul style="list-style-type: none"> i. Temperature should be monitored as part of routine vital sign assessments (every 4 hours for first 48 hours and then as per ward routine or based on clinical judgment) [Evidence Level C]. ii. For temperature greater than 37.5° C, increase frequency of monitoring and initiate temperature reducing measures [Evidence Level D] iii. Sources of fever should be treated and antipyretic medications should be administered to lower temperature in febrile patients with stroke to < 38° C [Evidence Level B]. iv. In case of fever, the search for a possible infection (site and cause) is recommended, in order to start tailored antibiotic treatment [Evidence Level C]. <p>4.2c Mobilization</p> <p><i>Mobilization is defined as " the act of getting a patient to move in the bed, sit up, stand, and eventually walk"</i></p> <ul style="list-style-type: none"> i. All people admitted to hospital with acute stroke should be mobilized as early and as frequently as possible [Evidence Level B] and preferably within 24 hours of stroke symptom onset, unless contraindicated [Evidence Level C] ii. Within the first 3 days after stroke, blood pressure, oxygen saturation, and heart 	<ul style="list-style-type: none"> vi. Proportion of admitted stroke patients with documentation that they were mobilized within 48 hours of hospital admission. vii. Proportion of admitted stroke patients who have bladder or bowel incontinence concerns identified on screening who have an individualized continence management plan documented and implemented viii. Proportion of admitted stroke patients who have hydration problems or dysphagia identified on screening who are seen by a dietitian within 48 hrs of admission. ix. Proportion of admitted stroke patients who have oral problems identified on screening and receive a referral to dentistry or other oral health professional for ongoing assessment and management

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>rate should be monitored before each mobilization [Evidence Level C].</p> <p>iii. All people admitted to hospital with acute stroke should be assessed by rehabilitation professionals as soon as possible after admission [Evidence Level A], preferably within the first 24 to 48 hours [Evidence Level C]. Refer to Section 5, "Stroke rehabilitation and community reintegration," for related recommendations.</p> <p>4.2d Continence</p> <p>i. All stroke patients should be screened for urinary incontinence and retention (with or without overflow), fecal incontinence, and constipation [Evidence Level C].</p> <p>ii. Stroke patients with urinary incontinence should be assessed by trained personnel using a structured functional assessment [Evidence Level B].</p> <p>iii. The use of indwelling catheters should be avoided. If used, indwelling catheters should be assessed daily and removed as soon as possible [Evidence Level C].</p> <p>iv. A bladder training program should be implemented in patients who are incontinent of urine [Evidence Level C].</p> <p>v. The use of a portable ultrasound is recommended as the preferred non-invasive painless method for assessing post-void residual and eliminates the risk of introducing urinary infection or causing urethral trauma by catheterization [Evidence Level C].</p> <p>vi. A bowel management program should be implemented in stroke patients with persistent constipation or bowel incontinence [Evidence Level A].</p> <p>4.2e Nutrition</p> <p>i. The nutritional and hydration status of stroke patients should be screened within the first 48 hours of admission using a valid nutritional screening tool [Evidence Level B].</p> <p>ii. Results from the screening process should guide appropriate referral to a dietitian for further assessment and the need for ongoing management of nutritional and hydration status [Evidence Level C].</p> <p>iii. Stroke patients with suspected nutritional and/or hydration deficits, including dysphagia, should be referred to a dietitian for:</p> <p style="padding-left: 40px;">i. recommendations to meet nutrient and fluid needs orally while supporting alterations in food texture and fluid consistency</p>	

