CHAPTER 4
Acute Inpatient Stroke Care
(UPDATE May 2013)

Casaubon LK, Suddes M (Co-Chairs)
on Behalf of the Acute Stroke
Best Practices Writing Group 2013
Table of Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CANADIAN BEST PRACTICE RECOMMENDATIONS FOR STROKE CARE - INTRODUCTION</td>
<td>2</td>
</tr>
<tr>
<td>CHAPTER 4: ACUTE INPATIENT STROKE CARE</td>
<td>3</td>
</tr>
<tr>
<td>Highlights of Acute Stroke Care Update 2013</td>
<td>4</td>
</tr>
<tr>
<td>Definitions of Acute Stroke Care</td>
<td>5</td>
</tr>
<tr>
<td>Canadian Stroke Best Practices Framework for Optimal Stroke Services Delivery</td>
<td>6</td>
</tr>
<tr>
<td>Development of the CANADIAN BEST PRACTICE RECOMMENDATIONS FOR STROKE CARE</td>
<td>7</td>
</tr>
<tr>
<td>ACUTE STROKE CARE BEST PRACTICES WRITING GROUP 2013</td>
<td>8</td>
</tr>
<tr>
<td>ACUTE STROKE CARE NEUROSURGERY SUB-GROUP 2013</td>
<td>8</td>
</tr>
<tr>
<td>ACUTE STROKE CARE PEDIATRIC STROKE SUB-GROUP 2013</td>
<td>9</td>
</tr>
<tr>
<td>ACUTE STROKE CARE YOUNG ADULT STROKE SUB-GROUP</td>
<td>9</td>
</tr>
<tr>
<td>ACUTE STROKE CARE EXTERNAL REVIEWERS 2013</td>
<td>10</td>
</tr>
<tr>
<td>CANADIAN STROKE BEST PRACTICES AND STANDARDS ADVISORY COMMITTEE</td>
<td>11</td>
</tr>
<tr>
<td>CANADIAN BEST PRACTICE RECOMMENDATIONS FOR ACUTE INPATIENT STROKE CARE</td>
<td>12</td>
</tr>
</tbody>
</table>

4.1 Stroke Unit Care

4.2 Inpatient Management and prevention of Complications

4.2.1 Cardiovascular Investigations

4.2.2 Venous Thromboembolism Prophylaxis

4.2.3 Temperature Management

4.2.4 Mobilization

4.2.5 Continence

4.2.6 Nutrition and Dysphagia

4.2.7 Oral Care

4.2.8 Seizure Management

Table 4.2 Swallow Screening and Assessment Tools

4.3 Palliative and End-of-Life Care

4.4 Advanced Care Planning

Page 1 of 40
Canadian Best Practice Recommendations for Stroke Care

The Canadian Best Practice Recommendations for Stroke Care are intended to provide up-to-date evidence-based guidelines for the prevention and management of stroke. The goal of disseminating and implementing these recommendations is to reduce practice variations in the care of stroke patients across Canada, and to reduce the gap between knowledge and practice. Recommendations are updated on a rotating cycle every two years to ensure they continue to reflect contemporary stroke research evidence and leading expert opinion. Each update involves critical review of the current medical literature, which informs decisions regarding modification of the recommendations and the performance measures used to assess their impact. Every attempt is made to coordinate with other Canadian groups who are developing guidelines that relate to stroke, such as hypertension, atrial fibrillation and diabetes. As well, if significant new evidence becomes available in between update cycles, a process is in place to conduct a modified Delphi process to rigorously review the new evidence and gain consensus on the impact of that evidence on current recommendations. Modifications that are required through the consensus process will be made as soon as they are available, which is readily enabled through the web-based format of the Canadian Stroke Best Practices.

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

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

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

All Canadian Best Practice Recommendations for Stroke Care, as well as supporting documents and implementation tools can be accessed through our Stroke Best Practices website at:

www.strokebestpractices.ca
SECTION 4.0  ACUTE INPATIENT STROKE CARE OVERVIEW

**TAKING ACTION IN ACUTE INPATIENT STROKE CARE**

**TAKING ACTION** is imperative across stroke systems of care, healthcare providers, patients, families, and the broader community. The primary underpinnings of ‘acute inpatient stroke care’ are to optimize recovery and patient outcomes. A coordinated and seamless system of care should be established in all hospitals to ensure timely access to diagnostics and interventions, consults with other services, and access to a range of rehabilitation therapies.

The evidence for managing acute stroke patients on dedicated inpatient stroke units is strong and irrefutable. Patients who are cared for on stroke units have better outcomes, less disability and lower mortality. Therefore every hospital that treats stroke patients should **TAKE ACTION** to create and implement stroke unit care. The Quality of Stroke Care in Canada (2011), which reported current levels of performance on key quality stroke indicators, found that only 23% of stroke patients were admitted to designated stroke units across Canada, and for stroke patients in hospitals that had a stroke unit, only 53% of stroke patients spent any time on the stroke unit during their inpatient stay. These numbers are quite disturbing given the strength of the evidence regarding the benefits of stroke unit care.

Recommendation 4.1 in this chapter clearly outlines the core elements of stroke unit care, which includes healthcare team members with specialized stroke training, a geographically defined area within the hospital where all stroke patients are clustered, evidence-based stroke protocols to address all aspects of stroke care, team meetings with case reviews, and early access to rehabilitation assessments and therapies. Hospitals that manage stroke patients and currently do not have dedicated stroke units should all **Taking Action** and striving to implement all the core elements of stroke unit care, regardless of whether there is a designated stroke unit, and at least cluster stroke patients within a consistent area of a hospital ward and provide staff with education and skills training specific to stroke care. If this goal is not possible within some hospitals, those hospitals should then **Take Action** to transfer acute stroke patients to the nearest hospital that does provide acute stroke unit care.

The core stroke team together with other appropriate healthcare professions should be **Taking Action** to develop an individualized management plan for each stroke patient. To accomplish this effectively, communication among healthcare professionals and hospital departments are paramount to ensure coordinated acute stroke care. Protocols should be established at all hospitals, based on the Canadian Stroke Best Practices, and agreements should be in place for high priority rapid access to all specialists, departments and services required for each stroke patient to reduce risks of complications, optimize outcomes and meet patient and family needs during the early post-stroke recovery phase.

**Taking Action** during acute stroke care also includes recognition that stroke can have devastating effects and not all patients will survive. For catastrophic strokes, both ischemic and hemorrhagic, the palliative care specialists within each hospital should be invited to be part of the care team as early as possible.
HIGHLIGHTS OF THE ACUTE INPATIENT STROKE CARE UPDATE 2013

The 2013 update of the Acute Inpatient Stroke Care Chapter of the Canadian Best Practice Recommendations for Stroke Care reinforces the growing and changing body of research evidence available to guide assessment, diagnosis, interventions and ongoing management of stroke patients following hospital admission.

Key messages for 2013 and significant changes to previous acute inpatient stroke care recommendations include:

✓ Organized stroke units with interprofessional stroke teams have the strongest evidence and a significant impact on patient outcomes following stroke.
✓ Greater efforts need to be undertaken to expand the number and location of organized stroke units across Canada.
✓ If stroke units are not available, hospitals should make every attempt to transfer appropriate patients to a facility with a stroke unit, or to implement a clustered model of care where all core elements of optimal stroke unit care are available to stroke patients.
✓ Acute inpatient management includes promoting optimal recovery through early access to rehabilitation assessments and early initiation of rehabilitation therapies, including dysphagia assessment and management, early mobilization, implementing continence programs, and reducing risk of complications such as pneumonia and venous thromboembolism.
✓ Expanded guidance on addressing palliative care issues in patients with severe stroke.
✓ Recommendations for initiating advanced-care planning discussions with patients and family members.
✓ Development of a TAKING ACTION TOWARDS OPTIMAL STROKE CARE resource kit including stroke care information, educational modules, summary tables and resource links.

ACUTE INPATIENT STROKE CARE UPDATE 2013 RESOURCE PACKAGE INCLUDES:

i. Stroke Best Practice Recommendations for Acute Inpatient Stroke Care
ii. TAKING ACTION TOWARDS OPTIMAL STROKE CARE resource kit, with implementation materials and educational slide decks for all topic areas
iii. Stroke Care Assessment Tools Summary Table
iv. Links to implementation resources for all topic areas
HYPERACUTE AND ACUTE INPATIENT STROKE CARE DEFINITIONS

Hyperacute and Acute Stroke care involves all direct care, service delivery and interactions from first contact with the healthcare system after the onset of an acute stroke to discharge from an emergency department or acute inpatient care, and moving on to the next stage of care or return to the community.

HYPERACUTE STROKE CARE

Hyperacute care refers to the key interventions involved in the assessment, stabilization and treatment in the first hours after stroke onset. This will represent all pre-hospital and initial emergency care for TIA, ischemic stroke, intracerebral hemorrhage, subarachnoid hemorrhage and acute venous sinus thrombosis. This includes thrombolysis or endovascular interventions for acute ischemic stroke, emergency neurosurgical procedures, and same-day TIA diagnostic and risk stratification evaluation.

The principal aim of this phase of care is to diagnose the stroke type, and to coordinate and execute the treatment plan as rapidly as possible.

Hyperacute care is time-sensitive by nature, minutes for disabling stroke and hours for TIA, but specific interventions are associated with their own individual treatment windows. Broadly speaking “hyperacute” refers to care offered in the first 24 hours after stroke (ischemic and hemorrhagic) and the first 48 hours after TIA.

ACUTE STROKE CARE

Acute care refers to the key interventions involved in the assessment, treatment or management, and early recovery in the first days after stroke onset. This will represent all of the initial diagnostic procedures undertaken to identify the nature and mechanism of stroke, interprofessional care to prevent complications and promote early recovery, institution of an individualized secondary prevention plan, and engagement with the stroke survivor and family to assess and plan for transition to the next level of care (including a comprehensive assessment of rehabilitation needs). New models of acute ambulatory care such as rapid assessment TIA and minor stroke clinics or day-units are also starting to emerge.

The principal aims of this phase of care are to identify the nature and mechanism of stroke, prevent further stroke complications, promote early recovery, and (in the case of severest strokes) provide palliation or end-of-life care.

Broadly speaking “acute care” refers to the first days to weeks of inpatient treatment with stroke survivors transitioning from this level of care to either inpatient rehabilitation, community based rehabilitation services, home (with or without support services), continuing care, or palliative care. This acute phase of care is usually considered to have ended either at the time of acute unit discharge or by 30 days of hospital admission.
**Canadian Stroke Best Practices Framework for Optimal Stroke Services Delivery**

There are variations in the levels of stroke care service provided within the Canadian healthcare system. These services can be arranged along a continuum from minimal, non-specialized services, provided in facilities that offer general medical and surgical care, to more advanced and comprehensive stroke care centres (See Figure 1). The goal for each organization involved in the delivery of stroke care services is to continue to develop the expertise and processes needed to provide optimal patient care, taking into consideration that organization’s geographic location, patient population, structural 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.

**Figure 1: Canadian Stroke Best Practices Framework for Optimal Stroke Services Delivery**

For additional information and details about the Stroke Services Framework, please refer to the “Taking Action Towards Optimal Stroke Care” resource at [www.strokebestpractices.ca](http://www.strokebestpractices.ca)
DEVELOPMENT OF THE CANADIAN BEST PRACTICE RECOMMENDATIONS FOR STROKE CARE

For detailed methodology on the development and dissemination of the Canadian Best Practice Recommendations for Stroke Care please refer to the Stroke Best Practices website at http://www.strokebestpractices.ca/index.php/methods/.

Acknowledgements

The Canadian Stroke Best Practices Team, Heart and Stroke Foundation and the Canadian Stroke Network gratefully acknowledge the writing group leaders and members, the external reviewers, all of who have volunteered their time and expertise to this update.

We thank the Canadian Stroke Quality and Performance Advisory Group for their work in updating and confirming the performance measures that accompany each recommendation. We acknowledge Norine Foley and Katherine Salter for their work on implementation tool development and the evidence reviews. We are grateful to Dr. Robert Teasell, Andrew McClure and the Evidence-Based Review in Stroke Rehabilitation (EBRSR) team for all their work on the systematic reviews of the literature and evidence tables; and, we thank Marie-France Saint-Cyr and Jan Carbon for their work on the French translations.

Funding

The development of these Canadian stroke care guidelines is funded in its entirety by the Canadian Stroke Network and the Heart and Stroke Foundation. 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.

Citing the Acute Inpatient Stroke Care Update 2013

Casaubon LK, Suddes M, on behalf of the Acute Stroke Care Writing Group. Chapter 4: Acute Inpatient Stroke Care.


Comments

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

Please forward comments to the Heart and Stroke Foundation Stroke Best Practices and Performance team at strokebestpractices@hsf.ca
**Canadian Best Practice Recommendations for Stroke Care**

**Acute Inpatient Stroke Care Writing Group 2012 - 2013:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Professional Role</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casaubon, Leanne Co-Chair</td>
<td>Hyperacute and Acute Stroke Writing Group Co-Chair; Stroke Neurologist, Director, TIA and Minor Stroke (TAMS) Unit, Toronto Western Hospital/University Health Network; Assistant Professor of Medicine, University of Toronto</td>
<td>Ontario</td>
</tr>
<tr>
<td>Suddes, Michael Co-Chair</td>
<td>Manager, Calgary Stroke Program, Alberta Health Services</td>
<td>Alberta</td>
</tr>
<tr>
<td>Blacquiere, Dylan</td>
<td>Stroke Neurology Fellow, University of Ottawa</td>
<td>Ontario</td>
</tr>
<tr>
<td>Bastyr, Barbara</td>
<td>Social Worker, Neurosurgery, Trillium Health Centre</td>
<td>Ontario</td>
</tr>
<tr>
<td>Cournoyer, Roxanne</td>
<td>Clinical Nurse Specialist for Systematic Review of Vascular Neurology, Centre hospitalier de l’université de Montréal (CHUM)</td>
<td>Quebec</td>
</tr>
<tr>
<td>Doody, Irene</td>
<td>Speech-Language Pathologist</td>
<td>Newfoundland</td>
</tr>
<tr>
<td>Fleetwood, Ian</td>
<td>Chair Neurosurgical Sub-Group Neurosurgeon, Associate Professor, Division of Neurosurgery, University of Victoria</td>
<td>British Columbia</td>
</tr>
<tr>
<td>Lariviere, Christian</td>
<td>Emergency Physician, St. Boniface General Hospital, Palliative Medicine Residency Program, University of Manitoba</td>
<td>Manitoba</td>
</tr>
<tr>
<td>Martin, Charmaine</td>
<td>Neurosurgical Nurse Specialist Integrated Stroke Unit, Hamilton Health Sciences</td>
<td>Ontario</td>
</tr>
<tr>
<td>Moses, Brian</td>
<td>General Internal Medicine, Chief of Medicine, South West District Health Authority</td>
<td>Nova Scotia</td>
</tr>
<tr>
<td>Steacie, Adam</td>
<td>Family Physician, Upper Canada Family Health Team</td>
<td>Ontario</td>
</tr>
<tr>
<td>Stotts, Grant</td>
<td>Stroke Neurologist, Medical Director Stroke Program, The Ottawa Hospital; Assistant Professor, Department of Neurology, University of Ottawa</td>
<td>Ontario</td>
</tr>
<tr>
<td>Talbot, Jo-Ann</td>
<td>Emergency Physician, Saint John Regional Hospital, Assistant Professor, Department of Emergency Medicine, Dalhousie University</td>
<td>Newfoundland</td>
</tr>
<tr>
<td>Taralson, Colleen</td>
<td>Registered Nurse, Acting Program Manager, Regional Edmonton Stroke Program</td>
<td>Alberta</td>
</tr>
<tr>
<td>Travers, Andrew</td>
<td>Chair, Emergency Medical Services Sub-Group Medical Director, Emergency Health Services Nova Scotia.</td>
<td>Nova Scotia</td>
</tr>
</tbody>
</table>

**Neurosurgery Sub-Group**

<table>
<thead>
<tr>
<th>Name</th>
<th>Professional Role</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fleetwood, Ian</td>
<td>Neurosurgeon, Associate Professor, Division of Neurosurgery, University of Victoria</td>
<td>British Columbia</td>
</tr>
<tr>
<td>Kelly, Michael</td>
<td>Neurosurgeon, Regina Qu’Appelle Region, Assistant Professor of Surgery, Division of Neurosurgery, University of Saskatchewan</td>
<td>Saskatchewan</td>
</tr>
<tr>
<td>Martin, Charmaine</td>
<td>Neurosurgical Nurse Practitioner Integrated Stroke Unit, Hamilton Health Sciences</td>
<td>Ontario</td>
</tr>
<tr>
<td>Silvaggio, Joseph</td>
<td>Neurosurgeon, Assistant Professor, Section of Neurosurgery, Department of Surgery, University of Manitoba</td>
<td>Manitoba</td>
</tr>
<tr>
<td>Tymianski, Dawn</td>
<td>Adult Nurse Practitioner, Cerebrovascular Surgery, Krembil Neuroscience Practice Lead, University Health Network</td>
<td>Ontario</td>
</tr>
</tbody>
</table>
### Pediatric Stroke Sub-Group

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Affiliations</th>
<th>Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirton, Adam</td>
<td>Chair, Paediatric Neurologist, Director, Calgary Paediatric Stroke Program, Alberta Children's Hospital, Associate Professor, University of Calgary</td>
<td>Alberta</td>
</tr>
<tr>
<td>Chan, Anthony</td>
<td>Paediatric Neurologist, McMaster Children’s Hospital, Professor, McMaster University</td>
<td>Ontario</td>
</tr>
<tr>
<td>D’Anjou, Guy</td>
<td>Paediatric Neurologist, Ste-Justine Hospital, Montreal Professor, University of Montreal</td>
<td>Quebec</td>
</tr>
<tr>
<td>deVebers, Gabrielle</td>
<td>Paediatric Neurologist, Director of the Children’s Stroke program, Toronto Hospital for Sick Children, Professor, University of Toronto</td>
<td>Ontario</td>
</tr>
<tr>
<td>Dilenge, Marie-Emanuelle</td>
<td>Child Neurologist, Montreal Children's Hospital, Department of Neurology and Neurosurgery, McGill University</td>
<td>Quebec</td>
</tr>
<tr>
<td>Rafay, Mubeen</td>
<td>Paediatric Neurologist, Department of Pediatrics and Child Health, Children’s Hospital, Assistant Professor, University of Manitoba</td>
<td>Manitoba</td>
</tr>
<tr>
<td>Yau, Ivanna</td>
<td>Pediatric Stroke Nurse Practitioner, Division of Neurology, Toronto Hospital for Sick Children</td>
<td>Ontario</td>
</tr>
</tbody>
</table>

### Young Adult Stroke Sub-Group

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Affiliations</th>
<th>Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swartz, Richard</td>
<td>Stroke Neurologist, Sunnybrook Hospital, Brain Sciences Program, Assistant Professor, University of Toronto</td>
<td>Ontario</td>
</tr>
<tr>
<td>Buck, Brian</td>
<td>Stroke Neurologist, Grey Nuns Hospital, Assistant Professor Neurology, University of Alberta</td>
<td>Alberta</td>
</tr>
<tr>
<td>Casaubon, Leanne</td>
<td>Stroke Neurologist, Director, TIA and Minor Stroke (TAMS) Unit, Toronto Western Hospital/University Health Network; Assistant Professor of Medicine, University of Toronto</td>
<td>Ontario</td>
</tr>
<tr>
<td>Green, Theresa</td>
<td>Assistant Professor of Nursing, University of Calgary, Editor, Canadian Journal of Neuroscience Nurses</td>
<td></td>
</tr>
<tr>
<td>Jeerakithil, Thomas</td>
<td>Stroke Neurologist, University of Alberta Hospital, Assistant Professor, University of Alberta</td>
<td>Alberta</td>
</tr>
<tr>
<td>Lanthier, Sylvain</td>
<td>Stroke Neurologist, Hôpital Notre-Dame, Assistant Professor, University of Montreal</td>
<td>Quebec</td>
</tr>
<tr>
<td>Saposnik, Gustavo</td>
<td>Stroke Neurologist, Director, Stroke Outcomes Research Unit, St. Michael's Hospital, Associate Professor, University of Toronto</td>
<td>Ontario</td>
</tr>
<tr>
<td>External Reviewer</td>
<td>Professional Role</td>
<td>Location</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Susan Alcock</td>
<td>Registered Nurse, Stroke Program, Health Sciences Centre, Winnipeg</td>
<td>Manitoba</td>
</tr>
<tr>
<td>Jean Martin Boulanger</td>
<td>Stroke Neurologist, Chef, Service De Neurologie, Hopital Charles-Lemoyne; Professeur Adjoint, Neurologie, Université De Sherbrooke, Hopital Charles-Lemoyne</td>
<td>Quebec</td>
</tr>
<tr>
<td>Katherine Churchward</td>
<td>Speech Language Pathologist, Foothills Medical Centre</td>
<td>Alberta</td>
</tr>
<tr>
<td>Martin Dennis</td>
<td>Stroke Neurologist, Professor Of Stroke Medicine In The Division Of Clinical Neurosciences In The University Of Edinburgh</td>
<td>Scotland, UK</td>
</tr>
<tr>
<td>Marie-Andrée Dejardins</td>
<td>Physiotherapist, CHUM Notre-Dame Hospital, Montreal</td>
<td>Quebec</td>
</tr>
<tr>
<td>Nathania Liam</td>
<td>Physiatrist, Director Of Rehabilitation, Windsor Regional Hospital</td>
<td>Ontario</td>
</tr>
<tr>
<td>Shauna Martiniuk</td>
<td>Emergency Physician, Mount Sinai Hospital; Lecturer, Faculty Of Medicine, University Of Toronto</td>
<td>Ontario</td>
</tr>
<tr>
<td>Sheila Cristina Ouirques Martins</td>
<td>Stroke Neurologist, Hospital Moinhos De Vento And Hospital De Clinicas De Porto Alegre, Porto Alegre;</td>
<td>Brazil</td>
</tr>
<tr>
<td>Miriam Pereira-NovO</td>
<td>Occupational Therapist, Fraser Regional Stroke Program</td>
<td>British Columbia</td>
</tr>
<tr>
<td>Melanie Montague-Penn</td>
<td>Stroke Nurse, Stroke Rapid Assessment Unit, Vancouver Island Stroke Program,</td>
<td>British Columbia</td>
</tr>
<tr>
<td>Daniel Selchen</td>
<td>Stroke Neurologist, Head Of The Division Of Neurology At St. Michael’s Hospital And The Medical Director Of The Regional Stroke Program For St. Michael’s Hospital And The South East Toronto Stroke Network.</td>
<td>Ontario</td>
</tr>
<tr>
<td>Debbie Summers</td>
<td>Advanced Practice Nurse, Stroke Program Coordinator/Apn At Saint Luke’s Hospital, Missouri</td>
<td>United States of America</td>
</tr>
</tbody>
</table>
## Canadian Best Practice Recommendations for Stroke Care
### Best Practices and Standards Advisory Committee

<table>
<thead>
<tr>
<th>Member</th>
<th>Professional Role</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips, Stephen</td>
<td>Stroke Neurologist, Queen Elizabeth II Health Sciences Centre, Professor, Division of Neurology, Faculty of Medicine, Dalhousie University</td>
<td>Nova Scotia</td>
</tr>
<tr>
<td>Bayley, Mark</td>
<td>Physiatrist; Associate Professor, University of Toronto Acquired Brain Injury, Physical Medicine &amp; Rehabilitation, Toronto Rehabilitation Institute</td>
<td>Ontario</td>
</tr>
<tr>
<td>Gubitz, Gord</td>
<td>Stroke Neurologist, Director, Neurovascular Clinic, Queen Elizabeth II Health Sciences Center, Assistant Professor of Medicine (Neurology), Dalhousie University</td>
<td>Nova Scotia</td>
</tr>
<tr>
<td>Graham, Ian</td>
<td>Senior Scientist, Centre for Practice-Changing Research, The Ottawa Hospital Research Institute, Associate Professor, School of Nursing, University of Ottawa</td>
<td>Ontario</td>
</tr>
<tr>
<td>Harris, Devin</td>
<td>Emergency Physician, St. Paul's Hospital, Professor, Department of Emergency Medicine, University of British Columbia</td>
<td>British Columbia</td>
</tr>
<tr>
<td>Joiner, Ian</td>
<td>Director, Stroke, Canada, Heart and Stroke Foundation</td>
<td>Canada</td>
</tr>
<tr>
<td>Lawrence, Stephanie</td>
<td>Senior Manager, Communications, Heart and Stroke Foundation</td>
<td>Canada</td>
</tr>
<tr>
<td>LeBrun, Louise-Helene</td>
<td>Stroke Neurologist, Directeur du Centre des maladies vasculairescérébrales du Centre Hospitalier de l'Université de Montréal (CHUM)</td>
<td>Quebec</td>
</tr>
<tr>
<td>Lindsay, Patrice</td>
<td>Director, Best Practices and Performance, Stroke Heart and Stroke Foundation Staff Lead, Canadian Best Practice Recommendations for Stroke Care</td>
<td>Canada</td>
</tr>
<tr>
<td>Markle-Reid, Maureen</td>
<td>Nurse Specialist, Associate Professor, School of Nursing and Associate Member, Clinical Epidemiology and Biostatistics, McMaster University</td>
<td>Ontario</td>
</tr>
<tr>
<td>Millbank, Robin</td>
<td>Manager, Professional Development and Training, Canadian Stroke Network</td>
<td>Canada</td>
</tr>
<tr>
<td>Smith, Eric</td>
<td>Associate Professor, Dept of Clinical Neurosciences, Radiology and Community Health Sciences Member, Hotchkiss Brain Institute, University of Calgary</td>
<td>Alberta</td>
</tr>
<tr>
<td>Rowe, Sarah</td>
<td>Physiotherapy Practice Coordinator, Vancouver Coastal Health</td>
<td>British Columbia</td>
</tr>
</tbody>
</table>
### SECTION 4.0 ACUTE INPATIENT STROKE MANAGEMENT

#### Best Practice Recommendation 4.1

**Stroke Unit Care**

**BOX 4.1: Optimal Acute Stroke Care**

**DEFINITION:**

A stroke unit is a specialized, geographically defined hospital unit dedicated to the management of stroke patients and staffed by an experienced interprofessional stroke team. Refer to the resource Taking Action Towards Optimal Stroke Care for detailed information about stroke unit criteria.

**Core Elements of Comprehensive Stroke and Neurovascular Care:**

- It is recognized that not all hospitals are able to deliver all of the stroke unit elements, and every hospital should be Taking Action to establish protocols and processes of care to implement as many elements as possible to achieve optimal stroke care delivery within their geographic location, hospital volumes and resource availability (human, equipment, funding). Refer to Figure 1 in Chapter 4 Overview for Canadian Stroke Services Framework, in the Overview section of this chapter, and in the Taking Action Towards Optimal Stroke Care resource kit.

- Specialized care for patients with ischemic stroke, intracerebral hemorrhage (ICH), and transient ischemic attack (TIA) (care may be expanded in some institutions to include patients with subarachnoid hemorrhage [SAH] and other neurovascular conditions);

- Dedicated stroke team with broad expertise – including neurology, nursing, neurosurgery, physiatry, rehabilitation professionals, pharmacists, and others;

- Consistent clustered model where all stroke patients are cared for on the same hospital ward with dedicated stroke beds by trained and experienced staff, including rehabilitation professionals;

- Access to 24/7 imaging and interventional neuroradiology expertise;

- Emergent neurovascular surgery access;

- Protocols in place for hyperacute and acute stroke management, and seamless transitions between stages of care (including pre-hospital, emergency department and inpatient care);

- Dysphagia screening protocols in place to assess all stroke patients without prolonged time delays prior to commencing oral nutrition and oral medications;

- Access to post-acute rehabilitation services, including inpatient, community-based, and/or early supported discharge (ESD) therapy;

- Discharge planning starting as soon as possible after admission, and anticipating discharge needs to facilitate smooth transitions;
4.1 Recommendations

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

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

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

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

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

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke unit care reduces the likelihood of death and disability by as much as 30 percent for men and women of any age with mild, moderate, or severe stroke. Stroke unit care is characterized by a coordinated interprofessional team approach for preventing stroke complications, preventing stroke recurrence, accelerating mobilization, and providing early rehabilitation therapy. Evidence suggests that stroke patients treated on acute stroke units have fewer complications, earlier mobilization, and pneumonia is recognized earlier. Patients should be treated in a geographically defined unit, as care through stroke pathways and by roving stroke teams do not provide the same benefit as stroke units. Access to early rehabilitation is a key aspect of stroke unit care. For patients with stroke, rehabilitation should start as early as possible and rehabilitation should be considered an intervention that can occur in any and all settings across the continuum of stroke care.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Organized systems of stroke care including stroke units with a critical mass of trained staff (interprofessional team). If not feasible, then mechanisms for coordinating the care of stroke patients to ensure use of best practices and optimal outcomes.</td>
</tr>
<tr>
<td>• Protocols and mechanisms to enable the rapid transfer of stroke patients from the emergency department to an interprofessional stroke unit as soon as possible after arrival in hospital, ideally within the first three hours.</td>
</tr>
<tr>
<td>• Comprehensive and advanced stroke care centres should have leadership roles within their geographic regions and ensure specialized stroke care access is available to patients who may first appear at general healthcare facilities (usually remote or rural centres) and facilities with basic stroke services only.</td>
</tr>
<tr>
<td>• Telestroke services should be optimized to ensure access to specialized stroke care across the continuum to meet individual needs (including access to rehabilitation and stroke specialists).</td>
</tr>
<tr>
<td>• Information on geographic location of stroke units and other specialized stroke care models available to community service providers, to facilitate navigation to appropriate resources and to strengthen relationships between each sector along the stroke continuum of care.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number of stroke patients who are admitted to hospital and treated on a specialized stroke unit at any time during their inpatient hospital stay for an acute stroke event (numerator) as a</td>
</tr>
</tbody>
</table>
percentage of total number of stroke patients admitted to hospital (core).

2. Percentage of patients discharged to their home or place of residence following an inpatient admission for stroke (core).

3. Proportion of stroke patients who die in hospital within 7 days and within 30 days of hospital admission for an index stroke (reported by stroke type) (core).

4. Proportion of total time in hospital for an acute stroke event spent on a stroke unit.

5. Percentage increase in telehealth or telestroke coverage to remote communities to support organized stroke care across the continuum.

Refer to Canadian Stroke Quality and Performance Measurement Manual for detailed indicator definitions and calculation formulas. www.strokebestpractices.ca/

**Measurement Notes**

- Performance measure 1: calculate for all cases, and then stratify by type of stroke.
- Definition of stroke unit varies widely from institution to institution. Where stroke units do not meet the criteria defined in the recommendation, then a hierarchy of other stroke care models could be considered: a) dedicated stroke unit; (b) designated area within a general nursing unit or neuro-unit where stroke patients are clustered; (c) mobile stroke team care; (d) managed on a general nursing unit by staff using stroke guidelines and protocols.
- Institutions collecting this data must note their operational definition of “stroke unit” to ensure standardization and validity when data is reported across institutions.
- Patient and family experience surveys should be in place to monitor care quality during inpatient stroke admissions.

**Implementation Resources and Knowledge Transfer Tools**

- Canadian Stroke Best Practices Patient Order Set for Admission to Inpatient Stroke Care
- Canadian Stroke Best Practices Table 3.3A Screening and Assessment Tools for Acute Stroke
- Canadian Stroke Best Practices Table 3.3B Recommended Laboratory Investigations for Acute Stroke and Transient Ischemic Attack
- HSF Stroke Nurses Assessment Pocket Cards http://www.heartandstroke.on.ca/site/c.pvl3leNWJwE/b.5852913/k.AC4B/Order_Resources/apps/ka/ct/contactcustom.asp
- Canadian Stroke Best Practices Implementation guide: Taking Action Towards Optimal Stroke Care
- RNAO Stroke Assessment Across the Continuum of Care (2005) http://mao.ca/sites/mao-ca/files/Stroke_Assessment_Across_the_Continuum_of_Care

**Summary of the Evidence Updated 2013**

Stroke patients who receive stroke unit care are more likely to survive, return home, and regain independence as compared to patients who receive less organized conventional care (Stroke Unit Trialists' Collaboration, 2009). Stroke units are characterized as hospital units in which care is provided by an experienced interprofessional stroke team (including physicians, nurses, physiotherapists, occupational therapists, speech therapists, etc.) dedicated to the management of stroke patients, often within a geographically defined space (Langhorne & Pollock, 2002). Stroke units also typically involve staff members who have a specialist interest in stroke, participate in routine team meetings and continuing
education/training, engage in interprofessional rehabilitation, and involve caregivers in the rehabilitation process. (Langhorne & Pollock, 2002)

In a Cochrane Review, the Stroke Unit Trialists’ Collaboration identified 31 randomized and quasi-randomized trials (n=6,936) comparing stroke unit care with alternative, less organized care (e.g., an acute medical ward) (Stroke Unit Trialists’ Collaboration, 2009). As compared to treatment in a less organized unit, stroke unit care was associated with a significant reduction in death (OR=0.82, 95% CI 0.73 to 0.92, p=0.001), death or institutionalization (OR=0.81, 95% CI 0.74 to 0.90, p<0.001), and death or dependency (OR=0.79, 95% CI 0.71 to 0.88, p<0.001) at a median follow-up period of one year. Based on the results from three trials, the authors also reported that the benefits of stroke unit care are maintained for periods up to 5 and 10 years post-stroke. Moreover, subgroup analyses demonstrated benefits of stroke unit care regardless of sex, age, or stroke severity (Stroke Unit Trialists’ Collaboration, 2009). In a more recent study, Saposnik et al. investigated the differential impact of stroke unit care on four subtypes of ischemic stroke and reported that stroke unit care is associated with reduced 30-day mortality across all four subtypes (Saposnik et al., 2011).

Seenan and colleagues conducted a systematic review of observational studies to determine if the benefits of stroke unit care described in clinical trials are replicated in clinical practice (Seenan et al., 2007). Twenty-five observational studies (n=42,236) comparing stroke unit care to non-stroke unit care were identified for inclusion, although only 18 provided data on case fatality or poor outcome. The authors reported that stroke unit care was associated with significantly reduced odds of death (odds ratio=0.79, 95% CI=0.73 to 0.86; p<0.001) and of death or poor outcome (odds ratio=0.87, 95% CI=0.80 to 0.95; p=0.002) within one-year of stroke. Although the analyses were subject to significant heterogeneity, similar findings were reported for the outcome of death at one year in a secondary analysis limited to multi-centered trials, which did not suffer from significant heterogeneity (OR=0.82, 95% CI 0.77 to 0.87, p<0.001) (Seenan et al., 2007). Although observational studies are associated with a greater risk of bias than RCTs, it is noteworthy that the benefit of stroke unit care observed in observational studies of clinical practice is comparable to that observed in clinical trials.

In a synthesis of evidence demonstrating the benefits of organized stroke care, Kalra and Langhorne noted that an important challenge for stroke units is a conceptual shift in the philosophy of stroke care from being predominantly engaged with patient-oriented interventions to a strategy in which the patient and the caregiver are seen as a combined focus for intervention, with the objective of empowering and equipping caregivers to be competent facilitators of activities of daily living when caring for disabled patients after stroke (Kalra & Langhorne, 2007). Research has consistently shown that better outcomes are associated with comprehensive and early processes of stroke-specific assessments, particularly assessments for swallowing and aspiration risk, early detection and management of infections, maintenance of hydration and nutrition, early mobilization, clear goals for function, and communication with patients and their families (Kalra & Langhorne, 2007).

Link to Evidence Table 4.1 and References available on website at www.strokebestpractices.ca
Best Practice Recommendation 4.2
Inpatient Management and Prevention of Complications Following Acute Stroke or TIA

Refer to Section 4.3 for the management of patients who are actively dying and require end-of-life care.

4.2 Appropriate investigations and management strategies should be implemented for all hospitalized stroke and TIA patients to optimize recovery, avoid complications, prevent stroke recurrence, and provide palliative care when required.

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

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

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

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

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

4.2.1 Cardiovascular Investigations

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

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

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

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

4.2.2 Venous Thromboembolism Prophylaxis

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

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

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

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

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

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

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

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

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

4.2.3 Temperature Management

i. Temperature should be monitored as part of vital sign assessments; ideally every four hours for the first 48 hours, and then as per ward routine or based on clinical judgment [Evidence Level C].

ii. For temperature greater than 37.5° Celsius, increase frequency of monitoring, initiate temperature-reducing care measures, investigate possible infection such as pneumonia or urinary tract infection [Evidence Level C], and initiate antipyretic and antimicrobial therapy as required [Evidence Level B].

4.2.4 Mobilization

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

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

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

ii. All patients admitted to hospital with acute stroke should be assessed by rehabilitation
professionals as soon as possible after admission [Evidence Level A], preferably within the first 24 to 48 hours [Evidence Level C]. Refer to Chapter 5 for additional recommendations on mobilization following an acute stroke.

4.2.5 Continence

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

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

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

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

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

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

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

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

4.2.6 Nutrition and Dysphagia

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

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

iii. Abnormal results from the initial or ongoing swallowing screens should prompt referral to a speech-language pathologist, occupational therapist, and/or dietitian for more detailed assessment and management of swallowing, nutritional and hydration status [Evidence Level C]. An individualized management plan should be developed to address therapy for dysphagia, dietary needs, and specialized nutrition plans [Evidence Level C].

iv. Stroke patients with suspected nutritional concerns, hydration deficits, dysphagia, or other comorbidities that may affect nutrition (such as diabetes) should be referred to a dietitian for recommendations:

   a. to meet nutrient and fluid needs orally while supporting alterations in food texture and fluid consistency recommended by a speech-language pathologist or other
trained professional [Evidence Level B];

b. for enteral nutrition support (nasogastric tube feeding) in patients who cannot safely swallow or meet their nutrient and fluid needs orally. The decision to proceed with tube feeding should be made as early as possible after admission, usually within the first three days of admission in collaboration with the patient, family (or substitute decision maker), and interprofessional team [Evidence Level B].

Refer to Recommendation 5.6 for additional information on dysphagia screening, assessment and management.

4.2.7 Oral Care

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

ii. For patients wearing a full or partial denture it should be determined if they have the neuromotor skills to safely wear and use the appliance(s) [Evidence Level C].

iii. An appropriate oral care protocol should be used for every patient with stroke, including those who use dentures [Evidence Level C]. The oral care protocol should be consistent with the Canadian Dental Association recommendations [Evidence Level B], and should address areas such as frequency of oral care (ideally after meals and before bedtime); types of oral care products (toothpaste, floss, and mouthwash); and management for patients with dysphagia.

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

v. If concerns are identified with oral health and/or appliances, patients should be referred to a dentist for consultation and management as soon as possible [Evidence Level C].

4.2.8 Seizure Management

i. New-onset seizures in admitted patients with acute stroke should be treated using appropriate short-acting medications (e.g. lorazepam IV) if they are not self-limiting [Evidence Level C].

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

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

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

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

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

**Rationale**

Acute stroke is responsible for prolonged lengths of stay compared to other causes of hospitalization in Canada, and the burden on inpatient resources increases further when complications arise. Acute stroke patients are at risk for complications during the early phase of recovery. The priorities for inpatient care are management of stroke sequelae to optimize recovery, prevention of post-stroke complications that may interfere with the recovery process, and prevention of stroke recurrence. There is weaker to moderate evidence for many of the interventions to accomplish these goals; however, that does not minimize their importance nor their contribution to patient outcomes, including length of stay, and complications.

**System Implications**

- Standardized evidence-based protocols instituted for optimal inpatient care of all acute stroke patients, regardless of where they are treated in the healthcare facility (stroke unit or other ward), and across the regional stroke system of care.
- Ongoing professional development and educational opportunities for all healthcare professionals who care for acute stroke patients.
- Referral systems to ensure rapid access to specialty care such as dentistry and hematology.

**Performance Measures**

1. Percentage of patients admitted to hospital with a diagnosis of acute stroke who experience one or more complications during hospitalization (deep venous thrombosis, pulmonary embolus, secondary cerebral hemorrhage, gastrointestinal bleeding, pressure ulcers, urinary tract infection, pneumonia, seizures [or convulsions]) during inpatient stay.
2. Median length of stay during acute phase of care for all stroke patients admitted to hospital (core). (Stratify by stroke type)
3. Percentage of patients who experienced prolonged length of stay beyond expected length of stay as a result of experiencing one or more complications.
4. Median length of stay during acute phase of care for all stroke patients admitted to hospital that experience one or more complications during hospitalization (core). (Stratify by stroke type and complication type).

Refer to Canadian Stroke Quality and Performance Measurement Manual for detailed indicator definitions and calculation formulas. www.strokebestpractices.ca/

**Measurement Notes**

- Risk adjustment to account for other comorbidities, age, and gender.
- Length-of-stay analysis should be stratified by presence or absence of in-hospital...
complications to look for the impact of a complication on length of stay.
● Patient and family experience surveys should be in place to monitor care quality during inpatient stroke admissions.
● Refer to the Canadian Stroke Strategy Performance Measurement Manual 2013 for additional performance measures for each specific component of inpatient care at www.strokebestpractices.ca/performance

Implementation Resources and Knowledge Transfer Tools

- Canadian Stroke Best Practices Taking Action Towards Optimal Stroke Care Resource Kit
- Canadian Stroke Best Practices Patient Order Set for Admission to Inpatient Stroke Care
- Canadian Stroke Best Practices Table 3.3A Screening and Assessment Tools for Acute Stroke
- Canadian Stroke Best Practices Table 3.3B Recommended Laboratory Investigations for Acute Stroke and Transient Ischemic Attack
- HSF Stroke Nurses Assessment Pocket Cards http://www.heartandstroke.on.ca/site/c.pvl3ieNWJwE/b.5852913/k.AC4B/Order_Resources/apps/ka/c1/contactcustom.asp
- RNAO Stroke Assessment Across the Continuum of Care (2005) http://mao.ca/sites/mao-ca/files/Stroke_Assessment_Across_the_Continuum_of_Care
- RNAO Guidelines for Falls Prevention in the Older Adult: http://mao.ca/sites/mao-ca/files/Prevention_of_Falls_and_Fall_Injuries_in_the_Older_Adult.pdf
### Summary of the Evidence

**Cardiovascular Investigations:**

An electrocardiogram (ECG) should be performed immediately for all patients with stroke and TIA presenting to the emergency department for the potential to identify arrhythmias. Atrial fibrillation (AF) is commonly diagnosed post-stroke, and is of particular concern due to its role in forming emboli. Immediate testing is important; Suissa and colleagues found that the greatest odds of AF detection were within the first 24 hours after stroke (OR 9.82; 95% CI 3.01 to 32.07) (Suissa et al., 2012). It is important to note, however, that an initial ECG is often not enough to detect all cases of AF. In the same study, it was found that ECG monitoring beyond the baseline assessment resulted in the identification of additional cases of AF in 2.3%–14.9% of the population (Suissa et al., 2012). The greatest number of new cases was identified with continual monitoring in an intensive stroke unit (Suissa et al., 2012). For sites not equipped with continuous monitoring equipment, the use of serial ECG assessments is an effective means of diagnosing AF (Douen et al., 2008). There was a statistically significantly greater percentage of patients diagnosed with AF as a result of serial ECG assessments within 72 hours of stroke compared to the percentage of patients diagnosed with AF at baseline (P=0.001) in this study (Douen et al., 2008). A Holter monitor may offer additional sensitivity to identify cases of AF (Douen et al., 2008). A 2007 systematic review found that the use of a Holter monitor for variable durations of time following acute stroke identified AF in approximately 5% of patients (Liao et al., 2007). The use of a Holter monitor as an adjunct to serial ECGs offers the greatest ability to detect AF (Douen et al., 2008).

The use of a transthoracic echocardiography (TEE) is indicated when there is suspected cardiac embolism involvement. For patients with an unknown cause of stroke following baseline diagnostic assessments, and no contraindications to anticoagulation therapy, TEE was found to identify possible sources of cardiac embolism (de Bruijn et al., 2006). In this study, TEE was found to perform better than transthoracic echocardiography in identifying possible sources of cardiac embolism, and was appropriate for all ages in the population of patients assessed (>45 years and ≤45 years) (de Bruijn et al., 2006).

**Venous Thromboembolism Prophylaxis:**

Recommendations for the routine use of prophylactic anticoagulation for venous thromboembolism in stroke patients are controversial (Stroke Foundation of New Zealand, 2003). The benefit of prophylaxis with an anticoagulant low-density unfractionated heparin or low molecular weight heparin should be weighed against the risk of serious bleeding complications in patients with additional risk factors for venous thromboembolism. The risk of venous thromboembolism in patients hospitalized with stroke is 20–50 percent (Hirsh, Guyatt, Albers, Harrington, & Schunemann, 2008). Additional pre-existing risk factors may increase the risk of venous thromboembolism and pulmonary embolism and should be addressed individually in each patient admitted with an acute stroke.

The Royal College of Physicians guidelines states that prophylactic anticoagulation should not be used routinely (Grade A recommendation) (Royal College of Physicians of London, 2006). Although subcutaneous heparin and low-molecular-weight heparin may prevent venous thromboembolism (VTE), this beneficial effect may be counterbalanced by an increased risk of intracranial hemorrhage. The American Stroke Association (ASA) and the Scottish Intercollegiate Guidelines Network both recommend prophylactic administration of heparin, low-molecular-weight heparin, or heparinoids to prevent venous thromboembolism in immobilized people following a stroke (Grade A recommendations) (Canadian Stroke Network & Heart and Stroke Foundation of Canada, 2006; SCORE, 2007; Scottish Intercollegiate Guidelines Network, 2013).

The PREVAIL study investigated optimal treatment for venous thromboembolism prophylaxis to compare the efficacy and safety of enoxaparin with that of unfractionated heparin for patients with stroke (Sherman et al., 2007). One thousand, seven hundred and sixty-two patients with acute ischemic stroke who were unable to walk unassisted were randomly assigned within 48 hours of symptoms to receive either enoxaparin (40 mg subcutaneously once daily) or unfractionated heparin (5000 U subcutaneously every 12 hours for 10 days). Patients were stratified by National Institutes of Health Stroke Scale score (severe stroke ≥14, less severe stroke <14). In the efficacy population (i.e. one or more dose received, presence of deep vein thrombosis or pulmonary embolism, or assessment for venous thromboembolism), enoxaparin (n=666) and unfractionated heparin (n=669) were given for 10.5 days (SD 3.2). Enoxaparin reduced the risk of...
venous thromboembolism by 43 percent compared with unfractionated heparin (68 [10%] vs. 121 [18%]; relative risk 0.57, 95% CI 0.44–0.76; p=0.0001; difference: −7.9%, −11.6 to −4.2%); this reduction was consistent for patients with an NIHSS score of 14 or more (26 [16%] vs. 52 [30%]; p=0.0036) or less than 14 (42 [8%] vs. 69 [14%]; p=0.0044). The occurrence of any bleeding was similar with enoxaparin (69 [8%]) or unfractionated heparin (71 [8%]; p=0.83). The frequency of the composite of symptomatic intracranial and major extracranial hemorrhage was small and closely similar between groups (enoxaparin 11 [1%] vs. unfractionated heparin 6 [1%]; p=0.23). Sherman noted no difference for symptomatic intracranial hemorrhage between groups (4 [1%] vs. 6 [1%], respectively; p=0.55); the rate of major extracranial bleeding was higher with enoxaparin than with unfractionated heparin (7 [1%] vs. 0; p=0.015). It was suggested that for patients with acute ischemic stroke, enoxaparin is preferable to unfractionated heparin (Sherman et al., 2007).

A follow-up study on the PREVAIL trial examined the economic impact of enoxaparin vs unfractionated heparin (UFH) after acute ischemic stroke (Pineo et al., 2011). The study used a decision analytic model to calculate the clinical costs associated with VTE prophylaxis with enoxaparin or UFH in patients with acute ischemic stroke. The model examined the overall clinical costs per patient using enoxaparin or UFH and costs based on patient’s classification according to National Institutes of Health Stroke Scale (NIHSS) scores. The study found an overall average net savings of $1096 per patient with enoxaparin, even though the drug costs were higher for enoxaparin than UFH ($260 vs $59). A total costs savings of $1800 were found for patients with more severe strokes (NIHSS score>14) receiving enoxaparin compared to UFH; while less severe stroke individuals (NIHSS score<14) receiving enoxaparin had a total costs-savings of $488 per patient (Pineo et al., 2011).

The use of low molecular weight heparin (LMWH) was associated with a significant risk reduction for any VTE (odds ratio [OR], 0.54; 95% confidence interval [CI], 0.41 to 0.70; p < 0.001). Limiting the analysis to proximal VTEs also indicated that LMWHs were superior (OR with LMWH vs UFH, 0.53; 95% CI, 0.37 to 0.75; p < 0.001). The LMWH use led to fewer PEs as well (OR, 0.26; 95% CI, 0.07 to 0.95; p = 0.042). There were no differences in rates of overall bleeding, intracranial hemorrhage, or mortality based on the type of agent employed. Restricting the analysis to the reports employing enoxaparin did not alter their findings (Shorr et al., 2008).

Definitive research evidence is lacking for the use of anticoagulants and antithrombotics for deep vein thrombosis prophylaxis after intracerebral hemorrhage (Boeer, Voth, Henze, & Prange, 1991). The use of anticoagulants may increase the risk of worsening the initial hematoma. Orken and colleagues investigated the safety of low dose low molecular weight heparin (LMWH) for DVT prophylaxis in patients with ICH and the effect of heparin on the enlargement of hemorrhage (Orken et al., 2009). Seventy-five primary ICH patients were randomized to subcutaneous LMWH (Enoxaparin sodium 40mg/d) or long compression stockings (CS) after the first 48 hours. All patients had cranial computed tomography (CT) scan at admittance, 1, 3, 7 and 21 days, as well as CT pulmonary angiography and bilateral lower extremity venous Doppler on day seven. Hematoma volumes were calculated on the initial and follow-up CTs with ABC/2 method. The study did not find any hematoma enlargement at 72 hours, 7 and 21 days in either group. In addition, no other systemic bleeding complications were observed in LMWH group. Four asymptomatic DVTs were detected (3 in LMWH and 1 in CS group). As a result of the study, investigators were able to calculate the rate of asymptomatic DVT and PE in ICH patients, at 4% and 2.5% in the LMWH group. The investigators concluded that low-dose heparin treatment after 48 hours of stroke in ICH patients was not associated with an increased hematoma growth, though sample size was small, and thus ICH patients should be considered for DVT and PE prophylaxis.

Tetri and colleagues conducted a retrospective review of 407 ICH patients in which 232 had received anticoagulant therapy for DVT prophylaxis using enoxaparin (Tetri et al., 2008). They found similar three-month mortality rates of 19% in the treated group compared to 21% in the group who did not receive prophylaxis. Hematoma enlargements occurred in 9% and 7% of the treated and untreated patients, whereas symptomatic venous thromboembolic complications were observed in 3% and 2%, respectively. The investigators discuss the fact that the safety of earlier initiation of prophylaxis in the ICH population is unknown and a randomized trial is needed to generate evidence to better guide clinicians.

The recommendation around the use of external compression stockings has been removed from this edition of the Canadian Best Practice Guidelines. In past editions external compression stockings were a recommended intervention that could be used for patients with acute ischemic stroke at high risk of
venous thromboembolism in the absence of contraindications. This was based on evidence that showed external compression stockings are effective for surgical patients (Amaragiri & Lees, 2000). However, two more systematic reviews concluded there is currently insufficient evidence of the effectiveness of physical methods to prevent DVT (Andre, de Freitas, & Fukujima, 2007; Naccarato et al., 2010). Of importance, a recent randomized controlled trial study (CLOTS trial 1) has shown that thigh length compression stockings do not significantly reduce the risk of deep vein thrombosis after stroke (The CLOTS Trials Collaboration, 2009). The CLOTS trial 1 was a multi-centre study in which 2518 patients were recruited within 3 days of admission after stroke. The primary outcome was a symptomatic or asymptomatic DVT in the popliteal or femoral veins. The primary outcome occurred in 126 (10.0%) patients allocated to thigh-length graduated compression stockings and in 133 (10.5%) in patients who were not treated with graduated compression stockings. Graduated compression stockings were not significant in reducing the risk of the occurrence of DVT (0.5%) compared with no graduated compression stockings. Graduated compression stockings did not affect secondary outcomes including PE and death. Also, graduated compression stockings were not effective in subgroups, such as patients treated early, those with leg weakness and those not given concomitant anticoagulation. However, the use of graduated compression stockings was associated with an increased risk of skin breaks, ulcers, blisters and necrosis.

One trial has assessed the use of intermittent pneumatic compression (IPC) in conjunction with elastic stockings (Lacut et al., 2005). The study reported a reduced incidence of asymptomatic DVT for patients with ICH in an ICU setting. However, the study was too small to detect clinical/symptomatic DVT differences between the groups and a higher number of patients in the intervention group discontinued treatment. The ongoing study CLOTS trial 3 may provide direction around the use of intermittent pneumatic compression.

Temperature Management:

It is recognized that body temperature is an important predictor of clinical outcome following stroke (Lakhan & Pamplona, 2012). A meta-analysis by Prasad and Krishnan demonstrated that fever within first 24 hours of ischemic stroke onset was associated with almost twice the risk of short-term mortality (Prasad & Krishnan, 2010). Conversely, Jorgenson et al. found that a 1°C decrease in temperature corresponded to almost doubling the likelihood of a good outcome (Jorgensen et al., 1999). The harmful effect of high temperature has been shown to occur in the first 48 hours (Blanco et al., 2012), thus continuous temperature monitoring during this time is necessary.

Various forms of temperature management have been discussed in the literature. Administration of antipyretic agents, such as paracetamol, is recommended but only in stroke patients with pyrexia. A prophylactic use of the drug in acute stroke patients with no signs of pain and/or fever is discouraged as it tends to exacerbate patient outcome (Frank et al., 2013). Sequential administration of four antipyretic interventions [1 g paracetamol, 1 g metamizole, calf packing, and 500 ml 0.9% NaCl], collectively known as the Standard Operating Procedure (SOP), is also an effective alternative since it can potentiate antipyretic properties by sustaining normothermia in acute stroke patients (Kallmunzer et al., 2011). Finally, therapeutic hypothermia may be initiated for stroke-mediated pyrexia when the body temperature exceeds 37.5°C. Ideally, hypothermic therapy should be maintained for 12 to 24 hours. It is important to consider alternative effects of this treatment including decreased urine output and higher risk of pneumonia (Guluma et al., 2010; Hemmen et al., 2010). Therefore, careful monitoring of temperature is recommended to avoid physiological complications brought on by prolonged cooling.

Mobilization:

Early mobilization post stroke may have a number of benefits for the stroke survivor. Prevention of complications, pressure sores, painful shoulders, and respiratory problems are thought to be some of the positive effects of mobilization of a patient as soon as possible following a stroke (Bernhardt J et al., 2010; Langhorne P, Pollock A, & Stroke Unit Trialists’ Collaboration, 2002). It has been described as one of the “simplest yet most important components of effective stroke unit care” (Bernhardt J, Dewey H, & Thrift A, 2008). Mobilization of patients early after stroke is currently a common practice on many stroke units.

Health professionals require an evidence-based approach to deliver safe and effective care to acute stroke patients, including early mobilization. Despite an absence of definitive positive benefit, several well-developed stroke guidelines promote early mobilization following stroke (European Stroke Organization
Urinary incontinence (UI) is a debilitating condition that can impede one’s personal, economic and psychosocial livelihood (Brittain et al., 1999). The prevalence of urinary incontinence (UI) post stroke is thought to exceed 50 percent (Kolominsky-Rabas, Hilz, Neundörffer, & Heuschmann, 2003) and can remain prevalent for up to 2 years later (Patel, Coshall, Rudd, & Wolfe, 2001). There is strong evidence that all stroke patients should be screened for UI within two days of admission (Herr-Wilbert et al., 2010) via a systematic review by Diserens and colleagues, a benefit of early mobilization was noted (Diserens K, Michel P, & Bogousslavsky J, 2006). This review defined ‘early’ mobilization as activities within the first three days following stroke. Authors observed that standardized procedures for early mobilization of patients post stroke may contribute to good long term outcomes. They concluded that, despite the potential positive benefits, early mobilization guidelines are poorly defined and need to be standardized to better evaluate their clinical effectiveness. A more recent meta-analysis by Craig et al. looked at two randomized trials (Craig LE et al., 2010). These two trials employed comparable protocols for early mobilization of patients post stroke. Pooled analysis demonstrated that patients receiving an early mobilization treatment experienced significantly greater odds of independent at three months (OR 3.11; 95% CI: 1.03-9.33), were more likely to be independent in activities of daily living (OR 4.41; 95% CI 1.36-14.32), and were less likely to experience complications of immobility (OR 0.20; 95%CI 0.10-0.70) than individuals receiving standard care. Authors concluded that early mobilization improved patient outcomes post stroke. The most recent randomized trials examining the effects of early post stroke mobilization were completed by Diserens et al. (Diserens K et al., 2011) and Sundseth et al. (Sudseth A et al., 2012). Both trials compared early vs. late mobilization in stroke patients. Diserens et al. observed significantly more severe complications in the delayed mobilized group (47%) vs. early mobilized group (8%) (p<0.006), however, no significant differences were found in the rate of minor complications, neurological deficits, or blood flow modifications (Diserens K et al., 2011). Conversely, Sundseth et al. demonstrated poorer outcomes in individuals in the early mobilization group including a greater risk of death and dependency at follow up; however, these results were not statistically significant (Sudseth A et al., 2012).

The AVERT trial (A Very Early Rehabilitation Trial for Stroke) is currently underway with the intent of providing further clarity on this topic. At this time, the safety and feasibility report for AVERT has been published. A 2009 Cochrane review included this report as its sole study (Bernhardt J et al., 2010). This study found that fewer patients who received very early mobilization (within 24 hours) died or were disabled at 3 months. However, this was not statistically significant. A secondary analysis examined complication rates at 3 months comparing the intervention and standard care groups (Sorbello D et al., 2009). In this Phase II study, there were no significant differences in complication rates between the two groups. Overall, most patients (81.6%) experienced at least one complication, most commonly falls. Patient quality of life at one year following a stroke was also assessed using the Assessment of Quality of Life scale (AQoL) (Tyedin K, Cummings TB, & Bernhardt J, 2010). The very early mobilization treatment group reported a higher median overall AQoL score (0.32) compared to standard care patients (0.24), however, this was not found to be statistically significant. Early mobilization patients also reported higher quality of life than standard care patients in the physical function related ‘Independent Living’ domain of the AQoL (adjusted for age, p = 0.03; adjusted for stroke severity, p = 0.04).

Variations in practice for the timing of mobilization following stroke have been found to range from 24 hours to several days (Bernhardt J, 2008). A Canadian survey study assessed functional mobility training for individuals admitted to acute care following a stroke event (Masters L, Barreca S, Ansley B, & et.al., 2007). One third of the 18 responding acute care settings reported that there were no written guidelines related to mobilization or positioning following a stroke, and few sites reported provision of stroke-specific education. Arias and Smith also examined practices for early mobilization of acute stroke patients through a survey in the United Kingdom (Arias M & Smith LN, 2007). It was noted that although early mobilization in acute stroke care is recommended in a range of European, American and United Kingdom policy guidelines as a strategy to minimize or prevent complications, the evidence to support early mobilization in acute stroke is conflicting. Although the evidence base for early mobilization post stroke is growing, there is a need for a coordinated and consistent approach to early mobilization and physical care for stroke patients in the acute care setting.

Continence:

Urinary incontinence (UI) is a debilitating condition that can impede one’s personal, economic and psychosocial livelihood (Brittain et al., 1999). The prevalence of urinary incontinence (UI) post stroke is thought to exceed 50 percent (Kolominsky-Rabas, Hilz, Neundörffer, & Heuschmann, 2003) and can remain prevalent for up to 2 years later (Patel, Coshall, Rudd, & Wolfe, 2001). There is strong evidence that all stroke patients should be screened for UI within two days of admission (Herr-Wilbert et al., 2010) via a
portable ultrasound device. This device provides a similar degree of precision as indwelling catheters when measuring bladder volume, but unlike the latter, the portable ultrasound device boasts simplicity and lacks invasiveness (Chan, 1997; Ersoz et al., 2007; Granier et al., 2002; Herr-Wilbert et al., 2010; Thomas et al., 2005b). There is also growing evidence that patients should be assessed for additional non-urological factors that may exacerbate incontinence, including estrogen deficiency, polyuria via drugs or glycosuria, cognitive impairments, and premorbid incontinence (Brittain et al., 1999; Granier et al., 2002). The aforementioned assessments and management of care should be performed by a specialized professional team as research suggests individuals experience fewer urinary symptoms as compared to their own care conducted in the community (Thomas et al., 2005b).

The use of indwelling catheters is largely discouraged in clinical settings to avoid the onset of urinary tract infections (UTIs). The negative health implications of indwelling catheters are well-documented in literature. Chan reported that the risk of UTI in acute stroke patients was greater than 90 percent after five days of treatment with indwelling catheters (Chan, 1997). Similarly, Ersoz et al. demonstrated that UTIs were observed in 50 percent of patients treated with indwelling catheters (Ersoz et al., 2007). Consequently, the use of indwelling catheters is typically limited to patients with incontinence who cannot be managed any other way. If used, however, it should be changed or removed as soon as possible, ideally within 48 hours (Duncan et al., 2005).

Several infection prevention strategies outlined by Maki et al. should be considered to prevent or delay the onset of catheter-associated UTIs (Maki & Tambyah, 2001). Most notable catheter-care practices include inserting the catheter using aseptic technique, correctly positioning the drainage tube and the collection bag, maintaining uncompromising closed drainage, achieving spontaneous voiding, and administering intermittent catheterizations. In addition, employing silver alloy-coated urinary catheters instead of industry standard silver oxide catheters should further attenuate the risk of UTI (Duncan et al., 2005).

Bladder-training programs, which typically include timed/prompted voiding, bathroom training, pelvic floor exercises, and/or drug therapy, are highly recommended when managing bladder dysfunction in the acute phase of stroke. In a study of 37 patients receiving a bladder retraining program, 84 percent achieved urinary continence within one month (Chan, 1997). Similarly, out of 44 patients subject to systemic interventions, which included habit training, prompted voiding and administration of anticholinergic drugs, 67 percent achieved continence within 30 days (Herr-Wilbert et al., 2010). Further evidence suggests that implementation of evidence-based interventions by an interdisciplinary rehabilitation team may generate greater clinical efficacy and lessen the burden on care management personnel (Cournan, 2012).

Although the benefits of the evidence-based interventions are relatively well-established, only two percent of occupational therapists and three percent of physical therapists in Canada use best practice interventions (Dumoulin et al., 2007), a situation which warrants the implementation of formal and structured UI management protocol. Acute Stroke Units (ASU) across Australia face the similar problem in that less than half of ASUs have a formal plan for the management of post-stroke UI. Perhaps there is a need for a universal protocol, as participants of the study by Herr-Wilbert et al. expressed that the use of standardized terminology will expedite professional assessment of post-stroke UI (Herr-Wilbert et al., 2010).

Nutrition and Dysphagia:

Screening for dysphagia within the first 48 hours post stroke is an important component of acute stroke care. Dysphagia, a common result following stroke, has been associated with medical complications, such as pneumonia, which can lead to death (Hinchey et al., 2005b). A simple bedside screen for dysphagia is both feasible and cost-effective. Hinchey et al. evaluated adherence to screening for dysphagia and associated pneumonia among individuals with ischemic stroke in the United States (Hinchey et al., 2005b). The authors found that pneumonia occurred less frequently among those who had received a dysphagia screen. The results were echoed in a similar study by Lakshminarayan et al. in that unscreened patients had a greater risk of developing pneumonia compared to patients who had passed dysphagia screening *(OR=2.2; 95% CI 1.7-2.7)* (Lakshminarayan et al., 2016b). Not only do screens aid in the identification of dysphagia, and thus help to prevent unnecessary complications (i.e., aspiration pneumonia), but they also facilitate timely treatment such that proper nutrition is provided throughout the healing process.

Post-stroke dysphagia impairs one’s swallowing, and thus one’s ability to consume sufficient calories and
protein. Malnourishment is a predictor for increased dependency and poor outcome post stroke. To adequately manage swallowing issues, appropriate personnel must develop a plan of care. Speech-language pathologists, occupational therapists, and registered dieticians, for example, have the professional expertise to establish these plans. Evidence suggests that there are many effective therapies for the treatment of dysphagia (e.g., drug therapy, neuromuscular stimulation, thermal therapy, behavioural therapy, etc.) (Geeganage et al., 2012). For example, in treating dysphagia among 92 patients with acute stroke, Kushner et al. reported that individuals receiving neuromuscular stimulation had a significant improvement in swallowing performance compared to individuals receiving traditional dysphagia therapy with progressive resistance (P<.001) (Kushner et al., 2013).

For individuals that cannot orally meet nutrient and fluid needs by altering food textures may require enteral nutrition support (nasogastric tube feeding). For these individuals, the decision to use enteral support should be made within the first seven days post stroke. In one of the large FOOD trials (Dennis et al., 2005a), 1,210 patients were randomized into four groups representing two arms of the trial. The first arm examined the effect of early (< 7 days) versus late (> 7 days) enteral support on absolute risk of poor outcome and death at six months. The second arm examined the effect of percutaneous enteral gastroscopy versus nasogastric tube nutritional support on the same outcomes. Results suggested that early nutritional support, particularly via a nasogastric tube, had a lower absolute risk of poor outcome and death (Dennis et al., 2005a). This evidence is supported by other studies that demonstrate a reduction in weight loss post stroke with the use of nutritional supplementation (Gariballa et al., 1998; Ha et al., 2010).

**Oral Care:**

Physical weakness following stroke may prevent patients from independently completing their activities of daily living, particularly oral care. Poor oral care, combined with many side effects of medication (e.g., dry mouth, oral ulcers, stomatitis), may contribute to a greater amount of bacteria in the mouth (McNally et al., 1999). Oral aerobic gram-negative bacilli has been shown to be very common in the mouths of stroke patients and is also correlated with dysphagia (Millns et al., 2003). Patients with dysphagia are at a high risk for aspiration pneumonia due to reduced cough sensation, significant bacterial colonization, and the potential to aspirate on their own saliva (Millns et al., 2003). In addition to the obvious physical aspects of poor oral care, acute stroke patients have also reported a lower oral health-related quality of life as a result of poor or inadequate dental care (Schimmel et al., 2011).

On admission to the hospital, all stroke patients should have an oral/dental assessment to examine mastication, tooth wear, disease and use of appliances (Talbot et al., 2005). At this time it should be determined whether the patient had the ability to independently wear and clean their appliance, if applicable. Oral care protocols have been described briefly in the literature. Talbot et al. examined 70 stroke units in Scotland and found that 21% of senior nurses reported using a formal oral care protocol and 23% used an oral care assessment tool (Talbot et al., 2005). Frequency of oral care has also been assessed and general consensus dictates that patients should clean, or have cleaned, their teeth and/or dentures at minimum once per day (Kuramoto et al., 2011; McNally et al., 1999; Talbot et al., 2005). Optimal oral care includes cleaning either twice per day or after every meal (Kuramoto et al., 2011; McNally et al., 1999; Talbot et al., 2005). Typical cleaning agents include toothbrushes, chlorohexidine washes and mouth swabs (Kuramoto et al., 2011).

Significant issues identified during the initial or ongoing assessment should be further investigated by dental professionals. Evidence suggests that some hospitals (27% - 91%) collaborate with community dentists, patients’ dentists, or dental hygiene staff for more specialized dental care (Kuramoto et al., 2011; McNally et al., 1999; Talbot et al., 2005). Dental professionals may provide dental prostheses, conduct extractions, or periodontal therapy/restorative dentistry (McNally et al., 1999). Management of oral care is an interdisciplinary process that requires collaboration between nurses, speech language pathologists, occupational therapists, registered dieticians, and/or dental professionals to address both mouth hygiene and swallowing issues.
Seizure Management:

Post stroke seizure incidence has been reported to range from 5 to 15% and varies between stroke aetiologies, severity, and location (Gilad R, 2012). Definitions of early and late post stroke seizures differ greatly, and incidence rates can range from 2-6% for early seizures and 3-6% for those classified as late seizures. Approximately 5-20% of individuals with seizure post stroke will experience a second seizure, and a small subset of this group will develop epilepsy (Silverman IE, Restrepo L, Gregory C, & Mathews C, 2002).

Although difficult to predict, there are several risk factors for the development of post stroke seizures. Stroke type and location can have an impact, with hemorrhagic events and cortical lesions experiencing the highest risk of both first and recurrent seizure (Gilad R, 2012; Ryvlin P, Montavont A, & Nighoghossian N, 2013). Occurrence of an early post stroke seizure has also been found to be predictive of increased risk of late seizure, and subsequent risk of developing epilepsy (Ryvlin P et al., 2013). The risk of seizure is especially high in children, and approximately one quarter of children with stroke will experience a seizure event, most within the first 24 hours. A large proportion of these will develop epilepsy (Singh RK et al., 2012; Yang JS, Park YD, & Hartlage PL, 1995; Zimmer JA, Garb BP, Williams LS, & Golomb MR, 2007). These rates may be even higher in infants (Singh RK et al., 2012).

Evidence surrounding the treatment of post stroke seizures is limited. Several studies have been conducted examining the effects of antiepileptic medications on the prevention of subsequent seizures following a first event, however, no placebo controlled studies exist. Much of the current evidence is in support of the effectiveness of antiepileptic medication (Gilad R et al., 2007; Gilad R, Lampi Y, Eschel Y, & Sadeh M, 2001; Rowan AJ et al., 2005). Studies have focused on the use of three anticonvulsants: lamotrigine, carbamazepine, and gabapentin. Although significant differences in the effectiveness of these treatments in preventing seizure events have not been found, lamotrigine is often favoured due to a lower risk of adverse side effects (Gilad R et al., 2007; Rowan AJ et al., 2005). However, it is generally recommended that treatment decisions remain individualized to each patient (Gilad R, 2012; Ryvlin P et al., 2013; Silverman IE et al., 2002). There is currently no evidence to support the prophylactic treatment of post stroke seizures (van Tuijl JH et al., 2011).

Link to Evidence Table 4.2 and References available on website at www.strokebestpractices.ca
Table 4.2: Canadian Stroke Best Practices Swallow Screening and Assessment Tools

<table>
<thead>
<tr>
<th>Author/Name of test</th>
<th>Components of test</th>
<th>Results of original validation study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Daniels et al. 1997</strong></td>
<td>Items included: 6 clinical features-dysphonia, dysarthria, abnormal volitional cough (includes water-swallowing test), abnormal gag reflex, cough after swallow and voice change after swallow were assessed.</td>
<td>Diagnostic standard: VMBS exam</td>
</tr>
<tr>
<td>“Any Two”</td>
<td>Scoring: Presence of any 2 of the items distinguished patients with/without dysphagia</td>
<td>Prevalence of dysphagia: 74.6%</td>
</tr>
<tr>
<td></td>
<td>Sample: 59 acute stroke survivors were studied within 5 days of hospital admission.</td>
<td>The sensitivities and specificities of individual items ranged from 31%-76.9% and 61%-88%, respectively.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overall: Sensitivity: 92% Specificity: 67%</td>
</tr>
<tr>
<td><strong>Logemann et al. 1999</strong></td>
<td>28 items divided into 5 categories:</td>
<td>Diagnostic standard: VMBS exam</td>
</tr>
<tr>
<td></td>
<td>i) 4 medical history variables</td>
<td>Prevalence of dysphagia: 57.5%</td>
</tr>
<tr>
<td></td>
<td>ii) 6 behavioural variables</td>
<td>Aspiration: Throat clearing, reduced laryngeal elevation and a history of recurrent pneumonia were the best combination of predictors.</td>
</tr>
<tr>
<td></td>
<td>iii) 2 gross motor variables</td>
<td>Sensitivity: 69% Specificity: 73%</td>
</tr>
<tr>
<td></td>
<td>iv) 9 observations from oromotor testing</td>
<td>Pharyngeal stage swallow disorder: reduced laryngeal elevation was the best single predictor.</td>
</tr>
<tr>
<td></td>
<td>v) 7 observations during trial swallows</td>
<td>Sensitivity: 72% Specificity: 67%</td>
</tr>
<tr>
<td></td>
<td>Scoring: logistic regression was used to identify best single predictors and best combination of predictors. The tool was designed to identify the presence or absence of aspiration, oral stage disorder, pharyngeal delay, and pharyngeal stage disorder.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sample: 202 consecutive patients (34% stroke) referred by their physicians for possible dysphagia.</td>
<td></td>
</tr>
<tr>
<td><strong>Perry 2001</strong></td>
<td>7 items in 2 sections plus water swallowing test</td>
<td>Diagnostic Standard: Clinical judgement of SLP</td>
</tr>
<tr>
<td>Standardized Swallowing</td>
<td>Section 1: 2 items to ensure the patient is physically capable of taking the test.</td>
<td>Prevalence of dysphagia: 47%</td>
</tr>
<tr>
<td>Assessment</td>
<td>Section 2: 5 items comprising a checklist</td>
<td>Sensitivity: 97% Specificity: 90%</td>
</tr>
<tr>
<td></td>
<td>Scoring: if answers to any question is no, then patient fails the screen, otherwise, proceed to water swallow test (3 trials of 1 teaspoon with progression to ½ cup). If any sign of problems (coughing, choking, change in voice quality), then patient fails.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sample: 200 consecutive admissions of acute stroke.</td>
<td></td>
</tr>
<tr>
<td><strong>Trapl et al. 2007</strong></td>
<td>Preliminary Assessment (vigilance, throat clearing, saliva swallow)</td>
<td>Diagnostic standard: fiberoptic endoscopic evaluation using the</td>
</tr>
<tr>
<td>Author/Name of test</td>
<td>Components of test</td>
<td>Details of validation study</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The Gugging Swallowing Screen (GUSS)</td>
<td>Direct swallow (semisolid, liquid, solid swallow trials)</td>
<td>Scoring: Total scores ranged from 0 (worst) - 20 (no dysphagia). A cut-off score of 14 was selected</td>
</tr>
<tr>
<td>Martino et al. 2009</td>
<td>Items included: presence of dysphonia before/after water swallowing test, impaired pharyngeal sensation and abnormal tongue movement. Scoring: pass=4/4 items; fail≥1/4 items</td>
<td>Sample: 311 stroke patients (103 acute, 208 rehabilitation)</td>
</tr>
<tr>
<td>The Toronto Bedside Swallowing Screening Test (TOR-B SST)</td>
<td>Items included: Glasgow Coma Scale score &lt;13, presence of facial, tongue or palatal asymmetry/weakness. If no to all 3 items, then proceed to 3 oz water swallowing test. Scoring: If there is evidence of change in voice quality, cough or change in vocal quality 1 minute after water swallowing test = fail. Sample: 300 acute stroke patients screened by nurses within 8 to 32 hours following admission.</td>
<td>Diagnostic standard: Mann Assessment of Swallowing Ability (MASA), performed by a SPL. Prevalence of dysphagia: 29% Sensitivity (Dysphagia): 91% Specificity: 74% Sensitivity (aspiration risk): 95% Specificity: 68% Interrater reliability: Kappa=94%</td>
</tr>
<tr>
<td>Edmiaston et al. 2009 USA</td>
<td>The two-tiered bedside tool was developed by SLPs. Tier 1 items included: voice quality, swallowing complaints, facial asymmetry, and aphasia. Tier 2 items included a water swallow test, with evaluation for swallowing difficulty, voice quality compromise, and pulse oximetry desaturation (≥2%). Patients failing tier 1 did not move forward to tier 2. Scoring: Patients who passed both tiers were considered to be low-risk. Sample: a convenience sample of 84 stroke patients (ischemic/hemorrhagic) screened by 45 ER MDs.</td>
<td>Diagnostic standard: formal assessment conducted by an SLP. Prevalence of dysphagia: 57% Sensitivity: 96% Specificity: 56% Interrater reliability: Kappa=0.90</td>
</tr>
</tbody>
</table>
## Author/Name of test

<table>
<thead>
<tr>
<th>Components of test</th>
<th>Details of validation study</th>
<th>Results of original validation study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antonios et al. 2010 8</td>
<td>Modified Mann Assessment of Swallowing Ability (MMASA)</td>
<td>12 of the 24 MASA items were retained including: alertness, co-operation, respiration, expressive dysphasia, auditory comprehension, dysarthria, saliva, tongue movement, tongue strength, gag, volitional cough and palate movement. Scoring: Maximum score is 100 (no dysphagia). A cut-off score of 94 was used to identify patients at risk of dysphagia. Sample: 150 consecutive patients with acute ischemic stroke were assessed by 2 neurologists shortly after admission to hospital.</td>
</tr>
<tr>
<td>Schrock et al. 2011 9</td>
<td>MetroHealth Dysphagia Screen</td>
<td>5 Items included: Alert and able to sit upright for 10 minutes, weak, wet or abnormal voice, drooling, slurred speech and weak, or inaudible cough. Scoring: ≥1 items answered yes=failed screen Sample: 283 patients admitted to the Emergency department with acute stroke and screened for the presence of dysphagia by nurses</td>
</tr>
</tbody>
</table>

---

### Reference List

Best Practice Recommendation 4.3
Palliative and End-of-Life Care

**Definitions**

**Palliative care** is an approach that focuses on comfort and quality of life for those affected by life-limiting illness, such as large hemispheric strokes, and severe hemorrhagic stroke. It aims to prevent and relieve physical, social, psychological, or spiritual suffering of stroke patients, their families and informal caregivers. Palliative care can complement life-prolonging or disease-modifying therapies post-stroke and need not be reserved for those whose death is imminent.

**End-of-life care** or terminal care is part of the palliative approach and is the management and treatment of dying patients, as well as their families and informal caregivers. The end-of-life period often involves a period of change (e.g. worsening diagnosis) rather than an acute event.

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

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

i. Communication with patients, families, and informal caregivers should provide, on an ongoing basis, information and counseling regarding diagnosis, prognosis, and management, including:
   a. the appropriateness of life-sustaining measures including mechanical ventilation, enteral/intravenous feeding, and intravenous fluids [Evidence Level B];
   b. reassessment of all medications, and recommendations for cessation of medications no longer necessary when the goals of care shift to comfort measures only (e.g., antiplatelets, anticoagulants, statins, hypoglycemics) [Evidence Level C];
   c. oral care [Evidence Level C];
   d. assessment and management of pain [Evidence Level B];
   e. assessment and management of delirium [Evidence Level C];
   f. assessment and management of respiratory distress and secretions [Evidence Level B];
   g. assessment and management of incontinence, nausea, vomiting, constipation, and skin and wound care [Evidence Level C].

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

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

iv. Formalized palliative care processes and a team experienced in providing end-of-life care for stroke patients (especially nursing staff) should be considered to introduce and monitor standards of care provided to patients at the end of life [Evidence Level B].
Rationale
Implementing stroke best practices can contribute to reductions in morbidity and mortality; however, stroke remains the third leading cause of death in Canada. Mortality rates in patients with hemorrhagic stroke are significantly higher than ischemic stroke in the hyperacute and acute phases of care, and both groups require expertise and clear information. There is evidence describing the unmet needs in stroke patients who are at the end of life. Recognizing and addressing the needs of the person with a life-limiting stroke or who is close to death after a stroke can enhance the quality of the time left and the satisfaction of the patient, family, caregivers, and the healthcare team.

System Implications
- Established referral process to specialist palliative care services, either within the same organization or through telehealth technology in rural and remote locations.
- Established referral process to spiritual care services.
- Communication training for physicians, nurses, and allied health professionals that addresses supporting patients with poor prognoses and their families.
- Protocols for advanced care planning to elicit patient and family goals for care preferences, and ensure these are documented and communicated to decision makers and healthcare team members.
- Palliative care protocols that are integrated into ongoing care delivery.

Performance Measures
1. Percentage of stroke patients who have been approached to participate in advance care planning and/or who have a documented conversation with a healthcare provider about resuscitation, hydration, and/or feeding preferences.
2. Percentage of stroke patients who identify a substitute decision-maker.
3. Percentage of stroke patients who complete a personal or advance care directive documented on their chart.
4. Percentage of deceased stroke patients who accessed specialist palliative care services.
5. Percentage of stroke patients who die in the location specified in their personal or advance care directive.
6. Percentage of dying patients who were placed on an end-of-life care protocol.
7. Family and caregiver ratings on the palliative care experience following the death in hospital of a patient with stroke.

Measurement Notes
- Documentation for the advance care and end-of-life measures may appear in consult notes, nursing notes, or physician notes. Just the presence of an order for palliative consultation should not be accepted as adequate documentation.
- Data quality may be an issue with some of these performance measures. Improved documentation should be promoted among healthcare professionals.
- Patient and family experience surveys should be in place to monitor care quality with end-of-life situations.

Implementation Resources and Knowledge Transfer Tools
- Canadian Stroke Best Practices Implementation guide: Taking Action Towards Optimal Stroke Care
- National Stroke Foundation (Australia) Palliative Care protocol
Palliative Care is defined by the World Health Organization (WHO) as “the active total care of patients whose disease is not responsive to curative treatment” (i.e. chronic disease) (World Health Organization, 2010). Palliative care is comprehensive care that aims to control pain, provide comfort, improve quality of life, and effectively manage patients and their families’ psychosocial needs during advanced or chronic illness. Palliative care can be provided in acute care hospitals, long-term care facilities, hospice facilities, or in home settings and does not need to be reserved for those who are imminently dying (Payne, Burton, Addington-Hall, & Jones, 2010).

Effective communication among all involved in end-of-life care (e.g. patients, family members, nurses, physicians) can help address issues that are important to patients during this period. In a study exploring end-of-life care needs in patients with acute stroke, Payne et al. reported that patients frequently have issues related to communication and information provision and wish to be more involved in their own medical decisions and management (Payne et al., 2010). Components of decision making regarding end-of-life care include information exchange, discussions about treatment options, and making—or not making—decisions (Payne et al., 2010). Specific issues that are important to discuss with patients during the end-of-life period include the patient’s prognosis, symptom management, and participation in decision-making as well as issues related to spirituality and psychosocial functioning and well-being (Cowey, 2012).

Palliative care pathways are tools that can be used to initiate, audit and implement cycles of change in the delivery of care for dying patients. In a recent Cochrane Review, Chan and colleagues failed to identify any randomized, quazi-randomized, or well-controlled before and after studies investigating the use of end-of-life care pathways within any population. Although 28 studies (3 of which were controlled before and after studies) examining end-of-life care pathways were identified, none met study design inclusion criteria. Given the lack of RCTs or other well-designed studies investigating the use of end-of-life care pathways, the authors concluded that recommendations regarding the use of such pathways cannot be made. In contrast, in a review of all published literature (including letters and editorials) that examined the palliative care needs of stroke patients, Stevens et al. identified seven articles for inclusion (Stevens et al., 2007). One small intervention study (Jack et al., 2004) (n=20) was indentified describing the implementation of a palliative care pathway (the Liverpool Care Pathway) on an acute stroke unit. Following a before and after comparison, it was reported that Implementation lead to ‘marked’ improvement in the documentation of 6/7 areas of palliative care. Although larger, more rigorous trials are needed to examine the benefits of palliative care pathways, the use of such pathways is generally considered best-practice for end-of-life care (Cowey, 2012). Developing or using existing pathways that describe standards of care across physical, psychological, social, spiritual domains may allow care teams to optimize the delivery of care to dying patients.

In these recommendations a distinction is made between generalist and specialist palliative care.
Generalist palliative skills (the awareness of the palliative philosophy, sensitive communication and basic symptom management) are required by healthcare providers across all disciplines to function effectively in caring for stroke patients (World Health Organization, 2010). Specialist palliative care providers (e.g. nurses, physicians, allied health, spiritual care providers and volunteers with advanced palliative care training) and services (e.g. hospice, palliative home care and consult teams) should be available to provide support when suffering persists despite the use of generalist palliative interventions (Cowey, 2012).

Link to Evidence Table 4.3 and References available on website at www.strokebestpractices.ca
**Best Practice Recommendation 4.4**

**Advanced Care Planning**

**Definitions**

*Advance care planning* is a process of helping a patient reflect on and communicate his or her goals, values, and preferences for future healthcare, to guide decision-making should the person become incapable of giving informed consent. Central to this process are conversations between the patient, his or her family or informal caregivers, and members of the healthcare team.

For stroke patients, the goal of advance care planning is a shared understanding of the stroke, comorbidities, and prognosis; the benefits and burdens of potential treatments; types and location of care; and the individual’s goals and values as they pertain to such care. It is an ongoing process that should be reviewed regularly and at times when the patient’s status or situation changes. These conversations may lead to a written document, often called a personal or advance directive, which names a substitute decision maker, proxy, or agent, and outlines the person’s desired medical interventions under a range of circumstances. Advance care planning can also result in rich conversations about meanings and fears around illness and dying, spirituality, and after-death religious practices. Documentation is a critical component to facilitate continuity of ongoing discussions and planning.

**4.4 Advanced Care Planning**

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

i. The primary goal of advance care planning conversations is to determine the individual’s goals of care [Evidence Level B].
   a. Advance care planning may include identifying a substitute decision-maker (proxy or agent), implementing a personal directive [Evidence Level C], and discussion of the patient’s preferences and the medical appropriateness of therapies such as feeding tubes, hydration, treatment of the current illness, admission to intensive care, ventilation, cardio-pulmonary resuscitation, and place of care [Evidence Level B].
   b. Advanced care planning discussions should be documented in the patient’s chart and any relevant hospital-specific forms should be completed and signed by the patient or decision-maker and a member of the healthcare team [Evidence Level C].

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

iii. The interprofessional team should have the appropriate communication skills and knowledge to address the physical, spiritual, psychological, ethical, and social needs of stroke patients, their families, and informal caregivers [Evidence Level C].
   a. Respectful discussion of patient’s values and wishes should be balanced with information regarding medically appropriate treatment related to ongoing stroke management and future medical care [Evidence Level C].

**Rationale**

Stroke remains the third leading cause of death in Canada and a leading cause of disability. In addition, the risk of a recurrent stroke is high, with up to 20% in the first 3 months following an...
initial stroke. Patients with higher risks of stroke, recurrent stroke, and those who present with multiple comorbidities (vascular and other conditions) may end up with significantly reduced quality of life that require changes to living situation and level of care required. Proactive initiation of sometimes difficult discussions regarding advance care planning can empower patients to express their needs, preferences and future medical wishes. This can lead to enhanced quality of life and satisfaction of the patient, family, caregivers, and the healthcare team. It also reduces challenges faced by family members and caregivers when critical situations arise where end-of-life care decisions are required.

### System Implications

- Communication training for physicians, nurses, and allied health professionals that addresses supporting patients and their families through the process of advance care planning, understanding current and future prognoses, and documenting decisions regarding future medical care.
- Established referral process to social workers and palliative care services, either within the same organization or through telehealth technology in rural and remote locations.
- Advance care planning conversations to elicit patient and family goals of care preferences, with mechanism for documentation and sharing of that information with designated family members and alternate decision-makers.

### Performance Measures

1. **Percentage of stroke patients who have been approached to participate in advance care planning and/or who have a documented conversation with a healthcare provider about resuscitation, hydration, or feeding preferences.**
2. Percentage of stroke patients who identify a substitute decision-maker.
3. Percentage of stroke patients who complete a personal or advance care directive, which is then documented on their hospital chart.
4. Number and percentage of patients' family members who report finding advance care planning discussions beneficial (survey).
5. Percentage of patients whose preferences identified in their advance directives are followed as they receive medically appropriate end-of-life care.

### Measurement Notes

- Documentation for the advance care measures may appear in consult notes, nursing notes, or physician notes. Just the presence of an order for social work or palliative consultation should not be accepted as adequate documentation.
- Data quality may be an issue with some of these performance measures due to the qualitative nature of some documentation. Improved documentation should be promoted among healthcare professionals, and standardized document templates implemented.

### Implementation Resources and Knowledge Transfer Tools

- **Health Canada Implementation Guide to Advance Care Planning in Canada:**
- **Province of Ontario Guide to Advanced Care Planning**
- **Province of British Columbia Advanced Care Planning:**
  [http://www2.gov.bc.ca/assets/gov/topic/2038E757D68E49D5DC8C3CD0061E8E1B/pdf/advancedcareplanningquicktips.pdf](http://www2.gov.bc.ca/assets/gov/topic/2038E757D68E49D5DC8C3CD0061E8E1B/pdf/advancedcareplanningquicktips.pdf)
Summary of the Evidence

Despite an increasing awareness of the importance of advance care planning, little research has been published exploring this area within the stroke population. Advance care planning involves discussion about the patients' prognosis, treatment options, and goals of care as well as identification of end-of-life wishes and, if appropriate, nomination of a substitute decision maker (Detering et al., 2010). Advance care planning may provide peace of mind to patients and reduce the stress of families faced with representing their loved ones' wishes during a subsequent critical illness (Detering et al., 2010). Documentation of advance care planning is important to ensure that patients do not receive care that is contrary to their wishes (Kirchhoff et al., 2012). Unfortunately, there is some evidence that the concordance between stated and documented end-of-life preferences may be as low as 30.2% within advanced pulmonary, cardiac, liver disease, and metastatic cancer populations (Heyland et al., 2013).

Within non-stroke populations, interventions aimed at increasing advance care planning and the documentation of end-of-life wishes have been successful in significantly increasing the likelihood that end-of-life wishes are known and respected (Detering et al., 2010; Grimaldo et al., 2001; Kirchhoff et al., 2012). For example, in a study of 309 patients' admitted to internal medicine, cardiology, or respiratory medicine, Detering et al. randomized to receive formal advance care planning from a trained facilitator or care as usual (Detering et al., 2010). Of the patients who died during the study period, end-of-life wishes were significantly more likely to be known and respected for those in the intervention group as compared to those in the control group (86% vs. 30%, p<0.01). Detering et al. also reported that, following the death of a loved one, family members of those in the intervention group reported significantly less anxiety and depression and more satisfaction with the quality of their relatives death, as compared to control group family members (all at p<0.05) (Detering et al., 2010).

Secondary stroke prevention clinics and community settings are ideal for pursuing the concept of advance care planning and following up on advance care conversations initiated in acute care. It is important to recognize that an individual's healthcare preferences may change with time or circumstances. Advance care plans should be reviewed periodically or when there is a change in health status or care location.

Link to Evidence Table 4.4 and References available on website at www.strokebestpractices.ca