

## Canadian Best Practice Recommendations for Stroke Care: Summary (updated 2008)



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Canadian Stroke Network  
Réseau canadien contre  
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# Canadian best practice recommendations for stroke care (updated 2008)

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This document is an abbreviated version of the *Canadian Best Practice Recommendations for Stroke Care*, updated 2008. This supplement provides an overview of the development process and a summary of the recommendations. For the full version (including glossary, appendices and references), please see: [www.cmaj.ca/content/vol179/issue12/#supplement](http://www.cmaj.ca/content/vol179/issue12/#supplement).

## Overview

The Canadian Stroke Strategy was initiated under the leadership of the Canadian Stroke Network and the Heart and Stroke Foundation of Canada. It brings together a multitude of stakeholders and partners to work toward the common goal of developing and implementing a coordinated and integrated approach to stroke prevention, treatment, rehabilitation and community reintegration in every province and territory in Canada. Enhanced access for all Canadians to integrated, high-quality and efficient stroke services will establish the Canadian Stroke Strategy as a model for innovative health system reform in Canada and internationally.

The Canadian Stroke Strategy provides a framework to facilitate the widespread adoption of evidence-based best practices across the continuum of stroke care, focusing at 2 levels:

- the national level, where the creation of working groups to address priority initiatives supports provincial and territorial work through coordination, content development and communication;
- the provincial/territorial level, where implementation of best practices in stroke prevention, treatment, rehabilitation and community reintegration occurs at the front lines of health care.

Best Practices and Standards represent 1 of 5 Canadian Stroke Strategy national priority platforms. The goal of the Best Practices and Standards platform is to transform stroke prevention and care, ensuring that evidence-based best practices are integrated into the Canadian health system. The development and dissemination of the Canadian Best Practice Recommendations for Stroke Care begins to address this goal.

The Best Practices and Standards Working Group was established in response to the observation that stroke research findings do not always reach health care professionals, hospital administrators, health ministries and, most importantly, persons with stroke. Thus, best practices are not consistently applied, leaving a significant gap in the quality of stroke care between what should be done and what is being done. The primary goal of the Canadian Stroke Strategy is to help close

this gap. The membership list for the Best Practices and Standards Working Group is provided in Appendix 1.

The first edition of the Canadian Best Practice Recommendations for Stroke Care, released in 2006,<sup>1</sup> included an ongoing plan to formally update the recommendations every 2 years to ensure that the best practice recommendations remain current and are coordinated with other similar initiatives nationally and internationally. The 2008 update includes both revisions to the 24 best practice recommendations released in 2006 and the addition of 4 new recommendations addressing emergency medical services, management of transient ischemic attack and minor stroke, acute inpatient care and vascular cognitive impairment.

## Scope, purpose and target audience

The Canadian Best Practice Recommendations for Stroke Care are the result of an extensive review of international stroke research and published evidence-based best practice recommendations or guidelines related to stroke. The document provides a synthesis of best practices in stroke care across the continuum of care and serves as a framework for provinces and territories as they develop and implement stroke strategies. For the purpose of this document, the “continuum of stroke care” is defined as having the following components:

- primary prevention, health promotion and public awareness
- hyperacute stroke management
- acute stroke management
- stroke rehabilitation
- prevention of stroke recurrence (secondary prevention)
- community reintegration
- long-term recovery

The Canadian Best Practice Recommendations for Stroke Care, 2008 update, reflect the most critical topics in effective stroke care, are evidence-based and/or key health system drivers and are relevant in the Canadian context. They are for use by health professionals throughout the health care system who care for those affected by stroke, as well as health system policy-makers, planners, funders and administrators.

Within the health care system, there are generally 3 levels of facilities that provide stroke services: comprehensive stroke centres, centres providing an intermediate level of stroke services and centres lacking necessary stroke resources (see the complete guideline for detailed descriptions of these facilities and for an appendix presenting a glossary of stroke-related terms). It is recognized that resource issues (human, financial and system) may make it difficult to implement

\*See Appendices 1 and 2 for affiliations of the writing group and a complete list of committees and other contributors to this work.

every recommendation in this document. However, they are presented as “gold standard” benchmarks toward which all organizations and systems managing stroke patients should be striving. Additionally, they are valuable tools that can be used by those advocating for improved stroke care services.

## Method: development and update process

The conceptual framework used to guide the identification, selection, development and updating of the Canadian best practice recommendations was the Practice Guideline Evaluation and Adaptation Cycle of Graham and colleagues.<sup>2</sup>

### Leadership

The guideline development process was led by a subgroup of the Best Practices and Standards Working Group (see Appendix 1) and managed by the performance and standards specialist from the Canadian Stroke Network (P.L.). An interprofessional group of experts in stroke care was identified to participate on task groups convened specifically to draft the Canadian recommendation statements for each segment of the continuum of stroke care. A national consensus panel was convened to provide further input into the recommendations. An external group of stroke and methods experts conducted a final review of the recommendations before release.

Participants in the guideline development and review process were asked to declare all potential conflicts of interest in writing. Sixteen people had received honoraria to speak about stroke. None of these conflicts were deemed to prevent unbiased participation in the guideline process. This project was funded in its entirety by the Canadian Stroke Strategy, a partnership of the Canadian Stroke Network and the Heart and Stroke Foundation of Canada (both nonprofit organizations). The recommendations were achieved by consensus of independent experts and stakeholders through a rigorous process, and the views and interests of the funding body have not influenced the final recommendations.

### Identification of key topics and core reference guidelines

Criteria were established to guide the selection of best practice recommendations for the Canadian stroke guideline. These were applied to the original recommendations and all updates. It was determined that, to be considered for inclusion, recommendations had to meet the following criteria:

- be supported by the highest levels of evidence and/or be considered essential to delivering best practice in stroke care
- be integral to driving important health system change
- be aligned with other stroke-related Canadian best practice recommendations, e.g., the management of hypertension, diabetes and dyslipidemia
- in their totality, reflect the full continuum of stroke care

It was agreed that all recommendations would be accompanied by specific information to support implementation, i.e., the rationale for the recommendation, key health system implications, standardized performance measures to evaluate implementation and a summary of the supporting evidence.

Initially, the scope and content of the project was defined by evaluating existing national and international stroke guidelines and recommendations to determine which topics should be considered for inclusion in the Canadian best practice recommendations for stroke care.<sup>1,3–38</sup> Two comprehensive Canadian stroke care guideline reviews that were already available, the Canadian Stroke Quality of Care Study (CSQCS),<sup>17–20</sup> which focused on acute care, telestroke and secondary prevention, and the Stroke Canada Optimization of Rehabilitation through Evidence project (SCORE),<sup>38</sup> which focused on specific rehabilitation components, were used as a starting point. These studies of best practices and performance measurement in stroke care flowed from 5 Canadian consensus panels (3 for the Canadian Stroke Quality of Care Study, 1 for the Stroke Canada Optimization of Rehabilitation through Evidence project and 1 joint) conducted from 2004 to 2006. The rigorous methodology and detailed findings of these 2 projects formed the foundation for the initial phase of development of the stroke best practices recommendations.

### Synthesis of best practice recommendations

For each segment of the continuum of stroke care (prevention, hyperacute and acute care, rehabilitation and community care), expert task groups were convened to select relevant recommendations from previously published recommendations or, if necessary, draft new recommendations based on the literature reviews (see Appendix 2 for list of task group members). At the end of each recommendation statement, we have listed other guidelines with which these recommendations are most strongly aligned, where appropriate and relevant (see Table 1 for the abbreviations of guideline titles or developers used in these lists).

The task groups

- reviewed the Stroke Recommendation Matrix and supporting documentation for their segment of the continuum
- reviewed structured literature reviews and the primary evidence for each stroke topic area
- considered additional topics that had high levels of supporting evidence but that did not appear on the original topic list identified by the working group
- wrote the first draft of the recommendations for their segment of the continuum by selecting from existing guidelines or crafting them to fit new evidence
- provided references for each recommendation, including the core reference guideline(s) that were adapted or that contributed most to the wording of the recommendation
- provided a rationale for each recommendation that stated its relevance to stroke care delivery
- identified the implications of implementing the recommendations for the Canadian health care system
- provided summaries of the primary research evidence underpinning the recommendations

### National Expert Consensus Panel review of recommendations

After the task groups completed their work, the draft recommendations and supporting information were presented for discussion and decision-making to a broad group of stakeholders

**Table 1:** Abbreviations used for citing other guidelines and clinical trials with which current recommendations are aligned\*

Abbreviation	Definition
AAN	American Academy of Neurology: Report of the Therapeutics and Technology Assessment Subcommittee <sup>39</sup>
ACCP	American College of Chest Physicians: Evidence-based clinical practice guidelines (8th ed.) <sup>9</sup>
AHA-P	American Heart Association: Management of stroke in infants and children <sup>8</sup>
ASA	American Stroke Association <sup>3-7</sup>
AU	National Stroke Foundation, Australia: Clinical guidelines for acute stroke management <sup>11</sup>
AU-R	National Stroke Foundation, Australia: Clinical guidelines for stroke rehabilitation and recovery <sup>12</sup>
AVERT	A Very Early Rehabilitation Trial for stroke <sup>40,41</sup>
CAST/IST	Chinese Acute Stroke Trial/International Stroke Trial <sup>42</sup>
CCCDTD	Canadian Consensus Conference of the Diagnosis and Treatment of Dementia <sup>13</sup>
CCF	Canadian Continence Foundation <sup>43</sup>
CDA	Canadian Diabetes Association: 2008 Canadian Diabetes Association clinical practice guidelines for the prevention and management of diabetes in Canada <sup>14</sup>
CHARISMA	Clopidogrel for High Atherothrombotic Risk and Ischemic Stabilization, Management, and Avoidance <sup>44</sup>
CHEP	Canadian Hypertension Education Program <sup>16</sup>
Cochrane	Cochrane Database of Systematic Reviews: Thrombolysis for acute ischaemic stroke <sup>45</sup>
CSQCS	Canadian Stroke Quality of Care Study <sup>17-20</sup>
EBRSR	Evidence-Based Review of Stroke Rehabilitation <sup>24</sup>
ECASS III	European Cooperative Acute Stroke Study III: Thrombolysis with alteplase 3 to 4.5 hours after acute ischemic stroke <sup>46</sup>
ESO	European Stroke Organization: Guidelines for the management of ischaemic stroke and transient ischaemic attack <sup>25</sup>
EXPRESS	Early use of Existing Preventive Strategies for Stroke <sup>47</sup>
HSFO	Heart and Stroke Foundation of Ontario: Consensus Panel on the Stroke Rehabilitation System <sup>48</sup>
MATCH	Management of Atherothrombosis with Clopidogrel in High-risk patients with recent TIA or ischemic stroke <sup>49</sup>
NAEMSP	National Association of EMS Physicians <sup>50</sup>
NICE	National Institute for Health and Clinical Excellence <sup>31</sup>
NOCP	Paramedic Association of Canada: National occupational competency profiles for paramedic practitioners <sup>51</sup>
NZ	Stroke Foundation, New Zealand: New Zealand guideline for management of stroke <sup>26</sup>
OCCPG	Obesity Canada clinical practice guidelines <sup>52</sup>
Ottawa Panel	Evidence-based clinical practice guidelines for post-stroke rehabilitation <sup>23</sup>
PROGRESS	PROGRESS Collaborative Group: Randomised trial of a perindopril-based blood-pressure-lowering regimen <sup>53</sup>
RCP	Royal College of Physicians: National clinical guidelines for stroke <sup>35</sup>
RCP-P	Royal College of Physicians: Stroke in childhood <sup>37</sup>
RNAO	Registered Nurses Association of Ontario: Nurses best practice guidelines (continence) <sup>22</sup>
SCORE	Stroke Canada Optimization of Rehabilitation through Evidence <sup>38</sup>
SIGN	Scottish Intercollegiate Guidelines Network: Management of patients with stroke <sup>27-30</sup>
SIGN 13	Scottish Intercollegiate Guidelines Network: Management of patients with stroke I: assessment, investigation, immediate management and secondary prevention <sup>27</sup>
SIGN 14	Scottish Intercollegiate Guidelines Network: Management of patients with stroke II: management of carotid stenosis and carotid endarterectomy <sup>28</sup>
SIGN 64	Scottish Intercollegiate Guidelines Network: Management of patients with stroke IV: rehabilitation, prevention and management of complications and discharge planning <sup>30</sup>
SIGN 78	Scottish Intercollegiate Guidelines Network: Management of patients with stroke III: identification and management of dysphagia <sup>29</sup>
VADoD	US Veterans Affairs/Department of Defense: Clinical practice guideline for the management of stroke rehabilitation <sup>10</sup>

\*In many instances, the best practice recommendations were adapted from or aligned with other existing guidelines. These are identified at the end of each recommendation statement, as appropriate, using the abbreviations listed here.



at a national consensus panel meeting (see the complete guideline for the list of participants). Panel participants included task group members, health care professionals from across disciplines and across the health care continuum who were external to the guideline development process, key opinion leaders and stroke survivors. The objectives of the consensus panel meeting were the following:

- to discuss and, where necessary, modify the proposed updates to existing recommendations, the inclusion of new recommendations and other suggested changes to the document
- to reach consensus and vote on the complete set of recommendations
- to discuss and propose ongoing implementation strategies
- to prioritize the best practice recommendations to identify foci for existing implementation resources, while maintaining an emphasis on the importance of all of the recommendations to an integrated and coordinated stroke care system

### Development of performance measures

The Canadian Stroke Strategy Information and Evaluation Working Group (see Appendix 1) was established to develop a framework to measure the quality and consistency of care across the continuum of stroke care delivery. As part of its mandate, the Information and Evaluation Working Group reviewed each final recommendation and developed a set of performance measures to monitor the impact of implementing the recommendation on the quality of patient care and/or patient outcomes. The working group also developed accompanying “measurement notes,” which identify potential data sources, methods to enhance data collection, challenges to data access and data quality issues. A complete data dictionary is available at [www.canadianstrokestrategy.ca](http://www.canadianstrokestrategy.ca).

### Release of best practice recommendations

Following the consensus panel meeting, the task groups reconvened to review the consensus panel feedback, address suggested revisions and propose final wording for the recommendations. Once that process was completed, the following steps were undertaken:

- The recommendations and supporting documentation were reviewed externally by a range of Canadian stroke experts and system leaders who had not participated in any previous step of the guideline development process (see the complete guideline for a list of the external reviewers and for an appendix showing the comments of the *CMAJ* editors and peer reviewers, accompanied by the authors’ responses).
- The document was translated into French and the translation was verified by bilingual stroke neurologists and stroke nurses.
- Monitoring and feedback mechanisms were put in place to continue preparation for the next update.

### Highlights of the 2008 update

Following the release of the 2006 best practice recommenda-

tions, an extensive national consultation was undertaken and valuable feedback was received from front-line staff directly involved in implementing the recommendations and from health system leaders in institutions, regional health authorities and government. All feedback and suggestions were considered by the Canadian Stroke Strategy and by the task groups during the development of the 2008 update. The consensus panel provided further direction and feedback. Ultimately, after the suggested changes were made, the consensus panel voted and developed essentially unanimous agreement to the following enhancements.

### Revisions to existing best practice recommendations

- Updates and minor edits were proposed and approved for 21 of the original 24 best practice recommendations.
- The recommendations on computed tomography (CT) scanning and carotid imaging were combined into 1 recommendation on neurovascular imaging.
- The recommendation on acute thrombolysis was substantially revised in light of late-breaking evidence.
- The recommendation addressing community rehabilitation was refocused to include both outpatient and community rehabilitation services.

### Additional amendments

- *Discharge planning*: Discharge planning should begin soon after the patient presents to the health care system, and should be reviewed and updated as required at each transition point. For 2008, amendments were made to some of the existing recommendations, where appropriate, to emphasize the importance of discharge planning.
- *Pediatric stroke*: Stroke may occur at any age. Although stroke is uncommon in children, it can result in significant long-term issues for the survivor. Many of the recommendations in this document apply across the lifespan, as well as across the continuum of stroke care. The Canadian Best Practice Recommendations for Stroke Care are not intended as comprehensive guidelines for the management of pediatric patients. Rather, some evidence-based additions have been made to highlight specific issues in pediatric stroke care. References for current detailed guidelines in pediatric stroke are included at the end of this document.<sup>8,37</sup>

### Approval of 4 new recommendations

Four recommendations were approved by the consensus panel, addressing the following topics:

- emergency medical services care of stroke patients before hospital arrival or during transport between hospitals
- acute management of transient ischemic attack and minor stroke, especially for patients managed in the community or discharged home from the emergency department
- components of acute stroke management, to minimize the risk of complications
- vascular cognitive impairment and dementia as manifestations of stroke, to emphasize that those symptoms of vascular cognitive impairment should trigger aggressive secondary prevention therapy

## Identification of implementation barriers and facilitators

A considerable amount of time was spent during the 2008 consensus panel meeting discussing the challenges to and strategies for implementation of the best practice recommendations. Panel members were divided into 4 groups: acute care; prevention; rehabilitation and recovery; and a broader systems group that included leaders from hospitals and health regions, stroke program administrators, government representatives and other stakeholder groups.

Among the factors identified for successful implementation were the following:

- well-resourced stroke coordinators hired to manage implementation
- government support and funding
- identification and participation of key stroke champions
- integration of stroke programs and services into regional and hospital strategic and operational plans
- demonstration of the economic impact of providing coordinated stroke care and implementing best practice recommendations

The major barriers to implementation of best practices for stroke were identified as (1) competing priorities within health care systems, regions and institutions and (2) limited human, financial and equipment resources. These factors were incorporated into the "Systems implications" sections of several recommendations as appropriate.

## Priorities for implementation

As the final task of the 2008 consensus panel meeting, members were asked to participate in an exercise to prioritize the recommendations for implementation. The intent was to provide guidance for the allocation of limited local, regional and national resources in stroke care; however, the consensus of the group was that effective stroke care for all Canadians depends on coordinated and integrated systems of care, which will require implementation of all of the best practice recommendations in this document.

At the end of the afternoon breakout session, all consensus panel participants were asked the question, "Keeping in mind that all of the recommendations in the Canadian Best Practice Recommendations for Stroke Care (2008) are both important and necessary, which ones, if implemented immediately, would have the greatest impact on stroke care in Canada?" The following top 10 priorities emerged (in descending order of priority), based on the highest number of votes by panel members:

1. Management of transient ischemic attack and minor stroke
2. Outpatient and community rehabilitation
3. Development of stroke units
4. Management of stroke by emergency medical services
5. Initial assessments for rehabilitation
6. Blood pressure management
7. Provision of inpatient rehabilitation
8. Management of post-stroke depression
9. Carotid artery interventions
10. Anticoagulation in stroke patients with atrial fibrillation

## Dissemination and implementation

### Networking

Several dissemination strategies for the best practice recommendations were identified and implemented following the initial release in 2006. Many of these are ongoing.

- Consultation with research experts in the field of knowledge translation and guideline implementation across Canada and internationally to identify and utilize evidence-based implementation strategies.
- Sharing progress with all Canadian Stroke Strategy working groups to ensure alignment and collaboration in dissemination.
- Presentation to and discussion with provincial stroke champions during draft stages of development and preparation of final content.
- Consultation with other national guideline groups in related fields (e.g., hypertension, dyslipidemia, diabetes).
- Presentation for discussion at meetings of health care professionals across health care disciplines and across the continuum of stroke care, at the national, provincial and regional levels.
- Presentation to front-line health care professionals at the local level and using local consensus processes to review and provide structured assessment of the enablers and barriers to guideline implementation, as well as innovative implementation strategies.
- Posting the recommendations on the Canadian Stroke Strategy website, as well as other central guideline repository websites.
- Direct mail-out to key stakeholders and front-line health care professionals working with persons with stroke and their families along the continuum of care.
- Highlights of individual recommendations in stroke-related newsletters, such as the National Stroke Nursing Council's newsletter.
- Structured feedback mechanism included in mailings and on the Canadian Stroke Strategy website.

### Tools to support implementation of best practice recommendations

The national professional development and training platform of the Canadian Stroke Strategy focuses on implementation of a professional development and training plan for health professionals caring for stroke patients. The Professional Development and Training Working Group has developed a 3-pronged approach encompassing pre-professional education, professional development and systems change. This working group conducted a national needs assessment and identified a need for point-of-care tools to facilitate knowledge transfer of stroke best practice recommendations to and within the clinical setting.

The Professional Development and Training Working Group has developed several point-of-care tools that are now available through the websites of the Canadian Stroke Strategy and the Heart and Stroke Foundation of Canada:

- Acute stroke management resource
- Toolkit for the Canadian Best Practice Recommendations for Stroke Care (2006)

- Pocket reference cards: Cranial Nerves, Common Stroke Presentations, Functions of the Brain, National Institutes of Health Stroke Scale, Canadian Neurological Scale, Stroke Prevention
- *FAAST FAQs for Nurses*
- *National Professional Education Atlas*

Professional development and training resources for stroke will continue to be an important part of the implementation strategy for the Canadian Best Practice Recommendations for Stroke Care. The Heart and Stroke Foundation is leading the ongoing prioritization and development of professional development resources in partnership with the Canadian Stroke Strategy.

Professional development information is also available at the following websites:

- Canadian Stroke Strategy: [www.canadianstrokestrategy.ca](http://www.canadianstrokestrategy.ca)
- Heart and Stroke Foundation Professional Education Site: <http://profed.heartandstroke.ca/>

## Using this document

The full text of each recommendation is presented in the following sections; the levels of evidence (A, B and C) are defined in Table 2 of this abridged document. The rationale, performance indicators, system implications and evidence summaries are available in the complete version of the Canadian Best Practice Recommendations for Stroke Care, at [www.cmaj.ca/content/vol179/issue12/#supplement](http://www.cmaj.ca/content/vol179/issue12/#supplement), along with additional information about the Canadian Stroke Strategy guideline development and update process.

## 1: Public awareness and patient education

### Recommendation 1.1 Public awareness

All members of the public should be able to recognize and identify the signs and symptoms of stroke, which include sudden weakness, sudden trouble speaking, sudden vision problems, sudden headache, sudden dizziness (Box 1).

- Public education on stroke should emphasize that stroke is a medical emergency, and that immediate medical attention should be sought. All members of the public should know to take the appropriate actions — that is, to call 9-1-1 or their local emergency number [Evidence Level B] (CSQCS, ESO).

- Public education should include information that stroke can affect persons of any age — from newborn and children to adults [Evidence Level C] (RCP-P).

### Recommendation 1.2 Patient and family education

Note: Patient, family and caregiver education is an integral part of stroke care that should be addressed at *all stages across the continuum of stroke care* for both adult and pediatric patients. Education includes the transfer of information and skills, and may include additional training components as required to transfer skills for self/patient management for both adult and pediatric stroke patients and their families.

Education that is integrated and coordinated should be provided in a timely manner across the continuum of stroke care for all patients with stroke or at risk for stroke, as well as their families and caregivers.

- Educational content should be specific to the phase of care or recovery across the continuum of stroke care and appropriate to patient, family and caregiver readiness and needs [Evidence Level B].<sup>55</sup>
- The scope of the educational content should cover all aspects of care and recovery, including the nature of stroke and its manifestations, signs and symptoms; impairments and their impact and management, including caregiver training; risk factors; post-stroke depression; cognitive impairment, discharge planning and decision-making; community resources, services, and support programs; and environmental adaptations and benefits [Evidence Level A] (AU, CSQCS, Hare et al.,<sup>56</sup> NZ, RCP).
- Education should be interactive, timely, up to date, provided in a variety of languages and formats (written, oral, aphasia friendly, group counselling approach), and specific to patient, family and caregiver needs and impairments. The provision of education should ensure communicative accessibility for stroke survivors [Evidence Level B] (AU, CSQCS, NZ, RCP).
- Clinicians and/or teams should develop processes for routine patient, caregiver and family education in which designated team members are responsible for provision and documentation of education [Evidence Level C] (ASA).

**Table 2:** Summary of definitions for levels of evidence reported in this document<sup>54</sup>

Grade	Criteria
A	Strong recommendation. Evidence from randomized controlled trials or meta-analyses of randomized controlled trials. Desirable effects clearly outweigh undesirable effects, or vice versa.
B	Single randomized controlled trial or well-designed observational study with strong evidence; or well-designed cohort or case-control analytic study; or multiple time series or dramatic results of uncontrolled experiment. Desirable effects closely balanced with undesirable effects.
C	At least one well-designed, nonexperimental descriptive study (e.g., comparative studies, correlation studies, case studies) or expert committee reports, opinions and/or experience of respected authorities, including consensus from development and/or reviewer groups.

## 2: Prevention of stroke (see Box 2)

### Recommendation 2.1 Lifestyle and risk factor management

Persons at risk of stroke and patients who have had a stroke should be assessed for vascular disease risk factors and lifestyle management issues (diet, sodium intake, exercise, weight, smoking and alcohol intake). They should receive information and counselling about possible strategies to modify their lifestyle and risk factors [Evidence Level B] (AU, NZ, RCP, VA/DoD).

Lifestyle and risk factor interventions should include:

- i. *Healthy balanced diet:* High in fresh fruits, vegetables, low-fat dairy products, dietary and soluble fibre, whole grains and protein from plant sources and low in satu-

#### Box 1: Warning signs of stroke\*

- Weakness: Sudden weakness, numbness or tingling in the face, arm or leg
- Trouble speaking: Sudden temporary loss of speech or trouble understanding speech
- Vision problems: Sudden loss of vision, particularly in one eye, or double vision
- Headache: Sudden severe and unusual headache
- Dizziness: Sudden loss of balance, especially with any of the above signs

**Action:** Call 9-1-1 or your local emergency number immediately

\*Heart and Stroke Foundation of Canada: [www.heartandstroke.ca](http://www.heartandstroke.ca)

rated fat, cholesterol and sodium, in accordance with Canada's Food Guide to Healthy Eating [Evidence Level B] (ASA, CHEP, RCP).

- ii. *Sodium:* The recommended daily sodium intake from all sources is the Adequate Intake by age. For persons 9–50 years, the Adequate Intake is 1500 mg. Adequate Intake decreases to 1300 mg for persons 50–70 years and to 1200 mg for persons > 70 years. A daily upper consumption limit of 2300 mg should not be exceeded by any age group [Evidence Level B]. See [www.sodium101.ca](http://www.sodium101.ca) for sodium intake guidelines.
- iii. *Exercise:* Moderate exercise (an accumulation of 30 to 60 minutes) of walking (ideally brisk walking), jogging, cycling, swimming or other dynamic exercise 4 to 7 days each week in addition to routine activities of daily living [Evidence Level A]. Medically supervised exercise programs are recommended for high-risk patients (e.g., those with cardiac disease) (ASA, CHEP, EBRSR, NZ).
- iv. *Weight:* Maintain goal of a body mass index (BMI) of 18.5 to 24.9 kg/m<sup>2</sup> and a waist circumference of < 88 cm for women and < 102 cm for men [Evidence Level B] (ASA, CHEP, OCCPG).
- v. *Smoking:* Smoking cessation and a smoke-free environment; nicotine replacement therapy and behavioural therapy [Evidence Level B] (ASA, CHEP, CSQCS, RCP). For nicotine replacement therapy, nortriptyline therapy, nicotine receptor partial agonist therapy and/or behavioural therapy should be considered [Evidence Level A] (ASA, AU).
- vi. *Alcohol consumption:* Two or fewer standard drinks per

#### Box 2: Definitions of prevention for the Canadian Best Practice Recommendations for Stroke Care

- **Primary prevention:** Primary prevention is an individually based clinical approach to disease prevention. It is directed toward preventing the initial occurrence of a disorder in otherwise healthy individuals.<sup>57,58</sup> Primary prevention is usually implemented in the primary care setting, and the physician, advanced practice nurse or patient may initiate a discussion of stroke risk reduction. Primary prevention and health promotion recommendations related to stroke (lifestyle and risk factor management, hypertension screening, dyslipidemia screening and diabetes management) emphasize the importance of screening and monitoring those patients at high risk of a first stroke event. Primary prevention and the reduction of risk factor prevalence in the general population are not the main purposes of the current Best Practice Recommendations for Stroke Care; therefore, only selected recommendations related to primary prevention are included. A comprehensive set of recommendations in this area is being developed for inclusion in future updates.
- **Secondary prevention:** Secondary stroke prevention is an individually based clinical approach to reducing the risk of recurrent vascular events in individuals who have already experienced a stroke or transient ischemic attack and in those who have one or more of the medical conditions or risk factors that place them at high "risk of stroke."<sup>58</sup> Secondary prevention recommendations in this document are directed to those risk factors most relevant to stroke, including lifestyle (diet, sodium intake, exercise, weight, smoking and alcohol intake), hypertension, dyslipidemia, previous stroke or transient ischemic attack, atrial fibrillation and stroke, and carotid stenosis. Secondary prevention recommendations provided in this section can be addressed in a variety of settings — acute care, stroke prevention clinics and community-based care settings. They pertain to patients initially seen in primary care, those who are treated in an emergency department and then released and those who are hospitalized because of stroke or transient ischemic attack. Recommendations for secondary prevention of stroke should be implemented throughout the recovery phase, including during inpatient and outpatient rehabilitation, reintegration into the community and ongoing follow-up by primary care practitioners. Secondary prevention issues should be addressed at all appropriate health care encounters on an ongoing basis following a stroke or transient ischemic attack.
- Please also refer to recommendation 3.2, "Acute management of transient ischemic attack and minor stroke," for further guidance on assessing stroke risk.



day; and fewer than 14 drinks per week for men; and fewer than 9 drinks per week for women [Evidence Level C] (ASA, AU, CHEP).

## **Recommendation 2.2 Blood pressure management**

Hypertension is the single most important modifiable risk factor for stroke. Blood pressure should be monitored in all persons at risk for stroke.

### **2.2a. Blood pressure assessment**

- i. All persons at risk of stroke should have their blood pressure measured at each health care encounter, but no less than once annually [Evidence Level C] (CHEP, NICE, RCP).
- ii. Proper standardized techniques, as described by the Canadian Hypertension Education Program, should be followed for blood pressure measurement (CHEP).
- iii. Patients found to have elevated blood pressure should undergo thorough assessment for the diagnosis of hypertension following the current guidelines of the Canadian Hypertension Education Program [Evidence Level A] (ASA, CHEP, RCP).
- iv. Patients with hypertension or at risk for hypertension should be advised on lifestyle modifications. [Evidence Level C]. Refer to recommendation 2.1, "Lifestyle and risk factor management," for details on lifestyle modifications.

### **2.2b. Blood pressure management**

- i. The Canadian Stroke Strategy recommends target blood pressure levels as defined by the Canadian Hypertension Education Program (CHEP) guidelines for prevention of first stroke, recurrent stroke, and other vascular events.

CHEP 2008 Recommendations for Management of Blood Pressure (excerpts used with permission; see [www.hypertension.ca/chep](http://www.hypertension.ca/chep) for detailed information<sup>16</sup>):

- For the prevention of first stroke in the general population the systolic blood pressure treatment goal is a pressure level of less than 140 mm Hg [Evidence Level C]. The diastolic blood pressure treatment goal is a pressure level of less than 90 mm Hg [Evidence Level A].
- Blood pressure lowering treatment is recommended for patients who have had a stroke or transient ischemic attack to a target of less than 140/90 mm Hg [Evidence Level C].
- In patients who have had a stroke, treatment with an angiotensin-converting enzyme (ACE) inhibitor or diuretic is preferred [Evidence Level B].
- Blood pressure lowering treatment is recommended for the prevention of first or recurrent stroke in patients with diabetes to attain systolic blood pressures of less than 130 mm Hg [Evidence Level C] and diastolic blood pressures of less than 80 mm Hg [Evidence Level A].
- Blood pressure lowering treatment is recommended for the prevention of first or recurrent stroke in patients with nondiabetic chronic kidney disease to attain a blood pressure of less than 130/80 mm Hg [Evidence Level C].

- ii. Randomized controlled trials have not defined the optimal time to initiate blood pressure lowering therapy after stroke or transient ischemic attack. It is recommended that blood pressure lowering treatment be initiated (or modified) prior to discharge from hospital. For patients with nondisabling stroke or transient ischemic attack not requiring hospitalization, it is recommended that blood pressure lowering treatment be initiated (or modified) at the time of the first medical assessment [Evidence Level B] (EXPRESS, PROGRESS).
- iii. For recommendations on specific agents and sequence of agents, please refer to the current Canadian Hypertension Education Program guidelines.<sup>16</sup>

## **Recommendation 2.3 Lipid management**

Lipid levels should be monitored in all persons at risk for stroke.

### **2.3a. Lipid assessment**

- i. Fasting lipid levels (total cholesterol, total glycerides, low-density-lipoprotein [LDL] cholesterol, high-density-lipoprotein [HDL] cholesterol) should be measured every 1 to 3 years for all men 40 years or older and for women who are postmenopausal and/or 50 years or older [Evidence Level C] (McPherson et al.,<sup>15</sup> VA/DoD). More frequent testing should be performed for patients with abnormal values or if treatment is initiated.
- ii. Adults at any age should have their blood lipid levels measured if they have a history of diabetes, smoking, hypertension, obesity, ischemic heart disease, renal vascular disease, peripheral vascular disease, ischemic stroke, transient ischemic attack or asymptomatic carotid stenosis [Evidence Level C] (McPherson et al.<sup>15</sup>).

### **2.3b. Lipid management**

- i. Ischemic stroke patients with LDL cholesterol of > 2.0 mmol/L should be managed with lifestyle modification and dietary guidelines [Evidence Level A] (AU, CSQCS, McPherson et al.,<sup>15</sup> VA/DoD).
- ii. Statin agents should be prescribed for most patients who have had an ischemic stroke or transient ischemic attack to achieve current recommended lipid levels [Evidence Level A] (AU, CSQCS, McPherson et al.,<sup>15</sup> VA/DoD).

## **Recommendation 2.4 Diabetes management**

### **2.4a. Diabetes assessment**

- i. All individuals in the general population should be evaluated annually for type 2 diabetes risk on the basis of demographic and clinical criteria [Evidence Level C] (CDA).
- ii. A fasting plasma glucose should be performed every 3 years in individuals > 40 years of age to screen for diabetes [Evidence Level C] (CDA). More frequent and/or earlier testing with either a fasting plasma glucose or plasma glucose sample drawn 2 hours after a 75-g oral glucose load should be considered in people with additional risk factors for diabetes [Evidence Level C]



- (CDA). Some of these risk factors include family history, high-risk population, vascular disease, history of gestational diabetes, hypertension, dyslipidemia, overweight, abdominal obesity, polycystic ovary syndrome.
- iii. In adults, fasting lipid levels (total cholesterol, HDL cholesterol, total glycerides and calculated LDL cholesterol) should be measured at the time of diagnosis of diabetes and then every 1 to 3 years as clinically indicated. More frequent testing should be performed if treatment for dyslipidemia is initiated [Evidence Level C] (CDA).
  - iv. Blood pressure should be measured at every diabetes visit [Evidence Level C] (CDA).

#### 2.4b. Diabetes management

- i. Glycemic targets must be individualized; however, therapy in most patients with type 1 or type 2 diabetes should be targeted to achieve a glycated hemoglobin ( $Hb_{A1c}$ ) level  $\leq 7.0\%$  in order to reduce the risk of microvascular complications [Evidence Level A] (CDA) and, for individuals with type 1 diabetes, macrovascular complications. [Evidence Level C] (CDA).
- ii. To achieve an  $Hb_{A1c} \leq 7.0\%$ , patients with type 1 or type 2 diabetes should aim for a fasting plasma glucose or preprandial plasma glucose targets of 4.0 to 7.0 mmol/L [Evidence Level B] (CDA).
- iii. The 2-hour postprandial plasma glucose target is 5.0–10.0 mmol/L [Evidence Level B]. If  $Hb_{A1c}$  targets cannot be achieved with a postprandial target of 5.0–10.0 mmol/L, further postprandial blood glucose lowering, to 5.0–8.0 mmol/L, can be considered [Evidence Level C] (CDA).
- iv. Adults at high risk of a vascular event should be treated with a statin to achieve an LDL cholesterol  $\leq 2.0$  mmol/L [Evidence Level A] (CDA).
- v. Unless contraindicated, low dose acetylsalicylic acid (ASA) therapy (80 to 325 mg/day) is recommended in all patients with diabetes with evidence of cardiovascular disease, as well as for those individuals with atherosclerotic risk factors that increase their likelihood of cardiovascular events [Evidence Level A] (CDA).

#### 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] (ASA, AU, CSQCS, ESO, NZ, RCP, VA/DoD).

- i. ASA, combined ASA (25 mg) and extended-release dipyridamole (200 mg), or clopidogrel may be used depending on the clinical circumstances [Evidence Level A].
- ii. For adult patients on ASA, the usual maintenance dosage is 80 to 325 mg per day [Evidence Level A] (CSQCS, VA/DoD), and in children with stroke the usual maintenance dosage of ASA is 3 to 5 mg/kg per day for the prevention of recurrent stroke [Evidence Level C] (AHA-P).
- iii. Long-term combinations of ASA and clopidogrel are not

recommended for secondary stroke prevention [Evidence Level B] (CHARISMA, MATCH).

#### Recommendation 2.6 Antithrombotic therapy in atrial fibrillation

Patients with stroke and atrial fibrillation should be treated with warfarin at a target international normalized ratio of 2.5, range 2.0 to 3.0 (target international normalized ratio of 3.0 for mechanical cardiac valves, range 2.5 to 3.5) [Evidence Level A], if they are likely to be compliant with the required monitoring and are not at high risk for bleeding complications (ASA, AU, CSQCS, ESO, SIGN, VA/DoD).

#### Recommendation 2.7 Carotid intervention

##### 2.7a Symptomatic carotid stenosis

Patients with transient ischemic attack or nondisabling stroke and ipsilateral 70%–99% internal carotid artery stenosis (measured on a catheter angiogram or by 2 concordant non-invasive imaging modalities) should be offered carotid endarterectomy within 2 weeks of the incident transient ischemic attack or stroke unless contraindicated [Evidence Level A] (ASA, AU, CSQCS, ESO, NZ, SIGN 14).

- i. Carotid endarterectomy is recommended for selected patients with moderate (50%–69%) symptomatic stenosis, and these patients should be evaluated by a physician with expertise in stroke management [Evidence Level A] (ASA, AU, CSQCS, NZ, SIGN 14).
- ii. Carotid endarterectomy should be performed by a surgeon with a known perioperative morbidity and mortality of  $< 6\%$  [Evidence Level A] (ASA, CSQCS, ESO, NZ).
- iii. Carotid stenting may be considered for patients who are not operative candidates for technical, anatomic or medical reasons [Evidence Level C].
- iv. Carotid endarterectomy is contraindicated for patients with mild ( $< 50\%$ ) stenosis [Evidence Level A] (ASA, CSQCS, SIGN 14).

##### 2.7b Asymptomatic carotid stenosis

Carotid endarterectomy may be considered for selected patients with asymptomatic 60%–99% carotid stenosis.

- i. Patients should be less than 75 years old with a surgical risk of  $< 3\%$ , a life expectancy of  $> 5$  years and be evaluated by a physician with expertise in stroke management [Evidence Level A] (AAN, AHA, AU, CSQCS).

### 3: Hyperacute stroke management

Within this section of the recommendations, hyperacute stroke care is defined as the health care activities that take place from the time of first contact between a patient with potential stroke and medical care until the patient is either admitted to hospital or discharged back into the community.

#### Recommendation 3.1 Emergency medical services management of acute stroke patients (new for 2008)

This recommendation covers management of patients with

suspected stroke from the time of first contact with the local emergency medical services to transfer to hospital personnel, as well as care of suspected or confirmed stroke patients who are being transferred between health care facilities by emergency medical services.

This recommendation is directed to paramedics and those individuals who support emergency medical services, including communications officers and dispatchers. It also applies to other first responders (such as emergency medical responders and primary care paramedics) who have received the appropriate training to screen for stroke and manage potential stroke patients during transfer.

Patients who show signs and symptoms of hyperacute stroke, usually defined as symptom onset within the previous 4.5 hours, must be treated as time-sensitive emergency cases and should be transported without delay to the closest institution that provides emergency stroke care [Evidence Level C] (ASA, AU, ESO, RCP).

- i. Immediate contact with emergency medical services (e.g., 9-1-1) by patients or other members of the public is strongly recommended because it reduces time to treatment for acute stroke [Evidence Level C] (ASA, ESO).
- ii. Emergency medical services dispatchers must triage patients exhibiting signs and symptoms of a hyperacute stroke as a priority dispatch [Evidence Level C] (ASA, AU, ESO, NAEMSP, RCP).
- iii. A standardized acute stroke diagnostic screening tool should be used by paramedics (as per the National Occupational Competency Profile [NOCP]<sup>51</sup>) [Evidence Level B] (ASA, AU, ESO).
- iv. Out-of-hospital patient management should be optimized to meet the needs of suspected acute stroke patients [Evidence Level A] (ASA, RCP).
- v. Direct transport protocols must be in place to facilitate the transfer of eligible patients to the closest and most appropriate facility providing acute stroke care [Evidence Level C] (AU, ESO).
- vi. Direct transport protocol criteria must be based on (1) both symptom duration and anticipated transport duration being less than the therapeutic window and/or (2) other acute care needs of the patient [Evidence Level B] (ASA).
- vii. History of event, including time of onset, signs and symptoms, and previous medical and drug history, must be obtained from the patient if able and/or informant when available [Evidence Level C] (RCP).
- viii. Paramedics must notify the receiving facility of a suspected acute stroke patient in order for the facility to prepare for patient arrival [Evidence Level C] (ASA, ESO, NAEMSP, RCP).
- ix. Transfer of care from paramedics to receiving facility personnel must occur without delay [Evidence Level C].

### **Recommendation 3.2 Acute management of transient ischemic attack and minor stroke (new for 2008)**

Patients who present with symptoms suggestive of minor stroke or transient ischemic attack must undergo a compre-

hensive evaluation to confirm the diagnosis and begin treatment to reduce the risk of major stroke as soon as is appropriate to the clinical situation.

#### **3.2a Assessment**

- i. All patients with suspected transient ischemic attack or minor stroke should have an immediate clinical evaluation and additional investigations as required to establish the diagnosis, rule out stroke mimics and develop a plan of care [Evidence Level B] (ASA, AU, CSQCS, ESO, EXPRESS, RCP).
- ii. Use of a standardized risk stratification tool at the initial point of health care contact — whether first seen in primary, secondary or tertiary care — should be used to guide the triage process [Evidence Level B] (AU, CSQCS).
- iii. Patients with suspected transient ischemic attack or minor stroke should be referred to a designated stroke prevention clinic or to a physician with expertise in stroke assessment and management or, if these options are not available, to an emergency department that has access to neurovascular imaging facilities and stroke expertise [Evidence Level B] (CSQCS, ESO, EXPRESS, SIGN 13).
- iv. Patients with suspected transient ischemic attack or minor stroke require brain imaging with CT or magnetic resonance imaging (MRI). Emergent patients (those patients classified at *highest risk* of recurrent stroke) should have neurovascular imaging within 24 hours, and patients classified as *urgent* should have neurovascular imaging within 7 days [Evidence Level B] (ASA, AU, CSQCS, ESO, SIGN 13).
- v. Patients who may be candidates for carotid revascularization should have computed tomographic angiography, magnetic resonance angiography, or a carotid duplex ultrasound as soon as possible (within 24 hours for emergent patients, and 7 days for urgent patients) [Evidence Level C] (AU, CSQCS).
- vi. The following investigations should be undertaken routinely for patients with suspected transient ischemic attack or minor stroke: complete blood count, electrolytes, renal function, cholesterol level, glucose level, and electrocardiography [Evidence Level C] (AU).
- vii. Patients with suspected transient ischemic attack or minor stroke with confirmed cerebral infarction on brain imaging should undergo a comprehensive outpatient assessment(s) for functional impairment, which includes a cognitive evaluation, screening for depression, screening of fitness to drive, as well as functional assessments for potential rehabilitation treatment [Evidence Level B] (RCP), preferably within 2 weeks [Evidence Level C]. Refer to Recommendation 5.1, “Initial stroke rehabilitation assessment,” and recommendation 5.5, “Follow-up and community reintegration,” for further details.

#### **3.2b Management (Refer to section 2, “Prevention of stroke,” for additional details)**

- i. All patients with transient ischemic attack or minor stroke not on an antiplatelet agent at time of presentation

- should be started on antiplatelet therapy immediately after brain imaging has excluded intracranial hemorrhage [Evidence Level A] (ASA, CAST/IST, ESO, RCP). The initial dose of ASA should be at least 160 mg. For clopidogrel the loading dose is 300 mg. Refer to recommendation 2.5, "Antiplatelet therapy," for details on long-term antiplatelet therapy.
- ii. Patients with transient ischemic attack or minor stroke and > 70% carotid stenosis and select patients with acutely symptomatic 50%–69% carotid stenosis on the side implicated by their neurologic symptoms, who are otherwise candidates for carotid revascularization, should have carotid endarterectomy performed as soon as possible, within 2 weeks [Evidence Level A] (AU, CSQCS, ESO, NICE, NZ, SIGN 14). Refer to Recommendation 2.7, "Carotid intervention," for additional details.
  - iii. Patients with transient ischemic attack or minor stroke and atrial fibrillation should begin anticoagulation using warfarin immediately after brain imaging has excluded intracranial hemorrhage, aiming for a target therapeutic international normalized ratio of 2 to 3. [Evidence Level A] (AU, CSQCS, ESO, NICE, NZ, SIGN 14). Refer to Recommendation 2.6, "Antithrombotic therapy in atrial fibrillation," for additional details.
  - iv. All risk factors for cerebrovascular disease must be aggressively managed, through both pharmacologic and nonpharmacologic means, to achieve optimal control [Evidence Level A] (ESO). While evidence for the benefit of modifying individual risk factors in the acute phase is lacking, there is evidence of benefit when adopting a comprehensive approach, including antihypertensives and statin medication (EXPRESS). Refer to recommendations 2.2, "Blood pressure management," and 2.3, "Lipid management," for additional details.
  - v. Patients with transient ischemic attack or minor stroke who smoke cigarettes should be strongly counselled to quit immediately, and be provided with the pharmacologic and nonpharmacologic means to do so [Evidence Level B] (ASA, CSQCS, ESO, RCP).
  - iii. If MRI is performed, it should include diffusion-weighted sequences to detect ischemia and gradient echo and fluid-attenuated inversion recovery (FLAIR) sequences to determine extent of infarct or presence of hemorrhage [Evidence Level B] (CSQCS, NZ, RCP).
  - iv. In children, if the initial CT is negative, MRI should be performed to assist with diagnosis and management plans [Evidence Level B] (AHA-P).
  - v. Carotid imaging should be performed within 24 hours of a carotid territory transient ischemic attack or nondisabling ischemic stroke (if not done as part of the original assessment) unless the patient is clearly not a candidate for carotid endarterectomy [Evidence Level B] (CSQCS, SIGN 14).
  - vi. In pediatric cases, cerebral and cervical arteries should be imaged as soon as possible, preferably within 24 hours [Evidence Level C] (AHA-P).

### Recommendation 3.4 Blood glucose abnormalities

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

- i. Blood glucose measurement should be repeated if the first value is abnormal or if the patient is known to have diabetes. Hypoglycemia should be corrected immediately [Evidence Level B] (AU, CSQCS, ESO).
- ii. Elevated blood glucose concentrations should be treated with glucose-lowering agents [Evidence Level B] (AU, CSQCS, ESO).

### Recommendation 3.5 Acute thrombolytic therapy

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

- i. Eligible patients are those who can receive intravenous alteplase within 4.5 hours of the onset of stroke symptoms in accordance with criteria adapted from the National Institute of Neurological Disorders and Stroke (NINDS) tPA Stroke Study and the Third European Cooperative Acute Stroke Study (ECASS III) [Evidence Level A] (Cochrane, ECASS III).
- ii. All eligible patients should receive intravenous alteplase within 1 hour of hospital arrival (door-to-needle time < 60 minutes) [Evidence Level C] (CSQCS, RCP).
- iii. Administration of alteplase should follow the American Stroke Association guidelines: total dose 0.9 mg/kg with 10% (0.09 mg/kg) given as an intravenous bolus over 1 minute and the remaining 90% (0.81 mg/kg) given as an intravenous infusion over 60 minutes [Evidence Level A] (ASA, CSQCS, RCP).
- iv. Features on the initial CT brain scan of an otherwise alteplase-eligible ischemic stroke patient that modify the response to treatment remain poorly defined. Some of the trials of alteplase excluded patients with severe hemispheric stroke if the initial CT scan showed early signs of infarction involving more than one-third of the territory of the middle cerebral artery (i.e., a score of less than 5 on the Alberta Stroke Program Early CT Score

### Recommendation 3.3 Neurovascular imaging

Note: This recommendation on neurovascular imaging has been developed by combining 2 separate recommendations from the 2006 edition of Canadian Best Practice Recommendations for Stroke Care: brain imaging and carotid imaging.

All patients with suspected acute stroke or transient ischemic attack should undergo brain imaging immediately [Evidence Level A] (ASA, CSQCS).

- i. In most instances, the initial modality of choice is a non-contrast CT scan [Evidence Level B] (ASA, CSQCS).
- ii. Vascular imaging should be done as soon as possible to better understand the cause of the stroke event and guide management decisions. Vascular imaging may include CT angiography, magnetic resonance angiography, catheter angiography and duplex ultrasonography [Evidence Level B] (ASA).

[ASPECTS]). In clinical practice, the decision to treat such a patient with alteplase should be based on the clinical judgment of the treating physician, and the wishes of the patient and family, until such time as additional data from randomized controlled trials are made available [Evidence Level B] (Dzialowski et al. 2006).<sup>59</sup>

- v. There remain situations where there are sparse or no clinical trial data to support the use of thrombolytic therapy: pediatric stroke, stroke in patients over the age of 80 years, adults who present within the first few hours of onset of an acute ischemic stroke but do not meet current criteria for treatment with intravenous alteplase, and the intra-arterial thrombolysis. In clinical practice, the decision to use alteplase in these situations should be based on the clinical judgment of the treating physician, and the wishes of the patient and family, until such time as additional data from randomized controlled trials are made available [Evidence Level A] (Cochrane, ECASS III, AHA-P).

Note: In Canada, alteplase is currently approved by Health Canada for use in adults with acute ischemic stroke within 3 hours after the onset of stroke symptoms. Exemptions may apply; e.g., a “Letter of No Objection” from Health Canada is required for clinical trials examining the use of intravenous alteplase for other treatment protocols.

### Recommendation 3.6 Acute ASA therapy

All acute stroke patients should be given at least 160 mg of ASA immediately as a one-time loading dose after brain imaging has excluded intracranial hemorrhage [Evidence Level A] (ESO, NZ, RCP, SIGN 13).

- i. In patients treated with recombinant tissue plasminogen activator, ASA should be delayed until after the 24-hour post-thrombolysis scan has excluded intracranial hemorrhage [Evidence Level A] (NZ, RCP).
- ii. ASA (80–325 mg daily) should then be continued indefinitely or until an alternative antithrombotic regime is started [Evidence Level A] (RCP). Refer to recommendation 2.5, “Antiplatelet therapy,” and 2.6, “Antithrombotic therapy in atrial fibrillation,” for further details on antiplatelet therapy and anticoagulation.
- iii. In dysphagic patients, ASA may be given by enteral tube or by rectal suppository [Evidence Level A] (RCP).
- iv. In pediatric patients, initial treatment with low molecular weight heparin should be considered and continued until vertebral artery dissection and intracardiac thrombus is excluded. If neither is present, switch to acute ASA therapy at a dose of 3–5 mg/kg [Evidence Level A] (AHA-P).

### Recommendation 3.7 Management of subarachnoid and intracerebral hemorrhage

- i. Patients with suspected subarachnoid hemorrhage should have an urgent neurosurgical consultation for diagnosis and treatment [Evidence Level B].
- ii. Patients with cerebellar hemorrhage should have an urgent neurosurgical consultation for consideration of craniotomy and evacuation of the hemorrhage [Evidence Level C].

- iii. Patients with supratentorial intracerebral hemorrhage should be cared for on a stroke unit [Evidence Level B].

## 4: Acute inpatient stroke care

### Recommendation 4.1 Stroke unit care

Patients admitted to hospital because of an acute stroke or transient ischemic attack should be treated in an interdisciplinary stroke unit [Evidence Level A] (CSQCS, ESO, SCORE, SIGN 64).

- i. A stroke unit is a specialized, geographically defined hospital unit dedicated to the management of stroke patients [Evidence Level A] (AU, RCP).
- ii. The core interdisciplinary team should consist of people with appropriate levels of expertise in medicine, nursing, occupational therapy, physiotherapy, speech–language pathology, social work and clinical nutrition. Additional disciplines may include pharmacy, (neuro)psychology and recreation therapy [Evidence Level B] (AU, SCORE, SIGN 64).
- iii. The interdisciplinary team should assess patients within 48 hours of admission and formulate a management plan [Evidence Level C].
- iv. Clinicians should use standardized, valid assessment tools to evaluate the patient’s stroke-related impairments and functional status [Evidence Level B] (ASA, RCP).
- v. Any child admitted to hospital with stroke should be managed in a centre with pediatric stroke expertise and/or managed using standardized pediatric stroke protocols [Evidence Level B] (ACCP, AHA-P, RCP-P).

### Recommendation 4.2 Components of acute inpatient care (new for 2008)

Risk for venous thromboembolism, temperature, mobilization, continence, nutrition and oral care should be addressed in all hospitalized stroke patients. Appropriate management strategies should be implemented for areas of concern identified during screening. Discharge planning should be included as part of the initial assessment and ongoing care of acute stroke patients.

#### 4.2a Venous thromboembolism prophylaxis

All stroke patients should be assessed for their risk of developing venous thromboembolism (including deep vein thrombosis and pulmonary embolism).

Patients considered as high risk include patients with inability to move one or both lower limbs and those patients unable to mobilize independently.

- i. Patients who are identified as high risk for venous thromboembolism should be considered for prophylaxis provided there are no contraindications [Evidence Level B] (ESO).
- ii. Early mobilization and adequate hydration should be encouraged with all acute stroke patients to help prevent venous thromboembolism [Evidence Level C] (AU, ESO, SCORE).
- iii. The use of secondary stroke prevention measures, such as antiplatelet therapy, should be optimized in all stroke



- patients [Evidence Level A] (ASA, AU, NZ, RCP, SIGN 13).
- iv. The following interventions may be used for patients with acute ischemic stroke at high risk of venous thromboembolism in the absence of contraindications:
    - a. low molecular weight heparin (with appropriate prophylactic doses per agent) or heparin in prophylactic doses (5000 units twice a day) [Evidence Level A] (ASA, AU, ESO);
    - b. external compression stockings [Evidence Level B] (AU, ESO).
  - v. For patients with hemorrhagic stroke, nonpharmacologic means of prophylaxis (as described above) should be considered to reduce the risk of venous thromboembolism [Evidence Level C].

#### 4.2b Temperature

- i. Temperature should be monitored as part of routine vital sign assessments (every 4 hours for first 48 hours and then as per ward routine or based on clinical judgment) [Evidence Level C] (ESO).
- ii. For temperature greater than 37.5°C, increase frequency of monitoring and initiate temperature reducing measures [Evidence Level C] (ESO).
- iii. Sources of fever should be treated and antipyretic medications should be administered to lower temperature in febrile patients with stroke to < 38°C [Evidence Level B] (ASA, CSQCS).
- iv. In case of fever, the search for a possible infection (site and cause) is recommended, in order to start tailored antibiotic treatment [Evidence Level C] (ESO).

#### 4.2c Mobilization

Mobilization is defined as “the act of getting a patient to move in the bed, sit up, stand, and eventually walk.”<sup>10</sup>

- i. All people admitted to hospital with acute stroke should be mobilized as early and as frequently as possible [Evidence Level B] (AU) and preferably within 24 hours of stroke symptom onset, unless contraindicated [Evidence Level C] (CSQCS).
- ii. Within the first 3 days after stroke, blood pressure, oxygen saturation and heart rate should be monitored before each mobilization [Evidence Level C] (AVERT).
- iii. All people admitted to hospital with acute stroke should be assessed by rehabilitation professionals as soon as possible after admission [Evidence Level A] (RCP), preferably within the first 24 to 48 hours [Evidence Level C] (NZ). Refer to section 5, “Stroke rehabilitation,” for related recommendations.

#### 4.2d Continence

- i. All stroke patients should be screened for urinary incontinence and retention (with or without overflow), fecal incontinence and constipation [Evidence Level C] (RNAO).
- ii. Stroke patients with urinary incontinence should be assessed by trained personnel using a structured functional assessment [Evidence Level B] (AU).

- iii. The use of indwelling catheters should be avoided. If used, indwelling catheters should be assessed daily and removed as soon as possible [Evidence Level C] (AU, CSQCS, RCP, VA/DoD).
- iv. A bladder training program should be implemented in patients who are incontinent of urine [Evidence Level C] (AU, VA/DoD).
- v. The use of portable ultrasound is recommended as the preferred noninvasive painless method for assessing post-void residual and eliminates the risk of introducing urinary infection or causing urethral trauma by catheterization [Evidence Level C] (CCF).
- vi. A bowel management program should be implemented in stroke patients with persistent constipation or bowel incontinence [Evidence Level A] (VA/DoD).

#### 4.2e Nutrition

- i. The nutritional and hydration status of stroke patients should be screened within the first 48 hours of admission using a valid screening tool [Evidence Level B] (AU, RPC, SIGN 78).
- ii. Results from the screening process should guide appropriate referral to a dietitian for further assessment and the need for ongoing management of nutritional and hydration status [Evidence Level C] (NZ, SIGN 78).
- iii. Stroke patients with suspected nutritional and/or hydration deficits, including dysphagia, should be referred to a dietitian for:
  - a. recommendations to meet nutrient and fluid needs orally while supporting alterations in food texture and fluid consistency based on the assessment by a speech–language pathologist or other trained professional [Evidence Level C] (AU, SCORE);
  - b. consideration of enteral nutrition support (tube feeding) within 7 days of admission for patients who are unable to meet their nutrient and fluid requirements orally. This decision should be made collaboratively with the multidisciplinary team, the patients, and their caregivers and families [Evidence Level B]. (AU, SIGN 78).
  - c. Also refer to recommendation 6.1, “Dysphagia assessment,” for dysphagia management.

#### 4.2f Oral care

- i. All stroke patients should have an oral/dental assessment, which includes screening for obvious signs of dental disease, level of oral care and appliances, upon or soon after admission [Evidence Level C] (Canadian Dental Association).
- ii. For patients wearing a full or partial denture it must be determined if they have the neuromotor skills to safely wear and use the appliance(s) [Evidence Level C].
- iii. An appropriate oral care protocol should be used for every patient with stroke, including those who use dentures [Evidence Level C] (SIGN 78). An oral care protocol should address areas including frequency of oral care (twice per day or more), types of oral care products (toothpaste, floss and mouthwash) and specific management for patients



- with dysphagia and should be consistent with current recommendations of the Canadian Dental Association [Evidence Level B] (Canadian Dental Association).
- iv. If concerns are identified with implementing an oral care protocol, consider consulting a dentist, occupational therapist, speech–language pathologist and/or dental hygienist [Evidence Level C].
  - v. If concerns are identified with oral health and/or appliances, patients should be referred to a dentist for consultation and management as soon as possible [Evidence Level C].

## 4.2g Discharge planning

Discharge planning should be initiated as soon as possible after patient admission to hospital (emergency department or inpatient care) [Evidence Level B] (AU, RCP).

- i. A process should be established to ensure involvement of patients and caregivers in the development of the care plan, management and discharge planning [Evidence Level C].
- ii. Discharge planning discussions should be ongoing throughout hospitalization to support a smooth transition from acute care [Evidence Level B] (AU, RCP).
- iii. Information about discharge issues and possible needs of patients following discharge should be provided to patients and caregivers soon after admission [Evidence Level C].

# 5: Stroke rehabilitation

## Recommendation 5.1 Initial stroke rehabilitation assessment

All persons with stroke should be assessed for their rehabilitation needs.

- i. All people admitted to hospital with acute stroke should have an initial assessment by rehabilitation professionals as soon as possible after admission [Evidence Level A] (RCP), preferably within the first 24 to 48 hours [Evidence Level C] (NZ).
- ii. All people with acute stroke with any residual stroke-related impairments who are not admitted to hospital should undergo a comprehensive outpatient assessment(s) for functional impairment, which includes a cognitive evaluation, screening for depression, screening of fitness to drive, as well as functional assessments for potential rehabilitation treatment [Evidence Level A] (RCP), preferably within 2 weeks [Evidence Level C].
- iii. Clinicians should use standardized, valid assessment tools to evaluate the patient's stroke-related impairments and functional status [Evidence Level C] (ASA, RCP-P). See complete guideline for a table of recommended tools.
- iv. Survivors of a severe or moderate stroke should be reassessed at regular intervals for their rehabilitation needs [Evidence Level C] (HSFO).

Note: Outpatient rehabilitation includes day hospital, outpatient ambulatory care and home-based rehabilitation.

## Recommendation 5.2 Provision of inpatient stroke rehabilitation

All patients with stroke who are admitted to hospital and who require rehabilitation should be treated in a comprehensive or rehabilitation stroke unit by an interdisciplinary team [Evidence Level A] (AU-R).

- i. Post-acute stroke care should be delivered in a setting in which rehabilitation care is formally coordinated and organized [Evidence Level A] (ASA).
- ii. All patients should be referred to a specialist rehabilitation team on a geographically defined unit as soon as possible after admission [Evidence Level A] (RCP). Pediatric acute and rehabilitation stroke care should be provided on a specialized pediatric unit [Evidence Level B] (RCP-P).
- iii. Post-acute stroke care should be delivered by a variety of treatment disciplines, experienced in providing post-stroke care, to ensure consistency and reduce the risk of complications [Evidence Level C] (RCP).
- iv. The interdisciplinary rehabilitation team may consist of a physician, nurse, physical therapist, occupational therapist, speech–language pathologist, psychologist, recreation therapist, patient and family/caregivers [Evidence Level A] (ASA). For children, this would also include educators and child-life workers. This “core” interdisciplinary team should consist of appropriate levels of these disciplines, as identified by the Stroke Unit Trialists' Collaboration [Evidence Level B] (AHA-P, SIGN 64).
- v. The interdisciplinary rehabilitation team should assess patients within 24 to 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 stroke patient [Evidence Level C] (HSFO, NZ).
- vi. Patients with moderate or severe stroke who are rehabilitation ready and have rehabilitation goals should be given an opportunity to participate in inpatient stroke rehabilitation [Evidence Level A] (HSFO).
- vii. Stroke unit teams should conduct at least one formal interdisciplinary meeting per week to discuss the progress and problems, rehabilitation goals and discharge arrangements for patients on the unit [Evidence Level B] (SIGN 64). Individualized rehabilitation plans should be regularly updated based on patient status reviews [Evidence Level C].
- viii. Clinicians should use standardized, valid assessment tools to evaluate the patient's stroke-related impairments and functional status [Evidence Level B] (ASA, RCP).
- ix. Where admission to a stroke rehabilitation unit is not possible, a less optimal solution is inpatient rehabilitation on a mixed rehabilitation unit (i.e., where interdisciplinary care is provided to patients disabled by a range of disorders including stroke) [Evidence Level B] (SIGN 64).

## Recommendation 5.3 Components of inpatient stroke rehabilitation

All patients with stroke should begin rehabilitation therapy as early as possible once medical stability is reached [Evidence Level A] (ASA).

- i. Patients should receive the intensity and duration of clinically relevant therapy defined in their individualized rehabilitation plan and appropriate to their needs and tolerance levels [Evidence Level A] (HSFO, RCP).
- ii. Stroke patients should receive, through an individualized treatment plan, a minimum of 1 hour of direct therapy by the interprofessional stroke team for each relevant core therapy, for a minimum of 5 days per week based on individual need and tolerance [Evidence Level A] (EBRSR), with duration of therapy being dependent on stroke severity [Evidence Level C] (EBRSR).
- iii. The team should promote the practice of skills gained in therapy into the patient's daily routine in a consistent manner [Evidence Level A] (RCP).
- iv. Therapy should include repetitive and intense use of novel tasks that challenge the patient to acquire necessary motor skills to use the involved limb during functional tasks and activities [Evidence Level A] (SCORE).
- v. Stroke unit teams should conduct at least one formal interdisciplinary meeting per week at which patient problems are identified, rehabilitation goals set, progress monitored and support after discharge planned [Evidence Level B] (SIGN 64).
- vi. The care management plan should include a predischarge needs assessment to ensure a smooth transition from rehabilitation back to the community. Elements of discharge planning should include a home visit by a health care professional, ideally before discharge, to assess home environment and suitability for safe discharge, determine equipment needs and home modifications, and begin caregiver training for how the patient will manage activities of daily living and instrumental activities of daily living in their environment [Evidence Level C].

#### **Recommendation 5.4 Outpatient and community-based rehabilitation**

After leaving hospital, stroke survivors must have access to specialized stroke care and rehabilitation services appropriate to their needs (acute and/or inpatient rehabilitation) [Evidence Level A] (RCP).

- i. Early supported discharge services and transition planning should be provided by a well-resourced, co-ordinated specialist interdisciplinary team with age-appropriate expertise. These are an acceptable alternative to extended in-hospital rehabilitation and can reduce the length of hospital stay for selected patients [Evidence Level A] (SIGN 64). Patients requiring early supported discharge services should not be referred to generic (nonspecific) community services [Evidence Level A] (RCP).
- ii. People who have difficulty in activities of daily living, including self-care, productivity and leisure, should receive occupational therapy or multidisciplinary interventions targeting activities of daily living [Evidence Level A] (AU) [Evidence Level C for pediatrics].
- iii. Multifactorial interventions provided in the community, including an individually prescribed exercise program,

may be provided for people who are at risk of falling, in order to prevent or reduce the number and severity of falls [Evidence Level A] (AU).

- iv. People with difficulties in mobility should be offered an exercise program and monitored throughout the program [Evidence Level B] (MacKay-Lyons and Howlett,<sup>60</sup> Pang et al.<sup>61</sup>).
- v. Patients with aphasia should be taught supportive conversation techniques [Evidence Level A] (EBRSR).
- vi. Patients with dysphagia should be offered swallowing therapy and opportunity for reassessment as required [Evidence Level A] (Singh and Hamdy<sup>62</sup>).
- vii. Children affected by stroke should be offered advice on and treatment aimed at achieving play, self-care, leisure and school-related skills that are developmentally relevant and appropriate in their home, community and school environments [Evidence Level B] (Kirton et al.,<sup>63</sup> RCP-P).

#### **Recommendation 5.5 Follow-up and community reintegration**

People with stroke living in the community should have regular and ongoing follow-up assessment to assess recovery, prevent deterioration and maximize functional outcome.

- i. Post-acute stroke patients should be followed up by a primary care provider to address stroke risk factors, ongoing rehabilitation needs, and to continue treatment of comorbidities and other sequelae of stroke [Evidence Level C] (ASA).
- ii. Stroke survivors and their caregivers should have their individual psychosocial and support needs reviewed on a regular basis [Evidence Level A] (RCP).
- iii. People living in the community who have difficulty with activities of daily living should have access, as appropriate, to therapy services to improve or prevent deterioration in activities of daily living [Evidence Level A] (AU).
- iv. Recommendation 6.2, "Identification and management of post-stroke depression," should also be observed as part of follow-up and evaluation of stroke survivors in the community [Evidence Level C].
- v. Any stroke survivor with declining activity at 6 months or later after stroke should be assessed for appropriate targeted rehabilitation [Evidence Level A] (RCP).
- vi. Infants and children, in whom new motor, language or cognitive deficits emerge over time, require ongoing follow-up and assessment throughout their development [Evidence Level C] (AHA-P).
- vii. Pediatric stroke survivors in the community should have ongoing assessments of education and vocational needs throughout their development [Evidence Level C] (AHA-P).
- viii. Stroke survivors and their families should be provided with timely, up-to-date information in conjunction with opportunities to learn from members of the interdisciplinary team and other appropriate community service providers. Simple information provision alone is not effective [Evidence Level A] (AU).

- ix. Patients and their caregivers should be offered education programs to assist them in adapting to their new role [Evidence Level B] (RCP).

## 6: Selected topics in stroke management

This section is new for the 2008 update. It includes 3 original recommendations from 2006 (dysphagia assessment, post-stroke depression and shoulder pain) and a new recommendation on vascular cognitive impairment. These recommendations apply across the continuum of stroke care, from onset of symptoms of stroke or transient ischemic attack, and should be considered throughout short-term recovery. In addition, screening for and management of vascular cognitive impairment and post-stroke depression should be revisited beyond the postacute recovery phase and return to the community.

### Recommendation 6.1 Dysphagia assessment

Patients with stroke should have their swallowing ability screened using a simple, valid, reliable bedside testing protocol as part of their initial assessment, and before initiating oral intake of medications, fluids or food [Evidence Level B] (CSQCS, NZ, SCORE, SIGN 78).

- i. Patients who are not alert within the first 24 hours should be monitored closely and dysphagia screening performed when clinically appropriate [Evidence Level C].
- ii. Patients with stroke presenting with features indicating dysphagia or pulmonary aspiration should receive a full clinical assessment of their swallowing ability by a speech-language pathologist or appropriately trained specialist who should advise on safety of swallowing ability and consistency of diet and fluids [Evidence Level A] (CSQCS, NZ, RCP, SCORE).
- iii. Patients who are at risk of malnutrition, including those with dysphagia, should be referred to a dietitian for assessment and ongoing management. Assessment of nutritional status should include the use of validated nutrition assessment tools or measures [Evidence Level C] (AU). Also refer to recommendation 4.2e, “Components of acute inpatient care—Nutrition,” for additional information.

### Recommendation 6.2 Identification and management of post-stroke depression

All patients with stroke should be considered to be at a high level of risk for depression. At the time of the first assessment, the clinical team should determine whether the patient has a history of depression or risk factors for depression [Evidence Level B] (SCORE).

- i. All patients with stroke should be screened for depression using a validated tool [Evidence Level A] (SCORE) (for recommended tools, see complete guideline). Screening should take place at all transition points and whenever clinical presentation indicates. Transition points may include:
  - a. upon admission to acute care, particularly if any evidence of depression or mood changes is noted
  - b. before discharge home from acute care or during

early rehabilitation if transferred to inpatient rehabilitation setting

- c. periodically during inpatient rehabilitation
- d. periodically following discharge to the community
- ii. Patients identified as at risk for depression during screening should be referred to a psychiatrist or psychologist for further assessment and diagnosis [Evidence Level B] (RCP, RCP-P).
- iii. Patients with mild depressive symptoms should be managed by “watchful waiting,” with treatment being started only if the depression is persistent [Evidence Level A] (RCP).
- iv. Patients diagnosed with a depressive disorder should be given a trial of antidepressant medication, if no contraindication exists. No recommendation is made for the use of one class of antidepressants over another; however, side effect profiles suggest that selective serotonin reuptake inhibitors (SSRIs) may be favoured in this patient population [Evidence Level A] (ASA).
- v. In adult patients with severe, persistent or troublesome tearfulness, SSRIs are recommended as the antidepressant of choice [Evidence Level A] (ASA).
- vi. Treatment should be monitored and should continue for a minimum of 6 months, if a good response is achieved [Evidence Level A] (RCP).
- vii. All patients with apparent depressive symptoms should be carefully screened for the presence of hypoactive delirium [Evidence Level C].
- viii. Routine use of prophylactic antidepressants is not recommended in post-stroke patients [Evidence Level A] (ASA, RCP).
- ix. Patients should be given information and advice about the impact of stroke, and the opportunity to talk about the impact of illness upon their lives [Evidence Level B] (RCP).
- x. Patients with marked anxiety should be offered psychological therapy [Evidence Level B] (RCP).
- xi. Patients and their caregivers should have their individual psychosocial and support needs reviewed on a regular basis as part of the longer-term recovery and management of stroke [Evidence Level A] (RCP).

### Recommendation 6.3 Vascular cognitive impairment and dementia (new for 2008)

All patients with vascular risk factors and those with clinically evident stroke or transient ischemic attack should be considered at high risk for vascular cognitive impairment.

Patients considered at high risk for cognitive and perceptual impairment are those with vascular risk factors such as hypertension, age > 65, hyperlipidemia, diabetes, clinical stroke, neuroimaging findings of covert stroke or white matter disease, damage to other target organs, and/or those patients with cognitive or functional changes that are clinically evident or reported during history-taking.

#### 6.3a Assessment

- i. All patients described above should be screened for cognitive impairment using a validated screening tool [Evi-

dence Level B] (AU, SCORE). (See complete guideline for a table of recommended tools.)

- ii. Screening to investigate a person's cognitive status should address the following domains: arousal, alertness, attention, orientation, memory, language, agnosia, visuospatial/perceptual function, praxis and executive functions such as insight, judgment, social cognition, problem-solving, abstract reasoning, initiation, planning and, organization [Evidence Level C].
- iii. The Montreal Cognitive Assessment is considered more sensitive to cognitive impairment than the Mini Mental Status Exam in patients with vascular cognitive impairment. Its use is recommended when vascular cognitive impairment is suspected [Evidence Level B] (CC-CDTD). Additional validation is needed for the Montreal Cognitive Assessment as well as other potential screening instruments such as the 5-minute protocol from the Vascular Cognitive Impairment Harmonization recommendations.
- iv. Patients should also be screened for depression, since depression has been found to contribute to cognitive impairment in stroke patients. A validated screening tool for depression should be used [Evidence Level B] (CCCDTD). Also refer to recommendation 6.2, "Identification and management of post-stroke depression."
- v. Persons who have cognitive impairment detected on a screening test should receive additional cognitive and/or neuropsychologic assessments as appropriate to further guide management [Evidence Level B] (CCCDTD).

### 6.3b Timing

- i. All patients considered at high risk for cognitive impairment should be assessed periodically as indicated by severity of clinical presentation, history and/or imaging abnormalities to identify cognitive, perceptual deficits, depression, delirium and/or changes in function [Evidence Level C].
- ii. Those who have suffered a transient ischemic attack or stroke should have a screening assessment and, where indicated, a more in-depth assessment of cognitive and perceptual status at various transition points throughout the continuum of stroke care [Evidence Level C]. Transition points may include:
  - a. during presentation to emergency when cognitive, perceptual or functional concerns are noted
  - b. upon admission to acute care, particularly if any evidence of delirium is noted
  - c. upon discharge home from acute care or during early rehabilitation if transferred to inpatient rehabilitation setting
  - d. periodically during in-patient rehabilitation stage according to client progress and to assist with discharge planning
  - e. periodically following discharge to the community by the most appropriate community health care provider according to client's needs, progress and current goals.

### 6.3c Management

- i. All vascular risk factors should be managed aggressively to achieve optimal control [Evidence Level A] (CC-CDTD). Also refer to section 2, "Prevention of stroke."
- ii. Patients who demonstrate cognitive impairments in the screening process should be referred to a health care professional with specific expertise in this area for additional cognitive, perceptual and/or functional assessment to determine the severity of impairment and impact of deficits on function and safety in activities of daily living and instrumental activities of daily living, and to implement appropriate remedial, compensatory and/or adaptive intervention strategies [Evidence Level B] (CC-CDTD). A team approach is recommended, and health care professionals may include an occupational therapist, neuropsychologist, psychiatrist, neurologist, geriatrician, speech-language pathologist or social worker.
- iii. An individualized, client-centred approach should be considered to facilitate resumption of desired activities such as return to work, leisure, driving, volunteer participation, financial management, home management and other instrumental activities of daily living [Evidence Level C] (CCCDTD).
- iv. Intervention strategies including rehabilitation should be tailored according to the cognitive impairments and functional limitations as well as remaining cognitive abilities, as identified through in-depth assessment and developed in relation to patients' and caregivers' needs and goals [Evidence Level B] (SCORE).
- v. Strategic or compensatory training appears to be effective in the treatment of apraxia post stroke and should be considered [Evidence Level A] (EBRSR). The evidence for the effectiveness of specific interventions for cognitive impairment in stroke is limited and requires more research. Attention training may have a positive effect on specific, targeted outcomes and should be implemented with appropriate patients [Evidence Level C] (EBRSR). Compensatory strategies can be used to improve memory outcomes [Evidence Level C] (EBRSR).
- vi. Patients with evidence of depression or anxiety on screening should be referred and managed by an appropriate mental health professional [Evidence Level C].
- vii. Pharmacotherapy:
  - a. Patients with evidence of vascular cognitive impairment should be referred to a physician with expertise in vascular cognitive impairment for further assessment and recommendations regarding pharmacotherapy [Evidence Level C].
  - b. Cholinesterase inhibitors should be considered for management of vascular cognitive impairment diagnosed using the National Institute of Neurological Disorders and Stroke (NINDS) – Association Internationale pour la Recherche et l'Enseignement en Neurosciences (AIREN) diagnostic criteria [Evidence Level B] (CCCDTD).
  - c. There is fair evidence of small magnitude benefits for galantamine on cognition function and behaviour in mixed Alzheimer and cerebrovascular disease.



Galantamine can be considered a treatment option for mixed Alzheimer and cerebrovascular disease [Evidence Level B] (CCCDTD).

- d. There is fair evidence of small magnitude benefits for donepezil in cognitive and global outcomes, with less robust benefits on functional measures. Donepezil can be considered a treatment option for vascular dementia [Evidence Level B] (CCCDTD).

Note: Also refer to recommendation 6.2, "Identification and management of post-stroke depression."

## Recommendation 6.4 Shoulder pain assessment and treatment

All stroke patients should be assessed for shoulder pain and, when symptoms present, have strategies implemented to minimize shoulder joint pain and trauma [Evidence Level A] (Ottawa Panel, RCP, SCORE).

- i. Factors that contribute to, or exacerbate, shoulder pain should be identified and managed appropriately.
  - a. Educate staff and caregivers about correct handling of the hemiplegic arm [Evidence Level B] (RCP, SCORE).
  - b. Consider use of supports for the arm [Evidence Level A] (RCP).
- ii. Joint protection strategies should be instituted to minimize joint trauma.
  - a. The shoulder should not be passively moved beyond 90° of flexion and abduction unless the scapula is upwardly rotated and the humerus is laterally rotated [Evidence Level A] (SCORE).
  - b. Overhead pulleys should not be used [Evidence Level A] (Ottawa Panel).
  - c. The upper limb must be handled carefully during functional activities [Evidence Level B] (SCORE).
  - d. Staff should position patients, whether lying or sitting, to minimize the risk of complications such as shoulder pain [Evidence Level B] (RCP).
- iii. Shoulder pain and limitations in range of motion should be treated through gentle stretching and mobilization techniques focusing especially on external rotation and abduction [Evidence Level B] (SCORE).

This article has been peer reviewed.

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Dr. Lindsay was the project leader and was responsible for the overall process for the development of the guidelines and supporting documentation, including development and editing of the sections of each recommendation template and editing and collating the work of each task group for individual recommendations. She was responsible for final completion of the full document and the shorter print version for publication. Dr. Bayley contributed significantly to the whole guideline process and to the development and writing

of the rehabilitation and selected topics sections, as well as reviewing and editing earlier drafts of the full document. Ms. Hellings was the project coordinator. She developed and prepared all the summary of evidence sections, and contributed to the development of other components of the recommendation templates and appendices. Dr. Hill was responsible for the development and editing of the performance measures and measurement notes sections of the document, as well as making significant contributions to the sections on acute care and prevention. Ms. Woodbury contributed to the development and writing of the overview section and appendices, as well as reviewing and editing earlier drafts of the full document. Dr. Phillips was the senior author of these guidelines. He contributed significantly to the development and writing of the acute care and prevention sections, well as reviewing and editing multiple drafts of the full document. All members of the writing group approved the final version prepared for publication.

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**Appendix 1:** Members of the Best Practices and Standards Working Group and the Information and Evaluation Working Group of the Canadian Stroke Strategy (part 1)

Name	Position	Facility or organization	Competing interests
<b>Best Practices and Standards National Platform Working Group</b>			
Dr. Stephen Phillips* (Co-Chair)	Director, Acute Stroke Program	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Ms. Alison McDonald (Co-Chair)	Physiotherapist, Nova Scotia Rehabilitation Centre	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Dr. Mark Bayley*	Physiatrist and Medical Director, Neuro Rehabilitation Program	Toronto Rehabilitation Institute, Toronto, Ont.	None declared.
Dr. Alan Bell	Family Practitioner	College of Family Physicians of Canada, Toronto, Ont.	Grants and honoraria for research, consultancy and speaking from Sanofi-Aventis, Bristol-Myers Squibb, Bayer and AstraZeneca.
Ms. Laurie Cameron	Program Coordinator and Executive Assistant	Canadian Stroke Strategy, Ottawa, Ont.	None declared.
Ms. Nancy Cooper	Director of Policy and Professional Development	Ontario Long-Term Care Association, Markham, Ont.	None declared.
Ms. Bev Culham	Project Manager	Alberta Provincial Stroke Strategy, Calgary, Alta.	None declared.
Dr. Ian Graham	Vice President, Knowledge Translation	Canadian Institutes of Health Research, Ottawa, Ont.	None declared.
Dr. Gordon Gubitza	Neurologist, Acute Stroke Unit and Outpatient Neurovascular Clinic	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Ms. Mary Elizabeth Harriman	Associate Executive Director	Heart and Stroke Foundation of Canada, Ottawa, Ont.	None declared.
Ms. Chelsea Hellings*	Research Coordinator	Canadian Stroke Strategy, Toronto, Ont.	None declared.
Ms. Shelley Irvine-Day	Speech–Language Pathologist	Deer Lodge Centre, Winnipeg, Man.	None declared.
Ms. Nina I. Jetha	Senior Program Manager, Health Promotion and Chronic Disease Prevention Branch	Public Health Agency of Canada, Ottawa, Ont.	None declared.
Ms. Katie Lafferty	Executive Director	Canadian Stroke Network, Ottawa, Ont.	None declared.
Dr. Sylvain Lanthier	Stroke Neurologist	Centre hospitalier de l'Université de Montréal, Montréal, Que.	Honoraria for lectures and participation on advisory boards (in no case > \$10 000) from Pfizer, Sanofi-Aventis, Bristol-Myers Squibb, Boehringer Ingelheim, Merck-Frosst and Servier. Travel fees related to these activities were also received.
Dr. Patrice Lindsay* (staff lead)	Performance and Standards Specialist	Canadian Stroke Network, Toronto, Ont.	None declared.
Ms. Michelle McKay	Specialty Nurse Practitioner, neurology	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Ms. Janel Nadeau	Patient advocate	Stroke Recovery Association, Calgary, Alta.	None declared.
Ms. Louise Nichol	Community Team Manager, Home Care Program	Community Stroke Care Service, Winnipeg, Man.	None declared.
Ms. Christina O'Callaghan	Manager, Regional Stroke Program	London Health Sciences Centre, London, Ont.	None declared.
Dr. Tejal Patel	Pharmacist	St. Michael's Hospital, Toronto, Ont.	None declared.

**Appendix 1: Members of the Best Practices and Standards Working Group and the Information and Evaluation Working Group of the Canadian Stroke Strategy (part 2)**

Name	Position	Facility or organization	Competing interests
<b>Best Practices and Standards National Platform Working Group (continued)</b>			
Ms. Elizabeth Woodbury*	Executive Director	Canadian Stroke Strategy, Ottawa, Ont.	None declared.
<b>Information and Evaluation National Platform Working Group</b>			
Dr. Michael Hill* (Co-Chair)	Director, Stroke Unit, Calgary Stroke Program	Foothills Medical Centre, Calgary, Alta.	Trial support from Baxter, Merck, and Hoffmann-LaRoche. Consultant with Genentech Ltd., Vanalis Group Ltd., Sanofi, Portola Inc., NONO Inc., Stem Cell Therapeutics, Hoffmann-LaRoche. Honoraria received for talks from all of the companies listed above, as well as Boehringer Ingelheim and Bristol-Myers Squibb Canada.
Dr. Patrice Lindsay* (Co-Chair)	Performance and Standards Specialist	Canadian Stroke Network, Toronto, Ont.	None declared.
Ms. Asako Bienek	Analyst, Surveillance Division, Centre for Chronic Disease Prevention and Control	Public Health Agency of Canada, Ottawa, Ont.	None declared.
Dr. Robert Côté	Stroke Neurologist and Chair, Research Policy and Planning Advisory Committee, Heart and Stroke Foundation of Canada	Montreal General Hospital, Montréal, Que.	Speaker fees from Aventis-Sanofi, Boehringer-Ingelheim, Merck, Solvay; travel reimbursement for Pfizer advisory meetings.
Ms. Mary Elizabeth Harriman	Associate Executive Director	Heart and Stroke Foundation of Canada, Ottawa, Ont.	None declared.
Dr. Tom Jeerakathil	Stroke Neurologist	Department of Medicine, University of Alberta, Edmonton, Alta.	Sat on an advisory committee for Novo Nordisk, with one meeting in 2007.
Dr. Moira Kapral	General Internist and Researcher	Toronto General Hospital, University Health Network, Toronto, Ont.	None declared.
Ms. Katie Lafferty	Executive Director	Canadian Stroke Network, Ottawa, Ont.	None declared.
Dr. Grace Warner	Researcher	Atlantic Health Promotion Research Centre, Dalhousie University, Halifax, NS	None declared.
Ms. Elizabeth Woodbury*	Executive Director	Canadian Stroke Strategy, Ottawa, Ont.	None declared.

\*Members of the Best Practices and Standards Writing Group.

**Appendix 2: Members of the task groups for the Canadian Best Practices Recommendations for Stroke Care (part 1)**

Name	Position	Facility or organization	Competing interests
<b>Prevention Task Group</b>			
Dr. Demetrios Sahlas (Chair)	Stroke Neurologist	Hamilton Health Sciences, Hamilton, Ont.	Speaker fees 2 years ago from Pfizer regarding Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) trial.
Dr. Alan Bell	Family Practitioner	College of Family Physicians of Canada, Toronto, Ont.	Grants and honoraria for research, consultancy and speaking from Sanofi-Aventis, Bristol-Myers Squibb, Bayer and AstraZeneca.
Ms. Eryka Hailey	Stroke Prevention Nurse and Investigator	Foothills Medical Centre, Calgary, Alta.	None declared.
Ms. Chelsea Hellings	Research Coordinator	Canadian Stroke Strategy, Toronto, Ont.	None declared.
Dr. Mark Hudon	Neuroradiologist	Foothills Medical Centre, Calgary, Alta.	None declared.
Dr. Tom Jeerakathil	Stroke Neurologist	Department of Medicine, University of Alberta, Edmonton, Alta.	Sat on an advisory committee for Novo Nordisk, with one meeting in 2007.
Ms. Linda Kelloway	Stroke Education Consultant	Heart and Stroke Foundation of Canada, Toronto, Ont.	None declared.
Dr. Patrice Lindsay	Performance and Standards Specialist	Canadian Stroke Network, Toronto, Ont.	None declared.
Dr. Tejal Patel	Pharmacist	St. Michael's Hospital, Toronto, Ont.	None declared.
Dr. Stephen Phillips	Director, Acute Stroke Program	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Dr. Jon Witt	Director, Acute Stroke Care, Department of Emergency Medicine	Royal University Hospital, Saskatoon, Sask.	Speaker's fees and travel assistance for educational program (Canadian Association of Emergency Physicians 2007 satellite symposium); 3-day Advisory Board meeting for Roche in 2007.
<b>Pre-Hospital Task Group</b>			
Mr. Pierre Poirier (Chair)	Executive Director	Paramedic Association of Canada, Ottawa, Ont.	None declared.
Ms. Chelsea Hellings	Research Coordinator	Canadian Stroke Strategy, Toronto, Ont.	None declared.
Ms. Linda Kelloway	Stroke Education Consultant	Heart and Stroke Foundation of Canada, Toronto, Ont.	None declared.
Ms. Brenda Kwiatkowski	Coordinator, Stroke Prevention Clinic	Saskatoon Health Region, Saskatoon, Sask.	None declared.
Dr. Patrice Lindsay	Performance and Standards Specialist	Canadian Stroke Network, Toronto, Ont.	None declared.
Mr. Mike Nolan	Emergency Services/Chief, Paramedic Services	County of Renfrew Paramedic Service, Renfrew, Ont.	None declared.
Ms. Chris O'Callaghan	Coordinator, Regional Stroke Program	London Health Sciences Centre, London, Ont.	None declared.
Dr. Andrew Travers	Provincial Medical Director, Emergency Health Services	Halifax, NS	Speaker's fees regarding emergency medical services and STEMI/stroke care from Roche.
Dr. Karen Wanger	Medical Director, Mainland Administration	British Columbia Ambulance Service, Vancouver, BC	None declared.

**Appendix 2: Members of the task groups for the Canadian Best Practices Recommendations for Stroke Care (part 2)**

Name	Position	Faculty or organization	Competing interests
<b>Pre-Hospital Task Group (continued)</b>			
Dr. Jon Witt	Director, Acute Stroke Care, Department of Emergency Medicine	Royal University Hospital, Saskatoon, Sask.	Speaker's fees and travel assistance for educational program (Canadian Association of Emergency Physicians 2007 satellite symposium); 3-day Advisory Board meeting for Roche in 2007.
<b>Acute Care Stroke Task Group</b>			
Dr. Gordon Gubitza (Chair)	Neurologist, Acute Stroke Unit and Outpatient Neurovascular Clinic	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Ms. Cindy Bolton	Program Manager and Member of Canadian Stroke Strategy Steering Committee	Kingston General Hospital, Kingston, Ont.	None declared.
Ms. Margaret Grant	Rehabilitation Education Coordinator	Alberta Provincial Stroke Strategy, Calgary, Alta.	None declared.
Dr. Teri Green	Coordinator, Calgary Stroke Program	Foothills Medical Centre, Calgary, Alta.	None declared.
Ms. Chelsea Hellings	Research Coordinator	Canadian Stroke Strategy, Toronto, Ont.	None declared.
Ms. Shelly Irvine-Day	Speech Language Pathologist	Deer Lodge Centre, Winnipeg, Man.	None declared.
Ms. Joanne Lee	Dietitian	Calgary Health Region, Calgary, Alta.	None declared.
Ms. Linda Kelloway	Stroke Education Consultant	Heart and Stroke Foundation of Canada, Toronto, Ont.	None declared.
Dr. Patrice Lindsay	Performance and Standards Specialist	Canadian Stroke Network, Toronto, Ont.	None declared.
Ms. Alison McDonald	Physiotherapist, Nova Scotia Rehabilitation Centre	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Ms. Michelle McKay	Specialty Nurse Practitioner, Neurology	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Dr. Tejal Patel	Pharmacist	St. Michael's Hospital, Toronto, Ont.	None declared.
Dr. Michael Sigal	Dentist-in-Chief	Mount Sinai Hospital, Toronto, Ont.	None declared.
<b>Stroke Dementia Task Group</b>			
Dr. Sandra Black (Chair)	Brill Professor of Neurology	University of Toronto, Sunnybrook Health Sciences Centre, Toronto, Ont.	Ad hoc consulting, including advisory board membership, subject to availability, for Novartis, Pfizer, Eisai, Janssen-Ortho, Lundbeck, Glaxo-Smith-Kline, Myriad, EBIX (not in excess of \$10 000 per company). Speaker fees from Novartis, Pfizer, Janssen-Ortho, Lundbeck, Myriad.
Dr. Mark Bayley	Physiatrist and Medical Director, Neuro Rehabilitation Program	Toronto Rehabilitation Institute, Toronto, Ont.	None declared.



**Appendix 2: Members of the task groups for the Canadian Best Practices Recommendations for Stroke Care (part 3)**

Name	Position	Faculty or organization	Competing interests
<b>Stroke Dementia Task Group (continued)</b>			
Dr. Gail Eskes	Associate Professor of Psychiatry and Psychology	Dalhousie University, Halifax, NS	None declared.
Dr. Antoine Hakim	Chief Executive Officer and Scientific Director	Canadian Stroke Network, Ottawa, Ont.	None declared.
Ms. Chelsea Hellings	Research Coordinator	Canadian Stroke Strategy, Toronto, Ont.	None declared.
Ms. Shelley Irvine-Day	Speech Language Pathologist	Deer Lodge Centre, Winnipeg, Man.	None declared.
Dr. Patrice Lindsay	Performance and Standards Specialist	Canadian Stroke Network, Toronto, Ont.	None declared.
Ms. Louise Nichol	Community Team Manager, Home Care Program	Community Stroke Care Service, Winnipeg, Man.	None declared.
Dr. David L. Nyenhuis	Department of Neurology and Rehabilitation	University of Illinois, Chicago Center for Stroke Research, Chicago, IL	Speaker fees from Eisai-Pfizer and consultant to Eisai-Pfizer.
Ms. Jill Moats	Regional Educator, Rehabilitation and Geriatrics Program	Winnipeg Regional Health Authority, Winnipeg, Man.	None declared.
Dr. Stephen Phillips	Director, Acute Stroke Program	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Dr. Kenneth Rockwood	Department of Medicine	Queen Elizabeth II Health Sciences Centre, Halifax, NS	Consultant for Pfizer, Jansen-Ortho, Novartis. Speaker's fees from Novartis.
Dr. Jon Ween	Director, Stroke and Cognition Clinic	Baycrest Centre for Geriatric Care, Toronto, Ont.	None declared.
<b>Rehabilitation Task Group</b>			
Dr. Mark Bayley (Chair)	Physiatrist, and Medical Director, Neuro Rehabilitation Program	Toronto Rehabilitation Institute, Toronto, Ont.	None declared.
Ms. Barb Ansley	Coordinator, Rehabilitation Research and Program Evaluation	Hamilton Health Sciences, Hamilton, Ont.	None declared.
Ms. Nancy Boaro	Advance Practice Leader, Neuro Rehabilitation Program	Toronto Rehabilitation Institute, Toronto, Ont.	None declared.
Ms. Jenn Fearn	Northeastern Ontario Stroke Network, Rehabilitation Coordinator	Sudbury Regional Hospital, Sudbury, Ont.	None declared.
Ms. Chelsea Hellings	Research Coordinator	Canadian Stroke Strategy, Toronto, Ont.	None declared.
Ms. Shelley Irvine-Day	Speech Language Pathologist	Deer Lodge Centre, Winnipeg, Man.	None declared.
Dr. Patrice Lindsay	Performance and Standards Specialist	Canadian Stroke Network, Toronto, Ont.	None declared.
Ms. Alison McDonald	Physiotherapist, Nova Scotia Rehabilitation Centre	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Ms. Louise Nichol	Community Team Manager, Home Care Program	Community Stroke Care Service, Winnipeg, Man.	None declared.

**Appendix 2: Members of the task groups for the Canadian Best Practices Recommendations for Stroke Care (part 4)**

Name	Position	Faculty or organization	Competing interests
<b>Rehabilitation Task Group (continued)</b>			
Dr. Robert Teasell	Physiatrist	Parkwood Hospital, London, Ont.	Travel expenses to make presentations in Winnipeg, Toronto, Ottawa and St. John's.
<b>Patient/Family Education Task Group</b>			
Ms. Linda Kelloway (Chair)	Stroke Education Consultant	Heart and Stroke Foundation of Canada, Toronto, Ont.	None declared.
Ms. Jill Cameron	Assistant Professor, Department of Occupational Science and Therapy	University of Toronto, Toronto, Ont.	None declared.
Ms. Patti Gallagher	Clinical Nurse Specialist, Neuroscience	Saint John Regional Hospital, Saint John, NB	None declared.
Ms. Chelsea Hellings	Research Coordinator	Canadian Stroke Strategy, Toronto, Ont.	None declared.
Ms. Samantha Li	Senior Associate Manager, Health Information	Heart and Stroke Foundation of Ontario, Toronto, Ont.	None declared.
Dr. Patrice Lindsay	Performance and Standards Specialist	Canadian Stroke Network, Toronto, Ont.	None declared.
Ms. Alison McDonald	Physiotherapist, Nova Scotia Rehabilitation Centre	Queen Elizabeth II Health Sciences Centre, Halifax, NS	None declared.
Mr. Frank Nieboer	Past President	Alberta Stroke Recovery Association, Calgary, Alta.	None declared.
Ms. Jody Yuzik	Care Management Leader	GF Strong Rehabilitation Centre, Vancouver, BC	None declared.
<b>Public Awareness Task Group</b>			
Dr. Patrice Lindsay (Chair)	Performance and Standards Specialist	Canadian Stroke Network, Toronto, Ont.	None declared.
Ms. Heather Rourke	Director of Communications	Heart and Stroke Foundation of Canada, Ottawa, Ont.	None declared.
Ms. Chelsea Hellings	Research Coordinator	Canadian Stroke Strategy, Toronto, Ont.	None declared.
Ms. Corinne Hodgson	Consultant	Toronto, Ont.	None declared.
Ms. Brenda Kwiatkowski	Member, National Stroke Nursing Council	Saskatoon Health, Saskatoon, Sask.	None declared.
Mr. Craig Pierre	General Manager	Island EMS, Charlottetown, PEI	None declared.
Mr. Pierre Poirier	Executive Director	Paramedic Association of Canada, Ottawa, ON	None declared.
Dr. Eli Segal	Attending Physician, Emergency Department	Sir Mortimer B. Davis Jewish General Hospital, Montréal, Que.	None declared.