Canadian Stroke Best Practice Recommendations
Stroke Recognition and Response ~ Fifth Edition

(Updated January 2015)

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Stroke Recognition and Response

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Section One: INTRODUCTION and OVERVIEW

Introduction

The Canadian Stroke Best Practice Recommendations (CSBPR) are intended to provide up-to-date evidence-based guidelines for the prevention and management of stroke, and to promote optimal recovery and reintegration for people who have experienced stroke (patients, families and informal caregivers). The CSBPR are under the leadership of the Heart and Stroke Foundation, Canada (HSF), following the 2013 transition of Canadian stroke best practices and quality activities to the HSF from the Canadian Stroke Network.

The goal of disseminating and implementing these recommendations is to reduce practice variations in the care of stroke patients across Canada, and to reduce the gap between current knowledge and clinical practice.

Why is better stroke management important?

• Every year, approximately 62,000 people with stroke and transient ischemic attack are treated in Canadian hospitals. Moreover, it is estimated that for each symptomatic stroke, there are nine “silent” strokes that result in subtle changes in cognitive function and processes.

• Stroke and other cerebrovascular diseases are the third leading cause of death in Canada.

• Stroke is a leading cause of adult disability, with some 315,000 Canadians living with the effects of stroke.

• The annual cost of stroke is approximately $3.6 billion, taking into account both healthcare costs and lost economic output.

• The human cost of stroke is immeasurable.

The HSF works closely with national and provincial stakeholders and partners to develop and implement a coordinated and integrated approach to stroke prevention, treatment, rehabilitation, and community reintegration in every province in Canada. The CSBPR provides a common set of guiding principles for stroke care delivery, and describes the infrastructure necessary at a system level, and the clinical protocols and processes that are needed to achieve and enhance integrated, high-quality, and efficient stroke services for all Canadians. Through the innovations embodied within the stroke best practices, these guidelines contribute to health system reform in Canada and internationally.

The Canadian Stroke Best Practice Recommendations are developed and presented within a continuous improvement model and are written for healthcare professionals, administrators, health system planners, and, funders, all of whom have important roles in the optimization of stroke prevention and care and who are accountable for results. A strong stroke research literature base is drawn upon to guide the optimization of stroke prevention and care delivery. Many implementation tools are provided to facilitate uptake into practice, and are used in combination with active professional development programs. By monitoring performance, the impact of adherence to best practices can be assessed and results then used to direct ongoing improvement. Recent stroke quality monitoring activities have compelling results which continue to support the value of adopting evidence-based best practices in organizing and delivering stroke care in Canada.
This is the fifth edition of the Canadian Stroke Best Practice Recommendations, which were first released in 2006. The theme for the 2014 – 2015 update is Working Together with Stroke Survivors and their Caregivers to Achieve Optimal Outcomes. This theme emphasizes the need for a committed interprofessional team approach to stroke care across the continuum, and to ensure consistent patient-centred care delivery. With stroke patients and family members at the core, the entire team must be supported and actively engaged at every stage of care and in every setting. The HSF Canadian Stroke Best Practice Recommendations provide healthcare professionals with the most current evidence and expert guidance on how to engage in patient-centred optimal stroke care for patients and family members. Patients and family caregivers particularly should receive education and be empowered as active participants throughout their journey of recovery to ensure meaningful contributions to goal setting and treatment planning. This theme aligns with and supports the new HSF survivorship mission priority and is included as part of each module for the 2014-15 update of the Canadian Stroke Best Practice Recommendations.

### Organization of Stroke Care in Canada

The Heart and Stroke Foundation, in collaboration with the CSBPR advisory committee and key stakeholders have developed a framework to facilitate system improvement through the adoption of evidence-based best practices in stroke across the continuum of care.

Optimal stroke services include access to stroke experts, diagnostic equipment and expertise, and a range of emergent and timely evidence-based acute and rehabilitation treatment options. These services can be arranged along a continuum from minimal, non-specialized services in organizations that provide general health care, to providing basic diagnostic services and management, then advanced care at a single site, and on to comprehensive stroke care across a region.

