

BC Stroke Strategy Provincial Stroke Action Plan

Executive Summary

NOVEMBER 23, 2010



Ministry of
Health Services



Acknowledgements & Contributions

At the request of both the Ministry of Health Services and the Health Authorities, the Heart and Stroke Foundation of BC & Yukon has lead the BC Stroke Strategy Initiative (BCSS) over the last five years, working in partnership with agencies and organizations representing those involved in stroke prevention and treatment and advancing the planning and prototyping phases for a number of priority areas, some of which are incorporated in this provincial plan.

The BC Stroke Strategy would like to acknowledge all the organizations and individuals who contributed to this work. Key contributors involved in the development or review of the Stroke Action Plan include but are not limited to the following:

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Provincial Health Services (PHSA)	David Babiuk – PHSA Janis McGladrey - PHSA

Key messages / products of various working groups of the BC Stroke Strategy have been incorporated into this Provincial Plan. These groups include the following:

- The ACVS Clinical Consensus / Expert Group
- The ACVS Advisory Group
- The joint MoHS / BCSS Measurement & Evaluation Working Group
- The Rehabilitation and Reintegration Expert Advisory Group
- The TIA Rapid Assessment Advisory Group
- The Telestroke Advisory Group

In addition to individuals actively serving on BCSS Working Groups, numerous clinicians and operations managers at site levels have been involved in the identification of gaps in care and in strategizing on possible approaches/strategies to address these gaps. The input from these multiple sources is reflected in this Provincial Plan and detailed in the Regional Site Work Plans included in the Appendices. We would like to thank all those persons and organizations that contributed to this collaborative planning work.

Requests regarding access to Regional Appendices or to other documents referenced in this Provincial Stroke Action Plan should be directed to:
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Purpose and Scope

This Provincial Stroke Action Plan (the Plan) is a key component of the broader BC Stroke Strategy (BCSS) which has been led by the Heart and Stroke Foundation of BC & Yukon over the last five years at the request of both the Ministry of Health Services and the Health Authorities. The Heart and Stroke Foundation has worked in partnership with agencies and organizations involved in stroke prevention and treatment and together they have advanced the planning and prototyping phases for a number of priority areas. The Plan is a result of a cumulative and collaborative effort with a number of clinical experts and health authority personnel and identifies gaps in care and strategic directions for improving stroke care in BC. It summarizes expected financial and population health benefits of optimal stroke care and identifies the priority areas for immediate investment to achieve systematic, coordinated improvements in the operation and clinical organization of stroke care in BC at provincial, regional and site levels.

Background and Gaps in Stroke Care

Stroke is a leading cause of acquired long-term disability in adults in British Columbia. In 2008/09, there were 4,526 patients in the province who experienced an incident stroke that was severe enough to require hospitalization. Of these patients, 36% died within a year following their stroke, making stroke the third leading cause of death in the province. The majority of stroke victims who survive their attack remain affected by neurological disabilities over the long term and this fact underlies the important economic burden of stroke.

Stroke is a highly preventable and treatable disease with the interventions currently available. However, within British Columbia, stroke prevention and care is not well organized resulting in decreased quality of life for stroke survivors and significant costs to the health care system. There are a number of gaps identified for stroke care in BC including:

- There is no provincially-organized pre-hospital system for stroke assessment/care to ensure patients are transported in a timely fashion to the appropriate facilities for optimal stroke care;
- There is less than 50% of needed capacity to access TIA rapid assessment services and only 20% of patients are seen within the 48 hours needed to significantly reduce their risk of having a subsequent full blown stroke;
- Only 4% of hospitalized ischemic stroke patients receive the clot-busting tPA drug which has been shown to reduce the impact of stroke;
- Only 26% of beds (in five BC hospitals) occupied by stroke patients are clustered (co-horted) in a designated geographic area within an acute care facility for improved coordination and quality of care;
- Early acute rehabilitation resources and protocols are under-developed and inconsistently implemented across the province;
- There is a shortage of neurologists and internal medicine specialists willing to provide stroke care and work in a coordinated “on-call pool;” and
- There are limited resources to provide coordinated and consistent stroke education to nurses and allied health professionals working in acute care centers across BC.

