Canadian Stroke Best Practices

QUALITY OF STROKE CARE IN CANADA

KEY QUALITY INDICATORS AND STROKE CASE DEFINITIONS

7TH EDITION

Update 2021

Canadian Stroke Best Practices
Stroke Quality Advisory Committee

February 2021

Quality of Stroke Care in Canada

1. Introduction

The *Canadian Stroke Best Practice Recommendations (CSBPR)* provides a synthesis of evidence-based best practices in the assessment, diagnosis and management of people who have had a stroke or transient reintegration within a quality improvement framework for provinces, territories and regional health authorities as they develop and implement integrated stroke strategies. These recommendations are the result of an extensive review of international stroke research and developed through a rigorous consensus process.

The goal of disseminating and implementing these recommendations is to improve the care of stroke patients across Canada by reducing variations in practice and closing the gap between knowledge and practice. Recommendations are updated on a rotating cycle every two to three years to ensure they continue to reflect the most current stroke research evidence and leading expert opinion.

Each update involves critical review of the current healthcare literature, which informs decisions regarding modification of the recommendations and the performance measures used to assess their impact. Every attempt is made to coordinate with other Canadian groups who are developing guidelines for certain conditions that relate to stroke, such as hypertension, atrial fibrillation and diabetes.

If significant new evidence becomes available in between update cycles, a process is in place to conduct a modified Delphi review to rigorously assess the new evidence and gain consensus on the impact of that evidence on current recommendations. Modifications that are required through the consensus process will be made as soon as they are available, which is readily enabled through the web-based format of the Canadian Stroke Best Practices.

2. Quality of Stroke Care in Canada

The Quality of Stroke Care in Canada is a program of ongoing monitoring and reporting on core stroke care indicators across the continuum, which aims to identify organizations that have successfully implemented the CSBPR to optimize patient outcomes.

The Stroke Quality Advisory Committee (SQAC) has been established to provide leadership, guidance, consistency and standardization in stroke measurement and monitoring across Canada. These goals facilitate opportunities to compare performance and monitor progress in achieving national benchmarks within and across provinces and peer groups based on stroke resources and service availability. Members of the Canadian Stroke Quality Advisory Committee include experts in quality of care, measurement and evaluation, and optimal stroke care delivery. Persons who have experienced a stroke, their family members and/or informal caregivers also participate on this committee.

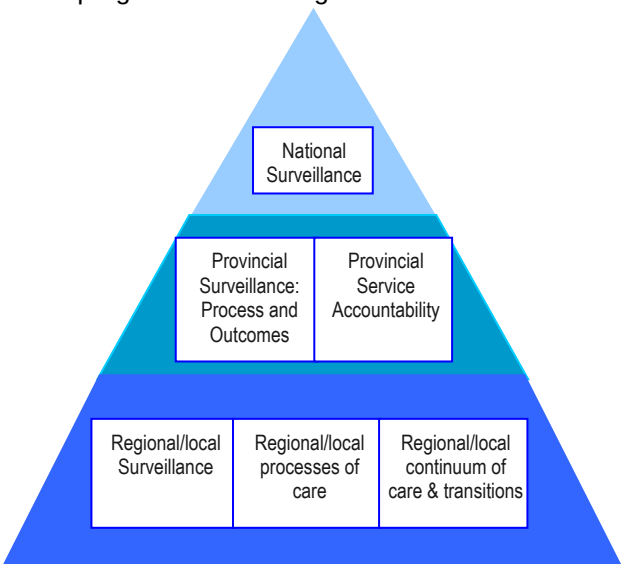


Figure 1: Hierarchy of Stroke Performance Priorities

This group has developed a quality framework that identifies the stroke best practices, HSF supporting services and mechanisms, internal and external partnerships and collaborations, and stroke data monitoring activities. The quality framework is operationalized through the development of a core set of stroke performance measures and quality indicators, a standardized set of case definitions for stroke care, a repository of additional recommendation-specific quality indicators, audit tools, data collection tools in collaboration with the Canadian Institute for Health Information (CIHI), and the CSBPR performance measurement manual.

3. Key Quality Stroke Indicators

The ***key quality stroke indicators (KQIs)*** have been selected through a rigorous Delphi process. They represent the areas of stroke care with the highest levels of evidence, and are drivers for improvement in processes of care and patient outcomes. The KQIs form the basis of ongoing measurement and monitoring activities by the Heart and Stroke Foundation, as well as through partnerships with the Public Health Agency of Canada, the Canadian Institute for Health Information, and Accreditation Canada. All KQIs are reviewed and updated as required every two to three years as a component of the Canadian Stroke Best Practice Recommendations bi-annual update cycle.

In addition to the KQI set, a more in-depth list of quality indicators has been developed for each topic area and set of recommendations included in the Canadian Stroke Best Practices. These additional indicators enable groups to more closely monitor the impact of implementing specific recommendations on the quality of patient care and/or patient outcomes. These are often applicable when quality improvement initiatives are undertaken on a specific stroke best practices topic. The more in-depth list of quality indicators for each topic area and set of recommendations included in the Canadian Stroke Best Practices can be found at www.strokebestpractices.ca.

The core and additional performance measures are identified through a literature review that runs concurrently to the review for the stroke best practice recommendations. Indicators are often included in research studies as primary and secondary outcomes, and some documents have been published that list stroke quality indicators specifically. Research articles that identify stroke quality indicators undergo the same rigorous critical appraisal as do articles for recommendations.

Developmental KQI (*noted in italics at end of each section where appropriate*) are performance measures that are valuable for supporting system planning and implementation and should be collected and reported; yet at this time data quality and feasibility is still a challenge. Organizations should develop mechanisms for valid and reliable data collection for these KQI to elevate them beyond the developmental stage for future iterations of the stroke key quality indicators. The HSF Stroke Quality Advisory Committee will monitor these on an ongoing basis.

All key quality indicators, developmental, and additional more detailed supporting indicators included with the stroke best practice recommendations are selected based on the following selection criteria:

i. ***Strong Evidence***: align with stroke best practice recommendations that have the highest levels of supporting evidence and/or measure key system drivers;

ii. ***Relevance****:* Are relevant and important in monitoring quality of stroke care within current clinical practice priorities;

iii. ***Validity:*** Are valid stroke performance measures, have been reported in the literature or have been tested by members of the advisory committee or collaborators, and have strong face and content validity;

iv. ***Reliability***: Are reliable for measurement over time and among a range of groups;

v. ***Feasibility:*** Are feasible to collect (data can be available with appropriate mechanisms established) and the benefits of collecting the data outweigh the costs of data collection;

vi. ***Actionability****:* Have clearly defined actions that could be taken to improve the quality of care being measured by the indicator;

vii. ***Unambiguous:*** Are clearly defined and can be calculated consistently by different groups, with specific numerators, denominators and inclusion/exclusion criteria.

Patient-Reported Measures: *New Additions for CSBPR Seventh Edition*

The theme of the Seventh Edition of the CSBPR is **Building connections to optimize individual outcomes**. People who have experienced a stroke often present to the healthcare system with multiple comorbid conditions – some that may contribute to their stroke, some that are consequences of their stroke, and some unrelated. One study revealed that approximately 80% of people who survive a stroke have on average five other conditions and a wide range of psychosocial issues (Nelson et al, 2016). These conditions must be considered as treatment and ongoing care planning is personalized and person-centred. In addition, there is strong evidence of the intrinsic connections between the heart and brain, and management of people following stroke should take heart health and possible association with vascular cognitive impairment into consideration. The healthcare system is often designed in siloes with different planning and organization for individual conditions, that are not integrated across conditions, even related vascular conditions. As people transition across settings and phases of care following a stroke, they report experiencing anxiety and feeling quite overwhelmed. Individualized care and ensuring connections are made within the community have a significant impact on patient short and long-term outcomes.

The Seventh Edition of the CSBPR includes a broader wholistic focus and take into consideration issues of multimorbidity and increasing complexity of people who experience stroke. As part of considering these broader perspectives, all key quality indicators and quality monitoring work will take into account multiple perspectives. Within each module, indicators will be identified within the following categories:

- Clinical and System level process and outcome indicators
- Patient reported experience and outcome measures (PREMS, PROMS)

The addition of the PREMS and PROMS highlights the need to consider the impact of stroke on the whole person and strive to optimize the experience and outcomes from the perspective of the person with stroke and their family members. All modules in the Seventh Edition of the CSBPR will include a listing of PREMS and PROMS along with system and clinical process and outcome indicators where appropriate.

Patient-reported outcome measures (PROMs) are used to assess a patient's health status at a particular point in time. PROMs tools can be completed either during an illness or while treating a health condition. In some cases, using pre- and post-event PROMs can help measure the impact of an intervention (CIHI 2020). Examples of PROMS include quality of life, symptom burden, well-being, levels of distress, unmet needs, health behaviours and functional ability.

Patient-reported experience measures (PREMS) Capture a person's perception of their experience with health care or service (e.g., wait times, involvement in decision-making, knowledge of and inclusion in communications).

PART ONE: Quality of Stroke Care in Canada Key Quality Indicators Set (2018)

** Notes:*

- *Table 1 represents the full list of stroke Key Quality Indicators - For complete description and details of each KQI, inclusion criteria, and calculation information please refer to supplemental HSF Stroke Performance Measurement Manual. www.strokebestpractices.ca*
- ***Developmental KQI** (noted in grey colour and italics at end of each section where appropriate) are performance measures that are valuable for supporting system planning and implementation and should be collected and reported; yet at this time data quality and feasibility is still a challenge. Organizations should work on mechanisms for valid and reliable data collection for these KQI and elevate them beyond the developmental stage.*
- ***Timeline:** a timeline to demonstrate some key process indicators and time intervals derived from the KQI described below can be found at the end of this table.*

Table 1: Stroke Key Quality Indicators, Update 2018*

(* all codes based on the 2018 update to he Coding manuals)

#	Key Quality Indicators	Rationale* and Targets
QSCiC Stroke Key Quality Indicators: Public Awareness		
1.	Proportion of the population aware of 2 or more signs of stroke, based on FAST (Face, Arm, Speech, Time).	HSF FAST impact outcome measure. Target: 10% improvement over previous year
2.	Proportion of the population that has any identified risk factors for stroke including any of: hypertension, hyperlipidemia, diabetes, atrial fibrillation, carotid artery disease, obesity, smoking history, low physical activity, sleep apnea, illicit drug use.	HSF FAST impact outcome measure
QSCiC Stroke Key Quality Indicators: Pre-Hospital / Use of Emergency Medical Services		
3.	Proportion of (suspected) stroke patients arriving in the ED who were transported to an acute care hospital by emergency medical services.	HSF FAST impact measure; proxy; pre-hospital access process measure
4.	Median time from onset of stroke symptoms (or last seen normal time) to hospital arrival time for all stroke and TIA patients (minutes).	HSF public awareness proxy impact measure; access, efficiency process measure
5.	Proportion of acute ischemic stroke patients who arrive at hospital within 3.5, 4.5, 5 and 6 hours of stroke symptom onset.	HSF public awareness proxy impact measure; access, efficiency process measure *If onset to arrival times are captured then any time interval can be calculated to fit specific goals and indicators*
6.	*Percentage of (suspected) stroke patients transported by EMS where a closer hospital was bypassed to take the patient to an advanced or comprehensive stroke centre.*	***Developmental indicator** of system integration, process – promote improved documentation, data quality, accuracy*

7.	*Percentage of (suspected) stroke patients transported by EMS where the destination hospital received pre-notification by EMS that a suspected stroke patient was enroute to the destination emergency department.*	***Developmental indicator** of system integration, process – promote improved documentation, data quality, accuracy*
QSCiC Stroke Key Quality Indicators: Hyperacute and Emergency Stroke Care ***(Refer to Figures 1 & 2 for Timelines)***		
8.	Median time from patient arrival to hospital (recorded triage time) to first brain imaging scan (first slice time) in minutes.	Measure of ED/hospital system efficiency, process. Target ≤ 15 minutes
9.	Proportion of all ischemic stroke patients who receive treatment with intravenous alteplase (tPA) . ** Local targets will be dependent on regional and institutional characteristics and system organization for stroke*	Measure of access, appropriateness, process. Target: >21% at 25th percentile and 28% at 10th percentile of top performing hospitals for patients arriving within 4.5 hours at advanced and comprehensive stroke centres; (based on Canadian Stroke Audit)
10.	Median time from patient arrival in the emergency department (recorded triage time) to administration of intravenous alteplase (tPA) (start of bolus) (in minutes).	Measure of efficiency, process. Target: median (50th percentile) of 30 minutes; 90th percentile 60 minutes
11.	Median time from stroke symptom onset (and/or last seen normal [LSN] time) to administration of intravenous alteplase (tPA) (start of bolus) (in minutes).	Measure of efficiency, process. SBP: less than 4.5 hours Target: TBD
12.	Proportion of all thrombolyzed ischemic stroke patients who receive acute thrombolytic therapy within 30 minutes and within one hour of hospital arrival.	Measure of efficiency, process. Target: median (50%) within 30 minutes; 90th percentile within 60 minutes.
13.	Proportion of patients with symptomatic intracranial hemorrhage within 24 hours of receiving intravenous alteplase (tPA) (includes ICH, SAH, IVH, SDH).	Measure of effectiveness, outcome. Target is less than 6% for IV alteplase.
14.	Proportion of all ischemic stroke patients who receive acute endovascular treatment.	Measure of access, appropriateness, process. * Targets TBD and will be dependent on regional and institutional characteristics and system organization for stroke. *(Developmental target is >10% of cases)*
15.	Median time from arrival at a comprehensive stroke centre to arterial puncture (groin or other access point) for patients undergoing acute endovascular treatment (minutes)	Measure of efficiency, process. Target: Target: median (50th percentile) of 60 minutes; 90th percentile 90 minutes
16.	Median time from stroke symptom onset (and/or last seen normal [LSN] time) to arterial puncture (groin or other access point) for patients undergoing acute endovascular treatment (minutes)	Measure of efficiency, process. SBP: less than 6 hours, with select cases < 12 hours. Target: TBD

17.	Proportion of patients with symptomatic intracranial hemorrhage within 24 hours of receiving acute endovascular treatment.	Measure of effectiveness, outcome. *Target: < 6%*
18.	Median DOOR IN DOOR OUT time for patients who arrive at an advanced stroke centre (primary/district stroke centre) and are then transferred to a comprehensive stroke centre for acute endovascular treatment.	Measure of efficiency, process. Target <45 minutes.
19.	*Median time from FIRST CT scan (first slice) to arterial puncture (groin or other access point) for patients undergoing acute endovascular treatment (minutes).*	*Developmental Indicator of efficiency,* process. *Target: proposed median < 45 minutes*
20.	*Median time from FIRST hospital arrival (recorded triage time) to the first deployment of thrombectomy device (stent-triever, penumbra, other device).*	***Developmental indicator** of system integration, efficiency, process – promote data quality, accuracy improved documentation Target median time = TBD*
21.	*Median time (recorded triage time) from arrival at comprehensive stroke centre (EVT treating hospital) to final reperfusion in patients where reperfusion achieved.*	***Developmental Indicator** of efficiency,* process. *Target: median (50th percentile) of 90 minutes; 90th percentile 120 minutes*
QSCiC Stroke Key Quality Indicators: Acute Inpatient Stroke Care		
22.	The hospital inpatient admission volumes for patients with ischemic stroke, intracerebral hemorrhagic stroke, subarachnoid hemorrhage, and transient ischemic attack (each reported separately).	Measure of efficiency, system capacity, process.
23.	Proportion of acute stroke patients first seen in the ED who are then admitted to hospital.	Measure of access, process, continuity.
24.	Median total acute inpatient hospital length of stay (active LOS + ALC = total) (days).	Measure of access and efficiency, outcome. Target <= 8 days (median)
25.	The proportion of all acute stroke patients who are managed on a designated geographically defined integrated, acute, and/or rehabilitation stroke unit at any point during hospitalization.	Measure of access, process. Target >75% of acute stroke admissions (excluding SAH and TIA) (based on Canadian Stroke Audit).
26.	Proportion of acute stroke patients who die in hospital of all causes within 7 days of hospital admission for an index stroke.	Measure of effectiveness, outcome. Target: <5% (based on Canadian Stroke Audit)
27.	Proportion of acute stroke patients who die in hospital of all causes within 30 days of hospital admission for an index stroke.	Measure of effectiveness, outcome.