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>based on the assessment by a speech-language pathologist or other trained professional [Evidence Level C].</p> <ul style="list-style-type: none"> ii. consideration of enteral nutrition support (tube feeding) within 7 days of admission for patients who are unable to meet their nutrient and fluid requirements orally. This decision should be made collaboratively with the multidisciplinary team, the patients, and their caregivers and family [Evidence Level C]. <p><i>Also refer to recommendation 6.1, "Dysphagia assessment," for dysphagia management.</i></p> <p>4.2f. Oral Care</p> <ul style="list-style-type: none"> i. All stroke patients should have an oral/dental assessment, which includes screening for obvious signs of dental disease, level of oral care and appliances, upon or soon after admission [Evidence Level C]. ii. For patients wearing a full or partial denture it must be determined if they have the neuromotor skills to safely wear and use the appliance(s) [Evidence Level C]. iii. An appropriate oral care protocol should be used for every patient with stroke, including those who use dentures [Evidence Level C]. An oral care protocol should address areas including frequency of oral care (twice per day or more), types of oral care products (toothpaste, floss, and mouthwash) and specific management for patients with dysphagia and should be consistent with current recommendations of the Canadian Dental Association [Evidence Level B]. iv. If concerns are identified with implementing an oral care protocol, consider consulting a dentist, occupational therapist, speech language pathologist and/or dental hygienist [Evidence Level C]. v. If concerns are identified with oral health and/or appliances, patients should be referred to a dentist for consultation and management as soon as possible [Evidence Level C]. <p>4.2g Discharge Planning</p> <p>Discharge planning should be initiated as soon as possible after patient admission to hospital (emergency department or inpatient care) [Evidence Level B].</p> <ul style="list-style-type: none"> i. A process should be established to ensure involvement of patients and caregivers in the development of the care plan, management and discharge planning [Evidence Level C]. ii. Discharge planning discussions should be ongoing throughout hospitalization to support a smooth transition from acute care [Evidence 	

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	Level B]. iii. Information about discharge issues and possible needs of patients following discharge should be provided to patients and caregivers soon after admission [Evidence Level C].	
5: Stroke Rehabilitation and Community Reintegration		
5.1: Initial stroke rehabilitation assessment	<p>All persons with stroke should be assessed for their rehabilitation needs.</p> <ul style="list-style-type: none"> i. All people admitted to hospital with acute stroke should have an initial assessment by rehabilitation professionals [Evidence Level A], preferably within the first 24 to 48 hours [Evidence Level C]. ii. All people with acute stroke with any residual stroke-related impairments who are not admitted to hospital should undergo a comprehensive outpatient assessment(s) for functional impairment, which includes a cognitive evaluation, screening for depression, screening of fitness to drive, as well as functional assessment for potential rehabilitation treatment [Evidence Level A], preferably within 2 weeks [Evidence Level C]. iii. Clinicians should use standardized, valid assessment tools to evaluate the patient's stroke-related impairments and functional status [Evidence Level C]. See Table 8 for recommended tools. iv. Survivors of a severe or moderate stroke should be re-assessed at regular intervals for their rehabilitation needs [Evidence Level C]. <p><i>Note: Outpatient rehabilitation includes day hospital, outpatient ambulatory care and home-based rehabilitation</i></p>	<ul style="list-style-type: none"> i. Median time from hospital admission for stroke to initial assessment for rehabilitation potential by each of the rehabilitation disciplines. ^c ii. Proportion of acute stroke patients discharged from acute care to inpatient rehabilitation. ^c iii. Proportion of stroke patients discharged to the community who receive a referral for outpatient rehabilitation prior to discharge from acute care or inpatient rehabilitation (referrals may include either facility-based or community-based programs). iv. Median length of time between referral for outpatient rehabilitation and admission to a facility-based or community stroke rehabilitation program. v. Median length of time between referral for outpatient rehabilitation to commencement of therapy. vi. Proportion of patients with severe stroke reassessed for rehabilitation following initial assessment. vii. Proportion of patients with severe stroke admitted to inpatient rehabilitation within 6 months of stroke onset. viii. Proportion increase in Telehealth/telestroke