The Plan

Areas of priority focus include:

- Confirming hospital/facility functional capacity and role designation with respect to stroke care capacity across the province;
- Ensuring timely assessment of patient needs and expedited transport to the most appropriate facility through a coordinated pre-hospital assessment and triage system;
- Providing rapid assessment for all TIAs occurring in the province through a variety of models;

- Embedding integrated stroke care (order sets, care pathways, repatriation agreements and co-horted beds) into the clinical operations of BC facilities/hospitals;
- Developing provincial telestroke, and in the future tele-rehab and tele-TIA networks, to enable and support best practices in stroke care across the province;
- Enhancing and coordinating stroke rehabilitation and reintegration capacity within BC;
- Exploring opportunities to enhance capacity in stroke care for physicians, nurses and allied health professionals through structured education and knowledge transfer using elearning, webinars, mentoring and coaching and practice support programs for family physicians; and
- Establishing an ongoing, system-wide network to oversee and support inter-health authority cooperation and coordination in implementing, monitoring, and sustaining stroke care improvements.

As a result of this planning process, there is consensus across health authorities that the priorities identified in the Provincial Stroke Action Plan are the foundation to a systems approach for improvement in stroke care and that this is where BC must focus initial efforts/resources. Details of health authority site plans are included as region-specific appendices. Direction from the MoHS and HA executive levels is now required to finalize staging of work, confirm a manageable number of priority areas from which to incrementally build system-wide capacity and to prepare detailed implementation and budget documents.

Resource Investment Implications

The Provincial Stroke Action Plan sets out a three year time frame but recognizes that realistically the scope and nature of some of the improvements being proposed will require a substantially longer implementation and evaluation cycle. Consequently the Plan includes a seven year implementation horizon. It also recognizes that decisions will be required to invest in both one-time change management and ongoing operational changes that will be incurred with a system-wide commitment to provide optimal, evidence-based stroke care to British Columbians. Without an immediate resource investment the benefits of the demonstrated cost avoidance will not be realized and costs of providing sub-optimal care will continue to grow at an increasingly rapid rate.

It is anticipated that **change management investment** will be required at a minimum over the next three fiscal years to close the most significant gaps in the stroke care system. The anticipated provincial change management investments include:

- Secretariat support for the central oversight and operations management structure to centrally coordinate/ facilitate implementation of the BCSS Provincial Stroke Action Plan and to ensure key stakeholders remain engaged;
- Facilitating the training of BCAS staff with respect to hot stroke and bypass protocols;
- Centrally coordinated activities to drive physician engagement and knowledge transfer;
- Coordination of the development and implementation of a provincial telestroke service; and
- Ongoing measurement and evaluation related to closing the care gaps through sustaining the provincial stroke registry tracking/ reporting system.

Regional resource investments are also essential for establishing change management stroke teams at the clinical interface. While the needs of individual Health Authorities will vary in terms of the skill sets/competencies required, for purposes of costing, the proposed functional composition of a change management regional stroke team should include:

- Project management and coordination to share best practices and processes amongst sites;
- Physician engagement, education and mentoring to increase the capacity of physicians skilled in stroke care;
- Clinical order sets and pathways to standardize and embed best practices;

- Clinical education and knowledge transfer to update and sustain best practice;
- Acute rehabilitation leadership and community reintegration to improve current state; and
- Administration/logistics support to drive the projects forward.

The total anticipated investment to support change management over the three year period (provincial coordination and regional teams) is estimated at approximately \$13.4 million.

Regional resource investments anticipated for **implementing operational changes** at the front line include:

- Developing and sustaining the necessary capacity to ensure as many as possible high risk TIA patients receive care in a TIA Rapid Assessment Service within the requisite time window;
- Developing and sustaining a provincial Telestroke model which will support sites without access to stroke specialists and potentially support other functions such as TIA assessment and tele-rehabilitation;
- Support the co-horting of inpatient stroke beds to ensure as many patients as possible receive care in a coordinated fashion; and
- Building a sustainable early home-supported discharge program.

Operational resources to move to optimal care in these areas will be incremental - some resources will be incurred in the first three years of implementing the Provincial Stroke Action Plan, while others will play out in subsequent years as foundational policy and practice changes are introduced or ramped up during the initial three years. Further, each health region is differentiated by the resources available in the health care setting and the clinical complexity of stroke patients it is able to manage. As a result, even though the Provincial Stroke Action Plan builds on a collaborative network model, each health region will have its own unique stroke care assets and its own set of challenges in providing the necessary components of optimal stroke care. Assuming an incremental ramping up of operational/program activity, operational investments over the three year period are estimated at \$20 million.