The Canadian Stroke Best Practices Optimal Stroke Services Framework, as visualized in Figure 1 is meant to organize and prioritize stroke services based on resource availability for a regional or geographic area. It is important to emphasize that the approach stroke care delivery will necessarily differ across Canada. The overarching goal set forth within this framework goal set forth within this framework is for each organization involved in the delivery of stroke care services to engage in an ongoing cycle of developing the expertise, processes and protocols needed to provide optimal stroke patient care, taking into consideration the organization’s geographic location, patient population, structural and human resources, and relationship to other centres within their healthcare region or system. Once a level of stroke services has been achieved, the organization should strive to develop and incorporate components of the next higher level for ongoing growth of stroke services where appropriate, as well as continuous quality improvement within the level of service currently provided.

For more information, refer to the Canadian Stroke Best Practices Overview and Methodology Module at www.strokebestpractices.ca.
Stroke Recognition and Response to Stroke Module Overview

Working Together with Stroke Survivors and their Caregivers to Achieve Optimal Outcomes is an imperative within Stroke Recognition and Response. The 2014 update of the Canadian Stroke Best Practice Recommendations Stroke Recognition and Response module emphasizes the need for a coordinated and consistent approach to public awareness and education of the signs of stroke. Education of the public is the responsibility of many levels of service providers, from government and health system leaders to healthcare providers, educators, and health organizations.

This module has been updated in tandem with the launch of the Heart and Stroke Foundation’s new Signs of Stroke Campaign and is part of a comprehensive educational resource kit. The Heart and Stroke Foundation’s new national campaign to raise awareness of the signs of stroke is based on FAST, a simple and effective educational approach that is being used in many countries with success. As shown in Figure 2, FAST stands for: Face – is it drooping? Arms – can you raise both? Speech – is it slurred or jumbled? and, Time – to call 9-1-1 or your local emergency service right away. As a public awareness approach, FAST has been translated into several other languages around the world. In French areas of Canada, the campaign will use VITE, for Visage, Incapacité, Trouble de la parole and Extrême urgence. FAST and VITE are short words that provide an easy way to remember the major signs of stroke, and remind people to take action as quickly as possible.

Several quality and impact indicators will be measured that directly link the FAST approach with the guidance provided in this Stroke Recognition and Response stroke best practice module and the recommendations contained in the Hyperacute Stroke module. This module addresses the emergency medical system and paramedic involvement, initial stroke assessment, diagnosis and management in emergency departments and appropriate emergency department disposition to either an acute care setting or community setting with appropriate follow-up care.

The primary underpinnings of recognition and response requires individuals and healthcare team members to work together to identify stroke as quickly as possible and follow a standardized series of critical steps for stroke survival to maximize treatment options and improve health outcomes. The critical steps for stroke survival are identified in Figure 3 and are applicable to most patients.
exhibiting the signs of stroke. Individual patient circumstances, geographic issues and resource access will affect the specific steps in early stroke management for each patient; however, the steps outlined in Figure 3 reflect stroke best practice for the majority of patients exhibiting the signs of stroke or transient ischemic attack (TIA).

**Figure 3: Critical Steps in Early Stroke Management**

![Critical Steps in Early Stroke Management Diagram]

**Definitions and Context**

Only about two-thirds of all patients who seek acute care for stroke symptoms arrive at the emergency department by ambulance (HSF Stroke Report 2014). The remaining patients either drive themselves to the hospital or are brought to hospital by family members or others. These other modes of transportation pose several challenges: 1) it is not safe for a person experiencing stroke symptoms to drive, even if the symptoms start to resolve as reaction times and judgment may be affected, and symptoms may worsen en route; 2) not all hospitals in Canada are equipped to provide urgent stroke care and the public may not know which hospitals they should go to, which potentially delays access to treatment; and, 3) paramedics are able to proceed to an appropriate hospital that is identified as a stroke centre and notify the receiving emergency department of their arrival, which saves valuable time, which could have a direct impact on outcomes.
Following extensive consultation, two timelines have been established to facilitate an effective and efficient response to stroke in Canada within the 4.5 hour-window from symptom onset to administration of thrombolytic therapy. These are:

1. The pre-hospital phase that starts with stroke symptom onset (or last seen normal or last seen well time) and includes dispatch, paramedic on-scene management and transport times, which ideally should occur as rapidly as possible, and within 3.5 hours or less; and

2. The emergency department phase after patient arrival to the ED; this includes diagnostic evaluation, diagnosis and consideration of treatment options, which ideally should occur as rapidly as possible, and be achieved in less than 60 minutes.

