Summary of Stroke Best Practice Recommendations
2012 – 2013 Update

Fourth Edition
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**OVERVIEW**

**CANADIAN BEST PRACTICE RECOMMENDATIONS FOR STROKE CARE**

The Canadian Best Practice Recommendations for Stroke Care are intended to provide up-to-date evidence-based guidelines for the prevention and management of stroke. The goal of disseminating and implementing these recommendations is to reduce practice variations in the care of stroke patients across Canada, and to reduce the gap between knowledge and practice. Recommendations are updated every two years to ensure they continue to reflect contemporary stroke research evidence and leading expert opinion. Each update involves critical review of the current medical literature, which informs decisions regarding modification of the recommendations and the performance measures used to assess their impact. Every attempt is made to coordinate with other Canadian groups who are developing guidelines that relate to stroke, such as hypertension, atrial fibrillation and diabetes.

This is the fourth edition of the **Canadian Best Practice Recommendations for Stroke Care**, which was first released in 2006. The theme of the 2012 – 2013 update is **Taking Action**, and stresses the critical role and responsibility of healthcare providers at every stage of the continuum of care to ensure that best practice recommendations are implemented and adhered to. **Taking Action** will lead to optimal outcomes for each stroke patient by providing the best care within the most appropriate setting. This includes rapid and efficient access to diagnostic services, stroke expertise and medical and surgical interventions, rehabilitation and support for ongoing recovery and community reintegration.

**Taking Action** requires a committed team approach and strong coordination of care across regions and networks, with pre-hospital, acute care, rehabilitation and community-based healthcare providers working together to ensure optimal outcomes for patients and their families, regardless of geographic location.

**Taking Action** also applies to patients who have experienced a stroke, their families and informal caregivers. Stroke patients and their families need to actively participate in their recovery and openly communicate with their healthcare team. Patients and families must participate in setting the goals they want to achieve during recovery from a stroke, and share concerns, as well as physical, mood and cognitive issues with their team, which will lead to the care required for optimal recovery in all aspects of health.

**Development of the Canadian Best Practice Recommendations for Stroke Care**

For detailed methodology on the development and dissemination of the Canadian Best Practice Recommendations for Stroke Care please refer to the stroke best practices website at [http://www.strokebestpractices.ca/index.php/methods/](http://www.strokebestpractices.ca/index.php/methods/).

**Acknowledgements**

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Citing this Document

Comments
We invite comments, suggestions, and inquiries on the development and application of the Canadian Best Practice Recommendations for Stroke Care and ongoing updates. Please forward comments to the Canadian Stroke Network’s Performance and Standards office at bestpractices@canadianstrokenetwork.ca
### Best Practice Recommendation 1.1  
**Symptom Recognition and Reaction**

All members of the public should be able to recognize the warning signs and symptoms of stroke, and react immediately by calling 9-1-1 or their local emergency number.

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 how to take the appropriate action—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 newborns and children to adults and be aware of the benefits of early medical attention [Evidence Level C].

Refer to Box 1.1 for the signs and symptoms of stroke.
SECTION 2.0 PREVENTION OF STROKE

Last Updated September 2012

<table>
<thead>
<tr>
<th>Best Practice Recommendation 2.1</th>
<th>Lifestyle and Risk Factor Management</th>
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<tr>
<td>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, alcohol intake, and use of oral contraceptives and hormone replacement therapy) [Evidence Level B].</td>
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<tr>
<td>i. They should receive information and counseling about possible strategies to modify their lifestyle and risk factors [Evidence Level B].</td>
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<td>ii. Referrals to appropriate specialists should be made where required to provide more comprehensive assessments and structured programs to manage risk factors [Evidence Level B].</td>
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Lifestyle and risk factor information and counseling should be provided and include:

2.1.1 Healthy balanced diet: Eating a diet 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 (< 200 mg daily for patients at increased vascular risk) and sodium, in accordance with Canada's Food Guide to Healthy Eating [Evidence Level B].

2.1.2 Sodium: Following the recommended daily sodium intake from all sources, known as the Adequate Intake. For persons 9 to 50 years, the Adequate Intake is 1500 mg. Adequate Intake decreases to 1300 mg for persons 51 to 70 years and to 1200 mg for persons over 70 years. A daily upper consumption limit of 2300 mg should not be exceeded by any age group [Evidence Level B].

2.1.3 Exercise: Participating in moderate exercise such as walking (ideally brisk walking), jogging, cycling, swimming or other dynamic exercise four to seven days each week in addition to routine activities of daily living [Evidence Level A].

   i. Patients should be counseled to achieve an accumulation of at least 150 minutes of moderate to vigorous activity per week, in episodes of 10 minutes or more [Refer to the CSEP Canadian Physical Activity Guidelines 2011 for additional information] [Evidence Level B].

   ii. Most stroke patients should be encouraged to start a regular exercise program.

      a. Supervision by a healthcare professional (physical therapist or cardiac rehab) at exercise initiation should be considered in stroke patients at risk of falls or injury, or in patients with other comorbid disease (such as cardiac disease), which may place them at higher risk of medical complications [Evidence Level C].

2.1.4 Weight: Maintaining a body mass index (BMI) of 18.5 to 24.9 kg/m² or a waist circumference of <80 centimetres for women and <94 centimetres for men* [Evidence Level B]. (Note: these numbers are reflective of current research based mostly on Caucasian patients. Refer to References 24 to 31 for waist circumference values for other ethnic groups).

2.1.5 Alcohol consumption: Limiting consumption to two or fewer standard drinks per day for men and one drink per day for women who are not pregnant [Evidence Level B].

2.1.6 Birth Control and Hormone Replacement Therapy: Patients who are taking estrogen-containing oral contraceptives or hormone replacement therapy in the presence of stroke should have the risks and benefits of these treatments discussed with them. Management alternatives should be considered in these patients [Evidence Level B].
### Best Practice Recommendation 2.2

**Blood Pressure Management**

Hypertension is the single most important modifiable risk factor for stroke. Blood pressure should be monitored and managed in all persons at risk for stroke [Evidence Level A].

#### 2.2.1 Blood pressure assessment

All persons at risk of stroke should have their blood pressure measured routinely, ideally at each healthcare encounter, but no less than once annually [Evidence Level C].

1. Proper standardized techniques should be followed for initial and subsequent blood pressure measurement including office, home, and community testing [Evidence Level B] as outlined by the Canadian Hypertension Education Program.50

2. Patients found to have elevated blood pressure (systolic greater than 130 mmHg and/or diastolic greater than 85 mmHg) should undergo thorough assessment for the diagnosis of hypertension [Evidence Level C].
   
   a. A specific follow-up visit should be scheduled and completed for the assessment and diagnosis of hypertension following an initial elevated blood pressure measurement [Evidence Level C].

   b. The specific visit for assessment of hypertension should include three measurements and be conducted in accordance with the current guidelines of the Canadian Hypertension Education Program [Evidence Level C]. See Figure 2.2.1

3. Patients with refractory hypertension should have comprehensive investigations for secondary causes of hypertension [Evidence Level B].

4. Patients with hypertension or at risk for hypertension should receive aggressive risk factor modification counseling and interventions [Evidence Level B]. Refer to recommendation 2.1 for additional information.

#### 2.2.2 Blood pressure management

Blood pressure should be managed in all patients to reach optimal control as follows:

1. For the prevention of first stroke in the general population the systolic blood pressure treatment goal is a pressure level of consistently lower than 140 mm Hg [Evidence Level B]. The diastolic blood pressure treatment goal is a pressure consistently lower than 90 mm Hg [Evidence Level A].

2. For patients who have had a stroke or transient ischemic attack, blood pressure lowering treatment is recommended to achieve a target of consistently lower than 140/90 mm Hg [Evidence Level B].

3. In patients with diabetes, blood pressure lowering treatment is recommended for the prevention of first or recurrent stroke to attain systolic blood pressure targets consistently lower than 130 mm Hg [Evidence Level B] and diastolic blood pressure targets consistently lower than 80 mm Hg [Evidence Level A].

4. In patients with nondiabetic chronic kidney disease, blood pressure lowering treatment is recommended for the prevention of first or recurrent stroke to attain a blood pressure consistently lower than 140/90mm Hg [Evidence Level C].

5. For recommendations on specific agents and sequence of agents for the secondary prevention of stroke, refer to the Canadian Hypertension Education Program treatment
vi. Randomized controlled trials have not defined the optimal time to initiate blood pressure lowering therapy after stroke or transient ischemic attack. Blood pressure lowering treatment should be initiated or modified before discharge from hospital [Evidence Level B]. Refer to recommendation 3.3 for blood pressure management during the acute phase of stroke (0 – 72 hours).

### Best Practice Recommendation 2.3

**Lipid Management**

Patients who have had an ischemic stroke or transient ischemic attack should have their serum lipid levels assessed and aggressively managed [Evidence level A].

#### 2.3.1 Lipid assessment

i. Fasting lipid levels (total cholesterol, total triglycerides, low-density lipoprotein [LDL] cholesterol, high-density lipoprotein [HDL] cholesterol) should be measured on all patients presenting with stroke or TIA [Evidence Level C].

ii. For management of dyslipidemia in the primary prevention of cardiovascular events, including stroke, refer to the current Canadian Cardiovascular Society Dyslipidemia clinical practice guidelines.78

#### 2.3.2 Lipid management

i. A statin drug should be prescribed for primary prevention of cardiovascular events, including stroke, to most patients with high global cardiovascular risk [Evidence Level A].

ii. A statin drug should be considered for primary prevention of cardiovascular events, including stroke, for those patients at intermediate cardiovascular risk [Evidence Level B]. Refer to Canadian Cardiovascular Guidelines for Dyslipidemia 2012 for additional information.

iii. A statin drug should be prescribed as secondary prevention to most patients who have had an ischemic stroke or transient ischemic attack in order to achieve an LDL cholesterol of less than 2.0 mmol/L, or a 50% reduction in LDL cholesterol from baseline [Evidence Level B].

iv. Patients with ischemic stroke or transient ischemic attack should be managed with aggressive therapeutic lifestyle changes, including dietary modification, as part of a comprehensive approach to lower risk of first or recurrent stroke [Evidence Level A].49

v. Statin therapy is not indicated for prevention of intracerebral hemorrhage. For intracerebral hemorrhage patients who have a clear concomitant indication for cholesterol lowering treatment, statin therapy should be individualized and should take into account the patient’s overall thrombotic risk as well as the possibility of increased risk of intracerebral hemorrhage on statin therapy [Evidence Level B].

vi. Statin therapy has not been well studied in certain sub-populations of stroke patients (for example, patients over 80 years of age, patients with cardioembolic stroke, arterial dissection). Decisions for prescribing should be based on current health status, comorbidities and other indicators of systemic vascular disease (such as coronary artery disease, peripheral vascular disease, and renal vascular disease)[Evidence Level C].
Best Practice Recommendation 2.4  
**Diabetes Management**

Patients with diabetes who have had an ischemic stroke or transient ischemic attack should have their diabetes assessed and optimally managed [Evidence level A].

2.4.1 Diabetes assessment

i. For patients with diabetes and either ischemic stroke or transient ischemic attack, glycated hemoglobin (HbA1C) should be measured as part of a comprehensive stroke assessment [Evidence Level B].

ii. In all patients with stroke or TIA, fasting lipid levels (total cholesterol, high-density lipoprotein cholesterol, total glycerides and calculated low-density lipoprotein cholesterol) should be measured at the time of diagnosis and at appropriate intervals if therapy initiated [Evidence Level C].

iii. Blood pressure should be measured at every diabetes visit in patients with stroke or at risk of stroke [Evidence Level C].

2.4.2 Diabetes management

i. Glycemic targets must be individualized; however, therapy in most patients with type 1 or type 2 diabetes and stroke or TIA should be treated to achieve a glycated hemoglobin (HbA1C) level ≤7.0 percent to reduce the risk of microvascular complications [Evidence Level A] and, in individuals with type 1 diabetes, macrovascular complications [Evidence Level C].

ii. To achieve an HbA1C ≤7.0%, patients with type 1 or type 2 diabetes should aim for a fasting plasma glucose or preprandial plasma glucose target 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 HbA1C targets cannot be achieved with a postprandial target of 5.0 to 10.0 mmol/L, further postprandial blood glucose lowering, to 5.0 to 8.0 mmol/L, can be considered [Evidence Level C].

iv. Adults with diabetes and ischemic stroke are at high risk of further vascular events and should also be treated with a statin to achieve a low-density lipoprotein cholesterol ≤2.0 mmol/L [Evidence Level A].

v. Unless contraindicated, low dose acetylsalicylic acid therapy (81 to 325 mg/day) is recommended in all patients with diabetes with evidence of cardiovascular disease such as stroke [Evidence Level A].

Best Practice Recommendation 2.5  
**Antiplatelet Therapy**

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].

i. Acetylsalicylic acid (81 mg to 325 mg), combined acetylsalicylic acid (25 mg) and extended-release dipyridamole (200 mg), or clopidogrel (75 mg) are all appropriate options and selection should depend on the clinical circumstances [Evidence Level A].

• For adult patients on acetylsalicylic acid, most patients should be on a maintenance dose of 81 mg/day unless other indications are present which may suggest a higher
dose is required [Evidence Level A].

ii. In children with stroke the usual maintenance dosage of acetylsalicylic acid is 1 to 5 mg/kg per day for the prevention of recurrent stroke [Evidence Level B]. The usual maximum dose is 81 mg/day.

iii. The evidence for clopidogrel use in children is sparse at this time. Clopidogrel may be considered an alternative for adolescents at a dose of 1 mg/kg/day up to a maximum of 75 mg/day. Younger children may have higher anti-platelet effects of clopidogrel, and the suggested doses should be considered within the range of 0.2 - 0.5 mg/kg/day [Evidence Level C].

iv. Short-term concurrent use of acetylsalicylic acid and clopidogrel (up to 90 days) has not shown an increased risk of bleeding [Evidence Level B]; however, longer-term use is not recommended for secondary stroke prevention, unless there is an alternate indication (e.g., drug-eluting carotid artery stent requiring dual antiplatelet therapy), due to an increased risk of bruising and bleeding [Evidence Level A].

v. At the present time, there is not enough evidence to guide management if a patient has a stroke while on a specific antiplatelet agent. Some clinicians may choose to switch to an alternate antiplatelet agent. In all cases other vascular risk factors should be aggressively managed [Evidence Level C].

Refer to recommendation 2.6 for additional information on combination therapy for patients with stroke and atrial fibrillation.

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**Best Practice Recommendation 2.6**

**Antithrombotic Therapy in Patients with Atrial Fibrillation**

Atrial fibrillation is a significant risk factor for stroke and should be aggressively managed to reduce the risk of cerebrovascular events.

### 2.6.1 Primary prevention of stroke in patients with non-valvular atrial fibrillation:

i. Patients with atrial fibrillation or atrial flutter (paroxysmal, persistent or permanent) should be stratified using a predictive index for stroke risk (e.g. CHADS2) and for the risk of bleeding, and most patients should receive either an oral anticoagulant or ASA [Evidence Level A].

   a. As part of the risk stratification, patients should be assessed for additional risk factors for stroke, including age 65-74yr, female sex, and presence of vascular disease.

ii. Patients with atrial fibrillation at low risk of stroke (CHADS2 = 0) should receive ASA (81-325 mg/day) [Evidence Level A].

iii. Patients with atrial fibrillation at intermediate risk of stroke (CHADS2 = 1) should receive oral anticoagulation therapy. The choice of OAC should be based on patient factors including age, renal function, additional health factors, likelihood of compliance, patient preferences, and costs.

   a. Most patients should receive dabigatran, rivaroxaban or apixaban (pending approval for use in Canada) [Evidence Level B] or warfarin [Evidence Level A]. Refer to Anticoagulant Medication Profile table 2.6 to guide choice of therapy.
b. Acetylsalicylic acid is a reasonable alternative for some lower risk patients, depending on their individual risk/benefit profile (age <65 and absence of vascular disease) [Evidence Level A].  
(link to CCS table with CHADS scores and treatment recommendations)

iv. Patients with atrial fibrillation at high risk of stroke (CHADS2 ≥ 2) should receive oral anticoagulation therapy. The choice of OAC should be based on patient factors including age, renal function, additional health factors, likelihood of compliance, and patient preferences.

a. Most patients should receive dabigatran, rivaroxaban or apixaban^ (pending approval for use in Canada) [Evidence Level A] or warfarin [Evidence Level A].  Refer to Medication Profile table 2.6 to guide choice of therapy.

v. Patients with atrial fibrillation who are already well-controlled on warfarin with a stable INR (with a documented therapeutic INR greater than 70% of the time) may continue on warfarin and may not need to switch to dabigatran, or rivaroxiban, or apixaban [Evidence Level C].

Note, in ROCKET, warfarin patients were in therapeutic range an average of 55% of the time, IQR 43 to 71%; RELY therapeutic range was 64% of the time; and in ARISTOTLE 66% of the time.

vi. Patients with non-valvular atrial fibrillation who are treated with warfarin should have a target INR of 2.5 (maintained in the range of 2.0 to 3.0); for patients with atrial fibrillation and mechanical heart valves, the target INR is 3.0 (range 2.5 to 3.5) [Evidence Level A].

vii. The combination of ASA and clopidogrel is not routinely recommended for the treatment of atrial fibrillation and should be reserved for patients in whom treatment with warfarin or the newer oral anticoagulants is not feasible [Evidence Level A].

viii. There is presently no evidence to recommend dabigatran, rivaroxaban, apixaban^ (pending approval for use in Canada) outside the setting of atrial fibrillation for stroke prevention [Evidence Level C].

2.6.2 Prevention of recurrent stroke in patients with non-valvular atrial fibrillation

i. Patients with transient ischemic attack and atrial fibrillation should begin oral anticoagulation* with dabigatran, or rivaroxiban, or apixaban (pending approval for use in Canada).* or warfarin immediately after brain imaging has excluded intracranial hemorrhage or large infarct [Evidence Level B].

ii. Most patients with acute ischemic stroke and atrial fibrillation should receive oral anticoagulant therapy with dabigatran, or rivaroxiban, or apixaban (pending approval for use in Canada) [Evidence Level A], or warfarin [Evidence Level A]. Therapy should be started as soon as it is thought to be safe for the patient (see “Clinical Considerations” box for common treatment protocols and expert suggestions)

iii. For stroke prevention, the new oral anticoagulant agents (dabigatran, rivaroxaban, and apixaban) have been shown to have advantages in efficacy or safety over warfarin; however, patient specific criteria should be considered when prescribing medication (refer to Table 2.6 for drug efficacy and toxicity descriptions). (Evidence level A).

iv. For patients with acute ischemic stroke and atrial fibrillation, routine use of bridging with heparin or heparinoid anticoagulation is not recommended [Evidence Level B]. Most physicians would use ASA until the patient is anticoagulated [Evidence Level C].
2.6.3 Enhancing anticoagulation therapy and minimizing bleeding complications

i. Patients prescribed any oral anticoagulation* for atrial fibrillation should be educated about the diagnosis of atrial fibrillation, the risk of stroke with atrial fibrillation, the importance of medication adherence, and compliance with international normalized ratio monitoring, if required [Evidence Level B].

ii. For patients with atrial fibrillation that are taking warfarin, careful dosing and consistent international normalized ratio monitoring is recommended to minimize adverse events; warfarin efficacy is dependent on maintaining therapeutic international normalized ratio control, and declines significantly when the international normalized ratio falls below 2.0 [Evidence Level A].

iii. Concomitant antiplatelet therapy with oral anticoagulation* is not recommended in patients with atrial fibrillation unless there is a specific medical indication such as a coronary stent [Evidence Level B].

iv. With the exception of patients with mechanical heart valves, the addition of acetylsalicylic acid to warfarin in patients with atrial fibrillation has not been shown to be of benefit in stroke prevention [Evidence Level B]

v. For patients prescribed dabigatran, rivaroxaban, or apixaban, renal function should be routinely monitored, and measured at least once annually [Evidence Level C].
### Best Practice Recommendation 2.7

#### Management of Extracranial Carotid Disease and Intracranial Atherosclerosis

#### 2.7.1 Symptomatic Carotid Stenosis

Patients with transient ischemic attack or non-disabling stroke and ipsilateral 50 to 99 percent internal carotid artery stenosis (measured by two concordant non-invasive imaging modalities such as dopplers, CTA, or MRA) should be evaluated by an individual with stroke expertise (neurosurgeon/vascular surgeon) and selected patients should be offered carotid endarterectomy as soon as possible, with the goal of operating within fourteen days of the incident event once the patient is clinically stable [Evidence Level A].

1. Carotid endarterectomy should be performed by a surgeon with a known perioperative morbidity and mortality of less than 6 percent [Evidence Level A].

2. Carotid stenting may be considered for patients who are not operative candidates for technical, anatomic or medical reasons [Evidence Level A]. Interventionalists should have expertise in carotid procedures and an expected risk of peri-procedural morbidity and mortality rate of less than 5 percent.

3. Carotid endarterectomy is more appropriate than carotid stenting for patients over age 70 years who are otherwise fit for surgery because stenting carries a higher short-term risk of stroke and death [Evidence Level A].

#### 2.7.2 Asymptomatic and Remotely Symptomatic Carotid Stenosis

Carotid endarterectomy may be considered for selected patients with 60 to 99 percent carotid stenosis who are asymptomatic or were remotely symptomatic (i.e., greater than three months) [Evidence Level A].

1. Patients with asymptomatic carotid disease should be evaluated by a physician with expertise in stroke management [Evidence Level A].

2. Patients should be less than 75 years old with a life expectancy of more than 5 years, and an acceptable risk of surgical complications [Evidence Level A].

3. Carotid endarterectomy should be performed by a surgeon with a less than 3 percent risk of peri-operative morbidity and mortality [Evidence Level A].

4. The benefits of carotid endarterectomy in women have shown mixed findings. Although the initial (5-year) results of the ACST showed no benefit in women, ten-year follow-up in the ACST trial suggest long-term benefit for both men and women [Evidence Level B]. Female sex in isolation is not an exclusion criterion for surgery, but should be considered as part of the overall risk benefit assessment with specific attention to co-morbid disease and general health status. [Evidence Level C].

5. Carotid stenting may be considered in patients who are not operative candidates for technical, anatomic or medical reasons provided there is a less than 3 percent risk of peri-procedural morbidity and mortality [Evidence Level A].

#### 2.7.3 Intracranial Stenosis

1. Intracranial stenting is not recommended for the treatment of recently symptomatic intracranial 70% to 99% stenosis [Evidence Level B].

2. In the SAMMPRIS trial the medical management arm included dual antiplatelet therapy with ASA 325 mg and Clopidogrel 75 mg for up to 90 days, as well as aggressive management of all vascular risk factors including blood pressure, lipids, diabetes mellitus,
and other at-risk lifestyle patterns [Evidence Level A]. It is not clear if all these components are necessary for medical management. Management decisions should be based upon individual vascular risk profiles.

iii. In patients who have been managed with maximal medical therapy in the presence of intracranial stenosis and experience a recurrent stroke (as per SAMMPRIS), there is lack of clear evidence to guide further management decisions. Management decisions should be based upon individual vascular risk profiles [Evidence Level C].