In summary, over the three year period, change management and operational investments are estimated to total up to \$34 million. Ongoing operating investments will however benefit from system redesign and cost avoidance resulting from improvements in functional areas of stroke care.

Benefits and Potential Cost Avoidance of Optimal Stroke Care

Published evidence indicates that health and economic benefits of an adequately-resourced and system-wide approach to stroke care in British Columbia can result in:

- 80% reduction in the risk of a major stroke developing in those who present with a TIA or minor stroke;
- 9% reduction in admissions to residential care for those treated with the clot-busting drug tPA;
- A 20% reduction in acute care hospital days following stroke and a 5% reduction in admissions to residential care (stroke unit impact);
- A further 27% reduction in acute care hospital days following stroke and a 16% reduction in admissions to residential care for patients eligible for early home-supported discharge;
- In sum, approximately 37,000 fewer acute care days, 56,000 fewer residential care days with an estimated current annual direct care cost avoidance of approximately \$42 million. This \$42 million will increase to \$52 million by 2017/18 due to a 3% per year inflation adjustment; and
- Reductions in vascular dementia, cardiovascular disease, diabetes, and renal failure as spin-off benefits.

In summary, the estimated annual direct costs avoided associated with acute and residential care services, if optimal stroke care is implemented throughout the province, are substantial. Indirect costs avoided, however, are likely to be even more substantial. Not only would there be 250 fewer early deaths in the province each year, but optimal care is

associated with about 3,300 life years saved. This represents both the early deaths avoided in stroke patients as well as the shorter life expectancy generally if an individual has a stroke. In addition, stroke is associated with significant disability and a reduced quality of life, primarily for the individual with the stroke but also for their caregiver(s).

Our BCSS analysis suggests that the intersection or breakeven point between resource investments and direct care costs avoided occurs in fiscal year 2014/15. Further, post 7 years, should see a steady state for both investment and costs avoided. The reduction in some investments (e.g. change management, telestroke implementation) will have largely already occurred by year 7. Other costs are linked to treatment volume so any increase in volume should lead to both increased costs and corresponding cost avoidance.

It should also be noted that in spite of the best efforts of BC stakeholders over the last three years, stroke care in BC lags behind Ontario and Alberta in many of the key areas. Ontario has recognized the full impact that stroke has on its health care system and implemented a comprehensive stroke strategy in June 2000 with a four-year investment of \$70 million followed by an annual investment of \$30 million. This has yielded significant improvements in stroke care and patient outcomes in Ontario. Similarly, the government of Alberta provided funding of \$44 million over a four-year period to enhance stroke care in that province. Priorities of the Ontario and Alberta stroke strategies are consistent with those proposed by BC and details of their strategies can be found on their websites. Several documents of particular note are the "Ontario Stroke Evaluation Report, April 2010" jointly sponsored by the Institute for Clinical Evaluation Sciences, the Canadian Stroke Network and the Ontario Stroke System. Alberta's "Provincial Stroke Strategy Pillar Recommendations" provides another informative resource on the significant gains made through these investments.

Measurement and Performance Monitoring

The joint BCSS/MoHS Measurement and Evaluation Working Group (MEWG) has identified five stroke-related performance indicators to be monitored on a regular basis. These measures are routinely tracked by the central Acute Cerebrovascular Syndrome (ACVS) Registry housed at the Ministry of Health. Performance targets have been identified for years 2009–2014. They are as follows:

- Increase the volume of TIA/non-hospitalized strokes processed in TIA Rapid Assessment Services by 50%;
- Increase the number of ischemic stroke patients appropriately receiving tPA to 10%;
- Reduce the age-standardized incidence rate of both ischemic and hemorrhagic stroke by 10%;
- Reduce the proportion of patients who die in hospital or are discharged to long-term care after being admitted/discharged for ischemic stroke; and
- Reduce acute care days by 10% for admissions in which an ischemic stroke is the principal diagnosis.

Refer to the Appendix for a more complete listing of performance measures available through the Provincial ACVS Registry and to Appendix A3 in the Plan for a listing of performance measures (mostly available through periodic chart audits and accreditation processes) linked to evidence-based best practices in clinical stroke care.

Requirements for an Oversight and Operations Management Structure

There is recognition by health system leadership that as the BC Stroke Strategy moves from planning and prototyping into implementation and operational stages of work, it is time to pass the provincial oversight role from the Heart and Stroke Foundation of BC and Yukon to a longer-term oversight and operations management structure within the health system. This is essential to drive any significant provincial and regional improvements in stroke care and to support change management activities.

Potential oversight and coordination roles and responsibilities for this provincial coordinating body include:

- Housing of Secretariat function to support the BC Stroke Strategy;
- Coordination of highly specialized health care services such as ACVS (acute cerebrovascular) stroke care and linkage with partners involved in the delivery of stroke services across the continuum of stroke care;
- Coordination of BC Ambulance Services in partnership with health authorities in order to facilitate expedited transport to appropriate centers for stroke care;
- Support and functional leadership for the Provincial Telestroke System in conjunction with system partners;
- Working with health authorities to prepare detailed budgets and implementation strategies for a manageable number of priority areas to incrementally build (year over year) towards optimal stroke care;
- Distribution of provincial stroke funds according to clearly defined deliverables outlined in agreements with health authorities;
- Fiduciary/Stewardship responsibility for provincial investments in BC Stroke Strategy initiatives;
- Monitoring and evaluating health authority performance against targets and service expectations;
- Working with health authorities to improve the data collection and reporting infrastructure/systems for monitoring of stroke incidence and prevalence and key indicators tracked as part of measurement of stroke system performance;
- Supporting a sustainable system of stroke surveillance for British Columbia, enhancing the data collection and reporting capabilities of the central stroke registry; and
- Ensuring alignment of the BC Stroke Strategy activities with other initiatives/system-wide commitments including provincial cardiac and renal services, the Canadian Stroke Network /Strategy, the MoHS Guidelines and Protocols Advisory Committee (GPAC), Tele-health BC, E-Health, and the BC MoHS Clinical Care Management & Key Result Area (KRA) Processes etc.

Consultation with key stakeholders suggests that PHSA could provide the leadership and coordination of the BC Stroke Strategy and align the oversight role of stroke with other like programs such as cardiac and renal. However, discussions regarding PHSA's potential role are still ongoing and hence for the purpose of this document, the oversight body is referred to as the "Provincial Coordinating Body."

Moving Forward

Successful implementation of the Provincial Stroke Action Plan and its component parts requires the full support of the MoHS and HA Leadership to move toward optimal stroke care in the province. Specifically, the following support is required:

- A long-term commitment to the vision for improved stroke care across the care continuum as a foundation for the longer term strategy elements to achieve optimal clinical and financial gains.
- A decision regarding the proposed model for oversight and operations management of the BC Stroke Strategy (and this Plan) in the operating context of the health authority system. The new leadership/oversight organization taking over for the Heart and Stroke Foundation must take effect by the end of fiscal year 2010/11. Representatives from Heart and Stroke will continue to stay involved in their advocacy, patient support and health promotion role and can continue to provide historical continuity with the new structures by serving on the BCSS Steering Committee.
- A commitment to a system-wide approach to change management and improvement in stroke care through a collaborative/network model. This approach will minimize the duplication of effort, promote standardization, and facilitate the sharing of models that work and other lessons learned.
- Clearly establish the anticipated working relationship between the provincial structures providing operations oversight for Stroke Care and the Clinical Care Management/KRA processes (who also have an interest in improving

stroke care at the front line). Clarification is required on respective roles, responsibilities, processes, deliverables and anticipated reporting of system performance.

- Utilize the Stroke Strategy Steering Committee structure to finalize priority areas for policy and system change in year 1 and prepare necessary documentation, detailed budgets, and implementation strategies.
- Explore criteria for accessing new funds available through “pay for performance” and “patient-focused funding.”
- Secure an approach to funding the change management and operations investment at both the provincial and regional levels and commence aligning provincial and health authority budgets with an agreed upon, manageable number of priority areas of focus.
- Adopt consistent, measureable performance targets for stroke care in letters of agreement/expectations of each Health Authority.

