



Performance Measurement Manual

*A supplement to the Canadian Stroke Strategy Canadian Best
Practices Recommendations for Stroke Care 2006*

Developed by:
CSS Information & Evaluation Working Group
May 2007



annual

Overview

Canadian Stroke Strategy: The Canadian Stroke Strategy (CSS) was initiated in 2003 under the leadership of the Canadian Stroke Network (CSN) and the Heart and Stroke Foundation of Canada (HSFC). It brings together a multitude of stakeholders and partners with the common vision that “*All Canadians have optimal access to integrated, high quality, and efficient services in stroke prevention, treatment, rehabilitation and community reintegration. The Canadian Stroke Strategy serves as a model for innovative and positive health system reform in Canada and internationally.*”

The CSS provides a framework to facilitate the widespread adoption of evidence-based best practices for the prevention, treatment and rehabilitation of stroke. The CSS focuses on two levels of change:

- at the provincial/territorial level, the implementation of best practices in stroke prevention, treatment, rehabilitation, and community reengagement; and
- at the national level, the creation of national platforms and Working Groups to support provincial and territorial stroke initiatives through coordination, content development, and communication.

CSS Best Practice Recommendations: In 2006, the CSS Best Practice and Standards working group released the *Canadian Best Practice Recommendations for Stroke Care 2006*. This document is the result of an extensive review of national and international evidence-based stroke best practice recommendations and guidelines. It is provided as a starting point for provinces and territories as they move to implement stroke strategies and improve stroke care in Canada across the continuum of care.

To develop this first set of recommendations, the BPS-WG focused on producing best practice recommendations that were:

- ◆ supported by the highest levels of evidence, and/or
- ◆ considered, in the expert opinion of the Working Group, essential to delivering best practice and integral to driving systems change, and/or
- ◆ representative of the full continuum of stroke care.

The Canadian Best Practice Recommendations for Stroke Care 2006 will be updated every two years to remain current and incorporate new research findings.

CSS Information and Evaluation:

The CSS Information and Evaluation Working Group (IEWG) Was established in the Spring of 2005. The mandate of this group is to develop and implement an broad evaluation framework for the Canadian Stroke Strategy that addresses both the implementation of the strategy and the impact of strategy activities and initiatives on the processes and outcomes of care for stroke patients.

The CSS-IEWG group reviewed each Best Practice recommendation and developed an appropriate set of performance measures. Members of the IEWG represent the full stroke continuum of care, and their expertise guided performance measure development as well as development of the accompanying ‘measurement notes’ which identify potential data sources, methods to enhance data collection, challenges to data access, and data quality issues.

The IEWG held a consensus panel in September 2005, during which 19 core performance measures for stroke across the continuum of care were developed. These have been incorporated into the best practice recommendations where appropriate, and are identified by the superscript “^{CS}”. Additional performance measures

have been provided for several recommendations to ensure a comprehensive evaluation of the degree to which the recommendations have been achieved, and capture the nature of the recommendation and its associated nuances.

It is not expected that each group using these recommendations will be able to document all performance measures provided. Therefore, the most significant measures have been identified. The remaining measures are provided for those groups who are able to conduct a more extensive evaluation of stroke practice in their region. Some measures appear under more than one recommendation. For clarity we have added all relevant indicators within each section.

Purpose of this Manual

This manual has been developed to provide standardization and consistency to the calculation of the performance measures. It is a tool that could be used by provinces and local groups in establishing their own evaluation frameworks for stroke. It will also be used to guide national efforts to measure specific indicators country-wide.

Sources for Stroke Data in Canada:

1. Canadian Institute for Health Information (CIHI)

- a. **Discharge Abstract Database (DAD):** The Discharge Abstract Database (DAD) contains data on acute care hospital discharges across Canada. CIHI receives data directly from participating hospitals. These include all hospitals in every province and territory, except Quebec. The Discharge Abstract Database (DAD) contains demographic, administrative and clinical data for hospital discharges (inpatient acute, chronic, rehabilitation) and day surgeries in Canada.
- b. **National Ambulatory Care Reporting System (NACRS):** The National Ambulatory Care Reporting System (NACRS) includes data for all hospital-based ambulatory care provided in emergency departments. Client visit data are collected at time of service in participating facilities. Data collection methods may vary by facility. Currently, data submission to NACRS has been mandated in Ontario for ER, Day Surgery, Dialysis, Cardiac Catheterization and Oncology (including all regional cancer centres). Some facilities in B.C., the Yukon, P.E.I and Nova Scotia are also submitting data. Data Elements include: demographic data, clinical data, administrative data, financial data and, service-specific data elements for day surgery and emergency.
- c. **National Rehabilitation Reporting System:** The National Rehabilitation Reporting System (NRS) contains client data collected from participating adult inpatient rehabilitation facilities and programs across Canada. Data are collected at time of admission and discharge by service providers in participating facilities. There is also an optional post-discharge follow-up data collection process. The NRS data elements are organized under the following categories: socio-demographic information; administrative data (e.g. referral, admission and discharge); health characteristics; activities and participation (e.g. ADL, communication, social interaction); interventions. These elements are used to calculate a variety of indicators including waiting times and client outcomes.
- d. **Continuing Care Reporting System:** The Continuing Care Reporting System (CCRS) was created to be a resource for standardized clinical and administrative information on continuing care in Canada. The database includes detailed clinical, functional and service information that identifies residents' preferences, needs and strengths, and provides a snapshot of the services they use. Two types of facilities are included in the CCRS: Hospitals that have beds designated and funded as continuing care beds, commonly known across Canada as extended, auxiliary, chronic, or complex care beds; and, Residential care facilities, commonly known across Canada as nursing homes, personal care homes or long-term care facilities. The data are collected using the Resident Assessment Instrument (RAI) Minimum Data Set, (MDS 2.0).

2. Registry of the Canadian Stroke Network (RCSN)

- a. **The Registry of the Canadian Stroke Network (RCSN)** was established in 2001 to allow for the measurement and monitoring of stroke care delivery and outcomes in Canadian patients at participating institutions, and to serve as a rich clinical database for investigator-initiated research projects. Currently there are records from over 20,000 stroke patients included in the

RCSN. Primary chart abstraction is completed by trained neurology research nurses. Data collected at each site are entered into a laptop computer with software designed specifically for RCSN data entry. The RCSN collects data from pre-hospital stroke onset to discharge from acute care following a stroke or TIA. Information is collected on risk factors, presentation, acute investigations and interventions, inpatient management, complications, discharge disposition, length of stay and mortality. The RCSN may be linked to other administrative databases, such as from CIHI, to develop information on the full continuum of stroke care for a patient.

The RCSN currently collects continuous data on acute stroke patients at the eleven regional and district stroke centres in Ontario, and one site in Nova Scotia. In addition, the RCSN methodology and case record form are used by Ontario, Nova Scotia and Alberta to perform periodic province-wide audits stroke patients, based on population sampling or census.

- b. **Stroke Performance Indicators for Reporting, Improvement and Translation (SPIRIT):** SPIRIT is a new addition to the Canadian Stroke Network data holdings. It is a web-based system designed to support data collection related to the Canadian Stroke Strategy Best Practice Recommendations and the CSS Monitoring and Evaluation framework. Currently, a module is available to collect evidence-based performance measures for stroke prevention clinics. An acute module and telestroke module have also been developed and will be launched in the Spring of 2007. This system is flexible and will continue to be enhanced with future modules related to stroke rehabilitation and other areas in the next twelve months.

SPIRIT data includes: demographics, risk factors, wait times and turn-around times for processes of care; medication management, investigations and procedures, and discharge outcomes.

3. Statistics Canada

- a. **Canadian Community Health Survey:** The primary objective of the CCHS is to provide timely cross-sectional estimates of health determinants, health status and health system utilization at a sub-provincial level (health region or combination of health regions). The CCHS collects information on a variety of health-related behaviours and issues, and some relevant to stroke and this document include: Risk factors for chronic diseases, smoking, alcohol, physical activities, socio-demographic characteristics, contact with healthcare professionals, blood pressure, stroke and heart disease history.

4. Provincial and Local Databases

Many local and provincial sources of data are available that can inform stroke care and service delivery. It is recommended that each province develop a list of available data sources that could support stroke care and make this information available to provincial and local stroke initiatives. This information should include: content of database, time frames data has been collected; data manager; data accessibility; costs for data access; and, contact person for database.

5. Stroke Codes Using ICD-10

The following ICD-10codes are currently being used to identify stroke cases in administrative databases in Canada.

Grouping	ICD-10	ICD-9	Comments
Cerebrovascular Disease	I60-I69	430-434, 436-438	Excludes TIAs. Matches WHO and American definitions for ICD10.
Cerebrovascular Disease inc. TIA	I60-I69, G45	430-438	Includes TIAs, historically equivalent.
Acute Stroke	I60, I61, I63, I64	430,431,434, 436	
Subarachnoid Hemorrhage	I60	430	
Intracerebral Hemorrhage	I61	431	
Ischemic Stroke	I63	434	
Acute but Ill Defined Cerebrovascular	I64	436	
Occlusion and Stenosis of Precerebral Arteries	I65	433	Generally not included in stroke analysis, unless able to identify to the level of the 5 th digit of ICD-9 coding.
Transient Ischemic Attack	G45, excluding G45.4	435	Exclude G45.4 Transient Global Amnesia.
Retinal Vascular Occlusion	H34.1	362.3	Tracked separately as there are inconsistencies across provinces in the reporting of stroke using this code.

Canadian Stroke Strategy Performance Measures

Rec. #	Recommended Performance Measures	Calculation Formulas	Data Sources	Additional Comments
1. Public Awareness and Responsiveness				
1.1 Recognize Signs & Symptoms	i. Proportion of the population that can name two or more stroke symptoms. ^{c1}	N: # of persons interviewed who can name two or more signs and symptoms of stroke. D: total # of persons interviewed.	National, provincial, local surveys	Signs and symptoms are based on current HSFC list used in all ad and print materials; Surveys and polls should be standardized and conducted by HSFC or other similar organization.
	ii. Proportion of patients who seek medical attention within 2.5 hours of stroke symptom onset	N: # of all stroke patients arriving at hospital within (2.5, 3, 5) hours of stroke/TIA symptom onset D: total # patients admitted to an ED for stroke/TIA	Local databases (not available from CIHI); stroke registries	Time frames from LSN to hospital can be varied according to need; Can sub-analyze by stroke type (hemorrhagic, ischemic), ambulance transport etc. *dependent on collecting accurate information on LSN time.
	iii. Median time from stroke symptom onset to presentation at an ED. ^c	Mean/median of LSN time to ED presentation for all stroke/TIA patients	Local databases (not available from CIHI); stroke registries	Should calculate mean, SD, and all percentiles (min, 5, 10, 25, 50, 75, 90, 95, 100). Note: Median is best measure to present this data – mean can be skewed and affected by outliers. *Measure is dependent on collecting accurate information on LSN time.

¹ The superscript 'c' following a recommended performance measure indicates that the performance measure is part of the CSS Core set of stroke performance measures identified at the CSS Information and Evaluation consensus meeting, 2005

	<p>iv. Proportion of emergency medical service (EMS) providers trained in stroke recognition and use of stroke triage algorithms for prioritizing stroke cases for transport within regions.</p>	<p>N: # of patients with EMS transport where there is documentation that a triage process was used D: total # of stroke patients transported by EMS.</p> <p>N: # EMS personnel trained in stroke triage D: # active EMS personnel</p> <p>N: # EMS personnel using algorithms/triage tools D: # EMS personnel surveyed</p>	<p>Local databases (not available from CIHI); stroke registries;</p> <p>Training info from EMS central offices. National/Provincial surveys of EMS providers</p>	<p>Ambulance call records are not always available at hospital once patient transported; education for EMS on documentation and access to records will increase ability to collect this information.</p> <p>Surveys should evaluate both individuals (personnel trained), and organizations (use of algorithms).</p>
	<p>v. The incidence of stroke in each province/territory by stroke type.^c</p>	<p>a. Number/% of all stroke/TIA admissions to an ED as a percentage of all admissions</p>	<p>Administrative databases (NACRS, DAD)</p>	<p>Hospital visits (ED and inpatient) are best available proxies for annual incidence of stroke</p>
		<p>b. Number/% of all stroke/TIA admissions to acute inpatient hospital care as a percentage of all admissions to hospital, and as a percentage of all stroke ED visits</p>	<p>Administrative databases (NACRS, DAD)</p>	<p>For a & b, calculate overall and by stroke type</p>

Rec. #	Recommended Performance Measures	Calculation Formulas	Data Sources	Additional Comments
2. Patient and Caregiver Education				
2.1 Education	i. Proportion of stroke patients with documentation of education provided for patient, family, and/or caregivers at each stage throughout the continuum of stroke management and recovery.	N: Number of stroke patients in clinical setting (ED, family practice, inpatient; rehab, etc) who have documentation in their record of the occurrence of patient/caregiver education D: Total number of stroke patients within the defined setting	Local charts, or stroke registries; National/Provincial survey (health institutions)	Patient education for all hospital programs is a performance measure in Hospital Accreditation organizations (Monitor Quality of Health Care).

3. Lifestyle and Risk Factor Management				
3.1 Life Style	i. The proportion of the population who have identified risk factors for stroke including: hypertension, obesity, smoking history, low physical activity, hyperlipidemia, diabetes, atrial fibrillation. ^c	N: % of patients within primary care practices with individual risk factors with evidence they are being treated D: % of pts in PCP's practice population with risk factors N: # of stroke./TIA patients admitted to acute hospital who have hypertension, diabetes, atrial fibrillation. D: # of stroke./TIA patients admitted to an acute care hospital	Administrative databases (NACRS, DAD). National survey data.	From administrative databases, identification of other risk factors are harder to identify accurately and consistently. The Canadian Community Health Survey is a primary source for this data nationally and provincially.
	ii. Percentage of the population who can identify the major risks for stroke.	N: % identifying 1, 2, 3 or more major risks for stroke care D: % completing survey	National, provincial, local surveys	The Canadian Community Health Survey is a primary source for this data in Canada.
	iii. Percentage of the population who know what to do to prevent/reduce stroke risk.	N: # identifying healthy lifestyle activities D: # completing survey	National, provincial, local surveys	The Canadian Community Health Survey is a primary source for this data nationally.

	iv. Proportion of patients with risk factors who are being treated for those risk factors.	N: # identifying healthy lifestyle targets for themselves (based on age, etc) D: # completing survey	National, provincial, local surveys. Chart Audits	The Canadian Community Health Survey is a primary source for this data nationally.
	v. The annual occurrence of stroke/TIA in each province and territory by stroke type. ^c	a. Number/% of all stroke/TIA admissions to an ED or acute inpatient setting	Administrative databases (NACRS, DAD)	Hospital visits (ED and inpatient) are best available proxies for annual incidence of stroke and should be considered underestimate, especially for TIA
	vi. The stroke/TIA mortality rates across provinces and territories, including in-hospital or 30 day, and one-year ^s	a. 7-day in-hospital mortality rates by stroke type b. 30-day all case mortality rates by stroke type c. 3 month all case mortality rates by stroke type d. 1 year all case mortality rates by stroke type	CIHI: NACRS & DAD RPDB	Risk adjustment required. Factors to include when available: age, gender, stroke type, stroke severity, comorbidities
3.2				
Blood Pressure	a. Proportion of persons at risk for stroke who have their blood pressure measured at each healthcare encounter.	N: # persons who have routine blood pressure measurements taken. D: All persons at risk for stroke.	Health surveys and chart audits. Registry datasets	The Canadian Community Health Survey is a primary source for this data in Canada. Could focus on persons within primary care practices.
	i. Proportion of the population who report having hypertension.	N: # persons reporting increased blood pressure D: # persons surveyed.	Health surveys	* Will need to reinforce parameters for defining hypertension – according to CHEP guidelines. General population may not be reliable to report this.
	ii. Proportion of the population who have diagnosed elevated blood pressure (hypertension).	N: # persons reporting they have been diagnosed with high blood pressure by a medical practitioner D: # persons surveyed.	Health surveys and chart audits. Administrative data.	The Canadian Community Health Survey is a primary source for this data in Canada. Also, can look to patients admitted to hospital who have HTN as a primary or secondary diagnosis.

	iii. Percentage of the population with known hypertension who are on blood-pressure lowering therapy.	N: # persons reporting they have been diagnosed with high blood pressure by a medical practitioner and are taking medication for hypertension D: # persons surveyed.	Health surveys and chart audits. Administrative pharmacy data.	The Canadian Community Health Survey is a primary source for this data in Canada. Some provinces collect data on all prescription drugs (may only be available for persons >65 years)
	iv. Proportion of stroke/TIA patients prescribed blood pressure lowering agents after assessment in a secondary prevention clinic.	N: # of all stroke/TIA patients who are on blood pressure lowering medication after assessment in a secondary prevention clinic. D: total #/% of ischemic/TIA stroke patients assessed in a stroke prevention clinic.	Local data records; Provincial drug plans for seniors,	May define categories for analysis: all anti-hypertensive, ACE inhibitors, ARBs, diuretics. Note: Secondary prevention clinic refers to any clinic visit where stroke/TIA issues are specifically addressed. It may include further diagnostics, investigations, medication prescriptions and management, etc.
	v. Proportion of stroke/TIA patients prescribed blood pressure lowering agents on discharge from acute care.	N: # of all stroke/TIA patients who are on blood pressure lowering medication at discharge from acute care D: total #/% of ischemic/TIA stroke patients at discharge from acute care	Local data records; Provincial drug plans for seniors,	May define categories for analysis: all anti-hypertensive, ACE inhibitors, ARBs, diuretics, etc Measures can be stratified by length of stay in hospital as those with a shorter LOS may be less likely to receive prescriptions.
3.3 Lipid Management	i. Proportion of the population who report having elevated cholesterol levels	N: # persons reporting increased cholesterol levels D: # persons surveyed.	Health surveys	Canadian Study on Healthy Aging, Canadian Community Health Survey, Physical Measures Survey. *Need to consider context of primary or secondary prevention
	ii. Proportion of the population who have diagnosed high cholesterol (dyslipidemia).	N: # persons reporting they have been diagnosed with high cholesterol levels by a medical practitioner D: # persons surveyed.	Health surveys and chart audits. Administrative data.	Canadian Study on Healthy Aging, Canadian Community Health Survey, Physical Measures Survey.

	iii. Proportion of stroke patients prescribed lipid-lowering agents for secondary prevention of stroke.	N: # of all stroke patients who are discharged on lipid-lowering medication within defined setting D: total # of ischemic/TIA stroke patients (can define by: seen in prevention clinic; d/c from ED; d/c from hospital; followed by PCP)	Administrative data, chart audit or stroke registry data	Define denominator population. This could vary.
	iv. Proportion of stroke patients with an LDL-C between 2.0-2.5 mmol/L at 3 months following stroke event.	N: # of stroke/TIA patients with an LDL-C between 1.8-2.5 mmol/L at 3 months following stroke event D: # stroke/TIA patients followed and lipid measurements obtained over time.	Local chart audit, stroke registries	May be possible to do through audits of primary care practices and/or stroke prevention clinics.
	v. Proportion of stroke patients with an LDL-C < 1.8 mmol/L at 3 months following stroke event.	N: # of stroke/TIA patients with an LDL-C less than 1.8 at 3 months following stroke event D: # stroke/TIA patients followed and lipid measurements obtained over time.	Local chart audit, stroke registries	May be possible to do through audits of primary care practices and/or stroke prevention clinics.
3.4 Diabetes Management	i. Proportion of the population with a confirmed diagnosis of diabetes (Type I and Type II)	N: # persons reporting they have been diagnosed with diabetes (Type I or II) by a medical practitioner D: # persons surveyed.	Health surveys and chart audits. Administrative data.	Canadian Study on Healthy Aging, Canadian Community Health Survey, Physical Measures Survey. Also, on primary or secondary admitting diagnosis in hospital.
	ii. Proportion of stroke patients with a pre-existing diagnosis of diabetes	N: # stroke patients entering hospital with previously diagnosed diabetes D: all persons admitted for stroke	Administrative data, local chart audit, stroke registries	Ensure documentation available to verify diabetes diagnosis.
	iii. Proportion of stroke inpatients without a previous diagnosis of diabetes who receive a fasting blood sugar in the ED	N: # stroke inpatients screened in the ED D: all persons admitted to the ED for stroke	Administrative data, local chart audit, stroke registries	

	iv. Proportion of secondary prevention clinic patients without a pre-existing diagnosis of diabetes who receive fasting blood sugar	N: # secondary prevention clinic patients with TIA/stroke screened for blood glucose levels D: # secondary prevention clinic patients with TIA/stroke	Administrative data, local chart audit, stroke registries	
3.5 Antiplatelet Therapy	i. Proportion of ischemic stroke/TIA patients prescribed antithrombotic therapy on discharge from acute care. ^c	N: # of all stroke/TIA patients who are discharged from the ED or from inpatient acute care on antiplatelet therapy. D: total # of ischemic/TIA stroke patients discharged from the ED or from inpatient acute care	Local chart audit, stroke registries, some administrative databases	Distinction should be made between antithrombotic, antiplatelet and anticoagulants. TIA population not captured if only hospitalization data (ambulatory care databases with ED data may capture this-may require chart review)- need to define populations of interest and inclusion.
	ii. Proportion of stroke/TIA patients prescribed antiplatelet therapy on discharge from secondary prevention clinic care. ^c	N: # of all stroke patients who are discharged on discharge from secondary prevention clinic. ^c D: total # of ischemic/TIA stroke patients seen in a stroke prevention clinic	Local chart audit, stroke registries of prevention clinics	Distinction should be made between antithrombotic, antiplatelet and anticoagulants.
.6 Antithrombotics for Atrial Fib	i. Proportion of eligible stroke/TIA patients with atrial fibrillation prescribed any antithrombotic therapy on discharge from acute care. ^c ii. Proportion of eligible stroke/TIA patients with atrial fibrillation prescribed anticoagulant therapy on discharge from acute care. ^c iii. Proportion of eligible stroke/TIA patients with atrial fibrillation prescribed antiplatelet therapy on discharge from acute care. ^c	N: # of all stroke/TIA patients with atrial fibrillation who are prescribed anticoagulant therapy on d/c from ED or inpatient acute care D: total # of ischemic/TIA stroke patients discharged from ED or inpatient acute care with a diagnosis of atrial fibrillation	Local chart audit, stroke registries, some administrative databases	Difficult to determine eligibility from administrative databases. Need to define which medication groups will be included for this measure when reporting.

	iv. Proportion of stroke/TIA patients with atrial fibrillation prescribed anticoagulant therapy after a visit to a secondary prevention clinic. ^c	N: # of all stroke patients with atrial fibrillation who are prescribed anticoagulant therapy during stroke prevention clinic encounter D: total # of ischemic/TIA stroke patients with a diagnosis of atrial fibrillation seen in stroke prevention clinics	Local chart audit, stroke registries of prevention clinics	Difficult to determine eligibility from administrative databases. Need to define which medication groups will be included for this measure.
	v. Proportion of patients on warfarin with INR in therapeutic range at 3 months and 1 year following index stroke event.	N: total number of ischemic stroke/TIA patients with atrial fibrillation on anticoagulation medications and have INR within range of 2.5 – 3.0 at 3 months and 1 year post-stroke D: total number of ischemic stroke/TIA patients with atrial fibrillation on anticoagulation medications	Local chart audit, stroke registries	Define population of interest when reporting this indicator - general population, Acute ED or inpatients. Clarify parameters for therapeutic range. – Levels have some variability, should consider average over time.
3.7 Carotid Intervention	i. Proportion of ischemic stroke/TIA patients with moderate to severe (70-99%) carotid artery stenosis who undergo a carotid intervention procedure following the index stroke event	N: # of stroke patients with severe carotid stenosis who undergo carotid revascularization D: All stroke patients diagnosed with severe carotid artery disease.	Administrative data, local chart audit, stroke registries, provincial MD billing records	Determining degree of stenosis very difficult from administrative databases. Separate stenting and CEA
	ii. Proportion of ischemic stroke/TIA patients with moderate carotid stenosis (50-69%) who undergo carotid intervention procedure following the index stroke event.	N: # of stroke patients with moderate carotid stenosis who undergo carotid revascularization D: All stroke patients diagnosed with moderate carotid artery disease.	Administrative data, local chart audit, stroke registries, provincial MD billing records	Determining degree of stenosis very difficult from administrative databases. Separate stenting and CEA
	iii. Proportion of stroke patients with mild carotid stenosis (<50%) who undergo carotid intervention procedure following the index stroke event.	N: # of stroke patients with mild carotid stenosis who undergo carotid revascularization D: All stroke patients diagnosed with mild carotid artery disease.	Administrative data, local chart audit, stroke registries, provincial MD billing records	Determining degree of stenosis very difficult from administrative databases. Separate stenting and CEA

	iv. Median time from stroke symptom onset to carotid endarterectomy (CEA) surgery. ^c	N: Sum[LSN to CEA time (days) for all CEA patients] D: # CEA patients	Administrative data, local chart audit, stroke registries, provincial MD billing records; SPIRIT tool	Should calculate mean, SD, and all percentiles (min, 5, 10, 25, 50, 75, 90, 95, 100). Median is stat of choice.
	v. Proportion of CEA patients who experience peri-operative in-hospital stroke, AMI or death.	N: # stroke patients undergoing CEA who experience {define complication} D: # stroke patients undergoing CEA	Administrative data (CIHI-DAD); stroke registries and chart audit	Outcomes should be age-sex standardized, and adjusted for stroke severity if severity values available
	vi. The 30-day in-hospital post-CEA mortality and stroke rates by carotid occlusion severity.	N: # stroke patients undergoing CEA who experience {define complication} D: # stroke patients undergoing CEA	Administrative data (CIHI-DAD); stroke registries and chart audit	Mortality should be age-sex standardized, and adjusted for stroke severity if severity values available- Degree of stenosis will be tough to capture from admin data but will likely be available from chart audit and registries.
	vii. Proportion of patients who undergo CEA within 2 weeks, from 2 – 4 weeks; between 4 weeks and 3 months, and between 3 – 6 months of stroke onset.	N: # stroke patients undergoing CEA within {define time frame} of stroke D: # patients undergoing CEA following stroke	Administrative data – may need to link between episodes	Report separately for CEA and stenting
	viii. Proportion of patients who wait > 6 months for CEA or who are cancelled due to long wait times.	N: # stroke patients who wait > 6 months or who are cancelled D: # stroke patients undergoing CEA	Administrative data – may need to link between episodes	Indicate whether these patients are followed in prevention clinic.

	ix. Proportion of patients who experience a subsequent stroke event or death while waiting for CEA, for patients treated with CEA/stent within 2 wks; 2-4; 4 wks – 3mos; 3mos-6mos, greater than 6 months of index stroke.		Administrative data (CIHI-DAD); stroke registries and chart audit	Report by time period.
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4. Acute Stroke Management				
4.1 Acute Stroke unit	i. Number of stroke patients treated on a stroke unit at any time during their in-patient hospital stay for an acute stroke event (numerator) as a percentage of total number of stroke patients admitted to hospital. ^c	N: # of stroke patients admitted to hospital and treated in an acute care stroke unit at any time during hospital stay D: total # of stroke clients admitted to a hospital (TIA, ischemic, hemorrhage)	Local/regional data and stroke registries	Stroke unit carries many definitions. When reporting it is important to define the type of stroke unit model being measured. This measure should be reported for all strokes, and also reported separately by stroke type.
	ii. Proportion of total time in hospital for an acute stroke event spent on a stroke unit.	N: Sum {all time spent on acute stroke unit} D: Number of stroke patients who spent any time on an acute stroke unit.	Local/regional data and stroke registries	Stroke unit carries many definitions. When reporting it is important to define the type of stroke unit model being measured. This measure could be reported for all strokes, and also reported separately by stroke type.

	<p>iii. Percentage increase Telehealth/telestroke coverage to remote communities to support organized stroke care across the continuum</p> <p>iv. of stroke patients in a rural community which receive consultation (acute or outpatient) via Telehealth by consultation type (ie rehab vs tPA vs stroke neurologist)</p>	<p>N1: Total number of telestroke consults for stroke patients by an institution</p> <p>D1: # stroke patients treated in the institution during time frame (ED only or ED and inpatient).</p> <p>N2: # telestroke consultations by modality used (telephone, video, digital imaging etc)</p> <p>D2: # telemedicine consults in region</p>	Local/regional data chart audit and stroke registries	Increasing reported numbers would indicate increasing access to these resources.
	v. Percentage of patients discharged to their home or place of residence following an inpatient admission for stroke. ^c	<p>N: Number/% of patients discharged from acute inpatient overall, and to each discharge disposition listed in DAD</p> <p>D1: All stroke patients admitted to acute care for their stroke</p> <p>D2: All stroke patients discharged ALIVE from acute inpatient hospital</p>	CIHI - DAD	<p>* Use sub-type list to report breakdown of disposition code 1 to type of inpatient institution.</p> <p>* this measure can be considered within certain time frames, such as those discharged within 30 days, 3 months etc.</p> <p>Should be reported overall and by stroke type.</p>
4.2 Brain Imaging	i. Proportion of stroke patients who receive a brain CT/MRI within 25 minutes of hospital arrival.	<p>N: # stroke patients who arrive in an ED and receive first CT or MRI scan within 25 minutes of arrival in ED</p> <p>D: total # of stroke clients admitted to ED</p>	Local/regional data chart audit and stroke registries	
	ii. Proportion of stroke patients who receive a brain CT/MRI within 24 hours of hospital arrival.	<p>N: # stroke patients who arrive in an ED and receive first CT or MRI scan within 24 hours of arrival in ED</p> <p>D: total # of stroke clients admitted to ED and/or inpatient care</p>	Local/regional data chart audit and stroke registries	

	iii. Proportion of stroke patients who receive a brain CT/MRI prior to hospital discharge. ^c	N: # stroke patients who receive at least one CT or MRI scan prior to hospital discharge D: total # of stroke clients admitted to ED and/or inpatient care	CIHI – DAD intervention codes	Need to specify denominators used during analysis when reporting.
4.3 Blood Glucose	i. Proportion of stroke/TIA patients with blood glucose levels documented during assessment in the ED or on the inpatient ward.	N: # of patients with blood glucose levels documented during assessment in the ED or on the inpatient ward. D: # stroke/TIA patients seen in the ED and/or admitted to inpatient ward.	Local/regional data chart audit and stroke registries	
	ii. Proportion of stroke/TIA patients with known diabetes who have blood glucose levels in therapeutic range for that patient.	N: # stroke patients with diabetes and glucose in therapeutic range D: # stroke patients with diabetes.	Local/regional data chart audit and stroke registries	Note: therapeutic range can be different for each patient depending on circumstance and should be clarified before reporting this measure.
4.4 Acute Thrombolytics	i. Proportion of all ischemic stroke patients who receive acute thrombolytic therapy (tPA). ^c	N: # of eligible ischemic stroke patients who receive IV, IV/IA or intra-arterial thrombolysis in a RSCs D: # of eligible ischemic stroke clients presenting to the ED [within eligible time frame – 2.5 hrs, 3 hrs, etc]	Local/regional data chart audit and stroke registries	When measuring and reporting this indicator, it is important to pre-define definition of eligible and last seen normal to treatment time frames included. Separate out IV and IA routes for this measure.
	ii. Proportion of all thrombolysed ischemic stroke patients who receive acute IV thrombolytic therapy (tPA) within one hour of hospital arrival. ^c	N: Number % of patients who receive IV tPA within 1 hour of hospital arrival D: All patients who receive IV tPA	Local/regional data chart audit and stroke registries	Can create a comparable indicator for IA route – need to define time window from arrival to treatment.

	iii. Median time from patient arrival in the emergency department to administration of acute thrombolytic agent (in minutes).	N: SUM [number of minutes from ED arrival (registration) to administration of tPA] D: # of ischemic stroke clients presenting in ED who receive tPA	Local/regional data chart audit and stroke registries	Should calculate mean, SD, and all percentiles (min, 5, 10, 25, 50, 75, 90, 95, 100)
	iv. Proportion of patients in rural or remote communities who receive thrombolysis through the use of telestroke technologies (as a proportion of all ischemic stroke cases in that community, and as a proportion of all telestroke consults for ischemic stroke cases).	N: # patients receiving a telestroke consult and also receive tPA as a result of the consult. D1: # patients receiving a telestroke consult D2: All stroke patients treated in the cohort	Local/regional data chart audit and stroke registries	CIHI does not have an official code for tPA. When reporting, it is important to describe and define the type of telestroke connection made – phone consult physician to physician, video link, etc.
	v. Proportion of patients with secondary intracerebral hemorrhage following thrombolysis.	N: % of patients who receive IV tPA who experience a secondary hemorrhage within 36 hours D: Number of all patients who receive tPA	Local/regional data chart audit and stroke registries	CIHI does not have an official code for tPA
4.5 Carotid artery imaging	i. Proportion of stroke patients who receive carotid imaging prior to hospital discharge.	N: # of all stroke patients who receive a carotid artery assessment prior to hospital discharge D: total # of ischemic/TIA stroke patients admitted to ED or inpatient	CIHI – NACRS, DAD Local/regional data chart audit and stroke registries	Research has shown poor validity of NACRS, DAD in capturing carotid imaging studies. Imaging may include: Dopplers, CTA, MRA, angiography
	i. Proportion of patients who do not undergo carotid imaging in hospital who have an appointment booked before discharge for carotid imaging as an outpatient.	N: # ischemic stroke/TIA patients who have appointment booked for outpatient carotid imaging prior to hospital or ED discharge. D: Total # ischemic stroke/TIA patients seen in ED or inpatient	Local/regional data chart audit and stroke registries	

	ii. Median time from stroke symptom onset to carotid imaging.	a. median time from ischemic stroke/TIA patient registration in an ED to carotid imaging.	Local/regional data chart audit and stroke registries	Mean time should not be used as may be skewed. This measure will be difficult to consistently obtain accurate information on times.
4.6 Dysphagia Screening	i. Proportion of stroke patients with documentation that an initial dysphagia screening assessment was performed during hospital admission (can be performed by any trained clinician such as an SLP, dietician, OT or nurse).	N: # of all stroke patients who receive a dysphagia assessment D: total # of stroke patients admitted to hospital	Local/regional data chart audit and stroke registries	* Need to define what constitutes a screen for dysphagia – whether using a standardized tool or any informal assessment. All types of stroke should be included in denominator.
	ii. Median time from patient arrival in the emergency department to initial swallowing screening by a trained clinician. (in minutes)	N: SUM[time from stroke patient registration in ED or inpatient to dysphagia screening completed] D: # of stroke/TIA patients admitted to ED or inpatient	Local/regional data chart audit and stroke registries	Median is preferred statistic as mean could be skewed. Both should be calculated.
	iii. Proportion of stroke patients who fail initial screening who then receive a comprehensive assessment by a speech language pathologist or other appropriately trained health care professional.	N: of stroke patients who fail initial screening who then receive a comprehensive assessment by a speech language pathologist or other appropriately trained health care professional. D: total # stroke patients screened for dysphagia	Local/regional data chart audit and stroke registries	
4.7 Acute Aspirin Therapy	i. Proportion of ischemic stroke patients who receive acute aspirin therapy within the first 48 hrs following a stroke event.	N: # ischemic stroke/TIA patients who receive acute aspirin therapy within the first 48 hrs following a stroke event. D: # ischemic stroke/TIA patients seen in ED or admitted to inpatient	Local/regional data chart audit and stroke registries	
	ii. Median time from stroke onset to administration of first dose of aspirin in hospital.	N: SUM[time from stroke patient registration in ED or inpatient to acute aspirin administration] D: total # ischemic stroke/TIA patients admitted to ED or inpatient.	Local/regional data chart audit and stroke registries	

4.8 Hemorrhage	i.	Proportion of hemorrhagic stroke patients treated on an acute stroke unit.	N: # of hemorrhagic stroke patients admitted to an RSC and treated in an acute care stroke unit at any time during hospital stay D: total # of hemorrhagic stroke clients admitted to a hospital (TIA, ischemic, hemorrhage)	Local/regional data, chart audit, stroke registries	Exclude patients taken directly to the operating room from the ED. If patients taken to the intensive care unit as opposed to acute stroke unit, these can be included, but should be reported separately,
	ii.	Proportion of total time in hospital spent on an acute stroke unit.	N: Sum {all time spent on acute stroke unit by all patients} D: Number of hemorrhagic stroke patients who spent any time on an acute stroke unit.	Local/regional data, chart audit, stroke registries	
	iii.	Percentage of hemorrhagic stroke patients who receive a neurosurgical consult while in hospital.	N: of hemorrhagic stroke patients who receive a neurosurgical consult while in hospital. D: total # hemorrhagic stroke patients admitted to hospital	Local/regional data, chart audit, stroke registries	Need to also account for referrals made or patients transferred to another hospital if neurosurgical services are not available in the hospital of original admission.
	iv.	Proportion of hemorrhagic stroke patients discharged to: their place of residence, inpatient stroke rehabilitation, Complex Continuing Care, or Long Term Care following hospital discharge.	N: hemorrhagic stroke patients discharged to each of: their place of residence, inpatient stroke rehabilitation, Complex Continuing Care, or Long Term Care following hospital discharge. D: total # hemorrhagic stroke patients admitted to hospital and discharged alive	Administrative data; Local/regional data, chart audit, stroke registries	
	v.	Mortality rate for subarachnoid and intracerebral hemorrhage at 30-days in hospital.	N: of hemorrhagic stroke patients who died while in hospital and within first 30 days D: total # hemorrhagic stroke patients admitted to hospital	Administrative data; Local/regional data, chart audit, stroke registries	

5. Stroke Rehabilitation

5.1 Initial Stroke Rehabilitation Assessment	i.	Proportion of acute stroke patients discharged from acute care to inpatient rehabilitation. ^c	N: stroke patients admitted to inpatient rehab following discharge from acute care D: Total # of stroke patients discharged alive from acute care hospital	Administrative data	Currently, not all patients go directly to rehab and of those who do go to rehab there may be a delay of up to or more than 30 days.. Reporting should include information on delays if appropriate.
	ii.	Median time from hospital admission for stroke to initial assessment for rehabilitation during inpatient stay. ^c	N1: Time from acute ED or hospital admission to initial assessment for stroke rehab. D1: All patients admitted to hospital with an acute stroke.	Local/regional data, chart audit, stroke registries	May be difficult to obtain. Need to clarify/define what constitutes an assessment when reporting. Also need to encourage good documentation that an assessment has been completed and the nature of the assessment (when, by whom, extent)
	iii.	Number/% of patients with a hospital admission for stroke who receive an initial assessment for rehabilitation within 48 hours of admission	N2: Number of patients who receive rehabilitation assessment within 48 hours of hospital admission. D2: All patients admitted to hospital with an acute stroke who receive a rehabilitation assessment..		
	iv.	Percentage of stroke patients discharged to the community who receive a referral for outpatient rehabilitation prior to discharge from acute and/or inpatient rehabilitation hospital (referrals may include either facility-based or community-based programs).	N: # patients discharged to the community who receive a referral for outpatient rehabilitation prior to discharge from acute and/or inpatient rehabilitation hospital D: # stroke patients discharged to the community from acute care or inpatient rehab.	Local/regional data, chart audit, stroke registries, some administrative databases (NRS)	Have to recognize some referrals will be made after patient discharge and for difficult to track.
	v.	Median length of time between referral for outpatient rehabilitation to admission to a community rehabilitation program.	a. time from referral being submitted to notification of acceptance into program.	Program referral logs, audits, specific community monitoring systems	Very difficult to obtain province-wide. Will be possible for funded homecare programs, but not so easy for other community programs.

	vi. Length of time between referral for outpatient rehabilitation to commencement of therapy.	a. time from referral being submitted to first day of actual therapy b. time from acceptance into program to first day of actual therapy	Program referral logs, audits, specific community monitoring systems	May be difficult to track unless audit tool set up.
	vii. Percentage increase in Telehealth/telestroke coverage to remote communities to support organized stroke care across the continuum and provide rehabilitation assessments for stroke patients.	N: # telestroke consults for rehabilitation assessments within a community D1: # stroke patients admitted to a community D2: Total # Telehealth consults in the community	Telehealth data systems; local chart audits; administrative data possibly	May be very difficult to establish an accurate denominator
5.2 Inpatient Stroke Rehabilitation	i. Number of stroke patients treated on a combined or rehabilitation-focused stroke unit at any time during their inpatient rehabilitation phase following an acute stroke event. ^c	N: # of stroke patients admitted to a rehab facility who spent any time on a stroke unit at any time during hospital stay D: total # of stroke clients admitted to a rehab facility (TIA, ischemic, hemorrhage)	Local/regional data and stroke registries	Stroke unit carries many definitions. When reporting it is important to define the type of stroke unit model being measured. This measure should be reported for all strokes, and also reported separately by stroke type.
	ii. Proportion of total time during inpatient rehabilitation following an acute stroke event that is spent on a rehabilitation stroke unit.	N: Sum {all time spent on rehab stroke unit} D: Number of stroke patients who spent any time on a rehab stroke unit.	Local/regional data and stroke registries	Stroke unit carries many definitions. When reporting it is important to define the type of stroke unit model being measured. This measure should be reported for all strokes, and also reported separately by stroke type.

	<p>iii. Final discharge disposition for stroke survivors following inpatient rehabilitation: percentage discharged to their original place of residence; percentage discharged to a long term care facility or nursing home; percentage of patients requiring readmission to an acute care hospital for stroke related causes. ^c</p>	<p>N: # stroke patients discharged from inpatient rehabilitation to each of: their original place of residence with or without support services; to a long term care facility or nursing home; other form of assisted living; readmission to an acute care hospital for stroke related causes</p> <p>D: All stroke patients discharged alive from an inpatient rehabilitation facility</p>	<p>Administrative databases (NRS)</p>	<p>Should be reported by stroke type, and functional related groupings</p>
	<p>iv. Number of stroke patients assessed by: physiotherapy; occupational therapy; speech language pathologist; and social workers during inpatient rehabilitation.</p>	<p>N: Number of stroke patients assessed by: physiotherapy; occupational therapy; speech language pathologist; and social workers during inpatient rehabilitation.</p> <p>D: total number of stroke patients admitted to inpatient rehabilitation</p>		
	<p>v. Frequency and duration/intensity of therapies received from rehabilitation professionals while in an inpatient rehabilitation setting following stroke.</p>	<p>a. Number of visits received by each type of rehabilitation professional b. Average Duration of each visit c. Total number of weeks therapy received by each provider</p>	<p>Provider databases are kept for workload measurement and may be accessible; patient diaries</p>	
	<p>vi. Percentage change in functional status using a standardized measurement tool, from time of admission to an inpatient rehabilitation unit for stroke patients, to the time of discharge.</p>	<p>a. Current functional score – functional score</p>	<p>Local/regional audits of data and stroke registries</p>	<p>* need to define a standardized functional scale to use, and set time intervals. This can be individualized as long as parameters clearly stated.</p>

