



# **Providing Optimal Stroke/Acute Cerebrovascular Syndrome Care in British Columbia: A Clinical Leadership Consensus Statement**

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*This report was prepared by Global Medical Services.*

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## INTRODUCTION

The management of the Stroke and Acute Cerebrovascular Syndrome<sup>1</sup> (ACVS) has been determined to be *the* key component to drive the comprehensive B.C. Stroke Strategy forward. The Ministry of Health has given a clinical leadership team<sup>2</sup> consisting of leading B.C. neurologists and emergency physicians a mandate to develop this central component of the overall strategy. The guiding principle of this mandate is to determine, in practical and sustainable terms, how every British Columbian can have access to optimal Stroke/ACVS care, at the right time, and at the right place. This document represents the consensus of this clinical leadership team and now requires approval from senior leadership within the Ministry of Health and each of the Health Authorities in order to move forward. If approved, this document would provide the guidance for the clinical leadership team to build out a detailed “how to” work plan with the goal of immediately improving the management of Stroke/ACVS care in a provincially structured and organized way. This work plan would also be designed to strongly support the work currently underway within the broader B.C. Stroke Strategy.

There are four components necessary to achieve optimal Stroke/ACVS care across the province:

1. Commitment, at the most senior levels, both from within the Ministry of Health and within each Health Authority to develop and implement an organized, systematic approach for the delivery of optimal Stroke/ACVS care at the local, regional, and provincial levels.
2. Designation of each facility in the province to have a specific role in the delivery of Stroke/ACVS care based on their currently available resources and, where necessary, identifying the inter-hospital networks that must be strengthened to promote the progressive enhancement and expansion of stroke care capacity across the province.
3. Mitigation of every barrier identified within each of the five essential requirements for optimal Stroke/ACVS care to allow immediate and significant capacity building toward a fully tPA-enabled province.
4. Creation of an effective monitoring system for the delivery of acute Stroke/ACVS care through focused site audits and a provincial Stroke Registry to provide robust safety and outcome data.

These components are discussed in greater detail through the rest of this document.

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<sup>1</sup> *Acute Cerebrovascular Syndrome* (ACVS) describes a spectrum of clinical presentations that share a similar underlying pathophysiology: cerebral ischemia or hemorrhage.

<sup>2</sup> See Appendix A for the clinical leadership list

## **1. Develop a Provincial Model for the Delivery of Acute Stroke/ACVS in B.C.**

Stroke is the leading cause of major disability, the second leading cause of dementia, the third leading cause of death, and the most costly reason for hospital admission in Canada.

Stroke care has become increasingly sophisticated. The 2008 Canadian Best Practice Recommendations for Stroke Care (CBPR)<sup>3</sup> state that all patients with acute stroke should undergo immediate brain imaging (CT scan). Eligible patients should be treated with tPA according to accepted guidelines (AHA 2006, ACCP 2008, CBPR 2008). The 2008 CBPR recommendation also extends the therapeutic window for tPA from 3 hours to 4.5 hours. This will increase the use of tPA thrombolysis in appropriate patients and put additional pressure on acute stroke services. Furthermore, the 2008 CBPR states that patients admitted to hospital with acute stroke should be treated in an interdisciplinary stroke unit. In B.C. this will require a restructuring of inpatient stroke care, as currently only a small fraction of stroke patients receive the benefits of stroke unit care.

In order to develop an optimal and sustainable Provincial Stroke Strategy that makes B.C. a tPA-enabled province for acute stroke, it will be necessary to significantly expand the capacity and re-engineer the delivery model for stroke care. New paramedic guidelines and assessment tools are necessary to optimize pre-hospital care, minimize in-field delays, and reduce the need for secondary inter-hospital transfers. Emergency departments must ensure that all stroke patients are rapidly triaged and emergency physicians must immediately assess any stroke patient who is potentially eligible for tPA. At tPA-enabled hospitals potentially eligible stroke patients must receive immediate CT imaging as a key inclusion criterion for tPA administration.

The roles and responsibilities for organized care of acute stroke patients must be established in every hospital and within each health authority. More B.C. hospitals must become tPA-enabled either as independent sites or as partially or fully Telestroke<sup>4</sup> supported sites. In hospitals with available stroke neurology or acute neurology on-call services, these physicians should take the primary responsibility for tPA management. The key initiative that will enable tPA delivery at other hospitals throughout B.C. is the development of a robust and sustainable Telestroke service for the province. Some hospitals without neurology services, but with an organized approach to acute stroke care and tPA delivery (includes emergency physicians, internal medicine, radiology, and critical care nursing support), will take on a greater role in initiating tPA therapy. This requires training and education as well as the support of organized emergency medicine.

An organized acute stroke care system, including rapid patient assessment for tPA, initiation and supervision of tPA administration, and ongoing care during the critical first 24-48 hours, must be determined for each hospital. This will involve the development of regional networks to provide all the necessary resources in order to support those sites who are able to administer tPA but are unable to provide the ongoing critical care, acute inpatient management (such as a stroke unit) or access to early rehab care.

Some hospitals will not have adequate stroke patient volumes to develop and maintain stroke and tPA expertise or may not have the required facilities, such as rapid access to CT scans and skilled CT interpretation. Pre-specified transfer policies such as the “Life or Limb” policy, the use of BCBedline, and the availability of a 24/7 Telestroke system will be required to support optimal Stroke/ACVS care.

<sup>3</sup> CMAJ 2008;179(12 SUPPL):S1-S25

<sup>4</sup> Telestroke merges acute stroke therapies and telemedicine, allowing stroke specialists to assist emergency physicians in the evaluation and management of acute ischemic stroke via information and communications technologies.

## **2. Hospital Designation to Enable Optimal B.C. Stroke/ACVS Care**

It is essential that a consistent, reproducible hospital designation system is adopted within the province to clearly identify the role each facility will play in the delivery of acute Stroke/ACVS care. This must be based on each hospital's currently available resources and geographic location.

Hospital designation will also facilitate the development of ambulance destination policies, particularly in large metropolitan areas with multiple hospitals offering different levels of service, and provide the framework for the inter-hospital transfer of patients for advanced stroke care. Telestroke will be a key enabler to promote more sites in the provision of optimal Stroke/ACVS care, including the administration of tPA.

Hospital designation categories and the role Telestroke will play are as follows:

### **DEFINITIONS**

Comprehensive Stroke Centre (Level I) serves as the key link for BCBedline, and referral destination from other hospitals for unique or highly skilled services. This site has the expertise of subspecialty trained stroke neurologists, neuroradiologists, neurointerventionalists, sophisticated vascular and neurosurgery, stroke training, and education. These sites contribute to the provincial Telestroke Consulting Pool.

Regional Stroke Centre (Level II) serves as a regional referral facility by accepting referral responsibilities from within their respective regions and participates in regional stroke care. All are CT and tPA-enabled 24/7 while working toward the goal of having neurologists on-call 24/7. Sites may contribute to the provincial Telestroke Consulting Pool.

Primary Stroke Centre (Level III) provides CT, tPA, and organized emergency care and may be a referral center for local community hospitals but not for the region. Sites may be Telestroke supported and includes sites which are CT equipped but not tPA-enabled.

Non-tPA Enabled Site (Level IV) are sites that do not provide CT or tPA care, but utilize rapid Triage and Hospital-to-Hospital transfer protocols, if geographically possible and are knowledgeable about criteria for immediate transfer of tPA eligible stroke patients to a Primary, Regional or Comprehensive Stroke Centre.

Role of Telestroke: To achieve success with this model, extensive work is required at each site to move toward increased self sufficiency. Current guidelines state that tPA therapy for acute stroke should be supervised by physicians with expertise in the assessment and management of acute stroke and the use of thrombolysis in acute stroke. Telestroke will play an important role in two ways:

1. Provide remote access to stroke expertise for the emergent assessment of acute stroke patients and guidance of tPA therapy at CT equipped hospitals that lack the stroke volume or clinical expertise.
2. Provide a mentorship service for hospitals with appropriate stroke volume and potential capability to serve as an independent tPA-enabled hospital as they acquire expertise in the assessment and management of acute Stroke/ACVS.

Requirements	FACILITY DESIGNATIONS			
	Comprehensive Stroke Centre	Regional Stroke Centre	Primary Stroke Centre	Non-tPA Enabled Site
Bypass protocol and/or rapid triage and transfer	N	N	In some select cases	Y
CT scan availability	Y	Y	Y	N
tPA and organized emergency care	Y	Y	May bypass in some cases	N
Require Telestroke support	N	N	In some sites	Y*
Local Neurology / Internal Medicine support	Y	Y	Y	N
Stroke Unit onsite	Y	Y	N	N
Neurosurgical/ Neurointerventional support	Y	May be available	N	N
Provide Telestroke support	Y	In some sites	N	N
Designated stroke centre for catchment area	Y	Y	In some select cases	N
Participation in an Stroke/ ACVS Care Monitoring System	Y	Y	Y	Y
<b>Current Number of Facilities</b>	<b>2</b>	<b>6</b>	<b>26</b>	<b>63+/-</b>

\*Non tPA-enabled sites may require telephone consultation to determine eligibility for tPA and transfer.

### 3. Five Essential Requirements for Optimal Stroke/ACVS Care

Driving an optimal hyperacute Stroke/ACVS care strategy in the province involves both maximizing the percentage of eligible patients receiving tPA and ensuring early intervention for patients identified with High Risk TIAs. Success will only be achieved if there is focused effort on the five key areas and requirements listed below:

KEY AREAS	REQUIREMENTS
<b>PRE-HOSPITAL</b>	<ul style="list-style-type: none"> <li>An organized pre-hospital system of Stroke/ACVS care in place which includes a public recognition of stroke symptoms, paramedic screening and transport protocols, and transfer/repatriation agreements to ensure the right patient arrives at the right facility in the least amount of time.</li> </ul>
<b>TRIAGE PROTOCOLS</b>	<ul style="list-style-type: none"> <li>Triage protocols for Stroke/ACVS patients within each facility to expedite hyperacute stroke care.</li> </ul>
<b>EMERGENCY DEPARTMENT</b>	<ul style="list-style-type: none"> <li>An organized Emergency Department (ED) system of Stroke/ACVS care in place which includes, emergency staff, Diagnostic Imaging (DI) and a referral management process to support optimal Stroke/ACVS care in each facility in the province.</li> <li>Best practice protocols in place for both the management of Acute Stroke (including tPA) and High Risk TIAs with links to an organized acute in-patient care pathway or organized outpatient clinic referral, as necessary.</li> </ul>
<b>DIAGNOSTIC IMAGING</b>	<ul style="list-style-type: none"> <li>An organized DI approach with both ED and DI staff to ensure tPA-eligible patients receive an immediate non-contrast CT scan and High Risk TIAs receive the appropriate rapid diagnostic workup.</li> </ul>
<b>ACCESS TO STROKE CARE SPECIALISTS</b>	<ul style="list-style-type: none"> <li>For Acute Stroke/ACVS patients throughout B.C., support by local Specialists in Stroke Care or support by Telestroke, whenever needed.</li> <li>For all high Risk TIA patients throughout BC, rapid access to Specialists in Stroke Care (Neurologists/Stroke Specialists/Internal Medicine) in order to access expedited investigation and care needed to prevent a stroke.</li> </ul>

### 4. Monitoring and Measurement of Interventions and Outcomes

To evaluate the success of this strategy, it will be necessary to create an effective monitoring system for the delivery of acute Stroke/ACVS care through focused site audits and a provincial Stroke Registry to provide robust safety and outcome data.

## NEXT STEPS

The next step is to seek approval and endorsement of this document by the senior leadership within the B.C. Stroke Strategy Steering Committee, the Ministry of Health and each of the Health Authorities. This process is essential to empowering the Stroke/ACVS Clinical Leadership Group to work effectively with the various branches of the Ministry of Health, the BCMA, the Health Authorities, Physicians, Nurses, and Allied Health professionals with the single focus of optimizing acute Stroke/ACVS care for every citizen of B.C.

## APPENDIX A: CLINICAL LEADERSHIP GROUP

<b>Dr. Todd Collier</b>	Stroke Neurologist, Interior Health Authority
<b>Dr. Valorie Cunningham</b>	Community Hospital Emergency Department Physician, Cowichan District Hospital
<b>Dr. William Cunningham</b>	Emergency Physician, B.C. Section of Emergency Medicine, PHSA Emergency Department Protocol Working Group Chair
<b>Dr. Howard Feldman</b>	Professor and Head, Division of Neurology, University of British Columbia and Vancouver Coastal Health
<b>Dr. Devin Harris</b>	Emergency Physician, Vancouver Coastal Health Authority
<b>Dr. Kennely Ho</b>	Stroke Neurologist, Fraser Health Authority
<b>Dr. Allan Holmes</b>	Emergency Physician, President, Global Medical Services
<b>Dr. Gordon Mackie</b>	Stroke Neurologist, Vancouver Coastal Health Authority
<b>Dr. Andrew Penn</b>	Stroke Neurologist, Vancouver Island Health Authority
<b>Dr. Philip Teal</b>	Stroke Neurologist, Vancouver Coastal Health Authority
<b>Dr. Karen Wanger</b>	Region 2 Medical Director, BC Ambulance Service
<b>Mark Collison</b>	Director, Advocacy & Stakeholder Relations, Heart and Stroke Foundation of BC & Yukon
<b>Diane Layton</b>	Manager, BC Stroke Strategy
<b>John Rowlandson</b>	Provincial Telestroke lead
<b>Rita Sweeney</b>	Registered Nurse, Clinical Lead for AMI/TIA/Stroke Protocols, Northern Health
<b>Valerie Tregillus</b>	Executive Director, Primary Health Care, Medical Services Division, BC Ministry of Health Services

## APPENDIX B: FACILITY DESIGNATIONS

The following designations were drafted for the purposes of discussion only and do not represent a final designation. The final designations will be determined and finalized by the leadership of each Health Authority.

### Vancouver Coastal Health Authority

DESIGNATIONS	FACILITIES	
Comprehensive Stroke Centre (1)	<ul style="list-style-type: none"> <li>Vancouver General Hospital</li> </ul>	
Regional Stroke Centre (2)	<ul style="list-style-type: none"> <li>St. Paul's Hospital</li> <li>Lions Gate</li> </ul>	
Primary Stroke Centre (2)	<ul style="list-style-type: none"> <li>Richmond Hospital</li> </ul>	<ul style="list-style-type: none"> <li>St. Mary's Hospital</li> </ul>
Non-tPA Enabled Site (8)	<ul style="list-style-type: none"> <li>Bella Coola General Hospital</li> <li>Mount St. Joseph Hospital</li> <li>Pemberton health Centre</li> <li>Powell River General Hospital</li> </ul>	<ul style="list-style-type: none"> <li>R.W. Large Memorial Hospital</li> <li>Squamish General Hospital</li> <li>Whistler Health Care Centre</li> <li>U.B.C. Health Sciences Centre</li> </ul>

### Fraser Health Authority

DESIGNATIONS	FACILITIES	
Comprehensive Stroke Centre (0)	<ul style="list-style-type: none"> <li>NA</li> </ul>	
Regional Stroke Centre (1)	<ul style="list-style-type: none"> <li>Royal Columbian Hospital</li> </ul>	
Primary Stroke Centre (8)	<ul style="list-style-type: none"> <li>Abbotsford Regional Hospital</li> <li>Burnaby Hospital</li> <li>Chilliwack General Hospital</li> <li>Eagle Ridge Hospital</li> </ul>	<ul style="list-style-type: none"> <li>Langley Memorial Hospital</li> <li>Peace Arch Hospital</li> <li>Ridge Meadows Hospital</li> <li>Surrey Memorial Hospital</li> </ul>
Non-tPA Enabled Site (3)	<ul style="list-style-type: none"> <li>Delta Hospital</li> <li>Fraser Canyon Hospital</li> </ul>	<ul style="list-style-type: none"> <li>Mission Memorial Hospital</li> </ul>

### **Vancouver Island Health Authority**

DESIGNATIONS	FACILITIES	
<b>Comprehensive Stroke Centre (1)</b>	<ul style="list-style-type: none"> <li>• Victoria General Hospital</li> </ul>	
<b>Regional Stroke Centre (0)</b>	<ul style="list-style-type: none"> <li>• NA</li> </ul>	
<b>Primary Stroke Centre (6)</b>	<ul style="list-style-type: none"> <li>• Campbell River &amp; District General Hospital</li> <li>• Cowichan District Hospital</li> <li>• Nanaimo Regional General Hospital</li> </ul>	<ul style="list-style-type: none"> <li>• Royal Jubilee Hospital</li> <li>• St. Joseph's General Hospital</li> <li>• Saanich Peninsula Hospital</li> </ul>
<b>Non-tPA Enabled Site (9)</b>	<ul style="list-style-type: none"> <li>• Chemainus Health Care Centre</li> <li>• Cormorant Island Health Centre</li> <li>• Lady Minto/Gulf Islands Hospital</li> <li>• Ladysmith and District General Hospital</li> </ul>	<ul style="list-style-type: none"> <li>• Port Alice Hospital</li> <li>• Port Hardy Hospital</li> <li>• Port McNeill and District Hospital</li> <li>• Tofino General Hospital</li> <li>• West Coast General Hospital</li> </ul>

### **Northern Health Authority**

DESIGNATIONS	FACILITIES	
<b>Comprehensive Stroke Centre (0)</b>	<ul style="list-style-type: none"> <li>• NA</li> </ul>	
<b>Regional Stroke Centre (1)</b>	<ul style="list-style-type: none"> <li>• Prince George Regional Hospital</li> </ul>	
<b>Primary Stroke Centre (5)</b>	<ul style="list-style-type: none"> <li>• Dawson Creek and District Hospital</li> <li>• G.R Baker Memorial Hospital</li> </ul>	<ul style="list-style-type: none"> <li>• Fort St. John Hospital and Health Centre</li> <li>• Mills Memorial Hospital</li> <li>• Prince Rupert Regional Hospital</li> </ul>
<b>Non-tPA Enabled Site (21)</b>	<ul style="list-style-type: none"> <li>• Alton Lake</li> <li>• Bulkley Valley District Hospital</li> <li>• Chetwynd Hospital</li> <li>• Lakes District Hospital</li> <li>• Fort St. John Hospital</li> <li>• Fort Nelson</li> <li>• Fraser Lake</li> <li>• Hudson Hope</li> <li>• Houston Health Centre</li> <li>• Kitimat Hospital</li> <li>• Mackenzie and District Hospital</li> </ul>	<ul style="list-style-type: none"> <li>• Masset</li> <li>• McBride and District Hospital</li> <li>• Queen Charlotte Islands General Hospital</li> <li>• Stewart Health Centre</li> <li>• Stikine Health Centre</li> <li>• Stuart Lake Hospital</li> <li>• St. John Hospital</li> <li>• Tumbler Ridge</li> <li>• Wrinch Memorial Hospital</li> <li>• Valemount Health Centre</li> </ul>

## **Interior Health Authority**

DESIGNATIONS	FACILITIES	
<b>Comprehensive Stroke Centre (0)</b>	<ul style="list-style-type: none"> <li>• NA</li> </ul>	
<b>Regional Stroke Centre (2)</b>	<ul style="list-style-type: none"> <li>• Kelowna General Hospital</li> <li>• Royal Inland Hospital</li> </ul>	
<b>Primary Stroke Centre (5)</b>	<ul style="list-style-type: none"> <li>• Cariboo Memorial Hospital</li> <li>• East Kootenay Regional Hospital</li> </ul>	<ul style="list-style-type: none"> <li>• Kootenay Boundary Regional Hospital</li> <li>• Penticton Regional Hospital</li> <li>• Vernon Jubilee Hospital</li> </ul>
<b>Non-tPA Enabled Site (22)</b>	<ul style="list-style-type: none"> <li>• 100 Mile District General Hospital</li> <li>• Ashcroft and District General Hospital</li> <li>• Arrow Lakes Hospital</li> <li>• Boundary Hospital</li> <li>• Castlegar and District Community Health Centre</li> <li>• Creston Valley Hospital</li> <li>• Dr. Helmcken Memorial Hospital</li> <li>• Elk Valley Hospital</li> <li>• Golden and District General Hospital</li> <li>• Invermere and District Hospital</li> </ul>	<ul style="list-style-type: none"> <li>• Kootenay Lake Hospital</li> <li>• Lillouet District Hospital</li> <li>• Nicola Valley General Hospital</li> <li>• Princeton General Hospital</li> <li>• Shuswap Lake General</li> <li>• Slocan Valley Hospital</li> <li>• South Okanagan General Hospital</li> <li>• Sparwood Health Centre</li> <li>• St. Bartholomew's Hospital</li> <li>• Summerland Health Centre</li> <li>• Victorian Community Health Centre of Kaslo</li> <li>• Queen Victoria Hospital</li> </ul>