In conclusion, the \$7 million investment made by the Ministry of Health Services thus far in the BC Stroke Strategy, is indeed notable and has yielded some significant proof of concept models, a number of valuable stroke-related initiatives and products, and has developed strong and productive relationships across the health care system. The implementation of the Provincial Stroke Action Plan with adequate resourcing and the guidance and support of a provincial oversight and operations management structure, will lay the foundation from which health regions and partners can share information about their stroke services and develop common, coordinated, and cost-effective strategies to facilitate timely patient access to evidence-based stroke care in all communities across British Columbia.

APPENDIX

Provincial Stroke Metrics & Summary Tables

Acute Cerebrovascular Syndrome | ADULTS* RESIDING IN BRITISH COLUMBIA

Data provided as of August 26, 2010

2001/02 to 2008/09

	Fiscal Year								% Change 01/02 - 08/09
	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	
Number of Incident ACVS Patients									
Hospitalized Ischemic Stroke	4,032	3,889	3,747	3,836	3,801	3,788	3,799	3,654	-9.4%
Hospitalized Hemorrhagic Stroke	911	822	815	856	856	870	886	872	-4.3%
Sub-total	4,943	4,711	4,562	4,692	4,657	4,658	4,685	4,526	-8.4%
Hospitalized TIA	1,248	1,203	1,124	1,236	1,151	1,102	1,178	1,206	-3.4%
Non-hospitalized TIA/Stroke	3,417	3,846	4,066	4,316	4,508	4,552	4,812	4,907	43.6%
Sub-total	4,665	5,049	5,190	5,552	5,659	5,654	5,990	6,113	31.0%
Readmission (within 28 days) of Hospitalized Stroke Patients									
Number	104	76	81	102	81	80	82	n/a	-21.2%
Percent	2.10%	1.61%	1.78%	2.17%	1.74%	1.72%	1.75%	n/a	-16.8%
Recurrence (within 365 days) in Hospitalized Stroke Patients									
Number	180	163	140	168	161	150	135	n/a	-25.0%
Percent	3.64%	3.46%	3.07%	3.58%	3.46%	3.22%	2.88%	n/a	-20.9%
Number of Prevalent ACVS Patients									
Hospitalized Ischemic Stroke	21,843	22,465	23,058	23,631	24,237	24,776	25,190	25,603	17.2%
Hospitalized Hemorrhagic Stroke	4,310	4,539	4,788	5,076	5,333	5,622	5,900	6,174	43.2%
Sub-total	26,153	27,004	27,846	28,707	29,570	30,398	31,090	31,777	21.5%
Hospitalized TIA	8,552	8,952	9,219	9,611	9,814	9,982	10,154	10,467	22.4%
Non-hospitalized TIA/Stroke	21,740	23,466	25,349	27,294	29,230	31,243	33,307	35,269	62.2%
Sub-total	30,292	32,418	34,568	36,905	39,044	41,225	43,461	45,736	51.0%
Age-Standardized Incidence / 1,000 Population									
Hospitalized Ischemic Stroke	0.999	0.934	0.870	0.868	0.833	0.800	0.775	0.723	-27.6%
Hospitalized Hemorrhagic Stroke	0.225	0.197	0.188	0.193	0.188	0.185	0.186	0.177	-21.4%
Sub-total	1.231	1.139	1.066	1.069	1.029	0.993	0.968	0.906	-26.4%
Hospitalized TIA	0.306	0.286	0.259	0.278	0.249	0.231	0.237	0.239	-21.8%
Non-hospitalized TIA/Stroke	0.858	0.939	0.962	0.995	1.011	0.995	1.018	1.009	17.5%
Age-Standardized Prevalence / 1,000 Population									
Hospitalized Ischemic Stroke	5.083	5.076	5.046	5.024	4.996	4.946	4.872	4.790	-5.8%
Hospitalized Hemorrhagic Stroke	1.030	1.060	1.083	1.118	1.145	1.175	1.200	1.218	18.2%
Sub-total	6.113	6.136	6.129	6.143	6.141	6.120	6.072	6.008	-1.7%
Hospitalized TIA	1.994	2.026	2.023	2.047	2.026	1.994	1.961	1.960	-1.7%
Non-hospitalized TIA/Stroke	5.338	5.605	5.865	6.138	6.372	6.599	6.819	6.994	31.0%
Conversion Rate from TIA/Non-hospitalized Stroke to Hospitalized Stroke									
90-Day Conversion Rate	3.79%	2.71%	2.41%	2.74%	2.93%	2.67%	2.27%	n/a	-40.2%
365-Day Conversion Rate	5.77%	4.14%	4.08%	4.21%	4.56%	4.03%	3.86%	n/a	-33.1%
Utilization of tPA by Incident Acute Ischemic Stroke Patients									
Number Receiving tPA	n/a	n/a	n/a	n/a	n/a	128	133	156	
Total Number	n/a	n/a	n/a	n/a	n/a	3,788	3,799	3,654	
Proportion of Incident Hospitalized AIS Patients Receiving tPA	n/a	n/a	n/a	n/a	n/a	3.38%	3.50%	4.27%	
Utilization of Acute Care by Incident Ischemic Stroke Patients									
Discharges	4,032	3,889	3,747	3,836	3,801	3,788	3,799	3,654	-9.4%
ALOS	28.95	28.67	27.09	26.71	26.77	26.39	26.41	22.49	-22.3%
Patient Days	116,718	111,488	101,491	102,474	101,761	99,965	100,340	82,171	-29.6%
Utilization of Acute Care by Incident Hemorrhagic Stroke Patients									
Discharges	912	823	815	857	856	871	887	872	-4.4%
ALOS	29.43	27.81	28.27	27.52	30.47	32.61	30.07	25.38	-13.8%
Patient Days	26,841	22,885	23,036	23,588	26,083	28,406	26,675	22,127	-17.6%
Discharge Disposition following Acute Admissions for Incident Ischemic Stroke Patients									
Died	26.8%	24.1%	23.5%	22.6%	23.3%	24.5%	24.7%	21.8%	-18.4%
Discharged to Home	46.8%	47.9%	47.6%	49.2%	46.8%	45.9%	45.7%	49.0%	4.7%
Home with Support Services	9.9%	10.1%	10.6%	10.0%	10.1%	9.8%	10.2%	10.5%	5.7%
Continuing Care Facility	13.8%	15.2%	15.9%	15.7%	16.8%	16.2%	15.7%	13.9%	1.0%
Other	2.7%	2.8%	2.5%	2.5%	3.0%	3.6%	3.6%	4.7%	75.1%
Discharge Disposition following Acute Admissions for Incident Hemorrhagic Stroke Patients									
Died	41.1%	42.9%	42.6%	41.1%	36.9%	40.1%	39.1%	35.2%	-14.4%
Discharged to Home	39.8%	38.5%	36.7%	37.3%	40.7%	36.5%	41.0%	40.4%	1.4%
Home with Support Services	5.4%	5.8%	7.4%	5.8%	7.1%	7.1%	6.3%	6.2%	15.3%
Continuing Care Facility	7.3%	9.6%	9.4%	10.5%	11.0%	11.6%	9.8%	10.7%	45.2%
Other	6.4%	3.2%	3.9%	5.3%	4.3%	4.7%	3.7%	7.6%	19.0%
Mortality Following an Incident Stroke (Hospitalized Ischemic Stroke)									
Crude 30-day In-hospital Mortality Rate	21.0%	18.9%	19.0%	18.2%	18.5%	20.0%	20.1%	18.3%	-12.6%
Crude 31-365 Day Mortality Rate in 30-day In-hospital Survivors	20.5%	19.4%	19.4%	19.8%	21.3%	20.7%	20.4%	19.2%	-6.3%
Mortality Following an Incident Stroke (Hospitalized Hemorrhagic Stroke)									
Crude 30-day In-hospital Mortality Rate	37.4%	39.5%	39.4%	38.9%	34.1%	36.7%	36.3%	32.5%	-13.3%
Crude 31-365 Day Mortality Rate in 30-day In-hospital Survivors	13.7%	16.3%	15.0%	13.8%	13.5%	19.2%	14.4%	14.6%	6.7%

* age 20 or older

Implementing Optimal Stroke Care in British Columbia | MODELING ESTIMATED RESOURCES REQUIRED AND POTENTIAL COSTS AVOIDED

2011/12 to 2017/18

The cost estimates identified in this table are order of magnitude estimates based on a number of data modeling assumptions related to moving the BC health system to optimal stroke care over the next seven years, as detailed in the text of the Provincial Plan. The modeling is based on a staged implementation approach. The actual timing of implementation will likely vary for each Health Authority.