It is important to emphasize that even when the time lapse from stroke symptom onset exceeds 4.5 hours (including pre-hospital time), every attempt should still be made to transport the patient to the closest most appropriate stroke-enabled healthcare facility. This information should be a clear component of any public, patient, or professional education related to the signs of stroke. Refer to Hyperacute Stroke Module, Section 2.1.3 for more information.

Recommendation Changes in the Stroke Recognition and Response Module for 2015 Update

The 2014 update of the Canadian Stroke Best Practice Recommendations Stroke Recognition and Response module reinforces the need for a coordinated and organized approach to public awareness of the signs of stroke. Education of the public is the responsibility of many levels of service providers, from government and health system leaders to healthcare providers, educators, and health organizations. The recommendations focus on public and professional awareness of the signs of stroke.

Highlights of the updates as well as new additions to the Stroke Recognition and Response module recommendations for 2015 include:

- Clearer articulation of the core principles and aspects of education on the signs of stroke
- Inclusion of the Heart and Stroke Foundation new Signs of Stroke campaign that promotes the FAST mnemonic
- Development of the Critical Steps in Early Stroke Management model, with broad collaborations from paramedics, emergency department and acute stroke professionals and system leaders.

Guideline Development Methodology

The Canadian Stroke Best Practice Recommendations present high-quality, evidence-based stroke care guidelines in a standardized framework to support healthcare professionals across all disciplines. Implementation of these recommendations is expected to reduce practice variations and close gaps between evidence and practice.

The recommendations are targeted to health professionals throughout the health system who care for those affected by stroke. Health system policy makers, planners, funders, senior managers, and administrators who are responsible for the coordination and delivery of stroke services within a province or region will also find this document relevant and useful to their work.

The methodology for updating the recommendations includes twelve distinct steps to ensure a
thorough and rigorous process. These steps are overseen by the CSBPR Advisory Committee, and include the following (details available online):

1. Establish an expert interprofessional writing group for module, as well as stroke survivors and/or caregivers
2. Systematic search, appraisal and update of research literature.
5. Writing group review and revision of existing recommendations and development of new recommendations as required.
6. Submission of proposed module update to the Canadian Stroke Best Practices Advisory Committee.
7. Internal review of proposed module update, feedback to writing group, and completion of edits.
8. External review, and final edits based on feedback.
9. Update of educational materials and implementation resources.
10. Final approvals, endorsement and translation of module.
11. Public release and dissemination of final updated module.
12. Continue with ongoing review and update process.

The detailed methodology and explanations for each of these steps in the development and dissemination of the Canadian Stroke Best Practice Recommendations is available in the Canadian Stroke Best Practice Recommendations Overview and Methodology manual available on the Canadian stroke best practices website at http://www.strokebestpractices.ca/wp-content/uploads/2014/08/CSBPR2014_Overview_Methodology_ENG.pdf

Conflicts of Interest: All potential participants in the recommendation development and review process are required to sign confidentiality agreements and to declare all actual and potential conflicts of interest in writing. Any conflicts of interest that are declared are reviewed by the Chairs of the Advisory committee and appropriate HSF staff members for their potential impact. Potential members of any writing group who have conflicts that are considered to be significant are not selected for advisory or writing group membership.

Assigning Evidence Levels: The writing group was provided with comprehensive evidence tables that include summaries of all high quality evidence identified through structured literature searches. The writing group discusses and debates the value of the evidence and through consensus develops a final set of proposed recommendations. Through their discussions, additional research may be identified and added to the evidence tables if consensus on the value of the research is achieved. All recommendations are assigned a level of evidence ranging from A to C, according to the criteria defined in Table 1 (below). When developing and including “C-Level” recommendations, consensus is obtained among the writing group and validated through the internal and external review process. “C-Level” evidence is used cautiously, and only when there is a lack of stronger evidence for topics that are agreed to be important system drivers for stroke care (e.g., transport using ambulance services or some screening practices). Recommendations with “C-level” evidence may also be made in response to requests from healthcare professionals who seek guidance and direction from national stroke experts in the absence of strong evidence regarding certain topics that are of high clinical importance.
Table 1: Summary of Criteria for Levels of Evidence Reported in the Canadian Best Practice Recommendations for Stroke Care (Update 2014)