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
		coverage to remote communities to support organized stroke care across the continuum and provide rehabilitation assessments for stroke patients.
5.2: Provision of inpatient stroke rehabilitation	<p>All patients with stroke who are admitted to hospital and who require rehabilitation should be treated in a comprehensive or rehabilitation stroke unit by an interdisciplinary team [Evidence Level A].</p> <ul style="list-style-type: none"> i. Post-acute stroke care should be delivered in a setting in which rehabilitation care is formally coordinated and organized [Evidence Level A]. ii. All patients should be referred to a specialist rehabilitation team on a geographically defined unit as soon as possible after admission [Evidence Level A]. Pediatric acute and rehabilitation stroke care should be provided on a specialized pediatric unit [Evidence Level B]. iii. Post-acute stroke care should be delivered by a variety of treatment disciplines, experienced in providing post stroke care, to ensure consistency and reduce the risk of complications [Evidence Level C]. iv. The interdisciplinary rehabilitation team may consist of a physician, nurse, physical therapist, occupational therapist, speech-language pathologist, psychologist, recreation therapist, patient and family/caregivers [Evidence Level A]. For children, this would also include educators and child-life workers. This “core” interdisciplinary team should consist of appropriate levels of these disciplines, as identified by the Stroke Unit Trialists’ Collaboration [Evidence Level B]. v. The interdisciplinary team should assess patients within 24 to 48 hours of admission and develop a comprehensive rehabilitation plan to reflect the severity of the stroke and the needs and goals of the stroke patient [Evidence Level C]. vi. Patients with moderate or severe stroke who are rehabilitation ready and have rehabilitation goals should be given an opportunity to participate in inpatient stroke rehabilitation [Evidence Level A]. vii. Stroke unit teams should conduct at least one formal interdisciplinary meeting per week to discuss the progress and problems, rehabilitation goals, and discharge arrangements for patients on the unit [Evidence Level B]. Individualized rehabilitation plans should be regularly updated based on patient status review [Evidence Level C]. 	<ul style="list-style-type: none"> i. Proportion of patients admitted to a coordinated stroke unit – either a combined acute care and rehabilitation unit, or a rehabilitation stroke unit in an inpatient rehabilitation facility – at any time during their hospital stay (acute and/or rehabilitation). ii. Proportion of total time during inpatient rehabilitation following an acute stroke event that is spent on a rehabilitation stroke unit. iii. Final discharge disposition for stroke survivors following inpatient rehabilitation: including proportion of stroke rehabilitation patients discharged to their original place of residence; to a long term care facility or nursing home; or requiring readmission back to an acute care hospital for stroke related causes. c iv. Number of stroke patients initially assessed by each rehabilitation discipline, including: physiotherapist; occupational therapist; speech language pathologist; social workers, and other relevant specialists during inpatient rehabilitation. v. Frequency, duration, and intensity of therapies received from each relevant rehabilitation professional while in an inpatient rehabilitation setting following stroke. vi. Change in functional status using a standardized

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<ul style="list-style-type: none"> viii. Clinicians should use standardized, valid assessment tools to evaluate the patient’s stroke-related impairments and functional status [Evidence Level B]. See Table 8 for list of tools. ix. Where admission to a stroke rehabilitation unit is not possible, a less optimal solution is inpatient rehabilitation on a mixed rehabilitation unit (i.e. where interdisciplinary care is provided to patients disabled by a range of disorders including stroke) [Evidence Level B]. 	<p>measurement tool, from time of admission to an inpatient rehabilitation unit for stroke patients, to the time of discharge from inpatient rehabilitation.</p>
<p>5.3: Components of inpatient stroke rehabilitation</p>	<p>All patients with stroke should begin rehabilitation therapy as early as possible once medical stability is reached [Evidence Level A].</p> <ul style="list-style-type: none"> i. Patients should receive the intensity and duration of clinically relevant therapy defined in their individualized rehabilitation plan and appropriate to their needs and tolerance levels [Evidence Level A]. ii. Stroke patients should receive, through an individualized treatment plan, a minimum of 1 hour of direct therapy by the interprofessional stroke team for each relevant core therapy, for a minimum of 5 days per week based on individual need and tolerance [Evidence Level A], with duration of therapy being dependent on stroke severity [Evidence Level C]. iii. The team should promote the practice of skills gained in therapy into the patient’s daily routine in a consistent manner [Evidence Level A]. iv. Therapy should include repetitive and intense use of novel tasks that challenge the patient to acquire necessary motor skills to use the involved limb during functional tasks and activities [Evidence Level A]. v. Stroke unit teams should conduct at least one formal interdisciplinary meeting per week at which patient problems are identified, rehabilitation goals set, progress monitored, and support after discharge planned [Evidence Level B]. vi. The care management plan should include a predischarge needs assessment to ensure a smooth transition from rehabilitation back to the community. Elements of discharge planning should include a home visit by a health care professional, ideally before discharge, to assess home environment and suitability for safe discharge, determine equipment needs or home modifications, and begin caregiver training for how the client will manage activities of daily living and instrumental activities of daily living in their environment [Evidence Level C]. 	<ul style="list-style-type: none"> i. Median time from hospital admission for stroke to initial assessment for rehabilitation potential by each of the rehabilitation disciplines. ^c ii. Median length of time spent on a stroke unit during inpatient rehabilitation. iii. Length of time between stroke onset and admission to stroke inpatient rehabilitation. iv. Proportion of patients admitted to a coordinated stroke unit – either a combined acute care and rehabilitation unit, or a rehabilitation stroke unit in an inpatient rehabilitation facility – at any time during their hospital stay (acute and/or rehabilitation). v. Final discharge disposition for stroke survivors following inpatient rehabilitation: including proportion of stroke rehabilitation patients discharged to their original place of residence; to a long term care facility or nursing home; or requiring readmission back to an acute care hospital for stroke related causes. vi. Proportion of stroke patients admitted to inpatient rehabilitation who requires readmission to an acute care hospital for

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
		<p>stroke related causes.</p> <ul style="list-style-type: none"> vii. Median number of days spent as 'alternate level of care' in an acute care setting prior to arrival in inpatient rehabilitation setting. viii. Change in functional status using a standardized measurement tool, from time of admission to an inpatient rehabilitation unit for stroke patients, to the time of discharge from inpatient rehabilitation. ix. Total length of time (days) spent in inpatient rehabilitation. x. Number of patients screened for cognitive impairment using valid screening tool during inpatient rehabilitation. xi. Time from stroke onset to mobilization: a) sitting; b) standing upright; c) walking with/without assistance. xii. Number of days spent in alternate level of care (ALC) in acute care or inpatient rehabilitation while waiting for return to home or placement to a residential or long term care setting.
<p>5.4: Outpatient and community-based rehabilitation</p>	<p>After leaving the hospital, stroke survivors must have access to specialized stroke care and rehabilitation services appropriate to their needs (acute and/or inpatient rehabilitation) [Evidence Level A].</p> <ul style="list-style-type: none"> i. Early supported discharge services and transition planning should be provided by a well resourced, coordinated specialist interdisciplinary team with age-appropriate expertise. These are an acceptable alternative to extended in-hospital rehabilitation and can reduce the length of hospital stay for selected patients [Evidence Level A]. Patients requiring early supported discharge services should not be referred to generic (nonspecific) community services [Evidence Level A]. See "Rationale," below, for explanation of early supported discharge. ii. People who have difficulty in activities of daily living, including self-care, productivity and leisure, should receive occupational therapy or multidisciplinary interventions targeting activities of daily living [Evidence Level A] [Evidence Level 	<ul style="list-style-type: none"> i. Proportion of stroke patients discharged to the community who receive a referral for outpatient rehabilitation prior to discharge from acute care or inpatient rehabilitation (referrals may include either facility-based or community-based programs). ii. Median length of time between referral for outpatient rehabilitation and admission to a facility-based, home-based or community stroke rehabilitation program. iii. Median length of time between referral for outpatient rehabilitation to commencement of therapy.

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>C for paediatrics].</p> <ul style="list-style-type: none"> iii. Multifactorial interventions provided in the community, including an individually prescribed exercise program, may be provided for people who are at risk of falling, in order to prevent or reduce the number and severity of falls [Evidence Level A]. iv. People with difficulties in mobility should be offered an aerobic exercise program and monitored throughout the program [Evidence Level B]. v. Patients with aphasia should be taught supportive conversation techniques [Evidence Level A]. vi. Patients with dysphagia should be offered swallowing therapy and opportunity for reassessment as required [Evidence Level A]. vii. Children affected by stroke should be offered advice on and treatment aimed at achieving play, self-care, leisure and school-related skills that are developmentally relevant and appropriate in their home, community and school environment [Evidence Level B]. 	<ul style="list-style-type: none"> iv. Number of stroke patients initially assessed by each rehabilitation discipline, including: physiotherapist; occupational therapist; speech language pathologist; social workers, and other relevant specialists while receiving stroke rehabilitation therapy in the community. v. Frequency, duration, and intensity of therapies received from each relevant rehabilitation professional in a home or community-based rehabilitation setting following stroke. vi. Change in functional status using a standardized measurement tool, from time of admission to an inpatient rehabilitation unit for stroke patients, to the time of discharge from home or community-based rehabilitation programs. vii. Proportion increase in Telehealth/telestroke coverage to remote communities to support organized stroke care across the continuum and provide rehabilitation assessments and programs for stroke patients who return to the community after hospitalization for an acute stroke.
<p>5.5: Follow-up and community reintegration</p>	<p>People with stroke living in the community should have regular and ongoing follow-up assessment to assess recovery, prevent deterioration, and maximize functional outcome.</p> <ul style="list-style-type: none"> i. Post-acute stroke patients should be followed up by a primary care provider to address stroke risk factors, ongoing rehabilitation needs, and to continue treatment of comorbidities and other sequelae of stroke [Evidence Level C]. ii. Stroke survivors and their caregivers should have their individual psychosocial and support needs reviewed on a regular basis [Evidence Level A] iii. People living in the community who have difficulty with activities of daily living should have access, as appropriate, to therapy services to improve or prevent deterioration in activities of daily living [Evidence Level A]. iv. Recommendation 6.2, "Identification and management of post-stroke depression." should also be observed as part of follow-up and evaluation of 	<ul style="list-style-type: none"> i. Proportion of patients who are discharged from acute care who receive a referral for home care/community supportive services. ^c ii. Proportion of stroke patients discharged from acute care to the community who require readmission to an acute care hospital for stroke related causes. iii. Proportion of stroke patients with documentation that information was given to patient/family during a healthcare encounter in the community. Topics that should be covered in educational sessions may include: formal/informal educational programs, care after stroke, available

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>v. stroke survivors in the community [Evidence Level C]. Any stroke survivor with declining activity at 6 months or later after stroke should be assessed for appropriate targeted rehabilitation [Evidence Level A].</p> <p>vi. Infants and children, in whom motor, language, or cognitive deficits emerge over time, require ongoing follow-up and assessment throughout their development [Evidence Level C].</p> <p>vii. Pediatric stroke survivors in the community should have ongoing assessments of education and vocational needs throughout their development [Evidence Level C].</p> <p>viii. Stroke survivors and their families should be provided with timely, up-to-date information in conjunction with opportunities to learn from members of the interdisciplinary team and other appropriate community service providers. Simple information provision alone is not effective [Evidence Level A].</p> <p>ix. Patients and their caregivers should be offered education programs to assist them in adapting to their new role [Evidence Level B].</p>	<p>services, process to access available services, and services are covered by health insurance.</p> <p>iv. Proportion of stroke patients referred to secondary prevention services after being discharged from acute care or inpatient rehabilitation following a stroke event</p> <p>v. Median/mean number of visits to primary care for stroke related follow-up after discharge from acute care or inpatient rehabilitation following a stroke event</p> <p>vi. Median/mean number of visits to an emergency department for stroke related issues after discharge from acute care or inpatient rehabilitation following a stroke event</p> <p>vii. Proportion of patients who return home following stroke rehabilitation who receive community support services (e.g., homecare or respite).</p> <p>viii. Length of time from hospital discharge to initiation of community support services following discharge from acute care or inpatient rehabilitation</p> <p>ix. Frequency and duration of community support services, provided by each service type received by stroke patients following discharge from acute care or inpatient rehabilitation</p> <p>x. Proportion of stroke patients discharged from inpatient rehabilitation to the community who require readmission to an acute care hospital for stroke related causes.</p> <p>xi. Proportion of patients who return to the community from acute hospital stay or following inpatient rehabilitation who require admission to long term care/nursing home. c</p> <p>xii. Median wait time from referral of a stroke patient for admission to along term care/ nursing home</p>

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
		until admission to the facility xiii. Proportion of stroke patients discharged to the community that have documentation to indicate that screening for fitness to drive was completed and related patient counselling was performed. xiv. Proportion of stroke patients referred for driving assessment by an occupational therapist or other trained healthcare professional after discharge to the community. xv. Measure of burden of care for family and care givers of stroke survivors living in the community.
6: Selected Topics in Stroke Management		
6.1: Dysphagia assessment	Patients with stroke should have their swallowing ability screened using a simple, valid, reliable bedside testing protocol as part of their initial assessment, and before initiating oral intake of medications, fluids or food [Evidence Level B]. <ul style="list-style-type: none"> i. Patients who are not alert within the first 24 hours should be monitored closely and dysphagia screening performed when clinically appropriate [Evidence Level C]. ii. Patients with stroke presenting with features indicating dysphagia or pulmonary aspiration should receive a full clinical assessment of their swallowing ability by a speech-language pathologist or appropriately trained specialist who should advise on safety of swallowing ability and consistency of diet and fluids [Evidence Level A]. iii. Patients who are at risk of malnutrition, including those with dysphagia, should be referred to a dietician for assessment and ongoing management. Assessment of nutritional status should include the use of validated nutrition assessment tools or measures [Evidence Level C]. Also refer to recommendation 4.2e, "Components of acute inpatient care – Nutrition," for additional information. 	<ul style="list-style-type: none"> i. Proportion of stroke patients with documentation that an initial dysphagia screening was performed during admission to the emergency department, acute care, and/or inpatient rehabilitation. ii. Proportion of stroke patients who have concerns identified on initial dysphagia screening who then receive a comprehensive assessment by a speech language pathologist or other appropriately trained health care professional. iii. Median time from patient arrival in the emergency department to initial swallowing screening by a trained clinician. (in minutes)
6.2: Identification and management of post-stroke depression	All patients with stroke should be considered at a high level of risk for depression. At the time of the first assessment, the clinical team should determine whether the patient has a history of depression or risk factors for depression [Evidence Level B]. <ul style="list-style-type: none"> i. All patients with stroke should be screened for depression using a validated tool [Evidence Level A] (for recommended tools, see Table 8). Screening should take 	<ul style="list-style-type: none"> i. Proportion of stroke patients with documentation to indicate screening for depression was performed either informally or using a formal assessment tool in the acute care or inpatient rehabilitation setting

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>place at all transition points and whenever clinical presentation indicates. Transition points may include:</p> <ul style="list-style-type: none"> (a) upon admission to acute care, particularly if any evidence of depression or mood changes is noted, (b) before discharge home from acute care or during early rehabilitation if transferred to inpatient rehabilitation setting (c) periodically during inpatient rehabilitation (d) periodically following discharge to community. <p>ii. Patients identified as at risk for depression during screening should be referred to a psychiatrist or psychologist for further assessment and diagnosis [Evidence Level B].</p> <p>iii. Patients with mild depressive symptoms should be managed by “watchful waiting,” with treatment being started only if the depression is persistent [Evidence Level A].</p> <p>iv. Patients diagnosed with a depressive disorder should be given a trial of antidepressant medication, if no contraindication exists. No recommendation is made for the use of one class of antidepressants over another; however, side effect profiles suggest that selective serotonin reuptake inhibitors (SSRIs) may be favoured in this patient population [Evidence Level A].</p> <p>v. In adult patients with severe, persistent or troublesome tearfulness, SSRIs are recommended as the antidepressant of choice [Evidence Level A].</p> <p>vi. Treatment should be monitored and should continue for a minimum of 6 months, if a good response is achieved [Evidence Level A].</p> <p>vii. All patients with apparent depressive symptoms should be carefully screened for the presence of hypoactive delirium [Evidence Level C].</p> <p>viii. Routine use of prophylactic antidepressants is not recommended in post-stroke patients [Evidence Level A].</p> <p>ix. Patients should be given information and advice about the impact of stroke, and the opportunity to talk about the impact of illness upon their lives [Evidence Level B].</p> <p>x. Patients with marked anxiety should be offered psychologic therapy [Evidence Level B].</p> <p>xi. Patients and their caregivers should have their individual psychosocial and</p>	<p>following an acute stroke event.</p> <ul style="list-style-type: none"> ii. Proportion of stroke patients who have concerns identified on initial depression screening who then receive a referral for a comprehensive assessment by a psychiatrist, psychologist, or other appropriately trained health care professional. iii. Proportion of stroke patients treated with antidepressants at 1 month, 3 months, 6 months and one year following initial stroke event

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>support needs reviewed on a regular basis as part of the longer-term recovery and management of stroke [Evidence Level A].</p>	
<p>6.3: Vascular cognitive impairment and dementia</p>	<p>All patients with vascular risk factors and those with clinically evident stroke or transient ischemic attack should be considered at high risk for vascular cognitive impairment.</p> <p>Patients considered at high risk for cognitive and perceptual impairment are those with vascular risk factors such as hypertension, age > 65, hyperlipidemia, diabetes, clinical stroke, neuroimaging findings of covert stroke or white matter disease, damage to other target organs, and/or those patients with cognitive or functional changes that are clinically evident or reported during history-taking.</p> <p>6.3a Assessment</p> <ul style="list-style-type: none"> <i>i.</i> All patients described above should be screened for cognitive impairment using a validated screening tool [Evidence Level B]. (See Table 8 for recommended screening tools for cognitive assessment). <i>ii.</i> Screening to investigate a person’s cognitive status should address the following domains: arousal, alertness, attention, orientation, memory, language, agnosia, visuospatial/perceptual function, praxis and executive functions such as insight, judgment, social cognition, problem-solving, abstract reasoning, initiation, planning and, organization [Evidence Level C]. <i>iii.</i> The Montreal Cognitive Assessment is considered more sensitive to cognitive impairment than the Mini Mental Status Exam in patients with vascular cognitive impairment. Its use is recommended when vascular cognitive impairment is suspected [Evidence Level B]. Additional validation is needed for the Montreal Cognitive Assessment as well as other potential screening instruments such as the 5-minute protocol from the Vascular Cognitive Impairment Harmonization recommendations (see Box 5). <i>iv.</i> Patients should also be screened for depression, since depression has been found to contribute to cognitive impairment in stroke patients. A 	<ul style="list-style-type: none"> <i>i.</i> Proportion of persons with stroke who undergo a brief cognitive screening at each transition point along the continuum of care following inpatient discharge, and at any time when there is a suspected change in a patient’s cognitive status. <i>ii.</i> Proportion of stroke patients who have concerns identified on initial screening for vascular cognitive impairment who then receive a referral for a comprehensive cognitive/ neuropsychological assessment by a neuropsychologist, or other appropriately trained health care professional. <i>iii.</i> Percentage improvement in control of high blood pressure and other vascular risk factors in patients with vascular cognitive impairment.

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>validated screening tool for depression should be used [Evidence Level B]. Also refer to recommendation 6.2, "Identification and management of post-stroke depression."</p> <p>v. Persons who have cognitive impairment detected on a screening test should receive additional cognitive and/or neuropsychological assessments as appropriate to further guide management [Evidence Level B].</p> <p>6.3b Timing</p> <p>i. All patients considered at high risk for cognitive impairment should be assessed periodically as indicated by severity of clinical presentation, history and/or imaging abnormalities to identify cognitive, perceptual deficits, depression, delirium and/or changes in function [Evidence Level C].</p> <p>ii. Those who have suffered a transient ischemic attack or stroke should have a screening assessment and, where indicated, a more in-depth assessment of cognitive and perceptual status at various transition points throughout the continuum of stroke care [Evidence Level C]. Transition points may include:</p> <ol style="list-style-type: none"> a. during presentation to emergency when cognitive, perceptual or functional concerns are noted b. upon admission to acute care, particularly if any evidence of delirium is noted c. upon discharge home from acute care or during early rehabilitation if transferred to inpatient rehabilitation setting d. periodically during in-patient rehabilitation stage according to client progress and to assist with discharge planning e. periodically following discharge to the community by the most appropriate community health care provider according to client's needs, progress and current goals. <p>6.3c Management</p> <p>i. All vascular risk factors should be managed aggressively to achieve optimal control [Evidence Level A]. Also refer to section 2, "Prevention of stroke."</p> <p>ii. Patients who demonstrate cognitive impairments in the screening</p>	

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>process should be referred to a health care professional with specific expertise in this area for additional cognitive, perceptual and/or functional assessment to determine the severity of impairment and impact of deficits on function and safety in activities of daily living and instrumental activities of daily living, and to implement appropriate remedial, compensatory and/or adaptive intervention strategies [Evidence Level B]. A team approach is recommended, and health care professionals may include an occupational therapist, neuropsychologist, psychiatrist, neurologist, geriatrician, speech–language pathologist or social worker.</p> <ul style="list-style-type: none"> iii. An individualized, client-centred approach should be considered to facilitate resumption of desired activities such as return to work, leisure, driving, volunteer participation, financial management, home management and other instrumental activities of daily living [Evidence Level C]. iv. Intervention strategies including rehabilitation should be tailored according to the cognitive impairments and functional limitations as well as remaining cognitive abilities, as identified through in-depth assessment and developed in relation to patients’ and caregivers’ needs and goals [Evidence Level B]. v. Strategic or compensatory training appears to be effective in the treatment of apraxia post stroke and should be considered [Evidence Level A]. The evidence for the effectiveness of specific interventions for cognitive impairment in stroke is limited and requires more research. Attention training may have a positive effect on specific, targeted outcomes and should be implemented with appropriate patients [Evidence Level C]. Compensatory strategies can be used to improve memory outcomes [Evidence Level C]. vi. Patients with evidence of depression or anxiety on screening should be referred and managed by an appropriate mental health professional [Evidence Level C]. Note: Also refer to recommendation 6.2, “Identification and management of post-stroke depression” vii. Pharmacotherapy: <ul style="list-style-type: none"> a. Patients with evidence of vascular cognitive impairment should be referred to a physician with expertise in 	

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<p>vascular cognitive impairment for further assessment and recommendations regarding pharmacotherapy [Evidence Level C].</p> <ul style="list-style-type: none"> b. Cholinesterase inhibitors should be considered for management of vascular cognitive impairment diagnosed using the National Institute of Neurological Disorders and Stroke (NINDS) – Association Internationale pour la Recherche et l’Enseignement en Neurosciences (AIREN) diagnostic criteria [Evidence Level B]. c. There is fair evidence of small magnitude benefits for galantamine on cognition function and behaviour in mixed Alzheimer and cerebrovascular disease. Galantamine can be considered a treatment option for mixed Alzheimer and cerebrovascular disease [Evidence Level B]. d. There is fair evidence of small magnitude benefits for donepezil in cognitive and global outcomes, with less robust benefits on functional measures. Donepezil can be considered a treatment option for vascular dementia [Evidence Level B]. 	
<p>6.4: Shoulder pain assessment and treatment</p>	<p>All stroke patients should be assessed for shoulder pain and, when symptoms present, have strategies implemented to minimize shoulder joint pain and trauma [Evidence Level A].</p> <ul style="list-style-type: none"> i. Factors that contribute to, or exacerbate, shoulder pain should be identified and managed appropriately. <ul style="list-style-type: none"> a. Educate staff and caregivers about correct handling of the hemiplegic arm [Evidence Level B]. b. Consider use of supports for the arm [Evidence Level A]. ii. Joint protection strategies should be instituted to minimize joint trauma. <ul style="list-style-type: none"> a. The shoulder should not be passively moved beyond 90° of flexion and abduction unless the scapula is upwardly rotated and the humerus is laterally rotated [Evidence Level A]. b. Overhead pulleys should not be used [Evidence Level A]. 	<ul style="list-style-type: none"> i. Length of stay during acute care hospitalization and inpatient rehabilitation for patients experiencing shoulder pain ii. Proportion of stroke patients who experience shoulder pain in acute care hospital, inpatient rehabilitation, and following discharge into the community. iii. Proportion of stroke patients who report shoulder pain at 3 months and 6 month following a stroke. iv. Pain intensity rating change from baseline to defined measurement periods. v. Motor score change from baseline at defined measurement periods. vi. Range of shoulder external rotation before and

<i>Best Practice Guideline</i>	<i>Recommendation Wording</i>	<i>Performance Measures</i>
	<ul style="list-style-type: none"> c. The upper limb must be handled carefully during functional activities [Evidence Level B]. d. Staff should position patients, whether lying or sitting, to minimize the risk of complications such as shoulder pain [Evidence Level B]. iii. Shoulder pain and limitations in range of motion should be treated through gentle stretching and mobilization techniques focusing especially on external rotation and abduction [Evidence Level B]. 	<ul style="list-style-type: none"> vii. Proportion of patients with restricted range of motion related to shoulder pain.