5.3 Components of Inpatient Rehabilitation	i. Median time from hospital admission for stroke to initial assessment for rehabilitation during inpatient stay. ^c	N1. Time from acute ED or hospital admission to initial assessment for stroke rehab. D1: All patients admitted to hospital with an acute stroke. N2. Number of patients who receive rehabilitation assessment within 48 hours of hospital admission. D2: All patients admitted to hospital with an acute stroke who receive a rehabilitation assessment..	Local/regional data, chart audit, stroke registries	May be difficult to obtain. Need to clarify/define what constitutes an assessment when reporting. Also need to encourage good documentation that an assessment has been completed and the nature of the assessment (when, by whom, extent)
	ii. Number/% of patients with a hospital admission for stroke who receive an initial assessment for rehabilitation within 48 hours of admission			
	iii. Length of time between stroke onset and admission to stroke inpatient rehabilitation.	a/ Stroke patient admission date to inpatient rehab facility – stroke admission data to acute care ED or inpatient.	Administrative data	Should break time down to acute inpatient admission time – alternate level of care days as inpatient (or days from ready to discharge to rehab until actual discharge date). Some patients may go to another setting for a short stay before entering inpatient rehab and this should also be accounted for and defined when data presented.
	iv. Number/percentage of patients admitted to a coordinated stroke unit – either a combined acute care and rehabilitation unit, or a rehabilitation stroke unit in an inpatient rehabilitation facility at any time during their hospital stay (acute and/or rehabilitation). ^c	N: # of stroke patients admitted to a rehab facility who spent any time on a stroke unit at any time during hospital stay D: total # of stroke clients admitted to a rehab facility (TIA, ischemic, hemorrhage)	Local/regional data and stroke registries	Stroke unit carries many definitions. When reporting it is important to define the type of stroke unit model being measured. This measure should be reported for all strokes, and also reported separately by stroke type.

	<p>v. Final discharge disposition for stroke survivors following inpatient rehabilitation: percentage discharged to their original place of residence; percentage discharged to a long term care facility or nursing home; percentage of patients requiring readmission to an acute care hospital for stroke related causes. ^c</p>	<p>N: Discharge to each NRS 'referral to' option</p> <p>D: Total # patients discharged alive from inpatient stroke rehabilitation</p>	<p>CIHI - NRS</p>	<p>Can have 2 denominators – one including all patients, and one including only those alive at discharge.</p>
	<p>vi. Median length of time spent on a stroke unit during inpatient rehabilitation.</p>	<p>N: Sum {all time spent on rehab stroke unit}</p> <p>D: Number of stroke patients who spent any time on a rehab stroke unit.</p>	<p>Local/regional data and stroke registries</p>	<p>Stroke unit carries many definitions. When reporting it is important to define the type of stroke unit model being measured.</p> <p>This measure should be reported for all strokes, and also reported separately by stroke type.</p>
	<p>vii. Median number of days in spent as 'alternate level of care' in an acute care setting prior to arrival in inpatient rehabilitation setting.</p>	<p>N: SUM [total days spent in ALC status at acute care hospital] for patients who are discharged to inpatient rehabilitation</p> <p>D: all patients discharged from acute care to inpatient rehabilitation</p>	<p>Administrative data (CIHI - DAD)</p>	<p>The definition of 'alternate level of care' in an acute care setting varies considerably across institutions and across provinces.</p>
	<p>viii. Change (improvement) in functional status scores using a standardized assessment tool from admission to an inpatient rehabilitation program to discharge.</p>	<p>N: {total FIM score at discharge – total FIM score on admission} to stroke rehabilitation facility</p> <p>D: # patients discharged alive from inpatient rehabilitation</p>	<p>Administrative data or specific registries for collecting this data (e.g. CIHI NRS)</p>	

	ix. Total length of time (days) spent in inpatient rehabilitation, by stroke type.	N: Sum [Number of days from Admission Date to Discharge Date] for inpatient rehab patients D: Total number of patients discharged from inpatient rehabilitation	Administrative data or specific registries for collecting this data (e.g. CIHI NRS)	
	x. Number of patients screened for cognitive impairment using valid screening tool during inpatient rehabilitation.	N: Number of patients screened for cognitive impairment using valid screening tool during inpatient rehabilitation. D: total # stroke patients in an inpatient rehab facility	Administrative data or specific registries for collecting this data (e.g. CIHI NRS)	
	xi. Time from stroke onset to mobilization: a) sitting; b) standing upright; c) walking with/without assistance.	a. Time from stroke onset to mobilization: a) sitting; b) standing upright; c) walking with/without assistance.	Administrative data or specific registries for collecting this data	This may occur in acute care for many stroke patients or in rehab facility for more sever strokes.
5.4 Post-Stroke Depression	i. Proportion of stroke patients with documentation to indicate assessment/screening for depression was performed either informally or using a formal assessment tool in the acute care or rehabilitation setting following an acute stroke event.	N: #of stroke patients with documentation to indicate assessment/screening for depression was performed either informally or using a formal assessment tool in the acute care or rehabilitation setting following an acute stroke event. D: Total # stroke patients admitted to acute care or inpatient rehab	Local/regional audits of data and stroke registries	Need to state whether the screening was done with standardized tool or an informal assessment. Post stroke depression included in rehab section but should be considered across the entire continuum of stroke care
	ii. Proportion of stroke patients referred for additional assessment/intervention for a suspected diagnosis of depression following an acute stroke event.	N: # patients with a referral made for investigation of post-stroke depression D: # people screened for post-stroke depression	Local/regional audits of data and stroke registries	

5.5 Shoulder Pain	i. Proportion of stroke patients who experience shoulder pain in acute care hospital, inpatient rehabilitation and following discharge into the community.	N: # patients with documentation of shoulder pain D: # stroke patients admitted to each setting including:	Local/regional audits of data and stroke registries	
	ii. Length of stay during acute care hospitalization and inpatient rehabilitation for patients experiencing shoulder pain (as compared to patients not experiencing shoulder pain).	N: Median length of stay calculated for all stroke patients in an inpatient rehabilitation facility, and a subgroup for those who experience shoulder pain D1: # stroke patients in an inpatient rehabilitation facility D2: # stroke patients in an inpatient rehabilitation facility who experience shoulder pain that is identified	Administrative data Local/regional audits of data and stroke registries	
	iii. Proportion of stroke patients who report shoulder pain at 3 months and 6 month follow-up.	N: # patients experiencing shoulder pain at 3 and/or 6 months following discharge D: # stroke patients with shoulder pain during hospitalization who are included in follow-up assessments	Local/regional audits of data and stroke registries	Require mechanism to conduct follow-up assessments, if patient has left inpatient rehabilitation facility by the time frames intended.
	iv. Pain intensity rating change from baseline to defined measurement periods.	a. Current pain score – previous pain score	Local/regional audits of data and stroke registries	* need to define a standardized pain scale to use, and set time intervals. This can be individualized as long as parameters clearly stated.
	v. Motor score change from baseline to defined measurement periods.	a. Current motor functional score – motor functional score	Local/regional audits of data and stroke registries	* need to define a standardized motor functional scale to use, and set time intervals. This can be individualized as long as parameters clearly stated.
	vi. Range of shoulder external rotation before and after treatment for shoulder pain.	a. Current external rotation score – external rotation score	Local/regional audits of data and stroke registries	* need to define a standardized external rotation measure to use, and set time intervals. This can be individualized as long as parameters clearly stated.

	vii. Proportion of patients with contractures related to shoulder pain during recovery from stroke.	N: # stroke patients with upper limb contractures at 30 days and 3 months D1: total # stroke patients D2: total # stroke patients with shoulder pain	Local/regional audits of data and stroke registries	Need to define parameters for contracture. Specify denominator of interest. Define time frames.
5.6 Community Rehabilitation	i. Percentage of stroke patients discharged to the community who receive a referral for ongoing rehabilitation prior to discharge from hospital (acute and/or inpatient rehabilitation).	N: # patients discharged to the community who receive a referral for outpatient rehabilitation prior to discharge from acute and/or inpatient rehabilitation hospital D: # stroke patients discharged to the community from acute care or inpatient rehab.	Local/regional data, chart audit, stroke registries, some administrative databases (NRS)	Have to recognize some referrals will be made after patient discharge and for difficult to track.
	ii. Median length of time between referral for outpatient rehabilitation to admission to a community rehabilitation program.	a. time from referral being submitted to notification of acceptance into program.	Program referral logs, audits, specific community monitoring systems	Very difficult to obtain province-wide. Will be possible for funded homecare programs, but not so easy for other community programs.
	iii. Frequency and duration of services by rehabilitation professionals in the community.	a. Number of visits received by each type of rehabilitation professional b. Average Duration of each visit c. Total number of weeks therapy received by provider	Provider databases are kept for workload measurement and may be accessible; patient diaries	Identify primary sources of where services provided.
	iv. Change in functional status scores, using a standardized measurement tool, for stroke survivors engaged in community rehabilitation programs.	a. Current functional score – functional score	Local/regional audits of data and stroke registries	* need to define a standardized functional scale to use, and set time intervals. This can be individualized as long as parameters clearly stated.

	v. Length of time between referral for ongoing rehabilitation to commencement of therapy.	a. time from referral being submitted to first day of actual therapy b. time from acceptance into program to first day of actual therapy	Program referral logs, audits, specific community monitoring systems	May be difficult to track unless audit tool set up.
	vi. Percentage of persons with a diagnosis of stroke who receive outpatient therapy after an admission to hospital for a stroke event.	N: # stroke patients receiving outpatient rehabilitation therapy after discharge D: # stroke patients discharged alive to the community	Local/regional audits of data and stroke registries Program referral logs, audits, specific community monitoring systems	Clearly state which programs are being measured and included when reporting this measure.
	vii. Percentage increase in Telehealth/telestroke coverage to remote communities to support organized stroke care across the continuum and provide rehabilitation assessments and ongoing rehabilitation monitoring and management for stroke survivors in the community.	N: # telestroke consults for rehabilitation assessments within a community D1: # stroke patients admitted to a community D2: Total # Telehealth consults in the community	Telehealth data systems; local chart audits; administrative data possibly	May be very difficult to establish an accurate denominator

6. Follow-up and Evaluation in the Community

6.1 Follow-up in the Community	i. Percentage of stroke patients with documentation that information was given to patient/family on: formal/informal educational programs, care after stroke, available services, process to access available services, and what services are covered by health insurance.	N: Number of stroke patients in a clinical setting (ED, family practice, inpatient; rehab, etc) who have documentation in their record of the occurrence of patient/caregiver education D: Total number of stroke patients within the defined setting	Local charts, or stroke registries; National/Provincial survey (health institutions)	Patient education for all hospital and community programs is a performance measure in Hospital Accreditation organizations (Monitor Quality of Health Care).
	ii. Proportion of patients who are discharged from acute care who receive a referral for home care/community supportive services. ^c	N: # patients discharged to the community who receive a referral for supportive services prior to discharge from acute and/or inpatient rehabilitation hospital D: # stroke patients discharged to the community from acute care or inpatient rehab.	Local/regional data, chart audit, stroke registries, some administrative databases (NRS)	Have to recognize some referrals will be made after patient discharge and for difficult to track. Define type of referrals made for community services when collecting data
	iii. Number of patients referred to a secondary prevention team by the rehabilitation team.	N: # patients referred to secondary prevention after being discharged from acute care or inpatient rehabilitation D: # patients discharged from acute care or inpatient rehabilitation	Local/regional data, chart audit, stroke registries,	Need to define clearly the nature of secondary prevention services – outpatient or community-based clinic.
	iv. Percentage of readmissions to acute care for stroke related causes following discharge to the community (by stroke type).	N: # patients who require readmission to an ED or inpatient setting after being discharged from acute care or inpatient rehabilitation D: # patients discharged from acute care or inpatient rehabilitation	Administrative database	

	v. Number of visits to primary care within specified time frames for stroke related issues.	N: # visits by each stroke patient to primary care following discharge from acute care or inpatient rehabilitation D: # patients discharged from acute care or inpatient rehabilitation	Local/regional data, chart audit, stroke registries, patient diaries	State type of primary care services – family physician, nurse practitioner, other
	vi. Number of visits to an emergency department within specified time frames.	N: # visits by each stroke patient to an emergency department following discharge from acute care or inpatient rehabilitation D: # patients discharged from acute care or inpatient rehabilitation	Administrative data	Track reasons for ED visits – may be stroke related or other causes.
	vii. Percentage of patients who return home following stroke rehab who require community support services (e.g., homecare or respite).	N: # patients discharged to community following acute care or inpatient rehabilitation for stroke, who require community support services D: # patients discharged to community following acute care or inpatient rehabilitation for stroke	Community care databases, service provider databases, patient diaries	Describe type of community support services received when reporting this measure.
	viii. Length of time from hospital discharge (following acute care or inpatient rehabilitation) to initiation of community support services.	a. date community support services first begin – date of discharge from acute care or inpatient rehabilitation following stroke	Community care databases, service provider databases, patient diaries	Describe type of community support services received when reporting this measure.
	ix. Frequency and duration of community support services, stratified by the type of service provided.	a. Number of visits received by each type of community support b. Average Duration of each visit c. Total number of weeks of service received by each provider	Provider databases are kept for workload measurement and may be accessible; patient diaries	

	<p>x. Number of readmissions from stroke rehabilitation to acute care for stroke related causes.</p>	<p>N: # stroke patients with readmissions to acute care following discharge to community</p> <p>D: # stroke patients discharged to the community following acute or inpatient rehabilitation.</p>	<p>Administrative databases</p>	<p>Should track both readmits for stroke and for all cause.</p> <p>Also should track time from initial discharge to readmission.</p>
	<p>xi. Percentage of patients who return to the community from acute hospital stay or following an inpatient rehabilitation who require admission to long term care/nursing home within 6 months/one year. ^c</p>	<p>N: # stroke patients with admissions to long term care following discharge from acute care to community</p> <p>D: # stroke patients discharged to the community following acute or inpatient rehabilitation.</p>	<p>Home care provider databases, provincial databases</p>	
	<p>xii. Median wait time from referral to admission to nursing home or long term care facility</p>	<p>a. Admission to LTC date – date referral made (days or weeks)</p>	<p>Home care provider databases, provincial databases</p>	
	<p>xiii. Documentation to indicate assessment for fitness to drive and related patient counseling was performed.</p>	<p>N: # stroke patients with documentation of initial driving status assessment during inpatient acute, inpatient rehab or community assessment</p> <p>D: # stroke patients discharged to the community following acute or inpatient rehabilitation.</p>	<p>Local/regional data, chart audit, stroke registries, patient diaries</p>	<p>Difficult to track as may occur in many places along the continuum by different healthcare providers</p>
	<p>xiv. Number of patients referred for driving assessment by occupational therapist in the community.</p>	<p>N: # stroke patients with referral to OT for detailed driving status assessment after discharge to the community</p> <p>D: # stroke patients discharged to the community following acute or inpatient rehabilitation.</p>	<p>Local/regional data, chart audit, stroke registries, patient diaries.</p> <p>OT workload databases may provide information.</p>	<p>Identify potential providers and discuss access to data with them.</p>

	xv. Measure of burden of care for family and care givers of stroke survivors living in the community.	N: Total burden of care on family members once stroke survivor returned to the community D: # families surveyed.	Local surveys	Identify validated and standardized tool to use for measurement.
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