<table>
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<th>Level of Evidence</th>
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<tr>
<td>A</td>
<td>Evidence from a meta-analysis of randomized controlled trials or consistent findings from two or more randomized controlled trials. Desirable effects clearly outweigh undesirable effects or vice versa.</td>
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<tr>
<td></td>
<td>Evidence from a single randomized controlled trial or consistent findings from two or more well-designed non-randomized and/or non-controlled trials, and large observational studies. Desirable effects outweigh or are closely balanced with undesirable effects or vice versa.</td>
</tr>
<tr>
<td>B</td>
<td>Writing group consensus and/or supported by limited research evidence. Desirable effects outweigh or are closely balanced with undesirable effects or vice versa, as determined by writing group consensus.</td>
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* (adapted from Guyatt et al. 2008) [12]

Acknowledgements

The Heart and Stroke Foundation gratefully acknowledges the Prevention of Stroke writing group leaders and members, the external reviewers, all of who volunteered their time and expertise to the update of these recommendations. We thank the Canadian Stroke Quality and Performance Advisory Committee members for their work in reviewing and updating the performance measures that accompany each recommendation. We acknowledge Norine Foley for her work on the literature review, development of evidence tables and evidence summary updates; and, we thank Christelle Desgranges-Farquhar and Roula Abboud for their work on the French translations.

Funding

The development of the Canadian Stroke Best Practice Recommendations is funded in its entirety by the Heart and Stroke Foundation, Canada. No funds for the development of these guidelines come from commercial interests, including pharmaceutical companies. All members of the recommendation writing groups and external reviewers are volunteers and do not receive any remuneration for participation in guideline development, updates and reviews. All participants complete a conflict of interest declaration prior to participation.

Comments

We invite comments, suggestions, and inquiries on the development and application of the Canadian Stroke Best Practice Recommendations.

Please forward comments to the Heart and Stroke Foundation’s Stroke Team at strokebestpractices@hsf.ca
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Section Two: RECOMMENDATIONS

Stroke Recognition and Response Recommendations Update 2015

i. All members of the public should be educated that stroke is a medical emergency [Evidence Level C].

ii. Public education should focus on recognizing the signs and symptoms of stroke [Evidence Level C]. See Box 1.

iii. Public awareness campaigns and education should include use of the FAST (Face, Arms, Speech, Time) acronym to facilitate memory of these symptoms [Evidence Level B]. Refer to Box 1.

iv. Public education should emphasize the need to respond immediately by calling 9-1-1 or their local emergency number [Evidence Level B], even if symptoms resolve.

   a. The public should be prepared to provide relevant information and answer questions from the dispatcher, paramedics and others [Evidence Level C]. Refer to Box 2.

   b. The public should be aware of the importance of following instructions of the emergency medical system dispatch centre.

v. Public education should include information that stroke can affect persons of any age from newborns and children to adults. Education should also emphasize the benefits of early medical attention [Evidence Level C]. Refer to Rationale for details of early benefits.

For recommendations on Paramedic Services and Pre-Hospital Care, refer to the CSBPR Hyperacute Module, Section 2

Box 1 Signs of Stroke: FAST

Heart and Stroke Foundation, www.heartandstroke.ca/fast

LEARN THE SIGNS OF STROKE

FACE is it drooping?

ARMS can you raise both?

SPEECH is it slurred or jumbled?

TIME to call 9-1-1 right away.

ACT FAST BECAUSE THE QUICKER YOU ACT, THE MORE OF THE PERSON YOU SAVE.

© Heart And Stroke Foundation of Canada, 2014
Box 2:

Core Information Required by Dispatch, Paramedics and Receiving Healthcare Facility

- Location of patient
- Stroke Symptom onset time if witnessed, and last seen well time if not witnessed
- Current condition of the patient having a stroke, and changes in their condition since the stroke symptoms started
- Current medications if known
- Additional health problems, if known

Rationale

When it comes to stroke, *time is brain!* Two million neurons die with every minute that lapses following symptom onset, leading to permanent damage to the brain.