<table>
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<tr>
<th>Best Practice Recommendation 2.8</th>
<th>Assessment and Management of Obstructive Sleep Apnea</th>
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<tbody>
<tr>
<td>2.8 Obstructive sleep apnea (OSA) is an emerging risk factor for stroke and has also shown to be present in many patients following a stroke [Evidence Level B]. Preventative strategies should be in place for people with obstructive sleep apnea and stroke patients with sleep disturbance symptoms that emerge following stroke [Evidence Level B].</td>
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2.8.1 Screening and Assessment for Sleep Apnea

Patients who have experienced a stroke or TIA are more likely to experience obstructive sleep apnea following their stroke compared to people who have not had a stroke [Evidence level A]. Patients who have experienced a stroke or TIA should be screened* at all transition points and follow-up visits for the presence of sleep apnea symptoms [Evidence level A], using a validated sleep apnea screening tool. (*Screening is defined as using a standardized brief clinical questionnaire to determine sleep patterns, symptoms of OSA, and likelihood that a patient may have sleep apnea – refer to Implementation Tools section for suggested tools).

i. Patients with sleep apnea post-stroke often do not display typical clinical characteristics of sleep apnea [Evidence level B]; therefore initial screening for sleep apnea using a validated screening questionnaire should be considered for patients with:

   a. recurrent stroke [Evidence level A].
   b. fragmented sleep, difficulty sleeping, daytime sleepiness [Evidence level B].
   c. increased frequency of nocturia or snoring [Evidence level B].

ii. Patients with symptoms suggestive of sleep apnea on initial screening (as described in 2.8.1.i) should be referred to a sleep specialist for more detailed assessment and diagnosis [Evidence level C], which may include a more detailed sleep history, physical assessment, and a formalized sleep study [Evidence level A].

iii. Sleep apnea screening should be considered in patients with drug resistant hypertension [Evidence Level B] and atrial fibrillation [Evidence Level C].

2.8.2 Management of Obstructive Sleep Apnea in Patients with Stroke

Stroke prevention strategies, including specific targeted management strategies for sleep apnea, should be initiated for patients with confirmed sleep apnea pre or post stroke or TIA, based on objective clinical assessment and investigations [Evidence Level B].

i. The management of all treatable vascular disease risk factors should be optimized in patients with confirmed sleep apnea pre or post stroke [Evidence Level B] as described in other sections of these best practice recommendations including: blood pressure, diet, sodium intake, physical activity, obesity, alcohol reduction, smoking cessation and antithrombotic therapy.
ii. First line therapies for the treatment of sleep apnea before or following a stroke may include:

a. Avoidance of hypnotic and sedative medications and alcohol (sedatives) (Evidence level B);

b. Positional therapy [Evidence level B]: Patients should be advised to stay off their back where possible to alleviate apnea-type symptoms when they have received a diagnosis of supine related sleep apnea [Evidence level B].

c. Weight loss [Evidence level B]

d. Continuous positive airway pressure (C-PAP) [Evidence level B].

e. Dental appliances [Evidence level B] in consultation with dental specialists.

iv. Severity of sleep apnea, presenting symptoms and patient compliance are factors that should be considered in the selection of treatment modalities [Evidence level B].

v. Determination of severity of sleep apnea should be based on clinical symptoms, sleep architecture (patterns), number of respiratory events per hour and oxygen saturation (Evidence level B).

vi. Patients and family members should be provided ongoing education, counseling and support regarding the signs, symptoms and risks of sleep apnea [Evidence Level B]; compliance with treatment to reduce stroke recurrence, and increase recovery; and, signs and symptoms of stroke and appropriate actions to take when any stroke symptoms appear [Evidence Level B].

vii. Refer to available comprehensive Sleep Apnea Guidelines for additional information on the management of sleep apnea (Refer to Canadian Thoracic Society Guidelines; American Academy of Sleep Medicine). 166,167

2.8.3 There is insufficient evidence to provide specific recommendations with respect to treatment of completely asymptomatic sleep apnea and the risks of stroke and TIA [Evidence Level C].

i. Based on expert opinion, the Canadian stroke sleep apnea writing group recommends that treatment be considered in asymptomatic patients with an AHI > 20 per hour or SaO₂ < 90% for greater than 12% of total recording time [Evidence Level C]. 168

ii. The overall vascular health status of the patient (e.g., presence of hypertension, coronary artery disease, etc) should also be considered as a factor in treatment decisions [Evidence Level C].

2.8.4 Paediatric Considerations: There is no direct evidence available to demonstrate a connection in children regarding sleep apnea and stroke. However, it is recommended that children with stroke be screened for signs and symptoms suggesting sleep apnea [Evidence Level C], or conditions predisposing them to sleep apnea, such as obesity, sickle cell disease, severe strokes, or structural airway problems (e.g., enlarged tonsils) [Evidence Level C]. 169,170

i. Any child with suspected sleep apnea should be referred to a paediatric sleep specialist or respirologist for further assessment and decision-making regarding appropriate management [Evidence Level C].
### Best Practice Recommendation 2.9  Management of Smoking Cessation

All members of the interdisciplinary team should address smoking cessation and a smoke-free environment at every healthcare encounter for active smokers.\(^{205}\)

1. In all healthcare settings along the stroke continuum (inpatient, ambulatory, and community), patient smoking status should be identified, assessed and documented [Evidence Level A].

2. Provide unambiguous, non-judgmental, and patient-specific advice regarding the importance of cessation to all smokers [Evidence Level B] and others who reside with the patient.

3. Offer assistance with the initiation of a smoking cessation attempt—either directly or through referral to appropriate resources [Evidence Level A].

4. People who are not ready to quit should be offered a motivational intervention to help enhance their readiness to quit [Evidence Level B].

5. A combination of pharmacological therapy and behavioural therapy should be considered in all smoking cessation programs and interventions [Evidence Level A].

6. The three classes of pharmacological agents that should be considered as first-line therapy for smoking cessation are nicotine replacement therapy, bupropion, and varenicline [Evidence Level A].
   
   a. The choice of appropriate pharmacotherapy should take into account the patient’s medical stability, clinical needs, other medical factors, and patient preferences [Evidence Level C]. Refer to Table 2.9 Pharmacotherapy in Smoking Cessation Treatment.

7. For admitted stroke patients who are current smokers, protocols should be in place to manage nicotine withdrawal during hospitalization [Evidence Level B].

8. There is a lack of clear evidence regarding the timing to initiate nicotine withdrawal/replacement therapy in patients following a stroke. Expert opinion suggests this may begin as soon as it is medically appropriate, and should take into consideration the type of stroke event, stroke severity, patient interest, and physician comfort level [Evidence Level C].
   
   a. In cases where the patient is likely to continue to smoke while in hospital or immediately after discharge, nicotine replacement therapy should be offered as a safer alternative to smoking [Evidence Level C].

9. The importance of smoking cessation in adolescent and teen populations must be considered a priority and addressed, especially in young patients who have already experienced a stroke [Evidence Level C].
   
   a. In teens and young adults, it is recommended that screening for smoking status be carried out in a confidential, non-judgmental environment without the presence of parents or caregivers where possible [Evidence Level B].

10. Health care providers working with pediatric populations should counsel patients, parents and caregivers about the potential harmful effects of early onset smoking and second-hand smoke on the health of their children. [Evidence Level C].

**Note:** The term ‘Smoking’ in these recommendations refers to tobacco and other inhaled substances.
### Best Practice Recommendation 3.1

**Outpatient Management of Transient Ischemic Attack and Non-Disabling Ischemic Stroke**


#### 3.1.1 Timing of Initial Assessment

- **i. Highest Risk for Stroke Recurrence**: Patients who present to a family physician’s office, nurse practitioner, other community primary care setting, or other ambulatory care setting within 48 hours of a suspected transient ischemic attack or non-disabling ischemic stroke and with persistent or fluctuating motor or speech symptoms or other clinically localizable symptoms are considered at highest risk of recurrent stroke, and should have **an immediate clinical evaluation** and investigations to establish the diagnosis, rule out stroke mimics, and develop a stroke management plan [Evidence Level B].
  
  a. These high risk patients should be immediately transferred to the closest emergency department that has access to neurovascular imaging facilities and stroke expertise [Evidence Level B].

- **ii. Patients who present to a family physician’s office, nurse practitioner, other community primary care setting, or other ambulatory care setting between 48 hours and 2 weeks from time last known well**, and without persistent or fluctuating motor or speech symptoms or other clinically localizable symptoms, are considered at increased risk for recurrent stroke, and should receive a comprehensive clinical evaluation and investigations within 24 hours of first contact with the healthcare system [Evidence Level B].
  
  a. Patients identified as at increased risk who cannot be evaluated as an outpatient within 24 hours from clinical presentation should be reviewed by a stroke expert either through physician to physician telephone consultation, telestroke consult using 2-way video conferencing with the patient and a stroke expert, or through an in person consultation; or, the patient should be transported to an emergency department that has access to neurovascular imaging facilities and stroke expertise [Evidence Level B].

- **iii. Patients presenting to a family physician’s office, nurse practitioner, or other community primary care setting more than two weeks following a suspected transient ischemic attack or non-disabling ischemic stroke, and/or those patients experiencing isolated sensory symptoms (such as tingling) may be considered as less urgent, and should be seen by a stroke specialist for evaluation, generally within one month of presentation** [Evidence Level B].

#### 3.1.2 Evaluation

- **i. All patients with suspected transient ischemic attack or non-disabling ischemic stroke should undergo an initial assessment that includes: brain imaging, non-invasive vascular imaging (for carotid territory transient ischemic attacks or non-disabling strokes), such as carotid dopplers, CT angiography or magnetic resonance angiography, and an**
electrocardiogram, within the time frames recommended in 3.1.1, based on level of urgency [Evidence Level B]. Refer to Recommendation 3.3 for additional information.

ii. The following laboratory investigations should be undertaken routinely for patients with suspected transient ischemic attack or non-disabling ischemic stroke as part of the initial evaluation: haematology (CBC), electrolytes, coagulation (aPTT, INR), renal function (creatinine, glomerular filtration rate), troponin, fasting lipid profile, fasting glucose level and HbA1c, and thyroid-stimulating hormone (TSH) [Evidence Level C].

   a. Additional blood work is recommended in the following patients: patients with a prothrombotic state such as cerebral venous thrombosis, deep vein thrombosis and stroke owing to paradoxical embolism; young patients with ischemic stroke or TIA; and/or where a vasculitic cause is suspected [Evidence Level C].

   Refer to Table 3.3B for additional information on recommended laboratory investigations.

iii. Echocardiogram should be performed in cases where stroke mechanism has not been identified, especially in children and younger adults with stroke or TIA [Evidence Level C].

iv. Holter monitoring should be performed in cases where cardioembolic mechanism is suspected, and where another stroke mechanism has not been identified [Evidence Level C].

v. Patients with non-disabling ischemic stroke who are not admitted to hospital should be assessed for the need to have a comprehensive outpatient assessment of functional impairment, which should include a cognitive evaluation, screening for depression, screening of fitness to drive, and functional assessments for potential rehabilitation treatment [Evidence Level B].

   a. Referral should be made to an appropriate rehabilitation program, and assessment should take place ideally within one week of first presentation to the healthcare system [Evidence Level C]. Refer to Recommendations 5.1 and 5.6 for additional information.

3.1.3 Management (Also refer to Chapter 2: Prevention of Stroke for additional guidance)

i. All patients with transient ischemic attack or non-disabling ischemic stroke who are not on an antplatelet agent at time of presentation should be started on antplatelet therapy immediately after brain imaging has excluded intracranial hemorrhage [Evidence Level A].

   a. A loading dose of ASA should be at least 160 mg. [Evidence Level A].

   b. If clopidogrel is used, a loading dose of 300 mg should be given then maintenance therapy should be started according to parameters set out in recommendation 2.5 for antplatelet therapy for secondary stroke prevention [Evidence Level A]. Refer to Recommendation 2.5 for additional information.

ii. Patients with transient ischemic attack or non-disabling stroke and ipsilateral 50 to 99 percent internal carotid artery stenosis (measured by two concordant non-invasive imaging modalities such as dopplers, CTA, or MRA) should be evaluated by an individual with stroke expertise (neurosurgeon/vascular surgeon) and selected patients should be offered carotid endarterectomy as soon as possible, with the goal of operating within fourteen days of the incident event once the patient is clinically stable [Evidence Level A]. Refer to Recommendation 2.7 for additional information.
iii. Patients with transient ischemic attack or non-disabling ischemic stroke with atrial fibrillation should receive oral anticoagulation therapy with apixaban, dabigatran, or rivaroxiban [Evidence Level A], or warfarin [Evidence Level A]. Therapy should be started as soon as it is thought to be safe for the patient. Refer to Recommendation 2.6 for additional information.

   a. For patients on warfarin, the target therapeutic International Normalized Ratio (INR) is 2.5 with a range of 2.0 to 3.0 [Evidence Level A]. Refer to Recommendation 2.6 for additional information.

   b. For patients with acute ischemic stroke and atrial fibrillation, routine use of bridging with heparin or heparinoid anticoagulation is not recommended [Evidence Level A]. Most physicians would use ASA 81 mg daily until the patient is anticoagulated [Evidence Level C]. Refer to Recommendation 2.6 for additional information.

iv. All risk factors for cerebrovascular disease must be aggressively managed through pharmacological and non-pharmacological means to achieve optimal control [Evidence Level A]. While there is a lack of conclusive evidence supporting acute-phase modification of individual risk factors, there is evidence of benefit from a comprehensive approach, which includes initiating or modifying antihypertensive therapy and statin medication [Evidence Level C]. Refer to Chapter 2. Stroke Prevention recommendations for additional information.

v. Patients with transient ischemic attack or non-disabling ischemic stroke who smoke should be strongly advised to quit immediately, and be provided with the pharmacological and non-pharmacological means to do so [Evidence Level B]. Refer to Recommendation 2.9 for additional information.
alternate decision-maker) to the responding paramedics while they are en route [Evidence Level C].

3.2.2 EMS On Scene Management

On-scene goal is to ‘recognize and mobilize’ – it is of the utmost importance proceed rapidly and safely to transport these patients as on-scene management for stroke patients is limited.

i. EMS personnel should be aware that stroke can affect individuals of any age, including children, adolescents and young adults as well as older adults [Evidence Level C].

ii. EMS personnel should use a standardized acute stroke out-of-hospital diagnostic screening tool as part of on scene assessment [Evidence Level B]. Refer to Table 3.2 Canadian Stroke Best Practices Table of Standardized Acute Stroke Out-of-Hospital Diagnostic Screening Tools.

iii. EMS personnel should obtain information from patient and/or family members about the suspected stroke event (presenting symptoms, time of onset or time of symptom recognition or time last known well, and sequence of events), co-morbid conditions, and any formal or informal advance directives that may influence care by EMS and in the emergency department [Evidence Level C].

iv. On-scene time with suspected stroke patients should be as short as possible; ideally less than 15 minutes for patients who present within the 4.5-hour time window [Evidence level C].

v. Initial care provided by paramedics on-scene must include blood glucose measurement [Evidence Level B].

vi. Prior to transport, EMS personnel should provide education and instructions to family, including recommend the family/decision-maker accompany patient to hospital or be accessible by phone for decision-making, confirming time last known well, and be able to provide required information about existing health conditions, current medications and other information as needed [Evidence Level C].

Note: Screening for potential stroke should be done early in the on-scene assessment. If the stroke screen is positive and the patient is eligible for reperfusion, all actions on scene from that point should be directed at moving to the ambulance and beginning transport. All treatments not immediately required (IV’s, etc.) should wait until the patient is en route to the hospital. Scene time is an important variable that EMS professionals can control and needs to be monitored very closely. Time lost due to inefficient scene care cannot be made up during subsequent transport to hospital (e.g., through use of lights and sirens).

3.2.3 Transport of Suspected Stroke Patients

i. Direct Transport Protocols must be in place to facilitate the transfer of suspected hyperacute stroke patients who are potentially eligible for thrombolytic therapy to the closest and most appropriate acute care facility capable of providing services for the diagnosis and hyperacute treatment of stroke [Evidence Level C].

ii. Direct Transport Protocol criteria must be based on:

   a. the medical stability of the patient;

   b. the advanced acute stroke care emergency department performance which is recommended as being 60 minutes or less from arrival to treatment time.
(door-to-needle time);

c. the pre-hospital phase, including symptom duration and anticipated transport 
   time, being 3.5 hours or less; and

d. other acute care needs of the patient [Evidence Level B].

iii. The emergency medical services system must be set up to categorize patients 
    exhibiting signs and symptoms of a hyperacute stroke as a high priority for 
    evaluation, response and transport [Evidence Level C].

iv. Patients with suspected stroke should be triaged by EMS personnel as Canadian Triage 
    Acuity Scale (CTAS) Level 2 in most cases, and as a CTAS Level 1 for patients presenting 
    with severe symptoms or compromised airway, breathing or cardiovascular function 
    [Evidence Level B].

   a. For pediatric stroke cases, patients with suspected stroke should be triaged by EMS 
      personnel as Pediatric Canadian Triage Acuity Scale (P-CTAS) Level 2 in most 
      cases, and as a P-CTAS Level 1 for patients presenting with severe symptoms or 
      compromised airway, breathing or cardiovascular function [Evidence Level C].

v. While en route to the receiving hospital, paramedics should notify the emergency 
    department of the incoming suspected hyperacute stroke patient; a “Code Stroke” 
    may be activated at this time in hospitals where acute stroke protocols are in place 
    [Evidence Level B].

vi. Patients who are considered ineligible for time-sensitive thrombolytic therapy should 
    be transported urgently (either directly or indirectly) to the closest hospital capable 
    of providing services for the rapid diagnosis and treatment of stroke (emergency 
    department, access to neuroimaging, and stroke expertise on site or through 
    telestroke) [Evidence Level C].

3.2.4 Hospital Arrival and EMS Handover to Emergency Department Staff

i. Transfer of care from paramedics to receiving facility personnel should occur with 
   minimal delay; patients with suspected hyperacute stroke who are potentially 
   eligible for thrombolytic therapy should receive the highest priority in the ED triage 
   queue [Evidence Level B]. Refer to Recommendation 3.3 for more information.

ii. Paramedics should provide the receiving hospital with the following information 
    during patient transport or on hospital arrival: time of stroke onset or time of symptom 
    recognition or time when last known well (as accurate as possible), total symptom 
    duration time at anticipated time of arrival in the ED, Glasgow Coma Scale score 
    (GCS), CTAS triage score (or P-CTAS), patient age, and expected time of arrival at 
    the receiving hospital [Evidence Level C].

   a. Paramedics should ensure all information noted in ‘i’ is documented on the 
      patient’s EMS record and provided to the receiving hospital during transport 
      with prenotification and upon arrival to the hospital [Evidence Level B].

Clinical Considerations:

- The term ‘eligible’ is usually defined within regional jurisdictions. Generally it refers to 
  acute stroke patients within the 4.5 hour time window, however local definitions 
  should be clarified during implementation of these guidelines.

- In some institutions the tPA time frame may extend beyond 4.5 hours under the
These factors should be taken into consideration during transport and prior agreements should be in place between the EMS dispatch and the receiving hospitals.

- In regions with a specialized paediatric hospital every attempt should be made to transport children with symptoms of stroke to that specialized paediatric hospital.

<table>
<thead>
<tr>
<th>Best Practice Recommendation 3.3</th>
<th>Emergency Department Evaluation and Management of Patients with Transient Ischemic Attack and Acute Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3</td>
<td>All patients presenting to an emergency department with suspected stroke or transient ischemic attack must have an immediate clinical evaluation and investigations to establish the diagnosis, rule out stroke and TIA mimics, determine eligibility for thrombolytic therapy, and develop a plan for further management [Evidence Level B]. Patients presenting with stroke or transient ischemic attack should not be discharged from the ED without diagnostic evaluations, consideration of functional impairments, initiation or modification of secondary prevention therapy, and a plan for ongoing management [Evidence Level B].</td>
</tr>
<tr>
<td>3.3.1 Initial Evaluation</td>
<td></td>
</tr>
<tr>
<td>i.</td>
<td>Patients with suspected acute stroke should have a rapid initial evaluation for airway, breathing and circulation [Evidence Level B].</td>
</tr>
<tr>
<td>ii.</td>
<td>A neurological examination should be conducted to determine focal neurological deficits and assess stroke severity [Evidence Level B]. A standardized stroke scale should be used (such as the National Institute of Health Stroke Scale or the Canadian Neurological Scale). Refer to Table 3.3A Screening and Assessment Tools for Acute Stroke for more detailed information.</td>
</tr>
<tr>
<td>iii.</td>
<td>Monitoring in the acute phase should include heart rate and rhythm, blood pressure, temperature, oxygen saturation, hydration, swallowing ability, and presence of seizure activity [Evidence Level B].</td>
</tr>
<tr>
<td>iv.</td>
<td>Acute blood work should be conducted as part of the initial evaluation [Evidence Level B]. Initial blood work should include: electrolytes, glucose, hematology (CBC), coagulation (INR, aPTT), creatinine, glomerular filtration rate (GFR), BUN, lipid profile, liver panel, and troponin. Refer to Table 3.3B Recommended Laboratory Investigations for Acute Stroke and Transient Ischemic Attack for additional detailed information on laboratory tests.</td>
</tr>
<tr>
<td>a.</td>
<td>Additional blood work may be required if a prothrombotic or vasculitic cause is suspected [Evidence Level C].</td>
</tr>
<tr>
<td>v.</td>
<td>Electrocardiogram and chest X-ray should be completed, especially where the patient has a clinical history or evidence of heart disease or pulmonary disease [Evidence Level B].</td>
</tr>
<tr>
<td>a.</td>
<td>However, for patients without cardiac or pulmonary symptoms, chest x-ray should not delay assessment for thrombolysis and can be deferred until after a decision regarding thrombolysis therapy is made. [Evidence Level C].</td>
</tr>
<tr>
<td>vi.</td>
<td>Patient swallowing screen should be completed as early as possible as part of initial assessment, but should not delay decision-making regarding eligibility for thrombolysis. [Evidence level A].</td>
</tr>
</tbody>
</table>
a. Patients should remain NPO (no oral intake) until swallowing screen completed for patient safety [Evidence Level B];

b. Oral medications should not be administered until swallowing screen has been completed [Evidence Level B]; alternate routes such as intravenous and rectal should be considered until swallowing ability verified;

c. A patient’s clinical status can change in the first hours following a stroke or TIA, therefore patients should be closely monitored for changes in swallowing ability following initial screening [Evidence level C];

d. Patients found to have abnormal swallowing ability on screening should be referred to a speech-language pathologist or other qualified professionals for an in-depth dysphagia assessment [Evidence Level B].

Refer to Recommendations 4.2 and 5.7 for additional information on screening for swallowing ability and dysphagia management.

vii. Seizure Assessment: New-onset seizures at the time of an acute stroke, occurring either immediately before or within 24 hours of the stroke onset, should be treated using appropriate short-acting medications (e.g. lorazepam IV) if they are not self-limiting [Evidence Level C]. Treatment may be required before completing hyperacute investigations for stroke, including brain and vascular imaging.

a. A single, self-limiting seizure occurring at the onset, or within 24 hours after an acute stroke (considered an “immediate” post-stroke seizure) should not be treated with long-term anticonvulsant medications [Evidence Level C].

b. Patients that have an immediate post-stroke seizure should be monitored for recurrent seizure activity during routine monitoring of vital signs and neurological status. Recurrent seizures in patients with ischemic stroke should be treated as per treatment recommendations for seizures in other neurological conditions [Evidence Level C].

- Seizures are a common presentation with stroke in neonates and children. Consider enhanced or increased seizure monitoring in at-risk populations such as neonates, children with stroke and adults with otherwise unexplained reduced level of consciousness [Evidence Level C];

- Electroencephalogram monitoring may be appropriate in patients at high risk of seizures, such as neonates and children [Evidence Level C].

c. Patients with one or more seizures in the early (defined as occurring up to four weeks post index stroke) or late (occurring beyond four weeks) post-stroke period should be treated as per treatment recommendations for seizures in other neurological conditions [Evidence Level C]. Other investigations may include electroencephalogram (EEG) and tests to rule out other precipitating factors of seizures (e.g., infections) may be warranted in these patients [Evidence Level C].

d. Prophylactic use of anticonvulsant medications in patients with acute stroke is not recommended [Evidence Level C]. There is no evidence to support the prophylactic use of anticonvulsant medications in patients with acute stroke and there is some evidence to suggest possible harm with negative effects on neural recovery.
### 3.3.2 Neurovascular Imaging

All patients with suspected acute stroke should undergo brain and vascular imaging of the brain and neck arteries immediately (CT/CTA, or MRI/MRA if urgently available) [Evidence Level A].

All patients with suspected transient ischemic attack should undergo brain imaging immediately (CT, or MRI if urgently available) [Evidence Level A], and vascular imaging of the brain and neck arteries within 24 hours [Evidence Level B].

**Note:** It is important to optimize time from patient arrival to tPA decision and administration initiation. Advanced imaging should not result in delays to tPA administration.

1. A non-contrast CT scan of the brain should be performed as a first step with or without CT angiography [Evidence Level B].
2. If MRI is performed emergently, it should include diffusion-weighted (DWI) sequences with apparent diffusion co-efficient (ADC) map to detect recent infarction, gradient echo (GRE) for diagnosis of hemorrhage, and fluid-attenuated inversion recovery (FLAIR) sequences to determine extent of infarct [Evidence Level B].
3. Non-invasive vascular imaging of the carotid and vertebral arteries by duplex ultrasonography, CT angiography (CTA), or magnetic resonance angiography (MRA) should be performed at the time of brain imaging or as soon as possible for an ischemic stroke, and within 24 hours of a transient ischemic attack unless the patient is clearly not a candidate for revascularization [Evidence Level B].
   - a. Ideally CTA or MRA is performed at the time of the initial CT or MRI;
   - b. By contrast to Duplex ultrasonography, CTA or MRA are preferred as they advantageously show the anatomy of intracranial arteries and of the posterior circulation. [Evidence Level C].
4. Non-invasive imaging of the extracranial and intracranial vessels is preferable. However, in some circumstances catheter angiography of the extracranial and intracranial vessels may be considered [Evidence Level B].

### 3.3.3 Cardiovascular Investigations

1. An initial electrocardiogram (ECG) should be completed on all stroke and TIA patients on arrival to the ED [Evidence Level B].
2. If the initial ECG does not identify an arrhythmia, serial ECGs (i.e., daily) should be done over the first 72 hours post-stroke to detect atrial fibrillation and other acute arrhythmias [Evidence Level B].
3. Perform an echocardiogram in patients where a cardiac cause of stroke is suspected, including in young adults and children who present with stroke, and when infectious endocarditis is suspected [Evidence Level B].

Refer to Recommendation 4.2.1 for additional information.

### 3.3.4 Acute Blood Pressure Management

There is a lack of clear evidence from randomized controlled trials to guide the treatment of elevated blood pressure within the first few hours after an acute ischemic or hemorrhagic stroke. Pharmacological agents and routes of administration should be chosen to avoid precipitous falls in blood pressure [Evidence Level C]. The following recommendations reflect the paucity of evidence in this area and indicate the need for further research.

1. Ischemic stroke eligible for thrombolytic therapy: Very high BP (>185/110mmHg) should...
be treated concurrently in patients receiving thrombolytic therapy for acute ischemic stroke as this may reduce the risk of secondary intracranial hemorrhage [Evidence Level B].

ii. Ischemic stroke patients not eligible for thrombolytic therapy: Treatment of hypertension in the setting of acute ischemic stroke should not be routinely undertaken [Evidence Level C].
   a. Extreme blood pressure elevation (e.g. systolic > 220 or diastolic > 120mmHg) may be treated to reduce the blood pressure by ~15 percent, and not more than 25%, over the first 24h with gradual reduction thereafter [ Evidence Level C];
   b. Avoid excessive lowering of blood pressure as this may exacerbate existing ischemia or may induce ischemia, particularly in the setting of intracranial arterial occlusion or extracranial carotid or vertebral artery occlusion [Evidence Level C].

Note: New information regarding acute blood pressure management for stroke patients is forthcoming at the 2013 European Stroke Conference, with release of the INTERACT2 trial results on May 30th, 2013. This new information will be considered and incorporated into these recommendations as appropriate when it becomes publicly available.

3.3.5 Blood Glucose Abnormalities

i. All patients with suspected acute stroke should have their blood glucose concentration checked immediately [Evidence Level B].

ii. Blood glucose measurement should be repeated if the first random glucose value is elevated greater than 11.0 mmol/L. The repeat measures should include a fasting glucose and an HbA1c [Evidence Level C].

iii. Hypoglycemia should be corrected immediately [Evidence Level B].

iv. If the repeat glucose levels and the HbA1c are elevated (fasting glucose greater than 7 mmol/L; HbA1c greater than or equal to 6.5 percent) (CDA 2013), the use of anti-hyperglycemic agents should be considered [Evidence Level C in the setting of acute stroke], and in the longer term, education on lifestyle changes and diabetes [Evidence Level A]. Refer to Recommendation 2.4 for additional information.

3.3.6 Additional Management Considerations in the Emergency Department

i. For some patients, based on clinical presentation and medical history, additional investigations should be considered [Evidence level B]. Refer to Table 3.3B for additional detailed information.

ii. The use of indwelling urethral catheters should be avoided due to the risk of urinary tract infections [Evidence Level A]. Refer to Recommendation 4.2.5 for additional detailed information.
   a. If used, indwelling catheters should be assessed daily and removed as soon as possible [Evidence Level A].
   b. Fluid status and urinary retention should be assessed as part of vital sign assessments [Evidence Level C].
   c. Excellent pericare and infection prevention strategies should be implemented to minimize risk of infections [Evidence Level C].
Best Practice Recommendation 3.4  

Acute Thrombolytic Therapy

All patients with disabling acute ischemic stroke who can be treated within 4.5 hours of symptom onset should be evaluated without delay by a physician with stroke expertise (either on-site or by telemedicine/telestroke consultation) to determine their eligibility for treatment with intravenous tissue plasminogen activator (tPA) (Alteplase) [Evidence Level A].

3.4.1 Intravenous Thrombolysis

i. Eligible patients are those who can receive intravenous tPA within 4.5 hours of the onset of stroke symptoms in accordance with criteria adapted from National Institute of Neurological Disorders and Stroke (NINDS) tPA Stroke Study and the European Cooperative Acute Stroke Study (ECASS III) [Evidence Level A]. (Refer to Box 3.4 for inclusion and exclusion criteria for tPA eligibility.)

ii. All eligible patients should receive intravenous tPA as soon as possible after hospital arrival, with a target door-to-needle time of less than 60 minutes [Evidence Level C].

iii. Administration of tPA should follow the American Stroke Association guidelines using a dose of 0.9 mg/kg to a maximum of 90 mg total dose, with 10 percent (0.09 mg/kg) given as intravenous bolus over one minute and the remaining 90 percent (0.81 mg/kg) given as an intravenous infusion over 60 minutes [Evidence Level A].

*Caution: the dosing of tPA for stroke is not the same as the dosing protocol for administration of tPA for myocardial infarction.*

iv. Features of early ischemia on the initial brain CT scan in an acute ischemic stroke patient may predict responsiveness to tPA and risk of post-tPA intracerebral hemorrhage, and should be assessed using the Alberta Stroke Program Early CT Score (ASPECTS).

   a. In patients with brain CT scans showing early signs of more extensive infarction, represented by an ASPECTS of less than five, the decision to treat or not treat with tPA should be made based on the clinical judgment of the treating physician [Evidence Level B].

   b. Where the technology and expertise are available, advanced imaging studies such as CTA should be completed with the initial brain CT [Evidence Level C].

   c. When it is unclear whether or not a patient should be treated with tPA, urgently consult with a stroke specialist within the institution or through telestroke services [Evidence Level C].

v. There remain situations in which clinical trial data to support the use of intravenous thrombolytic therapy is more limited. In these situations urgent consultation with a stroke expert is recommended alongside the clinical judgement of the treating physician and discussion with the patient [Evidence Level B]. This applies to:

   a. pediatric stroke (newborn to age 18 years);

   b. pregnant women with stroke;

   c. adults who present within the first few hours of onset of an acute ischemic stroke but do not initially meet criteria for treatment with intravenous tPA.

vi. Hospital inpatients that present with a sudden onset of new stroke symptoms should be rapidly evaluated by a specialist team and provided with access to appropriate hyperacute interventions (including thrombolysis) [Evidence Level B].
vii. Management of Complications from tPA Administration:
   a. use of fresh frozen plasma, prothrombin complex concentrates, or platelet transfusions is not recommended for tPA-associated bleeding [Evidence Level C];
   b. for tPA-induced angioedema, discontinue the tPA infusion if it is still running, obtain assistance for airway management if required, and give intravenous hydrocortisone 100 mg, diphenhydramine 50 mg, and ranitidine 50 mg. The use of epinephrine should be weighed against the risk of sudden hypertension and the risk of intracranial hemorrhage [Evidence Level C].

3.4.2 Endovascular Therapies for Acute Ischemic Stroke Treatment

i. Endovascular therapies for acute ischemic stroke treatment, including intra-arterial delivery of thrombolytic drug and/or endovascular mechanical thrombectomy by device or by aspiration, are being investigated as additions to acute stroke thrombolysis. However, IV thrombolysis remains the standard of care for hyperacute ischemic stroke treatment for appropriate patients [Evidence Level A].
   a. Endovascular therapies for acute ischemic stroke should ideally be reserved for investigational use in the context of randomized controlled trials [Evidence Level C].
   b. Endovascular therapy is a possible therapeutic addition to intravenous thrombolysis in highly selected circumstances. Emergency consultation with stroke experts and interventional radiology experts is relevant for this kind of decision-making [Evidence Level C].

ii. Endovascular mechanical thrombectomy alone, without intravenous or intra-arterial tPA, is a possible therapeutic option for patients who do not qualify for tPA thrombolysis due to increased systemic bleeding risks [Evidence Level C].

Clinical Considerations:

- tPA is still the standard of care, and currently the only approved agent for acute ischemic stroke treatment. There are other drugs being investigated; however, at this time are not approved for use in stroke patients.
- The IST3 trial (2012) suggests that in some patients it is safe to administer tPA up to 6 hours from time last known well. At this time, the evidence is not strong enough to extend recommended treatment times for tPA out to six hours for intravenous therapy.
- tPA administration for patients on novel oral anticoagulants (NOACs): until such time when there is a commercially available and validated assessment tool for NOAC levels, and until such time as it is reliably known what these levels mean clinically, tPA should not routinely be administered to patients on NOACs presenting with acute ischemic stroke.

Note on Alteplase approval status in Canada:

In Canada, Alteplase is approved by Health Canada for use in adults with acute ischemic stroke within three hours after the onset of stroke symptoms; the manufacturer has not yet applied to extend the time window.
**Best Practice Recommendation 3.5**

**Acute Aspirin Therapy**

All acute stroke patients not already on an antiplatelet agent should be given at least 160 mg of acetylsalicylic acid (ASA) immediately as a one-time loading dose after brain imaging has excluded intracranial hemorrhage [Evidence Level A].

i. In patients treated with tissue plasminogen activator (tPA), acetylsalicylic acid (ASA) should be delayed until after the 24-hour post-thrombolysis scan has excluded intracranial hemorrhage [Evidence Level B].

ii. Acetylsalicylic acid (80 to 325 mg daily) should then be continued indefinitely or until an alternative antithrombotic regime is started [Evidence Level A].

Refer to Recommendations 2.5 and 2.6 for additional information.

iii. In dysphagic patients, acetylsalicylic acid may be given by enteral tube or by rectal suppository [Evidence Level A].

iv. In pediatric patients, initial treatment with anticoagulation (heparin) or aspirin at established pediatric dosing should be considered and continued until cervical artery dissection and intracardiac thrombus is excluded. If neither is present, switch to acute aspirin therapy at dose of 1-5 mg/kg [Evidence Level B]. (Roach et al 2008)

v. In patients already on acetylsalicylic acid prior to ischemic stroke or transient ischemic attack, clopidigrel may be considered as an alternative [Evidence Level B]. If rapid action is required then a loading dose of 300 mg of clopidigrel could be considered, followed by a maintenance dose of 75 mg once a day [Evidence Level B].

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**Best Practice Recommendation 3.6**

**Early Management of Acute Subarachnoid Hemorrhage**

3.6 Patients with aneurysmal subarachnoid hemorrhage should be treated as a medical emergency and evaluated immediately by physicians with expertise in stroke management [Evidence Level B]. There is a high early risk for rebleeding in SAH patients; therefore they should be assessed without delay [Evidence Level B].

3.6.1 Initial Clinical Assessment of a Patient with SAH

i. Patients with suspected subarachnoid hemorrhage should have a non-contrast CT scan as soon as possible after hospital arrival to confirm the diagnosis [Evidence Level B].

ii. Patients with a strongly suggestive clinical history of subarachnoid hemorrhage, but negative non-contrast CT scan as reported by a radiologist, should undergo lumbar puncture for cerebrospinal fluid analysis [Evidence Level B].

   a. Xanthochromia evaluation may be more sensitive after a minimum delay of 4 hours from onset of headache but such a delay may not be practical or clinically appropriate [Evidence Level B].

   b. Cerebrospinal fluid analysis for xanthochromia by spectrophotometry is preferable to visual inspection, but is not routinely available in Canada [Evidence Level B].

iii. Patients with subarachnoid hemorrhage should undergo vascular imaging of the brain. High-quality CT angiography may be preferable to catheter angiography as an initial investigation [Evidence Level B], but catheter angiography should still be considered as the “gold standard” when initial CTA is negative.

   Note: Highly suspicious SAH undergoing CTA requires visualization of the vasculature starting from the aortic arch, including cervical and intracranial arteries, to identify all
possible hemorrhage sites.

iv. The severity of subarachnoid hemorrhage patients should be determined using a validated scale (strong predictors of patient outcomes after an SAH) [Evidence Level B].
   a. Recommended assessment tools may include: World Federation of Neurological Surgeons (WFNS), Glasgow Coma Scale (GCS), Hunt and Hess scale (H&H), National Institute of Medicine Stroke Scale (NIHSS), and the Fisher Scale. Other tools may be considered as appropriate to individual patients.

3.6.2 Consultation with Neurosurgery for Patients with Subarachnoid Hemorrhage
   i. Patients with subarachnoid hemorrhage should have an urgent consultation with a neurosurgeon [Evidence Level B].

3.6.3 Interventions for Patients with Subarachnoid Hemorrhage
   i. Once a subarachnoid hemorrhage is confirmed, patients initially seen in non-comprehensive stroke centres should be transferred to a tertiary centre for ongoing management [Evidence Level C].
   ii. Patients with subarachnoid hemorrhage and negative non-invasive vascular imaging should be considered for further imaging with catheter angiography [Evidence Level C].
   iii. Patients who present within 96 hours of a subarachnoid hemorrhage and have an adequate blood pressure should immediately be started on nimodipine 60 mg every four hours by mouth for 14 to 21 days [Evidence Level A].
   iv. Patients with an aneurysmal subarachnoid hemorrhage should have the aneurysm secured urgently by endovascular coiling or microsurgical clipping, ideally within 24 to 48 hours [Evidence Level B].
   v. Patients with aneurysmal subarachnoid hemorrhage and CT evidence of hydrocephalus that is clinically symptomatic should undergo urgent placement of an external ventricular drain (EVD) or other cerebrospinal fluid diversion technique [Evidence Level B].
   vi. For subarachnoid hemorrhage patients with intraparenchymal extension at the time the aneurysm is secured, urgent evacuation of the hematoma should be considered [Evidence Level C].
   vii. For most patients with subarachnoid hemorrhage who are technically eligible for endovascular or microsurgery treatment, an endovascular approach is preferred (ISAT trial) [Evidence Level A].
      a. Decisions regarding modality of treatment should be based on patient-specific characteristics, which include consideration of patient age, clinical grade, size, location and morphology of the aneurysm, medical co-morbidity and institutional experience and resources [Evidence Level B].
   viii. In the absence of seizures, routine use of prophylactic anti-convulsants is not recommended [Evidence Level B].

3.6.4 Blood Pressure Management
   i. Patients with an unsecured aneurysm in a subarachnoid hemorrhage should have their blood pressure closely monitored and maintained as normotensive [Evidence Level B].
   ii. Treatment for high blood pressure should be initiated while the aneurysm is unsecured to reduce the risk of hypertension-induced rebleeding and maintain cerebral perfusion
pressure (ASA 2012) [Evidence Level B].

3.6.5 Additional Aspects of Clinical Management

i. Neurological assessment should be conducted as part of regular vital signs, using standardized assessment tools throughout the course of stay to monitor changes, and ideally every two to four hours until patient is stable [Evidence Level C].
   a. Frequency of neurological assessment should be adjusted according to patients condition (e.g., frequency may increase during episodes of vasospasm);
   b. Recommended assessment tools may include: Glasgow Coma Scale (GCS), National Institutes of Health Stroke Scale (NIHSS). Other tools may be considered as appropriate to individual patients.

ii. Patients with SAH should have the head of their bed elevated 30 degrees for at least first 24 to 48 hours [Evidence Level B].

iii. Elevated temperature should be treated to achieve normothermia in SAH patients [Evidence Level B]. Refer to Recommendation 4.2 for additional information.

iv. Patients with subarachnoid hemorrhage should receive venous thromboembolism prophylaxis [Evidence Level A].
   a. Sequential compression devices may be preferred in the early stages prior to having the aneurysm secured. Refer to recommendation 4.2 for additional information.

v. For patients with poor prognosis for neurological recovery, an initial course of supportive non-surgical management may be appropriate [Evidence Level B].
   a. Goals of care should be established early after patient arrival at hospital, with patient and/or designated substitute decision-maker (Evidence Level B);
   b. “Do not resuscitate” (DNR) discussion should not occur with the patient’s family until such a time as there is no significant response to medical treatment or worsening despite medical care;
   c. Patients who are given DNR status at any point should receive all other appropriate medical and surgical interventions unless otherwise explicitly indicated. Pre-existing DNR orders should be considered where appropriate.

Best Practice Recommendation 3.7 Early Management of Intracerebral Hemorrhage

3.7 Patients with intracerebral hemorrhage must be treated as a medical emergency. Intracerebral hemorrhage should be promptly recognized and patients evaluated immediately by physicians with expertise in hyperacute stroke management [Evidence Level A].

3.7.1 Initial Clinical Assessment of an ICH Patient

i. An NIHSS should be conducted on awake or drowsy patients, or a GCS on patients who are obtunded, semi or fully comatose, as part of initial assessment to determine baseline severity of neurological impairments [Evidence Level B]. This has been found to be a strong predictor of outcomes following ICH.

ii. Patients with suspected intracerebral hemorrhage should undergo a CT or MRI immediately to confirm diagnosis, location and extent of hemorrhage [Evidence Level
iii. In patients with confirmed acute intracerebral hemorrhage, CT angiography, MR angiography, or catheter angiography is recommended to exclude an underlying lesion such as an aneurysm, arteriovenous malformation, or tumor [Evidence Level B].

iv. Evaluation of patients with acute intracerebral hemorrhage should include questions about anticoagulant therapy, measurement of platelet count, partial thromboplastin time (PTT) and International Normalized Ratio (INR) [Evidence Level A].

v. Patients should be assessed for clinical signs of increased intracranial pressure [Evidence Level B].

vi. A Canadian Neurological Scale (CNS) score should be conducted (usually by nurses) on baseline and repeated every 30 to 60 minutes, depending on stability of patient. Stability will be determined based on size of bleed, location of bleed, and patient’s clinical status [Evidence Level C].

### 3.7.2 Blood Pressure Management

i. Blood pressure should be assessed on initial arrival to the emergency department and every 15 minutes thereafter until blood pressure has stabilized [Evidence Level C].

   a. The target for stabilized blood pressure is either a blood pressure that can spontaneously remain less than 180 mmHg, or can be adequately controlled through the use of antihypertensive medications [Evidence Level C].

   b. Close blood pressure monitoring (e.g. every 30 to 60 minutes, or more frequently if above target) should continue for at least the first 24 to 48 hours [Evidence Level C].

ii. Patients with elevated blood pressure should be treated to maintain systolic blood pressure less than 180 mmHg, and there is evidence demonstrating it is safe to target systolic blood pressure to less than 160 mmHg [Evidence Level B]. There is presently no evidence that lower targets are associated with better clinical outcomes, and research is ongoing in this area.

   a. Labetalol is an acceptable choice for treatment for acute blood pressure management if there are no contraindications [Evidence Level B].

   b. Blood pressure targets in ICH patients may be challenging to achieve and require careful monitoring, and in some cases aggressive repeated dosing or intravenous infusion of antihypertensive medications [Evidence Level C].

iii. Patients with suspected or confirmed raised global intracranial pressure (ICP), including those with larger ICH volumes and/or decreased levels of consciousness (LOC), may be more vulnerable to acute blood pressure reductions. Therefore blood pressure parameters should be established on an individual basis to ensure adequate cerebral perfusion [Evidence Level C].

iv. After the first 24 to 48 hours following the onset of an ICH, further blood pressure lowering should be continued with the initiation of parenteral or oral antihypertensive medications (depending on swallowing ability), to achieve individualized blood pressure targets that will optimize secondary stroke prevention [Evidence Level B].

### 3.7.3 Management of Anticoagulation

i. Patients with acute intracerebral hemorrhage and an established coagulopathy or a history of anticoagulation medications should be promptly assessed with laboratory tests...
(INR/ PTT) and have a medical treatment plan to control bleeding [Evidence Level B].

ii. Warfarin use should be treated appropriately to reverse the coagulopathy with prothrombin complex concentrate (PCC) and Vitamin K 10 mg IV. Fresh-frozen plasma and Vitamin K could be used as alternative if PCC is not available [Evidence Level B].

iii. ASA should be stopped immediately in patients who present who are routinely on ASA and/or have taken ASA to manage headache symptoms [Evidence Level C].

iv. Novel oral anticoagulants (NOAC) use requires urgent consultation with a hematologist in the absence of direct reversal agents [Evidence Level C].

v. If there is a persisting strong indication for anticoagulation (e.g. mechanical heart valve), the decision about when to restart anticoagulant therapy should be made on a case-by-case basis [Evidence Level C]. The evidence is unclear regarding timing to restart anticoagulation. Consultation with a cardiologist, hematologist/ thrombosis expert may be considered to optimize individual patient care.

3.7.4 Consultation with Neurosurgery

i. Patients with cerebellar hemorrhage should be referred for urgent neurosurgical consultation and consideration of evacuation of intracerebral hemorrhage particularly in the setting of altered level of consciousness or new cranial neuropathy [Evidence Level A].

ii. Patients with new onset of acute hydrocephalus requiring placement of external ventricular drain (EVD) should be referred for urgent neurosurgical consultation [Evidence Level A]

iii. Select patients with acute supratentorial intracerebral hemorrhage may be considered for surgical intervention with craniotomy for evacuation of superficial lobar intracerebral hemorrhage [Evidence Level B].

iv. Early consultation with a neurosurgeon is recommended in cases where decompressive craniectomy is considered [Evidence Level C]. Refer to Recommendation 3.8 on Hemicraniectomy for additional information

3.7.5 Initial Interventions for ICH Patients

i. Medically stable patients with an acute intracerebral hemorrhage should be admitted to a Stroke Unit or neuro-intensive care unit [Evidence Level B], and undergo interprofessional stroke team assessment to determine their rehabilitation and other care needs. Refer to Recommendation 5.1 on Rehabilitation Assessment for additional information.

ii. Administration of recombinant Factor VIIa (NiaStase®) prevents hematoma growth, but increases the risk of arterial thromboembolic phenomena and does not provide a clinical benefit for survival or outcome. It is not recommended for use outside of clinical trials at this time, and clinical trials are currently ongoing to address this issue [Evidence Level A].

iii. Statin therapy is not indicated for prevention of intracerebral hemorrhage. For intracerebral hemorrhage patients who have a clear concomitant indication for cholesterol lowering treatment, statin therapy should be individualized and should take into account the patient’s overall thrombotic risk as well as the possibility of increased risk of intracerebral hemorrhage on statin therapy [Evidence Level B]. Refer to Recommendation 2.4 on Lipid Management for additional information

iv. Beyond the acutely symptomatic period, patients with intracerebral hemorrhage should
be managed similarly to those with ischemic stroke, except for avoidance of antithrombotic medications [Evidence Level B].

a. Goals of care should be established early after patient arrival at hospital, with patient and/or designated substitute decision-maker [Evidence Level B].

b. Discussion with most patients and their families regarding “do not resuscitate” (DNR) status should not occur until 24 to 48 hours following stroke onset, and if there is no significant response to medical treatment, or if there the patient’s condition is worsening despite optimal medical care [Evidence Level C].

c. Patients who are given DNR status at any point should receive all other appropriate medical and surgical interventions unless otherwise explicitly indicated. Pre-existing DNR orders should also be re-assessed after 24 to 48 hours [Evidence Level C].

d. Currently there is no role for prophylactic anti-convulsant treatment [Evidence Level C]. If a patient were to present with or proceed to have a seizure, anti-convulsants should be initiated. Refer to Recommendations 3.3 and 4.2 for additional information.

<table>
<thead>
<tr>
<th>Best Practice Recommendation 3.8</th>
<th>Early Management of Patients Considered for Hemicraniectomy</th>
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<tbody>
<tr>
<td>3.8</td>
<td>Hemicraniectomy should be considered in younger patients in the early stages of malignant middle cerebral artery territory ischemic stroke [Evidence Level B].</td>
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</table>

### 3.8.1 Patient Selection

i. Patients who meet the following criteria alone or in combination should be considered for Hemicraniectomy [Evidence Level A]:

   a. Patients between the age of 18 and 60 years;
   
   b. For children under 18 years, emerging evidence supports early Hemicraniectomy in children with progressive malignant MCA syndrome [Evidence Level C];
   
   c. Malignant middle cerebral artery territory ischemic stroke;
   
   d. Infarction size greater than 50% MCA territory on visual inspection, or an ischemic lesion volume greater than 150 cm³;
   
   e. GCS less than eight within 24 hours after stroke onset and following reperfusion treatment;
   
   f. Worsening GCS, NIHSS, CNS, or PedNIHSS scale scores, or imaging indications of worsening edema at any time from presentation.

   ii. If patient location is initially outside a comprehensive stroke centre, patient should have expedited transfer to tertiary or quaternary centre where advanced stroke care and neurosurgical services are available [Evidence Level C].

### 3.8.2 Initial Clinical Evaluation

i. Urgent consult with a stroke specialist for assessment and for determination to involve neurosurgery [Evidence Level C].

   ii. For patients who meet criteria for potential hemicraniectomy during initial assessment, an urgent neurosurgical consultation should be initiated, either in-person or via telemedicine.
(Telestroke services) [Evidence Level C].

iii. Initiate a discussion with patient, family members and legal decision-maker regarding a potential Hemicraniectomy [Evidence Level C].
   a. Key issues to be discussed with decision-makers include: stroke diagnosis and prognosis untreated, the risks of surgery, the possible and likely outcomes following surgery, and the patient’s previously expressed wishes concerning their treatment in the event of catastrophic illness.

3.8.3 Patient Management Prior to Hemicraniectomy Surgery

i. Once decision for hemicraniectomy has been confirmed, surgery should take place within 48 hours of initial presentation [Evidence Level A].

ii. Patients should be transferred to an intensive care unit or neuro step-down unit for close and frequent monitoring of neurological status prior to surgery [Evidence Level B].
   a. Monitoring should include assessments of level of consciousness (e.g., using Glasgow Coma Scale), symptom worsening severity, and blood pressure at least hourly, and more frequently as individual patient condition requires [Evidence Level C].
   b. If changes in status occur, the stroke team and neurosurgeon should be notified immediately for re-evaluation of patient [Evidence Level C]. Change in status may include level of drowsiness/consciousness, change in Glasgow Coma Scale, change in CNS score by 1 point or change in NIHSS score by 4 points.
   c. Repeat or serial CT scans are recommended for patients when a change in neurological status resulting in deterioration occurs [Evidence Level C].

iii. Initiate acute BP management to treatment for high blood pressure [Evidence Level B]. Refer to Recommendation 3.3 for additional information.

iv. Hyperosmotic therapy with 20% mannitol or 3% hypertonic saline may be used in the preoperative period if required [Evidence Level C].

v. The head of the patient’s bed should be elevated 30 degrees [Evidence Level C], and patient and family members should be educated about proper head positioning [Evidence Level C].

vi. Hyperventilation should be avoided prior to surgery, except mild hyperventilation for brief periods if required [Evidence Level C].

vii. All anticoagulants should be withheld prior to hemicraniectomy [Evidence Level B].

viii. Corticosteroids not recommended as a management strategy for increased intracranial pressure for patients awaiting hemicraniectomy [Evidence Level A].

ix. If hydrocephalus occurs, it may be managed by an external ventricular drain (EVD) placed by a neurosurgeon [Evidence Level C].

x. Patients’ temperature and pain levels should be monitored frequently and elevations in temperature or pain should be treated [Evidence Level C].

xi. Education should be provided to patients and families regarding stroke, hemicraniectomy and possible issues following hemicraniectomy (such as post-stroke depression, residual deficits and level of function, and other discharge considerations) [Evidence Level C].
Best Practice Recommendation 4.1

**Stroke Unit Care**

### 4.1

Patients admitted to hospital with an acute stroke or transient ischemic attack should be treated on an inpatient stroke unit [Evidence Level A].

#### i.

Patients should be admitted to a stroke unit which is a specialized, geographically defined hospital unit dedicated to the management of stroke patients [Evidence Level A].

- For facilities without a dedicated stroke unit, the facility must strive to focus care on the priority elements identified for comprehensive stroke care delivery (including clustering patients, interprofessional team, access to early rehabilitation, stroke care protocols, case rounds, patient education). Refer to Box 4.1: Core Elements of Comprehensive Stroke and Neurovascular Care for further information.

#### ii.

The core interprofessional team on the stroke unit should consist of healthcare professionals with stroke expertise including physicians, nursing, occupational therapy, physiotherapy, speech-language pathology, social work, and clinical nutrition (dietitian) [Evidence Level A].

- All stroke teams should include hospital pharmacists to promote patient safety, medication reconciliation, provide education to the team and patients/family regarding medication(s) (especially side effects, adverse effects, interactions), discussions regarding adherence, and discharge planning (such as special needs for patients, e.g., individual dosing packages) [Evidence Level B].

- Additional members of the interprofessional team may include discharge planners or case managers, (neuro) psychologists, palliative care specialists, recreation and vocational therapists, spiritual care providers, peer supporters and stroke recovery group liaisons [Evidence Level B].

#### iii.

The interprofessional team should assess patients within 48 hours of admission to hospital and formulate a management plan [Evidence Level B].

- Clinicians should use standardized, valid assessment tools to evaluate the patient’s stroke-related impairments and functional status [Evidence Level B]. Refer to Canadian Stroke Best Practices Table 3.3A: Screening and Assessment Tools for Acute Stroke for more detailed information.

- Assessment components should include dysphagia, mobility, functional assessment, temperature, nutrition, bowel and bladder function, discharge planning, prevention therapies, venous thromboembolism prophylaxis [Evidence Level B]. Refer to Section 4.2 Recommendations for further information.

- Alongside the initial and ongoing clinical assessments regarding functional status, a formal and individualized assessment to determine the type of ongoing post-acute rehabilitation services required should occur within 72 hours post-stroke, using a standardized protocol (including tools such as the alpha-FIM®) [Evidence Level B]. Refer to Recommendation 5.3 for information on inpatient stroke rehabilitation, which should commence as early as possible during the acute care hospital stay.

#### iv.

Any child admitted to hospital with stroke should be managed in a centre with paediatric stroke expertise when available; if there is no access to specialized paediatric
services, children with stroke should be managed using standardized paediatric stroke protocols [Evidence Level B].

4.1.2 In-Hospital Stroke: Hospital inpatients who have a diagnosis of a new stroke confirmed, should be assessed in a timely fashion and receive appropriate access to acute inpatient stroke care dependent upon their level of stroke-related impairment and other presenting medical/surgical conditions [Evidence Level B].

<table>
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<tr>
<th>Best Practice Recommendation 4.2</th>
<th>Inpatient Management and Prevention of Complications Following Acute Stroke or TIA</th>
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<tbody>
<tr>
<td>Refer to Section 4.3 for the management of patients who are actively dying and require end-of-life care.</td>
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4.2 Appropriate investigations and management strategies should be implemented for all hospitalized stroke and TIA patients to optimize recovery, avoid complications, prevent stroke recurrence, and provide palliative care when required.

i. During acute inpatient care, stroke patients should undergo appropriate investigations to determine stroke mechanism and guide stroke prevention and management decisions [Evidence Level B].

ii. Individualized care plans should address nutrition, oral care, mobilization and incontinence, and reduce the risk of complications such as urinary tract infection, aspiration pneumonia, and venous thromboembolism [Evidence Level B].

iii. Discharge planning should begin as a component of the initial admission assessment and continue throughout hospitalization as part of ongoing care of hospitalized acute stroke patients [Evidence Level B]. Refer to Recommendation 6.3 for additional information.

iv. All patients, family members and informal caregivers should receive timely and comprehensive information, education and skills training by all interprofessional team members [Evidence Level A]. Refer to Recommendations 6.1 and 6.2 for additional information.

v. All acute stroke inpatients should be screened for history and/or current signs of depression or vascular cognitive impairment [Evidence Level C]. Refer to Recommendations 7.1 and 7.2 for additional information.

4.2.1 Cardiovascular Investigations

iv. Following an initial electrocardiogram, serial electrocardiograms (i.e., daily) should be done for the first 72 hours post-stroke to detect atrial fibrillation and other acute arrhythmias [Evidence Level B].

v. Patients with suspected embolic stroke or lack of clear stroke mechanism (e.g., normal neurovascular imaging) should have serial electrocardiograms in the first 72 hours combined with a Holter monitor during hospitalization to increase detection of atrial fibrillation [Evidence Level C];

vi. Echocardiography, either 2-D or transesophageal, should be considered for patients with suspected embolic stroke and normal neurovascular imaging [Evidence Level B], as well as no contraindications for anticoagulant therapy. This is particularly relevant for younger adults with stroke or TIA and unknown etiology.

vii. Children with stroke should undergo a comprehensive cardiac evaluation including
echocardiography, as well as detailed rhythm monitoring if clinically indicated [Evidence Level B].

### 4.2.2 Venous Thromboembolism Prophylaxis

All stroke patients should be assessed for their risk of developing venous thromboembolism (deep vein thrombosis and pulmonary embolism). Patients at high risk include those who are unable to move one or both lower limbs; those who are unable to mobilize independently; a previous history of venous thromboembolism; dehydration; and comorbidities such as cancer.

i. Early mobilization and adequate hydration should be encouraged for all acute stroke patients to help prevent venous thromboembolism [Evidence Level C].

ii. Patients at high risk of venous thromboembolism should be started on venous thromboembolism prophylaxis immediately if there is no contraindication (e.g., systemic or intracranial hemorrhage) [Evidence Level A].

   a. Low molecular weight heparin should be considered for patients with acute ischemic stroke at high risk of venous thromboembolism; or unfractionated heparin for patients with renal failure [Evidence Level B].

   b. The use of anti-embolism stockings alone for post-stroke venous thromboembolism prophylaxis is not recommended [Evidence Level A].

iii. For patients with active bleeding, or at high-risk of bleeding, use of pneumatic anti-embolic stockings may be reasonable [Evidence Level B].

iv. There is some evidence on the safety and efficacy of anticoagulant deep vein thrombosis prophylaxis after intracerebral hemorrhage [Evidence Level B]. Antiplatelets and anticoagulants should be avoided for at least 48 hours after onset [Evidence Level C].

   a. Patients with intracerebral hemorrhage who are judged to be at high risk of venous thromboembolism may be treated after 48 hours post-stroke onset after careful risk assessment [Evidence Level C]. Consultation with a hematologist/thrombosis expert is advised [Evidence Level C].

   **Note:** Additional research evidence from the CLOTS3 trial will become available May 30th, 2013. When it is publicly released the results will be reviewed by the Acute Stroke Writing Group and appropriate edits to this section will be made if required.

### 4.2.3 Temperature Management

i. Temperature should be monitored as part of vital sign assessments; ideally every four hours for the 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 Celsius, increase frequency of monitoring, initiate temperature-reducing care measures, investigate possible infection such as pneumonia or urinary tract infection [Evidence Level C], and initiate antipyretic and antimicrobial therapy as required [Evidence Level B].

### 4.2.4 Mobilization

**Mobilization is defined as “the process of getting a patient to move in the bed, sit up, stand, and eventually walk.”**

i. All patients admitted to hospital with acute stroke should be mobilized as early and as
frequently as possible [Evidence Level B], and ideally within 24 hours of stroke symptom onset, unless contraindicated [Evidence Level C].

a. Contraindications to early mobilization include, but may not be restricted to, patients who have had an arterial puncture for an interventional procedure, unstable medical conditions, low oxygen saturation, and lower limb fracture or injury.

ii. All patients 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 Chapter 5 for additional recommendations on mobilization following an acute stroke.

4.2.5 Continence

i. The use of indwelling catheters should be avoided due to the risk of urinary tract infection [Evidence Level A]. If used, indwelling catheters should be assessed daily and removed as soon as possible [Evidence Level A]. Excellent periare and infection prevention strategies should be implemented to minimize risk of infections [Evidence Level C].

ii. All stroke patients should be screened for urinary incontinence and retention (with or without overflow), fecal incontinence, and constipation [Evidence Level C].

iii. The use of a portable ultrasound machine is recommended as the preferred noninvasive painless method for assessing post-void residual [Evidence Level C].

iv. Possible contributing factors surrounding continence management should be assessed, including urinary tract infection, medications, nutrition, diet, mobility, activity, cognition, environment and communication [Evidence Level C].

v. Stroke patients with urinary incontinence should be assessed by trained personnel using a structured functional assessment to determine cause and develop an individualized management plan [Evidence Level B].

vi. A bladder-training program should be implemented in patients who are incontinent of urine [Evidence Level C], including timed and prompted toileting on a consistent schedule [Evidence Level B].

vii. Appropriate intermittent catheterization schedules should be established based on amount of post-void residual [Evidence Level B].

viii. A bowel management program should be implemented for stroke patients with persistent constipation or bowel incontinence [Evidence Level A].

4.2.6 Nutrition and Dysphagia

i. Interprofessional team members should be trained to complete initial swallowing screening for all stroke patients to ensure patients are screened in a timely manner [Evidence Level C].

ii. The swallowing, nutritional and hydration status of stroke patients should be screened as early as possible, ideally on the day of admission, using validated screening tools [Evidence Level B]. Refer to Table 4.2: Canadian Stroke Best Practices Swallow Screening and Assessment Tools for more information.

iii. Abnormal results from the initial or ongoing swallowing screens should prompt referral to a speech-language pathologist, occupational therapist, and/or dietitian for more detailed assessment and management of swallowing, nutritional and hydration status.
iv. Stroke patients with suspected nutritional concerns, hydration deficits, dysphagia, or other comorbidities that may affect nutrition (such as diabetes) should be referred to a dietitian for recommendations:
   a. to meet nutrient and fluid needs orally while supporting alterations in food texture and fluid consistency recommended by a speech-language pathologist or other trained professional [Evidence Level B];
   b. for enteral nutrition support (nasogastric tube feeding) in patients who cannot safely swallow or meet their nutrient and fluid needs orally. The decision to proceed with tube feeding should be made as early as possible after admission, usually within the first three days of admission in collaboration with the patient, family (or substitute decision maker), and interprofessional team [Evidence Level B].

Refer to Recommendation 5.7 for additional information on dysphagia screening, assessment and management.

4.2.7 Oral Care
i. Upon or soon after admission, all stroke patients should have an oral/dental assessment, including screening for signs of dental disease, level of oral care, and appliances [Evidence Level C].

ii. For patients wearing a full or partial denture it should 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]. The oral care protocol should be consistent with the Canadian Dental Association recommendations [Evidence Level B], and should address areas such as frequency of oral care (ideally after meals and before bedtime); types of oral care products (toothpaste, floss, and mouthwash); and management for patients with dysphagia.

iv. If concerns with implementing an oral care protocol are identified, consider consulting a dentist, occupational therapist, speech-language pathologist, and/or a 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].

4.2.8 Seizure Management
i. New-onset seizures in admitted patients with acute stroke should be treated using appropriate short-acting medications (e.g. lorazepam IV) if they are not self-limiting [Evidence Level C].
   a. A single, self-limiting seizure occurring at the onset, or within 24 hours after an ischemic stroke (considered an “immediate” post-stroke seizure) should not be treated with long-term anticonvulsant medications [Evidence Level C].
   b. Patients that have an immediate post-stroke seizure should be monitored for recurrent seizure activity during routine monitoring of vital signs and neurological status. Recurrent seizures in patients with ischemic stroke should
be treated as per treatment recommendations for seizures in other neurological conditions [Evidence Level C].

- Seizures are a common presentation with stroke in neonates and children. Consider enhanced or increased seizure monitoring in at risk populations such as neonates, children with stroke and adults with otherwise unexplained reduced level of consciousness [Evidence Level C].
- Electroencephalogram monitoring may be appropriate in patients at high risk of seizures, such as neonates and children [Evidence Level C].

c. Patients with one or more seizures in the early (defined as occurring up to four weeks post index stroke) or late (occurring beyond four weeks) post-stroke period should be treated as per treatment recommendations for seizures in other neurological conditions [Evidence Level C]. Other investigations may include electroencephalogram (EEG) and tests to rule out other precipitating factors of seizures (e.g., infections) may be warranted in these patients.

d. Prophylactic use of anticonvulsant medications in patients with ischemic stroke is not recommended [Evidence Level C]. There is no evidence to support the prophylactic use of anticonvulsant medications in patients with ischemic stroke and there is some evidence to suggest possible harm with negative effects on neural recovery.

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**Best Practice Recommendation 4.3**

**Palliative and End-of-Life Care**

4.3 Palliative and End-of-Life Care

The palliative approach should be used when there has been a catastrophic stroke or a stroke in the setting of significant pre-existing comorbidity, to optimize care for the dying stroke patient, family, and informal caregivers [Evidence Level B].

i. Communication with patients, families, and informal caregivers should provide, on an ongoing basis, information and counseling regarding diagnosis, prognosis, and management, including:

   a. the appropriateness of life-sustaining measures including mechanical ventilation, enteral/intravenous feeding, and intravenous fluids [Evidence Level B];
   b. reassessment of all medications, and recommendations for cessation of medications no longer necessary when the goals of care shift to comfort measures only (e.g., antplatelets, anticoagulants, statins, hypoglycemics) [Evidence Level C];
   c. oral care [Evidence Level C];
   d. assessment and management of pain [Evidence Level B];
   e. assessment and management of delirium [Evidence Level C];
   f. assessment and management of respiratory distress and secretions [Evidence Level B];
   g. assessment and management of incontinence, nausea, vomiting, constipation, and skin and wound care [Evidence Level C].

ii. Patients, families, informal caregivers, and the healthcare team should have access to palliative care specialists, particularly for consultation regarding patients with difficult-to-
control symptoms, complex or conflicted end-of-life decision making, or complex psycho-social family issues [Evidence Level C].

iii. The interprofessional team should have the appropriate communication skills and knowledge to address the physical, spiritual, psychological, and social needs of patients, families and informal caregivers who are receiving end-of-life care. There should be regular communication with the patient, family and informal caregivers to ensure that these needs are being met [Evidence Level C].

iv. Formalised palliative care processes and a team experienced in providing end-of-life care for stroke patients (especially nursing staff) should be considered to introduce and monitor standards of care provided to patients at the end of life [Evidence Level B].

Best Practice Recommendation 4.4 Advanced Care Planning

4.4 Advanced Care Planning

Patients surviving a stroke, as well as their families and informal caregivers, should be approached by the stroke healthcare team to participate in advance care planning [Evidence Level C].

iii. The primary goal of advance care planning conversations is to determine the individual's goals of care [Evidence Level B].

   a. Advance care planning may include identifying a substitute decision-maker (proxy or agent), implementing a personal directive [Evidence Level C], and discussion of the patient’s preferences and the medical appropriateness of therapies such as feeding tubes, hydration, treatment of the current illness, admission to intensive care, ventilation, cardio-pulmonary resuscitation, and place of care [Evidence Level B].

   b. Advanced care planning discussions should be documented in the patient’s chart and any relevant hospital-specific forms should be completed and signed by the patient or decision-maker and a member of the healthcare team [Evidence Level C].

iv. The patient’s goals of care and advanced care planning decisions should be revisited periodically, such as when there is a change in the patient’s health status [Evidence Level B].

v. The interprofessional team should have the appropriate communication skills and knowledge to address the physical, spiritual, psychological, ethical, and social needs of stroke patients, their families, and informal caregivers [Evidence Level C].

   a. Respectful discussion of patient’s values and wishes should be balanced with information regarding medically appropriate treatment related to ongoing stroke management and future medical care [Evidence Level C].
Part One: Organization of a Stroke Rehabilitation System for Optimal Service Delivery

**Best Practice Recommendation 5.1**

<table>
<thead>
<tr>
<th>Best Practice Recommendation 5.1</th>
<th>Initial Stroke Rehabilitation Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients with acute stroke should be assessed to determine the severity of stroke and early rehabilitation needs.</td>
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<tr>
<td>i. All patients <strong>admitted to hospital</strong> with acute stroke should have an initial assessment, conducted by rehabilitation professionals, as soon as possible after admission [Evidence Level A].</td>
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<tr>
<td>a. The core rehabilitation professional team should include physiatrists, other physicians with expertise/core training in stroke rehabilitation, occupational therapists, physical therapists, speech-language pathologists, nurses, social workers and dietitians [Evidence Level A].</td>
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<tr>
<td>b. Additional core team members ideally also include recreation therapists, psychologists, vocational therapists, educational therapists, and rehabilitation therapy assistants [Evidence level C].</td>
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<tr>
<td>c. All members of the rehabilitation team should have specialized training in stroke care and recovery [Evidence level C].</td>
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<tr>
<td>d. All team members should be trained in supported conversation to be able to interact with patients with communication limitations such as aphasia [Evidence Level C].</td>
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<tr>
<td>e. All patients should undergo basic communication screening to ensure optimal vision (glasses or contact lenses), optimal hearing (hearing aids and batteries) and optimal speech (dental prosthesis) when interacting with members of the hospital and rehabilitation team [Evidence Level C].</td>
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<tr>
<td>ii. Initial assessment should be conducted within 48 hours of admission and include an evaluation of patient function, safety, physical readiness, and ability to learn and participate in rehabilitation therapies [Evidence Level C].</td>
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<tr>
<td>iii. Issues related to transition planning should be considered during the initial assessment [Evidence Level C].</td>
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<tr>
<td>iv. Assessments of impairment, functional activity limitations, and role participation restrictions should be conducted using standardized, valid assessment tools; tools should be adapted for use with patients who have communication differences or limitations where required [Evidence Level B]. Refer to Table 5.1 for a summary of validated and frequently used screening and assessment tools for stroke rehabilitation.</td>
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<tr>
<td>v. For patients who do not initially meet criteria for rehabilitation, rehabilitation needs should be reassessed weekly during the first month and at intervals as indicated by their health status thereafter [Evidence Level C].</td>
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<tr>
<td>vi. All patients who present with acute stroke or TIA who are <strong>not admitted to hospital</strong> should be screened for the need to undergo a comprehensive rehabilitation assessment to determine the scope of deficits from index stroke event and any potential rehabilitation requirements [Evidence level C].</td>
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<tr>
<td>a. Priority assessments, including evaluation of safety (cognition, fitness to drive), swallowing, communication and mobility, should be completed by a clinician with</td>
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</table>
expertise in stroke rehabilitation before the patients leave the emergency department or primary care setting [Evidence Level C].

b. Additional assessment should be conducted within 2 weeks of stroke onset, including evaluation of functional impairment and screening for depression [Evidence Level C].

vii. Once a stroke patient has undergone assessments, a standardized approach should be used to determine the appropriate setting for rehabilitation (inpatient, outpatient, community, and/or home-based settings) [Evidence Level C].

a. Criteria for admission to any rehabilitation setting should be standardized and communicated to all referring centres and services [Evidence Level C]. Refer to Box 1 for key elements of rehabilitation admission criteria.

### Best Practice Recommendation 5.2

#### Stroke Rehabilitation Unit Care

5.2.1 Stroke Rehabilitation Unit Care

i. All patients who require inpatient rehabilitation following stroke should be treated on a specialized stroke rehabilitation unit [Evidence Level A], characterized by the following elements:

a. Rehabilitation care is formally coordinated and organized [Evidence Level A].

b. The rehabilitation unit is geographically defined [Evidence Level A].

c. The rehabilitation unit is staffed by an interprofessional rehabilitation team consisting of a physician (physiatrist, neurologist, or other physician with expertise/core training in stroke rehabilitation), nurse, physical therapist, occupational therapist, speech-language pathologist, social worker, dietitian, recreation therapist, and psychologist [Evidence Level A], at staffing levels consistent with those identified by the Stroke Unit Trialists’ Collaboration [Evidence Level B].

d. The interprofessional rehabilitation team follows evidence-based best practices as defined by current consensus-based clinical practice guidelines [Evidence Level B].

e. Transition and discharge planning is initiated on admission to the unit [Evidence Level B]. Refer to Recommendation 6.4 for additional information.

f. Patient, family and caregiver education is provided both formally and informally, with consideration given to individual and group settings as appropriate [Evidence Level A]. Refer to Recommendation 6.1 and 6.2 for additional information.

g. Pediatric acute and rehabilitation stroke care should be provided on a specialized pediatric unit [Evidence Level B], including the same core group of interprofessional team members, with the addition of educators and child-life workers [Evidence Level B].

h. All team members should be trained and capable of interacting with people with communication limitations such as aphasia, by using supported conversation techniques [Evidence Level C].

ii. Patients with moderate or severe stroke, who are ready for rehabilitation and have goals amenable to rehabilitation, should be given an opportunity to participate in inpatient
stroke rehabilitation [Evidence Level A].

iii. Where admission to a stroke rehabilitation unit is not possible, inpatient rehabilitation provided on a general rehabilitation unit (i.e., where interprofessional care is provided to patients disabled by a range of disorders including stroke), where a physiatrist is available on the unit or by consultation, is the next best alternative [Evidence Level B].

   a. Patients treated on general rehabilitation units should receive the same levels of care and interventions as patients treated on stroke rehabilitation units, as described in section 5.2.1 (i)

5.2.2 Stroke Rehabilitation Team:

Note: Applicable for all stroke rehabilitation settings (acute care hospital, ambulatory clinic, community-based services and programs).

Stroke rehabilitation should be delivered by a full complement of health professionals, experienced in providing post-stroke care, regardless of where services are provided, to ensure consistency and reduce the risk of complications [Evidence Level C].

i. The interprofessional rehabilitation team should assess patients within 48 hours of admission and develop a comprehensive individualized rehabilitation plan which reflects the severity of the stroke and the needs and goals of the patient [Evidence Level C].

ii. Stroke unit teams should conduct at least one formal interprofessional 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 review of patient status [Evidence Level C].

iii.Clinicians should use standardized, valid assessment tools to evaluate the patient’s stroke-related impairments, functional activity limitations, and role participation restrictions [Evidence Level C]. Tools should be adapted for use in patients with communication differences or limitations due to aphasia. Refer to Table 5.1 for a summary of validated and frequently used screening and assessment tools for stroke rehabilitation.

** For management of bowel and bladder continence, refer to Chapter 4.2 for more information. For post-stroke depression and vascular cognitive impairment, refer to Chapter 7 of the Canadian Best Practice Recommendations for Stroke Care.

<table>
<thead>
<tr>
<th>Best Practice Recommendation 5.3</th>
<th>Delivery of Inpatient Stroke Rehabilitation</th>
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<tbody>
<tr>
<td>i. All patients with stroke should receive rehabilitation therapy within an active and complex stimulating environment [Evidence Level C] as early as possible once they are determined to be rehabilitation ready and they are medically able to participate in active rehabilitation [Evidence Level A].</td>
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<td>ii. Patients should receive rehabilitation therapies of appropriate intensity and duration, individually designed to meet their needs for optimal recovery and tolerance levels [Evidence Level A].</td>
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<tr>
<td>iii. Patients should receive a minimum of three hours of direct task-specific therapy, five days a week, delivered by the interprofessional stroke team [Evidence Level C].</td>
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<tr>
<td>iv. The team should promote the practice and transfer of skills gained in therapy into the patient’s daily routine [Evidence Level A].</td>
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<td>v. Patients should receive opportunities to repeat rehabilitation techniques learned in</td>
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therapy and implement them while supervised by stroke rehabilitation nurses [Evidence Level C].

vi. Therapy should include repetitive and intense use of novel tasks that challenge the patient to acquire the necessary skills needed to perform functional tasks and activities [Evidence Level A].

vii. Stroke rehabilitation unit teams should conduct at least one formal interprofessional meeting per week, during which rehabilitation goals are set, problems are identified, progress is monitored, and support after discharge is planned [Evidence Level B].

viii. The care plan should include a pre-discharge needs assessment to ensure a smooth transition from rehabilitation back to the community. Elements of discharge planning may include:

   a. A home visit by a healthcare professional, ideally conducted before discharge, for patients where the stroke rehabilitation team and/or family have concerns regarding changes in functional and/or cognitive abilities that may affect patient safety [Evidence Level C].
   
   b. Assessment of the safety of the patient’s home environment and the need for equipment and home modification [Evidence Level C].
   
   c. Caregiver education and training to assist the patient with activities of daily living and increasing the patient’s level of independence [Evidence Level B].
   
   d. Patients and families should be introduced to resources which will enable self-management and the ability to navigate through the health care system [Evidence Level B].

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<thead>
<tr>
<th>Best Practice Recommendation 5.4 Outpatient and Community-Based Stroke Rehabilitation (including Early Supported Discharge)</th>
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<tbody>
<tr>
<td><strong>5.4.1 Outpatient &amp; Community-Based Rehabilitation</strong></td>
</tr>
<tr>
<td>i. Stroke survivors with ongoing rehabilitation goals should continue to have access to specialized stroke services after leaving hospital [Evidence Level A]. This should include a blend of in-home community-based rehabilitation services (like “Early Supported Discharge” teams) and facility-based outpatient services.</td>
</tr>
<tr>
<td>ii. Outpatient and/or community based rehabilitation services should be available and provided by a specialized interprofessional team, when needed by patients, within 48 hours of discharge from an acute hospital or within 72 hours of discharge from inpatient rehabilitation [Evidence Level C].</td>
</tr>
<tr>
<td>a. All team members should be trained and capable of interacting with people with communication limitations such as aphasia, by using supported conversation techniques [Evidence Level C].</td>
</tr>
<tr>
<td>iii. Outpatient and/or community-based services should be delivered in the most suitable setting based on patient functional rehabilitation needs and participation-related goals, which may include in the home or other community settings [Evidence Level C].</td>
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<tr>
<td>iv. Outpatient and/or community- based rehabilitation services should include the same elements as coordinated inpatient rehabilitation services:</td>
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<tr>
<td>a. An interprofessional stroke rehabilitation team [Evidence Level B].</td>
</tr>
<tr>
<td>b. A case coordination approach including regular team communication to discuss assessment of new clients, review client management, goals, and plans for</td>
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</table>
discharge or transition [Evidence Level B].

c. Therapy should be provided for a minimum of 45 minutes per day up to 3 hours per day, 3 to 5 days per week 3 hours per day 3 to 5 days per week, based on individual patient needs and goals [Evidence Level B].

d. Patients and families should be involved in their management, goal setting, and transition planning [Evidence Level A].

v. At any point in their recovery, stroke survivors who have experienced a change in functional status and who would benefit from additional rehabilitation services should be offered a further trial of outpatient rehabilitation [Evidence Level B].

5.4.2 Early Supported Discharge (ESD)

i. Early supported discharge services are an acceptable form of rehabilitation for a select group of patients when available and provided by a well-resourced, coordinated specialized interprofessional team [Evidence Level A].

ii. ESD services must be provided within 48 hours of discharge from an acute hospital or within 72 hours of discharge from inpatient rehabilitation [Evidence Level C].

iii. Criteria for ESD candidacy include:

   a. Mild to moderate disability

   b. Ability to participate in rehabilitation from the point of discharge

   c. Medically stable, availability of appropriate nursing care, necessary resources and support services (e.g., family, carers, and home care services)

iv. Services should be provided five days per week at the same level of intensity as they would have received in the inpatient setting to meet patient needs [Evidence Level B].

Part Two: Providing Stroke Rehabilitation to Address Physical, Functional, Cognitive and Emotional Issues to Maximize Participation in Usual Life Roles

Best Practice Recommendation 5.5.1 Management of the Arm and Hand following Stroke

**Definition:** For the purposes of these recommendations “early” has been defined as patients who are less than 6 months post stroke, and ‘late’ is defined as more than 6 months from index stroke event.

**General Principles**

i. Patients should engage in training that is meaningful, engaging, progressively adapted, task-specific and goal-oriented in an effort to enhance motor control and restore sensorimotor function [Evidence Level: Early-Level A; Late-Level A].

ii. Training should encourage the use of patients’ involved affected limb during functional tasks and be designed to simulate partial or whole skills required in activities of daily living (e.g. folding, buttoning, pouring, and lifting) [Evidence Level: Early-Level A; Late-Level A].

**Specific Therapies**

i. Therapists should provide supplementary training programs aimed at increasing the active movement and functional use of the affected arm between therapy sessions, e.g. Graded Repetitive Arm Supplementary Program (GRASP) suitable for use during hospitalization and at home [Early - Evidence Level A; Late – Evidence level C].
ii. The Grasp Program should include:
   a. strengthening exercises for the arm and hand (using small wrist weight, putty, hand gripper), range of motion exercises (stretching, active exercises), and exercises that improve gross and fine motor skills (e.g., blocks, Lego™, pegs) [Early - Evidence Level A; Late – Evidence level C];
   b. the GRASP protocol suggests that the program be delivered for one hour per day, six days per week [Evidence Level: Early-Level A; Late-Level C];
   c. appropriate patients, based on the GRASP protocol, may include those with some arm function (i.e., Chedoke-McMaster; or the Fugl-Meyer Upper Limb Motor Impairment Scale score between 10 and 57) and with active scapular elevation (shoulder shrug) and palpable wrist extension [Early - Evidence Level A; Late – Evidence level C].

iii. Following assessment to determine if a patient is a suitable candidate, patients should be encouraged to engage in mental imagery to enhance upper-limb, sensorimotor recovery [Evidence Level: Early-Level A; Late-Level B].

iv. Functional Electrical Stimulation (FES) targeted at the wrist and forearm muscles should be used to reduce motor impairment and improve function [Evidence Level: Early-Level A; Late-Level A].

v. Traditional or modified constraint-induced movement therapy (CIMT) should be used for a select group of patients who demonstrate at least 20 degrees of active wrist extension and 10 degrees of active finger extension, with minimal sensory or cognitive deficits.
   a. Traditional CIMT refers to a two-week training regimen consisting of six hours of intensive upper-extremity training coupled with restraint of the unaffected arm for at least 90 percent of waking hours [Evidence Level: Between 3 and 6 months-Level A; Late-Level A].
   b. Traditional CIMT, where therapy is provided for more than 2 hours/day, should not be used within the first month following stroke [Evidence Level A].
   c. Modified CIMT most often refers to a less intense program which varies in terms of time of constraint, intensity of associated therapy, and duration of intervention (weeks). M-CIMT may be initiated in the first month following stroke in appropriate patients [Evidence Level: Early-Level A; Late-Level A].

vi. Mirror therapy may be appropriate for select patients to improve ADLs, reduce pain, and improve visual spatial neglect [Evidence Level A].

vii. Sensory stimulation (e.g., TENS, acupuncture, muscle stimulation, biofeedback) for the upper extremity may be offered to select patients to improve sensory motor function [Evidence Level A].

viii. For patients with a flaccid arm (i.e., Chedoke-McMaster Stroke Assessment <3) electrical stimulation should be considered [Evidence Levels: Early- Level B; Late- Level B].

ix. Where available, virtual reality techniques, using both immersive techniques (such as virtual reality) and non-immersive techniques (such as video games), can be used as an adjunct to other rehabilitation therapies as a means to provide additional opportunities for repetition, intensity and task-oriented training [Evidence Level B].

x. Range of movement exercises should be provided that includes placement of the upper limb in a variety of appropriate and safe positions within the patient’s visual field [Evidence Level: Early-Level C; Late-Level C]. Refer to Recommendation 5.5.3 for
Adaptive Devices

i. Adaptive devices (cutting boards, utensils) designed to improve safety and function should be used if other methods of performing specific functional tasks are not available or tasks cannot be learned [Evidence Level C].

ii. The need for special equipment (e.g., wheelchairs, safety devices) should be evaluated on an individual basis. Once provided, patients should be reassessed, as appropriate, to determine if changes are required or equipment can be discontinued with the aim of achieving normal unassisted function [Evidence Level C].

iii. Functional dynamic orthoses are an emerging therapy tool that may be offered to patients to facilitate repetitive task-specific training [Evidence Level C].

Best Practice Recommendation 5.5.2

Range of Motion and Spasticity in the Shoulder, Arm and Hand

i. Spasticity and contractures can be prevented or treated by antispastic pattern positioning, range-of-motion exercises, and/or stretching [Evidence Levels: Early-Level C; Late-Level C]. Routine use of splints is not recommended [Evidence Levels: Early-Level A; Late-Level B].

ii. Chemodenervation using botulinum toxin can be used to increase range of motion and decrease pain for patients with focal and/or symptomatically distressing spasticity [Evidence Levels: Early-Level C; Late-Level A].

iii. Oral medications can be prescribed for the treatment of disabling spasticity:
   a. Tizanidine can be used to treat more generalized, disabling spasticity. [Evidence Levels: Early-Level C; Late-Level B].
   b. Baclofen can be used as a lower cost alternative but has not been studied in this population [Evidence Levels: Early-Level C; Late-Level C].
   c. Benzodiazepines should be avoided due to sedating side effects, which may impair recovery [Evidence Level: Early-Level C; Late-Level C].

iv. The presence of spasticity should not limit the use of strength training in the arm [Evidence Level: Early-Level C; Late-Level C].

Best Practice Recommendation 5.5.3

Management of Shoulder Pain following Stroke

Note: Causes of shoulder pain may be due to the hemiplegia itself, injury or acquired orthopedic conditions due to compromised joint and soft tissue integrity.

A. Prevention of Hemiplegic Shoulder Pain

i. Joint protection strategies should be used during the early or flaccid stage of recovery to prevent or minimize shoulder pain. These include:
   a. Positioning and supporting the arm during rest [Evidence Level B].
   b. Protecting and supporting the arm during functional mobility [Evidence Level C].
   c. Protecting and supporting the arm during wheelchair use by using a hemi-tray or
arm trough [Evidence Level C].

d. During the flaccid stage slings can be used to prevent injury; however, beyond the
flaccid stage the use of slings remains controversial [Evidence Level C].

ii. Overhead pulleys should not be used [Evidence Level A].

iii. The arm should not be moved beyond 90 degrees of shoulder flexion or abduction, unless
the scapula is upwardly rotated and the humerus is laterally rotated [Evidence Level A].

iv. Patients and staff should be educated to correctly handle the involved arm [Evidence
Level A]. For example, excessive traction should be avoided during assisted movements
such as transfers [Evidence level C].

B. Assessment of Hemiplegic Shoulder Pain

i. The assessment of the painful hemiplegic shoulder should include evaluation of tone,
strength, changes in length of soft tissues, alignment of joints of the shoulder girdle and
orthopedic changes in the shoulder [Evidence Level C].

C. Management of Hemiplegic Shoulder Pain

i. Treatment of hemiplegic shoulder pain related to limitations in range of motion includes
gentle stretching and mobilization techniques, and typically involves increasing external
rotation and abduction. [Evidence Level B].

a. Active range of motion should be increased gradually in conjunction with restoring
alignment and strengthening weak muscles in the shoulder girdle [Evidence Level
B].

ii. If there are no contraindications, analgesics (such as acetaminophen or ibuprofen) can
be used for pain relief [Evidence Level C].

iii. Injections of botulinum toxin into the subscapularis and pectoralis muscles can be used to
treat hemiplegic shoulder pain thought to be related to spasticity [Evidence Level B].

iv. Subacromial corticosteroid injections can be used in patients when pain is thought to be
related to injury or inflammation of the subacromial region (rotator cuff or bursa) in the
hemiplegic shoulder [Evidence level A].

v. In a subset of patients who experience pain related to both injury or inflammation and
spasticity, dual therapy (botulinum toxin plus steroid injections) should be used [Evidence
Level C].

D. Complex Regional Pain Syndrome (CRPS)

(Also known as Shoulder-Hand Syndrome, Reflex Sympathetic Dystrophy, Sudecks Atrophy)

i. **Prevention:** Active, active-assisted, or passive range of motion exercises should be used
to prevent CRPS [Evidence Level C].

ii. **Diagnosis** should be based on clinical findings including pain and tenderness of
metacarpophalangeal and proximal interphalangeal joints, associated with edema over
the dorsum of the fingers, trophic skin changes, hyperaesthesia, and limited range of
motion [Evidence Level C].

iii. A triple phase bone scan (which demonstrates increased periarticular uptake in distal
upper extremity joints)) can be used to assist in diagnosis. [Evidence Level C].

iv. **Management of Complex Regional Pain Syndrome (CRPS):** An early course of oral
corticosteroids in tapering doses can be used to reduce swelling and pain [Evidence
v. Hand edema may be reduced by:
   a. Active, active-assisted, or passive range of motion exercises in conjunction with arm elevation [Evidence Level C].
   b. Retrograde massage [Evidence Level C].
   c. Gentle grade 1-2 mobilizations for accessory movements of the hand and fingers [Evidence Level C].

**Best Practice Recommendation 5.6.1 Lower Limb Mobility and Transfer Skills**

**Definition:** For the purposes of these recommendations ‘early’ has been defined as patients who are less than 6 months post stroke, and ‘late’ is defined as greater than 6 months from index stroke event.

**A. General Considerations**

   i. Patients should engage in training that is meaningful, engaging, progressively adaptive, task-specific and goal-oriented in an effort to improve transfer skills and mobility [Evidence Level: Early-Level A; Late-Level A].

**B. Specific Interventions**

   i. Ankle-foot orthoses can be used on selected patients with foot drop following proper assessment and with follow-up to verify its effectiveness [Evidence Level: Early-Level A; Late-Level A].

   ii. Lower-extremity orthotic devices can be used when ankle stabilization is required to help the patient walk. Prefabricated bracing can be used initially, while customized bracing should be reserved for patients with anticipated long-term need [Evidence Level: Early-Level C; Late-Level C].

   iii. Functional electrical stimulation (FES) can be used to improve muscle force, strength and function (gait) in selected patients, but the effects should not be assumed to be sustained [Evidence Level: Early-Level A; Late-Level A].

   iv. The need for gait aids, assistive devices, wheelchairs, and other special equipment should be evaluated on an individual basis [Evidence Level: Early-Level C; Late-Level C].
      a. Prescription or purchase of a long-term device should be based on anticipation of a long-term need [Evidence Level: Early-Level C; Late-Level C].
      b. Once provided, patients should be reassessed, as appropriate, to determine if changes are required or equipment can be discontinued [Evidence Level: Early-Level C; Late-Level C].
Best Practice Recommendation 5.6.2  Lower Limb Spasticity Following Stroke

i. Spasticity and contractures should be treated or prevented by antispastic pattern positioning, range-of-motion exercises and/o stretching [Evidence Level: Early-Level C; Late-Level C]. Current evidence does not support the use of splints.

ii. Chemodenervation using botulinum toxin can be used to increase range of motion, improve gait, and decrease pain for patients with focal and/or symptomatically distressing spasticity [Evidence Level: Early-Level C; Late-Level A].

iii. Oral medications can be prescribed for the treatment of disabling spasticity:
   a. Tizanidine can be used to treat more generalized, disabling spasticity. [Evidence Levels: Early-Level C; Late-Level B].
   b. Baclofen can be used as a lower cost alternative but has not been studied in this population [Evidence Levels: Early-Level C; Late-Level C].
   c. Benzodiazepines should be avoided due to sedating side effects, which may impair recovery [Evidence Level: Early-Level C; Late-Level C].

iv. The presence of spasticity should not limit the use of strength training in the leg [Evidence Level: Early-Level C; Late-Level C].

Best Practice Recommendation 5.6.3  Lower-Limb Gait Training following Stroke

i. Task and goal-oriented training that is progressively adapted, meaningful, salient, and involves active participation should be used to improve performance of selected lower-extremity tasks [Evidence Level: Early-Level B; Late-Level B].

ii. Treadmill-based gait training (without body support) can be used to enhance walking speed, endurance, and distance walked when over-ground training is not available or appropriate. When used, it is suggested that therapy should be provided for 30 minutes a day, five days a week, for two weeks [Evidence Level: Early-Level C; Late-Level B].

iii. Body weight supported treadmill training, (BWSTT) is one method can be used for patients with low ambulatory function when other strategies for walking practice are unsuccessful or unsafe [Evidence Level: Early-Level A; Late-Level A].

iv. Following medical clearance, patients should participate regularly in an aerobic exercise program that accommodates the patient’s co-morbidities and functional limitations to improve gait speed, endurance, stroke risk factor profile, mood, and cognition [Evidence Level: Early-Level A; Late-Level A].

Best Practice Recommendation 5.6.4  Falls Prevention and Management

i. Following stroke, all patients should be screened for fall risk by an experienced clinician at admission, at all transition points, and/or whenever there is a change in health status [Evidence Level C].

ii. Screening should include identification of medical, functional, cognitive, and environmental factors associated with risk of falling and fall injuries (e.g., osteoporosis and low vitamin D levels) [Evidence Level B].

iii. Those identified as being at risk for falls should undergo a comprehensive interprofessional
assessments that include medical and functional history and evaluation of mobility, vision, perception, cognition, and cardiovascular status [Evidence Level C].

iv. Based on risk assessment findings, an individualized falls prevention plan should be implemented for each patient [Evidence Level B].

v. Patients should be made aware of their increased risk for falls and given a list of precautions to reduce their risk of falling [Evidence Level B].

vi. Families and caregivers should receive skills training to enable them to safely transfer and mobilize the patient [Evidence Level B].

vii. The patient, family, and caregiver should receive education regarding suitable gait aids, footwear, transfers, and wheelchair use (e.g., direction of transfer, transfer belt use, seatbelt use, arm support devices, foot rests, and brakes) [Evidence Level B].

viii. If a patient experiences a fall, an assessment of the circumstances surrounding the fall should be conducted to identify precipitating factors. Pre-existing falls prevention plans should be modified to reduce the risk of further falls [Evidence Level C].

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<tr>
<th>Best Practice Recommendation 5.7</th>
<th>Assessment and Management of Dysphagia and Malnutrition Following Stroke</th>
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<tbody>
<tr>
<td><strong>5.7.1 Dysphagia</strong></td>
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<tr>
<td>i. Interprofessional team members should be trained to complete initial swallowing screening for all stroke patients to ensure patients are screened in a timely manner [Evidence Level C].</td>
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<tr>
<td>ii. Patients should be screened for swallowing deficits within the first 24 hours of admission using a valid screening tool [Evidence Level B]. Patients who are not initially alert should be closely monitored and screened when clinically appropriate [Evidence Level C].</td>
<td>Refer to Table 4.2: Canadian Stroke Best Practices Swallow Screening and Assessment Tools for more information (Also see Appendix 5.1 at the end of the Stroke Rehabilitation Chapter)</td>
</tr>
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<td>iii. Abnormal results from the initial or ongoing swallowing screens should prompt a referral to a speech-language pathologist, occupational therapist, dietitian or other trained dysphagia clinician for more detailed assessment and management of swallowing, nutritional and hydration status [Evidence Level C]. An individualized management plan should be developed to address therapy for dysphagia, dietary needs, and specialized nutrition plans [Evidence Level C].</td>
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<tr>
<td>iv. Videofluoroscopic modified barium swallow (MBS), which allows actual visualization of swallowing, should be performed on all patients considered at high risk for aspiration, based on results from a bedside swallowing assessment, stroke location (e.g., brain stem stroke, pseudobulbar palsy), or other clinical features (e.g., multiple strokes) [Evidence Level B].</td>
<td>a. Modified barium swallow may also be used to guide management decisions for patients with dysphagia [Evidence Level C].</td>
</tr>
<tr>
<td>v. Management of dysphagia includes the use restorative swallowing therapy (e.g., lingual exercises) and/or compensatory techniques, with reassessment as required [Evidence Level C].</td>
<td>a. Compensatory techniques may include upright positioning; double swallow</td>
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technique, coughing after swallowing, small sips of fluids only, texture-modified solids and altered consistency fluids, and/or restorative swallowing therapy [Evidence Level C].

vi. To reduce the risk of pneumonia, patients should be permitted and encouraged to feed themselves whenever possible [Evidence Level C].

vii. Patients should be given meticulous mouth and dental care, and educated in the need for good oral hygiene to further reduce the risk of pneumonia [Evidence Level B].

### 5.7.2 Nutrition

i. Patients should be screened for premorbid malnutrition within 48 hours of admission using a valid screening tool.
   a. Patients should be rescreened for changes in nutritional status throughout inpatient admission and prior to discharge, as well as periodically in outpatient and community settings [Evidence Level C].
   b. Screening of a patient’s nutritional status should include an assessment of their ability to eat independently, weight changes, and a periodic record of their food consumption and nutritional intake [Evidence Level C].
   c. Results from the screening process should be used to guide appropriate referral to a dietitian for further assessment and ongoing management of nutritional and hydration status [Evidence Level C].

ii. Stroke patients with suspected nutritional concerns, hydration deficits, dysphagia, or other comorbidities that may affect nutrition (such as diabetes) should be referred to a dietitian for recommendations:
   a. To meet nutrient and fluid needs orally while supporting alterations in food texture and fluid consistency recommended by a speech-language pathologist or other trained professional [Evidence Level B];
   b. For enteral nutrition support (nasogastric tube feeding) in patients who cannot safely swallow or meet their nutrient and fluid needs orally.
   c. The decision to proceed with tube feeding should be made as early as possible after admission, usually within the first three days of admission in collaboration with the patient, family (or substitute decision maker), and interprofessional team [Evidence Level B].

### Best Practice Recommendation 5.8 Rehabilitation of Visual Perceptual Deficits

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<tbody>
<tr>
<td>i.</td>
<td>All patients with stroke should be screened for visual perceptual deficits as a routine part of the broader rehabilitation assessment process [Evidence Level C].</td>
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<tr>
<td>ii.</td>
<td>Patients with suspected perceptual impairments (visual neglect, non-lateralized visuospatial impairment, agnosias, prosopagnosia, body schema disorders and apraxias) should be assessed using validated tools [Evidence Level C]. Tools should be adapted for use with patients who have communication limitations such as aphasia.</td>
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<tr>
<td>iii.</td>
<td>Treatment of neglect can include visual scanning techniques, phasic alerting, cuing, imagery, virtual reality, hemispheric (limb) activation and trunk rotation [Evidence Level B].</td>
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<tr>
<td>iv.</td>
<td>Remedial based techniques could include prisms, eye patching, transcranial magnetic</td>
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stimulation, and neck muscle vibration [Evidence Level A].

v. Patients with suspected limb apraxia should be treated using errorless learning, gesture training and graded strategy training [Evidence Level B].

**Best Practice Recommendation 5.9**

**Rehabilitation to Improve Central Pain**

i. Patients with persistent Central Post Stroke Pain (CPSP) should receive a trial of low-dose, centrally acting analgesics, as recommended by the Canadian Pain Society [Evidence Level C]:

a. Patients should receive an anticonvulsant (such as gabapentin or pregabalin) as a first-line treatment [Evidence Level C].

b. Patients should receive a tricyclic antidepressant (e.g., amitriptyline) or an SNRI (particularly duloxetine) as second-line treatment [Evidence Level C].

c. Treatment for patients resistant to first and second line treatment can include opioids or tramadol [Evidence Level C]. Caution is advised for the use of Opioids as there is a significant risk of physical dependency.

ii. An individualized patient-centred approach for management of central pain syndromes should be implemented by an interdisciplinary team that includes healthcare professionals with mental health expertise as well as expertise in central pain management [Evidence Level C].

**Best Practice Recommendation 5.10**

**Rehabilitation to Improve Communication**

i. All health care providers working with persons with stroke across the continuum of care should be trained about aphasia, including the recognition of the impact of aphasia and methods to support communication [Evidence Level C].

ii. All Stroke patients should be screened for communication deficits using a simple, reliable, validated tool [Evidence Level C]. Refer to Table 5.10: Screening and Assessment Tools for Stroke Patients with Aphasia.

iii. Patients with suspected communication deficits should be referred to a Speech-Language Pathologist (SLP) for assessment of communication ability in the following areas: listening, speaking, reading, writing, gesturing, use of technology, pragmatics (e.g. social cues, turn-taking, body language, etc.) and conversation [Evidence Level C].

iv. Persons with aphasia should have access to a combination of intensive language therapy and communication therapy according their needs, goals and impairment severity [Evidence Level B].

v. Treatment to improve functional communication can include language therapy focusing on production and/or comprehension of words, sentences and discourse, (including reading and writing) [Evidence Level C]; conversational treatment, and constraint-induced language therapy [Evidence Level B]; use of non-verbal strategies, assistive devices and technology (e.g., I-Pads, Tablets, other computer-guided therapies) can be incorporated to improve communication [Evidence Level C]. Therapy benefits can be enhanced with computerized language therapy [Evidence Level C].

vi. Treatment for aphasia should include group therapy and conversation groups. Groups can be guided by trained volunteers and caregivers overseen by an SLP to supplement
the intensity of therapy during hospitalization and/or as continuing therapy following discharge [Evidence Level B].

vii. Treatment to improve functional communication should include Supported Conversation techniques for potential communication partners of the person with aphasia [Evidence Level A].

viii. All information intended for patient use should be available in aphasia-friendly formats (e.g., patient education material should be available in audio/visual format) [Evidence Level C]. This includes materials such as educational information, consent forms and information regarding participation in stroke rehabilitation research, and assessment tools.

ix. Families of persons with aphasia should be engaged in the entire process from screening through intervention, including family education and training in supported communication [Evidence Level C].

Refer to section 7.1 for additional information on aphasia and depression.

<table>
<thead>
<tr>
<th>Best Practice Recommendation 5.11</th>
<th>Life Roles and Activities (Driving, Vocation, Sexuality and Relationships, and Leisure)</th>
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<tbody>
<tr>
<td><strong>Return to Driving</strong></td>
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<tr>
<td>i. Patients should be told to stop driving for at least one month after stroke, in accordance with the Canadian Council of Motor Transport Administrators (CCMTA) Medical Standards for Drivers [Evidence Level C].</td>
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<tr>
<td>a. Patients who have experienced one or multiple TIA s should be instructed not to resume driving until a comprehensive neurological assessment shows no residual loss of functional ability, to include motor function and cognitive ability, discloses no obvious risk of sudden re-occurrence and any underlying cause has been addressed with appropriate treatment, in accordance with the Canadian Council of Motor Transport Administrators (CCMTA) Medical Standards for Drivers [Evidence Level C].</td>
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<tr>
<td><em>Refer to individual provincial and territorial laws for requirements for reporting a patient’s fitness to drive to driving authorities.</em></td>
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<tr>
<td>ii. After one month, patients interested in returning to driving should be screened for any residual sensory, motor, or cognitive deficits [Evidence Level B]:</td>
<td></td>
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<tr>
<td>a. Sensory assessment should focus on vision, visual fields, visual attention and reading comprehension;</td>
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<tr>
<td>b. Motor assessment should focus on strength, coordination and reaction time;</td>
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<tr>
<td>c. Cognitive assessment should focus on perception, problem solving, speed of decision making and judgment</td>
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<tr>
<td>Refer to Table 5.11 for suggestions of tools for pre-driving screening</td>
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<tr>
<td>iii. For patients who have relevant residual neurological deficits related to driving ability, a full comprehensive driving evaluation is recommended to determine fitness to drive [Evidence Level B].</td>
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<tr>
<td>a. A government-sanctioned road test is also recommended (CCMTA Medical Standards for Drivers) [Evidence Level C].</td>
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iv. Patients can be referred to training programs, such as simulator based training, to help prepare for a road test or the resumption of driving [Evidence Level B].

Return to Vocation

i. Patients, especially those <65 years of age, should be asked about vocational interests (i.e., work, school, volunteering) and be assessed for their potential to return to their vocations [Evidence Level C]. This initial screening should take place early in the rehabilitation phase, and become included in the individualized patient goal setting and planning for rehabilitation needs.

ii. A detailed cognitive assessment including a neuropsychological evaluation, where appropriate and available, is recommended to assist in vocational planning [Evidence Level C].

iii. School age stroke survivors in the community should have ongoing assessment of educational and vocational needs throughout their development [Evidence Level C].

iv. Resumption of vocational interests should be encouraged where possible. A gradual resumption should occur when fatigue is a concern [Evidence Level C].

v. Patients should receive vocational rehabilitation services, as appropriate and where available, for advice on relevant issues such as health and disability benefits and legal rights [Evidence Level C].

vi. Employers and education providers should be encouraged to provide work/school modifications and flexibility to allow patients to return to work/school [Evidence Level C].

Sexuality and Relationships

i. Patients should be given the opportunity to discuss sexuality and sexual functioning with their healthcare provider. Discussion should occur during acute care, rehabilitation and as the patient transitions back into the community. Verbal and written information should be provided and adapted to patients who have communication limitations such as aphasia [Evidence Level C].

ii. Patients may benefit from education sessions that address expected changes in sexuality, strategies to minimize sexual dysfunction, and frequently asked questions [Evidence Level C].

Leisure Activity

i. Patients should be given the opportunity to discuss pre-stroke leisure pursuits and be assessed for rehabilitative needs to resume these activities. Participation in leisure activities should be encouraged where possible [Evidence Level B].

ii. Patients who experience difficulty engaging in leisure activities should receive targeted therapeutic interventions [Evidence Level: Adult-Level A; Pediatric-Level C].

iii. Children affected by stroke should be offered advice and treatment aimed at achieving play and leisure related skills that are developmentally relevant and appropriate in their home, community, and school environments [Evidence Level C].

iv. Patients should receive information regarding leisure activities in the community and/or be referred to relevant agencies. Use of peer support groups should be encouraged where available [Evidence Level C].

Refer to Recommendation 6.5 for additional information on community reintegration; and Section 7 for information on Mood and Cognition issues following stroke.
### Best Practice Recommendation 6.1

**Supporting Patients, Families and Informal Caregivers Following Stroke**

#### 6.1 Patients, families, and informal caregivers should be prepared for their transitions between care environments by being provided with information, education, training, emotional support, and community services specific to the transition they are undergoing [Evidence Level B].

#### 6.1.1 Screening and Assessment

i. Patients, families and informal caregivers should be **screened** at each transition of care stage for their readiness to learn and integrate knowledge into the recovery process, level of coping, risk for depression, and other psychosocial and physical issues (such as residual physical deficits, including aphasia) as appropriate to the individual [Evidence Level B].  
   *Refer to recommendations 7.1, 5.4 and 4.3 for additional information.*
   
   a. Family members and informal caregivers should be included in the screening process, and if issues identified, they should be advised to contact their healthcare providers and other services as appropriate [Evidence Level C].
   
   b. Validated screening tools should be used whenever possible to ensure a consistent approach to identifying potential issues during transitions [Evidence Level C]. *Refer to implementation tools and resources section below for additional information.*

ii. Patients, families and informal caregivers should be **assessed** at each transition point (starting with first contact with the healthcare system through primary care or the emergency department), and when there is a change in health status or other appropriate indication, to determine their needs and readiness for information, education, training, psychosocial support, and health and social services [Evidence Level B]. *Refer to recommendation 6.2 for additional information on education and training.*
   
   a. Family members and informal caregivers should be assessed for the following issues as they relate to their ability to care for the patient affected by stroke:
      
     - caregiver capabilities and experience in providing care to the person affected by stroke [Evidence Level C];
     
     - caregivers’ current health status, employment and social responsibilities, and how those will be managed in providing stroke care [Evidence Level B];
     
     - resource issues such as income, financial situation, housing, transportation, healthcare benefits, medication cost coverage [Evidence Level C];
     
     - social support from other family members, relatives and social networks [Evidence Level C].
      
   b. The type and depth of assessments should be appropriate to the individual patient’s needs, issues identified during screening, and the care setting (e.g., home with or without home care services, inpatient rehabilitation, assisted living, and long-term care) where the patient is transitioning [Evidence Level C].
When issues are identified through screening and assessments, referrals to appropriate care providers should be initiated to address the issues and promote optimal recovery after stroke (e.g., mental health experts, social services, etc.) [Evidence Level B].

### 6.1.2 Patient, Family and Caregiver Support

i. Patients, families and informal caregivers should be prepared with appropriate and realistic expectations regarding role changes, and the availability of services and resources within changing care environments [Evidence Level C].

ii. Support for patients, families and informal caregivers should begin at the time of admission and continue throughout the healthcare episode until discharge to the next healthcare setting or back to the community (either from the emergency department, acute care or inpatient rehabilitation, and with or without home support services in place at time of discharge) [Evidence Level B].

iii. Support should include:

   a. Written discharge instructions from healthcare providers that identify action plans, follow-up care, and goals, provided to the patient, family, and primary care giver [Evidence Level B]. Refer to recommendation 6.2 for additional information.

   b. Access to a contact person in the hospital or community (e.g., designated social worker, case manager or system navigator) for post-discharge queries [Evidence Level C].

   c. Access to and advice from health and social service organizations appropriate to their needs and stage of transition and recovery (ideally through single points of access to all organizations where available) [Evidence Level C].

   d. Referrals to community agencies such as stroke survivor groups, peer survivor visiting programs, meal provider agencies, and other services and agencies [Evidence Level C]. Refer to recommendation 6.5 for additional information.

iv. Support when patients are being discharged from acute care and admitted to inpatient rehabilitation should include:

   a. Accurate and up-to-date information about the inpatient rehabilitation setting: what the patient and family can expect and what would be expected of them (e.g., participation in rehabilitation, providing home/community type clothing, providing money for community-practice events) [Evidence Level C].

   b. Active participation of patients and family members in the development of an individualized rehabilitation plan that incorporates shared decision-making and reflects the patient’s recovery goals [Evidence Level C]. Refer to stroke rehabilitation recommendations in Chapter 5 for additional information.

   c. Discharge planning meetings and assessments to ensure all necessary training, equipment and home modifications are in place [Evidence Level B].

   d. Written discharge instructions from care providers that identify action plans, follow-up care, and goals, provided to the patient, family, and primary care giver [Evidence Level B]. Refer to recommendation 6.2 and 6.4 for additional information.

v. Support when patients are being transitioned to long-term care should include:

   a. Counseling, preparation and ongoing assessment for adjustment to change of living setting, change in physical needs and increased dependency, change in
social roles and leisure activities, impact on other family members (e.g., living spouse or partner, children), loss of home environment, and potential resource issues [Evidence Level C].

b. Access to restorative care and active rehabilitation to improve and/or maintain function based on individualized care planning [Evidence Level B]. Refer to Section 5.6 for additional information.

c. Providing advanced care planning, palliative care and end of life care as applicable [Evidence Level C]. Refer to Section 4.3 for additional information.

d. Access to a contact person in the long-term care setting (designated case manager or system navigator) for individualized care and rehabilitation planning, re-engagement in social and leisure activities, and other needs of patients and family members [Evidence Level C].

e. Where possible, access to a peer (survivor/family) who has experienced the transition and who can help the patient better understand the transition [Evidence Level C].

vi. Processes should be in place for post-discharge telephone follow-up with patients and informal caregivers; topics to address should include problem solving, educational information, and linkages with community services for ongoing support [Evidence Level B].

vii. The use of telemedicine technology modalities (e.g., video, and web-based technologies and services such as web-based support groups, tele-rehabilitation), should be considered to increase access to ongoing support services, healthcare services and rehabilitation therapies for patients following transitions to the community, when patients and family members are unable to travel into the facility for care and services [Evidence Level B]. Refer to recommendation 8.1 for additional information.

<table>
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<tr>
<th>Best Practice Recommendation 6.2</th>
<th>Patient, Family and Informal Caregiver Education</th>
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<tr>
<td><strong>6.2</strong> Stroke patient, family and informal caregiver education is an integral part of stroke care that must be addressed at all stages across the continuum and at all transition points of stroke care [Evidence Level A].</td>
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<tr>
<td><strong>6.2.1</strong> Assessment of Patient, Family and Informal Caregiver Learning Needs</td>
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| i. Throughout each stage along the continuum of stroke care, patient, family and informal caregiver learning needs and goals should be assessed and documented by members of the healthcare team [Evidence Level B].  
*Note: This applies to all settings including ambulatory care and emergency departments where there is shorter interaction time with patients and greater risk of learning needs being unmet.* |
| ii. Assessment should include inquiry about previous information received, information retention, and new and ongoing learning needs, and ensure patients and family are active participants [Evidence Level C]. |
| iii. Based on findings of educational assessments, a formalized educational plan should be developed for each stroke patient, their families and informal caregivers based on shared discussions and decision-making, and documented in patient records [Evidence Level C]. |
| a. Stroke patient education plans and decisions should be documented in the |
patient record and with healthcare providers as the patient transitions across settings [Evidence Level C].

b. Patient, caregiver and family educational needs should be assessed before leaving one healthcare setting and when entering into another care setting to ensure changing educational needs are met [Evidence Level C].

iv. Families and informal caregivers should be assessed for their understanding of the ongoing needs of the patient with stroke, to determine whether the patient, family and informal caregivers have the capability to meet the ongoing and changing needs of stroke patients in a caregiver role [Evidence Level C].

6.2.2 Delivery of Individualized Patient, Family and Informal Caregiver Education

i. Patient, family and informal caregiver education should include information sharing, teaching patients self-management skills, and training of family and informal caregivers to participate in and provide safe stroke patient care (Evidence Level B).

ii. Patient, caregiver and family education should be goal-oriented and facilitate decision-making regarding care and recovery [Evidence Level C].

iii. Educational content should be specific to the phase of care or recovery and appropriate to the readiness and needs of the stroke survivor, family, and informal caregiver [Evidence Level B]. Refer to Box 6.2A for summary of key educational content specific to each phase of stroke care.

iv. Education should be interactive, up to date, ongoing, repetitive, and provided in a variety of languages and formats (e.g., written, oral, instructive, and group counseling approaches); it should address varying levels of health literacy and ensure access to communication devices for stroke survivors (e.g., appropriate resources to help patients with aphasia and cognitive deficits or impairments communicate more effectively) [Evidence Level B].

v. Specific team members should be designated to provide and document educational activities and skills training sessions [Evidence Level C].

vi. The scope of stroke educational content should cover all aspects of stroke care and recovery [Evidence Level A].

   a. Depending on the needs and phase of care of the patient, education topics may include:
      
      o a description of the roles of all members of the healthcare team, and how and when they will be involved in the individual patient’s recovery;
      
      o the role of the patient, family and informal caregivers as members of the team, and the need for them to be active participants in decision-making and planning;
      
      o stroke symptom awareness and risk of recurrent stroke;
      
      o treatment goals within each care setting and environment;
      
      o information regarding discharge planning options and settings available following acute care to help support decision-making for care setting selection based on individual needs and functional status following stroke (e.g., benefits and costs of long-term care);
      
      o medical information and information regarding type and cause of stroke, physical, psychological, functional and emotional impact of stroke and
expectations for recovery;
- change in social and family roles and relationships;
- prevention of recurring stroke including risk factor modification and medication non-compliance;
- availability of and access to community services;
- information about community resources that should be broadly encompassing (e.g., the broad range of therapy and treatment resources available, home renovation resources, financial/tax consultants);
- on-going practical information and how to seek help if problems develop;
- information about the availability and potential benefits of local stroke groups;
- information on stroke patient advocacy within the healthcare system and within the community.

vii. Processes should be in place to ensure that patient, family and informal caregiver educational episodes are documented in the patient record and accessed by all members of the healthcare team [Evidence Level B]. Refer to 6.2 Implementation Tools section for examples of standardized patient education documentation tools.

viii. Processes should be in place to assess patient, family and informal caregiver understanding and retention of previously taught information [Evidence Level A].

ix. Ongoing education should be individualized and coordinated across transition points, and across the continuum, and include reinforcement of information previously taught, especially critical information that has not been retained (e.g., medication information and management) [Evidence Level B].

x. Acute care hospitals, rehabilitation facilities, home care and long-term care facilities should maintain up-to-date inventories of community resources, and provide this information to stroke patients and their families and informal caregivers, and offer assistance in obtaining needed services [Evidence Level C].

6.2.3 Promoting Self-Management for Patients, Family and Informal Caregivers following Stroke

i. Patient education should promote self-efficacy through mastering self-management skills, including action planning, modeling behaviors, problem-solving and decision-making strategies, reinterpreting symptoms, identification of risks within current and ideal lifestyle, level of risk is the patient willing to accept to maintain or improve health status following stroke (e.g., decision-making regarding smoking, diet, blood pressure management) [Evidence Level B].

   a. Key topics in self-management training should include exercise, symptom management techniques, risk factor management, secondary stroke prevention, nutrition, fatigue and sleep management, use of medications, managing emotions of fear, anger and depression, cognitive and memory changes, training in communication with health professionals and others, and health-related problem-solving and decision making [Evidence Level B].

   ii. Family and informal caregiver education should include training in personal care techniques, communication strategies, physical handling techniques, and food preparation and modifications for patients with dysphagia [Evidence Level B]; education on the self-management model to encourage them to allow patient to do
things on their own when possible, other daily living activity goals and preferences, how
to access community services and resources, problem-solving techniques, and ongoing
health system navigation [Evidence Level C].

iii. With the patient’s permission, family members and information caregivers should be
invited and encouraged to attend therapy sessions with the patient, and have their
questions addressed [Evidence Level C].

iv. Family and informal caregivers should be taught proper patient care skills and provided
with opportunities for demonstration and feedback to ensure safe care delivery for both
the patient and informal caregiver (e.g., in transfers from bed to chair, feeding
techniques, and positioning of the hemiplegic limb) [Evidence Level C].

v. As part of self-management, patients should be encouraged to be evaluated for return
to work if they were working prior to stroke, re-engage in leisure activities, and learn
appropriate modifications that may be required to continue participation in meaningful
roles and activities following stroke [Evidence Level C]. Refer to Recommendations
5.11 and 6.5 for additional information.

Best Practice Recommendation 6.3 Interprofessional Communication

A process should be in place to ensure timely and effective transfer of relevant patient-related
information at all points of access and transition in the healthcare system to ensure seamless
transitions and continuity of care [Evidence Level B].

i. All members of the interdisciplinary stroke team should share timely and up-to-date
information with healthcare providers at the next stage of care (e.g., from the emergency
department to inpatient care or primary care, acute care to rehabilitation specialists,
community service providers, primary care providers, and long-term care providers)
[Evidence Level B].
   a. Transfer of information should occur ideally within one week of patient discharge or
      transfer [Evidence Level C].
   b. Information shared across transitions should be complete, up-to-date, accurate and
      appropriate to the transition settings and information needs of the receiving
      healthcare providers [Evidence Level B].

ii. A social worker, system navigator, case manager or care coordinator should be a part of
the healthcare team, and should facilitate transfer of patient-related information, patient
referrals to appropriate follow-up services; and ensure patient and family educational
needs have been addressed [Evidence Level B].

iii. The patient and family should be given an up-to-date care plan at the time of discharge
that defines ongoing medical, functional, rehabilitation, cognitive, communication, and
psychosocial needs [Evidence Level C]. Ideally, the care plan should be initiated in the
emergency department and continue through the continuum of care with the patient.
   a. The care plan should be patient-centred, incorporate the agreed-upon goals and
      preferences of the patient, family, and healthcare team based on shared decision-
      making, and be culturally appropriate [Evidence Level C].
   b. The patient care plan should be utilized to facilitate timely discussion with healthcare
      providers, family and informal caregivers at the next stages of care, to ensure
      continued progress towards stated goals [Evidence Level C].
   c. The patient and healthcare providers should review the care plan regularly, at
transition points and when changes/improvements in health status occur, and together update the care plan to reflect changing needs, evolving goals and progress through the recovery process [Evidence Level B].

iv. Written discharge instructions should be included as a component of patient care plans, and should address the following issues as appropriate: functional ability at the time of transfer, risks and safety considerations, action plans for recovery, medications at discharge and instructions for adjustment, follow-up care, and follow-up care provider contact information [Evidence Level B].

**Best Practice Recommendation 6.4**

### Discharge Planning

Discharge planning should be initiated as soon as possible after the patient is admitted to each phase of care (e.g., emergency department, inpatient acute care, rehabilitation, complex continuing care, home care) [Evidence Level B].

i. A process should be established to ensure that patients, families, and informal caregivers are involved in discharge planning [Evidence Level B]. Refer to 6.3 Interprofessional Communication for additional information.

   a. Formulate goal oriented discharge plan with individual and family in collaboration with the interdisciplinary team for transition to community, rehabilitation, retirement home, and long-term care facilities [Evidence Level B].

   b. Identify possible discharge issues and patient needs which could potentially delay discharge and address early in the discharge planning process [Evidence Level B]. These may include issues of the patient, family, caregivers and/or environment.

   c. Patients discharged back to the community directly from the emergency department should have their discharge planning needs addressed prior to leaving the emergency department [Evidence Level C]. This may include stroke education, information regarding follow-up tests, appointments and referrals to stroke prevention clinics and primary care as appropriate to the individual patient.

ii. A social worker, system navigator, case manager/coordinator or other team member (e.g., social worker) should be designated to facilitate the development of the discharge plan, including ongoing reviews and updates until the time of discharge [Evidence Level C].

iii. Discharge planning activities should include:

   a. A pre-discharge needs assessment of patient physical needs, caregiver capacity, patient and family/caregiver psychosocial needs, care history information, and decision-making needs [Evidence Level C].

   b. Home-visits for patients being discharged to the community to identify home modifications required for access and safety [Evidence Level B].

   c. Meetings between the interdisciplinary team, patient, and family/caregiver to set goals of care, expectations for discharge dates, and identify potential transitional care needs and living setting [Evidence Level B].

   d. Caregiver training specific to the current and ongoing needs of the individual patient with stroke [Evidence Level B]; Refer to Recommendation 6.1 and 6.2 for additional information.

   e. Day, weekend and overnight passes to determine readiness for discharge, and to identify potential barriers to discharge and address psychosocial, emotional, physical, and financial needs of patients and families for successful discharge [Evidence Level C].
A post-discharge follow-up plan, including identification of key contacts and healthcare providers at the next stage of care, appointments, treatments, and contact information to re-access healthcare services as required [Evidence Level B].

g. Communication with team members at the next phase of care [Evidence Level C].
   Refer to 6.3 Interprofessional Communication for additional information

iv. Discharge planning discussions, decisions, and activities should be ongoing to reflect the patients changing needs, evolving goals and progress through the recovery process [Evidence Level B].

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**Best Practice Recommendation 6.5 Community Reintegration Following Stroke**

6.5 Patients and families should be provided with information, support and access to services throughout transitions to the community following a stroke to optimize the return to life roles and activities [Evidence Level B].

6.5.1 Physical Health Management Following Stroke:

   i. People with stroke living in the community should have regular and ongoing follow-up to assess recovery, prevent deterioration, maximize functional and psychosocial outcomes, and improve quality of life [Evidence Level B].

   ii. Post–acute stroke patients should receive follow-up by a primary care provider to address aggressive secondary stroke prevention, risk factor management, and ongoing treatment of comorbidities and sequelae of stroke [Evidence Level C].

      a. Initial review with primary care provider should occur within first two to four weeks following acute hospital discharge, and additional visits should occur at least every six months for at least three years following stroke [Evidence Level C]. Refer to Recommendations 3.1 and 5.11 for additional information.

      b. During primary care visits, medication lists, dosage, effectiveness, patient adherence, need for adjustment, potential interactions, and adverse side effects should be monitored and any concerns addressed [Evidence Level B]. Refer to Recommendations in Section 2, Prevention of stroke for additional information.

      c. Primary care providers should screen patients for ongoing physical issues including dysphagia, nutrition, hydration, continence, and pain [Evidence Level C]. Refer to Recommendations 4.2, 5.7, and 5.9 for additional information.

      d. Primary care providers should screen patients for new or ongoing cognitive concerns, mental health issues (i.e., depression), and psychosocial issues [Evidence Level B]. Refer to Recommendations 7.1 and 7.2 for additional information.

      e. Additional in-depth assessments should be conducted if screening indicates a potential issue; or referrals made as required to other healthcare providers with expertise in post-stroke functional, psychosocial, mood/depression or cognitive concerns as appropriate to meet patient needs [Evidence Level C]. Refer to Recommendations 4.2, 5.11, and Section 7 for additional information.

   iii. Secondary prevention of stroke should be aggressively managed and risk factor reduction strategies optimized in all living settings (e.g., long term care) [Evidence Level A]. Referrals to stroke prevention clinics and services should be initiated at hospital
discharge where appropriate, and in the community at the discretion of the primary care provider. Refer to Recommendations in Section 2, Prevention of stroke for additional information.

iv. Infants and children who have experienced a stroke should have ongoing follow-up screening and assessments throughout their development, especially if new motor, language, behavioral or cognitive deficits emerge [Evidence Level B].
   a. Developmental screening and assessments should include cognitive, motor, social, behavioral, emotional and physical aspects, as the full extent of stroke-related deficits may not become apparent until different ages and stages of development [Evidence Level C].

6.5.2 Functional and Psychological Health Management:

 i. Post-acute stroke survivors living in the community who experience a change/decline in functional status, physical activity, activities of daily living, or mobility should receive targeted interventions, as appropriate, even if the decline occurs six months or later post-stroke [Evidence Level A].

 ii. Processes should be in place for stroke survivors to re-access rehabilitation services during longer-term recovery [Evidence Level C]. This may include physical therapy, occupational therapy, speech therapy, recreation therapy and other services as required to address individual patient needs. Refer to Recommendations in Section 5, Stroke Rehabilitation, for additional information.

 iii. Stroke survivors living in the community should be screened for continuing or new signs of depression and/or cognitive impairment by healthcare providers (including primary care providers, nurses, occupational therapists providing home-based care, and other healthcare providers) during follow-up visits (e.g., stroke and prevention specialists) [Evidence Level B].
   a. Additional in-depth assessments should be conducted if screening indicates a potential issue; or referrals made as required to other healthcare providers with expertise in post-stroke emotional, psychosocial or cognitive concerns as appropriate to address patient-specific needs [Evidence Level B]. Refer to Recommendations 7.1 and 7.2 for additional information.

   b. Patients should be screened for depression and cognitive changes at least annually for the first 3 years following stroke, and ideally every six months [Evidence Level C]. Refer to Recommendations 7.1 and 7.2 for additional information.

 iv. Stroke survivors should be screened for communication deficits and receive support as required by community-based aphasia programs [Evidence Level C]. Refer to Recommendation 5.10 for additional Information.

 v. The use of telemedicine technology modalities (e.g., video, and web-based technologies and services such as web-based support groups, tele-rehabilitation), should be considered to increase access to ongoing support services, healthcare services and rehabilitation therapies for patients following transitions to the community, when patients and family members are unable to travel into the facility for care and services [Evidence Level B]. Refer to recommendation 8.1 for additional information.
6.5.3 Reintegration to Social and Life Roles Following Stroke

A. Vocations

i. Patients, especially those <65 years of age, should be asked about vocational interests (i.e., work, school, volunteering) and be assessed for their potential to return to their vocations [Evidence Level C]. Refer to Recommendation 5.11 for additional information.

   a. This initial screening should take place early in the rehabilitation phase and when planning transitions from acute care and/or inpatient rehabilitation to the community [Evidence Level C].

   b. A detailed cognitive assessment including a neuropsychological evaluation, where appropriate and available, is recommended to assist in determining the patient’s ability to meet the needs of their current or potential employment requirements, and contribute to vocational planning [Evidence Level C]. Results of assessments should be incorporated into the individualized patient goal setting and planning for return to the community following stroke.

   c. Vocational counselors, social workers and other team members should provide counselling and information to patients on employment benefits and legal rights. Referral should be initiated to social work, occupational therapy and/or vocational counselors as appropriate to assist patients and families in re-engaging in vocational activities as part of transitions to the community [Evidence Level C].

ii. Resumption of vocational interests should be encouraged where possible. A gradual resumption should occur when fatigue is a concern [Evidence Level C].

iii. School age stroke survivors in the community should have ongoing assessment of educational and vocational needs throughout their development [Evidence Level C].

iv. Primary care providers/healthcare team should work with employers/educators to devise an appropriate return to work plan [Evidence Level C].

v. The use of telemedicine technology modalities (e.g., video, and web-based technologies and services) should be considered to support return to work and skills attainment where possible [Evidence Level C]. Refer to recommendation 8.1 for additional information.

vi. Patients who are unable to return to work following stroke should be provided counselling regarding financial concerns and planning [Evidence Level C]. Referrals to these services should be provided by members of the healthcare team.

B. Leisure Activities

i. Patients should be given the opportunity to discuss pre-stroke leisure pursuits and be assessed for rehabilitative needs to resume these activities. Participation in leisure activities should be encouraged where possible [Evidence Level B]. Refer to Recommendations 5.11 for additional information.

ii. Patients who experience difficulty engaging in leisure activities should receive targeted therapeutic interventions and individualized plans for participation in leisure activities based on collaborative goal-setting with their healthcare team [Evidence Level: Adult-Level A; Pediatric-Level C].

iii. Children affected by stroke should be offered advice and treatment aimed at achieving play and leisure related skills that are developmentally relevant and appropriate in their home, community, and school environments [Evidence Level C].
iv. Patients should be provided with a list of community-based resources for engaging in aerobic and leisure activities in the community prior to discharge; they should be referred to relevant agencies as appropriate to provide support in re-engaging in leisure activities [Evidence Level C].

v. Community-based therapy for individuals with stroke should include the development of problem solving skills for overcoming the barriers to engagement in physical activity and leisure pursuits [Evidence Level C].

C. Disability Supports in the Community

i. Community based healthcare professionals across disciplines should provide patients and families with information and linkages regarding access to disability support services within their region [Evidence Level C].

   a. Healthcare providers should work with patients and families to develop a mobility access plan prior to transition to a home or community-based living setting [Evidence Level C]. This plan should identify mobility issues, assessment of access barriers, safety concerns, environment modifications, and equipment that may be required to ensure the safety and accessibility for patients with functional, communicative and/or cognitive deficits following stroke [Evidence Level C].

   b. Many regions and provinces have formal disability legislation and guidelines in place and these should be explained to patients and families in preparation for transitions; appropriate documentation and applications should be completed by healthcare professionals as required in a timely manner in collaboration with patients and families to minimize delays in access to eligible services [Evidence level C].

   c. Social workers or case managers should be involved with families to ensure appropriate services and equipment is accessed in a timely manner and to help patients and families navigate through the system [Evidence Level C].

D. Advanced Care Planning and Community-Based Palliative Care

i. Patients surviving a stroke, as well as their families and informal caregivers, should be approached by the stroke healthcare team to participate in advance care planning prior to or soon after transitions to the community following an acute stroke [Evidence Level C]. Refer to Recommendations 4.3 and 4.4 for additional information.

ii. The primary goal of advance care planning conversations is to determine the individual's goals of care [Evidence Level B].

   a. Advance care planning may include identifying a substitute decision-maker (proxy or agent), implementing a personal directive [Evidence Level C], and discussion of the patient’s preferences and the medical appropriateness of therapies such as feeding tubes, hydration, treatment of the current illness, admission to intensive care, ventilation, cardio-pulmonary resuscitation, and place of care [Evidence Level B].

   b. Advanced care planning discussions should be documented in the patient’s chart and any relevant hospital-specific forms should be completed and signed by the patient or decision-maker and a member of the healthcare team [Evidence Level C].

iii. The patient’s goals of care and advanced care planning decisions should be revisited periodically, such as when there is a change in the patient’s health status [Evidence
### Level B.

#### iv. The interprofessional team should have the appropriate communication skills and knowledge to address the physical, spiritual, psychological, ethical, and social needs of stroke patients, their families, and informal caregivers [Evidence Level C].

- b. Respectful discussion of patient's values, wishes and decisions should be balanced with information regarding medically appropriate treatment related to ongoing stroke management and future medical care [Evidence Level C].

#### 6.5.4 Family and Caregiver Support and Well-being

**i.** Family members and informal caregivers should be advised by members of the healthcare team to have regular ongoing assessment of their physical, psychosocial, and mental well-being with their primary healthcare providers [Evidence Level C]. Refer to Recommendations 6.1 and 6.2 for additional information.

**ii.** Caregivers of stroke survivors should receive education and support to assist them in their role as a caregiver [Evidence Level C]. Refer to Recommendations 6.1 and 6.2 for additional information.

**iii.** Patients and families should be provided with information regarding peer support groups in their community, and initial connection with these groups should be encouraged where available [Evidence Level C]. Refer to Recommendations 6.1 and 6.2 for additional information.

**iv.** Where hospital-based peer support visit programs exist, arrangements should be made for peer-support introductions during hospitalization [Evidence Level C].

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### Best Practice Recommendation 6.6

**6.6** Patients who have experienced a stroke and are transitioned to long-term care should continue to have their physical, functional, emotional, cognitive and social needs addressed to optimize quality of life and meet their ongoing goals of care.

#### 6.6.1 Patient Assessment and Care Planning

**i.** All patients who transition to a long-term care setting following a stroke should have an initial assessment, conducted by medical, nursing and rehabilitation professionals, as soon as possible after admission [Evidence Level A].

- a. The initial assessment of functional status, physical status, and cognitive status should be aligned with existing assessment processes (e.g., Minimal Data Set-Resident Assessment Inventory – MDS_RAI) where possible [Evidence Level C].

- b. The results of the assessment should be used to develop an individualized plan of care for each patient who transitions to a long-term care setting following a stroke to optimize quality of life and meet physical, functional, emotional, cognitive and social needs [Evidence Level C].

- c. Follow-up assessments should be conducted on a regular basis (e.g., every 3 to 6 months) and when changes in health status occur [Evidence Level C].

- d. When areas of decline are identified in reassessments, individualized care plans should be updated to incorporate changes in care requirements, address issues of safety, and the potential need for referrals to appropriate healthcare specialists.
professionals for further consultation [Evidence Level C].

ii. All patients who have experienced a stroke and are admitted to a long-term care setting should be cared for by staff members who are educated and knowledgeable in stroke care and recovery goals and therapies, and stroke best practice recommendations [Evidence Level C].

6.6.2 Rehabilitation and Restorative Care

i. All patients with stroke living in long-term care settings should live within an active and complex stimulating environment focused on restorative care, and maintaining or improving physical, functional and cognitive status, and based on individualized assessments and potential [Evidence Level C].

   a. Residents in long-term care should have access to recreation therapy encompassing group activities, one-on-one activities and outings into the community if appropriate [Evidence Level C].

ii. Stroke survivors with ongoing rehabilitation goals should continue to have access to specialized stroke services following admission to a community living setting [Evidence Level A], including within a long-term care setting. Refer to Recommendation 5.4 for additional information.

iii. At any point in their recovery, stroke survivors living in long-term care who have experienced a change/improvement in functional status and who would benefit from rehabilitation services should be offered a trial of active inpatient or outpatient rehabilitation [Evidence Level B].

6.6.3 Patient and Family Support and Education

i. Families of stroke patients living in long-term care should have regular meetings with the healthcare team to review health status, quality of life, improvements or declines, opportunities and training for participation in care, and updated goals of care [Evidence Level C], at least once annually and when changes in health status occur.

ii. All patients and family members should be provided interactive and timely education on stroke, recovery and prevention, based on individualized learning needs [Evidence Level C]. Refer to Recommendation 6.2 for additional information.

iii. Family members should be offered peer support information and counseling to address issues of changing life roles and coping with now having a family member living in a long-term care setting, and encouraged to seek help from their own primary care team members to address issues [Evidence Level C].

iv. Patients living in long-term care and their families should be provided information and counseling on appointing an Alternate Decision Maker, developing advanced directives for care, and palliative care options as appropriate [Evidence Level C]. Refer to Recommendations 4.3 and 4.4 for additional information.

   a. Patients, families and informal caregivers should receive training on how to advocate for active participation in care planning and shared decision-making [Evidence Level C].
### Best Practice Recommendation 6.7

**6.7 Post-stroke Fatigue**

Post-stroke fatigue is a VERY common condition, and can be experienced by stroke survivors at ANY point during the recovery process. Unfortunately, post-stroke fatigue is often under-recognized. Therefore, healthcare professionals should anticipate the possibility of post-stroke fatigue, and prepare patients and families to mitigate fatigue through assessment, education, and interventions at any point during the stroke-recovery continuum.

i. Prior to discharge from hospital ward, stroke unit or the emergency department, stroke survivors, their families and informal caregivers should be provided with basic information regarding the frequency and experience of post-stroke fatigue [Evidence Level C].

ii. Stroke survivors, their families and informal caregivers should be taught to recognize their current physical and cognitive limitations, and to help set realistic goals to help increase endurance and manage fatigue as they continue their stroke recovery [Evidence Level C].

iii. Stroke survivors should be routinely asked about post-stroke fatigue during healthcare visits (e.g., primary care, home care, and outpatient) following return to the community and at transition points [Evidence Level C].

iv. Patients, who experience post-stroke fatigue, and their families and informal caregivers, should be provided with strategies for energy conservation and fatigue management that address the following components [Evidence Level C].

*Note: many interventions listed here are well documented in the literature for general fatigue; there is a gap in this literature specific to stroke, however these strategies are all very applicable based on expert opinion, information from the occupational therapy literature, and qualitative patient feedback. Refer to Evidence Table 6.7 and Reference List.*

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Structuring day to include a balance of activity and scheduled periods of rest;</td>
</tr>
<tr>
<td>b.</td>
<td>Keeping an agenda of daily activities, planning higher energy activities immediately following a period of rest; planning activities a day in advance, anticipating energy requirements for each task, prioritizing tasks and energy requirements;</td>
</tr>
<tr>
<td>c.</td>
<td>Organizing physical environment to minimize efforts to move around, reduce stair climbing, and have ready access to the most frequently used items;</td>
</tr>
<tr>
<td>d.</td>
<td>Sitting rather than standing when doing chores such as ironing or washing dishes;</td>
</tr>
<tr>
<td>e.</td>
<td>Teaching body mechanics, posture and sitting positions and locations (i.e. rest in bed, rather than chair);</td>
</tr>
<tr>
<td>f.</td>
<td>Engaging in exercise appropriate to tolerance level and with a plan for gradual increase in intensity and duration as advised in discussions with healthcare team members;</td>
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<tr>
<td>g.</td>
<td>Establishing good sleep patterns, and avoidance of sedating drugs and excessive alcohol;</td>
</tr>
<tr>
<td>h.</td>
<td>Using energy saving equipment and technology to reduce physical efforts (e.g., electric can opener, online shopping);</td>
</tr>
<tr>
<td>i.</td>
<td>Engaging in enjoyable vocational and leisure activities that are planned ahead to ensure stroke survivor is well rested prior to activities;</td>
</tr>
</tbody>
</table>
### Section 6.0 Managing Stroke Transitions of Care

| v. | Stroke patients should be cared for by healthcare professionals who are knowledgeable in the symptoms of fatigue and its management. In situations where such knowledge does not exist among the providers caring for a patient with post-stroke fatigue, a referral for expert consultation (e.g., by an occupational therapist) is appropriate [Evidence Level C]. |
| vi. | Stroke survivors who experience post-stroke fatigue should be screened for signs of depression or other mood-related conditions and for sleep patterns as these are often associated with fatigue following stroke [Evidence Level B]. |
| vii. | There is insufficient evidence to recommend specific pharmacological treatment for post-stroke fatigue at this time [Evidence Level B] ([Cochrane Review, McGeogh 2009](#)). |

- j. Delegating activities that are low priority or can be done by someone else, such as family members;
- k. Communicating energy status and rest needs to family members, caregivers and social groups;
- l. Developing a plan for healthy diet or proper nutrition to help with energy levels.
### SECTION 7.0 MOOD AND COGNITION IN STROKE

**Last Updated March 2013**

**Best Practice Recommendation 7.1**

<table>
<thead>
<tr>
<th>Identification and Management of Post-Stroke Depression (PSD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients with stroke should be considered to be at high risk for post-stroke depression (PSD), which can occur at any stage of recovery.</td>
</tr>
<tr>
<td>Common risk factors associated with PSD include increasing stroke severity, functional dependence, presence of cognitive impairment, and history of previous depression. Increased functional dependence (e.g., requiring help with activities of daily living) and having a history of pre-stroke depression may be the two most salient risk factors for the development of PSD.</td>
</tr>
</tbody>
</table>

#### 7.1.1 Screening for Post-stroke Depression:

i. All patients with stroke should be screened for depressive symptoms using a validated tool [Evidence Level A]. Refer to reference table 7.1 A for some suggested tools. (Table 7.1A)

ii. Screening should also include evaluation of risk factors for depression, particularly a history of depression [Evidence Level C].

iii. Screening should take place at various stages throughout the continuum of stroke care [Evidence Level C]. Stages of care may include:

   a. during acute care stay, particularly if evidence of depression or mood changes are noted;
   b. following hospital discharge from the emergency department or inpatient setting to an outpatient or community-based healthcare setting;
   c. throughout rehabilitation within inpatient, outpatient, and home-based settings, according to client progress;
   d. periodically, following discharge to the community, during follow-up appointments and/or during periodic health assessments with primary care practitioners and consulting specialists.

#### 7.1.2 Assessment for Post-stroke Depression:

i. Patients identified as being at risk for depression during screening should be managed by a healthcare professional with expertise in diagnosis and management of depression in stroke patients. If required, a referral should be made to an appropriate mental health specialist (e.g., psychiatrist or psychologist) [Evidence Level C].

ii. Further assessment by the mental healthcare professional may include:

   a. More in-depth interview for the purpose of assessment and diagnosis based on accepted diagnostic criteria (e.g., Diagnostic and Statistical Manual of Mental Disorders) [Evidence Level B];
   b. Population-specific assessment measures (e.g., children, elderly, persons with co-morbid neuropsychiatric conditions) [Evidence Level C];
   c. Determination of appropriate course of treatment and individualized management plan;
   d. Post-treatment assessment and follow-up as needed.
7.1.3 Treatment and Management Modalities:

A. Pharmacotherapy

i. Patients with mild depressive symptoms or those diagnosed with minor depression may initially be managed by “watchful waiting”* (Evidence Level B).

   ➢ Pharmacological treatment should be considered/started if the depression is persistent and interferes with clinical goals, or worsens [Evidence Level B].

ii. Patients diagnosed with a depressive disorder following formal assessment should be considered for a trial of antidepressant medication [Evidence Level A].

iii. No one drug class has been found to be superior for PSD treatment. Side effect profiles, however, suggest that some selective serotonin reuptake inhibitors may be favoured in this patient population. [Evidence Level A]. Please refer to Pharmacology profile tables.

   ➢ Choice of an antidepressant medication will depend upon symptoms of depression, potential known side effects of the medication, particularly in the child or older adult, drug interactions with other current medications and underlying disease conditions.

iv. Response to treatment should be monitored regularly by a health professional with expertise in mental healthcare. Monitoring should include evaluation of any changes in the severity of depression, review of potential side effects, and update of ongoing management plans [Evidence Level C].

v. If a good response is achieved, treatment should be continued for a minimum of six months before slowly withdrawing the antidepressant [Evidence Level C].

   ➢ Examples of a ‘good response’ may be indicated by positive changes in thoughts and self-perceptions (e.g., hopelessness, worthlessness, guilt), emotional symptoms (e.g., sadness, tearfulness), and improved motivation to carry out daily activities.

vi. Following initial treatment for PSD, patients should continue to be monitored for recurrence of depressive symptoms, as part of ongoing comprehensive stroke management [Evidence Level C]. The involvement and feedback of family and caregivers can be an important component of ongoing monitoring.

   * Watchful waiting is defined as a period of time when the patient who displays mild depressive symptoms is monitored closely without additional therapeutic interventions to determine whether the mild depressive symptoms will improve. The timeframe for watchful waiting varies in the literature somewhere between 2 to 4 weeks. It is often described as including suggestions to the patient for self-help strategies and participation in exercise.

B. Non-Pharmacological and Adjunct Treatment

i. There is inadequate evidence at present to support the use of psychotherapy as monotherapy in the treatment of PSD [Evidence Level C].

ii. Treatment for PSD may also include psychotherapy as an adjunct in combination with antidepressants and/or longer-term option to prevent relapse. This approach, while supported by evidence in other populations, requires more research in stroke populations [Evidence Level C].

   a. Different options that have been explored in small studies have included cognitive behavioural therapy (CBT) and problem solving therapy, although the methodological details of the therapies have not been well described. These
therapies could be considered where appropriate at the discretion of the mental health expert [Evidence Level C].

iii. Other approaches to adjunctive treatment of PSD that are emerging, but require more research, include other forms of Repetitive Transcranial Magnetic Stimulation (rTMs), CBT, physical exercise, and acupuncture [Evidence Level C].

C. Other Mood Symptoms (Anxiety)

i. Patients with marked anxiety should be offered psychotherapy [Evidence level B].
   a. Although evidence is limited in stroke patients, pharmacotherapy may be considered as an adjunct to psychotherapy [Evidence Level C].

D. Post Stroke Emotional Incontinence (PSEI)

i. In cases of severe, persistent or troublesome tearfulness, patients may be given a trial of antidepressant medication [Evidence Level A]. Side effect profiles suggest that some selective serotonin reuptake inhibitors may be preferred over others for this patient population. Please refer to Pharmacology profile Table 7.1B

7.1.4 Prevention of Post Stroke Depression

i. Although emerging data on the use of pharmacotherapy as a preventive intervention for post stroke depression is encouraging, routine use of prophylactic antidepressants is not recommended in post-stroke patients, at this time [Evidence Level A].
   a. Further research is required to define at risk patients, choice of antidepressant agents, optimal timing and duration of intervention [Evidence Level A].

ii. Non-pharmacological, talk-based interventions including problem-solving therapy and motivational interviewing may be used to enhance rehabilitation and prevent depression post stroke [Evidence Level B].

iii. Engaging patients in activities such as exercise or music therapy may also have a beneficial effect on mood post-stroke [Evidence Level C].

7.1.5 Ongoing Monitoring, Support and Education

i. Patients should be given information and education about the potential impact of stroke on their mood and that of family and caregivers; patients and families should be provided with the opportunity to talk about the impact of stroke on their lives at all stages of care [Evidence level C]. (Refer to Chapter 6 for more recommendations on patient education and caregiver support)

ii. Patients and their caregivers should have their psychosocial and support needs assessed and reviewed on a regular basis (at least annually) as part of long-term stroke management [Evidence level C] by primary care practitioners and consulting specialists.

iii. For patients who experience some degree of communication challenge or deficits following stroke, appropriate strategies for screening of possible PSD should be implemented to ensure adequate assessment and access to appropriate treatment [Evidence Level C].
### Best Practice Recommendation 7.2 Vascular Cognitive Impairment and Dementia

All patients with vascular risk factors and those with clinically evident stroke or transient ischemic attack should be considered at increased risk for vascular cognitive impairment (VCI), particularly those patients with cognitive, perceptual or functional changes that are clinically evident or reported during history taking.

#### 7.2.1 Screening and Assessment

i. Patients with significant vascular risk factors for VCI, such as hypertension, diabetes, transient ischemic attack or clinical stroke, neuroimaging findings of covert stroke or white matter disease, hypertension-associated damage to other target organs, atrial fibrillation, other cardiac disease, and/or sleep apnea should be considered for VCI screening [Evidence Level A].

ii. Screening for VCI should be conducted using a validated screening tool, such as the Montreal Cognitive Assessment test [Evidence Level C]. Refer to Table 7.2B under Implementation Resources for information about selected tools and their psychometric properties (Table 7.2A).

iii. Screening to investigate a person’s cognitive status should address arousal, alertness, attention, orientation, memory, language, agnosia, visual-spatial/perceptual function, praxis, and executive function. Executive function screening may include assessment of initiation, insight, planning and organization, judgment, problem solving, abstract reasoning, and social cognition [Evidence Level C].

iv. Post-stroke patients with suspected cognitive impairment should also be screened for depression, given that depression has been found to contribute to vascular cognitive impairment. A validated screening tool for depression should be used [Evidence Level A].

Refer to recommendation 7.1 for additional information

v. Patients who demonstrate cognitive impairments in the screening process should be managed by a healthcare professional with expertise in the assessment and management of neurocognitive functioning.* This assessment should include cognition, perception and/or function as appropriate to guide comprehensive management [Evidence Level B]. If required, a referral should be made to an appropriate cognitive specialist [Evidence Level C].

- a. Additional assessments should be undertaken to determine: the nature and severity of cognitive impairments, as well as the presence of remaining cognitive abilities and strengths;
- b. The impact of deficits on function and safety in activities of daily living and instrumental activities of daily living, and occupational and school functioning should also be assessed.
- c. The results of these assessments should be used to guide selection and implementation of appropriate remedial, compensatory and/or adaptive intervention strategies according to client-centred goals and current or anticipated living environment (e.g., to help with discharge planning). [Evidence Level B].

* Experts in neurocognitive assessment may include a neuropsychologist, psychologist, occupational therapist, speech-language pathologist, clinical nurse specialist, psychiatrist, physiatrist, geriatrician, neurologist, and developmental pediatricians. Experts require specific qualifications to administer many of the identified assessments.
7.2.2 Timing of Screening and Assessments

i. All patients considered at high risk for cognitive impairment should be assessed periodically throughout the stages of care as indicated by the severity of clinical presentation, history and/or imaging abnormalities to identify cognitive, perceptual deficits, depression, delirium and/or changes in function [Evidence Level C].

ii. Stages of care across the continuum may include:
   a. during presentation to emergency when cognitive, perceptual or functional concerns are noted;
   b. during acute care stay, particularly if cognitive, perceptual or functional concerns, or evidence of delirium is noted;
   c. throughout rehabilitation within inpatient, outpatient, and home-based settings, according to client progress;
   d. following hospital discharge from the emergency department or inpatient setting to an outpatient or community-based healthcare setting.

iii. While assessment at different stages of care is important for guiding diagnosis and management, it is also important to be aware of the potential impact of multiple assessments on both the validity of the results as well as on the patient (e.g., test fatigue, practice effects) [Evidence Level B].

iv. Effects of age must also be considered, particularly in children with stroke where outcomes will evolve in parallel with development and deficits may not be fully realized until many years later [Evidence Level C].

7.2.3 Management of Vascular Cognitive Impairment

i. Vascular risk factors (e.g., hypertension, atrial fibrillation) should be managed aggressively to achieve optimal control of the pathology underlying cognitive impairment following a stroke or TIA [Evidence Level A].
   
   Refer to Chapter 2, Prevention of Stroke, for additional information

ii. Interventions should be tailored according to the following considerations:
   a. Goals should be patient-centred and sensitive to the values and expectations of patient, family and caregivers [Evidence Level B]
   b. Goals should be developed in the context of both the cognitive impairments as well as patients’ intact cognitive abilities, with the aim to facilitate resumption of desired activities and participation (e.g., self-care, home management, leisure, social roles, driving, volunteer participation, financial management, return to work) [Evidence Level B].

   NOTE: Issues such as intensity and dose of therapy, stage of treatment, and impact of severity of deficits can modify effectiveness of therapy, and require more research.

iii. Evidence for interventions for cognitive impairment is growing, although more research is required. Interventions with the patient can be broadly classified as either compensatory strategy training, or direct remediation/cognitive skill training. These approaches are not mutually exclusive, and, depending upon the impairments and goals, may be offered together.

   NOTE: It should be noted, however that if the level of impairment has reached
the moderate dementia stage, interventions may be more focused on providing education and support for the caregiver in addition to, or in lieu of, cognitive rehabilitation with the patient.

a. **Compensatory Strategy training** focuses on teaching strategies to address impairments and is often directed at specific functional limitations in activities of daily living to promote independence. Compensatory strategies can include learning to use external devices (e.g., memory notebooks or alarms), adapting the external environment (e.g., additional social supports or reorganization of living space), and/or learning to use internal mental operations or processes (e.g., problem-solving techniques) that enhance the impaired cognitive domain. Certain types of strategy training have been shown to be effective for improving attention, memory, language, praxis and executive function domains [Evidence Level B].

b. **Direct remediation/cognitive skill training** focuses on providing intensive specific training to directly improve the impaired cognitive domain. Computer-based training has been shown to be effective in improving attention and working memory impairments as well as language impairments [Evidence Level B]. The impact of direct skill training on achievement of goals at the activities and participation levels of functioning requires more research.

c. **New developments** in cognitive intervention that may be of potential benefit include repetitive transcranial magnetic stimulation or direct stimulation, the use of virtual reality environments or simulations, and application of constraint-induced therapy for the impaired cognitive domain. These strategies require more research before recommendations can be developed on their use.

iv. Patients with cognitive impairment and evidence of changes in mood (e.g., depression, anxiety), or behavioural changes on screening should be referred and managed by an appropriate mental healthcare professional [Evidence Level B]. Refer to recommendation 7.1 for additional information.

### 7.2.4 Pharmacotherapy for Vascular Cognitive Impairment

i. Patients with evidence of vascular cognitive impairment should be managed by a physician with expertise in vascular cognitive impairment for further assessment and recommendations regarding pharmacotherapy [Evidence Level C].

ii. 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].

a. There is fair evidence of small magnitude benefits for donepezil in cognitive and functional outcomes, with less robust benefits on global measures [Evidence Level B]. Donepezil can be considered as a treatment option for vascular dementia. More research is needed on the benefits of donepezil for vascular cognitive impairment.

b. 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].
### Section 8.0 Delivery of Stroke Care Using Telestroke Technology

**Last Updated September 2013**

#### Best Practice Recommendation 8.0 Delivery of Stroke Care Using Telestroke Technology

**8.0** Telestroke care delivery modalities should be integrated into stroke care planning and service delivery across the continuum to ensure equal access to care across geographic regions in Canada [Evidence Level C]. Telestroke is a modality that should be included as part of an organized stroke strategy within facilities and regions.

**8.1 Organization of Telestroke Services for Hyperacute Stroke Management**

i. Telestroke networks should be implemented to provide access to stroke expert consultations for hyperacute and acute stroke assessment, diagnosis and treatment, including thrombolytic therapy with tissue plasminogen activator (tPA). [Evidence Level B].

   a. Consulting and referring sites should have processes in place to ensure access to stroke experts through Telestroke modalities, available 24 hours a day, seven days a week to provide equal access to stroke care across geographic regions in Canada [Evidence Level B].

ii. Standardized protocols should be established to ensure a coordinated and efficient approach to Telestroke service delivery in the hyperacute phase of stroke to facilitate delivery of thrombolytic therapy in referring sites [Evidence Level B]. Refer to Telestroke Resource Toolkit for additional details.

iii. Clearly defined criteria and protocols should be available for referring sites to determine when and how, and to whom to initiate a hyperacute Telestroke referral [Evidence Level B]. This referral system should be part of a coordinated system of stroke care within geographic regions in Canada. Refer to Telestroke Resource Toolkit for additional details and examples.

iv. The consultant should be a physician with specialized training in stroke management, and must have timely access to diagnostic-quality CT images during the Telestroke consultation [Evidence Level A]. Refer to Telestroke Resource Toolkit Technical section for additional details.

v. Two-way audiovisual communication should be in place to enable remote clinical assessment of the patient by the consulting stroke expert [Evidence Level B].

   a. Compared with traditional bedside evaluation and use of intravenous tissue plasminogen activator, the safety and efficacy of intravenous tissue plasminogen activator administration based solely on telephone consultation without CT interpretation via teleradiology is not well established [Evidence Level C].

vi. All laboratory and diagnostic results required by the consultant should be made readily available during the telestroke consultation [Evidence Level B].

vii. Referring physicians should follow an algorithm agreed upon by both referring and consulting sites which describes inclusion and exclusion criteria for thrombolytic therapy [Evidence Level A].

viii. Referring physician and nursing staff who may be involved in acute Telestroke consultations should be trained in administration of the National Institute of Health Stroke
Scale (NIHSS), to efficiently and competently assist the Telestroke consultant with the remote video neurological examination. Ideally referring physicians should be trained in the NIHSS [Evidence Level B].

ix. The most responsible physician remains the attending physician at the referring site. Decision-making is a consensus process that is achieved in consultation with the attending medical staff at the referring site, the patient and family, and the consulting physician with stroke expertise [Evidence Level C].

x. A consulting physician should remain available to provide ongoing guidance to the referring site as required following initial consultation [Evidence Level C].

xi. Protocols should be in place to define criteria for patient transfer to a more advanced level of stroke care facility when clinically indicated [Evidence Level C].

xii. Standardized documentation should be completed by both the referring site and the consulting site (in accordance to hospital processes, jurisdictional legislation, and regulatory bodies) [Evidence Level C].

a. At the completion of the consultation, the consulting physician should provide a consultation note to the referring site to be included in the patient medical record [Evidence Level C].

b. The referring site should send a discharge summary to the consulting Telestroke physician to provide feedback about the patient’s outcome [Evidence Level C].

c. Data related to the Telestroke consultation and outcome should be captured and collected by the Telestroke Program for continuing quality improvement [Evidence Level C].

8.2 Organization of Telestroke Services for Ongoing Stroke Assessment and Management

i. Telestroke services should be part of an integrated stroke services delivery plan that addresses hyperacute stroke care, acute stroke care, and also includes stroke prevention, rehabilitation, home-based and ambulatory care to support optimal patient recovery and family support regardless of geographic location [Evidence Level C].

ii. Two-way audiovisual communication should be in place to enable referring hospitals to request Telestroke consultations regarding:

a. Optimal in-hospital stroke care (virtual stroke unit) [Evidence Level C].

b. Stroke rehabilitation services, where all rehabilitation disciplines should consider the use of telemedicine technology for patient assessment and clinical therapies (example, exercise monitoring and intensity adjustments, speech therapies for aphasia) [Evidence Level C].

c. Secondary prevention consultation and follow-up services in communities where these services do not exist [Evidence Level A].

d. Home-based patient monitoring through web-based applications should be considered as an alternative to face-to-face clinic visits in instances where frequent patient monitoring is necessary, such as for out-patient rehabilitation services [Evidence Level C].

iii. Clearly defined criteria and protocols or algorithms should be available for referring sites to determine when and how to access these rehabilitation, prevention and ambulatory services for stroke patients [Evidence Level B].

iv. The consulting healthcare provider should provide documentation to the referring site to
be included in the patient medical record, regarding patient progress, treatment plans, plans for ongoing follow-up, and discharge recommendations (in accordance with clinical care processes, organizational requirements, jurisdictional legislation, and regulatory bodies) [Evidence Level C].

8.3 Staff Training and Ongoing Education

i. Referring and consulting service providers should be trained in using the Telestroke system and understand their roles and responsibilities for technical aspects of a Telestroke consultation [Evidence Level C].

ii. Training should include physicians, nurses, therapists and any support staff (such as members of technology department), who may be involved in any Telestroke consultation or therapy appointment [Evidence Level C].

iii. Telestroke training and education should be ongoing with a regular update cycle to ensure competency [Evidence Level C]. Refer to Telestroke Resource Toolkit Technical section for additional information and resources for staff training.

iv. Consulting physicians and other healthcare professionals involved in Telestroke consults should have expertise and experience in managing stroke patients [Evidence Level C].

v. Education should be made available in online format as well as standard face to face teaching in order to ensure that remote based practitioners have access to ongoing education [Evidence Level C].

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