	Year 1 2011/12	Year 2 2012/13	Year 3 2013/14	3-Year Total	Year 4 2014/15	Year 5 2015/16	Year 6 2016/17	Year 7 2017/18
Change Management Resource Requirements								
Provincial	\$1,512,835	\$1,391,763	\$1,169,055	\$4,073,654	\$580,127	\$591,531	\$603,277	\$615,375
Regional	\$3,032,232	\$3,108,199	\$3,186,445	\$9,326,876	\$2,618,821	\$2,544,722	\$2,453,114	\$2,353,719
Sub-Total Change Management	\$4,545,067	\$4,499,962	\$4,355,500	\$13,400,530	\$3,198,948	\$3,136,253	\$3,056,391	\$2,969,095
Modeling for Optimal Care - Operational Areas								
TIA Rapid Assessment Services (1)								
Proportion of Patients Receiving Optimal Care	16.8%	25%	40%		60%	80%	80%	80%
Cost Estimate	\$0	\$235,699	\$464,547	\$700,246	\$827,679	\$1,212,181	\$1,248,546	\$1,286,003
Enhanced tPA Utilization / Telestroke (2)								
<i>Activity</i>	<i>Plan for expansion</i>	<i>Implement at 5 consulting sites</i>	<i>Implement at 9 referring sites</i>		<i>Implement at 8 referring sites</i>	<i>Ongoing operational costs</i>	→	
% Receiving tPA (assumption)	4.27%	4.27%	6.00%		8.00%	10.00%	10.00%	10.00%
Cost Estimate	\$1,011,531	\$1,459,345	\$3,279,787	\$5,750,663	\$3,674,899	\$2,417,183	\$2,424,602	\$2,448,153
Organized Stroke Care (3)								
Proportion of Patients Receiving Optimal Care	13.0%	25%	50%		75%	80%	80%	80%
Cost Estimate	\$0	\$2,881,196	\$6,973,250	\$9,854,447	\$11,308,235	\$12,497,394	\$12,872,316	\$13,258,485
Early Home Supported Discharge (4)								
Proportion of Patients Receiving Optimal Care	0%	0%	10%		20%	30%	37%	37%
Cost Estimate	\$0	\$0	\$1,669,331	\$1,669,331	\$3,438,821	\$5,312,978	\$6,749,253	\$6,951,731
Sub-Total Modeling for Optimal Care	\$1,011,531	\$4,576,240	\$12,386,915	\$17,974,687	\$19,249,633	\$21,439,736	\$23,294,717	\$23,944,372
Current Funding for the TIA Rapid Assessment Services ending after 2010//11	\$750,000			\$750,000				
Additional Funding to Maintain Current Capacity for the TIA Rapid Assessment Services		\$772,500	\$795,675	\$1,568,175	\$819,545	\$844,132	\$869,456	\$895,539
Order of Magnitude Estimate	\$6,306,598	\$9,848,703	\$17,538,091	\$33,693,392	\$23,268,127	\$25,420,121	\$27,220,564	\$27,809,005
Potential Costs Avoided	\$0	(\$4,281,957)	(\$18,879,319)	(\$23,161,276)	(\$34,958,934)	(\$45,470,176)	(\$50,281,542)	(\$51,789,988)

NOTES:

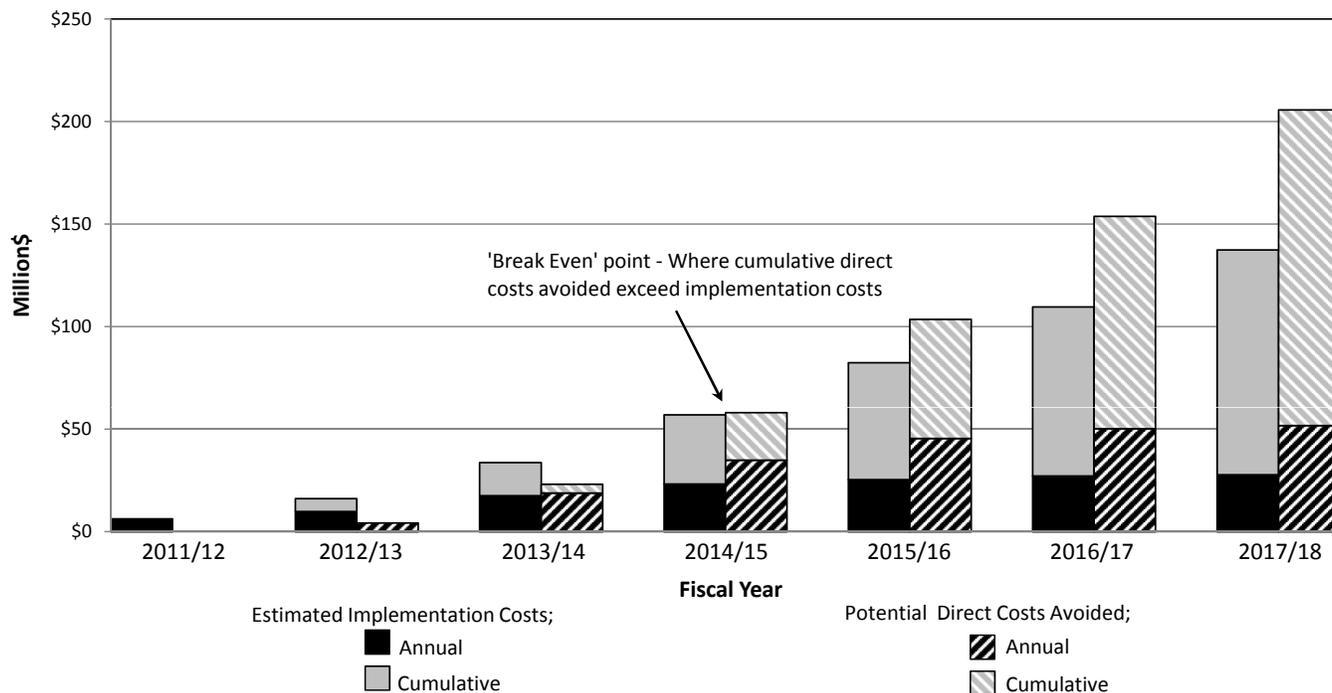
- Optimal care associated with TIA Rapid Assessment Services is defined as access within 72 hours for 80% of TIA/minor stroke patients in the province. Optimal care is currently being provided to an estimated 16.8% of TIA/minor stroke patients in the province.
- Optimal care associated with tPA utilization is defined as receipt by a maximum of 10% of incident ischemic stroke patients. tPA is currently being utilized by 4.27% of the incident ischemic stroke patients in the province.
- Optimal care assumes that 80% of stroke patients admitted to acute care will have access to organized stroke care. An estimated 13.0% of stroke patients in B.C. are currently receiving organized stroke care.
- An early home-supported discharge (EHSD) team is comprised of "physiotherapists and occupational therapists supported by speech therapists, physicians, nurses, and social workers whose teamwork is coordinated by regular meetings. Often the EHSD begins with one or more pre-discharge home visits, continues the day of discharge, and goes on with more home sessions per week based on a patient-held recovery plan. [However,] it should be emphasized that EHSD is not considered an alternate to a stroke unit". Larsen T, Olsen TS, Sorensen J. Early home-supported discharge of stroke patients: a health technology assessment. International Journal of Technology Assessment in Health Care. 2006; 22(3): 313-20.

The literature suggests that an average of 37% of stroke patients admitted to acute care would be eligible for EHSD. Winkel A, Ekdahl C, Gard G. Early discharge to therapy-based rehabilitation at home in patients with stroke: a systematic review. Physical Therapy Reviews. 2008; 13(3): 167-87.

No patients in the province are currently receiving EHSD.

Implementing Optimal Stroke Care in British Columbia | ESTIMATED COST OF ENHANCING FOUR KEY INTERVENTIONS[†] AND THE POTENTIAL DIRECT COSTS[‡] AVOIDED (MILLION\$)

ANNUAL AND CUMULATIVE COSTS, FISCAL YEARS 2011/12 to 2017/18



[†] The four key implemented interventions are;

1. Transient ischemic attack (TIA) rapid assessment and treatment services
2. Enhanced utilization of telestroke and tissue plasminogen activator (tPA)

3. Organized inpatient stroke care
4. Early home-supported discharge

[‡] Direct costs avoided include acute and residential care services.