Stroke is a medical emergency. Many people do not recognize the signs and symptoms of stroke or attribute the signs to a less serious health issue and therefore do not seek immediate medical attention. It is critical that all people with strokes arrive in the emergency department as soon as possible, as earlier assessment and treatment may allow time for life-saving intervention. People who experience a transient ischemic attack (TIA) are also considered a medical emergency and require rapid assessment and treatment.

Efforts to enhance emergency medical system response for people having a stroke and to encourage the public to recognize stroke signs and symptoms and contact emergency medical services result in treatment and better outcomes.

These recommendations apply across all geographic regions, and education should apply uniformly, regardless of local issues related to time to access care.

System Implications

- Government funding and support for awareness initiatives to improve the recognition and recall of the signs of stroke and the importance of contacting 9-1-1 immediately.
- Enhanced collaboration among community organizations and healthcare professionals to ensure consistency in public education of the signs of stroke with a strong emphasis on the urgency of responding when the signs of stroke are recognized.
- Training and education for emergency medical services, physicians in primary and acute care, nurses and allied health professionals to increase ability to recognize potential stroke patients and provide rapid assessment and management.
- Comprehensive systems in place to ensure all people in Canada have access to appropriate emergency medical services and stroke care regardless of geographic location.

Performance Measures

1. Proportion of the population aware of the signs of stroke as presented in FAST (core).
2. Proportion of people with stroke or TIA transported to acute care by paramedics (core).
3. Median time (hours) from stroke symptom onset to arrival at an emergency department.
4. Proportion of patients who seek medical attention within 3.5, 4, 4.5 and 6 hours of stroke symptom onset (core).
5. Median time lapse between stroke symptom onset and first contact with emergency medical services (time call placed to 9-1-1 or local emergency medical system dispatch).
6. Proportion of the population who live within 3.5, 4, 4.5 and 6 hours by ground transportation of a hospital equipped to provide hyperacute stroke care (i.e., has CT scanner onsite and ability to deliver tPA).
Refer to the CSBPR Hyperacute Stroke Care Module, Section 2 for additional performance measures related to pre-hospital care and transport.

**Measurement Notes**

- Performance measure 1: data may be obtained from specific public polling on the signs of stroke, by the Heart and Stroke Foundation, and other organizations.
- Performance measures 2 – 4: Data may be obtained from the Canadian Institute of Health Information NACRS and DAD databases and Stroke Special Project 340 and/or from primary chart audit.
- Performance measure 3 – ED triage time should always be used as the proxy time for ED arrival, and this is available in CIHI NACRS, and a calculated value in the DAD.
- Performance measures 3 and 4: Stroke symptom onset may be known if the patient was awake and conscious at the time of onset, or it may be unknown if symptoms were present on awakening. It is important to record whether the time of onset was estimated or exact. The time qualifies as exact provided that (1) the patient is competent and definitely noted the time of symptom onset or (2) the onset was observed by another person who took note of the time.
- Performance measure 6 may be obtained by performing geo-spatial analysis based on location of ambulance base stations, location of hospitals with hyperacute stroke services and road geography for a specified region.

**Implementation Resources and Knowledge Transfer Tools**

**Health Care Provider Information**

- Heart and Stroke Foundation FAST webpage at [www.heartandstroke.ca/fast](http://www.heartandstroke.ca/fast)
- Canadian Stroke Best Practices FAST Educational Slide Presentation, available by request [strokebestpractices@hsf.ca](mailto:strokebestpractices@hsf.ca)

**Patient Information**

- Heart and Stroke Foundation FAST webpage at [www.heartandstroke.ca/fast](http://www.heartandstroke.ca/fast)
- Your Stroke Journey (available) [www.heartandstroke.com](http://www.heartandstroke.com)