28.	Percentage of patients admitted to acute inpatient care with a diagnosis of acute stroke who experience one or more complications during hospitalization (including any of: fall, deep venous thrombosis, pulmonary embolus, secondary cerebral hemorrhage, gastrointestinal bleeding, pressure ulcers, urinary tract infection, pneumonia, seizures [or convulsions).	Measure of effectiveness, quality, outcome. Targets: TBD, *separate targets for each potential complication listed.*
29.	Distribution of discharge locations (dispositions) for acute stroke patients from acute inpatient care to: home (with and without services); inpatient rehabilitation (General or specialized); long-term care; and to palliative care.	Effectiveness and access measure, process. Target for admission to inpatient rehabilitation: >30% (based on Canadian Stroke Audit)
30.	*Distribution of modified Rankin scale scores at discharge from acute inpatient care.* *(Note, some provinces currently implementing alpha-FIM as discharge functional measure score.*	***Developmental indicator** of outcome and effectiveness.*
QSCiC Stroke Key Quality Indicators: Secondary Prevention of Stroke		
31.	Proportion of patients with major risk factors for stroke, including hypertension, obesity, hyperlipidemia, diabetes, atrial fibrillation, smoking, and physical inactivity.	HFS Impact measure, outcome.
32.	Proportion of acute stroke and TIA patients who are discharged alive from an emergency department or an inpatient stay and then readmitted to hospital for any cause within 7 days of index acute stroke discharge.	Effectiveness measure, outcome.
33.	Proportion of patients with TIA or non-disabling stroke who are investigated and discharged from the emergency department who are referred to organized secondary stroke prevention services at discharge.	Measure of access, efficiency, continuity, process. *Target: TBD*
34.	Proportion of stroke or TIA patients with moderate to severe (50 percent to 99 percent) symptomatic carotid artery stenosis who undergo a carotid revascularization procedure following an index stroke/TIA event.	Measure of access, process.
35.	Proportion of stroke/TIA patients with moderate to severe (50 percent to 99 percent) carotid artery stenosis who undergo a carotid revascularization procedure following an index event <u>within 2 weeks</u> of first hospital or SPC assessment.	Measure of access, efficiency, process. *Note: SBP states CEA should be done as soon as possible within 14 days.*
36.	Median time from onset of index ischemic stroke or TIA symptoms to carotid revascularization (days, hours).	Measure of access, efficiency, process. Target: < 14 days *Note: SBP states this should be done as soon as possible; sites should strive towards shorter treatment times.*
37.	***Developmental KQI:** Proportion of HIGHEST risk TIA and non-disabling stroke patients who are investigated and managed within 24 hours in the ED. or referred to organized secondary stroke prevention services*	***Developmental indicator** of process, responsiveness – promote improved documentation, data quality, accuracy.*

QSCiC Stroke Key Quality Indicators: Stroke Rehabilitation and Recovery		
38.	Proportion of stroke patients who have an initial rehabilitation assessment within 48 hours of hospital admission for acute stroke by at least one stroke rehabilitation specialist.	Measure of access, efficiency, process. Target is 100%
39.	Proportion of acute stroke patients discharged from acute care to inpatient rehabilitation.	Measure of access, process. Target is > 30% (based on Canadian Stroke Audit)
40.	Time from stroke symptom onset to admission for inpatient stroke rehabilitation services (days, hours).	Measure of access, efficiency, process. Target: TBD
41.	Proportion of stroke patients treated in a geographically defined stroke rehabilitation unit staffed with an interprofessional team at any time during their inpatient rehabilitation phase following an acute stroke event.	Measure of access, process. Target: > 75%
42.	Median length of time between from acute hospital discharge to commencement of outpatient rehabilitation therapy for patients not receiving care in a specialized inpatient rehabilitation unit.	Measure of access, efficiency, process. Target: TBD
43.	Median change in functional independence scale score from time of admission to inpatient rehabilitation to time of discharge from inpatient rehabilitation (stratified by stroke severity at admission).	Measure of effectiveness, outcome.. Target: 25th percentile = 20 point change in FIM score
44.	Proportion of patients with documentation of initial dysphagia screening during admission in the emergency department or acute inpatient unit/ward.	Measure of access, process. Target: > 80% (based on Canadian Stroke Audit)
45.	Proportion of stroke patients screened for cognitive impairment during inpatient rehabilitation using valid screening tool.	Measure of process. Target: TBD
46.	Proportion of stroke patients screened for depression during inpatient rehabilitation using valid screening tool.	Measure of process. Target: TBD
47.	Distribution of discharge locations (dispositions) from inpatient rehabilitation to: home (with and without services); acute care (for acute medical issues or as repatriation to home community); and to long-term care (each stratified by age, stroke type and severity).	Measure of process, access, effectiveness. Target: TBD
48.	Median number of days spent in active rehabilitation (i.e., length of stay less days unable to participate due to service interruptions, such as illness or short-term readmission to acute care).	Measure of effectiveness, outcome, access. Target: TBD
49.	Percentage of patients admitted to inpatient rehabilitation with a diagnosis of acute stroke who experience one or more complications during hospitalization (including any of: fall, deep venous thrombosis, pulmonary embolus, secondary cerebral hemorrhage, gastrointestinal bleeding, pressure ulcers, urinary tract infection, pneumonia, seizures [or convulsions).	Measure of effectiveness, quality, outcome. Targets: TBD, *separate targets for each potential complication listed.*

50.	*Median hours per day of direct evidence-based task-specific therapy provided by the interprofessional stroke team.*	***Developmental indicator** of appropriateness process, access – promote data quality, accuracy improved documentation.*
51.	*Distribution of modified Rankin scale scores at discharge from inpatient rehabilitation care.*	***Developmental indicator** of process, responsiveness – promote improved documentation, data quality, accuracy.*
QSCiC Stroke Key Quality Indicators: Health System		
52.	The emergency department annual admission volumes for patients with transient ischemic attack, ischemic stroke, intracerebral hemorrhage, and subarachnoid hemorrhage.	Measure of access, process, system capacity. Monitor trends – note that trends in admissions do not indicate trends in incidence or prevalence.
53.	Acute inpatient hospital annual admission volumes for patients with transient ischemic attack, ischemic stroke, intracerebral hemorrhage, and subarachnoid hemorrhage.	Measure of access, process, system capacity. Monitor trends – *note, trends in admissions do not indicate trends in incidence or prevalence.*
54.	Population-based stroke mortality rates per 100,000 people: 7-day in-hospital all-cause fatality for patients with ischemic stroke, intracerebral hemorrhagic stroke, subarachnoid hemorrhage, and transient ischemic attack.	Measure of effectiveness, outcome. Population-based rates, age and sex standardized.
55.	Population-based stroke mortality rates per 100,000 people: 30-day in-hospital all-cause fatality for patients with ischemic stroke, intracerebral hemorrhagic stroke, subarachnoid hemorrhage, and transient ischemic attack.	Measure of effectiveness, outcome. Population-based rates, age and sex standardized.
56.	Proportion of acute stroke and TIA patients who are discharged alive from an emergency department or an inpatient stay and then readmitted to hospital for any cause within 7 days of index acute care discharge.	Measure of effectiveness, outcome. Target: TBD (*Note: ASPIRE shows 10% readmission for any cause.)*
57.	Proportion of stroke patients with a modified Rankin Scale score of 0 – 2 at 90 days following onset of stroke (reported in subgroups of those who received alteplase or acute endovascular treatment or both).	Measure of effectiveness, outcome. Target for patients who receive EVT is > 50%.
58.	For patients living at home prior to their stroke, the proportion of acute stroke and TIA patients who were discharged to home after acute stroke care and/or inpatient stroke rehabilitation admission.	Measure of effectiveness, outcome. Target TBD
59.	For those patients living at home prior to their stroke, the proportion of acute stroke and TIA patients who were discharged to long-term care after stroke acute care and/or inpatient rehabilitation admission.	Measure of effectiveness, access, outcome. Target TBD
60.	*Home Time: Total number of days spent at home (private residence, with or without home4 care services) within the first 90 days and first 365 days of stroke/TIA onset for acute stroke patients following discharge from an acute care hospital.*	***Developmental indicator** of effectiveness – promote improved documentation, data quality, accuracy. Target: TBD*

FIGURE 1: PROCESS TIMES (MEDIAN) FOR PATIENTS ARRIVING DIRECTLY TO COMPREHENSIVE STROKE CENTRE

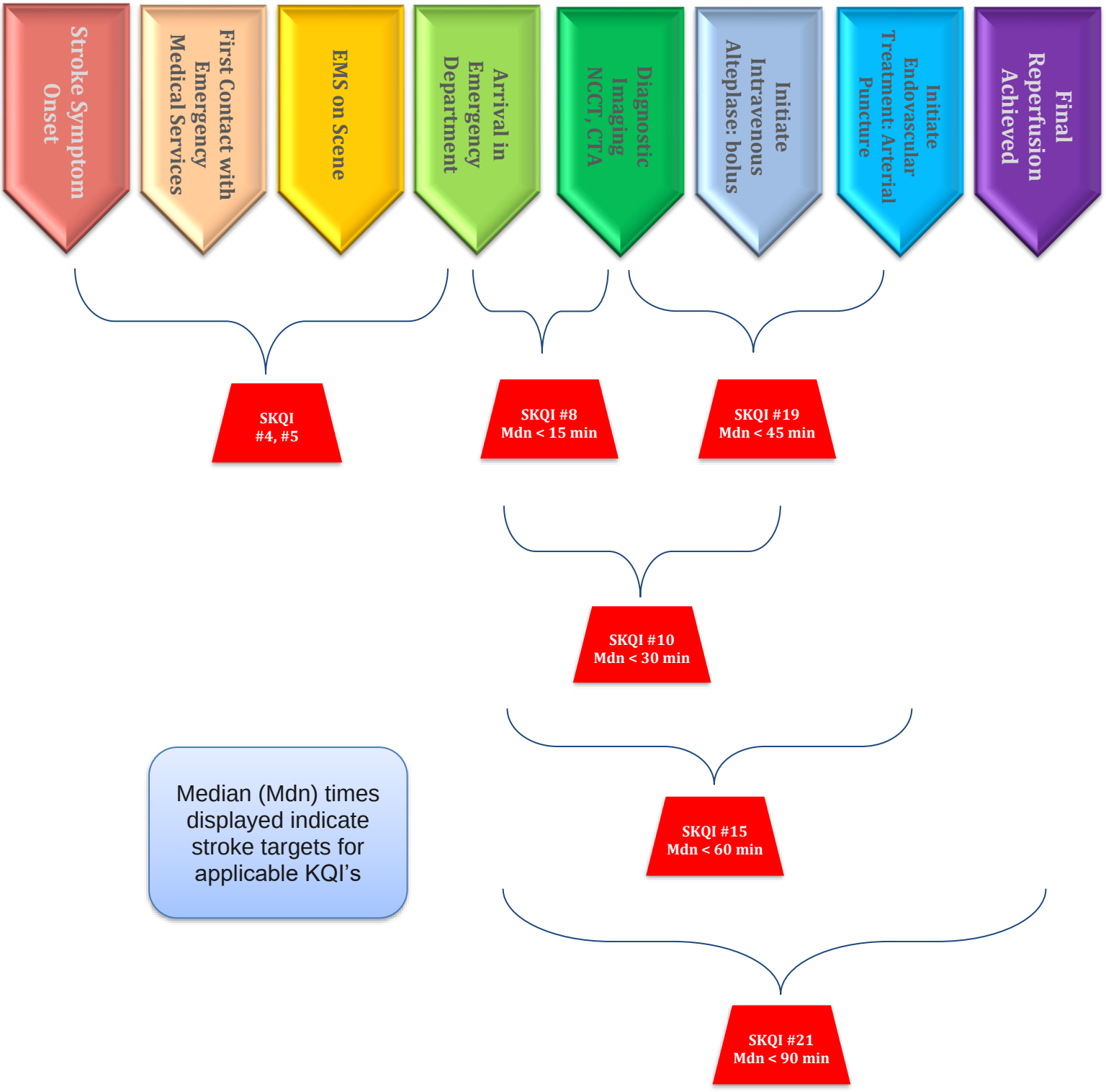
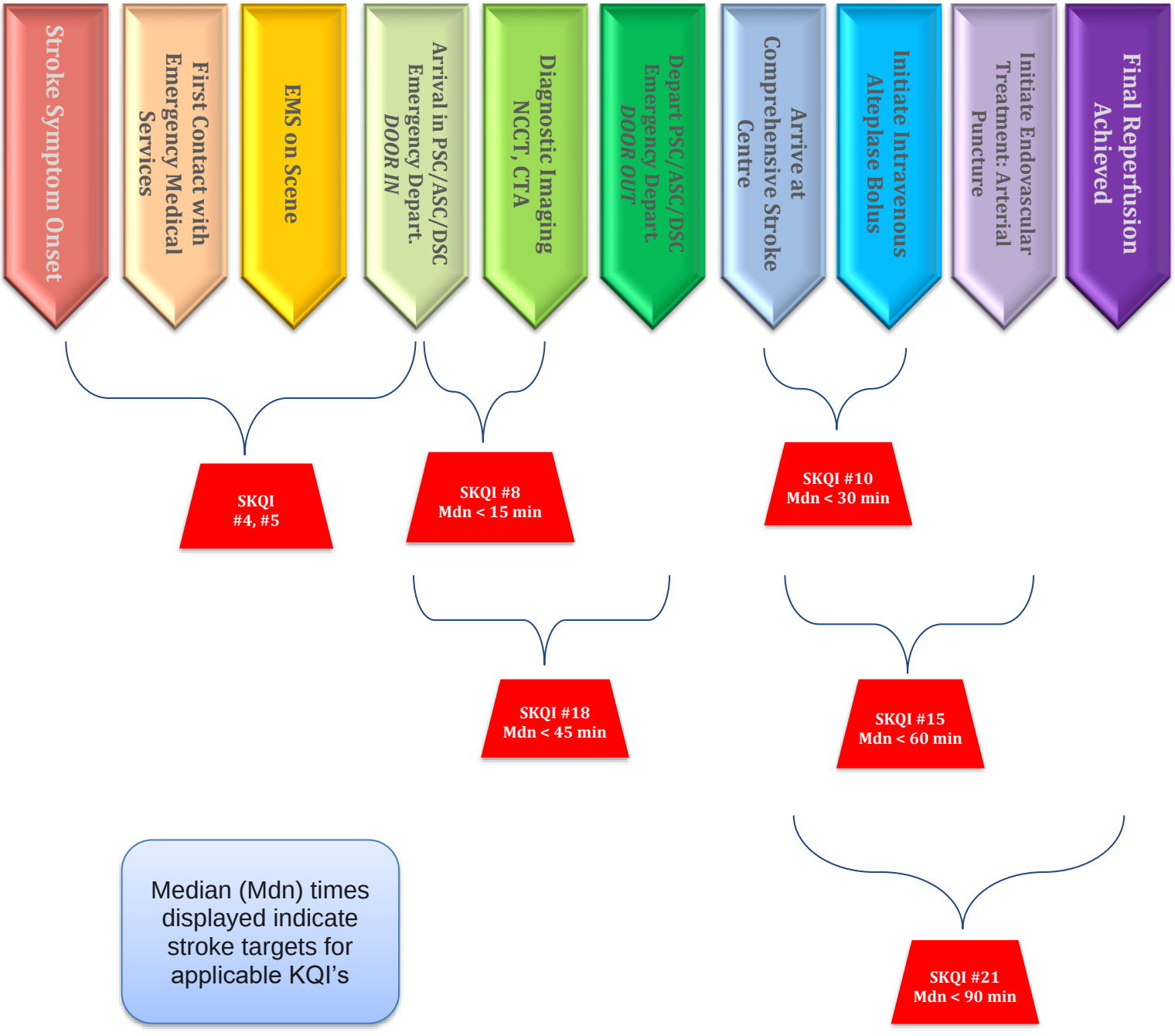


FIGURE 2: PROCESS TIMES (MEDIAN) FOR PATIENTS ARRIVING FIRST TO PRIMARY/DISTRICT/ADVANCED STROKE CENTRE THEN TRANSFERRED TO COMPREHENSIVE STROKE CENTRE



PART TWO: QSCIC Stroke Coding Definitions *(Based on 2018 Coding standards)*

1. Stroke Case Selection for Acute Stroke

The Canadian Stroke Quality Advisory Committee has developed a standardized set of stroke case identification and selection codes (i.e., stroke case definitions) which should be used for selecting appropriate stroke cases for analysis of the stroke key quality indicators (Table 2). These stroke case identification codes have been established through extensive data analysis and validity of case definition scenarios by stroke researchers in Canada. Sensitivity and specificity analyses have been conducted working in close collaboration with partner organizations such as the Canadian Institute for Health Information (CIHI) and the Public Health Agency of Canada (PHAC). Consensus was reached among these groups regarding appropriate International Classification of Diseases codes for inclusion and exclusion in a standardized set of case definitions.

In addition to application for all stroke key quality indicators and additional performance measures included in the Canadian Stroke Best Practice Recommendations, the stroke case identification codes contained in Table 2 are now aligned with codes that will be used by other research groups and organizations involved in stroke monitoring and surveillance. Examples of these collaborations include: PHAC surveillance reports on stroke care and will be applied to the stroke component of the Canadian Chronic Disease Surveillance System (CCDSS); and, the Canadian Institute of Health Information Special Projects #340, #640, #740 – Stroke Quality Improvement (for collecting stroke indicators using regular National Ambulatory Care Reporting System (NACRS) and/or inpatient Discharge Abstract Database (DAD) abstraction and submission to CIHI). Collaborating groups have agreed to align with these case selection codes for any future stroke related reporting, including national health indicators and mortality reports.

The present goal is that all organizations and research groups in Canada measuring the processes and outcomes of stroke care use the same stroke case identification codes, drawn from Table 2. All individuals and groups conducting research in stroke and reporting on performance indicators should state the purpose of the analysis to be undertaken; provide clear descriptions and explanations of their target population; rationale for specific case selection; and, inclusion and exclusion criteria for selecting a specific stroke cohort. Risk adjustment for factors such as age variations, types of stroke, comorbid conditions should be considered and applied as warranted and again be transparently reported. These efforts to improve documentation and communication will enable greater standardization, comparability and transparency.

Emerging Issues: There are certain unique circumstances where a stroke occurs that may result in the stroke not being coded as the main problem (NACRS) or most responsible diagnosis (DAD), thereby making identification of all appropriate cases for analysis and reporting a challenge. Work is undergoing to investigate coding practices, criteria for inclusion/exclusion, sensitivity and specificity for the following unique conditions and circumstances:

- Stroke that occurs during pregnancy and childbirth (prenatal, anti-partum, post-partum);
- Stroke that occurs for patients already in hospital for other health conditions (such as heart surgery, orthopedic surgery, etc.).
- Stroke patients who may be admitted to an inpatient rehabilitation bed without an acute inpatient stay during the same admission at the same facility.
- Stroke patients that are determined to be palliative in the emergency department prior to inpatient admission.

Further guidance on identifying and including such cases will be provided when current reviews of these situations are completed. These cases may be included in current analyses when appropriate, however, caution should be exercised with respect to on data quality and accuracy.

Acute Stroke Case Identification Codes

The table shown below titled, Table 2: Acute Stroke Case Identification Codes, Update 2018, , should be applied when identifying stroke cases for research, performance measurement and improvement, and ongoing monitoring and surveillance activities, as applicable. The codes referenced in the table represent codes from the International Statistical Classification of Diseases and Related Health Problems 10th Revision, Canada [ICD-10-CA], 2015. For further detail about these codes and application to specific KQIs, refer to the Heart and Stroke Foundation Stroke Data Dictionary (*found at www.strokebestpractices.ca after September 2018*).

Note: As part of the Canadian Coding Standards, each clinical diagnosis, represented by an ICD-10-CA code, that is submitted to the National Ambulatory Care Reporting System (NACRS) is reported as Main Problem or as Other Problem and to the Discharge Abstract Database (DAD) is assigned a specific Diagnosis Type to represent the significance of each clinical diagnosis relevant to the episode of care. The definitions of Main Problem and Other Problem in NACRS and the definitions of Diagnosis Types in DAD are described below.

Emergency Department Visit– each ICD-10-CA code(s) submitted to National Ambulatory Care Reporting System (NACRS) is assigned:

- ***Main Problem:*** *The main problem (MP) is the problem that is deemed the clinically significant reason for the client's visit and that requires evaluation and/or treatment or management. Note: Only one ICD-10-CA code can be assigned Main Problem (MP). All other ICD-10-CA codes submitted to NACRS are assigned Other Problem (OP)*
- ***Other Problem*** *An ICD-10-CA code is assigned as an 'other problem' (OP) when: 1) the condition or circumstance exists at the time of the client's visit and is significant to the client's treatment or care (Determination of significance: requires monitoring and/or treatment) 2) The direction is provided within another coding standard (Canadian Coding Standards for ICD-10-CA and CCI) and/or within the* International Statistical Classification of Diseases and Related Health Problems 10th Revision, Canada [ICD-10-CA].

Acute Inpatient Episode of Care – each ICD-10-CA code(s) submitted to Discharge Abstract Database (DAD) is assigned one of the following diagnosis types:

- ***Most Responsible Diagnosis*** *(MRDx): A Diagnosis Type (M) is the one diagnosis or condition that can be described as being most responsible for the patient's stay in a facility. If there is more than one such condition, the one held most responsible for the greatest portion of the length of stay or greatest use of resources (for example, operating room time or investigative technology) is selected.*
- ***Other Diagnoses:*** Other ICD-10-CA codes are assigned one of the following diagnosis types as per the definitions of each.
  - ***Type 1 Diagnosis****: A Diagnosis Type (1) is a condition that existed prior to admission, has been assigned an ICD-10-CA code and satisfies the requirements for determining comorbidity.*
  - ***Type 2 Diagnosis****: A Diagnosis Type (2) is a condition that arises post-admission, has been assigned an ICD-10-CA code and satisfies the requirements for determining comorbidity*
  - ***Type 3 Diagnosis****: A Diagnosis Type (3) is a secondary diagnosis or condition for which a patient may or may not have received treatment, has been assigned an ICD-10-CA code and does not satisfy the requirements for determining comorbidity.*
  - ***Type 6 Diagnosis****: Proxy Most Responsible Diagnosis: A Diagnosis Type (6) is assigned to a designated asterisk code (applies only to a select small number of diagnostic codes) in a dagger/asterisk convention when the condition it represents fulfills the requirements stated in the definition for diagnosis type (M)—MRDx. Diagnosis type (6) is used on the second line of the diagnosis field of the abstract to indicate that the manifestation is the condition most responsible for the patient's stay in hospital. Note: Only one asterisk code is allowed as a diagnosis type (6).*

- ***Type W, X or Y****: These are ICD-10-CA codes associated with the first, second or third service transfer, respectively.* Note: When a diagnosis is recorded with a service transfer diagnosis type, it is equivalent to a diagnosis type (1); therefore, it is not necessary to repeat it on the abstract as a diagnosis type (1). When a diagnosis is recorded as a diagnosis type (2) and also qualifies as a service transfer diagnosis type (W), (X) or (Y), facilities choosing to capture service transfer diagnoses must record the condition twice: first, mandatory, as a diagnosis type (2) and second, optional, as a service transfer diagnosis type (W), (X) or (Y).

- ***Definition of Comorbidity (Canadian Coding Standards for ICD-10-CA and CCI):*** *A comorbidity is defined as a condition that coexists in addition to the MRDx at the time of admission or that develops subsequently and meets at least one of the three criteria for significance: the condition 1) Requires treatment beyond maintenance of the pre-existing condition; 2) Increases the length of stay (LOS) by at least 24 hours; and/or 3) Significantly affects the treatment received.*

Table 2: Acute Stroke Case Identification Codes, Update 2018

Group	Acute Stroke Main Category	ICD-10-CA codes (v2018)
'Acute Stroke' – Updated Case Selection Definitions, 2018 all stroke categories listed below that have been submitted **as a 'Most Responsible Diagnosis' in DAD or as Main Problem in NACRS** are valid for inclusion in acute stroke cohorts for calculation of the HSF Stroke Key Quality Indicators, unless otherwise indicated [i] inclusion of stroke codes submitted to the DAD as Diagnosis Type1, Type 2, Type 3, Type W, X or Y or to NACRS as Other Problem will be dependent on the scope, purpose and target of the performance measures or analysis – in these cases, the analysis specifications should be clearly documented and communicated, to enable appropriate generalizability and comparability.		
a.	**Subarachnoid Hemorrhage**	**I60** (including all sub-codes)
b.	**Intracerebral Hemorrhage**	**I61** (including all sub-codes)
c.	**Intracranial Hemorrhage, Unspecified** [i]	**I62.9** [ii] (for fiscal years prior to 2015-2016 only)
d.	**Cerebral Infarction (Ischemic Stroke)**	**I63** (including all sub-codes)
e.	**Stroke, not specified as hemorrhage or infarction**	**I64** [iii]
f.	**Central Retinal Artery Occlusions (Ischemic Stroke)**	**H34.1**
g.	**Transient Cerebral Ischemic Attacks and Related Syndromes (Ischemic Stroke)**	**G45** [iv] (excluding sub-code G45.4)
h.	**Transient Retinal Artery Occlusions (Ischemic Stroke)**	**H34.0**
The following codes for cerebral venous thrombosis etiology are now be included as part of acute stroke definitions **(new as part of 2018 stroke case definition harmonization)**. *For some quality and research analysis, these codes for stroke of venous origin may be excluded based on the purpose and population of interest for the analysis.*		
i.	**Cerebral Infarction due to Cerebral Venous Thrombosis, Nonpyogenic**	**I63.6**

Group	Acute Stroke Main Category	ICD-10-CA codes (v2018)
j.	**Nonpyogenic Thrombosis of Intracranial Venous System**	**I67.6**
k.	**Intracranial Phlebitis and Thrombophlebitis**	**G08**
The following Z-codes (DAD) may be assigned as Most Responsible Diagnosis (MRDx, DAD) and should be included as part of acute stroke definitions when there is an accompanying acute stroke diagnostic code is assigned as an 'Other Diagnosis' with a Diagnosis Type 1, Type 2, Type 3 or Type W, X or Y.		
l.	**Care Involving use of Rehabilitation Procedures**	**Z50** (excluding sub-codes Z50.2, Z50.3, Z50.4)
m.	**Other Medical Care: Palliative Care**	**Z51.5** [vi, vii]
n.	**Convalescence Following other Treatment**	**Z54.8**
o.	**Convalescence Following Unspecified Treatment**	**Z54.9**
Stroke in Pregnancy		
p.	**Diseases of the circulatory system complicating pregnancy, childbirth and the puerperium** (Occurring during the initial episode of care for the stroke as a significant diagnosis type/main problem or other problem) ** Mandatory to assign an additional code from I60, I61, I63 or I64, as a diagnosis type (3)/other problem to identify the type of stroke that complicated the pregnancy, childbirth or puerperium.*	**O99.4– ***
q.	**TIA in the obstetrical population** ** Mandatory to assign an additional code — one of G45.0, G45.1, G45.2, G45.3, G45.8, G45.9 — as diagnosis type (3)/other problem to specify that the condition complicating the pregnancy, childbirth or puerperium is a TIA.*	**O99.30– ***
r.	**Transient retinal artery occlusion** ** Mandatory to assign the additional code H34.0 as a diagnosis type (3)/other problem to specify that the condition complicating pregnancy, childbirth or puerperium is a transient retinal artery occlusion.*	**O99.80– ***
s.	**Cerebral venous thrombosis in pregnancy or** **Cerebral venous thrombosis in the puerperium**	**O22.5–** **or O87.3–**

Group	Acute Stroke Main Category	ICD-10-CA codes (v2018)
t.	**Nonpyogenic thrombosis of intracranial venous system** ** Mandatory to assign the additional code I67.6 as diagnosis type (3)/other problem to specify that the condition complicating the pregnancy, childbirth or puerperium is nonpyogenic thrombosis of intracranial venous system*	**O99.40–**
u.	**Central retinal artery occlusion** ** Mandatory to assign the additional code H34.1 as diagnosis type (3)/other problem to specify that the condition complicating the pregnancy, childbirth or puerperium is a central retinal artery occlusion.*	**O99.80– ***
v.	**Intracranial non traumatic hemorrhage of fetus and newborn**	**P52.0-P52.6**
w.	**Neonatal cerebral ischemia**	**P91.0**
NOTES regarding acute stroke code selection:		
i.	For all KQI's, the **primary focus** is on patients who experience a hemorrhagic or ischemic stroke or TIA while in the community and arrive at hospital as a result of their stroke. There are occasions when a patient already in hospital for another medical reason experience a stroke during hospitalization. In these cases, the stroke would be assigned a Diagnosis Type 2 or other diagnosis in the DAD or as an Other Problem in NACRS. These **in-hospital stroke cases** should be included in overall stroke occurrence rates; however, they should be carefully considered or excluded from some process of care and time interval indicators as they may skew results. Inclusion or exclusion will depend on the purpose of the measure and target population.	
ii.	Conditions in category **I62** Other non-traumatic intracranial hemorrhage are **not** considered an acute stroke and therefore should not be included for any acute stroke case definition, cohort identification or acute stroke data analysis, Note that I62.9 was used for coding of "hemorrhagic stroke, unspecified" in fiscal years prior to 2015-16 by other organizations (not HSF). As of 2015-16 data, hemorrhagic strokes are classified to either category I60 Subarachnoid hemorrhage or I61 Intracerebral hemorrhage.	
iii.	**I64** should not be used routinely for coding stroke cases. I64 should only be recorded when: • Diagnostic imaging has not yet been performed (patient dies or is transferred) • Diagnostic imaging is inconclusive • Patient is transferred in and the transfer information does not indicate the type of stroke Every effort should be made by clinicians to determine stroke type and document the type of stroke as hemorrhagic or ischemic for health record coders. Health record coders should review the body of the discharge summary, consultation reports and the conclusion on relevant diagnostic imaging reports for specificity as to type of stroke.	
iv.	When calculating stroke **mortality rates**, TIA should be excluded, or reported as a separate category and not combined with acute stroke codes.	

Group	Acute Stroke Main Category	ICD-10-CA codes (v2018)
v.	**Special cases – Rehabilitation:** When a patient is treated for an acute stroke including rehabilitative care, there are circumstances where the Z-code for rehabilitative care may meet the definition of MRDx and the acute stroke code will be assigned Diagnosis Type 1, or Service Transfer Type W, X, Y. These cases should be included as part of an acute stroke cohort where appropriate.	
vi.	**Special cases – Palliative Care**: Where acute stroke patients have a component of palliative care during their episode of care and in the same facility due to the severity of stroke and/or other clinical characteristics, and Z51.5 Palliative care meets the definition of MRDx (DAD) or Main Problem (NACRS), and an acute stroke code is assigned a Diagnosis Type 1, Type 2, Type 3, Type W, X, or Y. These cases should be included as part of an acute stroke cohort where appropriate.	
vii.	**Mortality rates** for patients determined to be palliative care and receiving palliative care services are higher than the overall mortality for non-palliative care stroke cases. Therefore: ➢ When calculating overall stroke **mortality** rates, cases where Z51.5 Palliative Care is the MRDx and stroke is listed as a Diagnosis Type 1, Type 2, Type 3, Type W, X, or Y should be INCLUDED, even when the stroke itself was not treated. ➢ When calculating stroke **mortality** rates for patients who have received active stroke care processes as a measure of effectiveness of care delivery, cases where Z51.5 Palliative care is the MRDx and stroke is assigned Diagnosis Type 1, Type 2, Type 3, Type W, X, or Y and did not receive active acute stroke care or treatment, should be EXCLUDED (such as very severe stroke patients admitted directly to palliative care without active acute treatment).	

2. Stroke Case Selection for Inpatient Rehabilitation (Submitted to NRS)

The National Rehabilitation Reporting System (NRS) housed at the Canadian Institute for Health Information (CIHI) contains detailed information for Canadian adults receiving inpatient rehabilitation services. In Ontario, participation in the NRS is mandatory for all designated inpatient rehab beds. Across Canada, more than 80% of all stand-alone inpatient rehab facilities contribute to the NRS as well as many inpatient rehab wards located within acute care hospitals.

The NRS minimum data set contains clinical data on functional status based on the 18-item FIM™ instrument, additional cognitive elements, socio-demographic, administrative, and health characteristics information. The NRS is completed on intake and discharge from inpatient stroke rehab with an optional follow-up assessment.

Until 2008-09, patients included in the NRS where grouped according to a Rehab Client Group (RCG) classification system. Starting in 2008, a most responsible IDC-10 code was also added to the system along with the RCG. Assignment to a specific RCG (e.g., stroke, brain dysfunction, neurological disorders, trauma, spinal cord, etc) is determined by the admitting physician during inpatient rehab intake.

Note: There remain stroke rehabilitation facilities that do not report to the NRS. This creates challenges in consistent monitoring of stroke care in rehabilitation. All rehabilitation facilities are encouraged to implement a data collection system for stroke patients, and the NRS would be the preferred mechanism, which would enable consistency, standardization and facilitate benchmarking across Canada.

To identify stroke cases from the NRS, Stroke RCG (01) which contains the following sub-categories should be selected:

RCG 01	Sub Category Descriptions
1.1	Left Body Involvement (Right Brain)
1.2	Right Body Involvement (Left Brain)
1.3	Bilateral Involvement
1.4	No Paresis
1.9	Other Stroke

3. Select Stroke Related Investigation and Procedure Codes*

This list is a subset of investigations and procedures more commonly undertaken with stroke patients. Additional investigation and procedure codes may be found in the Canadian Classification of Health Interventions (CCI).

Note: The Canadian Coding Standards for ICD-10-CA and CCI provides direction as to which intervention codes are mandatory to capture in a NACRS Emergency Department setting and DAD Acute Care setting. Not all interventions performed are always collected on the abstract. Each site implementing stroke data collection should discuss local coding practices with their health records experts and collectively agree on local data capture requirements and practices to optimize relevant stroke data capture.

Stroke Related Investigations or Procedures	CCI Code Title Description	CCI Code (v2018)
Diagnostic Imaging		
Computed Tomography Scan (CT)	Computerized tomography [CT], brain	3.AN.20.^^
	Computerized tomography [CT], head NEC	3.ER.20.^^
Magnetic Resonance Imaging (MRI)	Magnetic resonance imaging [MRI], brain	3.AN.40.^^
	Magnetic resonance imaging [MRI], head NEC	3.ER.40.^^
Chest X-ray	Xray, thoracic cavity NEC	3.GY.10.^^
Carotid Doppler	Ultrasound, carotid artery	3.JE.30.^^
Leg Doppler	Ultrasound, arteries of leg, not elsewhere coded (NEC)	3.KG.30.^^
Alteplase (tPA) Administration		
Alteplase (tPA) Administration - Intravenous	Pharmacotherapy, total body, percutaneous approach [intramuscular, intravenous, subcutaneous, intradermal], using thrombolytic agent.	1.ZZ.35.HA-1C
Alteplase (tPA) Administration - Intra-arterial	Pharmacotherapy (local), intracranial vessels percutaneous injection approach using thrombolytic agent	1.JW.35.HA-1C
	Pharmacotherapy (local), intracranial vessels percutaneous infusion approach using thrombolytic agent. Includes: Targeted alteplase (tPA) (catheter directed)	1.JW.35.HH-1C
Carotid Surgery		
Carotid Endarterectomy	Extraction, carotid artery, open approach	1.JE.57.LA-^^
	Excision partial, carotid artery Includes: that with or without extraction (e.g. endarterectomy)	1.JE.87.^^

Stroke Related Investigations or Procedures	CCI Code Title Description	CCI Code (v2018)
*The following subset of investigations and procedures should be consistently applied for acute stroke patients undergoing **acute endovascular procedures for large vessel occlusions**. Our goal is to reduce coding variations across organization providing acute endovascular procedures for large vessel occlusions. Policies or best practice protocols should be in place for consistent coding of all procedures using the most appropriate code among those provided below.**		
Cerebral Endovascular Thrombectomy (Clot Retrieval)*	Extraction, **carotid artery** using percutaneous transluminal (arterial) approach. Includes mechanical thrombectomy, carotid artery	1.JE.57.GQ
	Extraction, **intracranial vessels** using percutaneous transluminal (arterial) approach Includes mechanical thrombectomy, intracranial artery.	1.JW.57.GQ
	Extraction, **other vessels of head, neck and spine** NEC, using percutaneous transluminal approach. Includes mechanical thrombectomy, extracranial vessels of head, neck and spine	1.JX.57.GP
Cerebral Endovascular Dilation When cerebral endovascular dilation is performed with a cerebral endovascular thrombectomy (extraction), a code for dilation and a code for extraction is assigned.	Dilation, **intracranial vessels** using percutaneous transluminal (arterial) approach[e.g., endovascular].	1.JW.50.GQ-^^
	Dilation, **other vessels of head, neck and spine** NEC using percutaneous transluminal approach [e.g., endovascular]	1.JX.50.GP-^^
	Dilation, **carotid artery** using percutaneous transluminal (arterial) approach.	1.JE.50.GQ-^^
Carotid Endovascular Dilation and Stenting	Dilation, **carotid artery** using percutaneous transluminal (arterial) approach and balloon dilator with (endovascular) **stent** (insertion)	1.JE.50.GQ-OA
Neurosurgical Interventions		
Decompressive Hemicraniectomy	Release, cranium no device used no tissue used (in the release)	1.EA.72.LA
	Release, cranium no device used with autograft	1.EA.72.LA-XX-A
	Release, cranium no device used with combined sources of tissue [e.g. graft and flap]	1.EA.72.LA-XX-Q
	Release, cranium no device used with pedicled flap [pericranial flap]	1.EA.72.LA-XX-G
	Release, cranium using plate, screw device (with/without wire or mesh) no tissue used	1.EA.72.LA-NW
	Release, cranium using wire or mesh only	1.EA.72.LA-KD
	Release, cranium using plate, screw device (with/without wire or mesh) with autograft	1.EA.72.LA-NW-A

	Release, cranium using wire or mesh only with autograft	1.EA.72.LA-KD-A
	Release, cranium using plate, screw device (with/without wire or mesh) with combined sources of tissue [e.g. graft and flap]	1.EA.72.LA-NW-Q
	Release, cranium using plate, screw device (with/without wire or mesh) with combined sources of tissue [e.g. graft and flap]	1.EA.72.LA-KD-Q
	Release, cranium using plate, screw device (with/without wire or mesh) with pedicle flap [pericranial flap]	1.EA.72.LA-NW-G
	Release, cranium using plate, screw device (with/without wire or mesh) with pedicled flap [pericranial flap]	1.EA.72.LA-KD-G
*The following subset of investigations and procedure codes are generally applicable for **hemorrhagic stroke** patients undergoing elective (and sometimes more urgent) procedures. These codes should NOT be applied for acute endovascular treatment for large vessel occlusions. Protocols and processes should be in place in all organizations providing these services with respect to appropriate codes to use for these cases.*		
AV Malformation, Aneurysm Repairs	Repair, intracranial vessels using percutaneous transluminal (arterial) approach [e.g. endovascular] using fibrin glue	1.JW.80.GQ-W3
	Repair, other vessels of head, neck and spine NEC using percutaneous transluminal approach [e.g. endovascular]	1.JX.80.GP-W3

Stroke Related Investigations or Procedures	CCI Code Title Description	CCI Code (v2018)
Cardiac Investigations and Procedures		
ECG (external application)	Electrophysiological measurement, heart NEC external application using recording electrodes [or ECG NOS]	2.HZ.24.JA-XJ
	Electrophysiological measurement, heart NEC external application using rhythm strips [rhythm electrocardiogram]	2.HZ.24.JA-KE
Holter monitor	Electrophysiological measurement, heart NEC external application using Holter monitor [ambulatory ECG],	2.HZ.24.JA-KH
Prolonged Cardiac Monitoring (e.g. Loop reveal recorder, implantable cardiac monitor)	Electrophysiological measurement, heart NEC percutaneous transluminal (cardiac catheterization) insertion using recording electrodes [or ECG NOS] Electrophysiological measurement, heart NEC percutaneous (subcutaneous) insertion using recording electrodes [or ECG NOS] Includes: Insertion subcutaneous (cardiac) event	2.HZ.24.GP-XJ 2.HZ.24.HA-XJ

	recorder	
Echocardiogram (2D)	Echocardiogram (2D) heart with coronary arteries	3.IP.30.^^
Echocardiogram (TEE)	Echocardiogram (TEE) heart with coronary arteries	

*** Note:** Acute endovascular treatment (EVT) is a relatively new procedure for acute stroke care. Recent analysis of coding practices for these procedures by the Heart and Stroke Foundation, as part of the Quality of Stroke Care in Canada series, has shown considerable variations in coding both within and across organizations, resulting in data quality concerns. The procedure codes included in this KQI comply with Canadian Coding Standards and Canadian Classification of Interventions and have been agreed to by CIHI and HSF working in collaboration. All sites should base their coding practices on the codes and definitions provided in this document. This is necessary for system planning, financial budgeting and accountability.

4. Select Stroke Related Comorbidity Codes

This list is a subset of comorbidities that represent specific risk factors stroke patients (InterStroke Study 2014) and are addressed in the CSBPR. These are not intended to be a complete and exhaustive list. Additional comorbidity codes may be found in the International Statistical Classification of Diseases and Related Health Problems Tenth Revision, Canada [ICD-10-CA]. Local sites should have a data collection plan in place that clearly specifies which comorbidities should be consistently captured for all stroke patients if applicable. This plan should be completed in collaboration with the local medical health records experts and communicated to all involved departments to optimize relevant stroke data capture.

*Note: The term **comorbid condition** referred to in the table below are referring to conditions a patient has in addition to their stroke that are present at the time of admission, which would be assigned a significant Diagnosis type M, 1, 2, 6, W, X, Y* on the DAD abstract or as a Main Problem or Other Problem on the NACRS abstract. *See definition on page of this document (Part 2, Section 1.)*

Note: The validity and reproducibility of these codes is less well-established for stroke patients, compared to the validity of the primary diagnosis of stroke.

Co-Morbid Condition Categories	ICD-10-CA Code Title Description	ICD-10-CA Code
Hypertension	Essential (primary) hypertension	I10
	Hypertensive Heart Disease	I11
	Hypertensive Renal Disease	I12
	Hypertensive Heart and Renal Disease	I13
Angina	Angina pectoris	I20
Acute Myocardial Infarction	Acute Myocardial Infarction	I21
	Subsequent Myocardial Infarction	I22

Atrial Fibrillation	Atrial fibrillation and flutter	I48
Diabetes Mellitus	Diabetes Mellitus	E10 – E14
Dementia *Note: this set of codes has been found to have some validity in capturing dementia in patients with stroke, as either a premorbid condition or post-stroke. At this time, they should be used as a group. When individual codes were examined independently, the data quality decreases.*	Dementia in Alzheimer's Disease	F00*
	Vascular Dementia	F01
	Unspecified Dementia	F03
	Delirium Superimposed on Dementia	F05.1
	Unspecified organic or symptomatic mental disorder	F09
	Manic behavior: Hypomania	F30.0
	Mania without psychotic symptoms	F30.1
	Other manic episodes	F30.8
	Manic episodes unspecified	F30.9
	Senility	R54

5. Select Stroke-Related Complication Codes

*Post-admission complications are considered those conditions a patient has in addition to their stroke that occur after admission to hospital, that have been assigned D**iagnosis Type 2** on the DAD abstract. In NACRS, it is not possible to distinguish conditions as existing before admission or developing after admission to the emergency department, therefore complications are not reported based on the NACRS dataset (DAD only).*

This list is a subset of potential complications often occurring in patients with stroke, and specifically addressed in the CSBPRs. These are not intended to be complete and exhaustive lists. Additional complication codes may be found in the International Statistical Classification of Diseases and Related Health Problems Tenth Revision, Canada [ICD-10-CA]. Local sites should have a data collection plan in place that clearly specifies which complications should be captured. This plan should be completed in collaboration with the local medical health records experts and communicated to all involved departments to optimize relevant stroke data capture.

Note: The validity and reproducibility of these codes is less well-established for stroke patients, compared to the validity of the primary diagnosis of stroke.

Post-Admission Complications	ICD 10 Description	ICD-10 Code
New Acute Stroke (ischemic or hemorrhagic)	For definitions, refer to Table 2: 2018 Acute Stroke Case Identification Codes, Update 2018	I60 – I64 Excl. I62
Gastrointestinal hemorrhage	Gastrointestinal hemorrhage, unspecified	K92.2
Venous thrombo-embolism of deep vessels of lower extremity	Phlebitis and Thrombophlebitis	I80

Pulmonary Embolus	Pulmonary Embolus	I26
Pneumonia	Influenza with pneumonia,seasonal influenza virus identified	J10.0
	Influenza with pneumonia, virus not identified	J11.0
	Viral pneumonia, not elsewhere classified	J12
	Pneumonia due to Streptococcus pneumoniae	J13
	Pneumonia due to Hemophilus influenzae	J14
	Bacterial pneumonia not elsewhere classified	J15
	Pneumonia, organism unspecified	J18
	Pneumonitis due to food and vomit, Includes: Aspiration pneumonia	J69.0
	Pneumonitis due to other solids and liquids, Includes: Pneumonitis due to aspiration of blood	J69.8
Urinary Tract Infection	Urinary Tract Infection, site no specified	N 39.0

APPENDIX ONE: CIHI Stroke Special Projects and Indicators

Special Project 340: Canadian Stroke Strategy Performance Improvement

Special Project 340 should be completed all new confirmed active ischemic and hemorrhagic stroke and transient ischemic attack cases, where the stroke is the reason or among the reasons for going to hospital and stroke care is provided to the patient. These data fields are also completed for cases with a diagnosis of "query" stroke (recorded with prefix "Q" in DAD Group10 Field 01 and NACRS DE 43) as patients with a query diagnosis of stroke undergo much of the same work-up and resource use during the inpatient visit. The Stroke Special Project enables the capture of key process and outcome information based on stroke best practices. This additional data collection supports stroke surveillance, quality improvement, benchmarking and the Accreditation Canada Stroke Program Distinction initiative.

DAD (Acute Inpatient Episode of Care)

Field Name	Field Number	Valid Data/Format
Project Number	**99**	**340**
CT Scan/MRI Scan Within First 24 Hours (of Arrival)	01	Y, N or P
Admission to a Stroke Unit	02	Y, N or 8 (not applicable)
Administration of Acute Thrombolysis	03	Y, N, P, X or 8 (not applicable)
Date and Time of Acute Thrombolysis Administration	04-11	MMDDHHMM, 99999999 (unknown) or blank
Prescription for Antithrombotic Medication at Discharge	12	Y, N, 8 (not applicable) or 9 (unknown)
Stroke Symptom Onset Date & Time	13-24	YYYYMMDDHHMM, or 999999999999 (unknown)

NACRS (Emergency Department)

Field Name	Field Number	Valid Data/Format
Project Number	**145**	**340**
CT Scan/MRI Scan Within First 24 Hours of ED Arrival	146	Y, N or P
Referral to Stroke Prevention Services at ED Discharge	147	Y, N
Administration of Acute Thrombolysis	148	Y, N, P, X or 8 (not applicable)
Date and Time of Acute Thrombolysis Administration	149-156	MMDDHHMM,, 99999999 (unknown) or blank
Prescription for Antithrombotic Medication at Discharge	157	Y, N, 8 (not applicable) or 9 (unknown)
Stroke Symptom Onset Date & Time	158-169	YYYYMMDDHHMM, 999999999999 (unknown)

Project Completion Guidelines

This project collects additional data on patients who have been diagnosed with an acute/current stroke, and certain other conditions that from an ICD-10-CA classification perspective are not classified as a haemorrhagic, ischaemic or unspecified stroke. The other conditions included in this project are: transient ischemic attack (TIA), transient retinal artery occlusion, intracranial and intraspinal phlebitis and thrombophlebitis, nonpyogenic thrombosis of intracranial venous system and central retinal artery occlusion. Project 340 completion applies to acute care records and ED Level 3 records when one of the above conditions listed is recorded on the abstract, regardless of the diagnosis type or main or other problem assigned.

It is applicable to patients 1 year and older and to the obstetrical population. Note that some strokes occurring in older children may have similar causes as adult strokes and be treated similarly; whereas strokes in younger children may be from some different causes as well.

Stroke Special Project 440: Canadian Stroke Strategy Performance Improvement II

Special Project 440 collects additional data on patients who undergo endovascular thrombectomy for large-vessel occlusion causing acute ischemic stroke. It supplements the existing Canadian Stroke Performance Improvement Project, Special Project 340, by expanding the data collected on acute stroke patients. Project 440 data elements will enhance our understanding of stroke care and also support benchmarking, stroke surveillance, quality improvement activities and Accreditation Canada's Stroke Distinction program.

Project 440 should be completed for acute care records when at least one of the CCI codes listed in the inclusion criteria below is recorded on the abstract and performed for large-vessel occlusion causing acute ischemic stroke. It is applicable to patients age 1 and older.

DAD (Acute inpatient episode of care)

Field Name	Field Number	Valid Data/Format
Project Number	**99**	**440**
CTA, CTP or MRA Scan Performed Prior to Start of Endovascular Thrombectomy Intervention	01	P, Y, N or 8 (not applicable)
Date and Time of Qualifying Scan Prior to Endovascular Thrombectomy Intervention	02 - 09	MMDDHHMM
Date and Time of Arterial Puncture	10 - 15	DDHHMM
First Reperfusion achieved	16	Y, N, 8 (Not applicable), 9 (Unknown)

Date and Time of First Reperfusion Achieved	17–22 17 -22	DDHHMM DDHHMM
Final Endovascular Thrombectomy Reperfusion Outcome Achieved	23	Y, N, 8 (Not applicable), 9 (Unknown)

Project Completion Guidelines

Project 440 should be completed for acute care records when at least one of the CCI codes listed in the inclusion criteria below is recorded on the abstract and performed for large-vessel occlusion causing acute ischemic stroke. It is applicable to patients age 1 and older.

Inclusion criteria
CCI code list
Endovascular thrombectomy (clot retrieval)

- 1.JE.57.GQ *Extraction,* ***carotid artery*** *using percutaneous transluminal (arterial) approach*

Includes: Mechanical thrombectomy, carotid artery

- 1.JW.57.GQ *Extraction,* ***intracranial vessels*** *using percutaneous transluminal (arterial) approach*

Includes: Mechanical thrombectomy, intracranial artery

- 1.JX.57.GP *Extraction,* ***other vessels of head, neck and spine*** *NEC using percutaneous transluminal approach*
  Includes: Mechanical thrombectomy, extracranial vessels of head, neck and spine

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Stroke Special Project 640: Canadian Stroke Strategy Performance Improvement II

Special Project 640 supplements the existing Canadian Stroke Performance Improvement Project, Special Project 340, by expanding the data collected on acute stroke patients. Project 640 data elements will enhance our understanding of stroke care and also support benchmarking, stroke surveillance, quality improvement activities and Accreditation Canada's Stroke Distinction program. Note: The inclusion and exclusion criteria for Special Project 640 are the same as those for Special Project 340. Special project 640 is to be completed on the DAD abstract for all acute inpatient admissions with a new ischemic and/or hemorrhagic stroke.

DAD (Acute inpatient episode of care)

Field Name	Field Number	Valid Data/Format
Project Number	**99**	**640**
Dysphagia Screening	01	Y, N or 8 (not applicable)
Telestroke Consultation	02	Y, N, 8 (not applicable)
Date of Stroke Unit Admission	03–06	MMDD, 9999 (unknown), 8888 (not applicable)

Date of Stroke Unit Discharge	07–10	MMDD, 9999 (unknown), 8888 (not applicable)
Triage Date and Time	11–20	YYMMDDHHMM, 9999999999 (unknown) or blank

NACRS (Emergency Department)

Field Name	Field Number	Valid Data/Format
Project Number	**145**	**640**
Dysphagia Screening	146	Y, N, or 8 (not applicable)
Telestroke Consultation	147	Y, N, 8 (not applicable)

Project Completion Guidelines

The inclusion and exclusion criteria for Special Project 640 are the same as those for Special Project 340.

DAD Special Project 740 – Ontario AlphaFIM®

Special Project 740 focuses on the AlphaFIM™ and supplements the existing Canadian Stroke Performance Improvement Project, Special Project 340. The purpose of this special project is to standardize the collection of AlphaFIM® scores and enable stakeholders to Inform discharge decision-making and align services to patient needs; compare AlphaFIM® scores with FIM® scores recorded in the National Rehabilitation Reporting System (NRS) to evaluate access to stroke rehabilitation services and to monitor patient outcomes across sectors and databases; Quantify the functional impact of stroke in the acute care setting. Note: Special project 740 is to be completed on the DAD abstract for all acute inpatient admissions with a new ischemic and/or hemorrhagic stroke.

DAD (Acute inpatient episode of care)

Field Name	Field Number	Valid Data/Format
Project Number	**99**	**740**
Documentation of AlphaFIM® Scores	01	Y or N
AlphaFIM® Completion Date	02-09	YYYYMMDD, 99999999 (unknown) or blank
Projected FIM® - 13 Raw Motor Rating	10-11	13 to 91, 99 (unknown) or blank

Projected FIM® - 5 Raw Cognitive Rating	12-13	5 to 35, 99 (unknown) or blank

Project Completion Guidelines

The inclusion and exclusion criteria for Special Project 740 are the same as those for Special Project 340, except that:

- Project 740 is applicable to patients 18 years and older.
- Transient retinal artery occlusion (H34.0) is excluded from Project 740.
- Central retinal artery occlusion (H34.1) is excluded from Project 740.
- Project 740 doesn't have to be completed for patients declared palliative before the AlphaFIM® assessment is performed (as AlphaFIM® scores are used to predict rehab).