**Summary of the Evidence 2015**

**Hyperlink to Stroke Recognition and Response Evidence Tables and Reference List**

The results from many cross-sectional surveys indicate that, among members of the general public, knowledge of the signs and symptoms associated with stroke is poor. Failure of recognition on the part of the person witnessing a stroke and/or those experiencing a stroke event can delay the time to contact emergency services, which may in turn decrease a patient’s opportunity to receive time-sensitive treatment. Mochari-Greenberger et al. (2014) surveyed 1,205 women aged ≥25 years living in the United States, who had participated in the American Heart Association National Women’s Tracking Survey. Participants were contacted by telephone and asked standardized questions related to stroke warning signs and actions to take in the event of stroke. Sudden weakness and/or numbness of the face or limb of one side were the most commonly-cited symptom (51%). Loss of/trouble with understanding speech was
also frequently recognized as a symptoms among 44% of respondents, while headache, unexplained dizziness and loss of vision in one eye were recognized by 23%, 20% and 18%, respectively. In the UK, Robinson et al. (2013) surveyed 1,300 individuals in public areas, places of work, and academic institutions. Among those surveyed, 70% were aware of the FAST campaign and 80% recalled the ‘burning face’ image. Over 75% of participants were able to recall all three FAST stroke symptoms and >90% were able to recall at least one. Stroke warning signs not included as part of the FAST campaign were not as well recognized. Lundelin et al. (2012) conducted telephone surveys of 11,827 adults living in Spain who had participated in the Study on Nutrition & Cardiovascular Risk in Spain study to assess their ability to identify stroke symptoms, including sudden confusion or trouble speaking, numbness of face, arm or leg, sudden trouble seeing in one or both eyes, sudden chest pain (decoy), sudden trouble walking, dizziness or loss of balance or severe headache. 65.2% of the participants could correctly identify 4-6 symptoms of stroke, although only 19% could identify all 6 symptoms correctly and 11.4% were unable to identify a single symptom. 81.1% of participants indicated that they would call an ambulance if they suspected someone was having a stroke. Persons who could identify more stroke symptoms were more likely to call for an ambulance.

The number of Public Health campaigns designed to increase the recognition of the signs and symptoms of stroke has increased over the past decade. One of the most recognized programs is FAST, a mnemonic standing for F-face drooping, A- Arm weakness, S-speech difficulties and T-time to call 911. The results of several studies evaluating the effectiveness of these campaigns indicates that that persons exposed to the campaigns become more aware of the signs and symptoms of stroke. Bray et al. (2013) surveyed 12,439 individuals ≥40 years of age from the general population in Australia and reported that from 2004 to 2010, there had been a significant increase in the number of respondents who were aware of the national multimedia stroke awareness campaigns (31% vs 50%), which included FAST and in the number or participants able to name ≥1 (69% vs 81%), ≥2 (43% vs 63%), and ≥3 (19% vs 32%) warning signs of stroke. Respondents who could identify ≥2 warning signs were significantly more likely to be aware of the campaign (OR= 1.88, 95% CI 1.74 to 2.04). Jurkowski et al. (2010) also reported that following a public awareness campaign to increase awareness of FAST, respondents who were exposed to a 3-phase multimedia campaign over a 7-month were more likely to be aware of the campaign and its primary message to call 9-1-1. The percentage of respondents who reported they would call 9-1-1 in response to specific stroke symptoms increased from 9%-12% for specific symptoms identified in oneself and 4%-12% for specific symptoms, from pre-to post campaign, compared to those who had not been exposed to the campaign.

Most recently, Rasura et al. (2014) conducted a review of 22 studies, of which 14 targeted the general public using mass media campaigns, which varied in duration from 3 months to 4 years and 6, which targeted specific groups with the interventions lasting 3 minutes-12 hours. Three popular stroke signs and symptoms were included in all of the studies using mass media campaigns: FAST, SUDDEN and Give-Me-Five. Effectiveness of the interventions was assessed in most studies through questionnaires administered pre and post intervention. The authors concluded that large public health campaigns using mass media are expensive and short lived and may not be effective, although the increased costs could be mitigated through more prompt treatment with t-PA. They also indicated that, to be effective, the message being delivered must direct the person to call an ambulance. They also reported that the dose of the campaign appeared to be as important as the message, television was found to be the most effective medium and while online campaigns can also be successful, they tended to attract a self-selected group (e.g. well-educated women).
References:


