

Ontario Stroke Evaluation Report 2014

On Target for Stroke Prevention and Care

November 2014





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About the Organizations Involved in this Report

Ontario Stroke Network

With its vision of *Fewer Strokes, Better Outcomes*, the mission of the **Ontario Stroke Network**¹ (OSN) is to provide provincial leadership and planning for the 11 Ontario Regional Stroke Networks supporting the 14 Local Health Integration Networks through: partnering to achieve best practices; measuring and reporting on performance; leading and/or supporting provincial initiatives; and supporting innovations for stroke prevention, care, recovery and reintegration. The OSN is funded by the Ontario Ministry of Health and Long-Term Care.

Regional Stroke Networks are collaborative partnerships of health care organizations and providers that develop and implement strategies to improve access and outcomes for stroke survivors and their families through the integration of stroke best practices across the care continuum. Each Regional Stroke Network has a regional stroke centre, and many have one or more district stroke centres.

The OSN delivers on its mission by establishing province-wide goals and initiatives to implement best practices across the stroke continuum, evaluating and reporting on its progress, and translating and exchanging knowledge. The OSN's role as a backbone organization² (one with a lean staffing model that can mobilize many partners to help further its work) and experience as a boundary spanner³ (reaching across borders to build relationships, interconnections and interdependencies and thereby manage complex problems) have been key factors in its success.⁴ Currently the OSN is collaborating with Health Quality Ontario and the Ministry of Health and Long-Term Care to advise on the implementation of stroke quality-based procedures, and the subsequent monitoring and reporting on system performance.

Canadian Stroke Network

The Canadian Stroke Network (CSN) partnered with the Ontario Stroke Network to fund the Ontario Stroke Registry (formerly known as the Registry of the Canadian Stroke Network) from 2002 to 2013. As well, the CSN has worked with the **Heart and Stroke Foundation** to establish the **Canadian Best Practice Recommendations for Stroke Care**,⁵ a report that presents high-quality, evidence-based guidelines for the prevention and management of stroke to support health care professionals in all disciplines. Implementation of the recommendations is expected to contribute to reducing practice variations and closing the gap between evidence and practice.

Institute for Clinical Evaluative Sciences

The **Institute for Clinical Evaluative Sciences** (ICES) is an independent, non-profit organization that uses population-based health information to produce knowledge on a broad range of health care issues. ICES' unbiased evidence provides measures of health system performance, a clearer understanding of the shifting health care needs of Ontarians, and a stimulus for discussion of practical solutions to optimize scarce resources.

Key to ICES' work is its ability to link population-based health information, at the patient level, in a way that ensures the privacy and confidentiality of personal health information. Linked databases reflecting 13 million of 34 million Canadians allow researchers to follow patient populations through diagnosis and treatment, and to evaluate outcomes.

ICES receives core funding from the Ontario Ministry of Health and Long-Term Care. In addition, ICES scientists and staff compete for peer-reviewed grants from federal funding agencies, such as the Canadian Institutes of Health Research, and project-specific funds from provincial and national organizations. ICES knowledge is highly regarded in Canada and abroad, and is widely used by government, hospitals, planners, and practitioners to make decisions about care delivery and to develop policy.

About this Report

Background and Purpose

In 2003, the Ontario Ministry of Health and Long-Term Care launched a monitoring and evaluation initiative for stroke prevention and care. The initiative's goals included:

- measuring changes and outcomes
- identifying areas of excellence and areas for improvement
- making recommendations to achieve better performance and outcomes at the provincial, regional, Local Health Integration Network (LHIN), facility and patient levels
- reporting on improvements and gaps in stroke prevention and care

The proclamation of the *Excellent Care for All Act* in 2010 signaled the Ontario government's commitment to the delivery of high-quality, evidence-based care. To advance the Act's principles, Ontario's Action Plan for Health Care⁶ was announced by the Ministry of Health and Long-Term Care in 2012. Within the plan, health system funding reform is considered a key driver for delivering high-quality and fiscally sustainable care.⁷ Hospital funding has

shifted from a global budget to a patient- and evidence-based funding approach. Quality-based procedures (QBP) are an integral part of patient-based funding, and their implementation began in 2012 with a focus on four surgical conditions, including hip replacement, knee replacement, cataract surgery, and treatments for chronic kidney disease. In 2014, the QBPs were expanded to include three medical conditions, one of which was stroke.

The OSN has collaborated with the Ministry of Health and Long-Term Care to advise on stroke QBP best practices, including monitoring, reporting system performance, driving system change and implementing best practices across the province. The Stroke Evaluation and Quality Committee reports to the OSN Board of Directors. In collaboration with the OSN evaluation specialist, the committee is responsible for measuring, monitoring, evaluating and reporting on OSN progress.

The OSN has produced an Ontario Stroke Evaluation Report annually since 2010. The report's purpose is to:

- provide detailed information on outcomes and progress toward best practices across the care continuum at multiple levels of analysis (province, Local Health Integration Network [LHIN], sub-LHIN, facility)
- enable the OSN and the LHINs to compare their performance to other LHINs and to identify best practice sites

- highlight stroke system successes and identify opportunities for improvement
- provide recommendations for improving the stroke care system at the provincial, regional and LHIN levels
- provide baseline performance of the key indicators identified by the Stroke Quality-Based Procedures Expert Advisory Panel

Methods

INDICATOR SELECTION

In 2010, the OSN's Stroke Evaluation and Quality Committee reviewed over 150 performance indicators included in the Canadian Stroke Strategy's **2008 Performance Measurement Manual**⁸ (based on national best practices) and identified a subset of 43 core performance indicators. The 2014 Stroke Evaluation Report provides a comprehensive look at each core performance indicator and the variation in care by stroke care sector, including the emergency department, inpatient acute care, inpatient rehabilitation, complex continuing care and home care services, in Ontario from 2003/04 to 2012/13. In addition, 14 phase 1^a stroke QBP indicators selected by the Stroke Quality-Based Procedures Expert Advisory Panel⁷ are included.

a The *Quality-Based Procedures Clinical Handbook for Stroke* was developed in two phases. Phase 1 includes best practices for the emergency department, acute care and inpatient rehabilitation.

DATA SOURCES

This report includes two main sources of data: **Ontario Stroke Registry** data captured from the Ontario Stroke Audit of Acute Care Facilities and administrative health data. These datasets were linked using unique encoded identifiers and analyzed at the Institute for Clinical Evaluative Sciences (ICES).

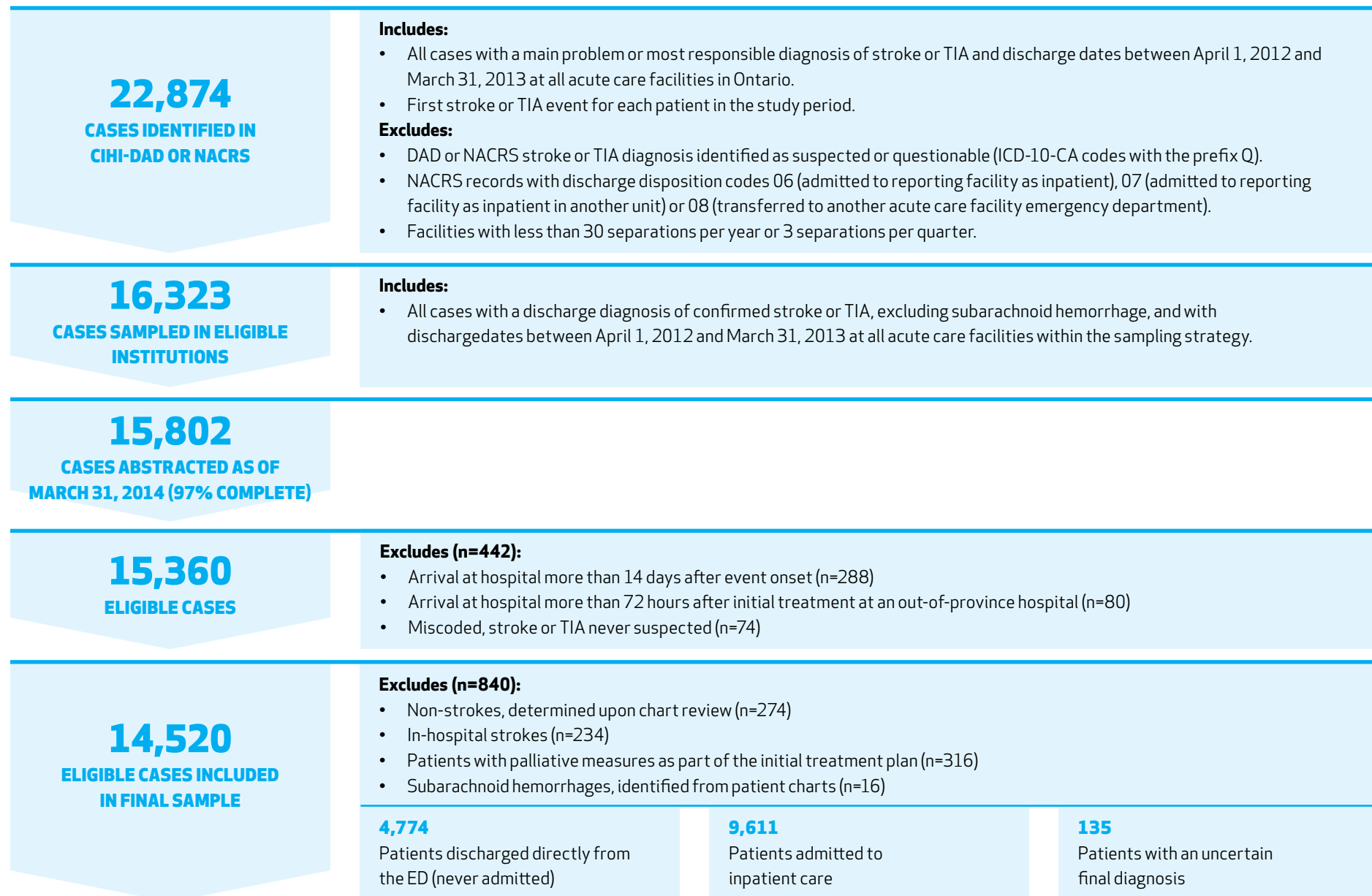
Ontario Stroke Audit of Acute Care Facilities

In the past, the Ontario Stroke Audit of Acute Care Facilities was a biennial random sample of patients with stroke or TIA seen at over 140 acute care facilities in Ontario.^b The audit is a retrospective chart abstraction project that captures clinical stroke care data not currently available from administrative data sources; these data encompass stroke symptom onset, stroke severity, dysphagia screening, tPA administration, stroke unit admission and disability level at discharge.

The 2012/13 audit was completed in 2013/14. This audit focused on the stroke QBP cohort, and therefore, the sampling strategy excluded subarachnoid hemorrhagic stroke patients and paediatric stroke patients. Hospitals admitting less than 30 stroke patients annually were also excluded so as to focus the audit on hospitals that had the critical mass to support QBP recommendations, resulting in 100 acute care facilities contributing to the 2012/13 audit.

^b The 2004/05 and 2008/09 Ontario Stroke Audits were conducted on a random sample of 20% of all eligible suspected stroke events, with oversampling performed at low-volume institutions where each contributed a minimum of 10 cases and at district stroke centres where each contributed a minimum of 50 cases. Only adult patients (those 18 years and older) and patients whose stroke occurred prior to hospital arrival were eligible for inclusion. In 2010/11, the audit included 100% of eligible cases at designated stroke centres; a random sample of 30% of eligible cases at high-volume, non-designated centres; 30 eligible cases from each medium-volume, non-designated centre; and 10 eligible cases from each low-volume, non-designated centre. The 2010/11 audit included both paediatric and adult patients.

2012/13 Ontario Stroke Audit sample of adult patients aged 18 years and older



Data Abstraction and Management

Eighteen centrally-trained abstractors performed chart abstraction at participating hospitals. Data were collected on all aspects of acute stroke management, including patient demographics, the use of pre-hospital emergency medical services, in-hospital and emergency department management, complications and outcomes. Abstractors used laptop computers to enter data into an ICES-developed application called Offline Chart Abstraction version 3.0. This application enhanced data validity by checking ranges and internal data consistency at the time of data entry. It also anonymized and encrypted the data before transfer via a secure virtual private network to ICES in Toronto. The aggregate dataset was managed and analyzed by the Ontario Stroke Registry team at ICES. Unique patient identification numbers were used to link the Ontario Stroke Registry database with the Registered Persons Database to obtain information on deaths that occurred after discharge from hospital.

The overall research project was approved annually by the Research Ethics Board at Sunnybrook Health Sciences Centre in Toronto, with additional approval by research ethics boards at participating institutions, as required. ICES is a prescribed entity under Ontario's *Personal Health Information Protection Act*, and charts were audited without patient consent for the purposes of monitoring and improving the quality of stroke care delivery.

Administrative Health Data

The following data sources, all held at the Institute for Clinical Evaluative Sciences, were used:

- from the Canadian Institute for Health Information: the Discharge Abstract Database (CIHI-DAD), the National Ambulatory Care Reporting System–Emergency Department subset (NACRS-ED), the National Rehabilitation Reporting System (NRS), and the Continuing Care Reporting System (CCRS)
- from the Ontario Ministry of Health and Long-Term Care: the Home Care Database–Ontario Association of Community Care Access Centres (HCD-OACCAC), the Long-Term Care Client Profile Database (CPRO) and the Registered Persons Database (RPDB)

Stroke Cohorts

Stroke cohorts were generated from administrative databases using codes from the International Classification of Diseases, 10th Revision, Canada (ICD-10-CA); these are listed in **Appendix C**. The most responsible or 'main problem' diagnosis was used to identify stroke or TIA records for adults aged 18 years or older in the CIHI-DAD and NACRS databases, respectively.

Analyses

Process-Based Indicators. Indicator analyses counted only unique patients for each 12-month period.^c The majority of indicators reported at the regional and LHIN levels are facility-based rather than patient residence-based (i.e., they examine how well the facilities in a LHIN performed on various indicators) unless otherwise indicated. Time-based measures are reported as median values. The median time is the time required for half of the patients to receive a given service (e.g., carotid intervention, inpatient rehabilitation, home care-based rehabilitation therapy). Mean values are reported in the Rehabilitation section since many of the stroke rehabilitation QBP indicators are based on the mean.

Population-Based Indicators. Most of the indicators in the report are observed rates or proportions, which is appropriate for process-based indicators. To make comparisons across regions and hospital types, age- and sex-adjusted rates were calculated for prevalence and outcomes. For admissions data, direct standardization was used to compare rates between regions as if they had similar population compositions. The direct standardized rates were calculated using the 2003/04 Ontario adult population (aged 18 years or older) to examine provincial and regional rates over time.

c Community Care Access Centre data presented in this report are based on patient visits (i.e., multiple patient-visits are included if they occurred in different LHINs).

Outcome Indicators. Revisit and readmission rates relate to patients who survived the initial stroke emergency department visit or hospitalization but revisited or were readmitted to hospital at least once within 30 and 90 days of the index visit or admission. Indirect standardization based on an age-sex regression model was used to calculate an expected revisit/readmission rate for each region; the crude (observed) rate for each region was divided by the expected rate and multiplied by the annual Ontario rate to provide the age- and sex-adjusted rate. The readmission rate is a good indicator of whether there was appropriate discharge planning to prevent secondary complications or another stroke or TIA event.

Long-term care admission rates within one year of an acute stroke relate to patients who survived the initial stroke hospitalization but were neither residents of nor applicants seeking admission to a long-term care home. Indirect standardization based on an age-sex regression model was used to calculate an expected admission rate for each region; the crude (observed) rate for each region was divided by the expected rate and multiplied by the overall annual Ontario rate to provide the age- and sex-adjusted rate.

In-hospital, 30-day and one-year mortality rates relate to patients who were alive when they arrived at the emergency department. Indirect standardization based on a risk-adjusted regression model was used to calculate an expected mortality rate for each

region; the crude (observed) rate for each region was divided by the expected rate and multiplied by the overall annual Ontario rate to provide the risk-adjusted mortality rate. The details of the risk-adjustment model are available upon request.

Statistical Analyses

Results are presented for the province and by Local Health Integration Network, OSN hospital designation (regional stroke centres, district stroke centres, non-designated centres and Telestroke sites) and, where appropriate, health care facility. (See **Appendix D** for a list of hospitals and their designations.) In accordance with requirements of the *Personal Health Information Privacy Act*, cell counts and calculations based on cell counts of five or less are suppressed.

This year's report includes Telestroke data for the second time. The 2012/13 Ontario Stroke Audit included a 100% sample from 19 of 22 hospitals^d providing access to the Telestroke program to better understand its impact at these hospitals. Telestroke is available at one of the 11 regional stroke centres and nine of the 17 district stroke centres and was analyzed on this basis for all indicators.

Influenced by the establishment of Echo: Improving Women's Health in Ontario in 2010 and the publication of recent research on sex differences in health care in the province,⁹ we present findings for indicators where there are statistically significant differences between men and women.

To account for sampling at the non-designated centres, results were weighted based on annual hospital stroke volume and the number of charts sampled. The weight assigned to a record was inversely proportional to the probability of that record being selected for inclusion in the study. By using weights in the analyses, an estimate that applied to the entire population of discharge records was obtained.

The characteristics, management and in-hospital outcomes of stroke patients were compared by LHIN and by OSN hospital designation using Rao-Scott chi-square tests for categorical variables. Tests for trends over time were performed using a chi-square test, a Wilcoxon rank-sum test and Poisson and logistic regressions, as appropriate. SAS version 9.3 (SAS Institute Inc.) was used for all data analyses.

Maps Included in this Report

In this year's report, results for stroke QBP indicators are presented as maps. The performance of individual facilities is displayed graphically (only facilities with a sample size of 6 or more are mapped and included in the range), while the performance of the LHINs and Ontario overall has been added as a tabular inset in numeric form. Choropleth maps illustrate LHIN performance relative to the provincial average based on the care received by patients residing in each LHIN (i.e., performance was population-based rather than facility-based).

^d Dryden Regional Health Centre and Sioux Lookout Meno-Ya-Health Centre were not audited due to a low volume of stroke cases. Telestroke at Grand River Hospital was not operational for all of 2012/13 and therefore not analyzed as a Telestroke site.

Shapes are used to indicate the type of facility that is mapped and the colour of the shape indicates the performance of each facility in relation to the Ontario average for that indicator. A **red** shape indicates that the facility has performed better than the Ontario average, **blue** means the facility's performance is equal to the provincial average, and **black** indicates that the facility has performed below average for the indicator.

Maps reporting on acute inpatient care use **squares** to denote designated centres^e and **circles** to denote non-designated centres. Additionally, maps reporting on tPA administration show non-designated Telestroke sites with a **triangle**. The names of the cities in which a designated centre or Telestroke site is located have been labelled.

For maps reporting on rehabilitation care, **squares** indicate freestanding rehabilitation centres, and **circles** indicate non-freestanding centres.^f The cities that are labelled do not signify a site's designation and have been included for ease of navigation.


Benchmark Calculations


Provincial benchmarks were calculated for a subset of indicators presented in the Ontario Stroke Report Cards (see **Appendix A**). The benchmarks were calculated using the Achievable Benchmarks of Care (ABC) methodology,¹⁰ which summarizes the performance of the top-ranked facilities representing at least 20% of all patients eligible for the appropriate care. The benchmarks were calculated using demonstrated care among a few facilities (i.e., not only the top-ranked facility).


Report Layout and Interpretation

The sections of the report are divided into patient characteristics; emergency department care; acute inpatient care; inpatient rehabilitation, complex continuing care; home care services; and patient outcomes. The phase 1 stroke QBP indicators are included within the appropriate section across the continuum.

The *Summary by Sector* section provides an overview of findings and recommendations by QBP module or stroke care sector.

-
-  A green check mark indicates a statistically significant improvement, where available—a positive trend relative to best practices and/or expected course.

 -  A red X indicates statistically significant negative results, where available—a negative trend relative to best practices and/or expected course.

 -  A blue diamond indicates neutral or descriptive results.

e Regional stroke centres and district stroke centres are considered designated centres.

f Freestanding facilities are physically separate from affiliated acute care facilities; non-freestanding facilities are housed within acute care facilities.

Executive Summary

On Target for Stroke Prevention and Care

What's New?

This year's report includes the results of the 2012/13 Ontario Stroke Audit of Acute Care Facilities. This audit was conducted to align with the Ministry of Health and Long-Term Care's implementation of phase 1 of the stroke quality-based procedures (QBP)⁷ funding reform initiative.

The report includes graphical presentation of results to enable easy comparison of progress on best practices over time and of current performance on phase 1 QBP indicators. Maps are used to illustrate regional or facility performance relative to provincial performance.

Development of stroke QBP indicators with the Ministry of Health and Long-Term Care has highlighted a need to refine the definition of stroke unit care. Performance in relation to current and previous stroke unit definitions is included. The 2012/13 stroke unit results are based on the new definition; they will be used to ascertain the performance baseline for future reporting.

This report also provides information on performance against the 2016/17 targets of the Ontario Stroke Network (OSN) (see [Appendix I](#)).

Are We on Target in Providing Quality Stroke Prevention and Care?

Key Findings in the 2014 Report

PATIENT CHARACTERISTICS

- There were 20,050 emergency department visits and 15,647 inpatient stays for stroke or transient ischemic attack (TIA), 128 patients received thrombolytic therapy (in the form of tPA, or tissue plasminogen activator) via the Telestroke program, and 3,628 patients were admitted into inpatient rehabilitation.
- More than two in three stroke patients had at least one risk factor for stroke.
- One in five stroke patients admitted to hospital was older than 85 years.

AREAS OF CONTINUED PROGRESS

- More patients are receiving their acute stroke care at designated stroke centres. This is associated with statistically significant improvements in:
 - the proportion of patients having a confirmed stroke diagnosis (92.0%)

- the proportion of patients with stroke or TIA receiving neuroimaging within 24 hours (93.2%, which is better than most jurisdictions nationally and internationally^{11,12})
- the proportion of patients accessing carotid imaging (82.3%), and the median time to intervention to open the carotid artery (15 days)
- the proportion of ischemic stroke patients receiving tissue plasminogen activator (tPA) (12.3%, which exceeds most internationally reported rates¹¹⁻¹⁶)
- the proportion of ischemic stroke patients receiving tPA within 60 minutes of arrival in the emergency department (46.3%)
- the proportion of all stroke patients receiving inpatient rehabilitation (32.6%)
- the proportion of referrals to outpatient stroke rehabilitation (7.3%)
- the proportion of stroke patients discharged from the emergency department and referred to stroke prevention services (78.5%)

- Associated with these improvements in care, in the past three years (2010/11 to 2012/13) there has been a decline in:
 - the rates of in-hospital, 30-day and one-year mortality (9.9%, 12.6% and 23.3%, respectively),
 - the rates of 30-day all-cause readmission (7.4%) and 30-day readmission for stroke or TIA (4.3%)
 - the proportion of patients admitted to long-term care within one year of a stroke event (7.1%).

AREAS FOR CONTINUED IMPROVEMENT

- Wide variation across the 14 Local Health Integration Networks (LHINs) remains a challenge.
- Four of every 10 stroke patients in Ontario do not call 911 when experiencing stroke; this is unchanged since 2010/11.
- Although access to inpatient rehabilitation has improved, there is wide variation in access across the LHINs.
- The proportion of stroke patients who receive rehabilitation services from Community Care Access Centres has declined.
- The proportion of patients in complex continuing care who are discharged back to an acute care setting has increased.

Conclusions

Many improvements have been made in acute stroke care over the past decade, placing Ontario on target to achieve better outcomes. Progress has begun with more stroke patients having access to inpatient rehabilitation including severe stroke patients. Several Local Health Integration Networks are working to improve access to stroke unit care by concentrating stroke care at facilities where stroke expertise and volumes support the establishment of a stroke unit. However, more work is needed to transition patients from the acute care setting into the appropriate rehabilitation setting. Further improvements are expected as regions and facilities work to deliver best practice stroke care aligned with the stroke QBP clinical handbook⁷ and related funding reform. As in previous years, deficiencies in community-based rehabilitation and care remain, but as phase 2 of the stroke QBP work begins,⁸ the availability of community services is expected to increase.

In 2013/14, funding ended for the Ontario Stroke Registry, a key data source used to monitor and report on stroke acute care and prevention best practice indicators over the past decade. Therefore, administrative data will be the only data source for ongoing reporting of key stroke quality indicators. With facility funding potentially being tied to

performance indicators, monitoring the quality of stroke data captured through our administrative databases is critical. Work is needed to address gaps in the administrative data.

Key Recommendations

1. The Ontario Stroke Network (OSN) should continue to work with the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information to address data gaps and data quality. The OSN should provide support for stroke-related data collection that allows for monitoring, reporting and evaluating the effectiveness of stroke QBP implementation on an ongoing basis. In particular, the OSN should validate Project 340 stroke data elements recorded in the CIHI Discharge Abstract Database (CIHI-DAD) against data elements from the 2012/13 Ontario Stroke Audit to determine whether the data quality is sufficient for use in monitoring stroke care. This validation process would identify opportunities for the OSN, the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information to implement data quality improvement strategies.
2. The OSN should continue joint planning and implementation activities with the 11 Regional Stroke Networks to ensure continued progress and to address areas for improvement.
3. The OSN should continue to work with the Local Health Integration Networks to ensure that infrastructure funding for the Regional Stroke Networks is maintained throughout the stroke QBP implementation. For example, access to and provision of stroke rehabilitation and community services will likely require restructuring in most Local Health Integration Networks, and the leadership of the Regional Stroke Networks will be required to facilitate patient flow planning and change management.
4. The OSN should continue to sponsor the OSN forum as an opportunity for Local Health Integration Networks, Regional Stroke Networks, Health Quality Ontario and the Health System Funding Branch of the Ministry of Health and Long-Term Care to exchange information and provide advice on the delivery of services to meet stroke QBP clinical practice expectations.

^g The Quality-Based Procedures Clinical Handbook for Stroke has been developed in two phases. Phase 2 includes best practices for TIA and stroke prevention clinics, early supported discharge and outpatient and community rehabilitation.

5. The OSN should continue to share the findings of the Regional Stroke Networks associated with stroke QBP implementation with the Health System Funding Branch of the Ministry of Health and Long-Term Care; it should also alert the branch to unintended consequences and potential revisions to inclusion/exclusion criteria for stroke QBPs (e.g., outlier acute stroke patients).
6. The OSN should continue to work with the Ministry of Health and Long-Term Care to support the Stroke QBP phase 2 implementation.
7. Due to the prevalence of vascular risk factors (with hypertension being the leading risk factor), the OSN should continue to support the successful Hypertension Management Program^h and the promotion of vascular health in primary care.

^h The Hypertension Management Program is an evidenced-informed primary care-based chronic disease management program managed by the Ontario Stroke Network and funded by the Ministry of Health and Long Term Care.

Summary by Sector

On Target for Stroke Prevention and Care

Patient Characteristics

- ◆ Vascular risk factors were present in almost 7 of 10 patients with stroke or transient ischemic attack (TIA) arriving at Ontario's acute care hospitals. The most prevalent risk factors were hypertension (69.4%), hyperlipidemia (43.3%), previous stroke or TIA (29.0%), diabetes (26.2%) and atrial fibrillation (16.9%).

- ◆ The proportion of patients with stroke or TIA increased for the age groups 46 to 65 years and older than 85 years.
- ◆ Almost 1 in 3 patients with stroke or TIA had at least 2 comorbid conditions. The proportion of men with 2 comorbidities (31.2%) was significantly higher than the proportion of women (27.7%) ($p < 0.0001$).

INTERPRETATION

More than 2 of every 3 patients have risk factors for stroke that are treatable. The proportion of admitted stroke/TIA patients older than 85 years and between 46 and 65 years continues to increase, raising concerns about post-acute care discharge

destinations for the older age group and the use of appropriate secondary prevention medications and adoption of lifestyle modifications for the younger age group. Given the lack of universal drug benefits for the 46- to 65-year age group, this may be a challenge. In the United States, less than half of patients are taking effective preventive medication prior to being hospitalized for stroke.¹³

RECOMMENDATION

The OSN should maintain its Hypertension Management Program and its focus on advancing vascular health assessment and management, given hypertension's role as the leading risk factor for stroke and the overall high prevalence of vascular risk factors.

Emergency Department – Early Treatment

STROKE QBP RECOMMENDED PRACTICES⁷

- All patients should undergo brain imaging (MRI or CT) immediately.
- All patients with ischemic stroke or TIA should be prescribed antiplatelet therapy for secondary prevention of recurrent stroke unless there is an indication for anticoagulation.

- ◆ The proportion of patients arriving at hospital within the 3.5-hour window to be considered for the clot-busting drug tPA increased from 34.1% in 2004/05 to 44.7% in 2012/13 ($p < 0.0001$).
- ✓ The 2012/13 benchmark was 55.3%, an increase from 52.0% observed in the 2010/11 Ontario Stroke Audit.

Neuroimaging

- ✓ Rates of neuroimaging within 24 hours of hospital arrival increased significantly from 68.6% in 2004/05 to 93.2% in 2012/13 ($p < 0.0001$), a trend observed across all hospital types. Designated stroke centres consistently had the highest neuroimaging rates. Variation across the Local Health Integration Networks (LHINs) was minimal.

- ✓ The benchmark rate for neuroimaging was 97.9% in 2012/13, an increase from 97.7% observed in the 2010/11 Ontario Stroke Audit.

Secondary Prevention

- ✓ Almost 90% of patients discharged to the community from the emergency department (ED) were prescribed antithrombotics upon discharge. Regional stroke centres had the highest prescribing rate among the hospital types.

Emergency Department Visits

- ✓ The OSN's 2016 target rate of 1.65 ED visits for stroke or TIA per 1,000 population has been achieved. When the rate of ED visits for stroke or TIA was standardized to the 2003/04 population, it decreased from 2.0 to 1.64 per 1,000 population ($p < 0.0001$).
- ✓ The proportion of stroke patients arriving at the ED of non-designated stroke centres decreased from 60.1% in 2003/04 to 48.3% in 2012/13 ($p < 0.0001$).
- ◆ The proportion of patients arriving at hospital by ambulance was unchanged at 57% in the three-year period between 2010/11 and 2012/13.

Undetermined Stroke

- ✓ The prevalence of undetermined stroke type as a diagnostic code declined steadily from 2003/04 to 2012/13 in both the ED and inpatient sectors, dropping from 51.0% to 34.5% among ED patients ($p < 0.0001$) and from 32.7% to 8.0% among inpatients ($p < 0.0001$).

INTERPRETATION

The Heart and Stroke Foundation's Warning Signs of Stroke campaign seems to be associated with the increased proportion of patients arriving at hospital within the treatment window for thrombolysis therapy (from 42.3% in 2010/11 to 44.7% in 2012/13) and the proportion arriving at hospital by ambulance (from 57.1% in 2010/11 to 57.6% in 2012/13).

The reduction in the number of cases diagnosed as 'undetermined stroke' is likely due to a combination of increased rates of brain imaging and improved coding of stroke data elements in the CIHI-DAD and NACRS-ED databases (which became mandatory in 2012/13).

Despite the province's aging population, the rate of ED visits for stroke or TIA has decreased over time. This may reflect the increasing uptake of stroke prevention best practices supported by the Regional Stroke Networks.

RECOMMENDATIONS

1. While the OSN has reached its target of 1.65 ED visits per 1,000 population in advance of the 2016/17 deadline (see targets in **Appendix I**), continued preventive strategies, as well as improved access to clinics for stroke prevention and rapid TIA assessment, may result in further improvements. The ED visit rate should continue to be monitored because stroke QBPs include TIA patients, and there may be an incentive to send these patients to the ED rather than to these clinics.
2. As regions begin to consider consolidating stroke care at designated centres, the issue of non-ambulance arrivals may have an impact on the ambulance and transport services needed to transfer patients to designated centres. The Heart and Stroke Foundation's Warning Signs of Stroke campaign should focus on the urgency of calling 911 and being transported directly to a designated stroke centre for assessment of eligibility for thrombolysis and best practice stroke care.
3. The OSN should consider retiring the neuroimaging indicator on the LHIN stroke report cards, given the excellent level of performance (more than 90% compliance) and minimal variation across LHINs.

Inpatient Acute Care – Early Treatment

STROKE QBP RECOMMENDED PRACTICE⁷

All eligible patients should receive intravenous thrombolysis tPA as soon as possible after arrival to hospital with a target door-to-needle time of less than 60 minutes. All patients should undergo carotid imaging of the brain and neck as soon as possible to determine appropriate management/intervention.

- ✓ Access to tPA has increased. In 2004/05, only 3.9% of patients with ischemic stroke received tPA; in 2012/13, this rate had tripled to 12.3% and exceeded rates in the United States, England, Wales, Northern Ireland, Japan, Australia and Sweden.¹¹⁻¹⁵ This trend was observed at designated stroke centres and was met with a corresponding decline at non-designated centres that typically did not administer tPA.
- ◆ The proportion of patients arriving at hospital in time to be considered for tPA increased from 34.1% in 2004/05 to 44.7% in 2012/13 ($p < 0.0001$); however, this was still less than half of all patients with stroke or TIA.
- ✓ Among patients arriving at hospital in time to be considered for tPA, 38.6% received tPA in 2012/13, compared to 15.2% in 2004/05 ($p < 0.0001$). At regional stroke centres, 54.5% of ischemic stroke patients who arrived in time received tPA, up from 40.4% in 2004/05.
- ◆ The 2012/13 benchmark for the proportion of ischemic stroke patients who arrived at hospital within 3.5 hours of stroke symptom onset was 61.0%, a slight drop from 61.2% observed in the 2010/11 Ontario Stroke Audit.
- ✓ The median door-to-needle time decreased by 20 minutes between 2004/05 and 2012/13, dropping from 82.6 to 62.8 minutes ($p < 0.05$). The median time for patients receiving tPA at district stroke centres in 2012/13 was 59.1 minutes, which was below the target of 60 minutes.
- ✗ Among patients that arrived at hospital within 3.5 hours of stroke symptom onset and were administered tPA, only 46.3% received it within 60 minutes in 2012/13.
- ✓ The proportion of ischemic stroke patients without atrial fibrillation who received carotid artery imaging increased from 58.4% in 2004/05 to 82.3% in 2012/13 ($p < 0.0001$); this improved performance was observed across all hospital designations.
- ✗ Women with ischemic stroke and without atrial fibrillation had a lower carotid imaging rate than men in 2012/13 (79.5% vs. 84.6%; $p < 0.0001$).

- ✓ The time to carotid intervention has almost reached the stroke care best practice recommendation of two weeks. In 2012/13, the median time to carotid intervention was 15 days, a decline from 51 days in 2003/04 ($p < 0.0001$) and 21 days in 2010/11. The variation across LHINs decreased by a third, from a median range of 66.5 days in 2003/04 to 21.0 days in 2012/13.

INTERPRETATION

The OSN fully implemented the revised medical redirect paramedic prompt card for stroke thrombolysis in September 2011, and it appears to have had a positive impact as evidenced by the increasing proportions of patients arriving within the treatment window and receiving tPA. Overall access to tPA in Ontario has improved, and the provincial rate exceeds those of several jurisdictions internationally; however, more work is needed to ensure that tPA is delivered within 60 minutes of ED arrival as “time is brain.” Ontario’s success is likely associated with its regionalized approach to the stroke system that is initiated when 911 is called.¹⁷ A larger proportion of admitted patients are receiving carotid imaging, and time to surgical intervention has improved. Future work, including the OSN-funded research study of optimal TIA management, will examine the use of carotid imaging in patients with minor stroke or TIA who are seen in the emergency department but not admitted to hospital. The recent finding of lower carotid imaging rates for women

suggests updating earlier evidence which held that differences in carotid imaging rates between men and women were attributable to differences in surgical eligibility.¹⁸

RECOMMENDATIONS

1. The OSN should work with the Emergency Health Services Branch of the Ministry of Health and Long-Term Care to integrate findings from their jointly funded study of the revised acute stroke medical redirect paramedic protocol¹⁹ into the provincial training bulletin.
2. The OSN’s Stroke Evaluation and Quality Committee analyses should take into account tPA eligibility based on initial stroke severity to better understand optimal rates of tPA administration as many stroke patients who arrive at hospital in time are not eligible for other medical reasons. The OSN should continue its collaboration with the Ontario Telemedicine Network to improve tPA delivery performance and reevaluate the Telestroke program with new data from the 2012/13 Ontario Stroke Audit.
3. The OSN should recommend that the Stroke Quality-Based Procedures Expert Advisory Panel review the carotid imaging indicator and consider including the data fields collected in Project 340 in the CIHI-DAD and NACRS databases as a means of capturing carotid imaging, given that the

Ontario Stroke Registry no longer receives funding for ongoing data collection.

4. The Regional Stroke Networks should continue the work at the LHIN and regional levels that has resulted in improved access to carotid imaging and intervention year over year.

Inpatient Acute Care

STROKE QBP RECOMMENDED PRACTICES⁷

- All patients should be admitted to a specialized, geographically defined hospital unit dedicated to the management of stroke patients.
 - All patients with stroke should be placed NPO and have their swallowing ability screened using a simple, valid, reliable bedside testing protocol as part of their initial assessment and before initiating oral medication, fluid, or foods.
 - AlphaFIM[®] should be completed on day 3.ⁱ
 - Recommended length of stay for patients with ischemic stroke or intracerebral hemorrhage is 5 and 7 days, respectively.
 - Risk factor management should be included in discharge planning.
-

i The AlphaFIM instrument is designed to provide a consistent method of assessing patient functional status in the acute care hospital setting. It is comprised of two projected scores: the Projected FIM-13 Raw Motor Rating and the Projected FIM-5 Raw Cognitive Rating. A higher score indicates a higher level of function. The assessment is to be completed on day 3 following hospital admission. AlphaFIM[®] and FIM[®] are registered trademarks of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

- ✘ There were 14 stroke units in Ontario in 2012/13; however, they were concentrated in only 8 of the 14 LHINs. Only 26.3% of stroke patients were treated on stroke units. LHIN variation in the proportion of patients having access to stroke units ranged from 0% to 71.1%.
- ✓ Among hospitals with stroke units, 75.3% of patients were treated on a stroke unit; this meets Accreditation Canada's stroke distinction standard of 75%.
- ✓ The proportion of stroke patients having swallowing assessments increased from 53.3% in 2004/05 to 67.2% in 2012/13 ($p < 0.0001$). The 2012/13 benchmark was 87.5%, an increase from 83.7% observed in the 2010/11 Ontario Stroke Audit.
- ◆ Among patients that had a documented AlphaFIM assessment, 61.0% of the assessments were completed on day 3 following hospital admission.
- ◆ Among patients with ischemic stroke, the median total inpatient length of stay decreased from 8 days in 2003/04 to 7 days in 2012/13; among patients with intracerebral hemorrhage, it increased from 6 days in 2003/04, to 7 days in 2012/13. In the three-year period between 2010/11 and 2012/13, the median total inpatient length of stay remained at 7 days for both stroke types.
- ◆ The proportion of Alternate Level of Care (ALC) days to total inpatient length of stay decreased from 32.5% in 2010/11 to 27.7% in 2012/13 ($p = 0.42$). Designated stroke centres had lower proportions of ALC days compared to non-designated centres. District stroke centres had the lowest proportion of ALC days (24.8%), followed by regional stroke centres (26.2%) and non-designated centres (30.3%).
- ✓ The 2012/13 benchmark for the proportion of ALC days to total length of stay in acute care was 12.4%, an improvement from 14.6% observed in 2011/12.
- ◆ The variation across LHINs in the proportion of Alternate Level of Care (ALC) days to total length of stay decreased between 2010/11 and 2012/13. The proportion of patients with ALC days decreased from 23.1% in 2010/11 to 20.3% in 2012/13 ($p = 0.12$).
- ◆ In 2012/13, among patients with ALC days who were discharged to long-term care, home with services or to complex continuing care, ALC days represented, respectively, 72.6%, 53.8% and 48.3% of their total acute care length of stay.
- ✓ The proportion of patients with ischemic stroke or TIA and atrial fibrillation who were discharged from an acute care inpatient stay with a prescription for an anticoagulant increased from 73.4% in 2010/11 to 76.3% in 2012/13 ($p = 0.05$). The 2012/13 benchmark rate was 87.4%.
- ◆ Provincially, 35.6% of patients admitted for stroke or TIA were discharged home without services, 29.4% were discharged to inpatient rehabilitation and 14.3% were discharged home with CCAC services, 7.3% were discharged to outpatient rehabilitation, 7.0% were discharged to long-term care and 1.6% to complex continuing care.

INTERPRETATION

A revised stroke unit definition was developed to align with stroke QBPs and be measurable, and as a result, fewer patients have access to a stroke unit than previously reported. Among the facilities with a stroke unit, 3 of 4 patients admitted for stroke were receiving their care in the stroke unit. These patients demonstrated better outcomes, including shorter length of stay, increased referral to inpatient rehabilitation, and reduced mortality. Ontario's stroke unit performance at 75.3% exceeds Accreditation Canada's stroke distinction standard but remains lower than rates reported in England, Wales and Northern Ireland (88%), Australia (80%), Sweden (90%) and Scotland (80%).^{11,12,20,33}

According to the stroke QBP clinical handbook,⁷ the target length of stay for patients with ischemic stroke or intracerebral hemorrhage is 5 and 7 days, respectively. Therefore, the proportion of ALC days to total length of stay will require ongoing monitoring as facilities work to discharge patients in alignment with the QBP target length of stay. The post-acute care sector will need to be responsive to allow for these QBP targets to be achieved. The observed increase in the proportion of ALC days to total length of stay at regional stroke centres may reflect the

increasing complexity of stroke patients. Additionally, stroke patients admitted to regional stroke centres are often referred to freestanding rehabilitation facilities that have longer times between stroke onset and inpatient admission.

RECOMMENDATIONS

1. The OSN should continue to work with the Ministry of Health and Long-Term Care, Health Quality Ontario and the Canadian Institute for Health Information to monitor the application of the revised stroke unit definition and the availability of stroke units in the province.
2. Admission to a stroke unit should be a QBP monitoring indicator for the Ministry of Health and Long-Term Care and Health Quality Ontario. The indicator should use the revised stroke unit definition and data from the 2012/13 Ontario Stroke Audit as the baseline measure for stroke QBP implementation.
3. The OSN should continue to monitor the application of the new stroke unit definition and collaborate with the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information to ensure high-quality data capture of stroke unit use. In addition, work to enhance capture of stroke unit data in the Discharge Abstract Database will support the stroke QBP clinical handbook's indicator 'treated on a stroke unit for at least 80% of total length of stay.'⁷
4. The OSN should support the participation of acute care hospitals in **Accreditation Canada's Stroke Distinction Program**²¹ as a means of ensuring that stroke units are established and sustained in these hospitals to align with the implementation of acute stroke QBPs.
5. The OSN should continue its collaboration with the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information to have AlphaFIM data included in the provincial Discharge Abstract Database and coders trained in capturing this data.
6. The OSN should continue to recommend that patients with TIA or mild stroke be treated on an outpatient basis to alleviate the demand for acute care beds, and that secondary prevention clinics review their practice patterns in an effort to reduce inpatient admissions for TIA. Annually, this represents over 2,900 potentially avoidable inpatient stays.
7. The OSN should continue to work with the Ministry of Health and Long-Term Care and Health Quality Ontario to ensure stroke QBP funding does not create unintended incentives to admit patients with TIA but does encourage innovative ambulatory rapid TIA assessment clinics. Currently, the cost of treating inpatients with TIA is eligible for funding according to stroke QBPs; however, assessment of these patients in an inpatient setting may not be the best use of acute care beds.
8. The Ministry of Health and Long-Term Care should establish an ambulatory clinic database to capture data from facilities that have created rapid TIA assessment clinics to deliver best practice care to patients with TIA or minor stroke in an attempt to prevent an inpatient stay.

Inpatient Rehabilitation

STROKE QBP RECOMMENDED PRACTICE⁷

- Patients with moderate or severe stroke should be given the opportunity to participate in inpatient rehabilitation.
 - Inpatient rehabilitation length-of-stay targets should be attained.
-

Access

- ✓ The proportion of patients with moderate stroke who were admitted to inpatient rehabilitation rose from 40.5% in 2003/04 to 48.6% in 2012/13 ($p < 0.0001$).
- ✗ The variation among the LHINs in the proportion of moderately disabled patients admitted to inpatient rehabilitation increased from 2003/04 to 2012/13.
- ✓ The proportion of patients admitted to inpatient rehabilitation with severe stroke increased from 32.2% in 2010/11 to 34.5% in 2012/13. The 2012/13 benchmark was 49.0%, a slight improvement from 48.6% observed in 2011/12.

- ✓ The variation among the LHINs in the proportion of severely disabled stroke patients admitted to inpatient rehabilitation increased between 2003/04 and 2012/13.
- ✓ The proportion of mildly disabled stroke patients admitted to inpatient rehabilitation decreased from 21.9% in 2003/04 to 17.0% in 2012/13 ($p < 0.001$). Variation among the LHINs also decreased.
- ✓ Median admission FIM scores declined from 76 in 2003/04 to 74 in 2012/13, indicating that the overall level of stroke severity of admitted patients had increased, a positive trend that suggests increasing access to rehabilitation for more complex patients.
- ✗ Only 45.0% of stroke patients admitted to inpatient rehabilitation were meeting the QBP target for active length of stay in 2012/13, and there was wide variation across the LHINs.
- ✓ The 2012/13 benchmark for the proportion of inpatient rehabilitation patients achieving RPG active length of stay was 73.1%, an increase from 66.9% in 2011/12.

Wait Times

- ✓ Wait times for admission to rehabilitation centres decreased from 14 days in 2003/04 to 11 days in 2012/13. Wait times remained longer for freestanding rehabilitation facilities than for non-freestanding facilities (13 days vs. 9 days).
- ✓ The 2012/13 benchmark for median wait time from stroke onset to admission to inpatient rehabilitation was 6.0 days, an improvement from 6.5 days in 2011/12.
- ✗ There was wide variation in the median wait time from stroke onset to inpatient rehabilitation admission across LHINs, ranging from 7 days to 17 days.

Admission Rates

- ✓ Admission to inpatient rehabilitation in Ontario increased from 27.7% in 2003/04 to 32.6% in 2012/13; however, there was wide variation across LHINs, ranging from 39.1% to 24.2%. The 2012/13 benchmark was 44.3%.

Length of Stay

- ✓ Provincially, the total mean length of stay in inpatient rehabilitation for stroke decreased from 38 days in 2003/04 to 32 in 2012/13. The proportion of days in inpatient rehabilitation that were coded as Alternate Level of Care decreased from 6.6% in 2010/11 to 5.8% in 2012/13.

- ✓ The mean active length of stay for most stroke-related Rehabilitation Patient Groups (RPG) decreased between 2003/04 and 2012/13, from 66.8 days to 50.5 days for the most severe stroke patients (RPG 1100), from 30.2 days to 21.5 days for moderate stroke patients (RPG 1140), and from 18.5 days to 13.3 days for the mildest stroke patients (RPG 1160).

Discharge Destination

- ✓ In Ontario, the proportion of patients with stroke discharged from inpatient rehabilitation to long-term care decreased from 13.5% in 2003/04 to 8.0% in 2012/13 ($p < 0.0001$).
- ✗ The proportion of patients with stroke discharged from an inpatient rehabilitation facility to another acute care facility rose from 5.7% in 2003/04 to 8.0% in 2012/13.

INTERPRETATION

The median wait time for admission to inpatient rehabilitation from stroke acute care has remained unchanged at 10 days from 2009/10 to 2012/13. The OSN has set a median wait time target of 5 days by 2016/17 (see OSN targets in [Appendix I](#)). In addition, according to stroke QBPs, the length of stay in acute care for patients with ischemic stroke or intracerebral hemorrhage before admission to inpatient rehabilitation is set at 5 days and 7 days, respectively. If these targets are to be met, strategies to facilitate earlier transfers to inpatient rehabilitation are required.

The proportion of moderately disabled stroke patients admitted to inpatient rehabilitation increased from 40.5% in 2003/04 to 48.6% in 2012/13. There was a minimal increase in the proportion of severely disabled stroke patients admitted over the same period, from 37.6% to 34.5%, which has likely contributed to the decrease in length of stay.

Across the province, more work is required to move mildly disabled stroke patients to outpatient programs and admit severely disabled patients to inpatient rehabilitation. Without access to rehabilitation services, this group of stroke patients will continue to be a major source of acute care Alternate Level of Care (ALC) days and long-term care admissions. The decrease in admission of mildly disabled stroke survivors to inpatient rehabilitation (17.0% of inpatient rehabilitation admissions) highlights the innovation taking place to improve patient flow to outpatient rehabilitation and community based rehabilitation services to achieve RPG target length of stay as defined in the stroke QBP clinical handbook.⁷

The stroke QBP clinical handbook has set target lengths of stay to deliver best practice rehabilitation for all stroke Rehabilitation Patient Groups; these targets are based on increased rehabilitation intensity. The 2012/13 results reveal that mildly disabled stroke patients (RPGs 1160 and 1150) that could be served in a community setting exceed the expected best practice length of stays by 13.3 and 12.6 days, respectively. Among the moderately disabled stroke patients (RPGs 1140, 1130 and 1120), only RPG 1120 is meeting the target length of stay, and among the severely disabled stroke group, only RPG 1110 is meeting the target length of stay.

The reduction in stroke patients being discharged to long-term care after inpatient rehabilitation may be due to the increased proportion of moderate and severely disabled stroke patients being admitted to rehabilitation, to better outcomes and to improved discharge planning in inpatient rehabilitation.

RECOMMENDATIONS

1. Rehabilitation programs should continue to identify and reduce barriers to admission for patients with severe stroke as evidence indicates these patients benefit from rehabilitation.
2. The Ministry of Health and Long-Term Care through QBPs should consider financial incentives for the regions to allow them to implement early supported discharge and access to outpatient rehabilitation and to achieve improved efficiency and length of stay targets for inpatient stroke rehabilitation.
3. The OSN should continue to collaborate with the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information to capture rehabilitation intensity in all rehabilitation sectors in order to evaluate uptake of stroke rehabilitation best practices and rehabilitation facility length of stay.
4. The OSN should continue to monitor discharge from inpatient rehabilitation back to acute care, as the stroke QBP initiative begins to be implemented. Ischemic stroke patients are to be discharged from acute care at day 5 and hemorrhagic stroke patients at day 7.

5. Successful models of community rehabilitation services, such as those available from the **OSN Stroke Rehabilitation Resource Centre**, should be shared and used to inform models of care that will enhance community services.
6. The OSN should work with the Ministry of Health and Long-Term Care on the process of stroke capacity planning to ensure that all LHINs have adequate rehabilitation infrastructure and resources, thereby reducing the wide variation that currently exists among LHINs.
7. The OSN should continue to collaborate with the **Rehabilitation Care Alliance** to promote quality improvement and accountability within the rehabilitation sector and drive system change through innovation.

Complex Continuing Care

- ✓ From 2008/09 to 2011/12, time to admission to complex continuing care from acute care decreased by eight days and length of stay in complex continuing care decreased by six days; there has been minimal change in the two years since 2011/12.
- ✗ The proportion of stroke patients discharged back to an acute care setting from complex continuing care increased.

- ✓ Among stroke patients in complex continuing care, fewer were discharged to long-term care, and more were discharged home with services.
- ✗ The intensity of rehabilitation therapy for stroke patients in complex continuing care remained unchanged at just over 45 minutes a day.

INTERPRETATION

For complex continuing care facilities, the time to admission and the length of stay have shown no improvement in the two-year period from 2011/12 to 2012/13, yet the proportion of patients discharged back to an acute care setting from complex continuing care has been increasing. This may be due to the increasing complexity of stroke patients and should be investigated.

The QBP target for intensity of rehabilitation is approximately three hours per day; this is not being achieved within the context of complex continuing care services.

RECOMMENDATIONS

1. More investigation is needed to assess the stroke patient population receiving care in complex continuing care facilities in order to identify patients that may benefit from more intensive rehabilitation and referral to the most appropriate setting.

2. The OSN should continue its work with the Canadian Institute for Health Information and the Ministry of Health and Long-Term Care to develop a means to monitor and evaluate rehabilitation intensity. The OSN should also continue to work with the Rehabilitative Care Alliance to drive consistency in the measurement of functional improvement across rehabilitation sectors.
3. Less than a third of patients in complex continuing care are discharged to the community. The provincial Stroke Capacity Planning Committee should examine the role of complex continuing care in stroke rehabilitation.

Community Care

STROKE QBP RECOMMENDED PRACTICES⁷ – PHASE 2

Recommended practices and indicators that will measure ambulatory and community-based stroke care are currently being considered.

- ✓ The number of stroke patients referred to a Community Care Access Centre (CCAC) following acute stroke increased from 5,859 in 2006/07–2007/08 to 7,101 in 2011/12–2012/13.
- ✗ CCAC services to stroke patients declined over time with the exception of care provided by personal support workers.

- ✗ The proportion of stroke patients receiving CCAC-based rehabilitation declined from 57.8% in 2006/07–2007/08 to 51.3% in 2011/12–2012/13.
- ✗ The proportion of stroke patients receiving CCAC rehabilitation services varied across the LHINs from 30.7% to 70.7%.
- ✓ The variation among the LHINs in the proportion of stroke patients receiving CCAC rehabilitation services decreased in the three-year period between 2009/10–2010/11 and 2011/12–2012/13.
- ✗ The median wait time for patients receiving CCAC-based rehabilitation between 2010/11 and 2012/13 remained unchanged at approximately 15 days. Across the LHINs, the median time to the first CCAC rehabilitation visit varied from 8 to 26 days.
- ✗ The mean number of rehabilitation service visits (occupational therapy, physiotherapy, speech therapy or social work) per patient over a 180-day period declined from 6.9 visits in 2006/07–2007/08 to 5.8 visits in 2011/12–2012/13.
- ✗ The mean number of CCAC rehabilitation visits varied from 3.6 to 12.1 per client. In the three-year period from 2009/10–2010/11 to 2011/12–2012/13, variation in the mean number of rehabilitation services provided increased across the LHINs.

- ✓ The 2012/13 benchmark was a mean of 8.5 rehabilitation visits over 180 days per client, an increase from the 2011/12 benchmark of 7.9.

INTERPRETATION

Half of patients with stroke or TIA (51.3%) received CCAC-based rehabilitation therapy. The intensity of that therapy remains insufficient to obtain optimal functional outcomes. However, due to the lack of standardized measures of functional outcomes, the effectiveness of CCAC rehabilitation services is unknown.

Overall, there has been no notable improvement in CCAC services. The work of the Ontario Association of Community Care Access Centres in developing a stroke pathway and plans to develop quality-based funding for community services could assist in addressing the significant gaps in service. To support best practices in stroke rehabilitation, the pathway will need to address wait times, the proportion of stroke patients referred to CCAC rehabilitation services and the intensity of those services. In addition, the Ministry of Health and Long-Term Care and the Stroke Quality-Based Procedures Expert Advisory Panel are working to include community-based best practices in the phase 2 stroke QBP clinical handbook, and this will serve as a roadmap for improvement.

RECOMMENDATIONS

1. The OSN should continue to work through the stroke QBP process to establish best practices and appropriate funding for CCAC rehabilitation services that could potentially improve patient flow and reduce rates of readmission to hospitals and admission to long-term care.
2. The OSN should continue to collaborate with the Ontario Association of Community Care Access Centres on the development of the Stroke Outcome-Based Pathway to support uptake of best practices by CCAC service providers.
3. Successful models of community rehabilitation services, such as those available through the OSN's Stroke Rehabilitation Resource Centre, should be shared and used to inform models of care that will enhance community services.
4. The OSN should continue to collaborate with the Rehabilitative Care Alliance in the development of outpatient and community-based rehabilitation indicators and the identification of standardized assessment tools to measure indicators.

Stroke QBP Effectiveness

STROKE QBP RECOMMENDED OUTCOME INDICATOR⁷

Greater access to stroke best practices should result in lower readmissions, mortality rates and institutionalization.

Readmissions

- ✓ In Ontario, the 30-day all-cause readmission rate following the first emergency department visit or inpatient admission for stroke or TIA declined from 8.8% in 2003/04 to 7.4% in 2012/13 ($p < 0.0001$). A decrease in the rate occurred for all stroke types, with intracerebral hemorrhage patients experiencing the most dramatic decline, from 8.0% to 5.5% between 2003/04 and 2012/13 ($p = 0.01$).
- ✓ Following the first emergency department visit or inpatient admission for stroke or TIA, the rate of another stroke-related revisit or readmission within 30 days was 4.3% in 2012/13, a large decline from 5.0% in 2003/04. Compared to other stroke subtypes, patients with TIA had the highest rate of stroke- or TIA-related revisits or readmissions in 2012/13 (5.8%), a large decline from 2003/04 (6.7%).

Mortality

- ✓ Ontario's in-hospital risk-adjusted mortality rate among admitted patients with stroke or TIA decreased significantly from 14.2% in 2003/04 to 9.9% in 2012/13 ($p < 0.0001$).
- ✓ The 30-day risk-adjusted mortality rate among patients admitted for stroke or TIA declined from 15.8% in 2003/04 to 12.6% in 2012/13 ($p < 0.0001$).

- ✓ Provincially, the risk-adjusted mortality rate at one year following admission for stroke or TIA declined from 27.9% in 2003/04 to 23.3% in 2011/12 ($p < 0.0001$).
- ✓ There was a relative decline in in-hospital, 30-day and one-year mortality rates following admission for stroke or TIA (respectively, 9.9%, 12.6% and 23.3%; $p < 0.0001$). With approximately 15,600 stroke admissions per year, the absolute decrease in one-year mortality of 4.6% would be expected to produce an additional 718 survivors.

Institutionalization

- ✓ The rate of institutionalization within one year following an acute stroke decreased from 11.1% in 2004/05 to 7.1% in 2011/12 ($p < 0.01$). The OSN's target for 2016/17 is 3.75%.

INTERPRETATION

Acute care in-hospital admission rates and all-cause readmission rates have significantly improved. This progress, together with the overall decline in mortality rates over the nine years from 2003/04 to 2012/13, is a reflection of a mature, organized acute care stroke system and of regions directing patients to designated stroke centres where they are more likely to have access to thrombolysis, stroke unit care, health care providers with expertise in stroke, and inpatient rehabilitation. Ontario's results align with previous work that demonstrated that stroke mortality was lower when patients received care at stroke centres.²²

Interestingly, readmission rates for stroke or TIA have not shown the same improvement. Patients with stroke or TIA who are cared for at non-designated stroke centres have higher readmission and mortality rates than those hospitalized at designated stroke centres.

RECOMMENDATIONS

1. Efforts to consolidate care into specialized stroke centres should continue. The data support the view that patients admitted to designated stroke centres have better outcomes in relation to rates of readmission, mortality, Alternate Level of Care and having a confirmed diagnosis at discharge.
2. Regional Stroke Networks should work with the Local Health Integration Networks to ensure patients are cared for in centres with appropriate stroke best practice infrastructure, in alignment with stroke QBPs.
3. The OSN should continue its work in support of the stroke QBP implementation. The standards of care in the stroke QBP clinical handbook, if implemented, would support ongoing improvement in access to best practices, reducing Alternate Level of Care days and costs of care while improving patient flow and outcomes.
4. The OSN should monitor the impact of stroke QBPs, including access to stroke units, implementation of AlphaFIM and change management.

List of Exhibits

1. Ontario Stroke Audit Patient Characteristics, 2012/13

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1 Ontario Stroke Audit Patient Characteristics, 2012/13

According to records from the CIHI-DAD and NACRS databases, there were 22,874 emergency department visits or hospitalizations for acute stroke or transient ischemic attack (TIA) during the study period. The audit sample included 100 of 169 hospitals and 16,323 patient charts, of which 15,802 (97%) were abstracted at the time of analysis. Additionally, 1,282 charts were excluded: 316 because the patient required palliative care as part of the initial treatment plan, 288 because the patient arrived more than 14 days from event onset, 234 because the stroke occurred after patient arrival in hospital, 290 that were determined upon review to be non-strokes or subarachnoid hemorrhages, 80 because the patients were from out of province and 74 that were miscoded, as stroke or TIA were never suspected. This left a final sample of 14,520 charts, representing 63.5% of the total stroke population. Thirty-three percent of the patients were discharged directly from the emergency department, and 66% were admitted as inpatients.

Unlike previous audits, the 2012/13 Ontario Stroke Audit of Acute Care Facilities did not include patients with subarachnoid hemorrhage or paediatric patients so as to align with the parameters of the provincial stroke quality-based procedures funding initiative.

Key Findings

EXHIBIT 1.0

- The mean age at stroke presentation was 73.0 years (median, 74.7 years), 49.8% of stroke patients were female and they were on average five years older than their male counterparts. The audit was able to capture 309 patients managed with the assistance of the Telestroke program.
- Among those with a diagnosis of stroke, the stroke type was ischemic in 88.0% of patients and unable to be determined in 0.9% of patients.
- The Canadian Neurological Scale^j mean score for all patients was 8.3 (median score, 8.8).
- The prevalence of established stroke risk factors was high: 69.4% of patients had hypertension, 43.3% had hyperlipidemia, 26.2% had diabetes mellitus, 16.9% had atrial fibrillation and 14.5% were current smokers. Further, 29.0% of patients had a prior stroke or transient ischemic attack (TIA) and 11.7% had a prior myocardial infarction.
- There were variations in patient characteristics across the Local Health Integration Networks (LHINs). In particular, of the seven risk factors for stroke, patients in the Erie St Clair LHIN had a high prevalence for four: hypertension (78.6%), hyperlipidemia (51.4%), prior stroke or TIA (32.8%) and myocardial infarction (15.6%). Conversely, stroke patients in the Central LHIN had a low prevalence for all seven stroke risk factors: hypertension (65.4%), hyperlipidemia (37.3%), prior stroke or TIA (22.1%), myocardial infarction (8.1%), diabetes (24.3%), atrial fibrillation (15.1%) and current smoker (10.0%).

^j The Canadian Neurological Scale is designed to assess neurological function in conscious stroke patients. The scale ranges from 0 to 11.5, with a higher score indicating less impairment. A CNS score of 8 or less indicates severe stroke.

EXHIBIT 1.0 Characteristics of patients with stroke or transient ischemic attack, in Ontario and by Ontario Stroke Network designation and Local Health Integration Network, 2012/13

Group/Subgroup	Patients (provincial total) ¹ , n	Patients (audit sample), n	Age, mean (median)	Canadian Neurological Scale score ² , mean ± SD	Canadian Neurological Scale score ² , median (IQR)	Long-term Care Resident, n (%)	Independent ³ , n (%)	Rural Resident, n (%)
Ontario	19,327	14,520	73.0 (74.7)	8.3 ± 0.03	8.8 (6.3-10.3)	1,032 (5.3)	13,453 (69.6)	2,164 (11.2)
Female	9,618	7,228	75.3 (77.7)	8.1 ± 0.04	8.7 (6.0-10.2)	722 (7.5)	6,143 (63.9)	957 (9.9)
Male	9,709	7,292	70.7 (71.6)	8.4 ± 0.04	9.0 (6.6-10.3)	310 (3.2)	7,310 (75.3)	1,207 (12.4)
Telestroke patients ⁴	309	299	71.2 (72.9)	7.1 ± 0.18	7.0 (4.6-9.4)	25 (8.0)	218 (70.5)	90 (29.1)
Ontario Stroke Network Designation								
Regional stroke centre	5,701	5,418	72.3 (74.2)	8.0 ± 0.05	8.5 (5.7-10.2)	279 (4.9)	4,144 (72.7)	444 (7.8)
District stroke centre	4,582	4,411	73.2 (74.8)	8.0 ± 0.05	8.5 (5.8-10.1)	270 (5.9)	3,100 (67.7)	584 (12.7)
Non-designated centre	8,302	3,980	73.4 (75.1)	8.8 ± 0.05	9.2 (7.3-10.4)	445 (5.4)	5,714 (68.8)	977 (11.8)
Non-designated Telestroke sites ⁵	743	711	72.9 (74.3)	7.9 ± 0.14	8.1 (5.8-9.7)	39 (5.2)	495 (66.7)	159 (21.4)
Local Health Integration Network								
1. Erie St. Clair	1,219	1,035	73.1 (74.1)	7.8 ± 0.13	8.5 (5.0-9.9)	103 (8.5)	783 (64.2)	81 (6.6)
2. South West	1,376	1,137	73.2 (74.4)	8.0 ± 0.11	8.6 (6.1-10.0)	82 (6.0)	950 (69.0)	320 (23.2)
3. Waterloo Wellington	996	725	73.2 (75.2)	8.4 ± 0.12	8.9 (7.0-10.2)	55 (5.5)	759 (76.2)	84 (8.5)
4. Hamilton Niagara Haldimand Brant	2,544	1,852	73.1 (74.8)	8.9 ± 0.07	9.5 (7.1-10.8)	117 (4.6)	1,651 (64.9)	95 (3.7)
5. Central West	805	370	70.8 (72.7)	8.9 ± 0.16	9.3 (7.5-10.4)	57 (7.0)	577 (71.7)	27 (3.4)
6. Mississauga Halton	1,480	1,016	72.4 (73.8)	8.0 ± 0.11	8.5 (6.3-10.0)	61 (4.1)	1,126 (76.1)	19 (1.3)
7. Toronto Central	2,164	1,863	72.4 (75.0)	7.8 ± 0.09	8.4 (5.4-10.1)	113 (5.2)	1,499 (69.3)	13 (0.6)
8. Central	1,734	985	72.7 (74.7)	8.2 ± 0.12	8.8 (6.4-10.1)	91 (5.2)	1,201 (69.3)	52 (3.0)
9. Central East	2,052	1,586	73.9 (75.5)	7.9 ± 0.09	8.1 (6.0-9.7)	118 (5.7)	1,403 (68.4)	173 (8.4)
10. South East	861	728	74.5 (76.0)	8.0 ± 0.16	8.5 (6.1-10.1)	42 (4.9)	551 (64.0)	329 (38.2)
11. Champlain	1,821	1,259	73.3 (75.3)	8.3 ± 0.11	8.9 (6.2-10.3)	90 (4.9)	1,361 (74.8)	325 (17.8)
12. North Simcoe Muskoka	858	614	73.5 (75.4)	8.3 ± 0.14	8.7 (6.4-10.2)	42 (4.9)	623 (72.6)	309 (36.0)
13. North East	965	907	73.4 (74.8)	8.6 ± 0.10	9.2 (6.6-10.5)	50 (5.2)	599 (62.0)	218 (22.6)
14. North West	452	443	71.9 (73.4)	8.5 ± 0.15	9.0 (6.4-10.3)	12 (2.7)	368 (81.4)	120 (26.5)

EXHIBIT 1.0 continued

Group/Subgroup	Comorbidities, n (%)							Stroke Diagnosis, n (%)			Ischemic Stroke as Final Stroke Type n (%)	Charlson Score ≥ 2, n (%)
	Prior stroke/TIA	Diabetes	Hypertension	Current smoker	Hypertlipidemia	Atrial fibrillation	Prior myocardial infarction	Stroke	Transient ischemic attack	Unable to determine		
Ontario	5,600 (29.0)	5,070 (26.2)	13,412 (69.4)	2,799 (14.5)	8,376 (43.3)	3,270 (16.9)	2,259 (11.7)	11,746 (60.8)	7,413 (38.4)	168 (0.9)	10,332 (88.0)	5,691 (29.4)
Female	2,871 (29.9)	2,244 (23.3)	6,788 (70.6)	1,081 (11.2)	3,890 (40.4)	1,741 (18.1)	840 (8.7)	5,610 (58.3)	3,918 (40.7)	90 (0.9)	4,974 (88.7)	2,662 (27.7)
Male	2,728 (28.1)	2,826 (29.1)	6,623 (68.2)	1,718 (17.7)	4,486 (46.2)	1,530 (15.8)	1,419 (14.6)	6,136 (63.2)	3,495 (36.0)	78 (0.8)	5,359 (87.3)	3,029 (31.2)
Telestroke patients ⁴	89 (28.7)	80 (25.8)	208 (67.1)	55 (17.7)	121 (39.1)	58 (18.7)	35 (11.4)	255 (82.4)	55 (17.6)	-	228 (89.3)	104 (33.5)
Ontario Stroke Network Designation												
Regional stroke centre	1,703 (29.9)	1,449 (25.4)	4,064 (71.3)	837 (14.7)	2,698 (47.3)	1,118 (19.6)	657 (11.5)	3,926 (68.9)	1,732 (30.4)	43 (0.8)	3,332 (84.9)	1,793 (31.5)
District stroke centre	1,422 (31.0)	1,202 (26.2)	3,148 (68.7)	724 (15.8)	1,925 (42.0)	770 (16.8)	589 (12.9)	2,787 (60.8)	1,764 (38.5)	31 (0.7)	2,514 (90.2)	1,441 (31.5)
Non-designated centre	2,277 (27.4)	2,186 (26.3)	5,688 (68.5)	1,137 (13.7)	3,428 (41.3)	1,286 (15.5)	951 (11.5)	4,601 (55.4)	3,630 (43.7)	71 (0.9)	4,099 (89.1)	2,255 (27.2)
Non-designated Telestroke sites ⁵	198 (26.6)	235 (31.6)	512 (68.9)	101 (13.6)	325 (43.8)	96 (12.9)	62 (8.3)	432 (58.2)	287 (38.7)	23 (3.1)	387 (89.6)	202 (27.2)
Local Health Integration Network												
1. Erie St. Clair	400 (32.8)	346 (28.3)	959 (78.6)	185 (15.2)	626 (51.4)	202 (16.6)	191 (15.6)	684 (56.1)	531 (43.5)	**	601 (87.8)	457 (37.5)
2. South West	429 (31.2)	397 (28.8)	982 (71.4)	229 (16.6)	733 (53.3)	256 (18.6)	145 (10.5)	833 (60.5)	538 (39.1)	**	728 (87.3)	476 (34.6)
3. Waterloo Wellington	300 (30.1)	271 (27.2)	647 (65.0)	152 (15.3)	438 (44.0)	159 (16.0)	98 (9.9)	558 (56.0)	437 (43.9)	**	490 (87.8)	271 (27.2)
4. Hamilton Niagara Haldimand Brant	759 (29.8)	619 (24.3)	1,737 (68.3)	376 (14.8)	1,055 (41.5)	475 (18.7)	345 (13.6)	1,525 (59.9)	1,006 (39.6)	13 (0.5)	1,318 (86.5)	718 (28.2)
5. Central West	196 (24.3)	252 (31.3)	567 (70.4)	81 (10.1)	361 (44.8)	101 (12.5)	107 (13.3)	487 (60.5)	318 (39.5)	-	438 (90.0)	231 (28.7)
6. Mississauga Halton	426 (28.8)	398 (26.9)	1,103 (74.5)	197 (13.3)	768 (51.9)	226 (15.3)	175 (11.8)	990 (66.9)	486 (32.9)	**	867 (87.5)	399 (27.0)
7. Toronto Central	547 (25.3)	530 (24.5)	1,509 (69.7)	324 (15.0)	880 (40.7)	388 (17.9)	248 (11.5)	1,489 (68.8)	640 (29.6)	35 (1.6)	1,246 (83.7)	678 (31.3)
8. Central	384 (22.1)	422 (24.3)	1,135 (65.4)	173 (10.0)	647 (37.3)	261 (15.1)	140 (8.1)	1,070 (61.7)	654 (37.7)	10 (0.6)	969 (90.6)	382 (22.0)
9. Central East	584 (28.5)	566 (27.6)	1,344 (65.5)	265 (12.9)	780 (38.0)	334 (16.3)	244 (11.9)	1,231 (60.0)	786 (38.3)	35 (1.7)	1,105 (89.8)	565 (27.5)
10. South East	232 (27.0)	216 (25.1)	564 (65.5)	145 (16.8)	348 (40.5)	163 (18.9)	93 (10.8)	519 (60.3)	296 (34.4)	45 (5.3)	447 (86.2)	291 (33.8)
11. Champlain	621 (34.1)	447 (24.6)	1,311 (72.0)	269 (14.8)	877 (48.2)	298 (16.4)	182 (10.0)	1,038 (57.0)	775 (42.6)	8 (0.4)	915 (88.2)	537 (29.5)
12. North Simcoe Muskoka	268 (31.3)	199 (23.1)	560 (65.2)	132 (15.4)	249 (29.0)	152 (17.7)	97 (11.3)	466 (54.4)	384 (44.8)	7 (0.8)	426 (91.4)	261 (30.5)
13. North East	323 (33.4)	278 (28.8)	650 (67.4)	198 (20.6)	388 (40.2)	173 (18.0)	150 (15.6)	584 (60.5)	380 (39.4)	**	533 (91.2)	304 (31.5)
14. North West	131 (28.9)	131 (28.9)	343 (75.8)	73 (16.0)	226 (49.9)	82 (18.1)	43 (9.5)	272 (60.0)	181 (40.0)	-	249 (91.7)	122 (26.9)

Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All patients aged ≥18 years admitted to an acute care facility for suspected stroke (excluding subarachnoid hemorrhage) or transient ischemic attack.

1 Results were weighted based on hospital volume and the number of patient charts sampled.

2 Canadian Neurological Scale (CNS) score is designed to assess neurological function in conscious stroke patients. The scale ranges from 0 to 11.5, with a higher score indicating less impairment. A CNS score of 8 or less indicates severe stroke.

3 Describes a patient who is fully independent in all activities of daily living and instrumental activities of daily living.

4 Includes patients at 19 Telestroke sites with a Telestroke consultation documented in the patient's chart.

5 Non-designated centres (n=8). The remaining 11 Telestroke sites were regional or district stroke centres.

** Cell value suppressed for reasons of privacy and confidentiality.

Note: Cells in which there were no reported or available data are marked with a hyphen (-).

SD = standard deviation. IQR = Interquartile range.

INTERPRETATION

In 2012/13, patients arriving at Ontario acute care facilities with stroke or TIA had a median age of 75 years. Risk factors for stroke were common in the study cohort (similar to the previous Ontario Stroke Audit of Acute Care Facilities in 2010/11) but lower than those observed in other stroke registries.¹¹⁻¹³

Half of all patients arriving at Ontario acute care hospitals with stroke or TIA had experienced a mild stroke (as indicated by a median score of 8 on the Canadian Neurological Scale).

RECOMMENDATION

The OSN should continue its commitment to the Hypertension Management Program (given that hypertension is the leading risk factor for stroke) and focus on advancing vascular health assessment and management and the overall prevalence of vascular risk factors among stroke patients.

2 Early Assessment – Stroke Quality-Based Procedures

Key Findings

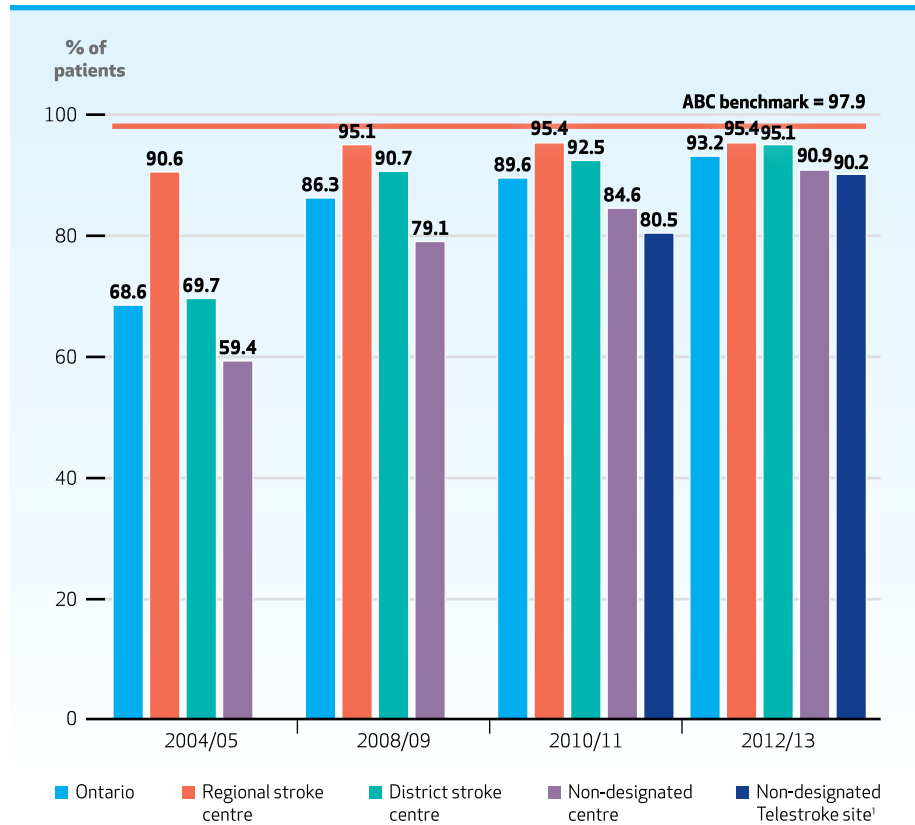
EXHIBITS 2.1A, 2.1B

- In 2012/13, 93.2% of patients underwent neuroimaging within 24 hours of hospital arrival, a dramatic improvement from 68.6% in 2004/05 ($p < 0.0001$) and one observed across all hospital designations. The benchmark was 97.9%, based on data from the 2012/13 Ontario Stroke Audit.
- The rate for neuroimaging within 24 hours of a patient's arrival was 95.4% at regional stroke centres, 95.1% at district stroke centres, 90.9% at non-designated centres and 90.2% at non-designated Telestroke sites.
- There was an 11-point variation in the neuroimaging rate across Local Health Integration Networks (LHINs), ranging from 86.0% in the South East LHIN to 97.1% in the Toronto Central and Central West LHINs.

EXHIBITS 2.2A, 2.2B, 2.2C

- In 2012/13, 82.3% of ischemic stroke patients without atrial fibrillation had carotid imaging done while in hospital, an increase from 58.4% of patients in 2004/05 ($p < 0.0001$). The benchmark for carotid imaging was 93.6%.
- Women had lower carotid imaging rates than men (79.5% vs. 84.6%; $p < 0.0001$).
- There was considerable improvement across all designations and for most LHINs in the proportion of patients accessing carotid imaging prior to hospital discharge.
- Patients seen at facilities in the North Simcoe Muskoka LHIN had the lowest rates of carotid imaging.
- Patients seen at most designated facilities had rates of imaging above the provincial rate of 82.3%, the exceptions being the designated facilities in Windsor, Stratford, Brantford, Barrie, Huntsville, Peterborough, Pembroke, Timmins and Belleville.

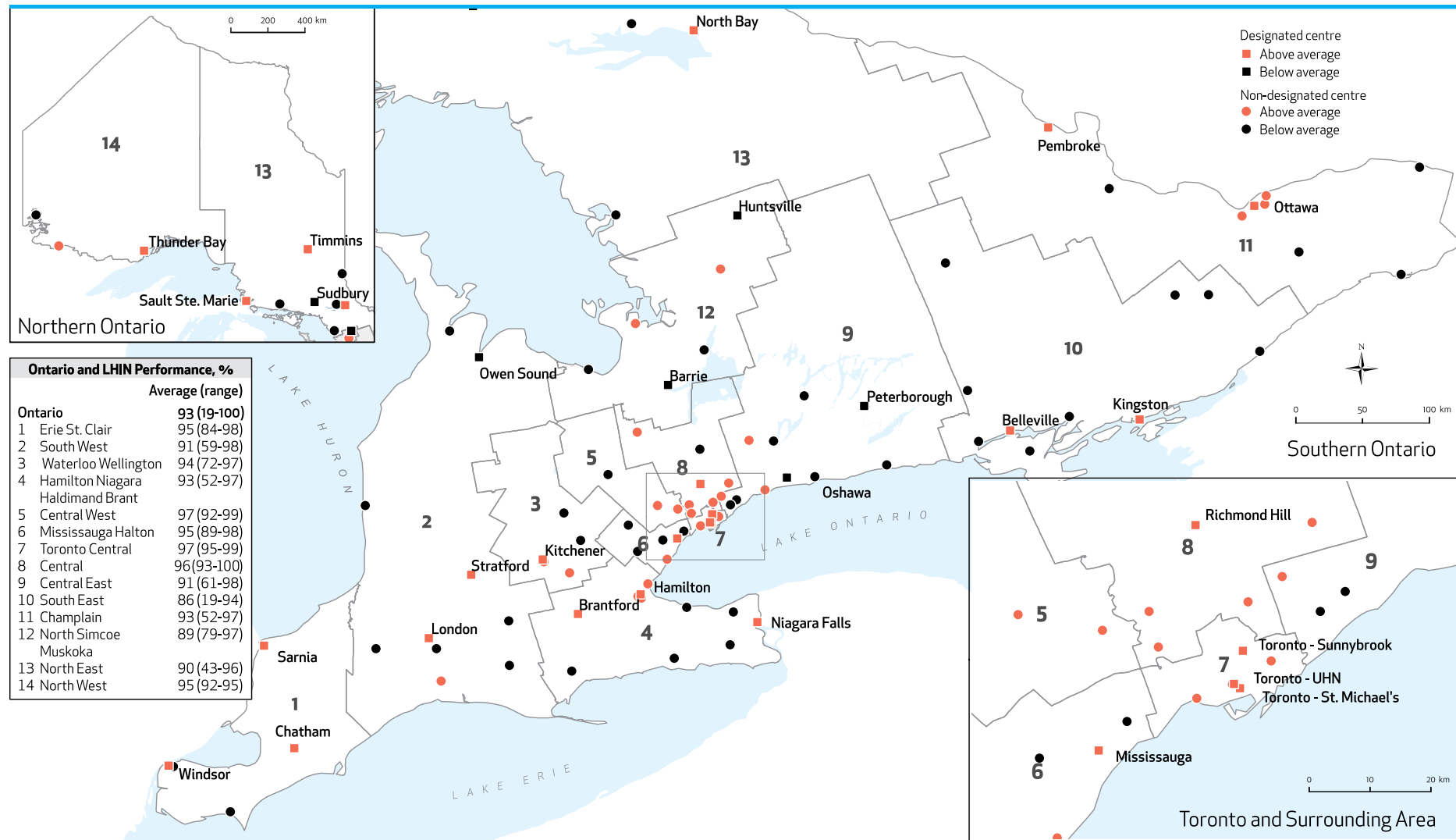
EXHIBIT 2.1A Proportion of adult patients with stroke or transient ischemic attack who received neuroimaging within 24 hours of presenting to the emergency department, in Ontario and by Ontario Stroke Network designation, 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2004/05, 2008/09, 2010/11 and 2012/13.
 Inclusion criteria: All patients aged ≥18 years presenting to an emergency department or admitted to inpatient care at an acute care facility for suspected stroke (excluding subarachnoid hemorrhage in 2012/13) or transient ischemic attack with a scan date and time (N=17,072 in 2004/05; 18,416 in 2008/09; 17,453 in 2010/11; and 18,910 in 2012/13).

1 Non-designated centres (N=7 in 2010/11 and 8 in 2012/13). The remaining Telestroke sites (N=10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.

EXHIBIT 2.1B Proportion of adult patients with stroke or transient ischemic attack who received neuroimaging within 24 hours of presenting to the emergency department, in Ontario and by Local Health Integration Network and facility performance, 2012/13



Datasource: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All patients aged ≥18 years presenting to an emergency department or admitted to inpatient care at an acute care facility for suspected stroke (excluding subarachnoid hemorrhage) or transient ischemic attack with a scan date and time (N=18,910 in 2012/13).

EXHIBIT 2.2A Proportion of admitted adult ischemic stroke patients without atrial fibrillation who received carotid imaging prior to discharge, in Ontario and by Ontario Stroke Network designation, 2004/05, 2008/09, 2010/11 and 2012/13

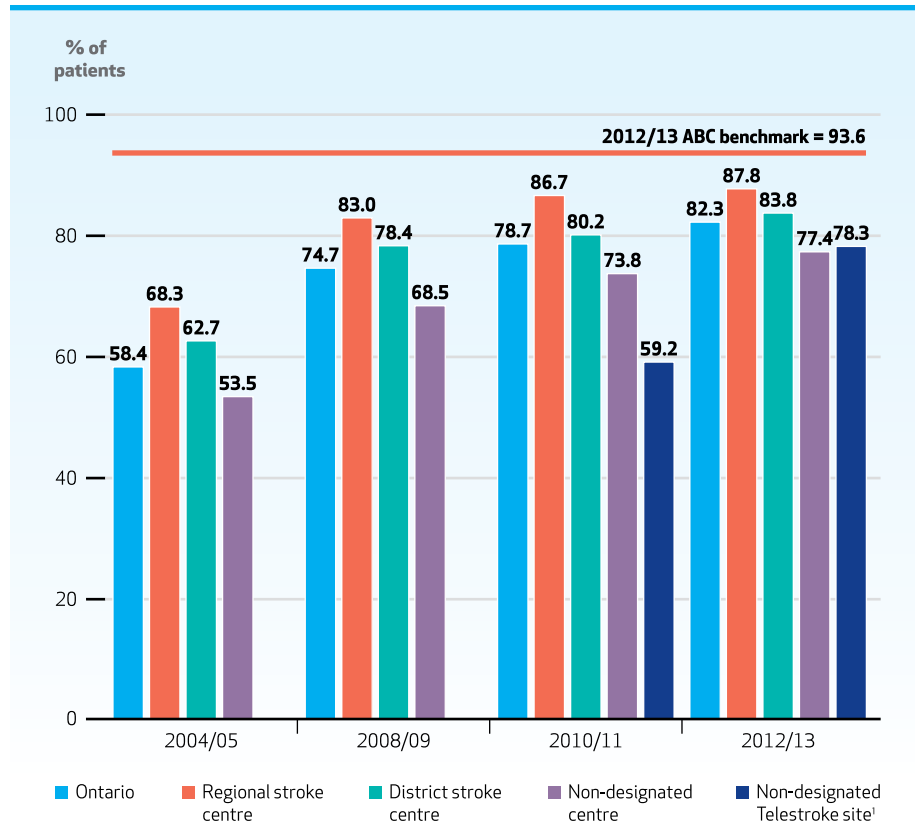
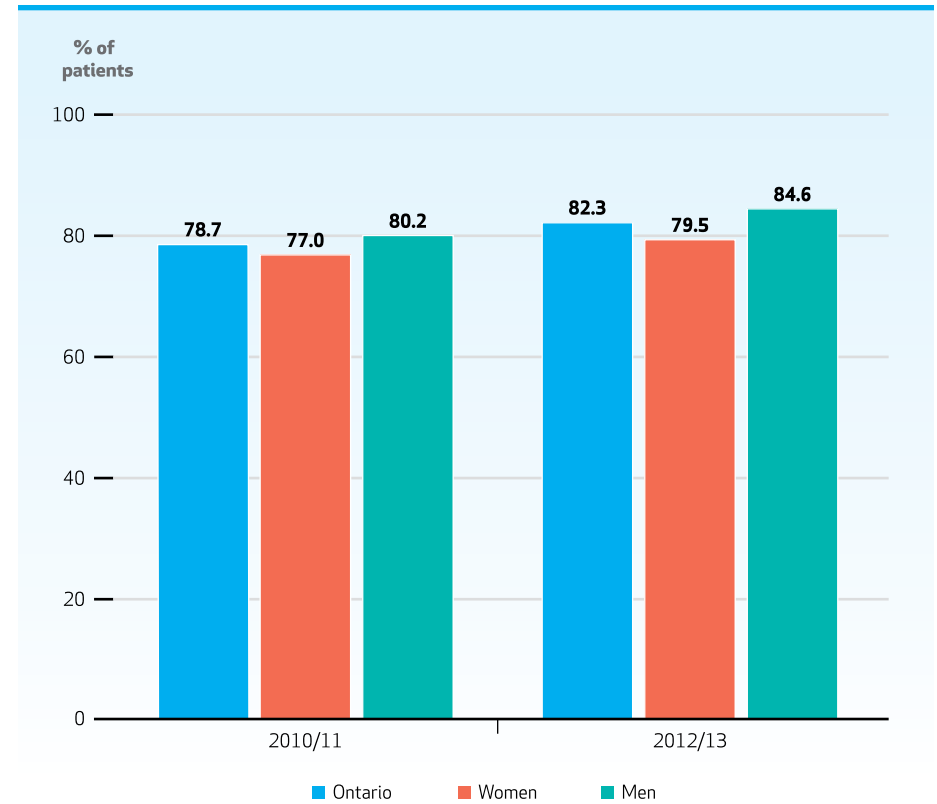


EXHIBIT 2.2B Proportion of admitted adult ischemic stroke patients without atrial fibrillation who received carotid imaging prior to discharge, in Ontario and by sex, 2010/11 and 2012/13

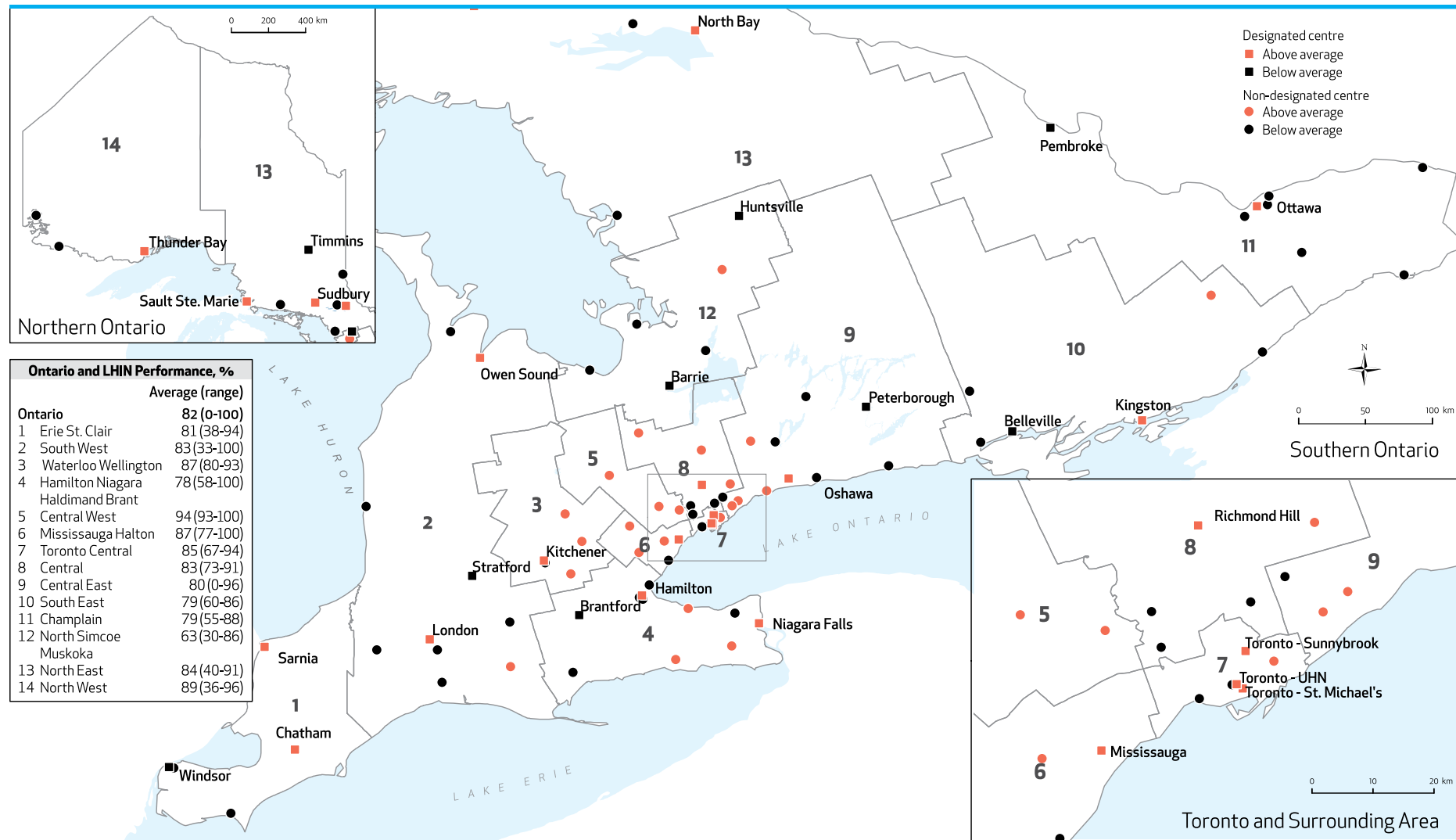


Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2004/05, 2008/09, 2010/11 and 2012/13.

Inclusion criteria: All ischemic stroke patients aged ≥18 years without atrial fibrillation who were admitted as an inpatient in an acute care facility (N=7,169 in 2004/05; 6,969 in 2008/09; 6,327 in 2010/11; and 6,313 in 2012/13).

1. Non-designated centres (N=7 in 2010/11 and 8 in 2012/13). The remaining Telestroke sites (N=10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.

EXHIBIT 2.2C Proportion of admitted adult ischemic stroke patients without atrial fibrillation who received carotid imaging in hospital, in Ontario and by Local Health Integration Network and facility performance, 2012/13



Datasource: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.
 Inclusion criteria: All ischemic stroke patients aged ≥18 years without atrial fibrillation who were admitted as an inpatient in an acute care facility (N=6,313 in 2012/13).

CONCLUSIONS

Provincially, neuroimaging rates were very high, exceeding 90% for all hospital types. Carotid imaging rates improved dramatically between 2004/05 and 2012/13, but variations persisted among hospital types and regions.

Among patients admitted to hospital with ischemic stroke, a larger proportion received carotid imaging. Future work, including OSN-funded research on optimal TIA management, will examine the use of carotid imaging among patients with minor stroke or TIA who are seen in the emergency department but not admitted to hospital.

In 2012/13, women had lower in-hospital carotid imaging rates compared to men (79.5% vs. 84.6%). Earlier evidence found this disparity was attributable to differences in surgical eligibility between men and women.¹⁸ Further investigation is warranted to confirm that this is still the case.

In 2013/14, the Canadian Stroke Network's funding through the Networks of Centres of Excellence ended for the Ontario Stroke Registry, a key data source used to monitor best practice indicators for stroke acute care and prevention over the past decade. Henceforth, investigators will have to rely solely on administrative health data for ongoing reporting of key stroke quality of care indicators. If facility funding is tied to performance indicators, the quality of stroke data captured in administrative databases becomes critically important. Gaps exist in the administrative data, including a lack of data on carotid imaging. Work is needed to identify methods to capture this data.

RECOMMENDATIONS

The OSN should continue to monitor rates of neuroimaging through administrative health databases.

The OSN should work with the Ministry of Health and Long-Term Care to address the lack of carotid imaging data in administrative health databases.

3 Emergency Department Care

Key Findings

EXHIBITS 3.1A, 3.1B

- When standardized by age and sex to the 2003/04 Ontario population, the incidence of stroke-related emergency department (ED) visits per 1,000 LHIN population declined steadily from 2.0 in 2003/04 to 1.6 in 2012/13 ($p < 0.0001$).
- In 2012/13, there was modest regional variation in rates of ED visits for stroke or transient ischemic attack (TIA), ranging from 1.33 to 2.08 per 1,000 LHIN population.
- The Central, South East, North Simcoe Muskoka, Central East, Mississauga Halton and Toronto Central LHINs had steady declines in their rates of stroke- or TIA-related ED visits since 2003/04.
- The North West and Erie St. Clair LHINs continued to have the highest rates of ED visits related to stroke or TIA in the province.

EXHIBITS 3.2A, 3.2B, 3.2C

- Ontario EDs were visited by 20,050 adults with a stroke or TIA in 2012/13, an increase from 18,961 in 2003/04, 19,704 in 2010/11 and 20,034 in 2011/12.

- Between 2003/04 and 2012/13, the proportion of patients aged 85 years and older with stroke or TIA increased from 14.5% to 19.0% and the proportion aged 46 to 65 years increased from 21.8% to 25.5%. The proportions of patients aged 66 to 75 years and 76 to 85 years declined.
- The stroke type could not be determined for 34.5% of patients seen in the ED in 2012/13, a marked improvement from 51.0% in 2003/04 ($p < 0.0001$).
- The proportion of ED visits for stroke or TIA at designated stroke centres increased from 39.9% in 2003/04 to 51.7% in 2012/13, an increase of 12 points in nine years.
- There was a 20% relative decrease in the proportion of stroke or TIA patients going to non-designated stroke centres, from 60.1% in 2003/04 to 48.3% in 2012/13.

EXHIBITS 3.3A, 3.3B

- Provincially, the proportion of adult patients with stroke or transient ischemic attack who arrived at hospital by ambulance increased from 52.8% in 2003/04 to 57.6% in 2012/13 ($p < 0.0001$) and remained steady in the three years between 2010/11 and 2012/13.

- In 2012/13, regional and district stroke centres continued to have the highest rates of patient arrival by ambulance (67.9% and 66.5%, respectively), compared to non-designated centres (47.4%).
- In 2012/13, the variation in patients using ambulance transport ranged from a high of 62.7% in the Toronto Central LHIN to a low of 46.1% in the North West LHIN.

EXHIBITS 3.4A, 3.4B

- In 2012/13, 44.7% of patients arrived at hospital within 3.5 hours of symptom onset, a small increase compared to 42.3% in 2010/11.
- Results are presented at the regional level rather than the hospital level to reflect the fact that hospitals do not influence how quickly patients with stroke or TIA respond to their symptoms by calling 911 or going to hospital for treatment. There were regional variations in the proportion of patients presenting within 3.5 hours of symptom onset, with the lowest proportions in the Toronto Central (37.1%) and Central West LHINs (38.4%).

EXHIBITS 3.5A, 3.5B

- In 2012/13, 78.5% of patients discharged from the ED were referred to secondary stroke prevention services, a dramatic increase from 57.2% in 2008/09 ($p < 0.0001$). Improvement was observed across most LHINs.
- Men were slightly more likely than women to be referred to secondary prevention services (80.8% vs. 76.3%; $p < 0.001$).
- The proportion of patients referred to stroke secondary prevention services was greatest at regional stroke centres (87.7%), followed by district stroke centres (78.8%), non-designated centres (74.7%) and non-designated Telestroke sites (71.9%).
- Among stroke types, patients with TIA were more likely to be discharged from the ED with a referral to stroke prevention services.
- Across LHINs, the proportion of patients who were discharged from the ED and referred to secondary prevention services varied from 49.8% in the North Simcoe Muskoka LHIN to 89.2% in the Toronto Central LHIN. This variation is likely a result of the number of clinics in each LHIN and their hours of operation.

EXHIBIT 3.1A Age- and sex-adjusted rates of emergency department visits by adult patients with stroke or transient ischemic attack per 1,000 LHIN population, in Ontario, 2003/04–2012/13

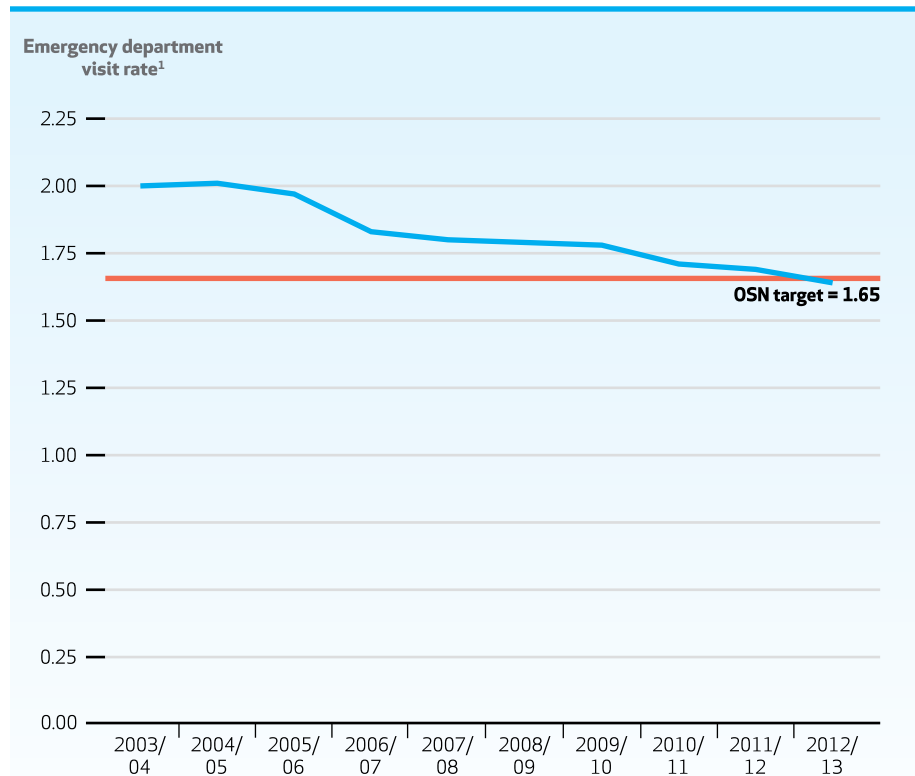


EXHIBIT 3.1B Age- and sex-adjusted rates of emergency department visits by adult patients with stroke or transient ischemic attack per 1,000 LHIN population, in Ontario and by Local Health Integration Network, 2003/04 and 2010/11–2012/13

Group/Subgroup	Emergency Department Visit Rate, % (n)			
	2003/04	2010/11	2011/12	2012/13
Standardized Provincial Rate²	2.00 (18,935)	1.71 (19,688)	1.69 (20,013)	1.64 (20,024)
Observed Provincial Rate	2.00 (18,935)	1.87 (19,688)	1.88 (20,013)	1.85 (20,024)
Local Health Integration Network³				
1. Erie St. Clair	2.35 (1,236)	2.10 (1,275)	2.12 (1,315)	2.00 (1,282)
2. South West	1.70 (1,348)	1.75 (1,610)	1.79 (1,696)	1.73 (1,627)
3. Waterloo Wellington	1.91 (921)	1.76 (1,052)	1.87 (1,150)	1.64 (1,043)
4. Hamilton Niagara Haldimand Brant	2.03 (2,409)	1.81 (2,502)	1.70 (2,396)	1.76 (2,543)
5. Central West	2.04 (812)	1.75 (938)	1.81 (1,007)	1.70 (989)
6. Mississauga Halton	1.79 (1,067)	1.42 (1,183)	1.33 (1,157)	1.33 (1,217)
7. Toronto Central	1.76 (1,604)	1.55 (1,542)	1.49 (1,503)	1.43 (1,469)
8. Central	1.85 (1,877)	1.50 (2,083)	1.48 (2,142)	1.41 (2,142)
9. Central East	1.97 (2,234)	1.66 (2,327)	1.59 (2,310)	1.59 (2,398)
10. South East	2.24 (1,014)	1.77 (929)	1.73 (926)	1.72 (941)
11. Champlain	2.21 (1,973)	1.78 (1,923)	1.85 (2,053)	1.77 (2,012)
12. North Simcoe Muskoka	2.27 (787)	1.82 (804)	1.82 (821)	1.68 (789)
13. North East	2.36 (1,174)	1.81 (1,050)	1.86 (1,096)	1.81 (1,096)
14. North West	2.44 (479)	2.11 (470)	1.96 (441)	2.08 (476)

Data sources: Canadian Institute for Health Information, National Ambulatory Care Reporting System (NACRS), 2003/04–2012/13; Statistics Canada, Ontario intercensal population estimate, 2003.

Inclusion criteria: All patients aged ≥18 years with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack.

Exclusion criteria: Patients with a scheduled emergency department visit.

1 Age- and sex-adjusted rates were determined by using the 2003/04 Ontario population as the standard.

Notes:

(1) Population-based analysis (i.e., the location of the patient's residence was used to report regional performance).

(2) Excludes patients with missing postal codes.

(3) Excludes all NACRS records with ICD codes that include the prefix "Q" (suspected, questionable diagnoses) starting in 2008/09.

(4) **Indicates significant difference from the standardized rate.**

(5) LHIN and sub-LHIN populations were determined using the data files POPLHIN 2003–2011, POPLHIN_PROJECTED 2012 and POPSUBLHIN Version 9 2006–2008 from the Ontario Ministry of Health and Long-Term Care: IntelliHealth Ontario.

EXHIBIT 3.2A Proportion of adult patients with stroke or transient ischemic attack discharged from an emergency department, by age group, in Ontario, 2003/04 and 2010/11-2012/13

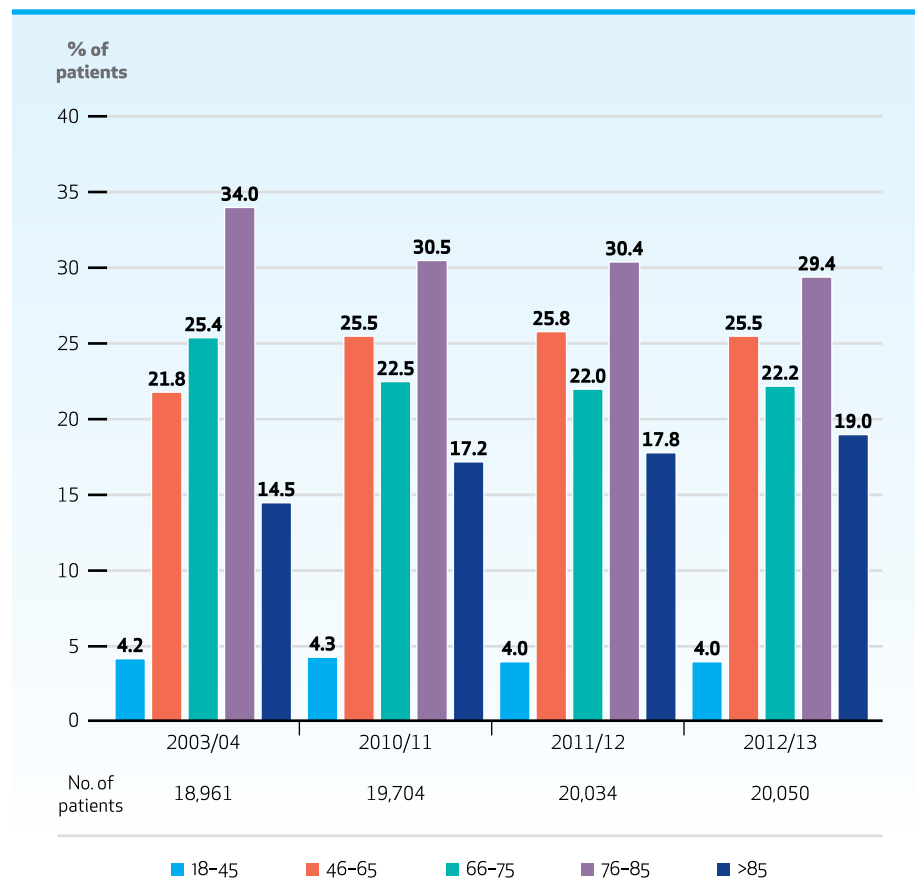
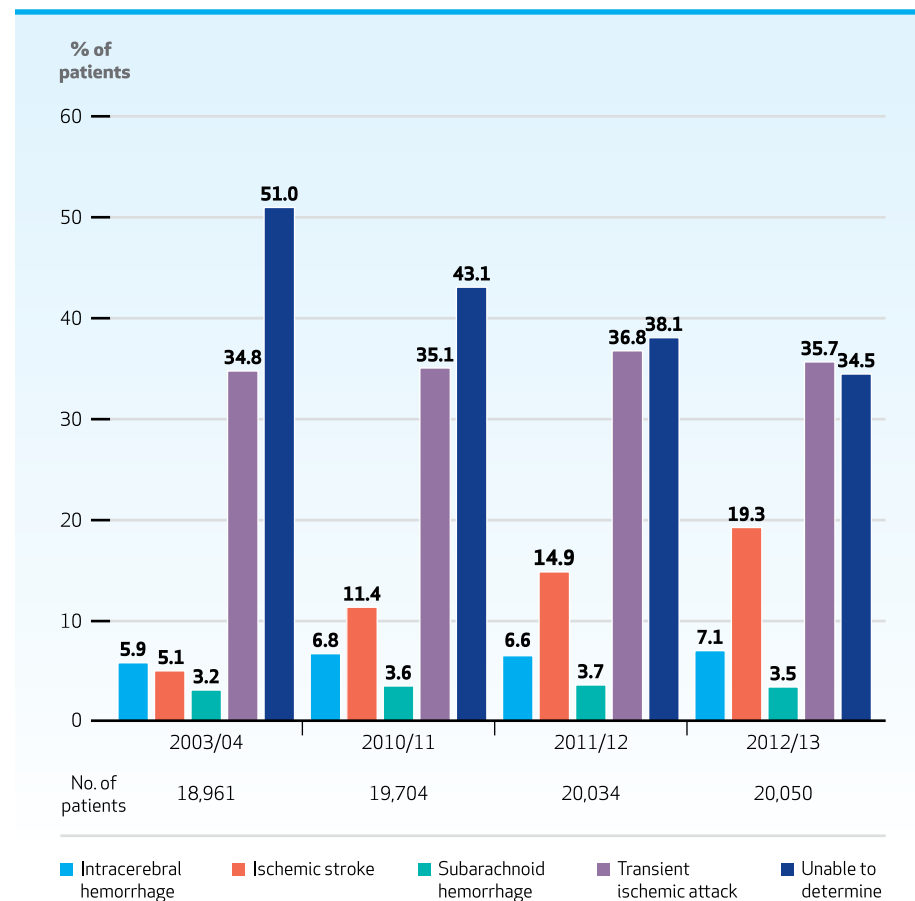
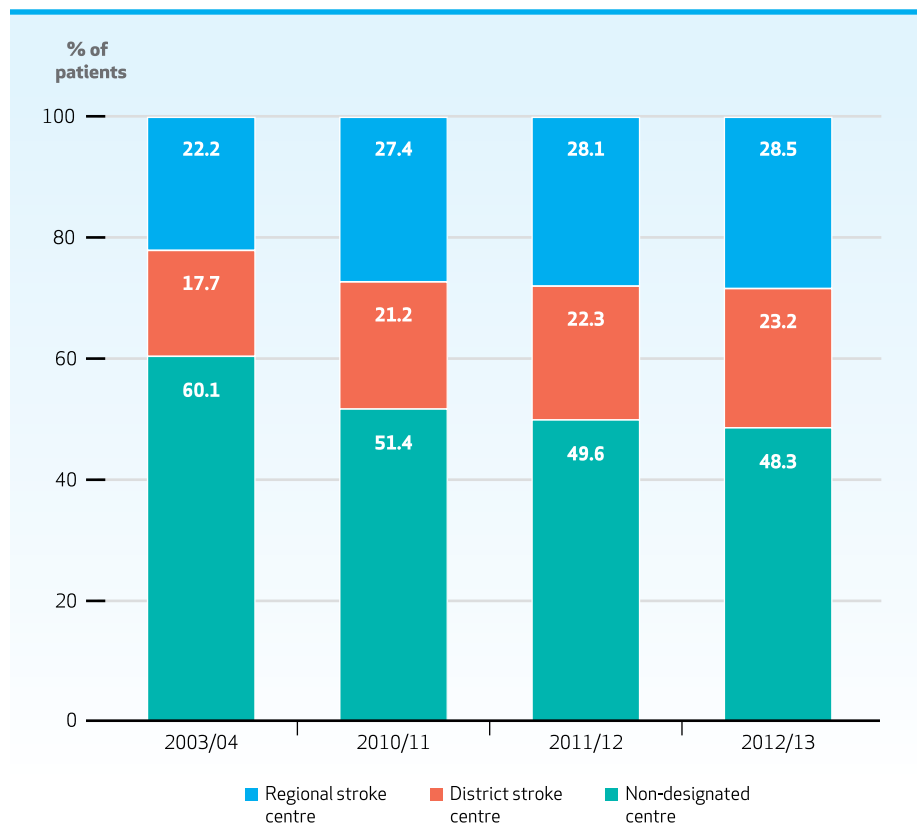


EXHIBIT 3.2B Proportion of adult patients with stroke or transient ischemic attack discharged from an emergency department, by stroke type, in Ontario, 2003/04 and 2010/11-2012/13



Data source: Canadian Institute for Health Information, National Ambulatory Care Reporting System (NACRS), 2003/04-2012/13.
 Inclusion criteria: All patients aged >18 years discharged from an emergency department with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack.
 Note: Excludes all NACRS records with ICD codes that include the prefix "Q" (suspected, questionable diagnoses) starting in 2008/09.

EXHIBIT 3.2C Proportion of adult patients with stroke or transient ischemic attack discharged from an emergency department, by Ontario Stroke Network designation, 2003/04 and 2010/11-2012/13



Data source: Canadian Institute for Health Information, National Ambulatory Care Reporting System (NACRS), 2003/04-2012/13.
 Inclusion criteria: All patients aged ≥18 years discharged from an emergency department with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack.
 Note: Excludes all NACRS records with ICD codes that include the prefix "Q" (suspected, questionable diagnoses) starting in 2008/09.

EXHIBIT 3.3A Proportion of adult patients with stroke or transient ischemic attack transported to hospital by ambulance, in Ontario and by Ontario Stroke Network designation, 2003/04 and 2010/11–2012/13

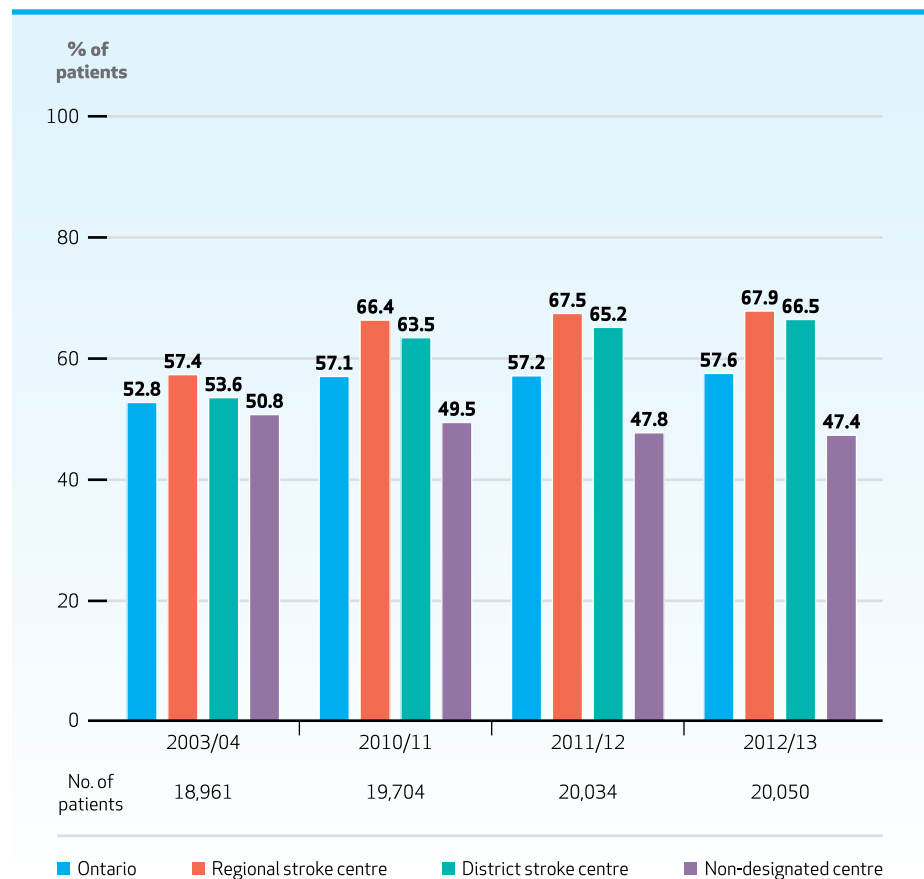
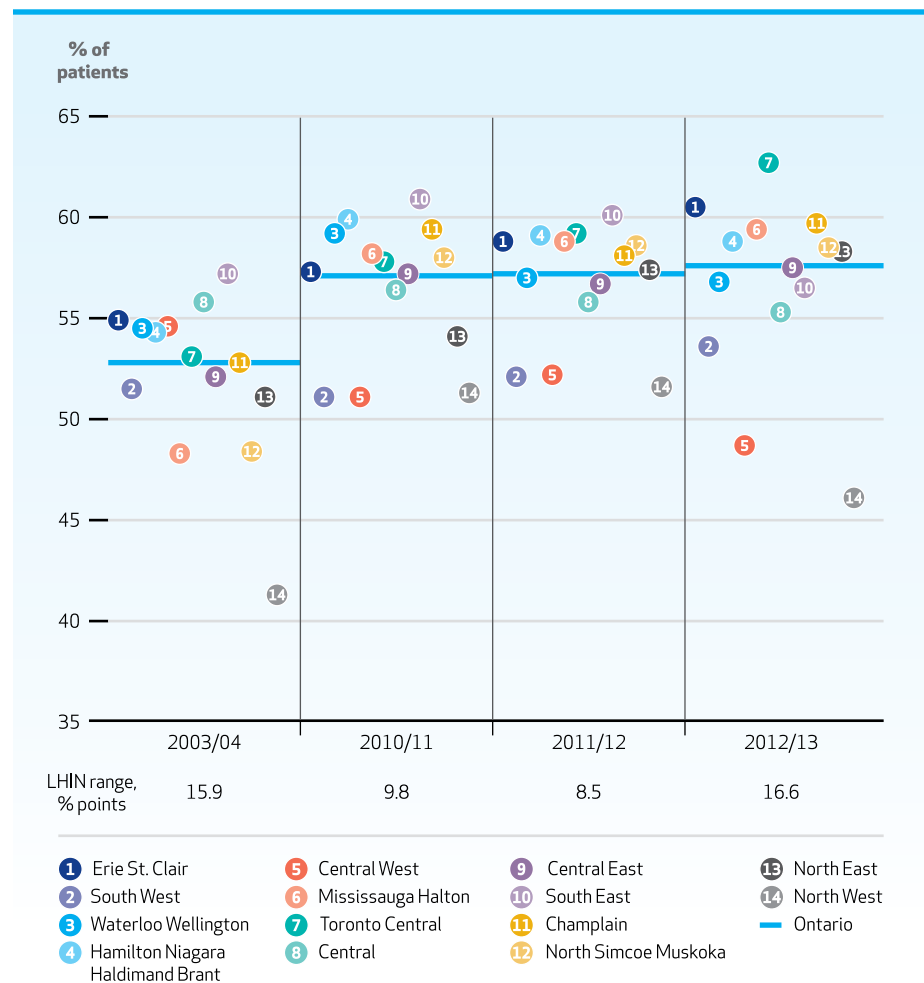
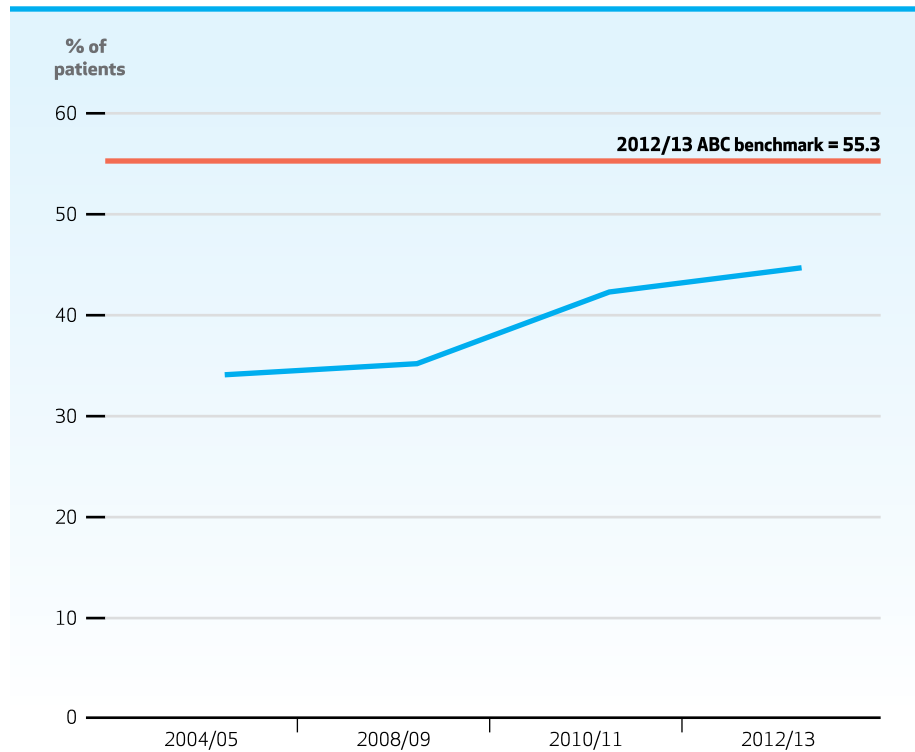


EXHIBIT 3.3B Variation in the proportion of adult patients with stroke or transient ischemic attack transported to hospital by ambulance, in Ontario and by Local Health Integration Network, 2003/04 and 2010/11–2012/13



Data source: Canadian Institute for Health Information, National Ambulatory Care Reporting System (NACRS), 2003/04–2012/13.
 Inclusion criteria: All patients aged ≥18 years discharged from an emergency department with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack.
 Note: Excludes all NACRS records with ICD codes that include the prefix "Q" (suspected, questionable diagnoses) starting in 2008/09.

EXHIBIT 3.4A Proportion of adult patients with stroke or transient ischemic attack who arrived at hospital within 3.5 hours of stroke symptom onset,¹ in Ontario, 2004/05, 2008/09, 2010/11 and 2012/13



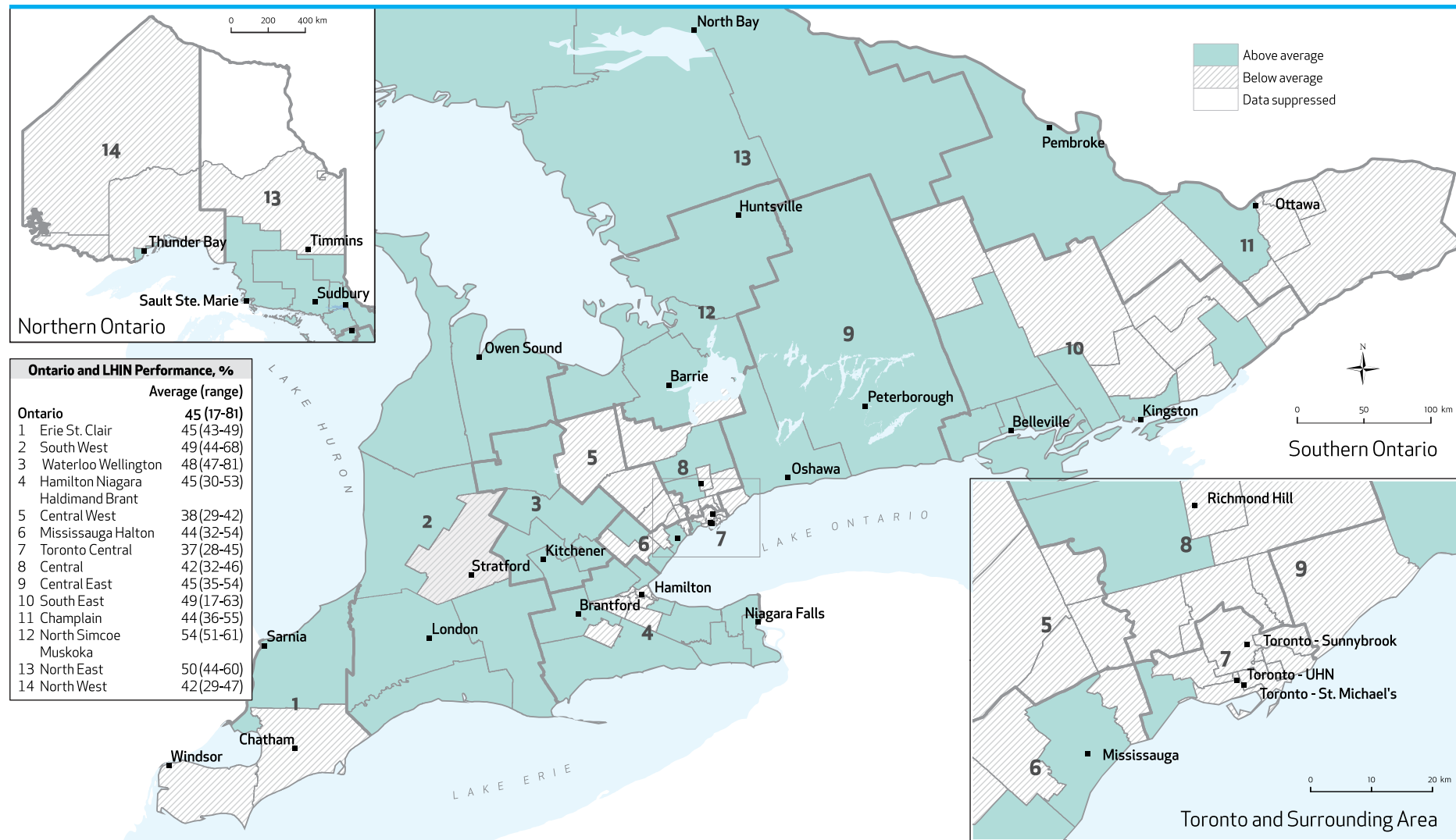
Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2004/05, 2008/09, 2010/11 and 2012/13.

Inclusion criteria: All patients aged ≥18 years admitted to an emergency department at an acute care facility for suspected stroke (excluding subarachnoid hemorrhage in 2012/13) or transient ischemic attack with a known stroke onset time.

¹ From 2002/03 to 2009/10, the calculated treatment window was 2.5 hours; in 2010/11, it was increased to 3.5 hours to reflect updated best practice guidelines.

Note: Population-based analysis (i.e., the location of the patient's residence was used to report regional performance).

EXHIBIT 3.4B Proportion of adult patients with stroke or transient ischemic attack who sought medical attention within 3.5 hours of stroke symptom onset, in Ontario and by Local Health Integration Network and sub-LHIN, 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

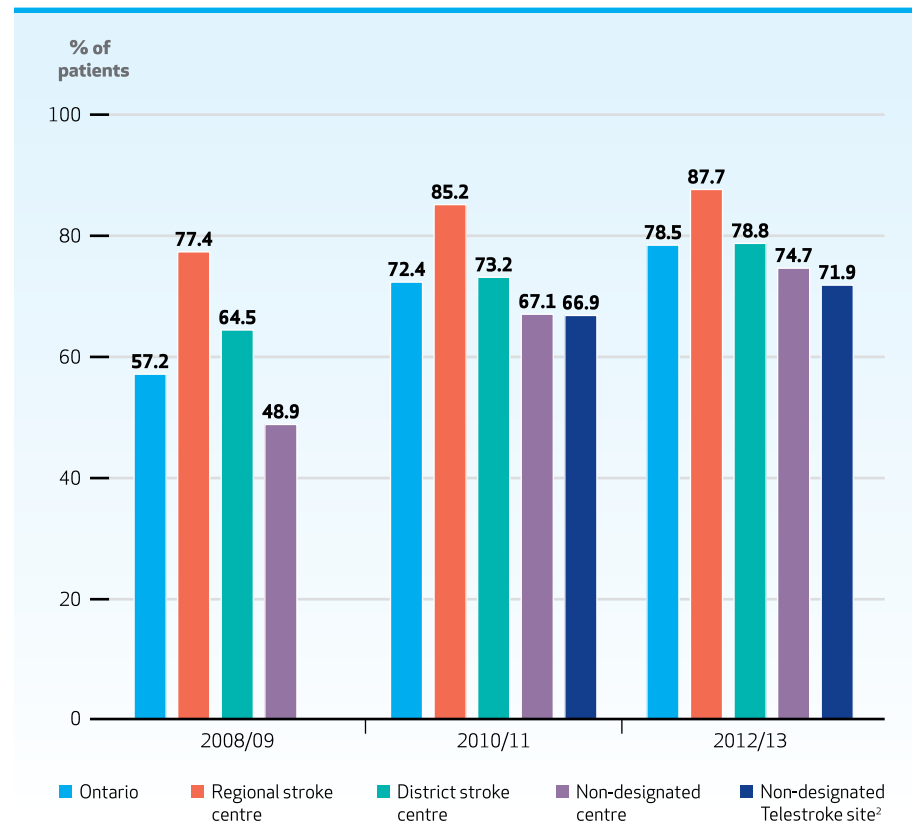
Inclusion criteria: All patients aged ≥18 years admitted to an emergency department at an acute care facility for suspected stroke (excluding subarachnoid hemorrhage) or transient ischemic attack with a known stroke onset time.

Note: Population-based analysis (i.e., the location of the patient's residence was used to report regional performance).

EXHIBIT 3.5A Proportion of adult patients with stroke or transient ischemic attack referred to secondary stroke prevention services¹ from the emergency department, in Ontario and by sex, stroke type and Local Health Integration Network, 2008/09, 2010/11 and 2012/13

Group/Subgroup	Patients, n (%)		
	2008/09	2010/11	2012/13
Ontario	4,178 (57.2)	4,247 (72.4)	5,051 (78.5)
Female	2,079 (56.7)	2,026 (70.8)	2,519 (76.3)
Male	2,100 (57.7)	2,221 (73.9)	2,532 (80.8)
Stroke Type			
Intracerebral hemorrhage	6 (10.0)	16 (53.1)	8 (29.6)
Ischemic stroke	791 (56.6)	810 (73.0)	836 (74.9)
Subarachnoid hemorrhage	6 (7.8)	**	-
Transient ischemic attack	2,890 (62.3)	3,407 (72.6)	4,192 (79.6)
Uncertain	485 (43.0)	9 (32.8)	15 (61.0)
Local Health Integration Network			
1. Erie St. Clair	343 (73.6)	390 (81.7)	422 (87.0)
2. South West	289 (50.2)	374 (64.5)	387 (83.4)
3. Waterloo Wellington	194 (46.6)	234 (63.8)	176 (56.5)
4. Hamilton Niagara Haldimand Brant	619 (66.2)	578 (74.5)	717 (79.0)
5. Central West	218 (66.0)	213 (83.3)	229 (82.5)
6. Mississauga Halton	322 (72.6)	297 (84.8)	330 (82.2)
7. Toronto Central	399 (68.6)	369 (83.9)	458 (89.2)
8. Central	203 (30.7)	366 (85.0)	511 (84.3)
9. Central East	445 (51.2)	426 (63.8)	546 (76.7)
10. South East	189 (56.2)	154 (72.9)	181 (74.4)
11. Champlain	628 (69.7)	576 (80.5)	715 (85.1)
12. North Simcoe Muskoka	176 (43.4)	103 (40.6)	163 (49.8)
13. North East	131 (42.0)	120 (44.4)	127 (54.0)
14. North West	24 (32.1)	49 (63.6)	89 (82.2)

EXHIBIT 3.5B Proportion of adult patients with stroke or transient ischemic attack referred to secondary stroke prevention services¹ from the emergency department, in Ontario and by Ontario Stroke Network designation, 2008/09, 2010/11 and 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2008/09, 2010/11 and 2012/13.

Inclusion criteria: All patients aged ≥18 years discharged alive from acute care with a final diagnosis of stroke (excluding subarachnoid hemorrhage in 2012/13) or transient ischemic attack.

Exclusion criteria: Patients discharged to another acute care facility or for whom secondary stroke prevention services were not applicable.

1 Secondary stroke prevention services include outpatient clinics or physicians providing stroke prevention follow-up.

2 Non-designated centres (N=7 in 2010/11 and 8 in 2012/13). The remaining Teletroke sites (N=10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.

** Cell value suppressed for reasons of privacy and confidentiality.

Note: Cells in which there were no reported or available data are marked with a hyphen (-).

CONCLUSIONS

In 2011/12, the OSN established a target of 1.65 ED visits for stroke or TIA per 1,000 population by 2015, and despite Ontario's aging population, the rate of ED visits has decreased in the interim and the OSN target has been met. This may be due to the increasing uptake of stroke prevention best practices supported by the Regional Stroke Networks across the province.

There has been a reduction in the number of cases diagnosed as 'undetermined stroke.' This is likely due to a combination of increased rates of imaging and improved coding of stroke data elements in the Discharge Abstract Database and the National Ambulatory Care Reporting System—Emergency Department database (which became mandatory in 2012/13).

The proportion of ED visits for stroke or TIA at designated stroke centres increased from 39.9% in 2003/04 to 51.7% in 2012/13, an increase of 12 points in nine years. The increase of 1.3% between 2011/12 and 2012/13 may reflect the impact of the 2011/12 province-wide implementation of a revised paramedic prompt card to direct patients to the nearest designated stroke centre.

The proportion of patients with stroke or TIA arriving at the ED by ambulance remained steady at 57% in the three years between 2010/11 and 2012/13, despite the Heart and Stroke Foundation's Warning Signs of Stroke campaign, including the message to call 911 that appeared in various blocks of time in 2011 (between March and July) and 2012 (between March and August) and the OSN's 2011 release of the revised paramedic prompt card. However, Ontario's performance exceeds that of the US hospitals participating in the Get With the Guidelines—Stroke program.²³

The modest improvement observed in the proportion of patients arriving at the ED within 3.5 hours of symptom onset—from 42.3% in 2010/11 to 44.7% in 2012/13—may also be associated with the 2011 release of the revised paramedic prompt card that reflects the increase in the treatment window time from 2.5 hours to 3.5 hours. The previously observed dramatic improvement observed in 2010/11 compared to 2008/09 reflects the publication of clinical trial data in September 2008 supporting an increase in the thrombolysis treatment window from 3.5 hours to 4.5 hours.²⁴

RECOMMENDATIONS

As Regional Stroke Networks consider consolidating stroke care at designated centres, the issue of non-ambulance arrivals may have an impact on the ambulance and transport services needed to transfer patients to designated centres. A focus of the Heart and Stroke Foundation's Warning Signs of Stroke campaign should be on the urgency of calling 911 and being transported directly to a designated stroke centre for assessment of eligibility for thrombolysis and best practice stroke care.

The Regional Stroke Networks should inform hospitals in their jurisdictions of the online coding course Different Codes for Different Strokes offered by the Canadian Institute for Health Information. Participation in this course has led to a dramatic decline in prevalence of the 'unable to determine' stroke type diagnosis code (Linda Dykes, e-mail communication, March 7, 2012)

4 Early Treatment – Stroke Quality-Based Procedures

Key Findings

EXHIBITS 4.1A, 4.1B, 4.1C, 4.1D, 4.1E

- Acute thrombolytic therapy in the form of tissue plasminogen activator (tPA) was administered to slightly more than 1 in 10 stroke patients with ischemic stroke (12.3%) in Ontario in 2012/13.
- In 7 of the 14 LHINs, ischemic stroke patients were receiving tPA at rates above the provincial average of 12.3%.
- The majority of designated stroke centres (21 of 28) were delivering tPA at rates above the provincial performance target.
- Among patients with ischemic stroke presenting within the thrombolysis treatment window (3.5 hours from stroke onset from 2010/11 onward and 2.5 hours in previous years) and without contraindications to tPA, the proportion receiving thrombolysis increased from 15.2% in 2004/05 to 38.6% in 2012/13 ($p \leq 0.0001$).
- Among patients arriving at hospital within 3.5 hours of symptom onset and without contraindications for tPA, the 2012/13 benchmark rate for tPA administration was 61.0%, based on 2012/13 Ontario Stroke Audit data for hospitals with the capacity to deliver tPA. This benchmark was unchanged from the 2010/11 audit.²⁵
- In 6 of the 14 LHINs, ischemic stroke patients arriving at hospital within 3.5 hours of symptom onset were receiving tPA at rates above the provincial rate of 38.6%.
- Rates of tPA administration were highest at regional stroke centres (54.5%), followed by district stroke centres (44.9%), non-designated Telestroke centres (29.7%) and non-designated centres (3.9%).

EXHIBITS 4.1F, 4.1G

- In 2012/13, the median door-to-needle time for tPA administration was 62.8 minutes, an improvement from 82.6 minutes in 2004/05 but still above the benchmark of 60 minutes.
- In 2012/13, district stroke centres administered tPA in the least amount of time (59.1 minutes), followed by regional stroke centres (64.2 minutes) and non-designated Telestroke sites (74.8 minutes). All Ontario Stroke Network centres improved their tPA administration times from 2004/05 onward.

EXHIBITS 4.2A, 4.2B

- In 2012/13, 46.3% of patients who received tPA had it administered within 60 minutes of ED arrival, and a few centres (11 of 36) were able to achieve or exceed the provincial rate.
- The proportion of patients receiving tPA within 60 minutes was greater at district stroke centres than at regional stroke centres (51.4% vs. 44.4%).
- Among the LHINs, the proportion of patients receiving tPA within 60 minutes varied from 14.9% in the North West LHIN to 69.1% in the Central LHIN.

EXHIBITS 4.3A, 4.3B

- In 2012/13, 91.7% of patients were prescribed antithrombotic therapy upon discharge from the emergency department (ED). The exclusion of patients with contraindications had no impact on overall performance (91.8%) (data not shown).
- Men were slightly more likely than women to be prescribed antithrombotic therapy upon discharge from the ED (93.4% vs. 90.1%; $p < 0.001$) and from inpatient care (97.1% vs. 95.4%; $p < 0.001$) (data not shown).
- Performance rates across Ontario Stroke Network designations were similar, although non-designated centres with access to Telestroke support had the highest prescribing rate upon discharge from the ED (95.6%) followed by regional stroke centres (92.3%).
- There was an 11-point variation across LHINs in prescribing antithrombotics upon discharge from the ED, ranging from 85.1% in the Hamilton Niagara Haldimand Brant LHIN to 96.5% in the Central LHIN.

EXHIBIT 4.1A Proportion of adult patients with ischemic stroke who received acute thrombolytic therapy (tPA), in Ontario and by Telestroke program, 2004/05, 2008/09, 2010/11 and 2012/13

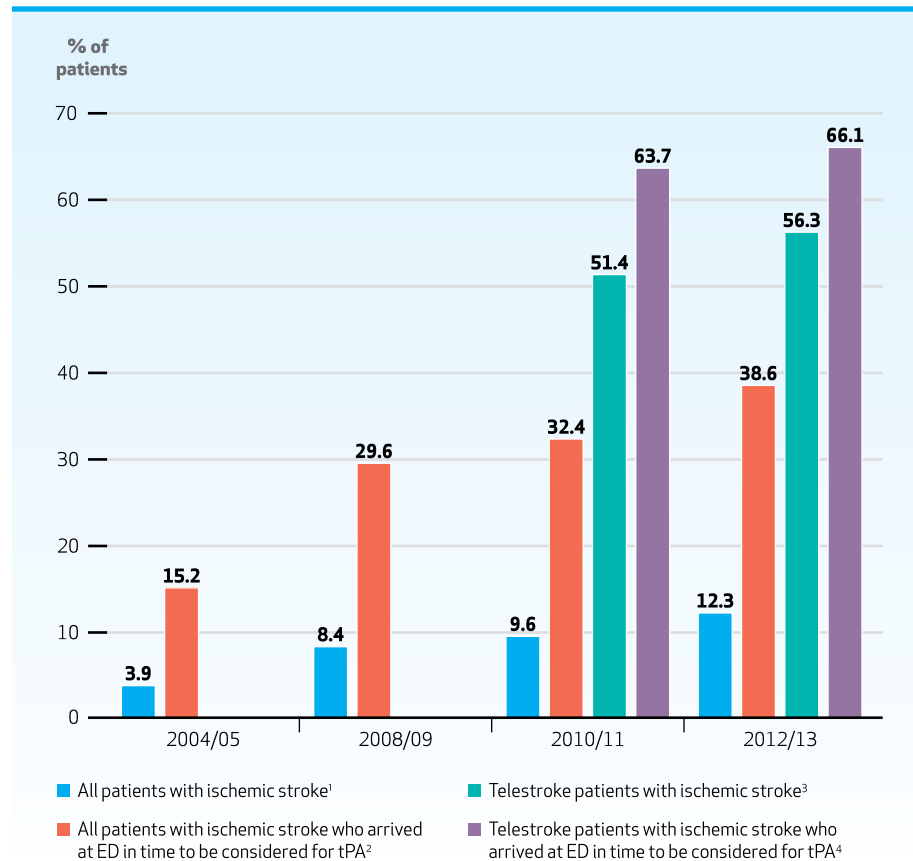
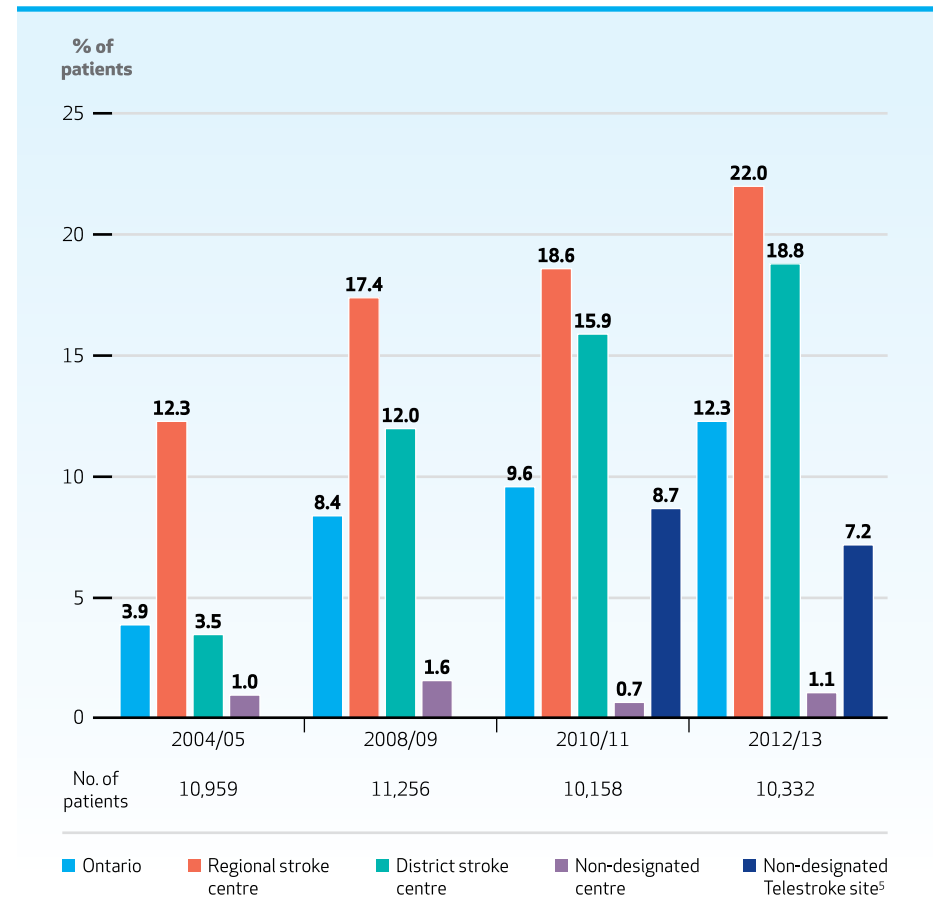


EXHIBIT 4.1B Proportion of adult patients with ischemic stroke who received acute thrombolytic therapy (tPA), in Ontario and by Ontario Stroke Network designation, 2004/05, 2008/09, 2010/11 and 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2004/05, 2008/09, 2010/11 and 2012/13.

Inclusion criteria: All ischemic stroke patients aged ≥18 years admitted to an emergency department or inpatient care at an acute care facility.

1 Among ischemic stroke patients (N=10,959 in 2004/05; 11,256 in 2008/09; 10,158 in 2010/11; and 10,332 in 2012/13).

2 Among ischemic stroke patients who arrived at an emergency department within 2.5 hours from symptom onset from 2004/05 to 2009/10 and within 3.5 hours from 2010/11 onward and who did not have a contraindication for tPA (N=2,625 in 2004/05; 2,735 in 2008/09; 2,895 in 2010/11 and 3,090 in 2012/13).

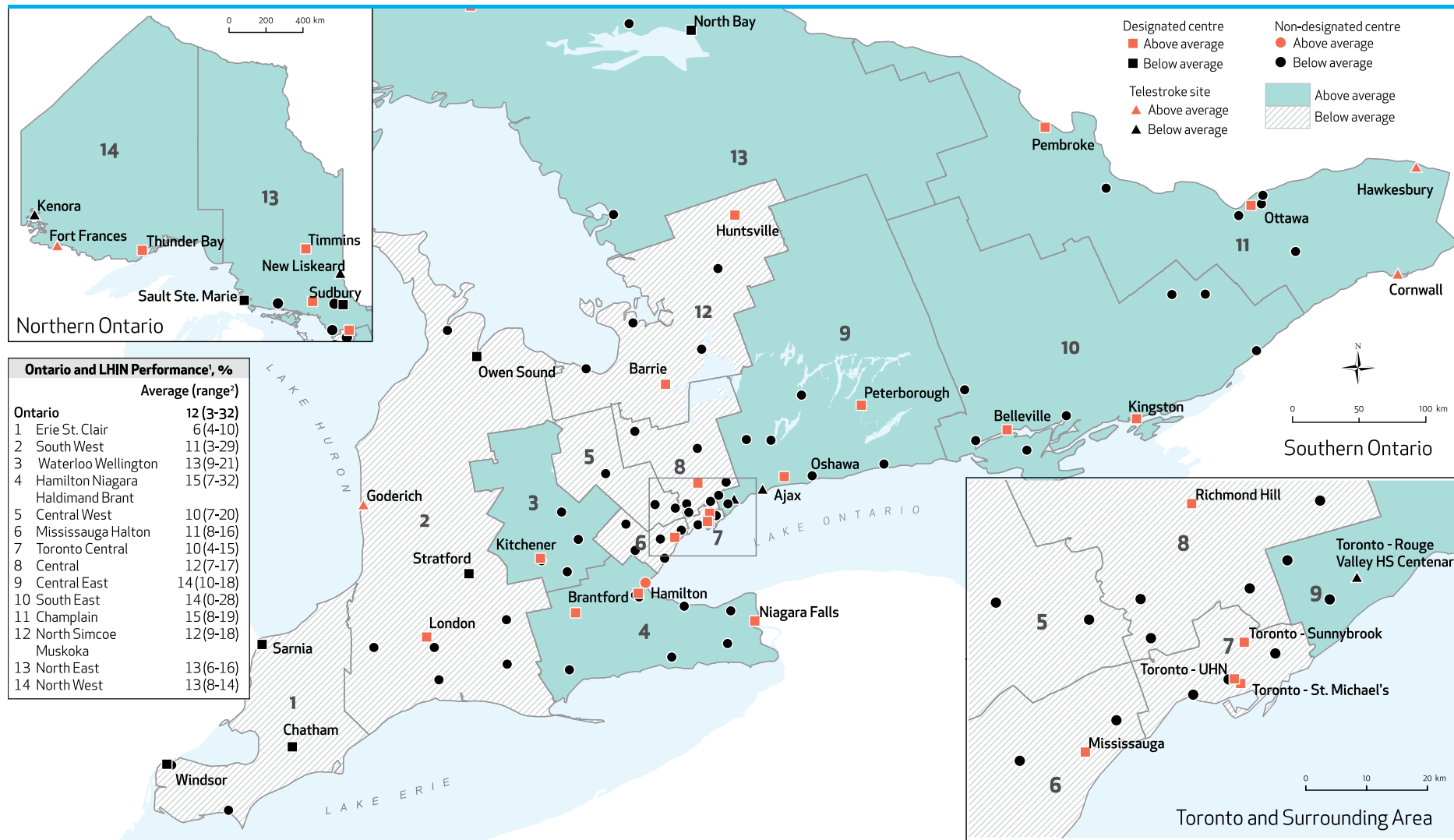
3 Among ischemic stroke patients who had a documented Telestroke consult at one of the 19 Telestroke sites (N=175 in 2010/11 and 228 in 2012/13).

4 Among ischemic stroke patients who arrived at an emergency department within 3.5 hours from symptom onset from 2010/11 to 2012/13, did not have a contraindication for tPA and had a documented Telestroke consult at one of the 19 Telestroke sites (N=135 in 2010/11 and 183 in 2012/13).

5 Non-designated centres (N=7 in 2010/11 and 8 in 2012/13). The remaining Telestroke sites (N=10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.

tPA = tissue plasminogen activator

EXHIBIT 4.1C Proportion of adult patients with ischemic stroke who received acute thrombolytic therapy (tPA), in Ontario and by Local Health Integration Network and facility performance, 2012/13



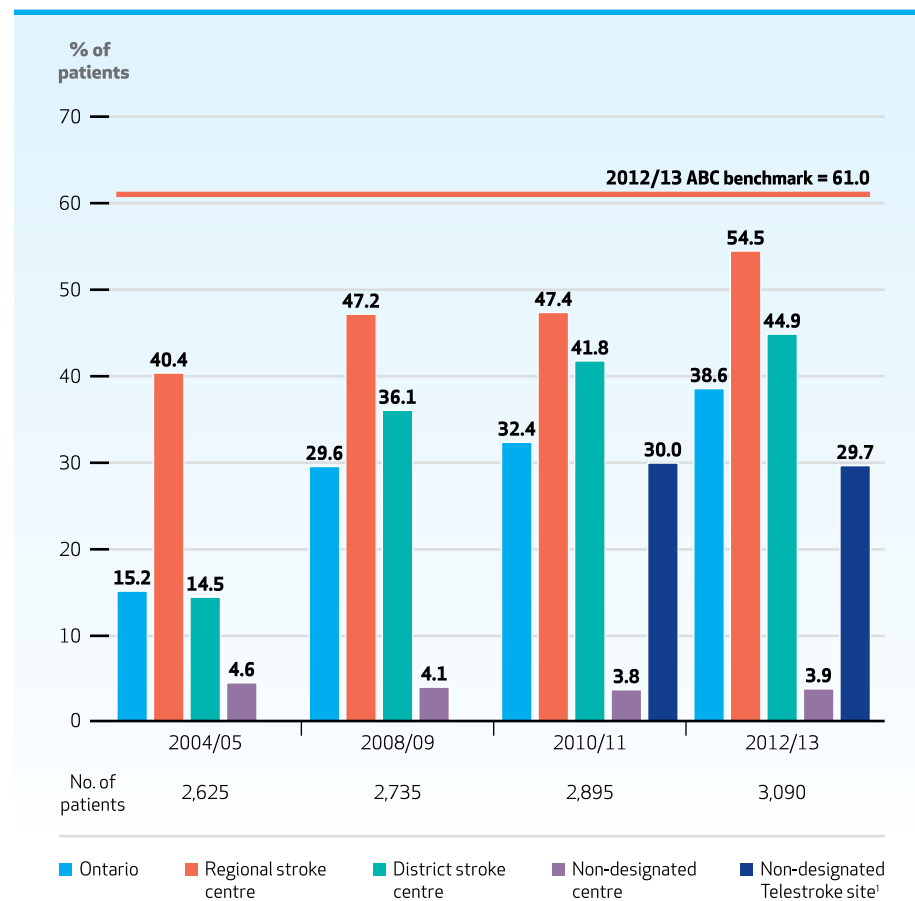
Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All ischemic stroke patients aged ≥18 years admitted to an emergency department or inpatient care at an acute care facility (N=10,332 in 2012/13).

1 Population-based analysis (i.e., the location of the patient's residence was used to report regional performance).

2 Range includes the minimum and maximum performance of the sub-LHINs and excludes sub-LHINs with insufficient sample size.

EXHIBIT 4.1D Proportion of adult patients with ischemic stroke who arrived at hospital in time to be considered for acute thrombolytic therapy and received tPA, in Ontario and by Ontario Stroke Network designation, 2004/05, 2008/09, 2010/11 and 2012/13

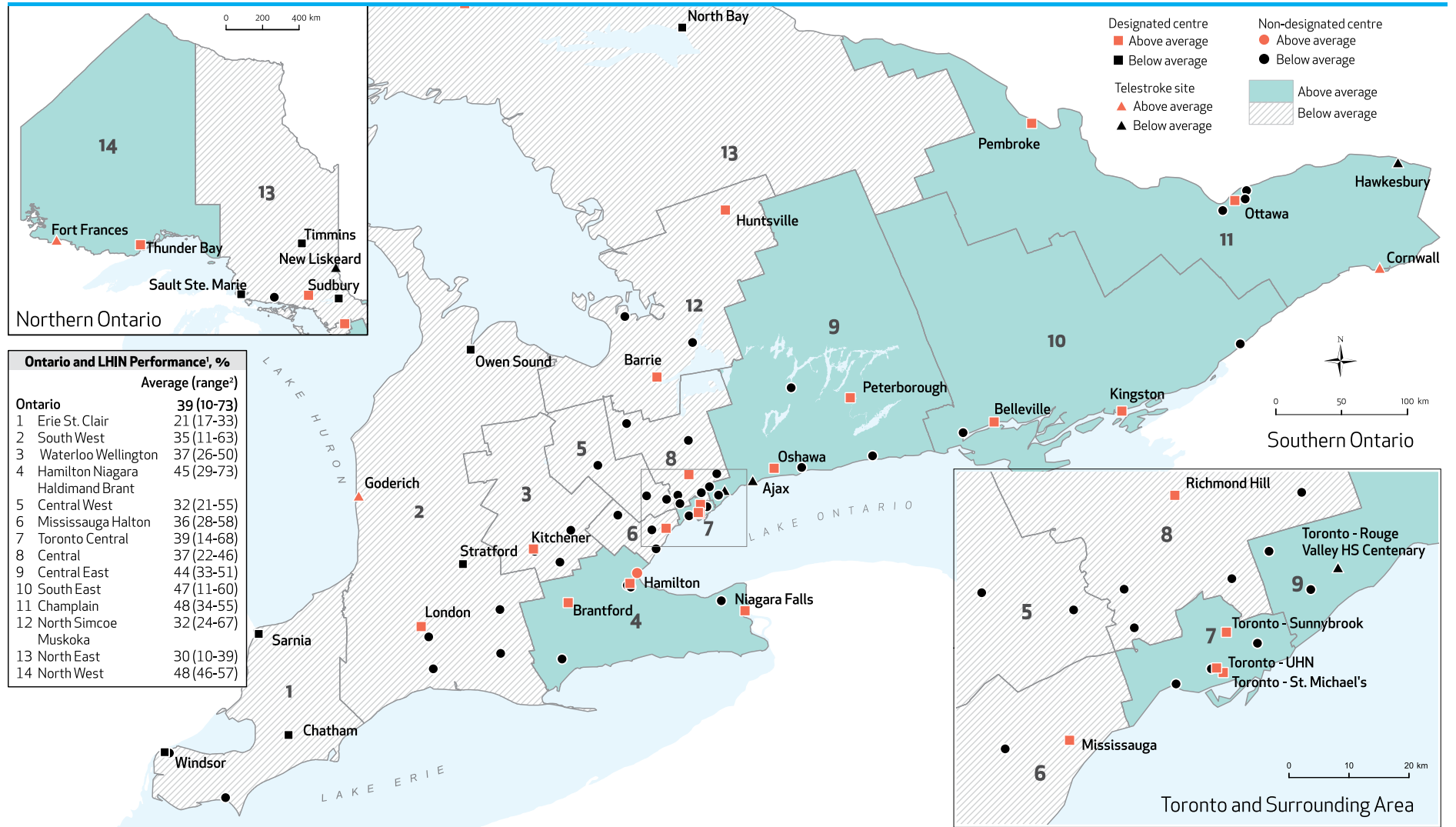


Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2004/05, 2008/09, 2010/11 and 2012/13.
 Inclusion criteria: All ischemic stroke patients aged ≥18 years who arrived at an emergency department within 2.5 hours from symptom onset from 2004/05 to 2009/10 and within 3.5 hours from 2010/11 onward.

Exclusion criteria: Patients with contraindications to tPA (tissue plasminogen activator).

1 Non-designated centres (N = 7 in 2010/11 and 8 in 2012/13). The remaining Telestroke sites (N = 10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.

EXHIBIT 4.1E Proportion of adult patients with ischemic stroke who arrived at hospital in time to be considered for acute thrombolytic therapy and received tPA, in Ontario and by Local Health Integration Network and facility performance, 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All ischemic stroke patients ≥18 years who arrived at an emergency department within 3.5 hours from symptom onset and who did not have a contraindication to tPA (tissue plasminogen activator) (N = 3,090 in 2012/13).

1 Population-based analysis (i.e., the location of the patient's residence was used to report regional performance).

2 Range includes the minimum and maximum performance of the subLHINs and excludes subLHINs with insufficient sample size.

EXHIBIT 4.1F Median door-to-needle time¹ for adult patients who received acute thrombolytic therapy (tPA) intravenously, in Ontario and by Ontario Stroke Network designation, 2004/05, 2008/09, 2010/11 and 2012/13

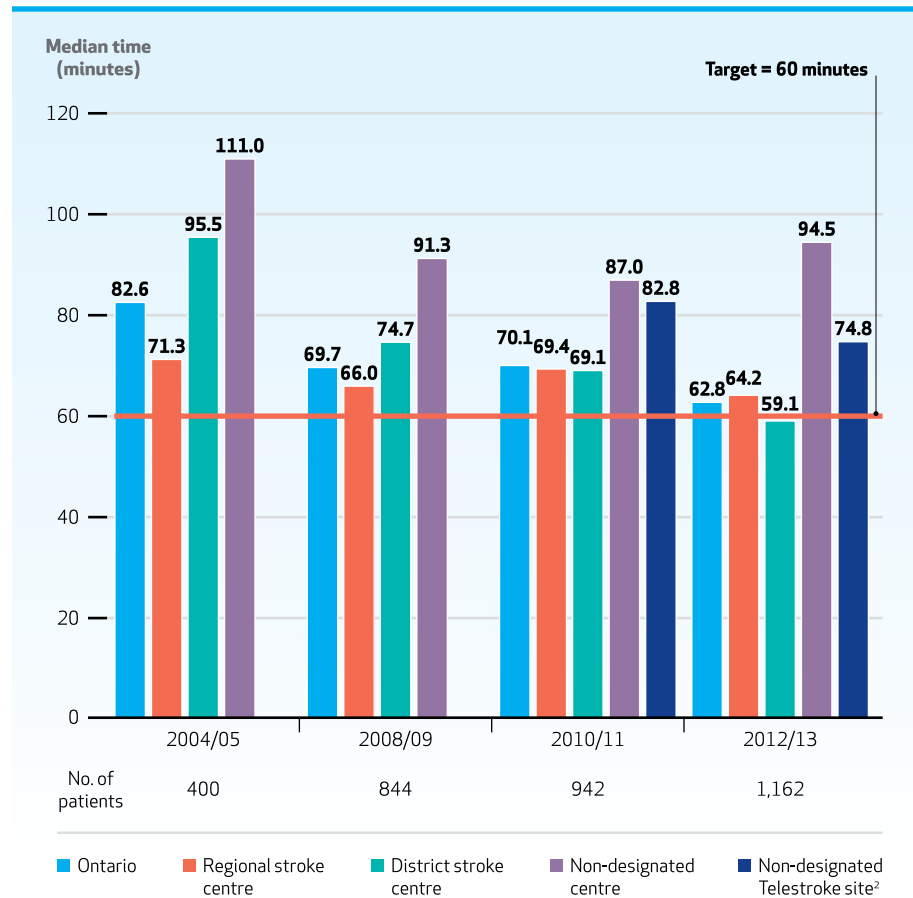
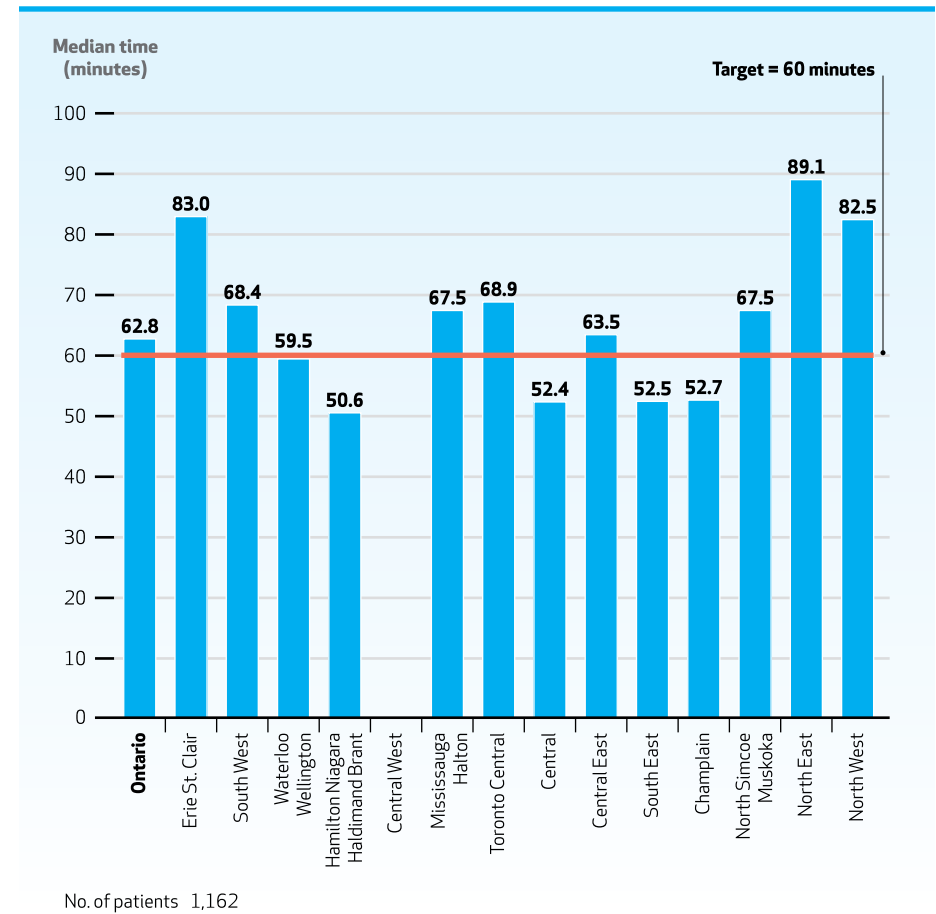


EXHIBIT 4.1G Median door-to-needle time¹ among adult patients who received acute thrombolytic therapy (tPA) intravenously, in Ontario and by Local Health Integration Network, 2012/13



Datasource: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2004/05, 2008/09, 2010/11 and 2012/13.

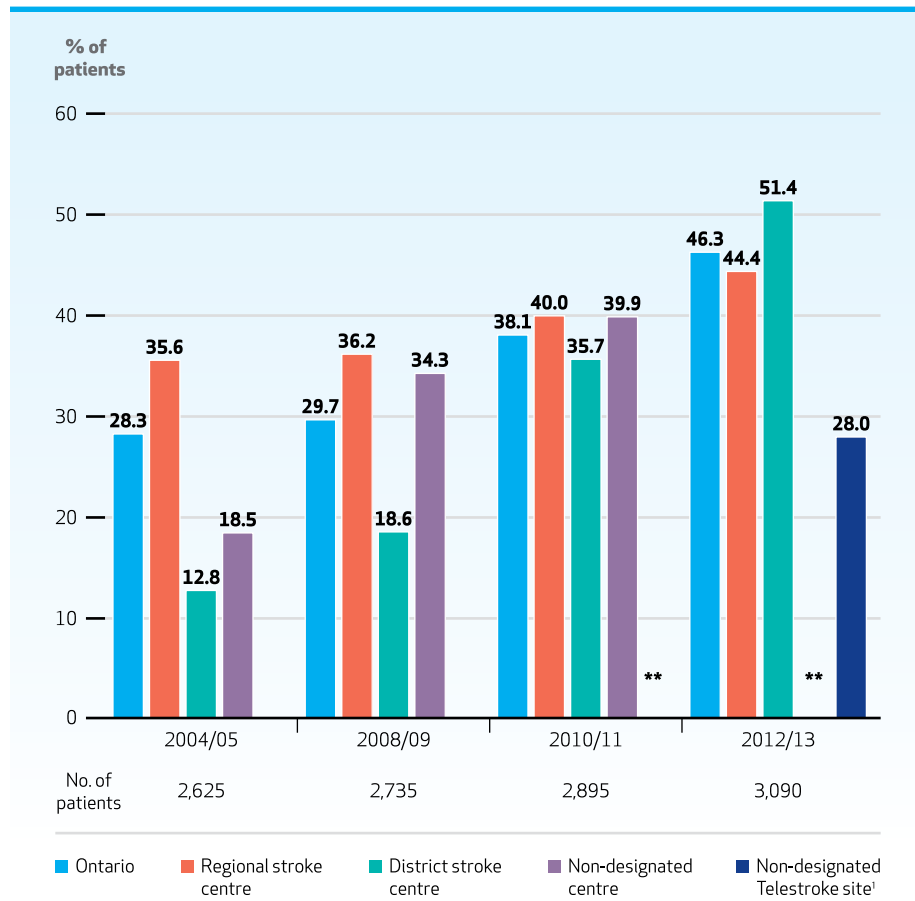
Inclusion criteria: All ischemic stroke patients aged ≥18 years admitted to an emergency department or inpatient care at an acute care facility and received tissue plasminogen activator (tPA) intravenously.

1 Number of minutes between a patient's arrival in hospital to the time tPA was first administered.

2 Non-designated centres (N = 7 in 2010/11 and 8 in 2012/13). The remaining Telestroke sites (N = 10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.

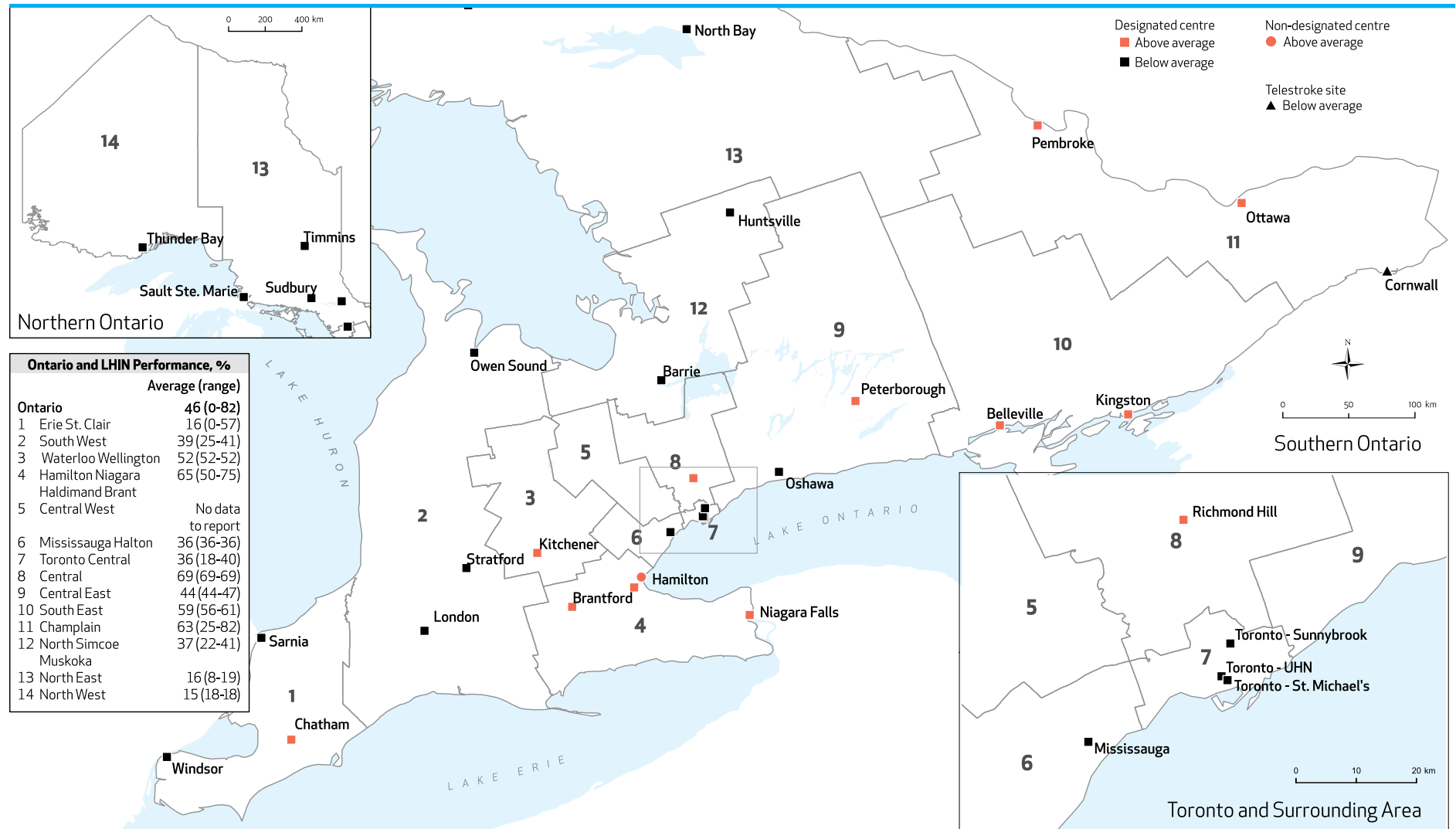
Note: Facilities in the Central West LHIN do not administer tPA.

EXHIBIT 4.2A Proportion of adult patients with ischemic stroke who arrived at hospital in time to be considered for acute thrombolytic therapy and received tPA within 60 minutes of arrival, in Ontario and by Ontario Stroke Network designation, 2004/05, 2008/09, 2010/11 and 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2004/05, 2008/09, 2010/11 and 2012/13.
 Inclusion criteria: All ischemic stroke patients aged ≥18 years who arrived at an emergency department within 2.5 hours from symptom onset from 2004/05 to 2009/10 and within 3.5 hours from 2010/11 onward, and who received tissue plasminogen activator (tPA).
 Exclusion criteria: Patients with a contraindication to tPA.
 1 Non-designated centres (N = 7 in 2010/11 and 8 in 2012/13). The remaining Telestroke sites (N = 10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.
 ** Value suppressed for reasons of privacy and confidentiality.

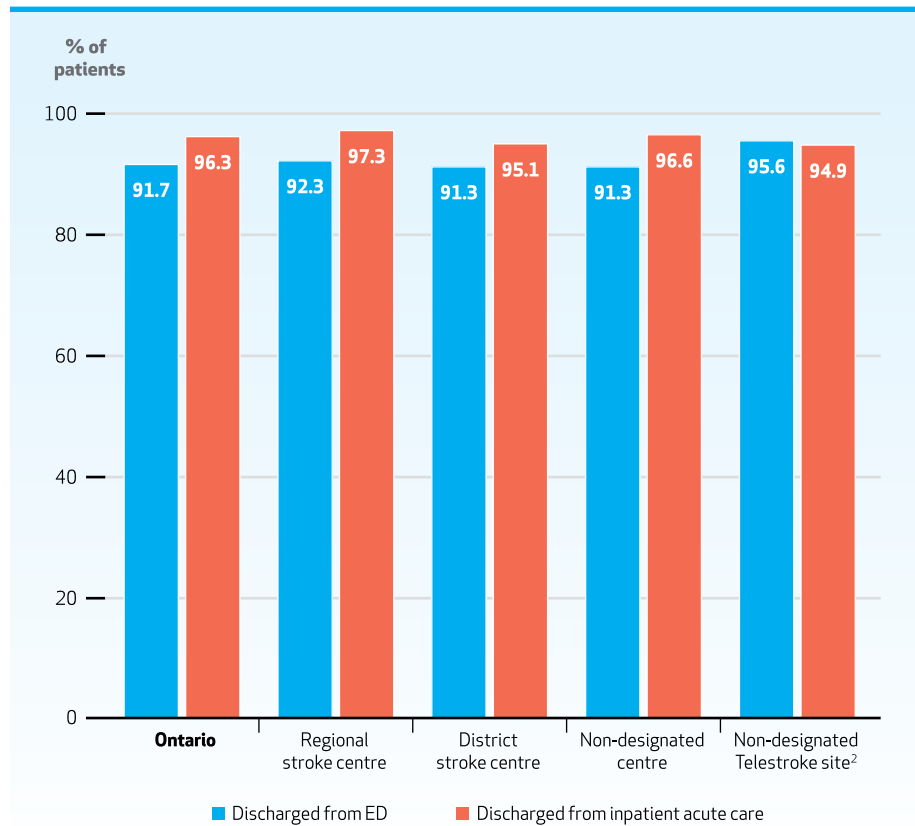
EXHIBIT 4.2B Proportion of adult patients with ischemic stroke who arrived at hospital in time to be considered for acute thrombolytic therapy and received tPA within 60 minutes of arrival, in Ontario and by Local Health Integration Network and facility performance, 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All ischemic stroke patients ≥18 years arriving at an emergency department within 3.5 hours from symptom onset who did not have a contraindication to tissue plasminogen activator (tPA) and who received tPA (N=1,156 in 2012/13).

EXHIBIT 4.3A Proportion of adult patients with ischemic stroke or transient ischemic attack who were prescribed antithrombotic therapy¹ upon discharge from the emergency department or inpatient acute care, in Ontario and by Ontario Stroke Network designation, 2012/13



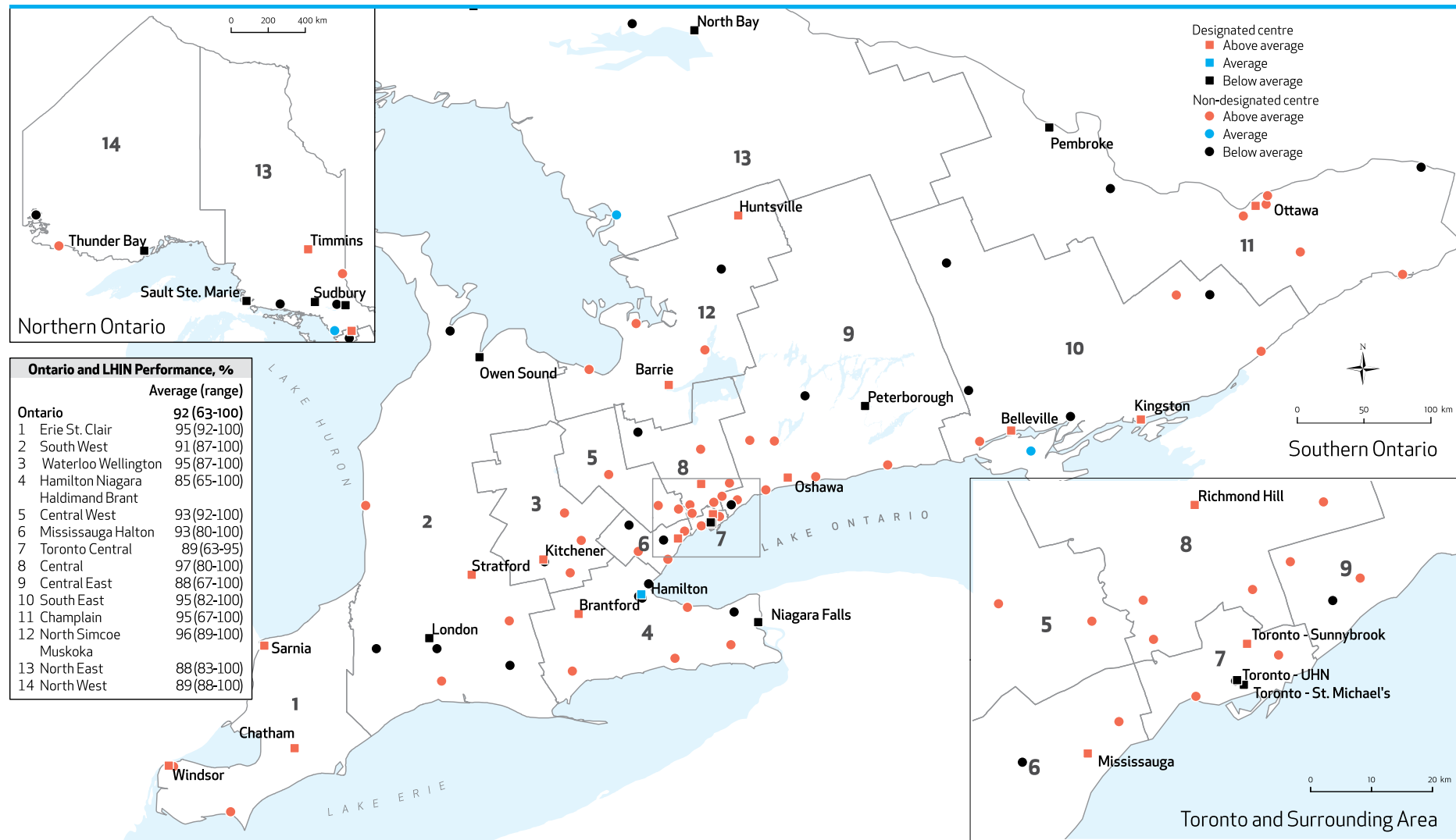
Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All patients aged ≥18 years discharged alive from the emergency department or from inpatient care at an acute care facility with a final diagnosis of ischemic stroke or transient ischemic attack.

1 Includes antiplatelet therapy or anticoagulant therapy (new or already on).

2 Non-designated centres (N = 7 in 2010/11 and 8 in 2012/13). The remaining Telestroke sites (N = 10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.

EXHIBIT 4.3B Proportion of adult patients with ischemic stroke or transient ischemic attack who were prescribed antithrombotic therapy¹ on discharge from the emergency department, in Ontario and by Local Health Integration Network and facility performance, 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All patients aged ≥18 years discharged alive from the emergency department with a final diagnosis of ischemic stroke or transient ischemic attack.

1. Includes antiplatelet therapy or anticoagulant therapy (new or already on).

CONCLUSIONS

In Ontario, 12.3% of all ischemic patients received tPA in 2012/13, a marked increase from 3.9% in 2004/05. The most recent increase, from 9.6% in 2010/11 to 12.3% in 2012/13, may be associated with the 2011 provincial release of the revised paramedic prompt card to ensure that patients are directed to designated stroke facilities and facilities with Telestroke sites. Between 2010/11 and 2012/13, two more Telestroke sites became available, giving the province a total of 22 facilities with Telestroke capacity. The current rate of tPA administration among ischemic stroke patients is 12.3%, which exceeds many rates internationally.¹¹⁻¹⁵

Although less than half of patients (46.3%) administered tPA in Ontario in 2012/13 received it within 60 minutes, this result is better than the national rate of 34%²⁶ and the US rate of 26.6% for hospitals participating in the American Heart Association/American Stroke Association's Get with the Guidelines–Stroke program.^{27,28}

Among Ontario's 11 Regional Stroke Networks, there was a three-fold increase between 2004/05 and 2012/13 in the proportion of eligible patients receiving tPA, as well as improvements in door-to-needle times. The increase in the number of health care facilities providing Telestroke services has improved access to tPA in the province. The median door-to-needle time of 62.8 minutes compares favourably with results from US hospitals participating in the Get with the Guidelines–Stroke program and the multinational Safe Implementation of Treatment in Stroke–International Stroke Thrombolysis Register, where median door-to-needle times were 75 minutes and 65 minutes, respectively.^{29,30} However, many regions in Ontario are not achieving the 60-minute benchmark. The rate of prescribing antithrombotics is high upon discharge from the emergency department (91.7%) and from an inpatient stay (96.3%), with minimal variation across LHINs. Similar rates have been observed in the United States; Australia; and England, Wales and Northern Ireland.¹¹⁻¹³

RECOMMENDATIONS

The OSN should continue to work with the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information to have the Telestroke program included in Stroke Project 340 in order to evaluate the quality of stroke care provided through Telestroke.

The OSN should continue to monitor the quality of tPA and antithrombotic data capture in the Discharge Abstract Database and the National Ambulatory Care Reporting System through Stroke Project 340.

The Regional Stroke Networks need to learn from the best practices of local facilities that are achieving the benchmark of 60 minutes.

5 Acute Inpatient Care – Stroke Quality-Based Procedures

Key Findings

EXHIBITS 5.1A, 5.1B, 5.1C

- In 2012/13, 48.1% of patients admitted to hospital with stroke or transient ischemic attack (TIA) spent some part of their hospital stay in a stroke unit, an improvement from 38.3% in 2010/11, 30.3% in 2008/09 and 18.6% in 2004/05 ($p < 0.0001$), using the definition of a stroke unit in effect prior to 2014 (data not shown).
- In 2014, the definition of a stroke unit was revised^k and the number of acute care facilities in Ontario identified as having a stroke unit decreased from 34 to 14. Accordingly, 26.3% of patients admitted to acute care hospitals for stroke or TIA were considered to have spent some part of their stay in a stroke unit. However, among patients admitted to the 14 hospitals with stroke units, 75.3% spent some part of their stay in the unit.
- In this subgroup of patients admitted to a facility with a stroke unit, there was significant regional variation in the proportion of patients admitted to a stroke unit, ranging from 65.0% in the Central LHIN to 91.4% in the Waterloo Wellington LHIN.

- Six of the 14 LHINs did not have a health care facility with a stroke unit (using the revised definition). All but one of these LHINs had a designated stroke centre providing some components of stroke unit care but not meeting the updated criteria for the definition of stroke unit.

EXHIBIT 5.2

- Among stroke QBP patients^l (including those with ischemic stroke, intracerebral hemorrhage or TIA), Alternate Level of Care (ALC) days represented 28.3% of the total length of stay. For most designated facilities (10), the proportion of ALC days to total length of stay was below 28.3%.
- The variation across LHINs was modest, ranging from 21.7% in the North West LHIN to 34.3% in the Erie St Clair and North Simcoe Muskoka LHINs.
- For most patients in health care facilities in the North West and South East LHINs, the proportion of ALC days to total length of stay was less than the provincial rate of 28.3%.

EXHIBITS 5.3A, 5.3B

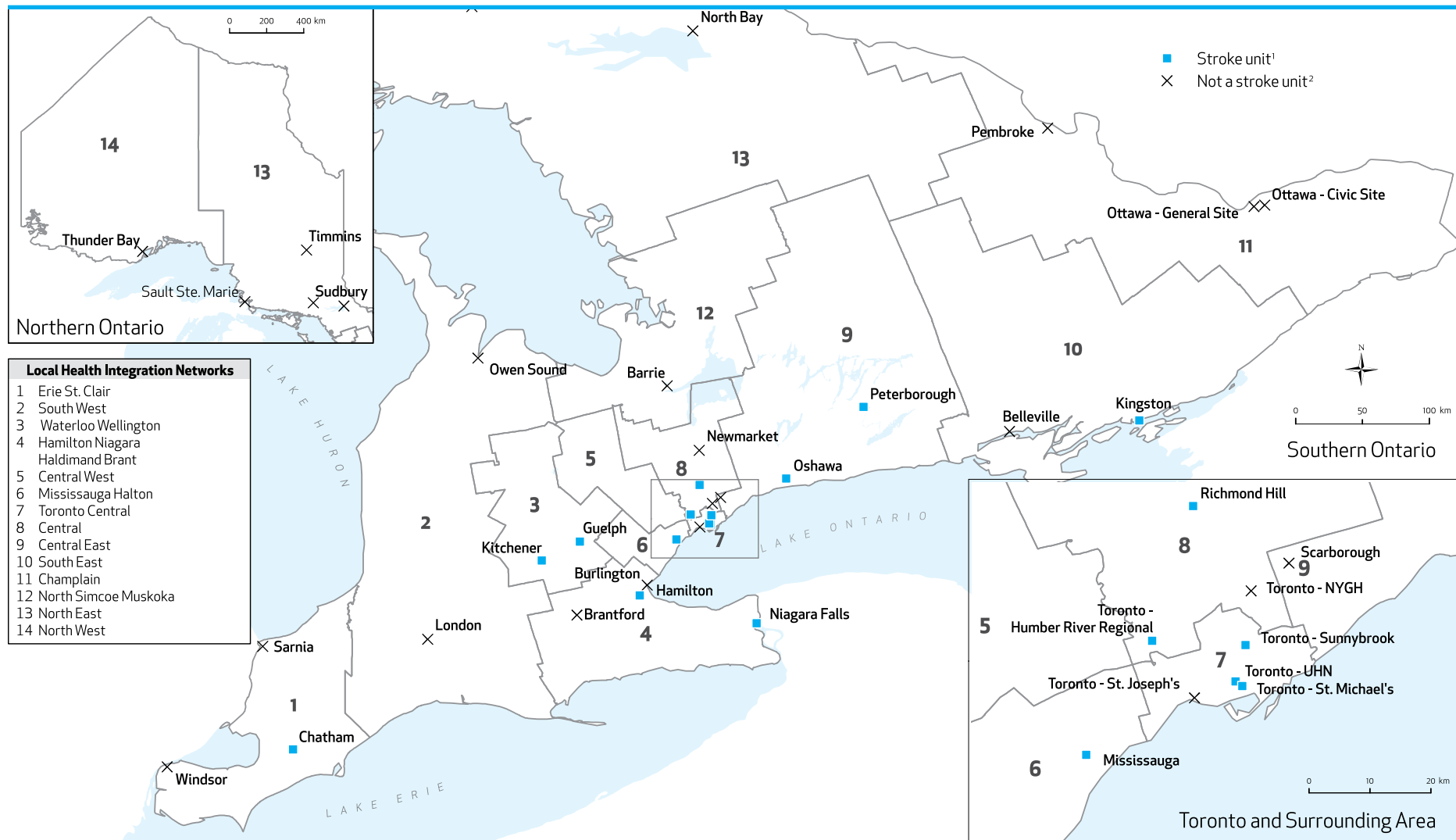
- The Stroke Quality-Based Procedures Expert Advisory Panel recommended that all patients admitted to acute care undergo an AlphaFIM assessment on day 3 of their inpatient stay and the score used to triage patients to appropriate discharge destinations and associated rehabilitation services. Overall, 24.6% of patients admitted to inpatient care had an AlphaFIM score documented in their chart, and 61.0% of patients were assessed by day 3 following admission.
- The mean total AlphaFIM score was 72.4 (median score, 76.2), with men scoring almost 10 points higher than women: 76.4 vs. 67.9 (median score, 82.0 vs. 68.6).
- Among patients with documented AlphaFIM assessments, 47.4% were considered to have mild disability (total AlphaFIM score ≥ 80); 32.4% had moderate disability (score 40–79); and 20.2% had severe disability (score < 40).

^k Revised definition: A stroke unit is a geographical unit with identifiable co-located beds (e.g., 5A-7, 5A-8, 5A-9, 5A-10) that are occupied by stroke patients 75% of the time and have a dedicated interprofessional team with expertise in stroke care including, at a minimum, nursing, physiotherapy, occupational therapy and speech-language pathology.

^l The stroke quality-based procedures cohort excluded subarachnoid hemorrhagic stroke patients and paediatric stroke patients. See **Appendix C** for the ICD-10-CA codes used to create the cohort.

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- Among women, 40.6% were considered mildly disabled, 36.2% moderately disabled and 23.2% severely disabled, compared to 53.6%, 28.9% and 17.5% of men, respectively ($p < 0.0001$).
 - Among stroke patients discharged to inpatient rehabilitation, 32.3% were severely disabled, 71.1% were moderately disabled and 31.4% were mildly disabled.
 - Of patients in the mildly disabled group, 39.8% were discharged home without services and 13.8% referred to outpatient rehabilitation services. In the severely disabled group, 21.6% of patients were discharged to long-term care or complex continuing care facilities and 24.3% died in acute care.

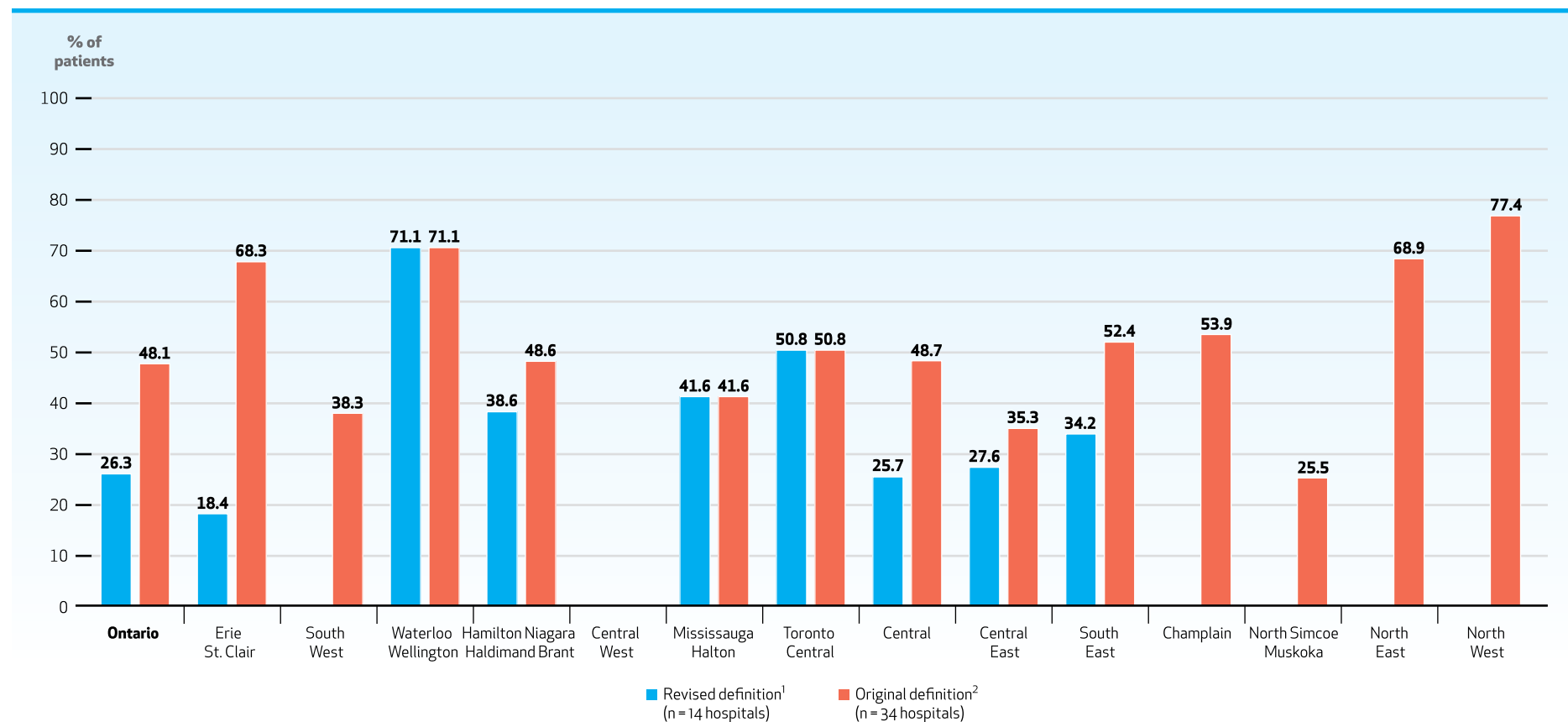
EXHIBIT 5.1A Hospitals with stroke units (based on original and revised definitions), in Ontario, 2012/13



1 Revised definition obtained through consensus with Ontario Stroke Network regional directors (February 2014). A stroke unit is a geographical unit with identifiable co-located beds (e.g., 5A-7, 5A-8, 5A-9) that are occupied by stroke patients 75% of the time and have a dedicated interprofessional team with expertise in stroke care including, at a minimum, nursing, physiotherapy, occupational therapy and speech-language pathology.

2 Original definition of a stroke unit obtained through the Ontario Stroke Network Resource Survey (November 2012). A stroke unit is a specialized, geographically-located hospital unit with a dedicated stroke team and stroke resources (e.g., care pathway, educational materials, monitored beds). The unit does not need to have all of these resources nor does it have to be exclusive to stroke patients, but it must be in one location in the hospital.

EXHIBIT 5.1B Proportion of adult patients with stroke or transient ischemic attack admitted to an acute care hospital and treated on a stroke unit at any time during their stay, in Ontario and by Local Health Integration Network, 2012/13



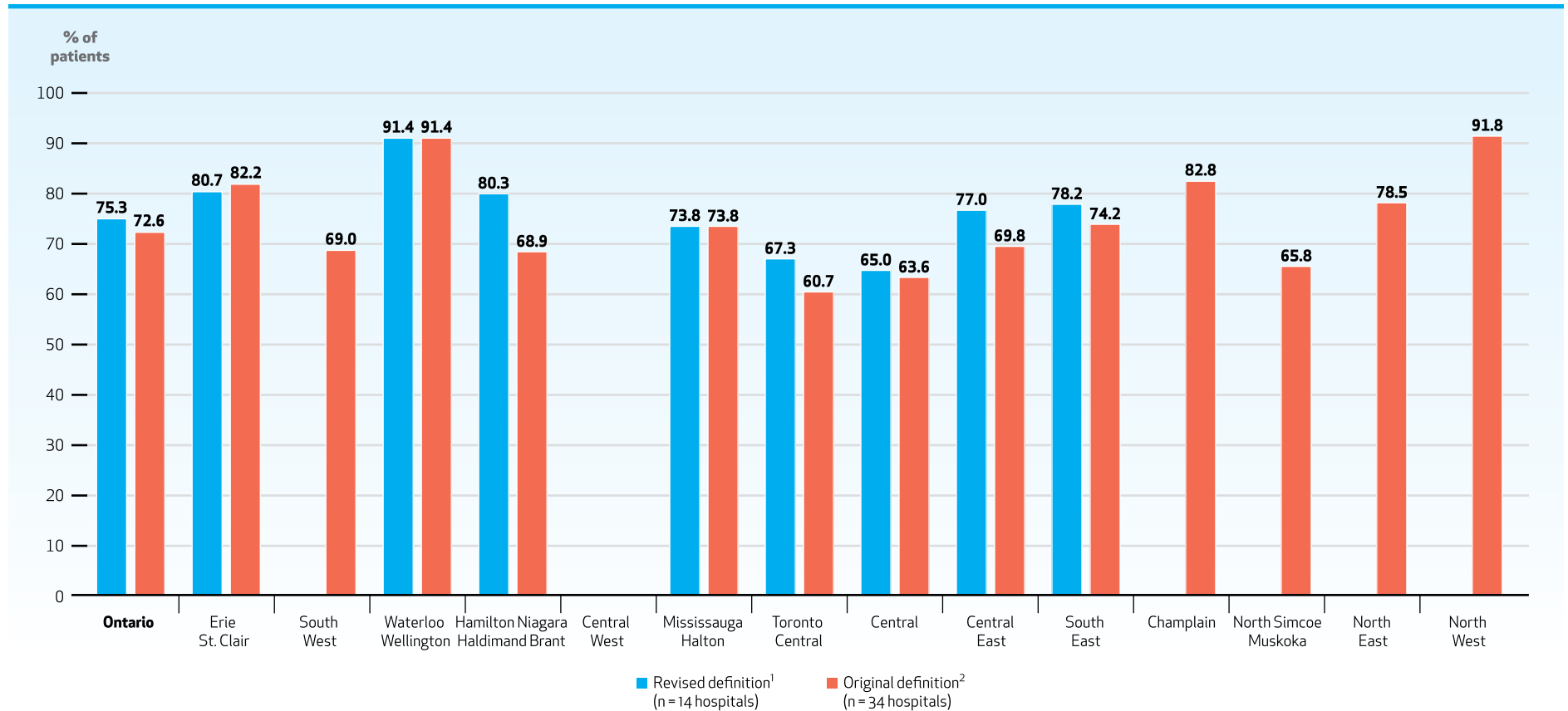
Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All patients aged ≥18 years admitted to an acute care facility for stroke (excluding subarachnoid hemorrhage) or transient ischemic attack.

1 A stroke unit is a geographical unit with identifiable co-located beds (e.g., 5A-7, 5A-8, 5A-9) that are occupied by stroke patients 75% of the time and have a dedicated interprofessional team with expertise in stroke care including, at a minimum, nursing, physiotherapy, occupational therapy and speech-language pathology.

2 A stroke unit is a specialized, geographically-located hospital unit with a dedicated stroke team and stroke resources (e.g., care pathway, educational materials, monitored beds). The unit does not need to have all of these resources nor does it have to be exclusive to stroke patients, but it must be in one location in the hospital.

EXHIBIT 5.1C Proportion of adult patients with stroke or transient ischemic attack admitted to an acute care hospital with a stroke unit and treated on a stroke unit at any time during their stay, in Ontario and by Local Health Integration Network, 2012/13

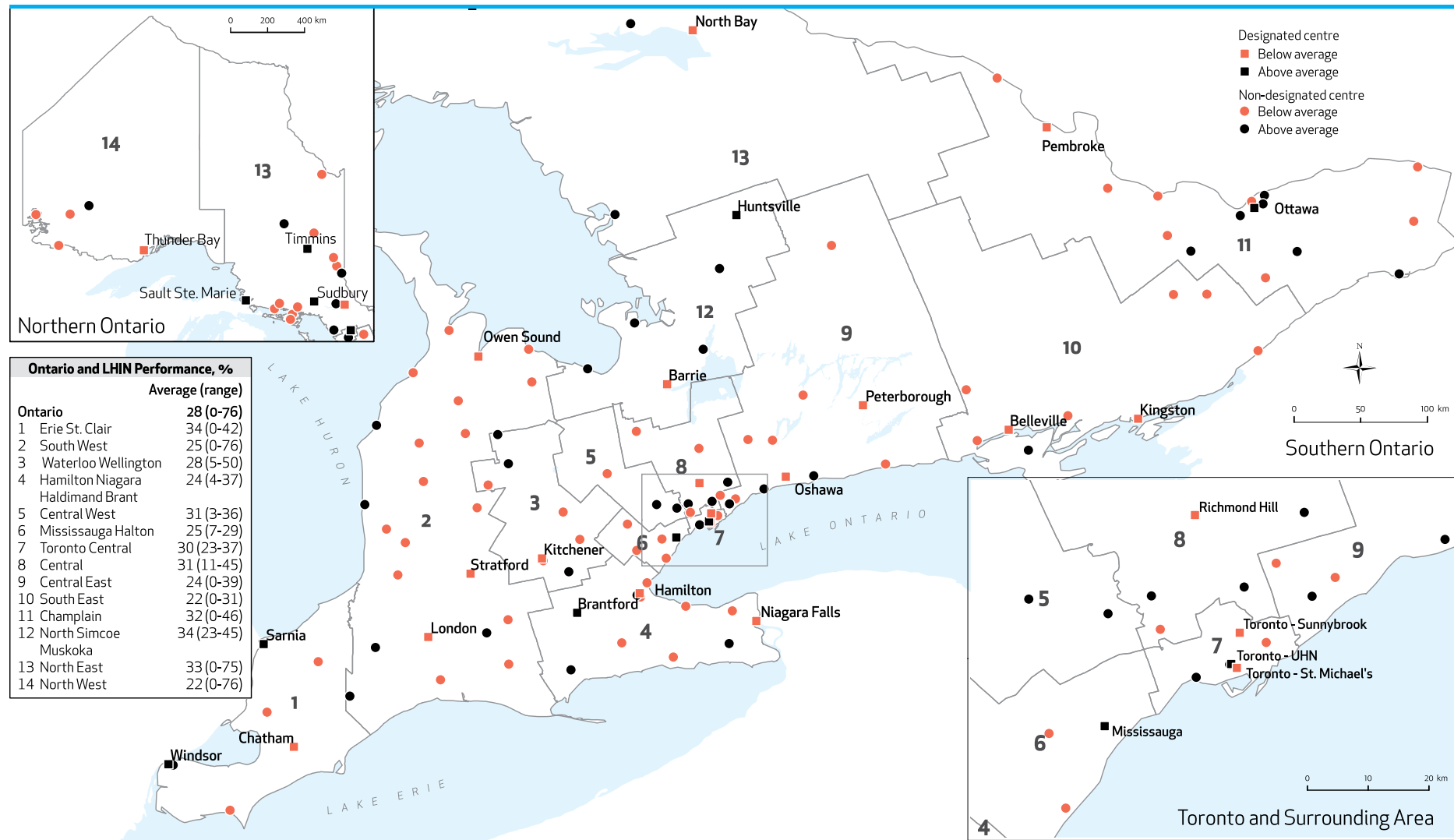


Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All patients aged ≥18 years admitted to an acute care facility with a stroke unit for stroke (excluding subarachnoid hemorrhage) or transient ischemic attack.

- 1 A stroke unit is a geographical unit with identifiable co-located beds (e.g., 5A-7, 5A-8, 5A-9) that are occupied by stroke patients 75% of the time and have a dedicated interprofessional team with expertise in stroke care including, at a minimum, nursing, physiotherapy, occupational therapy and speech-language pathology.
- 2 A stroke unit is a specialized, geographically-located hospital unit with a dedicated stroke team and stroke resources (e.g., care pathway, educational materials, monitored beds). The unit does not need to have all of these resources nor does it have to be exclusive to stroke patients, but it must be in one location in the hospital.

EXHIBIT 5.2 Proportion of total inpatient length of stay spent in Alternate Level of Care for adult patients with stroke or transient ischemic attack, in Ontario and by Local Health Integration Network and facility performance, 2012/13



Data source: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2012/13.

Inclusion criteria: All patients aged >18 years admitted to an acute care facility for stroke management with at least one Alternate Level of Care (ALC) day during admission for an index stroke (excluding subarachnoid hemorrhage) or transient ischemic attack.

Exclusion criteria: Patients with elective admissions.

EXHIBIT 5.3A Characteristics of adult patients with stroke or transient ischemic attack who received AlphaFIM® assessments, in Ontario and by sex, assessment score and discharge destination, 2012/13

Group/Subgroup	All	Women	Men	AlphaFIM Score		
				<40	40-79	≥80
Ontario, n (%)	3,073 (100.0)	1,462 (47.6)	1,611 (52.4)	621 (20.2)	995 (32.4)	1,457 (47.4)
Age, mean (median)	73.2 (75.1)	75.8 (78.2)	70.8 (71.8)	78.8 (80.7)	74.7 (77.4)	69.7 (70.1)
Living independently prior to assessment, n (%)	2,158 (70.2)	913 (62.4)	1,245 (77.3)	310 (50.0)	630 (63.3)	1,217 (83.6)
Time to AlphaFIM Assessment						
Days from inpatient admission to AlphaFIM, mean (median)	4.3 (3.0)	4.2 (3.0)	4.4 (3.0)	4.9 (3.0)	5.3 (3.0)	3.3 (2.0)
Received AlphaFIM within 3 days of inpatient admission, n (%)	1,836 (61.0)	855 (59.9)	980 (61.9)	310 (51.7)	524 (53.3)	1,002 (70.2)
AlphaFIM Score, mean (median)						
AlphaFIM motor score	48.6 (50.0)	45.0 (45.0)	51.7 (55.4)	15.3 (13.0)	36.9 (36.4)	70.7 (73.3)
AlphaFIM cognitive score	24.0 (25.5)	23.1 (24.4)	24.8 (26.7)	10.4 (7.0)	23.3 (22.8)	30.2 (31.6)
AlphaFIM total score	72.4 (76.2)	67.9 (68.6)	76.4 (82.0)	25.6 (23.1)	59.8 (59.2)	100.9 (101.9)
Discharge Destination, n (%)						
Inpatient rehabilitation program or facility	1,365 (44.4)	654 (44.8)	711 (44.1)	200 (32.3)	708 (71.1)	457 (31.4)
Home without services	616 (20.0)	238 (16.3)	377 (23.4)	**	32 (3.2)	580 (39.8)
Home with CCAC services	279 (9.1)	145 (9.9)	134 (8.3)	39 (6.3)	54 (5.4)	185 (12.8)
Home with outpatient rehabilitation	225 (7.3)	84 (5.8)	141 (8.7)	**	23 (2.3)	200 (13.8)
Long-term care/nursing home	165 (5.4)	107 (7.3)	58 (3.6)	103 (16.6)	53 (5.3)	9 (0.6)
Other acute care hospital	146 (4.8)	66 (4.5)	80 (5.0)	60 (9.6)	57 (5.8)	29 (2.0)
Complex continuing care	60 (1.9)	38 (2.6)	22 (1.3)	31 (5.0)	24 (2.4)	**
Retirement home	57 (1.9)	38 (2.6)	19 (1.2)	9 (1.4)	21 (2.1)	27 (1.9)
Other (e.g., psychiatric facility, palliative care)	36 (1.2)	23 (1.5)	14 (0.9)	24 (3.9)	6 (0.6)	6 (0.4)
Died	182 (5.9)	95 (6.5)	87 (5.4)	151 (24.3)	28 (2.8)	**

Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All patients aged ≥18 years admitted to inpatient care with a final diagnosis of stroke (excluding subarachnoid hemorrhage) or transient ischemic attack who completed an AlphaFIM assessment and had a score documented in their medical chart.

** Cell value suppressed for reasons of privacy and confidentiality.

CCAC = Community Care Access Centre

Notes:

(1) In total, 201 patients with a final diagnosis of transient ischemic attack had a documented AlphaFIM score.

(2) AlphaFIM® is a registered trademark of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

EXHIBIT 5.3B AlphaFIM® score categories of adult patients with stroke or transient ischemic attack, in Ontario and by sex, 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All patients aged ≥18 years admitted to inpatient care with a final diagnosis of stroke (excluding subarachnoid hemorrhage) or transient ischemic attack who completed an AlphaFIM assessment and had a score documented in their medical chart.

Notes:

(1) In total, 201 patients with a final diagnosis of transient ischemic attack had a documented AlphaFIM score.

(2) AlphaFIM® is a registered trademark of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

CONCLUSIONS

Patient care provided on a stroke unit can decrease the risk of death and disability.³¹ In 2012/13, the Stroke Quality-Based Procedures Expert Advisory Panel recommended that patients be treated on a stroke unit for at least 80% of their total length of stay and included this as an important monitoring indicator for stroke QBP funding reform.⁷ However, because of concerns around the validity and reliability of this data element, the indicator was not included in the baseline stroke QBP report.³² The Ontario Stroke Network consulted directors of Regional Stroke Network to define a stroke unit in the Ontario context that would be consistent with Canadian Stroke Strategy best practice recommendations, be measureable and include the context of facility bed supply and demand pressures. The revised definition of a stroke unit requires geographically co-located, identifiable beds that are occupied by stroke patients 75% of the time and has a dedicated interprofessional team that at a minimum is represented by nursing, physical therapy, occupational therapy and speech-language pathology.

Using the revised definition of a stroke unit, only 26.3% of Ontario patients admitted to hospital with acute stroke or TIA were cared for in a stroke unit, a level well below that of other jurisdictions, such as England, Wales and Northern Ireland,^{11,30} and only eight of the 14 LHINs had at least one health care facility with a stroke unit. Among patients admitted to facilities with a stroke unit, only 75.3% were treated there, well below the levels reported for Scotland (90%) and England, Wales and Northern Ireland (88%).^{11,33}

In 2012/13, 28.3% of the total length of stay of inpatients with stroke (excluding subarachnoid hemorrhage) or TIA was considered Alternate Level of Care. Several designated centres reported a proportion of ALC days above the provincial average.

The 2012/13 Ontario Stroke Audit included a relatively small sample of patients with AlphaFIM scores (n=3,073), which limits the generalizability of evaluating rehabilitation access in Ontario at this time. However, the results obtained reveal that almost half of patients (47.4%) were considered to have mild impairment, yet 31.4% were discharged to inpatient rehabilitation and only 13.8% referred to outpatient rehabilitation. This suggests a gap in access to outpatient rehabilitation services for patients with mild impairment.

RECOMMENDATIONS

1. The Ministry of Health and Long-Term Care should begin to report 'admission to a stroke unit' as a QBP monitoring indicator based on the revised stroke unit definition, using data from the 2012/13 Ontario Stroke Audit as a baseline for QBP implementation.
2. The OSN should continue to oversee and monitor implementation of the revised stroke unit definition and collaborate with the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information to ensure high-quality data capture of stroke unit utilization within the Discharge Abstract Database to be able to support the stroke quality based-procedures indicator 'treated on a stroke unit' for at least 80% of the total length of stay.⁷
3. The OSN should continue to support the participation of acute care hospitals in Accreditation Canada's stroke distinction status as a means of ensuring hospital stroke units are implemented and sustained to align with the implementation of acute stroke QBPs.
4. The OSN, the Ministry of Health and Long-Term Care, and the Canadian Institute for Health Information should continue their work to have the AlphaFIM scores collected as a mandatory data element in the Discharge Abstract Database. This will provide a standardized data reporting tool to assist in triaging stroke patients to the appropriate rehabilitation setting; it would also allow the OSN to evaluate patient access to rehabilitation and examine system utilization.
5. Regional Stroke Networks and facilities need to examine patient flow between acute care and rehabilitation for opportunities to reduce ALC days, because rehabilitation is the most common discharge destination among patients with acute care ALC, and because QBPs recommend that access to rehabilitation be within five days for patients with ischemic strokes.

6 Acute Inpatient Care

Key Findings

EXHIBITS 6.1A, 6.1B

- Provincially, the annual incidence rate of admission for stroke or transient ischemic attack (TIA) per 1,000 LHIN population (standardized to the age- and sex-adjusted 2003/04 Ontario population) remained at 1.3 from 2010/11 to 2012/13.
- Inpatient admission rates for stroke or TIA per 1,000 LHIN population were consistently higher in northern Ontario (1.6 in the North East LHIN and 2.0 in the North West LHIN in 2012/13). The Central and Champlain LHINs had the lowest rate at 1.1 per 1,000 LHIN population.
- In the Erie St. Clair LHIN, the rate of inpatient admissions for stroke or TIA per 1,000 LHIN population dropped dramatically from 2.2 in 2003/04 to 1.4 in 2012/13.

EXHIBIT 6.2

- Ontario had more than 15,000 inpatient admissions for stroke or TIA in each year studied.
- In 2012/13, 24.7% of inpatient admissions for stroke or TIA were adults aged 46 to 65 years; in 2003/04, 19.2% of admissions involved adults in this age group ($p < 0.0001$).

- In 2012/13, two-thirds of inpatients with stroke or TIA and over the age of 85 were female (data not shown).

EXHIBITS 6.3A, 6.3B

- In 2012/13, almost 1 in 5 inpatient admissions (18.6%) were for TIA, an increasing trend since 2003/04 ($p < 0.001$).
- Provincially, the proportion of patients discharged from an inpatient stay with a stroke type diagnosed as 'unable to determine' decreased from 32.7% in 2003/04 to 8.0% in 2012/13 ($p < 0.0001$). The proportion of patients discharged with a diagnosis of ischemic stroke in this period increased from 35.9% to 59.0% ($p < 0.001$). This trend was observed across all hospital types, but non-designated centres had the highest occurrence of the 'unable to determine' stroke diagnosis code at 13.1%, compared to district and regional stroke centres at 5.0% and 3.3%, respectively (data not shown).
- Over the nine years examined, there was a steady decrease in the proportion of patients admitted to non-designated stroke centres, from 55.9% in 2003/04 to 44.1% in 2012/13.

EXHIBITS 6.4A, 6.4B

- The proportion of stroke inpatients who were screened for dysphagia (difficulty swallowing) within 3 days of admission increased from 53.3% in 2004/05 to 67.2% in 2012/13 ($p < 0.0001$). The benchmark for dysphagia screening was 87.5%, based on data from the 2012/13 Ontario Stroke Audit.
- In 2012/13, dysphagia screening rates were highest at district stroke centres (77.9%), followed by regional stroke centres (74.2%) and non-designated centres (55.9%).
- In 2012/13, the variation in dysphagia screening rates across LHINs ranged from 48.2% in the Central LHIN to 81.7% in the Toronto Central LHIN.

EXHIBITS 6.5A, 6.5B

- Among patients with ischemic stroke who had atrial fibrillation and were without contraindications, the proportion who were prescribed or had antithrombotic therapy recommended upon discharge from acute care increased from 73.4% in 2010/11 to 76.3% in 2012/13 ($p=0.05$). The benchmark for this indicator is 87.4%, based on data from the 2012/13 Ontario Stroke Audit. Ontario's performance was better than rates observed in England, Wales and Northern Ireland.¹¹
- Prescribing rates at non-designated facilities were slightly higher than rates observed at district stroke centres (75.2% and 71.4%, respectively). Regional stroke centres demonstrated the highest prescribing rate (81.3%). There was a 15-point variation in mean prescribing rates across LHINs, ranging from 70.7% in the Central East LHIN to 85.5% in the North West LHIN.

EXHIBITS 6.6A, 6.6B, 6.6C, 6.6D

- Between 2010/11 and 2012/13, there was a one-day decrease in the total mean length of stay (from 12.1 to 11.1 days) for hospital inpatients. Between 2010/11 and 2012/13, the proportion of total inpatient length of stay designated as Alternate Level of Care declined from 32.5% to 27.7% ($p=0.42$).
- In 2012/13, women had 29.0% of their total length of stay designated as Alternate Level of Care, compared to 26.3% for men ($p<0.0001$).
- Regional stroke centres consistently had longer patient lengths of stay than district stroke centres and non-designated centres; this is likely attributable to the fact that hemorrhagic stroke patients are more often admitted to regional stroke centres.
- Non-designated centres had a higher proportion of ALC days at 30.3% compared to regional and district stroke centres at 26.2% and 24.8%, respectively.
- The extent of LHIN variation in the proportion of ALC days to total length of stay decreased from 2010/11 to 2012/13. In 2012/13, this variation ranged from 21.9% in the North West LHIN to 34.2% in the North Simcoe Muskoka. Also in 2012/13, the mean total length of stay varied from 8.2 days in the North West LHIN to 13.3 days in the Toronto Central LHIN.

EXHIBITS 6.7A, 6.7B, 6.7C

- Among the 15,647 patients admitted to hospital in 2012/13 with a stroke or TIA, 1 in 5 had at least one ALC day.
- Among the LHINs, there was wide variation in the proportion of patients admitted to acute care facilities who had ALC days, ranging from almost 1 in 3 patients in the Central West LHIN to just over 1 in 10 patients in the Central East, Mississauga Halton, and South West LHINs.
- Among patients with ALC days, the most prevalent discharge destination was inpatient rehabilitation (47.7%) followed by complex continuing care (16.7%), home with services (11.6%) and long-term care (9.5%).
- Among patients with at least one ALC day who were discharged to long-term care, home with services or to palliative care in 2012/13, ALC accounted for 72.6%, 53.8% and 51.7%, respectively, of their total inpatient length of stay.
- Among patients who died having had at least one ALC day in 2012/13, 52.0% of their total inpatient length of stay was ALC.
- Among patients with a discharge destination of inpatient rehabilitation in 2012/13, ALC accounted for 42.3% of their total inpatient length of stay.

EXHIBITS 6.8A, 6.8B

- Following a hospital admission for acute stroke or TIA, 35.6% of patients were discharged home without services, 29.4% were discharged to inpatient rehabilitation, 7.3% were discharged to outpatient rehabilitation and 2.5% were discharged to another acute care facility.
- Over 30% of patients admitted to designated stroke centres were discharged to inpatient rehabilitation, compared to 26.5% of patients admitted to non-designated facilities.

EXHIBITS 6.9A, 6.9B, 6.9C

- The median time to carotid intervention decreased substantially in Ontario, from 51 days in 2003/04 to 15 days in 2012/13 ($p < 0.0001$), despite little change in the number of procedures done annually (data not shown). This decline was observed across all hospital designations.
- Patients discharged from regional stroke centres continued to have the shortest median wait time (9 days in 2012/13) for carotid intervention and met the target of having the procedure done within 2 weeks of the stroke or TIA event for the years 2010/11, 2011/12 and 2012/13.
- Among LHINs, the variation in median wait time for carotid intervention was reduced considerably from 41 days in 2010/11 to 21 days in 2012/13. In 2012/13, the mean wait time ranged from 8 days in the Toronto Central LHIN to 29 days in the North Simcoe Muskoka LHIN.

EXHIBIT 6.1A Age- and sex-adjusted¹ inpatient admission rates for adults with stroke or transient ischemic attack per 1,000 LHIN population aged 18 and older, in Ontario, 2003/04–2012/13

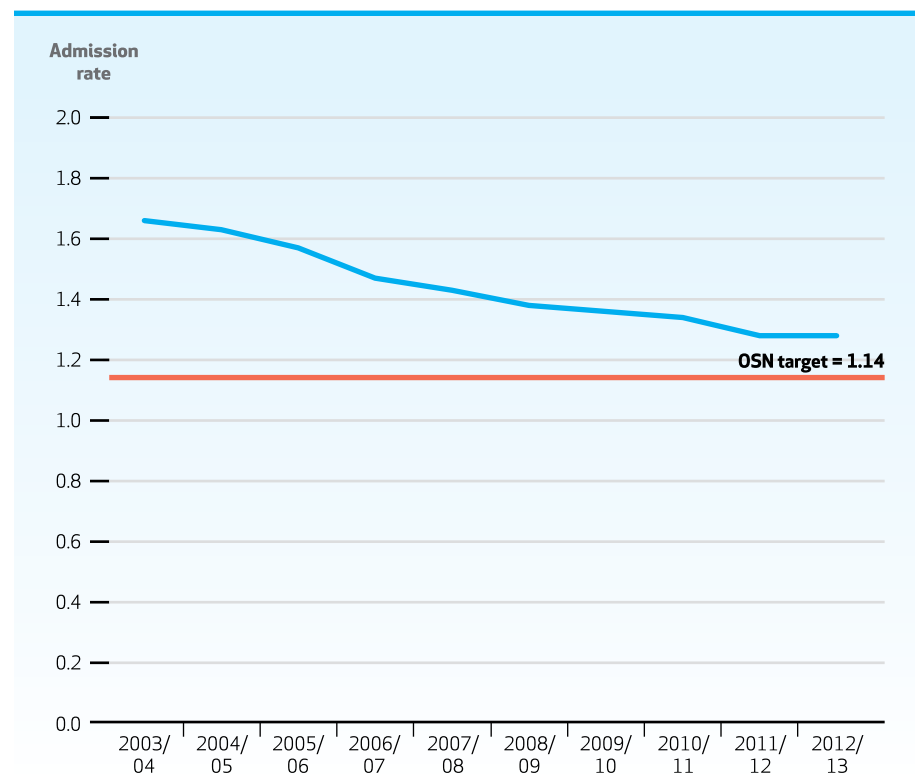


EXHIBIT 6.1B Age- and sex-adjusted inpatient admission rates for adults with stroke or transient ischemic attack per 1,000 LHIN population aged 18 and older, in Ontario and by Local Health Integration Network, 2003/04 and 2010/11–2012/13

Group/Subgroup	Inpatient Admission Rates, % (n)			
	2003/04	2010/11	2011/12	2012/13
Standardized Provincial Rate²	1.66 (15,714)	1.34 (15,485)	1.28 (15,180)	1.28 (15,623)
Observed Provincial Rate	1.66 (15,714)	1.47 (15,485)	1.42 (15,180)	1.44 (15,623)
Local Health Integration Network³				
1. Erie St. Clair	2.19 (1,152)	1.53 (937)	1.40 (878)	1.41 (911)
2. South West	1.65 (1,321)	1.35 (1,262)	1.32 (1,260)	1.37 (1,303)
3. Waterloo Wellington	1.62 (783)	1.33 (791)	1.36 (841)	1.38 (873)
4. Hamilton Niagara Haldimand Brant	1.75 (2,088)	1.45 (2,016)	1.27 (1,819)	1.33 (1,925)
5. Central West	1.67 (659)	1.48 (782)	1.34 (745)	1.26 (735)
6. Mississauga Halton	1.60 (933)	1.22 (1,013)	1.14 (992)	1.19 (1,084)
7. Toronto Central	1.49 (1,360)	1.27 (1,286)	1.23 (1,253)	1.22 (1,256)
8. Central	1.48 (1,496)	1.19 (1,646)	1.16 (1,671)	1.13 (1,719)
9. Central East	1.57 (1,779)	1.21 (1,701)	1.10 (1,608)	1.20 (1,812)
10. South East	1.63 (736)	1.36 (712)	1.31 (701)	1.27 (698)
11. Champlain	1.41 (1,251)	1.15 (1,244)	1.14 (1,267)	1.12 (1,270)
12. North Simcoe Muskoka	2.00 (693)	1.41 (627)	1.42 (642)	1.28 (607)
13. North East	2.14 (1,068)	1.78 (1,037)	1.80 (1,070)	1.61 (975)
14. North West	2.01 (395)	1.93 (431)	1.93 (433)	1.99 (455)

Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2003/04–2012/13; Statistics Canada, Ontario intercensal population estimate, 2003.

Inclusion criteria: All patients aged ≥18 years with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack.

Exclusion criteria: Patients with elective admissions or patients provided palliative care as an initial treatment plan.

1. Age- and sex-adjusted standardized rates were determined by using the 2003/04 Ontario population as the standard.

Notes:

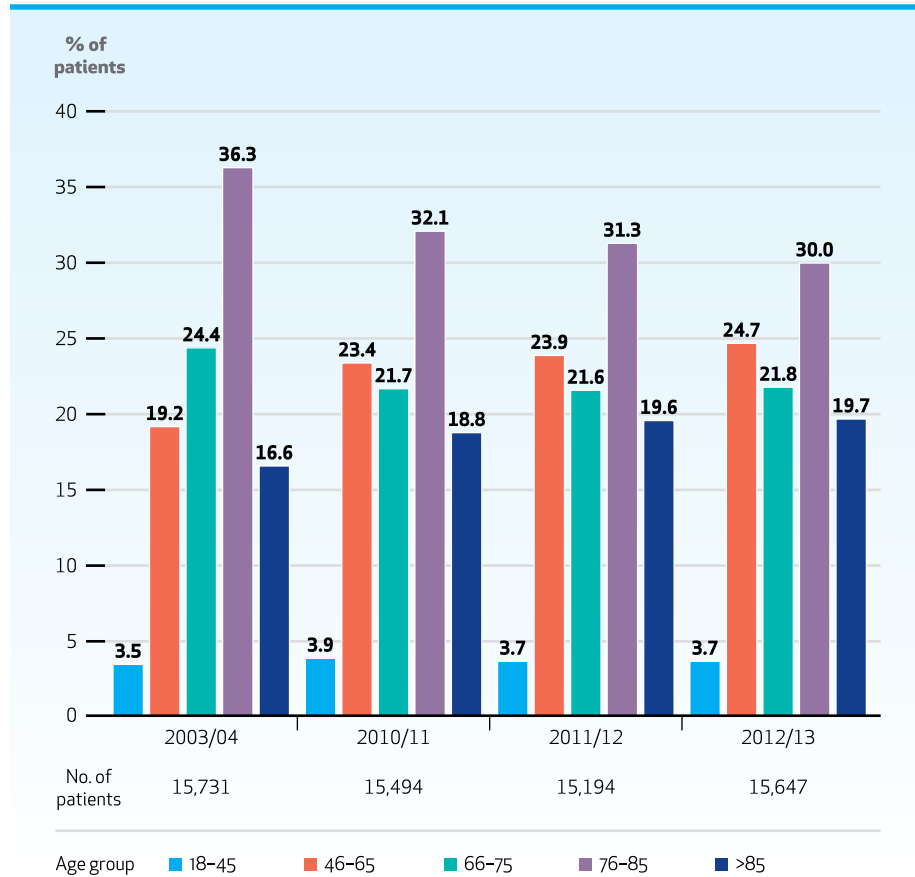
(1) Population-based analysis (i.e., the location of the patient's residence was used to report regional performance).

(2) Excludes patients with missing postal codes.

(3) **Indicates significant difference from the standardized rate.**

(4) LHIN and sub-LHIN populations were determined using the files POPLHIN 2003–2011, POPLHIN_PROJECTED 2012 and POPSUBLHIN Version 9 2006–2008 from the Ontario Ministry of Health and Long-Term Care: IntelliHealth Ontario.

EXHIBIT 6.2 Proportion of adult patients admitted to acute care hospitals with stroke or transient ischemic attack, by age group, in Ontario, 2003/04 and 2010/11–2012/13



Data source: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2003/04–2012/13.
 Inclusion criteria: All patients aged ≥18 years with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack.
 Exclusion criteria: Patients with elective admissions or patients provided palliative care as an initial treatment plan.

EXHIBIT 6.3A Proportion of adult patients admitted to acute care hospitals with stroke or transient ischemic attack, by stroke type, in Ontario, 2003/04 and 2010/11–2012/13

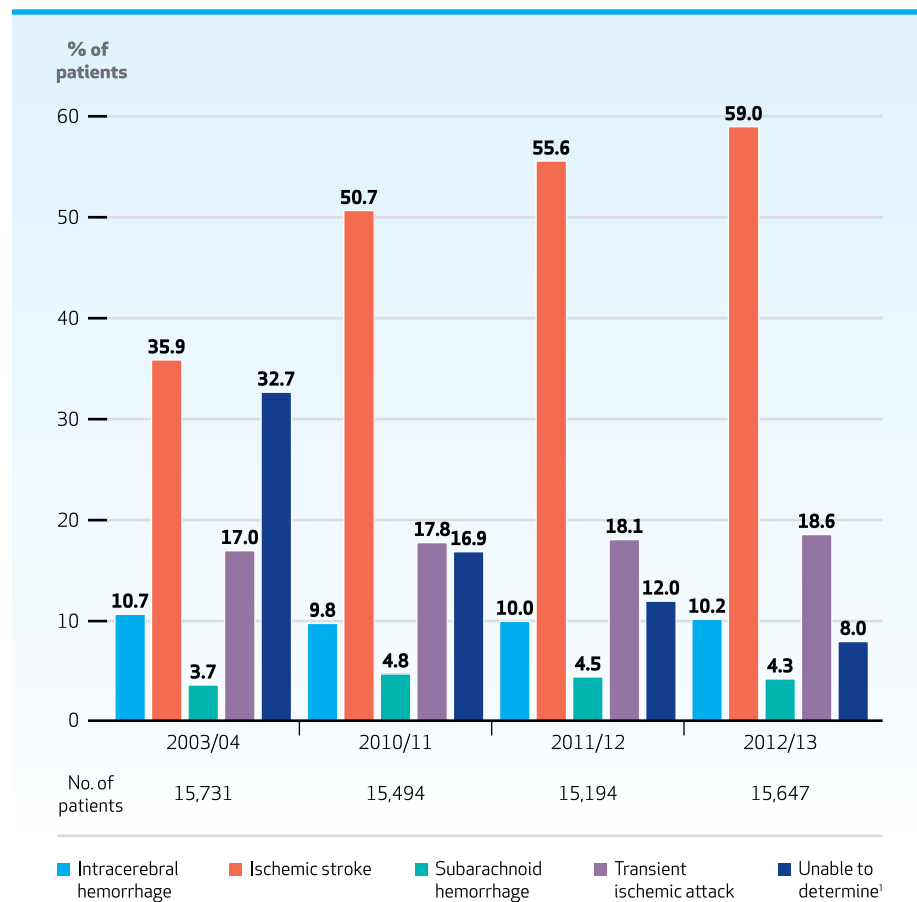
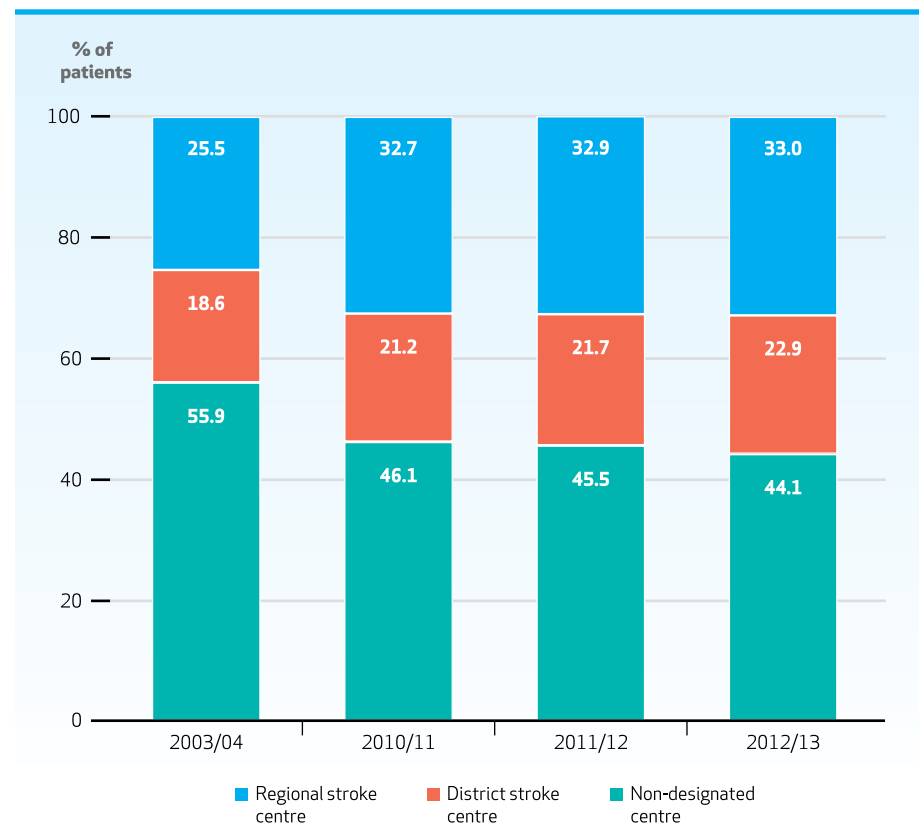


EXHIBIT 6.3B Proportion of adult patients admitted to acute care hospitals with stroke or transient ischemic attack, by Ontario Stroke Network designation, 2003/04 and 2010/11–2012/13



Data source: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2003/04–2012/13.
 Inclusion criteria: Patients aged >18 years with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack.
 Exclusion criteria: Patients with elective admissions or patients provided palliative care as an initial treatment plan.
 1. Includes stroke not specified as hemorrhagic or infarction.

EXHIBIT 6.4A Proportion of adult stroke patients with documentation indicating an initial dysphagia screening¹ was performed during admission to acute care, in Ontario and by Ontario Stroke Network designation, 2004/05, 2008/09, 2010/11 and 2012/13

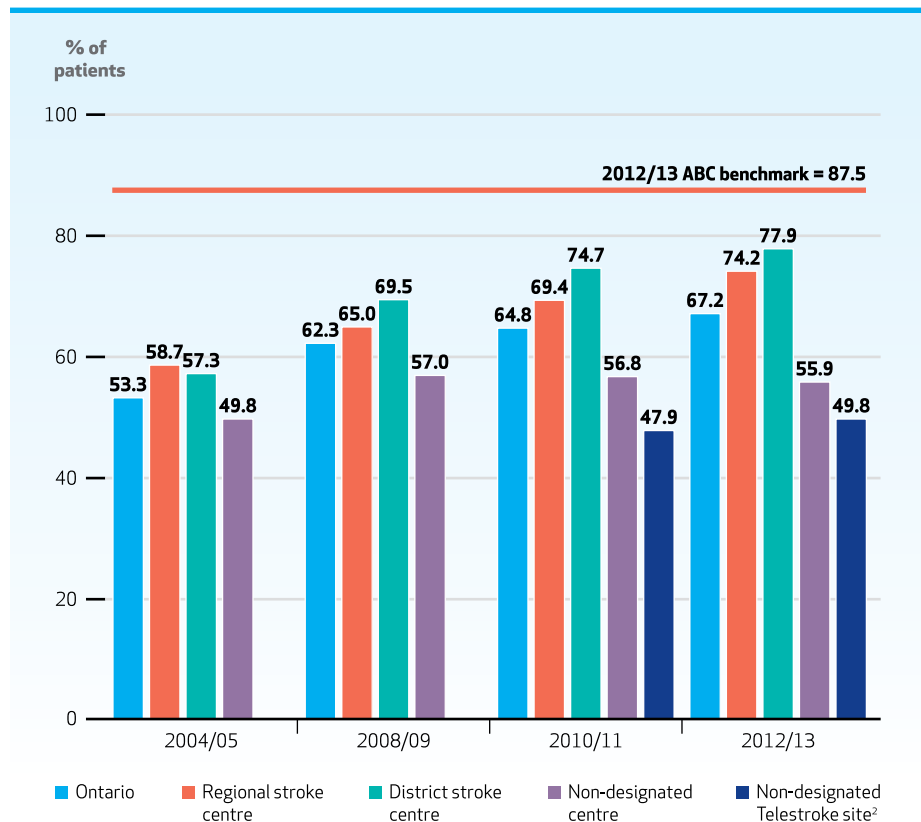
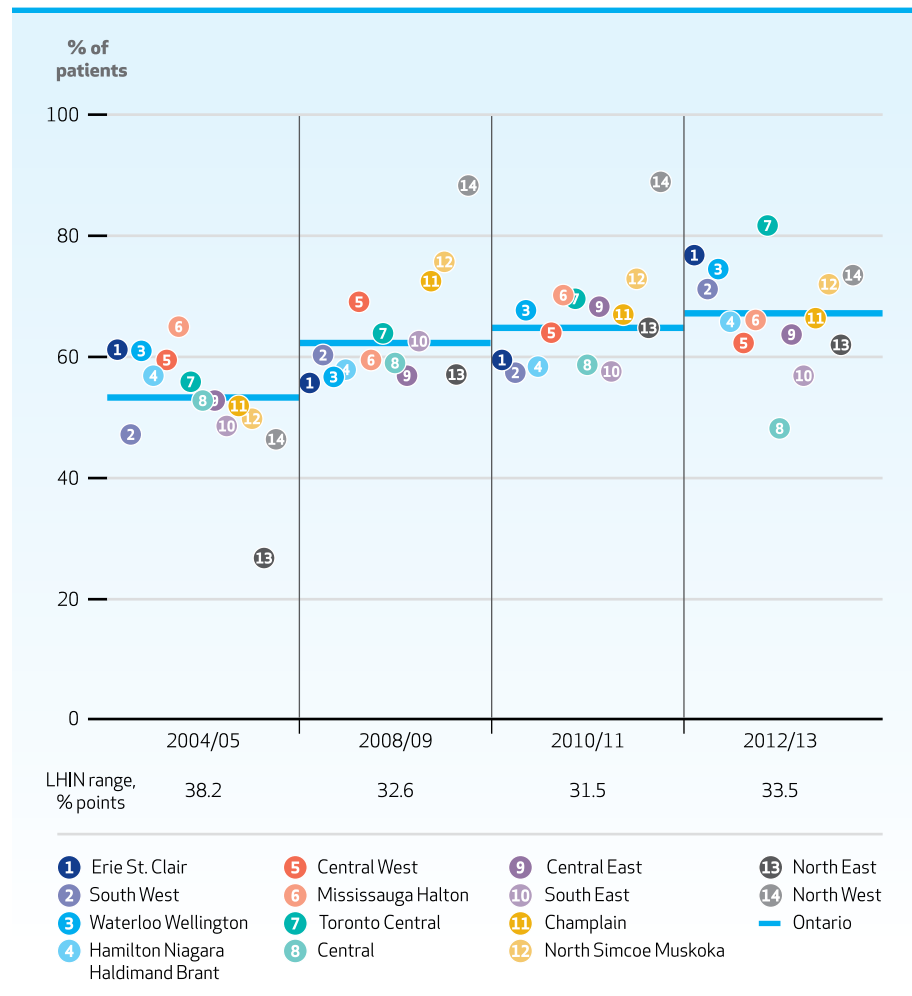


EXHIBIT 6.4B Variation in the proportion of adult stroke patients with documentation indicating an initial dysphagia screening¹ was performed during admission to acute care, in Ontario and by Local Health Integration Network, 2004/05, 2008/09, 2010/11 and 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2010/11 and 2012/13.

Inclusion criteria: All patients age ≥18 years admitted to an acute care facility in Ontario with a final diagnosis of stroke.

Exclusion criteria: Patients with a diagnosis of transient ischemic attack (or subarachnoid hemorrhage in 2012/13); patients who were unconscious at the time of initial assessment while in hospital.

1 A speech-language pathology assessment or swallowing screen performed within 72 hours of arrival at hospital. This includes bedside assessments done by health care providers (e.g., nurses) or standardized swallowing screening tests (e.g., TOR-BSST).

2 Non-designated centres (N=7 in 2010/11 and 8 in 2012/13). The remaining Telestroke sites (N=10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.

EXHIBIT 6.5A Proportion of adult patients with ischemic stroke or transient ischemic attack and atrial fibrillation¹ who were prescribed or recommended anticoagulant therapy on discharge from acute care (excluding those with contraindications), in Ontario and by Ontario Stroke Network designation, 2010/11 and 2012/13

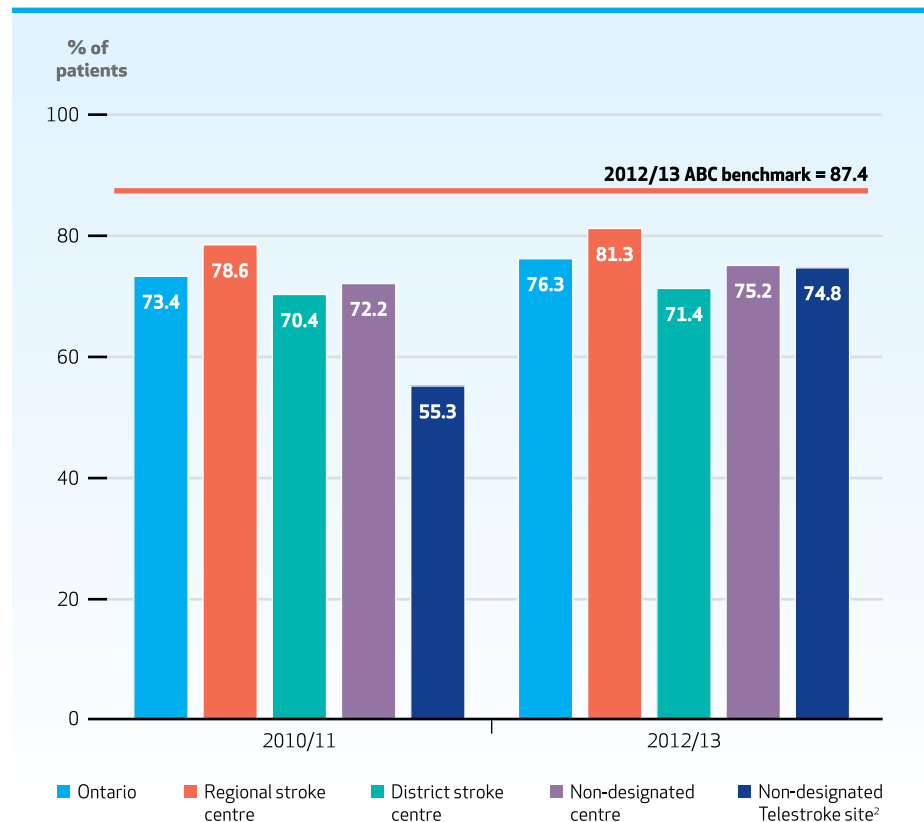
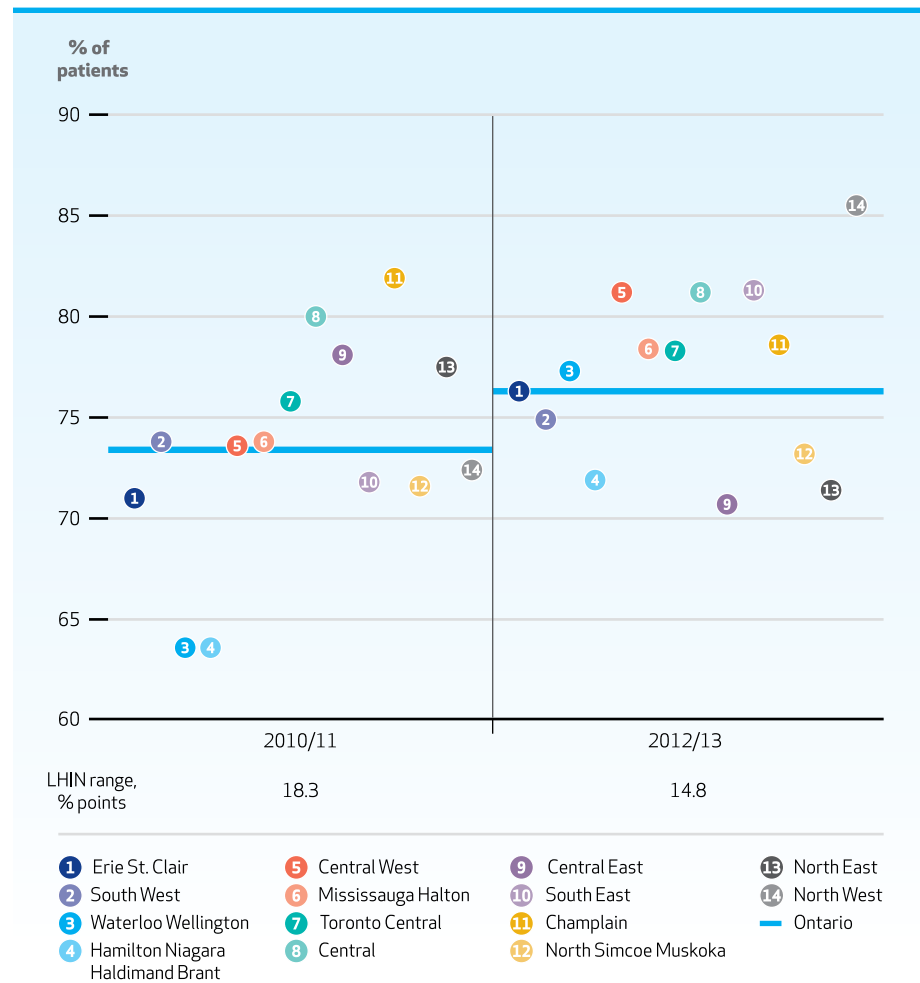


EXHIBIT 6.5B Variation in the proportion of adult patients with ischemic stroke or transient ischemic attack and with atrial fibrillation¹ who were prescribed or recommended anticoagulant therapy on discharge from acute care, in Ontario and by Local Health Integration Network, 2010/11 and 2012/13



Datasource: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2010/11 and 2012/13.
 Inclusion criteria: All patients aged ≥18 years discharged alive from the emergency department or inpatient care with a final diagnosis of ischemic stroke or transient ischemic attack.
 Exclusion criteria: Patients with contraindications (a history of intracranial hemorrhage, GI bleeding, cirrhosis or renal disease or a GI hemorrhage while in hospital).
 1 Includes patients with a past history or new onset of atrial fibrillation at any time during their hospital stay.
 2 Non-designated centres (N = 7 in 2010/11 and 8 in 2012/13). The remaining Telestroke sites (N = 10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.

EXHIBIT 6.6A Inpatient length of stay (total and Alternate Level of Care) for adult patients with stroke or transient ischemic attack, in Ontario and by sex, stroke type, Ontario Stroke Network designation and Local Health Integration Network, 2003/04 and 2010/11–2012/13

Group/Subgroup	2003/04			2010/11								
	No. of patients	Total length of stay (days)		No. of patients	Total length of stay (days)		Acute care length of stay (days)		ALC length of stay (days)		Proportion of ALC days to total LOS (%)	
		Mean	Median		Mean	Median	Mean	Median	Mean	Median		
Ontario	15,731	12.5	7	15,494	12.1	6	8.2	5	3.9	0	32.5	
Female	8,010	13.0	7	7,865	12.2	6	8.3	6	3.9	0	32.0	
Male	7,721	12.0	6	7,629	12.1	6	8.1	5	4.0	0	33.0	
Stroke Type												
Intracerebral hemorrhage	1,691	13.8	6	1,519	16.8	7	10.4	6	6.5	0	38.4	
Ischemic stroke	10,786	14.2	8	10,476	13.2	7	8.7	6	4.5	0	34.3	
Subarachnoid hemorrhage	584	15.0	9	738	14.8	10	12.9	9.5	1.8	0	12.3	
Transient ischemic attack	2,670	4.7	3	2,761	4.6	3	3.8	3	0.8	0	17.9	
Ontario Stroke Network Designation												
Regional stroke centre	4,009	14.3	7	5,068	12.9	7	9.5	6	3.4	0	26.4	
District stroke centre	2,925	10.6	6	3,279	9.5	5	6.8	5	2.7	0	28.5	
Non-designated centre	8,797	12.4	7	7,147	12.8	6	7.9	5	4.9	0	38.2	
Local Health Integration Network												
1. Erie St. Clair	1,092	8.5	6	892	11.3	7	8.2	6	3.1	0	27.3	
2. South West	1,399	10.3	6	1,337	9.2	5	7.4	4	1.7	0	18.8	
3. Waterloo Wellington	721	11.5	6	725	9.4	5	5.9	4	3.5	0	36.9	
4. Hamilton Niagara Haldimand Brant	2,103	13.3	7	2,007	12.0	6	7.7	5	4.3	0	35.9	
5. Central West	559	14.0	8	615	9.3	6	6.5	5	2.8	0	30.0	
6. Mississauga Halton	1,018	11.0	6.5	1,150	12.0	7	9.0	6	3.0	0	24.7	
7. Toronto Central	1,674	15.7	9	1,946	13.8	7	9.8	6	4.0	0	28.8	
8. Central	1,345	15.8	9	1,337	16.1	7	9.9	6	6.1	0	38.2	
9. Central East	1,643	11.7	7	1,472	11.2	6	7.7	5	3.6	0	31.8	
10. South East	756	12.4	6	670	12.6	6	8.3	5	4.3	0	34.2	
11. Champlain	1,265	13.3	7	1,269	14.6	7	9.2	6	5.4	0	36.7	
12. North Simcoe Muskoka	702	11.1	5	629	9.9	5	6.5	4	3.4	0	34.0	
13. North East	1,054	12.7	6	1,010	11.5	5	7.2	4	4.3	0	37.4	
14. North West	400	10.9	6	435	12.4	7	7.1	5	5.3	0	42.7	

	2011/12								2012/13							
	No. of patients	Total length of stay (days)		Acute care length of stay (days)		ALC length of stay (days)		Proportion of ALC days to total LOS (%)	No. of patients	Total length of stay (days)		Acute care length of stay (days)		ALC length of stay (days)		Proportion of ALC days to total LOS (%)
		Mean	Median	Mean	Median	Mean	Median			Mean	Median	Mean	Median	Mean	Median	
	15,194	11.3	6	8.2	5	3.1	0	27.3	15,647	11.1	6	8.0	5	3.1	0	27.7
	7,655	11.8	6	8.4	5	3.4	0	28.9	7,811	11.5	6	8.2	5	3.3	0	29.0
	7,539	10.8	6	8.0	5	2.7	0	25.5	7,836	10.6	5	7.8	5	2.8	0	26.3
	1,512	15.1	7	10.6	6	4.5	0	30.0	1,590	14.9	7	10.4	6	4.5	0	30.3
	10,259	12.4	7	8.7	6	3.7	0	29.6	10,481	11.9	7	8.4	6	3.5	0	29.3
	679	15.4	10	13.6	10	1.9	0	12.2	666	17.9	10.5	14.3	10	3.6	0	19.9
	2,744	4.2	3	3.8	3	0.4	0	10.0	2,910	4.3	3	3.7	3	0.6	0	13.4
	4,993	12.7	7	9.9	6	2.8	0	22.0	5,161	13.2	7	9.8	6	3.5	0	26.2
	3,293	8.8	5	6.5	5	2.3	0	25.7	3,579	8.3	5	6.3	5	2.1	0	24.8
	6,908	11.5	6	7.8	5	3.7	0	32.1	6,907	10.8	6	7.6	5	3.3	0	30.3
	836	11.0	6	8.5	6	2.6	0	23.4	865	11.2	6	7.4	5	3.8	0	33.6
	1,323	9.5	4	7.3	4	2.2	0	23.3	1,351	9.9	5	7.6	5	2.4	0	23.8
	760	8.8	5	6.0	4	2.8	0	31.9	788	8.4	5	6.0	4	2.3	0	27.9
	1,841	11.8	6	8.6	6	3.2	0	27.4	1,958	11.0	6	8.4	5	2.6	0	23.4
	596	10.2	6	7.2	5	3.0	0	29.3	610	11.5	7	8.0	6	3.5	0	30.7
	1,097	11.6	7	9.3	6	2.3	0	19.8	1,236	12.2	7	9.3	6	2.9	0	23.8
	1,906	12.6	7	9.5	6	3.0	0	24.0	1,967	13.3	7	9.6	6	3.8	0	28.3
	1,321	13.6	7	8.9	6	4.7	0	34.5	1,347	11.8	6	7.9	5	3.8	0	32.5
	1,397	9.9	5	7.6	5	2.3	0	23.5	1,513	10.1	6	7.6	5	2.5	0	24.8
	675	11.0	6	8.7	5	2.2	0	20.3	718	10.5	5	7.9	4	2.6	0	24.7
	1,296	13.9	8	10.0	7	3.9	0	28.2	1,296	12.6	6	8.8	6	3.7	0	29.8
	648	7.8	4	5.6	4	2.2	0	28.6	614	9.6	4	6.3	4	3.3	0	34.2
	1,063	11.6	5	7.1	4	4.5	0	39.1	937	9.6	5	6.4	4	3.2	0	33.1
	435	9.4	5	6.4	5	3.0	0	32.2	447	8.2	5	6.4	5	1.8	0	21.9

Data source: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2003/04-2012/13.

Inclusion criteria: All stroke and transient ischemic attack patients aged >18 years admitted to an acute care facility for stroke management.

Exclusion criteria: Patients with elective admissions or patients provided palliative care as an initial treatment plan.

EXHIBIT 6.6B Proportion of total inpatient length of stay spent in Alternate Level of Care for adult patients with stroke or transient ischemic attack, in Ontario and by sex, 2010/11–2012/13

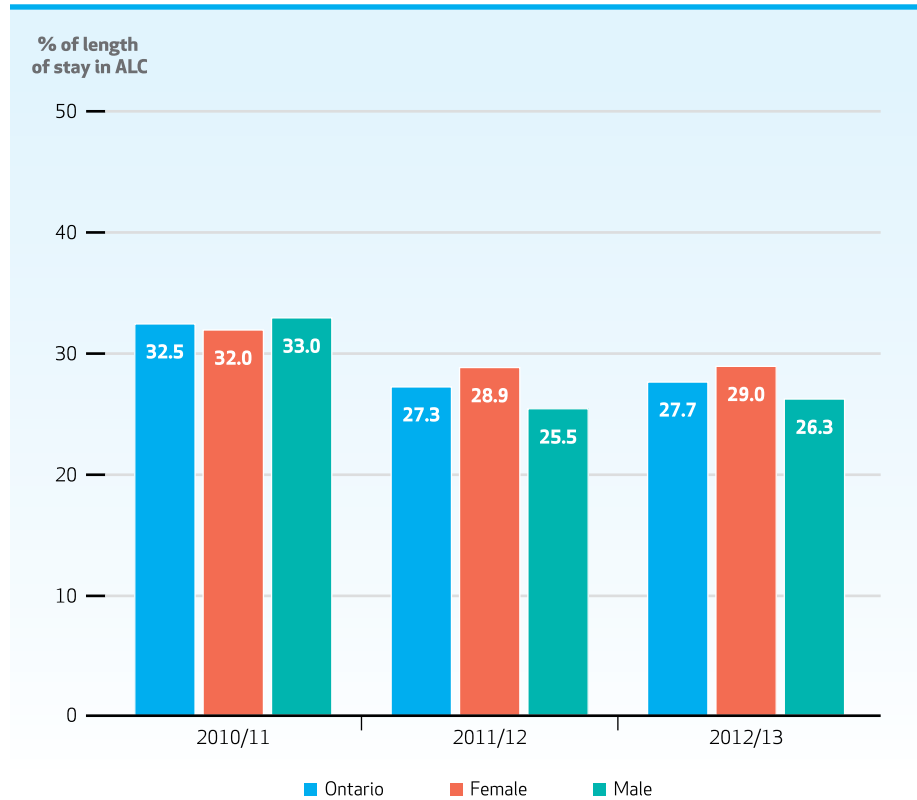
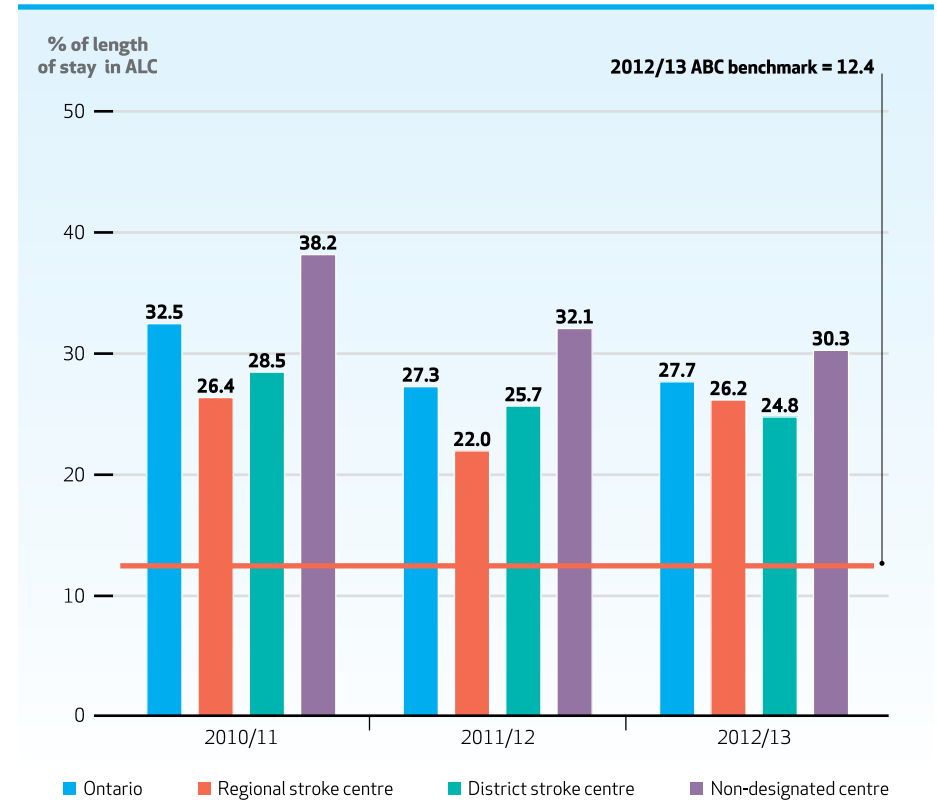
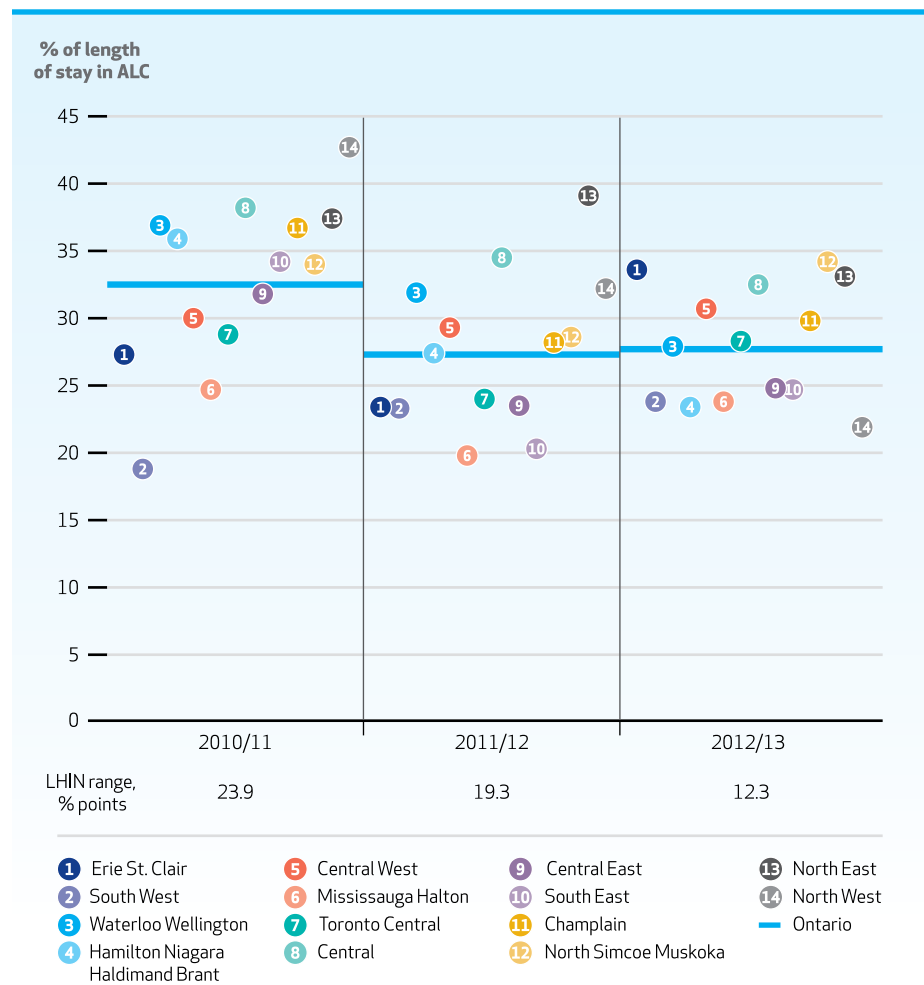


EXHIBIT 6.6C Proportion of total inpatient length of stay spent in Alternate Level of Care for adult patients with stroke or transient ischemic attack, in Ontario and by Ontario Stroke Network designation, 2010/11–2012/13



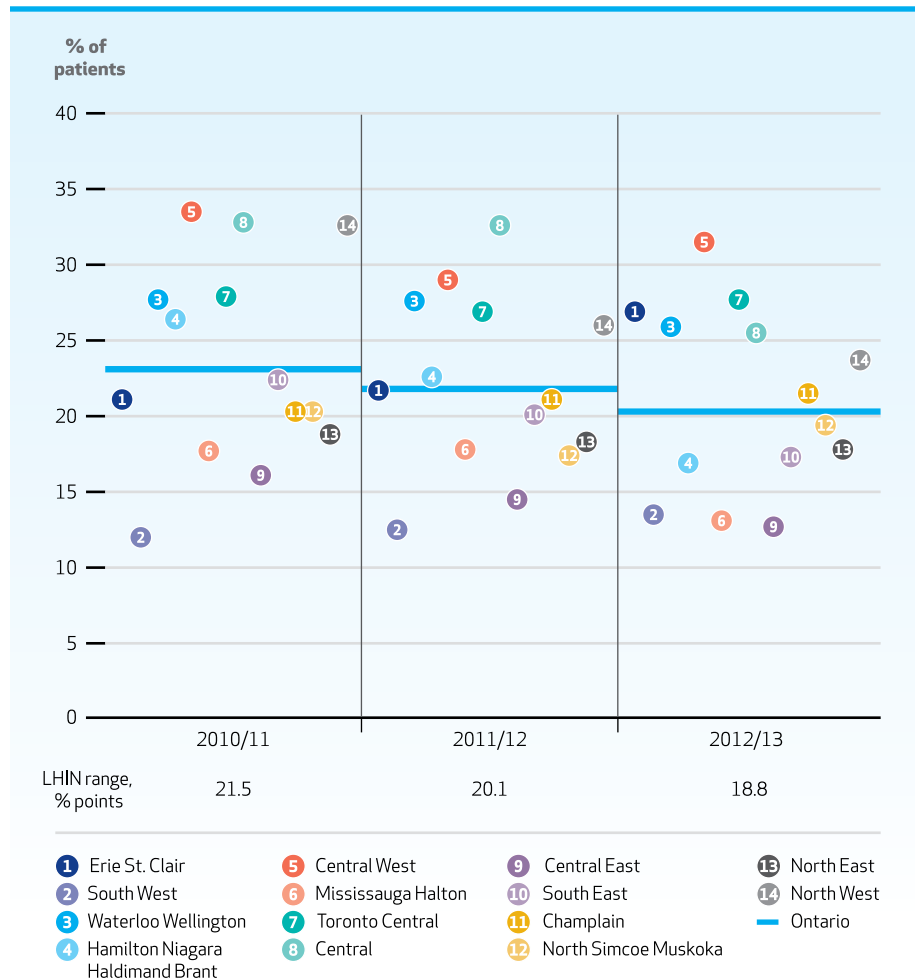
Data source: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2010/11–2012/13.
 Inclusion criteria: All stroke and transient ischemic attack patients aged >18 years admitted to an acute care facility for stroke management.
 Exclusion criteria: Patients with elective admissions or patients provided palliative care as an initial treatment plan.

EXHIBIT 6.6D Variation in the proportion of total inpatient length of stay spent in Alternate Level of Care for adult patients with stroke or transient ischemic attack, in Ontario and by Local Health Integration Network, 2010/11–2012/13



Data source: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2010/11–2012/13.
 Inclusion criteria: All stroke and transient ischemic attack patients aged >18 years admitted to an acute care facility for stroke management.
 Exclusion criteria: Patients with elective admissions or patients provided palliative care as an initial treatment plan.

EXHIBIT 6.7A Variation in the proportion of adult patients with stroke or transient ischemic attack and with Alternate Level of Care days, in Ontario and by Local Health Integration Network, 2010/11–2012/13



Data source: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2010/11–2012/13.
 Inclusion criteria: All stroke and transient ischemic attack patients aged >18 years admitted to an acute care facility for stroke management
 Exclusion criteria: Patients with elective admissions or patients provided palliative care as an initial treatment plan.

EXHIBIT 6.7B Discharge destinations of patients with stroke or transient ischemic attack and at least one Alternate Level of Care day, in Ontario, 2011/12 and 2012/13

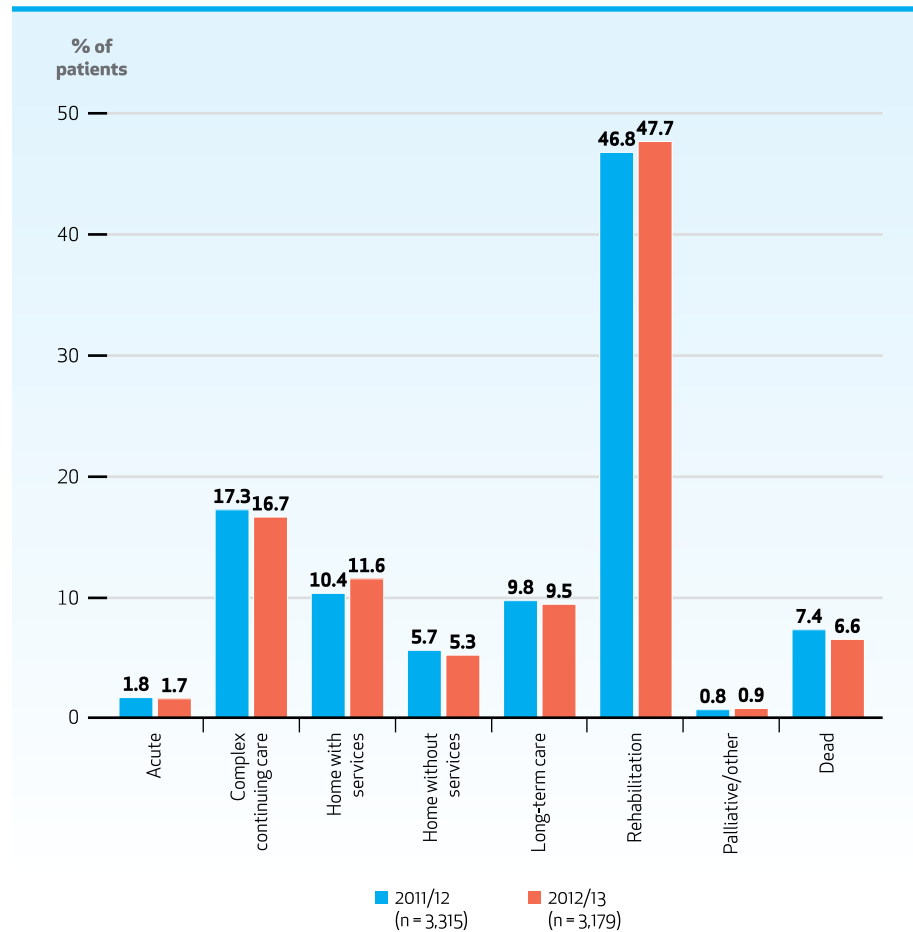
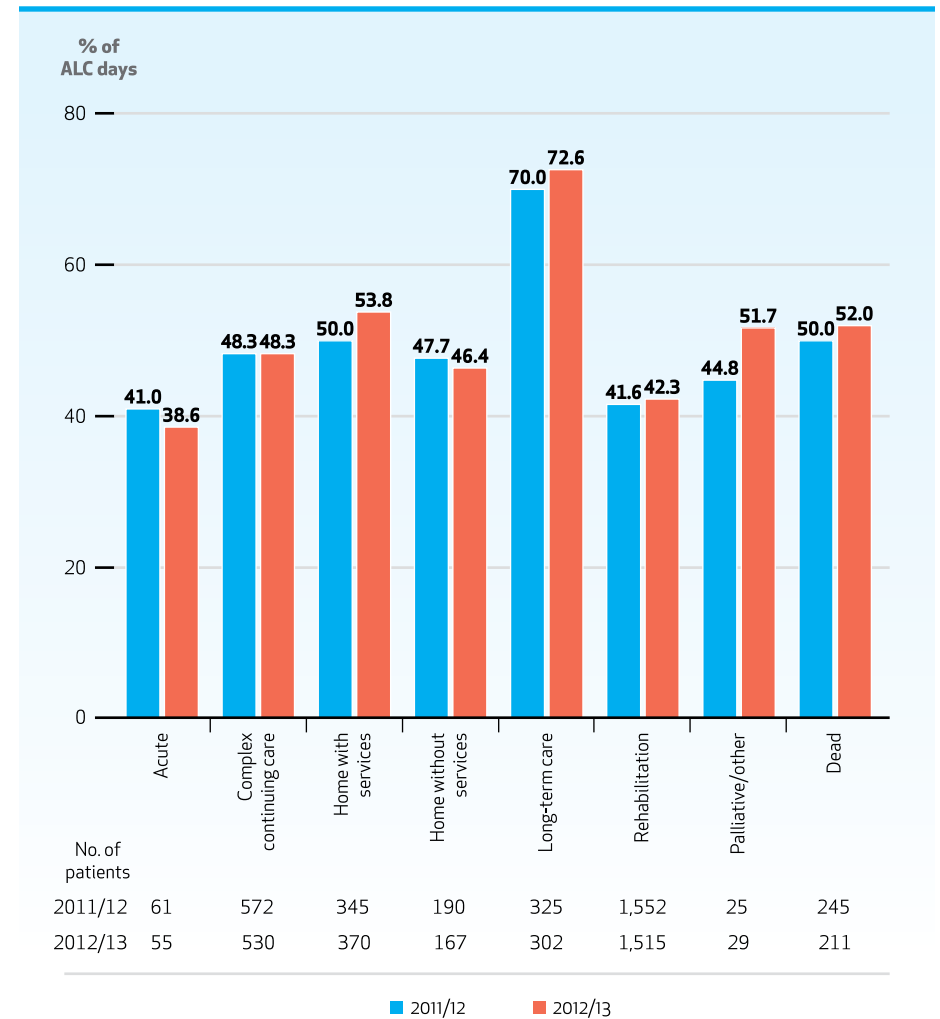
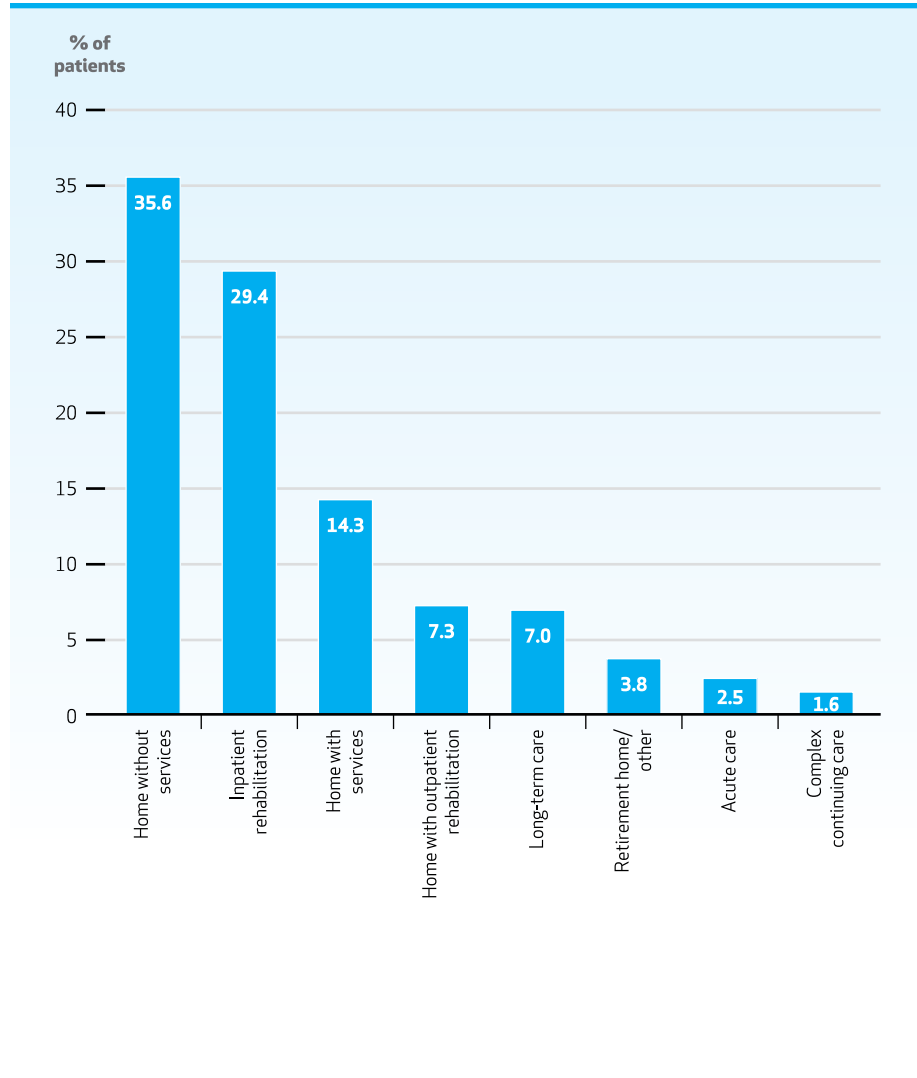


EXHIBIT 6.7C Proportion of Alternate Level of Care (ALC) days to total length of stay for adult patients with stroke or transient ischemic attack and with at least one ALC day, by discharge destination, in Ontario, 2011/12–2012/13



Data source: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2011/12–2012/13.
 Inclusion criteria: All stroke and transient ischemic attack patients aged >18 years admitted to an acute care facility for stroke management and with at least one ALC day.
 Exclusion criteria: Patients with elective admissions or patients provided palliative care as an initial treatment plan.

EXHIBIT 6.8A Discharge destinations of adult patients with stroke or transient ischemic attack following admission to an acute care hospital, in Ontario, 2012/13



Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.
 Inclusion criteria: All patients aged ≥18 years discharged alive following an admission to an acute care facility for suspected stroke (excluding subarachnoid hemorrhage) or transient ischemic attack.
 Note: Percentages add to more than 100 as patients discharged home with services could select both options (outpatient rehabilitation and Community Care Access Centre).

EXHIBIT 6.8B Discharge destinations of adult patients with stroke or transient ischemic attack following admission to an acute care hospital, in Ontario and by sex, stroke type, Ontario Stroke Network designation and Local Health Integration Network, 2012/13

	Patients, n (%)								
	Home without services	Home with services		Inpatient rehabilitation	Long-term care	Retirement home	Acute care	Complex continuing care	Other
		Home with CCAC services	Home with outpatient rehabilitation						
Ontario	3,588 (35.6)	1,447 (14.3)	744 (7.3)	2,964 (29.4)	706 (7.0)	315 (3.1)	253 (2.5)	157 (1.6)	66 (0.7)
Female	1,538 (31.4)	793 (16.2)	273 (5.6)	1,395 (28.5)	488 (10.0)	235 (4.8)	126 (2.6)	97 (2.0)	32 (0.7)
Male	2,050 (39.6)	653 (12.6)	471 (9.1)	1,569 (30.3)	218 (4.2)	80 (1.5)	128 (2.5)	59 (1.1)	33 (0.6)
Stroke Type									
Intracerebral hemorrhage	166 (21.4)	109 (14.0)	39 (5.0)	303 (39.0)	60 (7.7)	13 (1.6)	75 (9.6)	18 (2.4)	**
Ischemic stroke	1,989 (27.7)	1,035 (14.4)	648 (9.0)	2,594 (36.1)	529 (7.4)	189 (2.6)	170 (2.4)	125 (1.7)	55 (0.8)
Transient ischemic attack	1,418 (68.9)	293 (14.2)	50 (2.4)	59 (2.9)	111 (5.4)	112 (5.4)	9 (0.4)	7 (0.3)	6 (0.3)
Uncertain	11 (28.0)	7 (18.7)	**	**	**	**	-	6 (14.6)	**
Ontario Stroke Network Designation									
Regional stroke centre	1,054 (34.6)	399 (13.1)	230 (7.5)	902 (29.6)	209 (6.9)	97 (3.2)	161 (5.3)	35 (1.1)	17 (0.5)
District stroke centre	890 (35.1)	285 (11.2)	222 (8.7)	859 (33.9)	155 (6.1)	67 (2.7)	50 (2.0)	33 (1.3)	20 (0.8)
Non-designated centre	1,491 (36.6)	704 (17.3)	275 (6.7)	1,077 (26.5)	306 (7.5)	143 (3.5)	33 (0.8)	80 (2.0)	25 (0.6)
Non-designated Telestroke site ¹	154 (36.8)	59 (14.3)	17 (4.1)	126 (30.1)	35 (8.4)	8 (2.0)	9 (2.2)	8 (2.0)	**
Local Health Integration Network									
1. Erie St. Clair	167 (33.0)	86 (16.9)	53 (10.3)	127 (25.1)	56 (11.1)	9 (1.9)	6 (1.2)	12 (2.5)	**
2. South West	172 (35.5)	124 (25.6)	53 (10.8)	76 (15.7)	35 (7.2)	22 (4.5)	14 (3.0)	**	**
3. Waterloo Wellington	250 (45.3)	51 (9.4)	72 (13.1)	113 (20.4)	42 (7.6)	33 (5.9)	-	**	8 (1.5)
4. Hamilton Niagara Haldimand Brant	444 (34.4)	168 (13.0)	80 (6.1)	436 (33.8)	69 (5.4)	32 (2.5)	41 (3.2)	43 (3.3)	9 (0.7)
5. Central West	173 (36.9)	94 (20.0)	16 (3.4)	133 (28.4)	42 (9.0)	8 (1.8)	-	**	**
6. Mississauga Halton	351 (50.2)	92 (13.2)	55 (7.8)	142 (20.3)	44 (6.3)	20 (2.8)	**	**	-
7. Toronto Central	423 (30.8)	167 (12.2)	111 (8.1)	456 (33.2)	91 (6.6)	27 (2.0)	79 (5.8)	26 (1.9)	14 (1.0)
8. Central	356 (37.7)	159 (17.0)	61 (6.5)	285 (30.2)	55 (5.9)	22 (2.3)	**	6 (0.7)	**
9. Central East	329 (30.2)	143 (13.2)	68 (6.3)	406 (37.3)	95 (8.8)	24 (2.2)	11 (1.0)	17 (1.5)	**
10. South East	174 (38.7)	75 (16.6)	19 (4.3)	119 (26.6)	34 (7.6)	16 (3.5)	11 (2.5)	6 (1.4)	**
11. Champlain	273 (33.6)	90 (11.1)	36 (4.4)	264 (32.5)	45 (5.6)	56 (7.0)	23 (2.9)	21 (2.6)	**
12. North Simcoe Muskoka	154 (33.6)	47 (10.3)	31 (6.9)	126 (27.5)	38 (8.2)	22 (4.7)	33 (7.2)	**	11 (2.4)
13. North East	228 (35.6)	96 (15.0)	49 (7.7)	179 (28.0)	50 (7.8)	20 (3.2)	22 (3.4)	**	**
14. North West	95 (30.9)	52 (17.0)	39 (12.7)	101 (32.9)	8 (2.7)	**	7 (2.3)	6 (2.0)	-

Data source: Ontario Stroke Registry, Ontario Stroke Audit of Acute Care Facilities, 2012/13.

Inclusion criteria: All patients aged ≥18 years discharged alive following an admission to an acute care facility for suspected stroke (excluding subarachnoid hemorrhage) or transient ischemic attack.

1 Non-designated centres (N = 7 in 2010/11 and 8 in 2012/13). The remaining Telestroke sites (N = 10 in 2010/11 and 11 in 2012/13) were regional or district stroke centres.

** Cell value suppressed for reasons of privacy and confidentiality.

Notes:

(1) Percentages add to more than 100 as patients discharged home with services could select both options (outpatient rehabilitation and Community Care Access Centre).

(2) Cells in which there were no reported or available data are marked with a hyphen (-).

EXHIBIT 6.9A Median number of days to carotid intervention within 6 months of hospitalization for adult patients with stroke or transient ischemic attack, in Ontario, 2003/04–2012/13

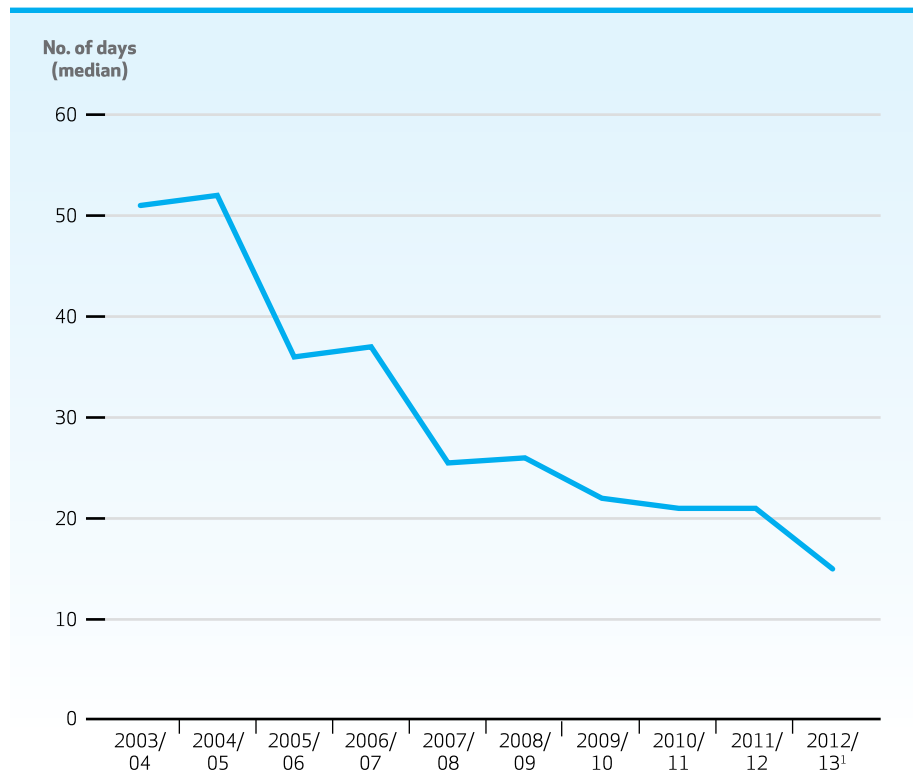
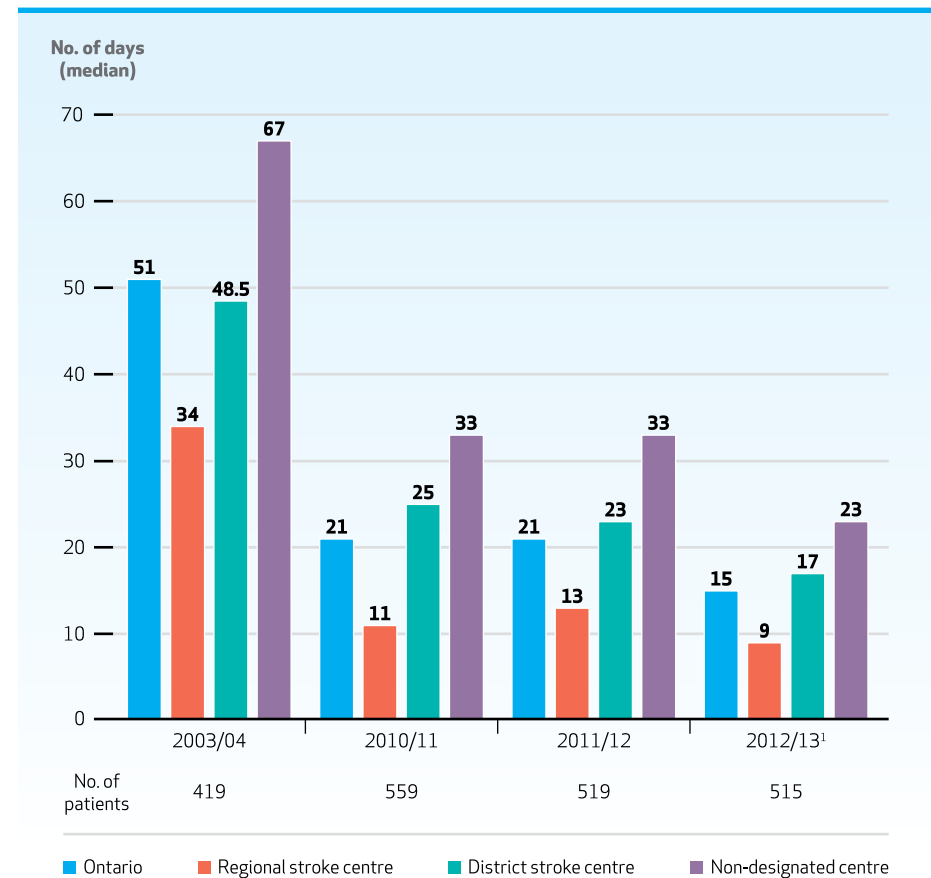


EXHIBIT 6.9B Median number of days to carotid intervention within 6 months of hospitalization for adult patients with stroke or transient ischemic attack, in Ontario and by Ontario Stroke Network designation, 2003/04 and 2010/11–2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2003/04–2012/13 and National Ambulatory Care Reporting System (NACRS), 2003/04–2012/13.

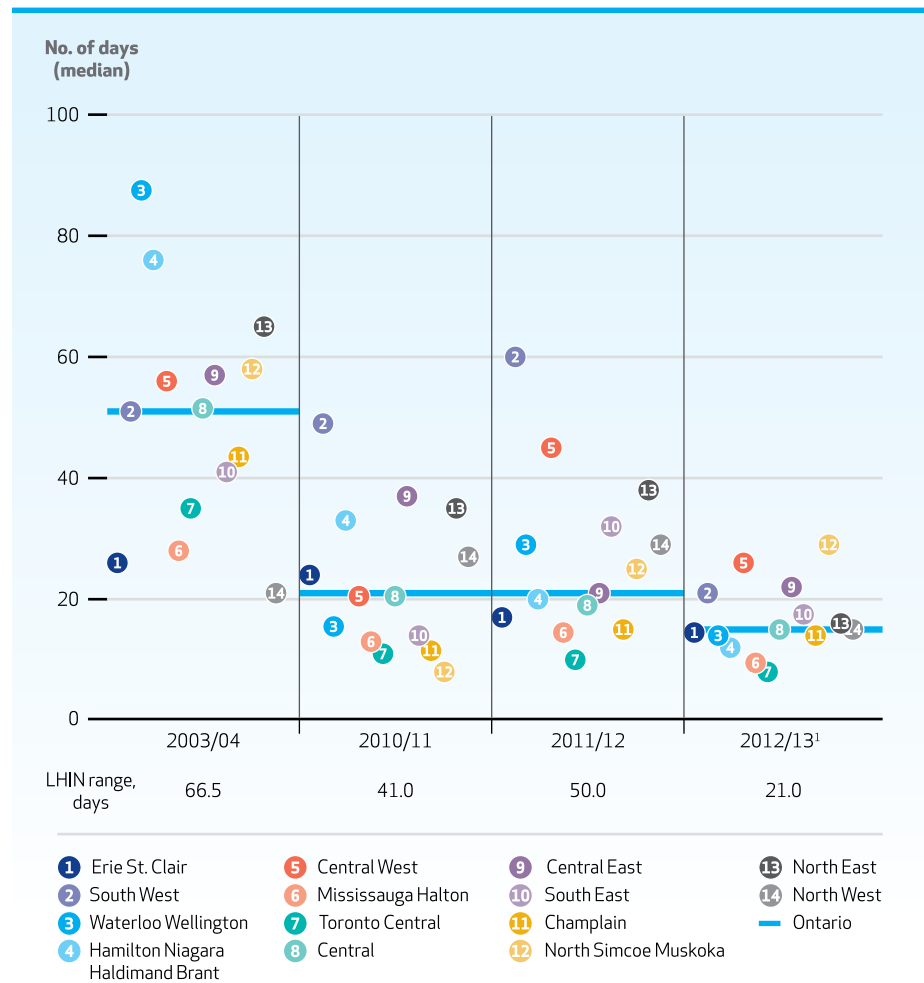
Inclusion criteria: All patients aged ≥18 years who visited or were admitted to an acute care hospital for stroke or transient ischemic attack and who underwent carotid revascularization through carotid endarterectomy or carotid artery stenting within six months of the index stroke or TIA event ED registration or hospital admission date.

Exclusion criteria: Patients with an elective admission or patients provided palliative care as an initial treatment plan.

¹ This year includes only patients with interventions that occurred in 2012/13 (i.e., if the patient was discharged after September 30, 2012 and the intervention occurred in 2013/14, data were not available for a six-month follow-up).

Note: The degree of stenosis in patients requiring carotid revascularization was unavailable in the administrative databases.

EXHIBIT 6.9C Variation in the median number of days to carotid intervention within 6 months of hospitalization for adult patients with stroke or transient ischemic attack, in Ontario and by Local Health Intergration Network, 2003/04 and 2010/11 and 2010/11-2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2003/04–2012/13 and National Ambulatory Care Reporting System (NACRS), 2003/04–2012/13.
 Inclusion criteria: All patients aged ≥18 years who visited or were admitted to an acute care hospital for stroke or transient ischemic attack and who underwent carotid revascularization through carotid endarterectomy or carotid artery stenting within six months of the index stroke or TIA event ED registration or hospital admission date.

Exclusion criteria: Patients with an elective admission or patients provided palliative care as an initial treatment plan.
 1 This year includes only patients with interventions that occurred in 2012/13 (i.e., if the patient was discharged after September 30, 2012 and the intervention occurred in 2013/14, data were not available for a six-month follow-up).
 Note: The degree of stenosis in patients requiring carotid revascularization was unavailable in the administrative databases.

CONCLUSIONS

Inpatient admissions for stroke and TIA decreased from 1.7 to 1.3 per 1,000 adult population in the nine years between 2003/04 and 2012/13. Using the 2010/11 rate of 1.34 per 1,000 as the baseline, a small decline was observed between 2011/12 and 2012/13. The OSN target is 1.14 per 1,000 population (see Appendix I).

The proportion of patients admitted for stroke or TIA who were 85 years and older and between 46 and 65 years continued to increase, the former raising concerns about discharge destinations from acute care, and the latter about appropriate secondary prevention medications and lifestyle modifications. Lack of universal drug benefits for patients aged 46 to 65 years may be a challenge.

Among admitted patients, the proportion considered to have an 'unable to determine' stroke type decreased dramatically in the nine years between 2003/04 and 2012/13. This is likely due to a combination of increased rates of imaging and improved coding of stroke data elements in the Discharge Abstract Database and the National Ambulatory Care Reporting System—Emergency Department, which became mandatory in 2012/13.

Patients with TIA comprised 18.6% of admitted patients in 2012/13, despite the increasing proportion being referred to secondary stroke prevention services. This may represent better awareness of the signs of TIA and stroke, although only a small percentage of TIA patients require an inpatient admission. Annually, inpatients with TIA represent over 2,900 potentially avoidable hospital stays.

More patients are being cared for at specialized stroke centres. In 2012/13, 55.9% of stroke patients were cared for in specialized centres compared to 44.1% in 2003/04. This is likely a key factor behind the improvements observed for many of the acute stroke quality indicators, a pattern also observed in other jurisdictions.^{11,34}

Rates for dysphagia screening have improved over time. This may reflect the efforts of the OSN in implementing best practices for screening and of more facilities applying for and achieving Accreditation Canada's stroke distinction status.²¹ Although Ontario's screening rate of 67.2% in 2012/13 was an improvement from 53.3% in 2004/05, it is much lower than rates in the United States (77% among hospitals participating in the Get With The Guidelines—Stroke program^m); England, Ireland and Wales (86%); and Scotland (more than 80%).^{11,13,33} However, dysphagia screening performance among Ontario's designated facilities is similar to the GWTG—Stroke facilities at 76.1% and 76.8%, respectively.¹³

There was minimal change in the proportion of total length of stay considered Alternate Level of Care (ALC) in 2012/13, although the degree of variation decreased across the LHINs. However, the proportion of inpatients with stroke or TIA who had ALC days decreased from 1 in 4 to 1 in 5. Among stroke types, patients with intracerebral hemorrhage and ischemic stroke had the highest proportion of their total length of stay deemed ALC at 30.3% and 29.3% respectively.

The proportion of stroke patients discharged to inpatient rehabilitation, outpatient rehabilitation and home with services continued to increase; the proportion discharged to complex continuing care and long-term care homes declined.

m Hospitals participating in the program are self-selected and tend to be larger teaching institutions with an interest in stroke quality improvement.

RECOMMENDATIONS

1. The OSN and the Regional Stroke Networks should continue efforts to consolidate stroke patients into designated facilities in each region, where the expertise for stroke care exists and patients are more likely to be discharged to inpatient rehabilitation to achieve optimal functional outcomes.
2. The OSN will continue to work with the Ministry of Health and Long-Term Care and Health Quality Ontario to ensure that quality-based procedures funding does not create incentives to admit patients with TIA and discourage innovation in ambulatory TIA rapid assessment clinics.
3. The OSN continues to recommend that outpatient resources be available for the management of patients with TIA or mild stroke to alleviate the demand for acute care beds, and that secondary prevention clinics review their practice patterns in an effort to reduce inpatient admissions for TIA through the work of phase 2 of the stroke QBPs.
4. The results and recommendations of the OSN-funded research project on optimal TIA management should be used to assess the need to admit patients with TIA to hospital and the impact of secondary stroke prevention clinics.
5. The OSN should continue to monitor Alternate Level of Care days by stroke type, as stroke QBPs are implemented.

7 Rehabilitation – Stroke Quality-Based Procedures

Key Findings

EXHIBIT 7.1

- In 2012/13, a third of stroke patients discharged from acute care were admitted to inpatient rehabilitation. A majority of designated centres (21) admitted a higher proportion of patients to inpatient rehabilitation than the provincial average of 33.9%.
- The proportion of stroke patients admitted into inpatient rehabilitation varied from 24.5% in the Central LHIN to 40.1% in the Central East LHIN.

EXHIBITS 7.2A, 7.2B, 7.2C

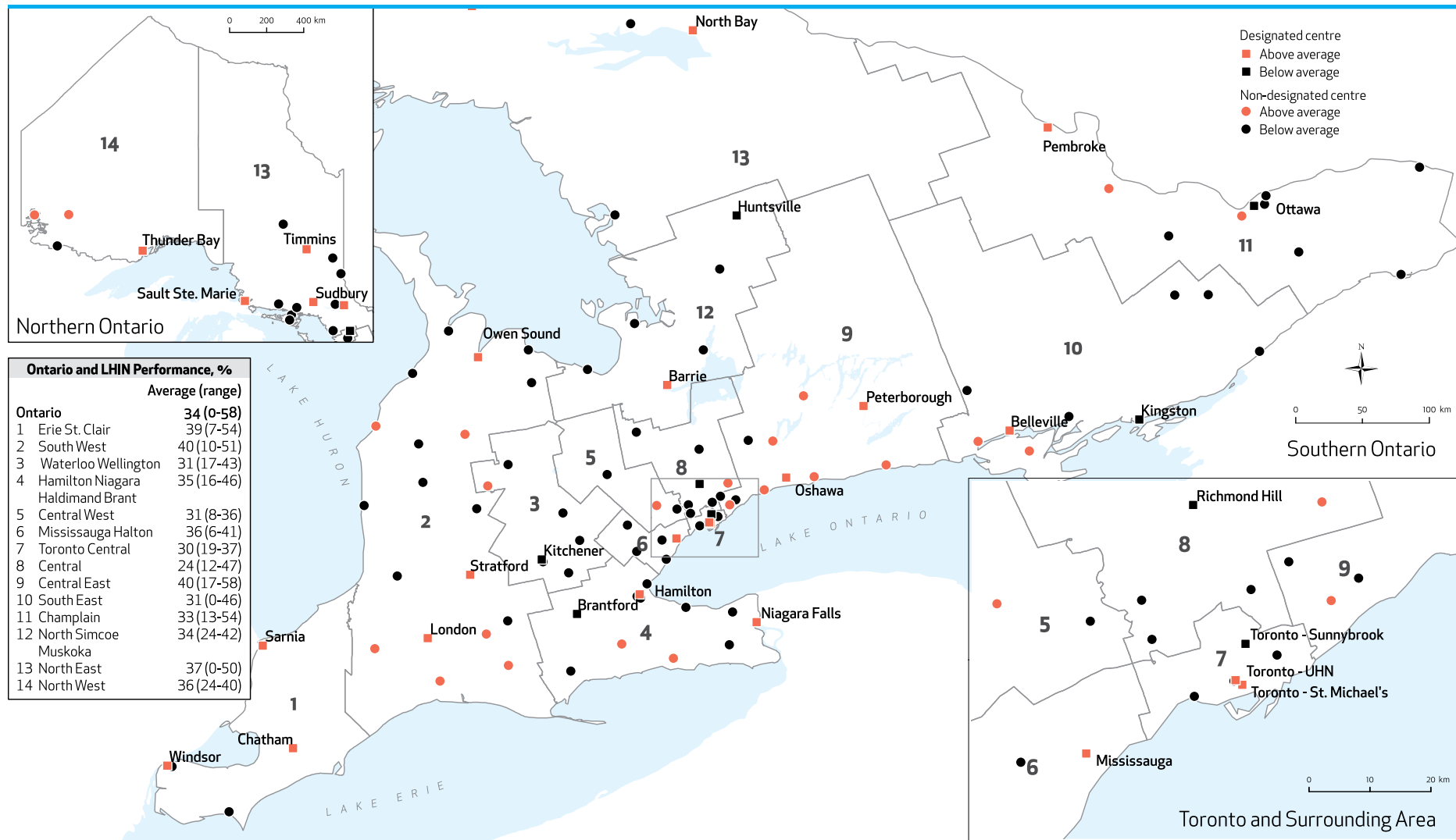
- The proportion of stroke patients admitted to inpatient rehabilitation with mild disability varied from 9.8% in the South East LHIN to 23.3% in the South West LHIN.
- Approximately half of the patients in Ontario's inpatient rehabilitation facilities were considered to have moderate disability. The southwestern part of the province tended to have fewer patients in this category.

- Most inpatient rehabilitation facilities in the Champlain LHIN and in the Toronto Central LHIN and surrounding area had admission rates for patients with severe disability that were lower than the provincial rate of 34.5%, while all facilities in the South East LHIN had admission rates that were higher than the provincial rate.

EXHIBITS 7.3A, 7.3B

- The proportion of patients achieving the target length of stay in inpatient rehabilitation for their Rehabilitation Patient Group (RPG) increased from 32.4% in 2003/04 to 45.0% in 2012/13 ($p < 0.0001$).
- Three of the 14 freestanding inpatient rehabilitation facilities were above the provincial RPG target length of stay (45.0%), as were 27 of the 41 non-freestanding facilities.

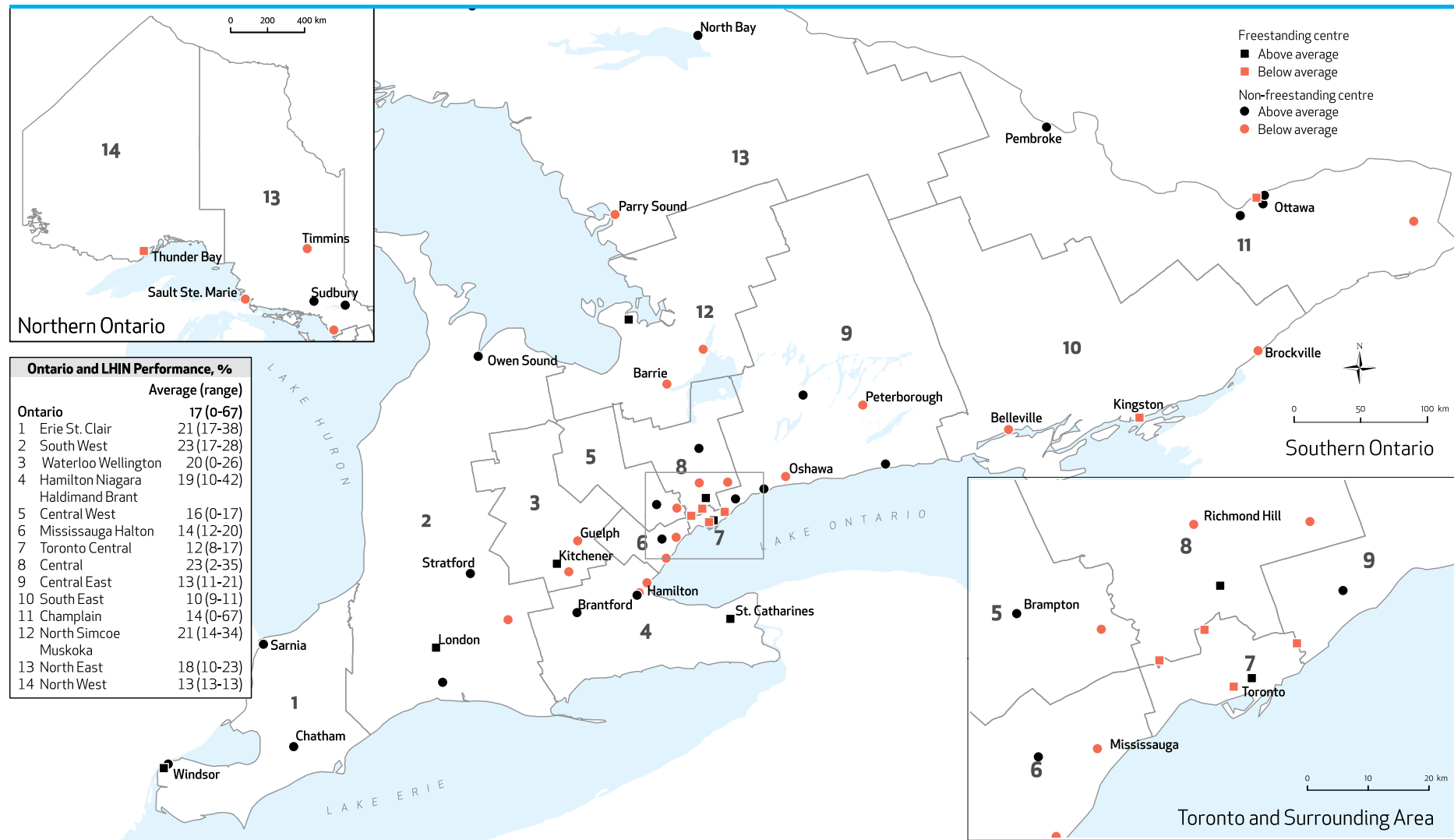
EXHIBIT 7.1 Proportion of adult patients with stroke discharged alive from acute care and admitted to inpatient rehabilitation, in Ontario and by Local Health Integration Network and facility performance, 2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and National Rehabilitation Reporting System (NRS), 2012/13.

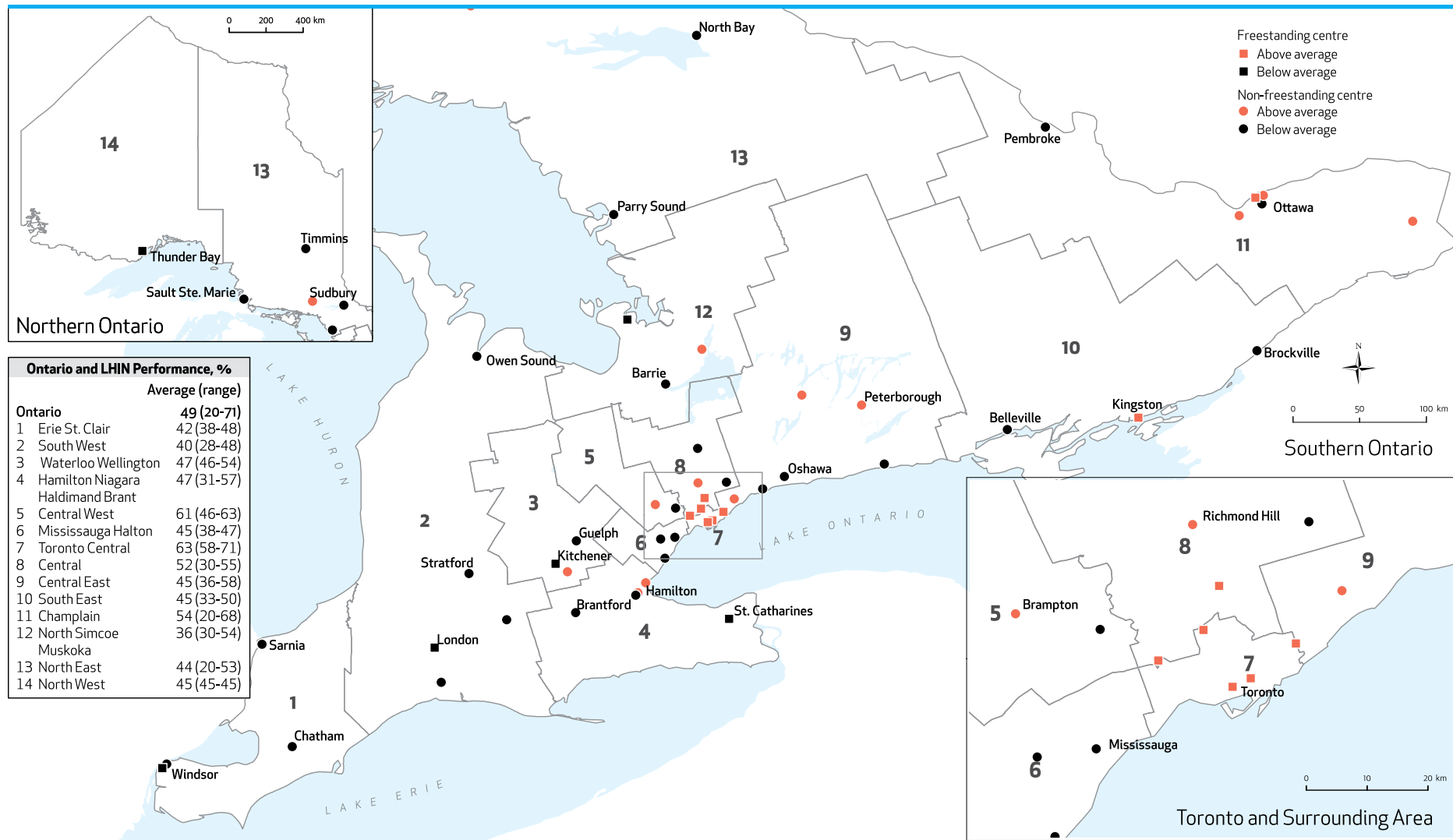
Inclusion criteria: All patients aged ≥18 years with a diagnosis of stroke excluding subarachnoid hemorrhage and transient ischemic attack (using ICD-10-CA codes) discharged from an acute care hospital, admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database; patients had rehabilitation assessments completed in the same 12-month period as the acute care facility discharge.

EXHIBIT 7.2A Proportion of adult patients admitted to inpatient rehabilitation with mild stroke,¹ in Ontario and by Local Health Integration Network and facility performance, 2012/13



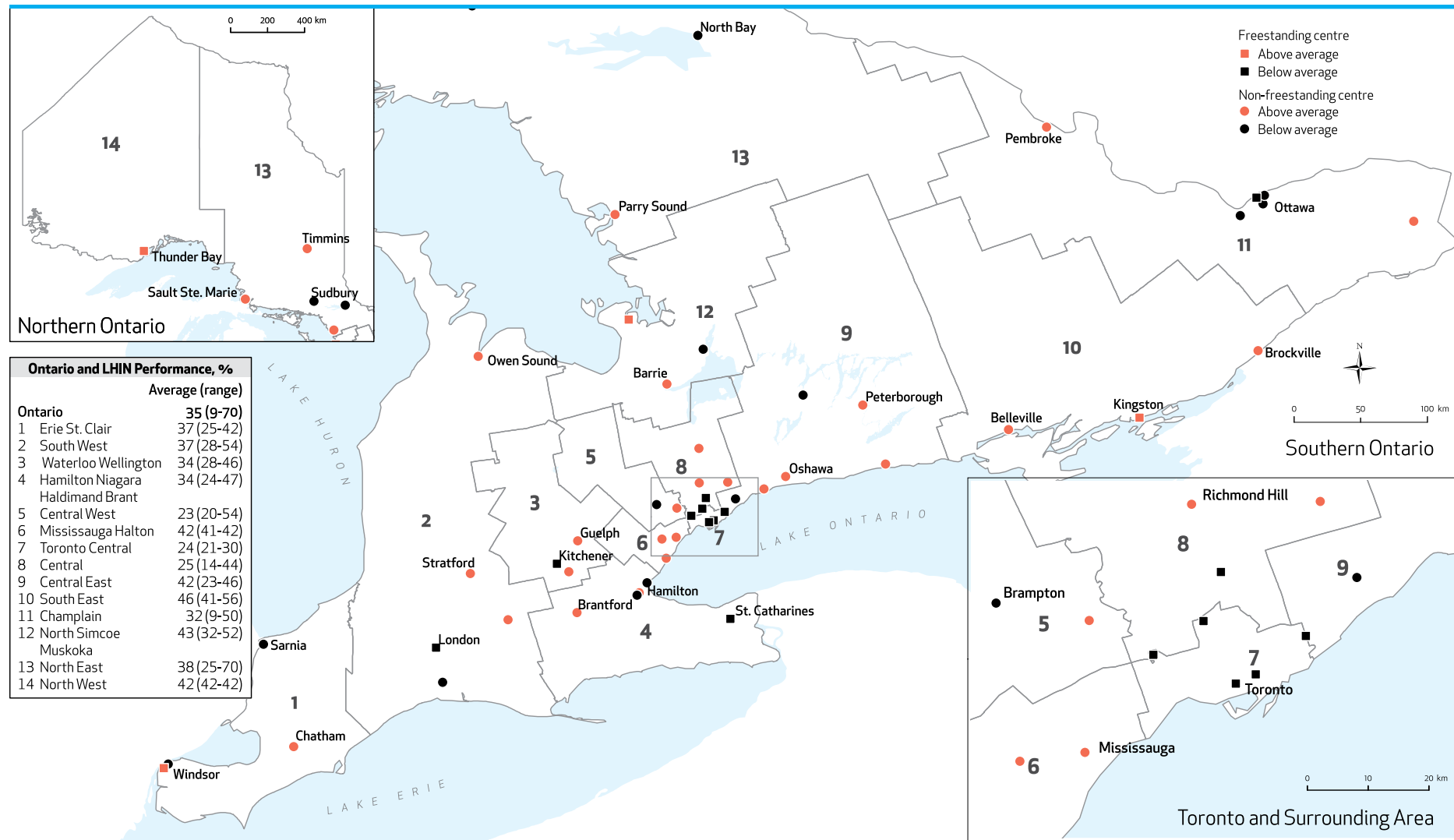
Data source: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2012/13.
 Inclusion criteria: All patients aged ≥18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.
 Exclusion criteria: Patients discharged from one facility and admitted to another within 24 hours.
 1. Includes Rehabilitation Patient Groups 1160 and 1150 (mild disability).

EXHIBIT 7.2B Proportion of adult patients admitted to inpatient rehabilitation with moderate stroke,¹ in Ontario and by Local Health Integration Network and facility performance, 2012/13



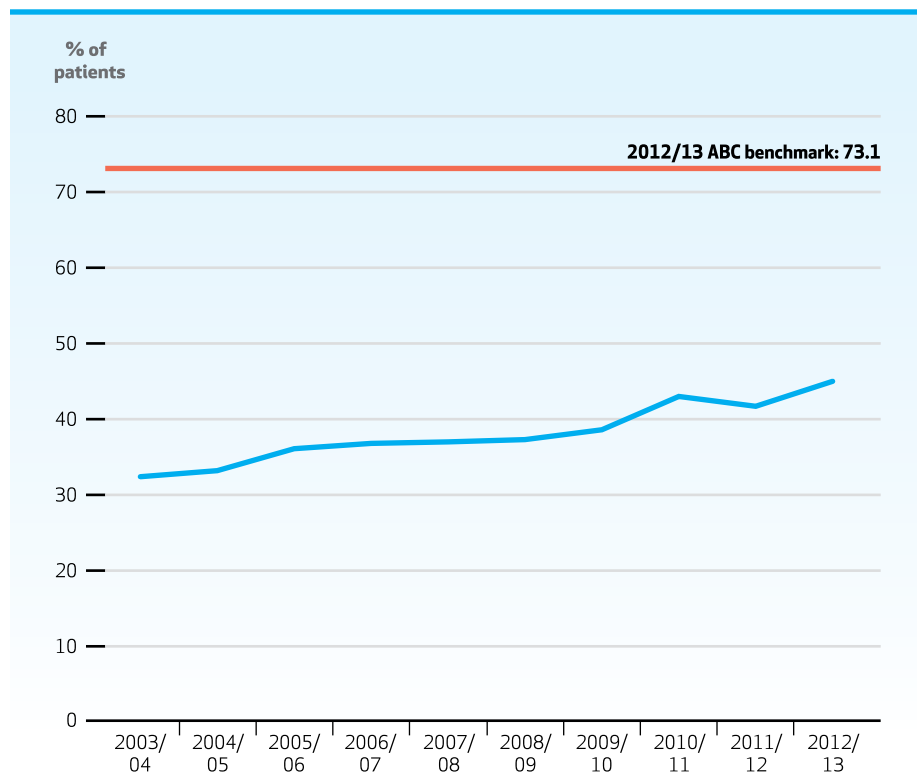
Data source: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2012/13.
 Inclusion criteria: All patients aged ≥18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.
 Exclusion criteria: Patients discharged from one facility and admitted to another within 24 hours.
 1. Includes Rehabilitation Patient Groups 1140, 1130 and 1120 (moderate disability).

EXHIBIT 7.2C Proportion of adult patients admitted to inpatient rehabilitation with severe stroke,¹ in Ontario and by Local Health Integration Network and facility performance, 2012/13



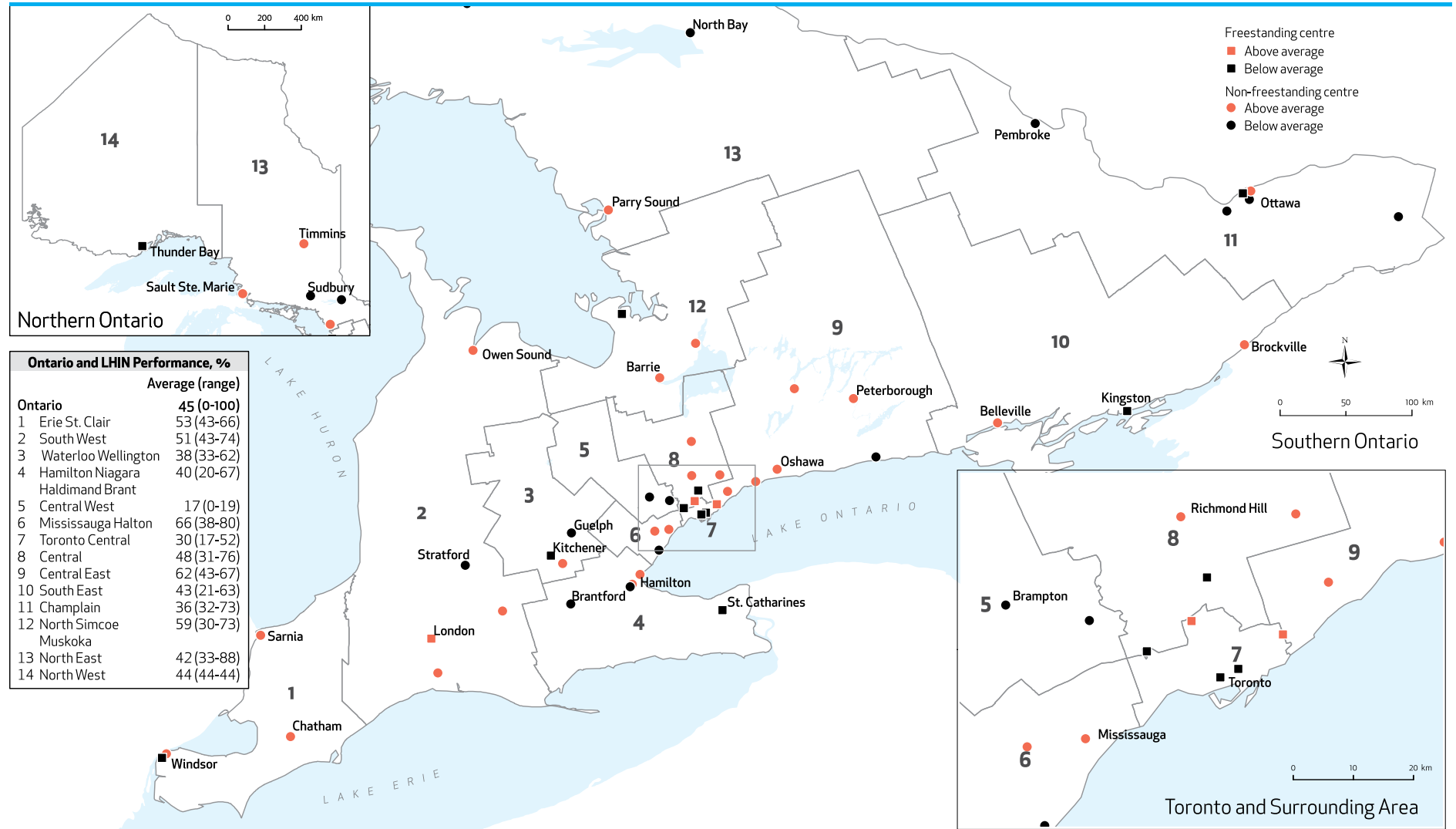
Data source: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2012/13.
 Inclusion criteria: All patients aged >18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.
 Exclusion criteria: Patients discharged from one facility and admitted to another within 24 hours.
 1. Includes Rehabilitation Patient Groups 1110 and 1100 (severe disability).

EXHIBIT 7.3A Proportion of adult patients with stroke achieving the active length of stay¹ target in inpatient rehabilitation for their Rehabilitation Patient Group classification, in Ontario, 2003/04–2012/13



Data source: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2003/04–2012/13.
 Inclusion criteria: All patients aged ≥18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.
 Exclusion criteria: Patients discharged from one facility and admitted to another within 24 hours.
¹ Active length of stay (LOS) refers to total time spent in inpatient rehabilitation excluding days waiting for discharge from inpatient rehabilitation and service disruptions (e.g., short readmissions into acute care) and is calculated using the admission and ready for discharge dates in the NRS database (active LOS = date ready for discharge – admission date).

EXHIBIT 7.3B Proportion of adult patients with stroke achieving the active length of stay¹ target in inpatient rehabilitation for their Rehabilitation Patient Group, in Ontario and by Local Health Integration Network and facility performance, 2012/13



Data source: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2012/13.
 Inclusion criteria: All patients aged ≥18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.
 Exclusion criteria: Patients discharged from one facility and admitted to another within 24 hours.
¹ Active length of stay (LOS) refers to total time spent in inpatient rehabilitation excluding days waiting for discharge from inpatient rehabilitation and service disruptions (e.g., short readmissions into acute care) and is calculated using the admission and ready for discharge dates in the NRS database (active LOS = date ready for discharge – admission date).

CONCLUSIONS

Of patients admitted to inpatient rehabilitation in 2012/13, 48.6% had moderate strokes and 34.5% had severe strokes. The OSN is working to increase access to inpatient rehabilitation for patients with severe stroke. The OSN is also promoting improvements in efficiency through the establishment of RPG length of stay targets, as recommended in the stroke QBP clinical handbook.⁷

Further analysis of the RPG length of stay is required, as regions that performed well in achieving the target length of stay may have done so by admitting a greater proportion of patients with mild stroke. This highlights the importance of having more than one indicator to drive system change toward best practice stroke care.

Although some of the LHINs performed above the provincial average on access to inpatient rehabilitation from acute care (e.g., the South West and Erie St Clair LHINs), this was likely achieved by admitting a higher proportion of patients considered to have mild disability (22.1%) and a lower proportion considered to be moderately disabled (40.9%), relative to the provincial averages (respectively, 17.0% and 48.6%).

RECOMMENDATIONS

1. The OSN should work with the Ministry of Health and Long-Term Care on its stroke capacity planning initiative to ensure that all LHINs have access to adequate rehabilitation infrastructure and resources as a means to reduce the wide LHIN variation in access to inpatient rehabilitation.
2. The Ministry of Health and Long-Term Care through the QBPs should consider financial incentives for regions to implement early supported discharge and access to outpatient rehabilitation to achieve improved efficiency and length of stay targets for inpatient stroke rehabilitation.
3. The OSN should continue to collaborate with the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information to capture rehabilitation intensity in all rehabilitation sectors in order to evaluate uptake of stroke rehabilitation best practices and rehabilitation facility length of stay.

8 Rehabilitation and Complex Continuing Care

Key Findings

EXHIBIT 8.1A

- In 2012/13, 3,628 stroke patients were admitted to inpatient rehabilitation following an acute stroke hospitalization, an increase year over year from 2010/11.
- The proportion of women admitted to inpatient rehabilitation was consistently lower than the proportion of men. In 2012/13, 46.7% of those admitted to inpatient rehabilitation were women.
- In 2012/13, women were five years older than men at the time of admission to rehabilitation (median, 76 and 71 years).
- Among patients admitted to inpatient rehabilitation between 2011/12 and 2012/13, there was an increase in the proportion of severely disabled patients (from 34.3% to 36.3%), and a decrease in the proportion of mildly disabled patients (from 18.6% to 15.9%).

EXHIBIT 8.1B

- Among those admitted to inpatient rehabilitation, there were more men than women in the 46–65 age group (64.4% vs. 35.6%) and in the 66–75 age group (57.0% vs. 43.0%). Women predominated over men in the 76–85 age group (51.3% vs. 48.7%) and in the over-85 age group (62.2% vs. 37.8%).

EXHIBIT 8.1C

- The median time from stroke onset to admission remained at 10 days from 2010/11 to 2012/13, with no difference between men and women.

EXHIBIT 8.1D

- Total admission FIM scores dramatically decreased over time from a median of 78 in 2010/11 to 74 in 2012/13, and women were admitted to inpatient rehabilitation with lower scores than men (73 vs. 75). The overall change in the median total FIM score from admission to discharge was 22 points, and the median FIM efficiency score increased to 0.8 in 2012/13 from 0.7 in the previous two years ($p < 0.0001$) with no difference between men and women.
- Between 2003/04 and 2012/13, a 5-point increase in the total admission FIM score was observed among freestanding facilities (from a median of 74 to 79) (data not shown).
- For the years 2010/11 to 2012/13, the median admission and discharge FIM scores were higher for freestanding than non-freestanding facilities (79 vs. 73 and 109 vs. 104, respectively, in 2012/13) with lower mean FIM efficiency scores (0.8 vs. 1.0) (data not shown).

EXHIBIT 8.1E

- The median active length of stay in inpatient rehabilitation decreased from 33 days in 2003/04 to 28 days in 2012/13. The proportion of total length of stay considered Alternate Level of Care declined from 6.6% in 2010/11 to 5.8% in 2012/13.
- While the discharge FIM score remained similar over the years (ranging from 106 to 107), the mean active length of stay decreased from 38 days in 2003/04 to 31 days in 2012/13.

EXHIBIT 8.1F

- The proportion of patients discharged to long-term care decreased from 13.5% in 2003/04 to 8.0% in 2012/13 ($p < 0.0001$).
- The proportion of patients discharged home without services following inpatient rehabilitation increased from 29.3% in 2003/04 to 33.3% in 2012/13 ($p < 0.0001$).

EXHIBIT 8.2A

- Provincially, the median time from stroke onset to inpatient rehabilitation remained unchanged between 2010/11 and 2012/13, and this held true for non-freestanding facilities. Freestanding facilities had a one-day decrease in time to admission from 2011/12 to 2012/13.
- In 2012/13, the median time to admission was shorter for non-freestanding facilities than for freestanding ones (9 vs. 13 days).

EXHIBIT 8.2B

- Patients in the Central East LHIN had the shortest median time to inpatient rehabilitation (7 days), and patients in the Central West LHIN had the longest (17 days).

EXHIBIT 8.2C

- The proportion of patients admitted to inpatient rehabilitation within 7 days of their acute care admission increased from 20.2% in 2003/04 to 28.3% in 2012/13.
- There was wide variation among the LHINs in the proportion of patients admitted to inpatient rehabilitation within 7 days, with the Waterloo Wellington LHIN having the lowest proportion (15.9%) and the Central East LHIN the highest (49.6%).

EXHIBIT 8.3A

- In 2012/13, 32.6% of stroke patients received inpatient rehabilitation.
- In 2012/13, there was wide variation among the LHINs in the proportion of patients admitted to inpatient rehabilitation, ranging from 24.2% in the Central LHIN to 39.1% in the Erie St. Clair LHIN.

EXHIBITS 8.3B, 8.3C, 8.3D

- The proportion of stroke patients with mild disability decreased from 21.9% in 2003/04 to 17.0% in 2012/13 ($p < 0.001$).
- The proportion of stroke patients with moderate disability who were admitted to inpatient rehabilitation increased from 40.5% in 2003/04 to 48.6% in 2012/13 ($p < 0.0001$).
- The proportion of stroke patients with severe disability increased from 32.2% in 2010/11 to 34.5% in 2012/13; this was below the 2003/04 proportion of 37.6%.

- Among LHINs, the proportion of mildly disabled stroke patients with access to inpatient rehabilitation varied from 9.8% in the South East LHIN to 23.3% in the South West LHIN. The proportion of moderately disabled stroke patients accessing inpatient rehabilitation varied from 36.2% in the North Simcoe Muskoka LHIN to 63.4% in the Toronto Central LHIN. For severely disabled stroke patients, inpatient rehabilitation admission rates ranged from approximately 23.4% in the Central West LHIN to 45.5% in the South East LHIN.
- Between 2003/04 and 2012/13, there was a reduction in the variation among the LHINs for the proportion of stroke patients with mild disability. There was increased LHIN variation in the proportion of stroke patients with moderate and severe disability.

EXHIBIT 8.4A

- The mean active length of stay in inpatient rehabilitation decreased for all Rehabilitation Patient Groups (RPGs) between 2003/04 and 2012/13, with severe stroke patients exhibiting the greatest reduction (from 66.8 to 50.5 days for RPG 1100 and from 49.2 to 40.0 days for RPG 1110).

EXHIBIT 8.4B

- Among stroke patients with mild disability, there was wide variation in the mean rehabilitation length of stay. Greater variation was seen among patients in Rehabilitation Patient Group (RPG) 1150 than among those in RPG 1160.
- For the RPGs representing mild disability, best-practice targets for length of stay in rehabilitation had been set. As recommended, patients in RPG 1160 were not expected to be receiving inpatient rehabilitation.
- The best practice expected length of stay for RPG 1150 was 7.7 days, and no LHIN met this target in 2012/13.

EXHIBIT 8.4C

- Among moderately disabled stroke patients, the widest variation was observed in RPG 1130, ranging from a mean length of stay of 8.3 days in the North Simcoe Muskoka LHIN to 42.6 days in the Central West LHIN.
- For moderately disabled stroke patients, the best-practice-expected length of stay was 14.4, 25.2 and 35.8 days for RPGs 1140, 1130 and 1120, respectively. The best-practice expected length of stay among patients in RPG 1140 was achieved in 2 LHINs, for patients in RPG 1130 in 5 LHINs and for patients in RPG 1120 in 12 LHINs.

EXHIBIT 8.4D

- Among severely disabled stroke patients (RPG 1110), the mean length of stay in inpatient rehabilitation ranged from 30.2 days in the Mississauga Halton LHIN to 73.6 days in the Central West LHIN.
- For severely disabled stroke patients, the best-practice-expected length of stay was achieved by 8 LHINs for those in RPG 1110 and by 6 LHINs for those in RPG 1100.

EXHIBIT 8.5

- In 2011/12, 1,203 patients were admitted to complex continuing care following an acute care hospitalization for stroke or transient ischemic attack (TIA). Of these, 52.9% were women. The median age was 79 years, six years older than patients admitted to inpatient rehabilitation.
- In 2011/12, patients had a median wait of 28 days from the time of their admission to complex continuing care from acute care, a reduction from 36 days in 2008/09. The median length of stay in acute care for these patients was 15 days, 9 days longer than for the general stroke population.
- The median length of stay in complex continuing care was 57 days in 2011/12, a decrease from 63 days in 2008/09.

- In 2011/12, 22.4% of patients were discharged to long-term care, a decrease from 28.1% in 2008/09 ($p < 0.0001$); 14.0% of patients were discharged back to inpatient acute care, an increase from 12.2% in 2008/09 ($p = 0.38$).
- There was substantial variability in discharge destinations across Local Health Integration Networks (LHINs). The proportion discharged home with services varied from 11.7% in the South East LHIN to 36.6% in the Central East LHIN. The proportion of patients discharged to long-term care ranged from 10.3% in the Mississauga Halton LHIN to 41.0% in the South West LHIN.
- The proportion of patients discharged back to the community increased from 28.4% in 2008/09 to 32.9% in 2011/12 ($p < 0.0001$).

EXHIBITS 8.6A, 8.6B

- In 2011/12, 41.3% of patients received speech therapy, 81.0% received occupational therapy, 87.5% received physiotherapy and 32.5% received recreational therapy either individually or in a small-group setting.
- The intensity of recreational therapy remained stable between 2008/09 and 2011/12 with patients receiving less than one hour of therapy per day.

EXHIBIT 8.1A Characteristics and outcomes of adult stroke patients in inpatient rehabilitation, in Ontario and by sex, 2003/04 and 2010/11–2012/13

Characteristics/Outcomes	2003/04			2010/11			2011/12			2012/13		
	All	Female	Male	All	Female	Male	All	Female	Male	All	Female	Male
Ontario	2,929 (27.7)	1,386	1,543	3,359 (30.9)	1,607	1,752	3,423 (31.7)	1,617	1,806	3,628 (32.6)	1,693	1,935
Age, mean (median)	71.2 (74)	73.1 (76)	69.6 (72)	71.8 (74)	73.6 (76)	70.2 (71)	71.6 (73)	74.3 (77)	69.1 (70)	71.4 (73)	73.5 (76)	69.6 (71)
Age Group, n (%)												
18–45	111 (3.8)	54 (48.6)	57 (51.4)	128 (3.8)	66 (51.6)	62 (48.4)	107 (3.1)	43 (40.2)	64 (59.8)	140 (3.9)	76 (54.3)	64 (45.7)
46–65	710 (24.2)	263 (37.0)	447 (63.0)	867 (25.8)	329 (37.9)	538 (62.1)	971 (28.4)	352 (36.3)	619 (63.7)	1,022 (28.2)	364 (35.6)	658 (64.4)
66–75	823 (28.1)	355 (43.1)	468 (56.9)	828 (24.7)	362 (43.7)	466 (56.3)	815 (23.8)	333 (40.9)	482 (59.1)	867 (23.9)	373 (43.0)	494 (57.0)
76–85	1,000 (34.1)	532 (53.2)	468 (46.8)	1,097 (32.7)	572 (52.1)	525 (47.9)	1,060 (31.0)	573 (54.1)	487 (45.9)	1,054 (29.1)	541 (51.3)	513 (48.7)
>85	285 (9.7)	182 (93.9)	103 (36.1)	439 (13.1)	278 (63.3)	161 (36.7)	470 (13.7)	316 (67.2)	154 (32.8)	545 (15.0)	339 (62.2)	206 (37.8)
Days from Onset to Admission												
Mean ± SD	20.7 ± 47.2	22.1 ± 62.4	19.4 ± 27.0	15.3 ± 20.6	14.9 ± 17.7	15.6 ± 22.9	16.5 ± 30.5	16.2 ± 34.1	16.9 ± 26.8	17.8 ± 90.8	18.1 ± 93.3	17.6 ± 88.6
Median (IQR)	13 (7–22)	13 (7–22)	13 (7–23)	10 (7–17)	11 (7–17)	10 (6–17)	10 (7–17)	10 (7–17)	10 (7–18)	10 (6–16)	10 (6–16)	10 (6–16)
Disability, n (%)												
Mild ¹	663 (23.2)	308 (22.8)	355 (23.5)	674 (20.4)	312 (19.7)	362 (21.0)	627 (18.6)	277 (17.4)	350 (19.7)	570 (15.9)	247 (14.8)	323 (16.9)
Moderate ²	1,165 (40.7)	540 (39.9)	625 (41.4)	1,581 (47.8)	749 (47.3)	832 (48.2)	1,585 (47.0)	754 (47.3)	831 (46.8)	1,714 (47.8)	780 (46.7)	934 (48.8)
Severe ³	1,034 (36.1)	504 (37.3)	530 (35.1)	1,055 (31.9)	524 (33.1)	531 (30.8)	1,157 (34.3)	563 (35.3)	594 (33.5)	1,301 (36.3)	644 (38.5)	657 (34.3)
Admission FIM⁴ Score, mean (median)												
Total motor FIM score	49.2 (50)	47.9 (48)	50.5 (51)	50.8 (51)	49.6 (50)	51.9 (52)	49.4 (50)	47.9 (49)	50.8 (52)	48.4 (48)	46.9 (47)	49.7 (50)
Total cognitive FIM score	25.4 (27)	25.8 (28)	25.1 (27)	25.3 (26)	25.4 (26)	25.3 (26)	24.9 (26)	24.9 (26)	24.9 (26)	24.8 (26)	24.9 (26)	24.8 (26)
Total FIM score	74.6 (76)	73.7 (75)	75.5 (77)	76.1 (78)	75.0 (77)	77.2 (80)	74.4 (76)	72.9 (75)	75.7 (78)	73.3 (74)	71.8 (73)	74.5 (75)
Discharge FIM Score, mean (median)												
Total motor FIM score	69.6 (77)	68.6 (76)	70.5 (78)	71.8 (78)	70.4 (77)	73.0 (79)	70.6 (77)	68.8 (75)	72.1 (79)	70.4 (78)	68.3 (76)	72.3 (79)
Total cognitive FIM score	28.3 (30)	28.5 (30)	28.1 (30)	28.3 (30)	28.2 (30)	28.4 (30)	28.0 (29)	27.8 (29)	28.1 (30)	28.1 (30)	28.0 (30)	28.2 (30)
Total FIM score	97.9 (106)	97.0 (106)	98.6 (107)	100.1 (107)	98.7 (106)	101.4 (108)	98.5 (106)	96.6 (104)	100.2 (108)	98.5 (107)	96.3 (104)	100.5 (109)
Change in FIM Score from Admission to Discharge, mean (median)												
Total motor FIM score	19.5 (18)	19.8 (19)	19.2 (18)	19.9 (19)	19.9 (19)	20.0 (18)	20.2 (19)	20.0 (19)	20.4 (19)	20.3 (20)	19.8 (20)	20.8 (20)
Total cognitive FIM score	2.6 (1)	2.4 (1)	2.7 (2)	2.7 (2)	2.6 (2)	2.7 (2)	2.8 (2)	2.6 (2)	3.0 (2)	2.9 (2)	2.9 (2)	3.0 (2)
Total FIM score	22.0 (21)	22.2 (21)	21.9 (20)	22.6 (21)	22.5 (21)	22.7 (21)	23.0 (22)	22.5 (21)	23.4 (22)	23.3 (22)	22.7 (22)	23.8 (23)
Improvement in functional status ⁵ , %	27.1	27.8	26.3	26.8	27.9	25.8	27.6	28.6	26.7	29.4	28.9	29.8
FIM efficiency ⁵ in inpatient rehabilitation, mean (median)	0.8 (0.6)	0.8 (0.6)	0.8 (0.6)	0.9 (0.7)	0.9 (0.7)	0.9 (0.7)	0.9 (0.7)	0.9 (0.7)	0.9 (0.7)	0.9 (0.8)	0.9 (0.8)	1.0 (0.8)
Length of Stay												
Total length of stay ⁶ in days in inpatient rehabilitation, mean (median)	37.9 (31)	37.0 (30)	38.8 (32)	33.2 (28)	33.2 (28)	33.1 (28)	35.1 (29)	35.1 (29)	35.0 (28)	32.2 (28)	33.4 (29)	31.2 (27)
Active length of stay ⁷ in days in inpatient rehabilitation, mean (median)	38.1 (33)	36.9 (31)	39.1 (33)	31.6 (28)	31.5 (28)	31.8 (28)	33.6 (29)	33.7 (29)	33.6 (29)	31.0 (28)	31.8 (29)	30.3 (27)
Proportion of ALC ⁸ days to total length of stay in inpatient rehabilitation, %	-	-	-	6.6	7.3	6.1	7.0	7.0	6.9	5.8	6.7	5.0

Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI–DAD) and the National Rehabilitation Reporting System (NRS), 2003/04–2012/13.

Inclusion criteria: All patients aged >18 years with a diagnosis of stroke (using ICD-10–CA codes) discharged from an acute care hospital who were admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database in the same fiscal year.

1. Includes Rehabilitation Patient Groups (RPGs) 1160 and 1150.

2. Includes RPGs 1140, 1130 and 1120.

3. Includes RPGs 1110 and 1100.

4. Relative improvement in median total FIM score from admission to discharge.

5. FIM efficiency is the change in total FIM score divided by total length of stay; it provides information on the average amount of functional recovery per day of inpatient rehabilitation.

6. Length of stay refers to the total time spent in inpatient rehabilitation and is calculated using the admission and discharge dates in the NRS database (LOS = discharge date – admission date).

7. Excludes days waiting for discharge from inpatient rehabilitation and service disruptions (e.g., short readmissions into acute care).

8. A patient is designated Alternate Level of Care (ALC) by a physician or his/her delegate when the patient is occupying a bed in a hospital and does not require the intensity of resources or services provided in the current care setting (acute care, complex continuing care, mental health or rehabilitation). The ALC wait period begins at the time of designation

and ends at the time of discharge or transfer to a discharge destination (or when the patient's condition changes and the ALC designation no longer applies). The standardized ALC definition was implemented across all acute care facilities in Ontario on July 1, 2009. The number of ALC days was calculated using the total length of stay and the active length of stay in the NRS database (ALC = total LOS – active LOS).

Note: Cells in which there were no reported or available data are marked with a hyphen (-). SD = standard deviation.

IQR = interquartile range (25th–75th percentile).

FIM® = Functional Independence Measure; a registered trademark of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

EXHIBIT 8.1B Proportion of adult stroke patients in inpatient rehabilitation, by age group and sex, in Ontario, 2012/13

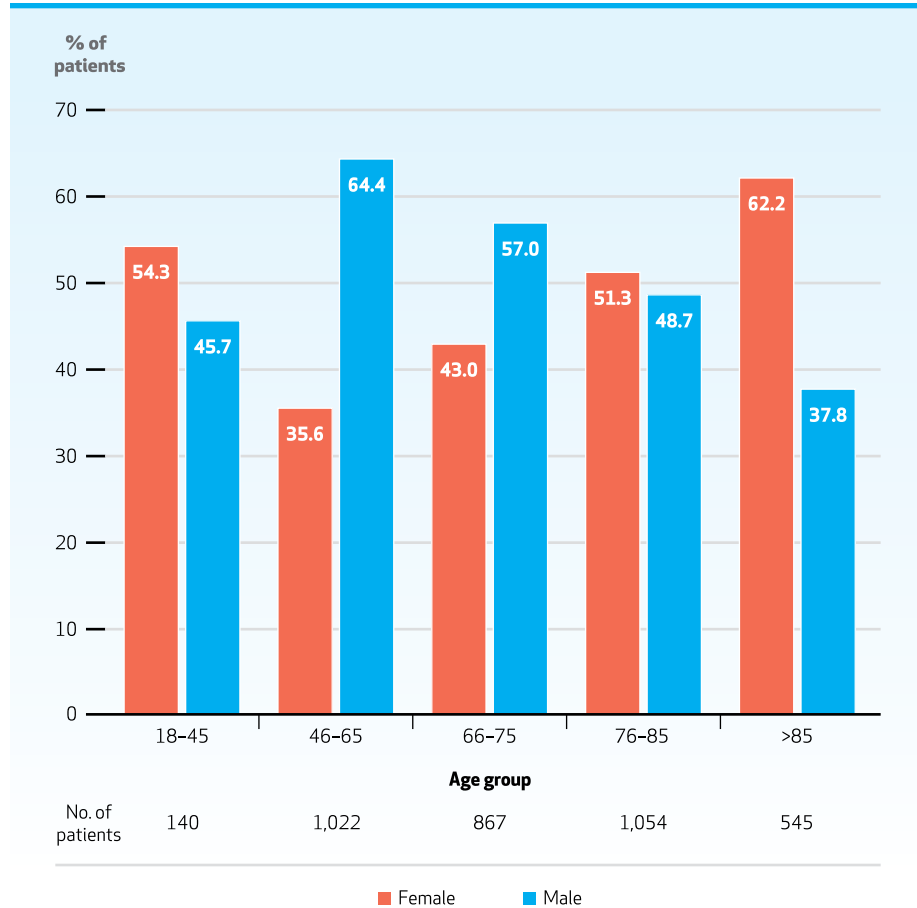
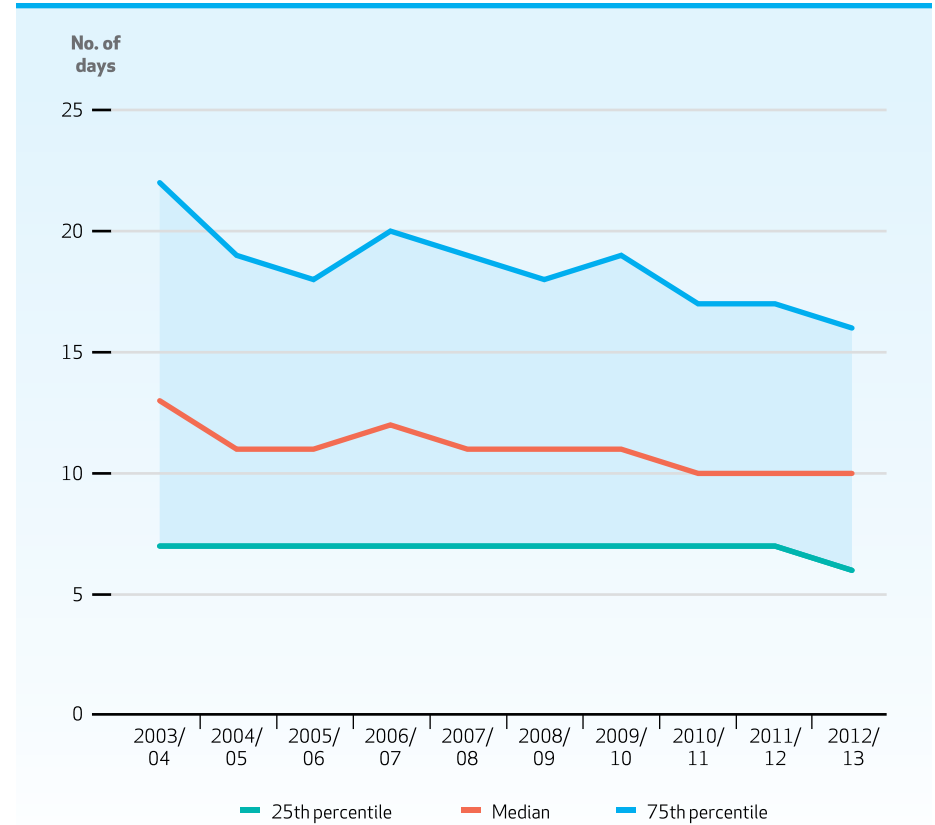


EXHIBIT 8.1C Median number of days from stroke onset to admission to inpatient rehabilitation for adult stroke patients, in Ontario, 2003/04–2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and the National Rehabilitation Reporting System (NRS), 2003/04–2012/13.

Inclusion criteria: All patients aged ≥18 years with a diagnosis of stroke (using ICD-10-CA codes) discharged from an acute care hospital who were admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database in the same fiscal year.

EXHIBIT 8.1D Total admission FIM® score of adult stroke patients in inpatient rehabilitation, in Ontario, 2003/04–2012/13

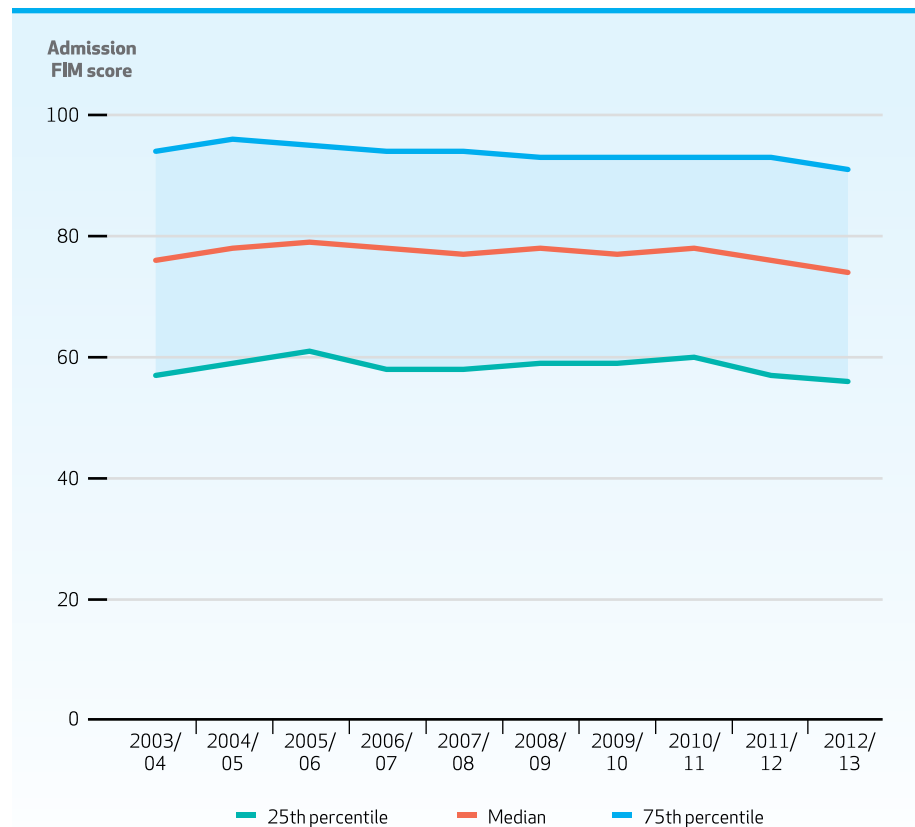
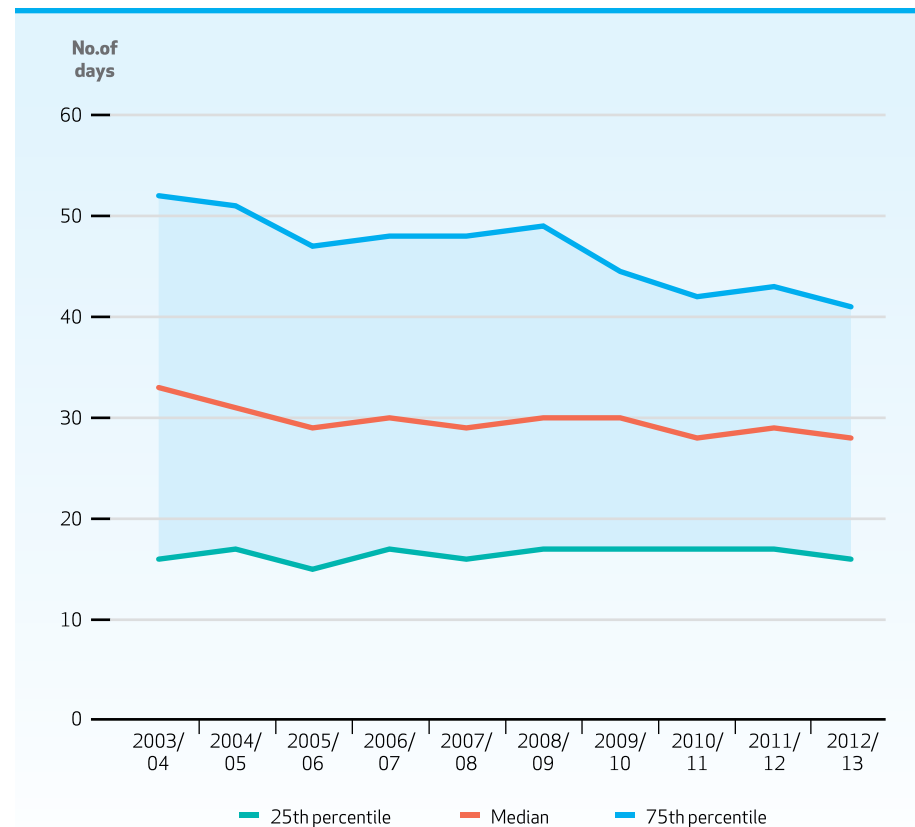
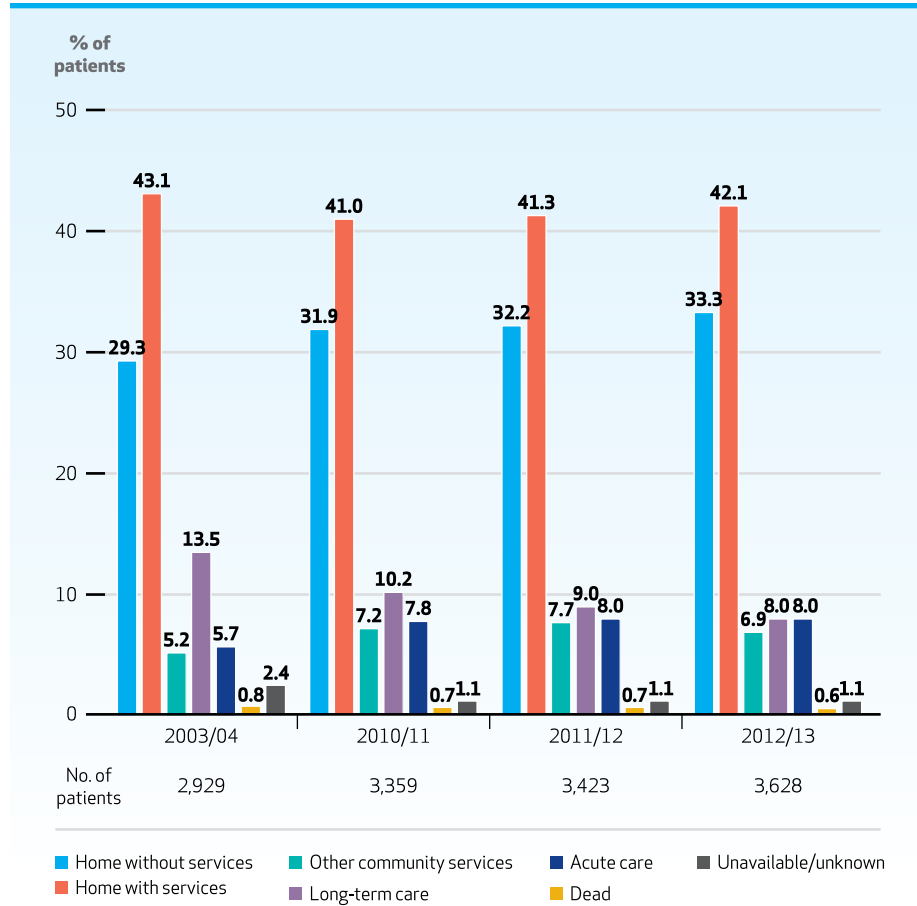


EXHIBIT 8.1E Active length of stay¹ in inpatient rehabilitation of adult stroke patients, in Ontario, 2003/04–2012/13



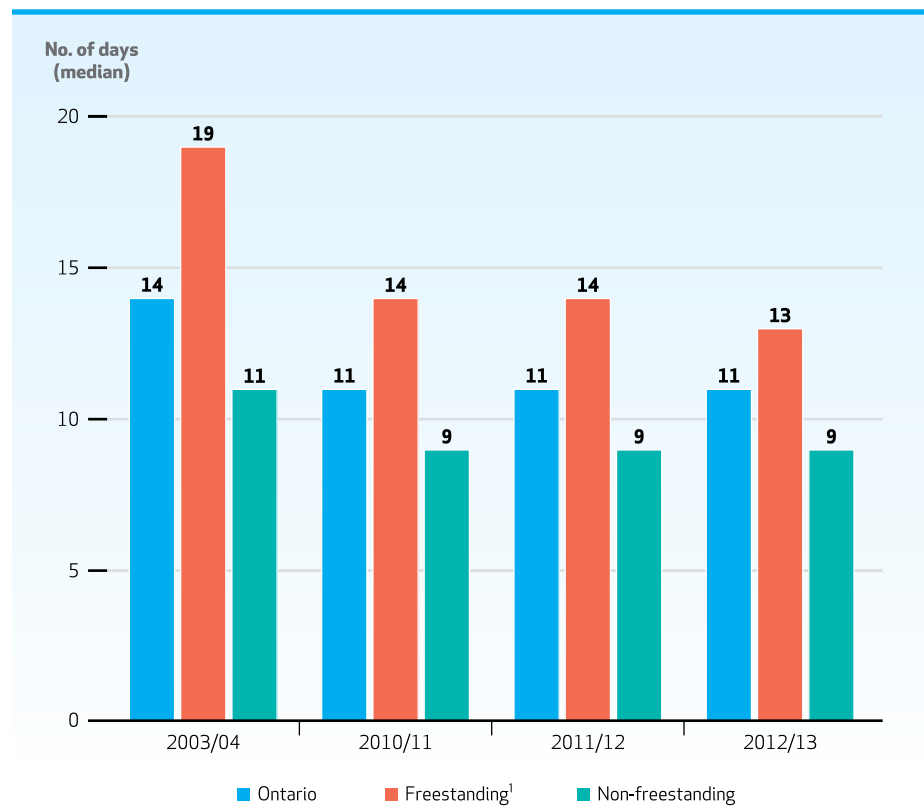
Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and the National Rehabilitation Reporting System (NRS), 2003/04–2012/13.
 Inclusion criteria: All patients aged ≥18 years with a diagnosis of stroke (using ICD-10-CA codes) discharged from an acute care hospital who were admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database in the same fiscal year.
 1 Active length of stay excludes days waiting for discharge from inpatient rehabilitation and service disruptions (e.g., short readmissions into acute care).
 FIM® = Functional Independence Measure; a registered trademark of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

EXHIBIT 8.1F Discharge destinations of adult stroke patients following inpatient rehabilitation, in Ontario, 2003/04 and 2010/11–2012/13



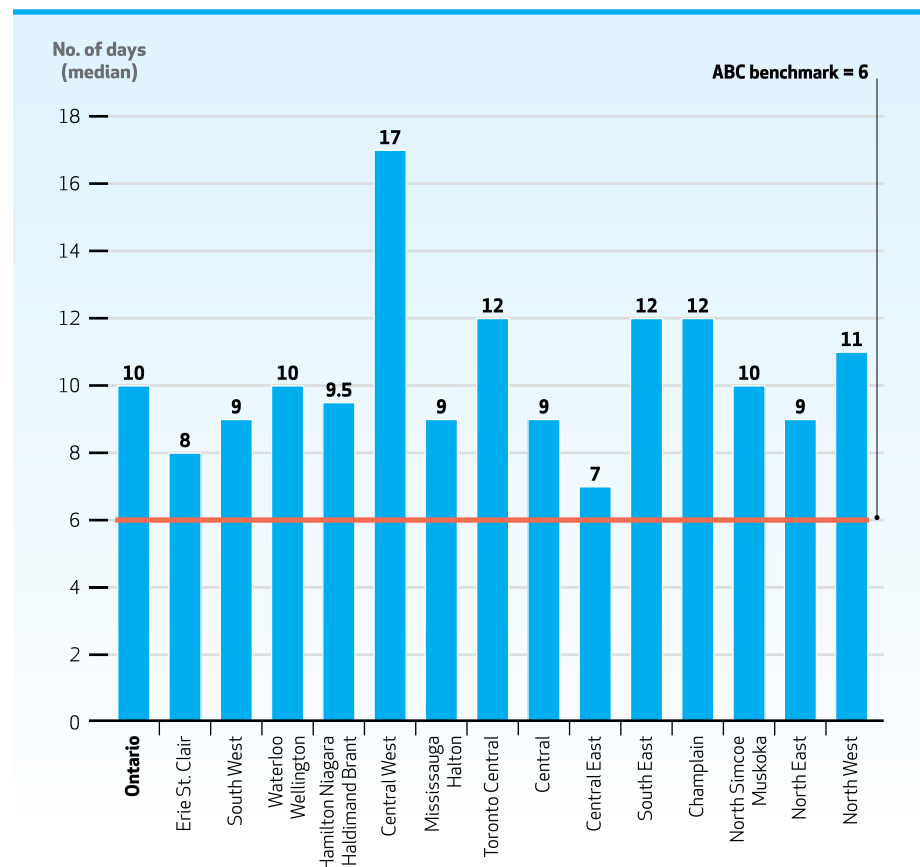
Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and the National Rehabilitation Reporting System (NRS), 2003/04–2012/13.
 Inclusion criteria: All patients aged ≥18 years with a diagnosis of stroke (using ICD-10-CA codes) discharged from an acute care hospital who were admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database in the same fiscal year.

EXHIBIT 8.2A Median number of days from stroke onset to admission for adult stroke patients in inpatient rehabilitation, in Ontario and by facility type, 2003/04 and 2010/11-2012/13



Data source: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2003/04-2012/13.
 Inclusion criteria: All patients aged >18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.
 Exclusion criteria: Patients discharged from one facility and admitted to another within 24 hours.
 1 A rehabilitation centre that is physically separate from an affiliated acute care hospital and does not have onsite access to acute care medical services.

EXHIBIT 8.2B Median number of days from stroke onset to admission to inpatient rehabilitation for adult stroke patients, in Ontario and by Local Health Integration Network, 2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and National Rehabilitation Reporting System (NRS), 2012/13.
 Inclusion criteria: All patients aged >18 years with a diagnosis of stroke excluding transient ischemic attack (using ICD-10-CA codes) discharged from an acute care hospital, admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database; patients had rehabilitation assessments completed in the same fiscal year as the acute care facility discharge.

EXHIBIT 8.2C Proportion of adult patients with stroke admitted to inpatient rehabilitation within 7 days of admission to acute care, in Ontario and by Local Health Integration Network, 2003/04 and 2010/11–2012/13

Group/Subgroup	Patients, n (%)			
	2003/04	2010/11	2011/12	2012/13
Ontario	578 (20.2)	834 (25.5)	854 (25.7)	999 (28.3)
Local Health Integration Network				
1. Erie St. Clair	116 (39.2)	71 (27.5)	76 (31.3)	93 (38.4)
2. South West	33 (12.7)	113 (37.3)	90 (31.6)	102 (31.6)
3. Waterloo Wellington	19 (17.3)	30 (19.7)	31 (18.2)	28 (15.9)
4. Hamilton Niagara Haldimand Brant	77 (19.6)	108 (24.5)	74 (19.2)	112 (24.9)
5. Central West	6 (50.0)	10 (10.9)	6 (5.6)	**
6. Mississauga Halton	106 (34.0)	65 (32.8)	82 (31.2)	97 (33.7)
7. Toronto Central	23 (5.7)	51 (10.9)	53 (12.6)	70 (17.2)
8. Central	31 (13.6)	58 (24.0)	46 (19.2)	82 (27.7)
9. Central East	65 (27.4)	156 (46.3)	161 (47.1)	185 (49.6)
10. South East	21 (16.8)	23 (17.2)	45 (32.8)	38 (28.4)
11. Champlain	28 (10.9)	50 (19.7)	37 (12.6)	61 (22.0)
12. North Simcoe Muskoka	41 (38.0)	43 (38.4)	65 (46.1)	48 (34.8)
13. North East	12 (12.4)	45 (23.2)	61 (31.4)	53 (26.6)
14. North West	-	11 (11.7)	27 (26.0)	27 (25.0)

Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and the National Rehabilitation Reporting System (NRS), 2003/04–2012/13.

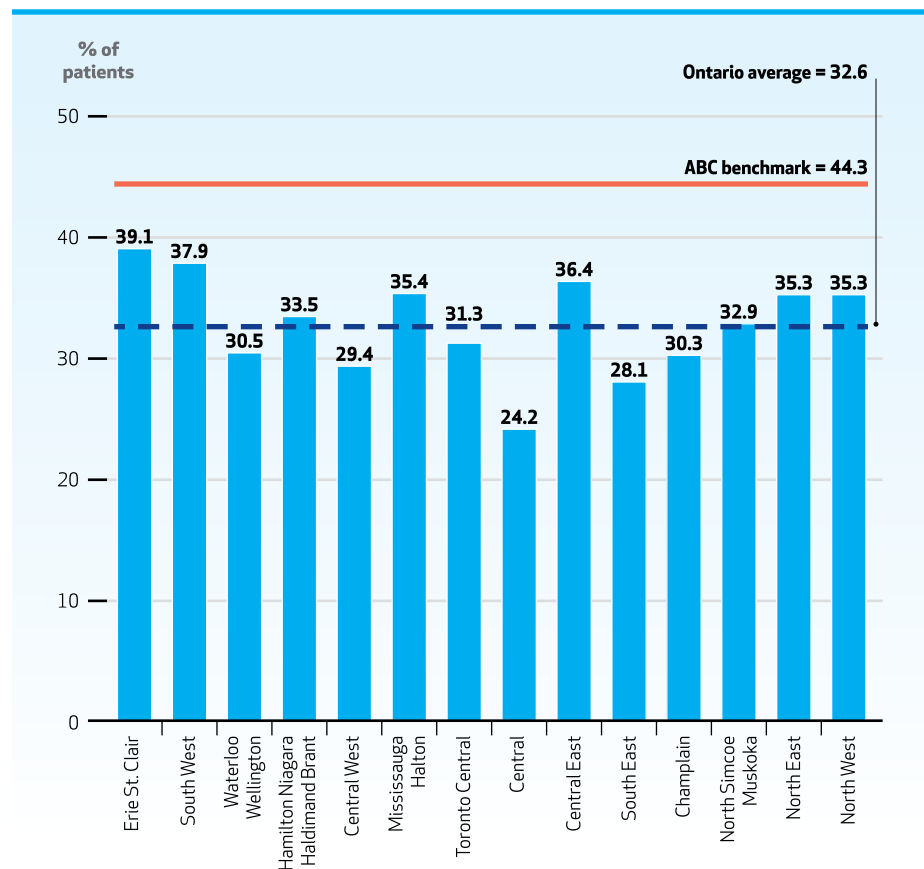
Inclusion criteria: All patients aged ≥18 years with a diagnosis of stroke excluding subarachnoid hemorrhage and transient ischemic attack (using ICD-10-CA codes) discharged alive from an acute care hospital who were admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database in the same fiscal year (N = 2,867 in 2003/04, 3,276 in 2010/11, 3,323 in 2011/12, and 3,535 in 2012/13).

Exclusion criteria: Patients with palliative care as an initial treatment plan and those with missing admission dates.

** Cell value suppressed for reasons of privacy and confidentiality.

Note: Cells in which there were no reported or available data are marked with a hyphen (-).

EXHIBIT 8.3A Proportion of adult stroke patients admitted to inpatient rehabilitation, in Ontario and by Local Health Integration Network, 2012/13



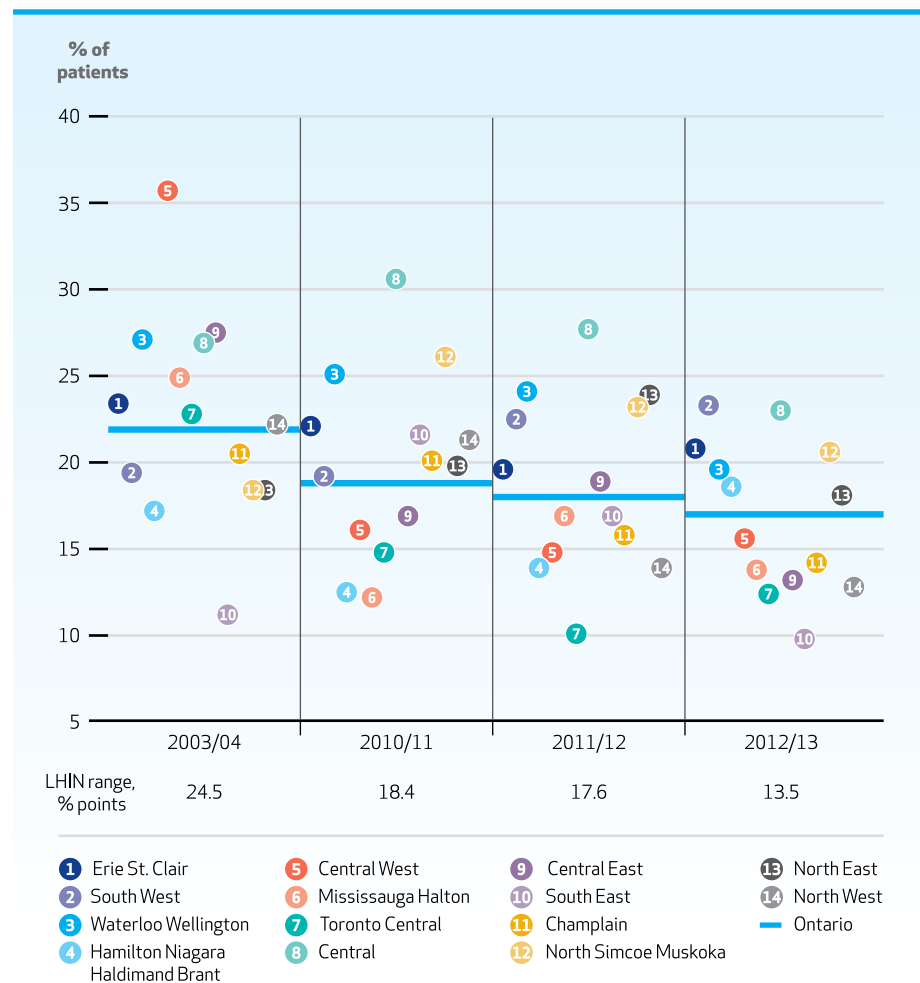
Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and National Rehabilitation Reporting System (NRS), 2012/13.

Inclusion criteria: All patients aged ≥18 years with a diagnosis of stroke excluding transient ischemic attack (using ICD-10-CA codes) discharged from an acute care hospital, admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database; patients had rehabilitation assessments completed in the same fiscal year as the acute care facility discharge.

Notes:

- (1) Population-based analysis (i.e., the location of the patient's residence is used to report regional performance).
- (2) LHIN and sub-LHIN populations were determined using the files POPLHIN 2003-2011, POPLHIN_PROJECTED 2012 and POPSUBLHIN Version 9 2006-2008 from the Ontario Ministry of Health and Long-Term Care: IntelliHealth Ontario.

EXHIBIT 8.3B Variation in the proportion of adult stroke patients in inpatient rehabilitation with mild disability¹, in Ontario and by Local Health Integration Network, 2003/04 and 2010/11-2012/13



Data sources: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2003/04-2012/13.

Inclusion criteria: All patients aged ≥18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.

1. Includes Rehabilitation Patient Groups (RPGs) 1160 and 1150.

EXHIBIT 8.3C Variation in the proportion of adult stroke patients in inpatient rehabilitation with moderate disability¹, in Ontario and by Local Health Integration Network, 2003/04 and 2010/11–2012/13

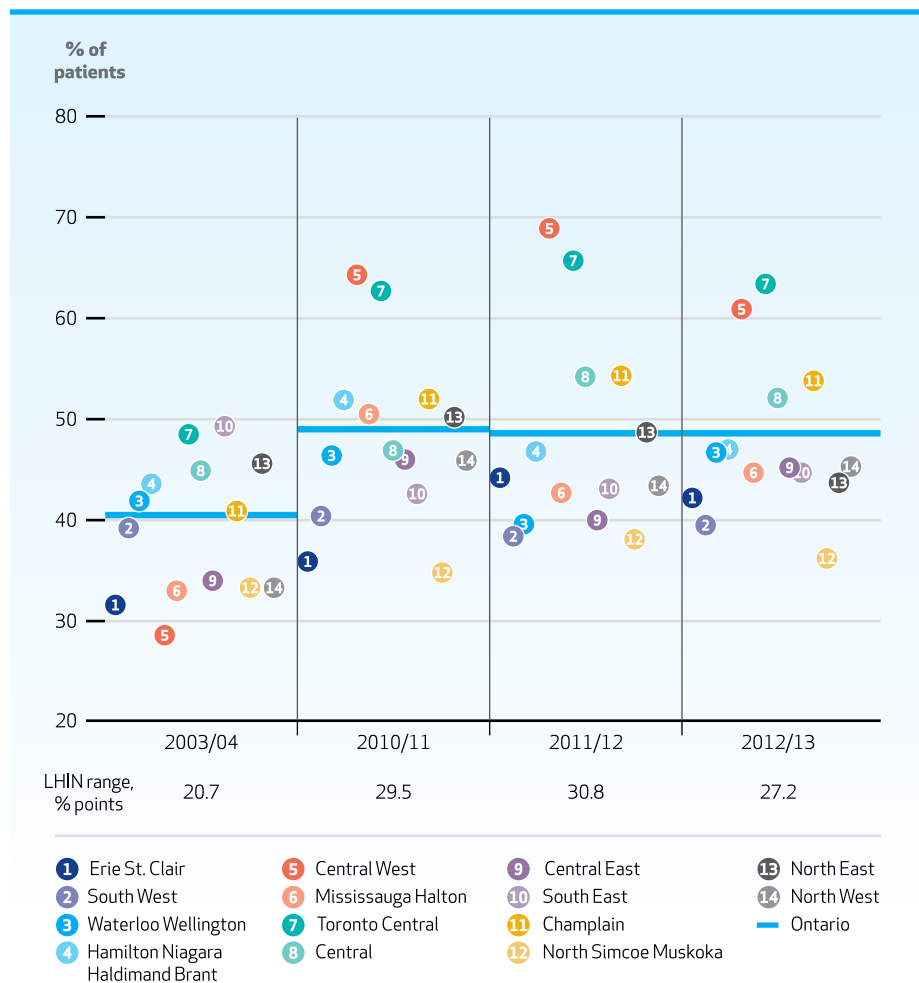
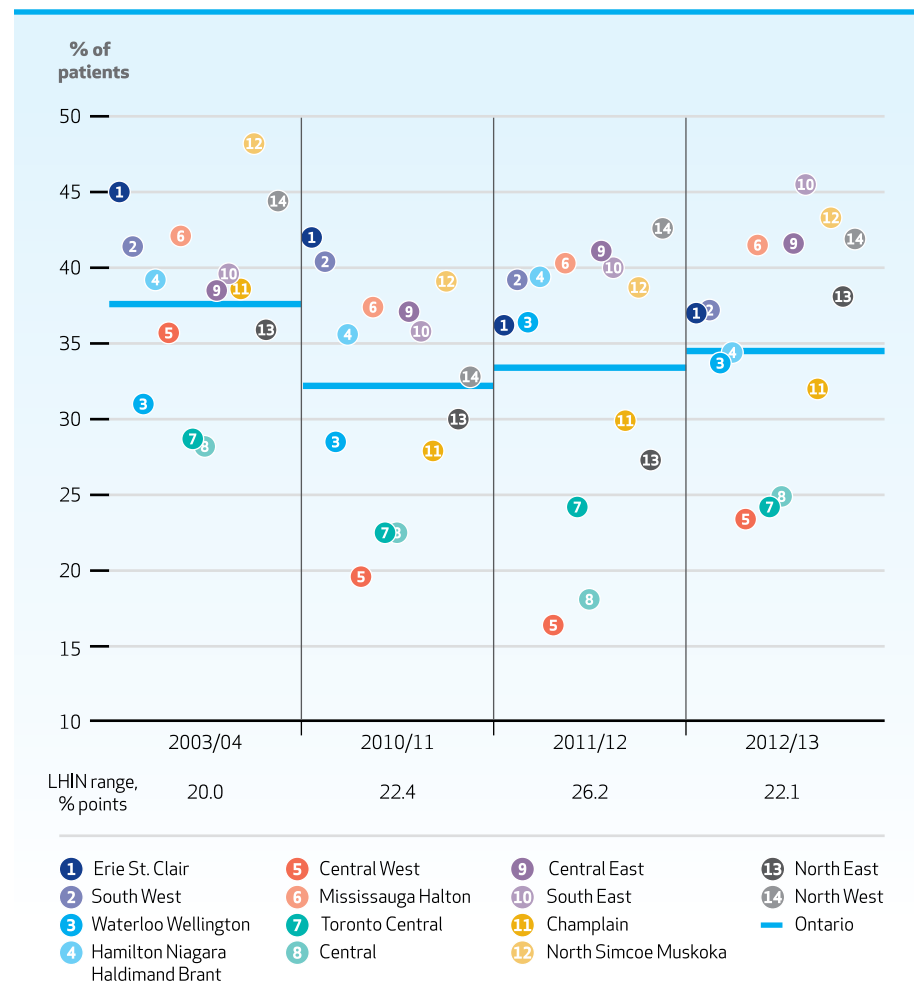
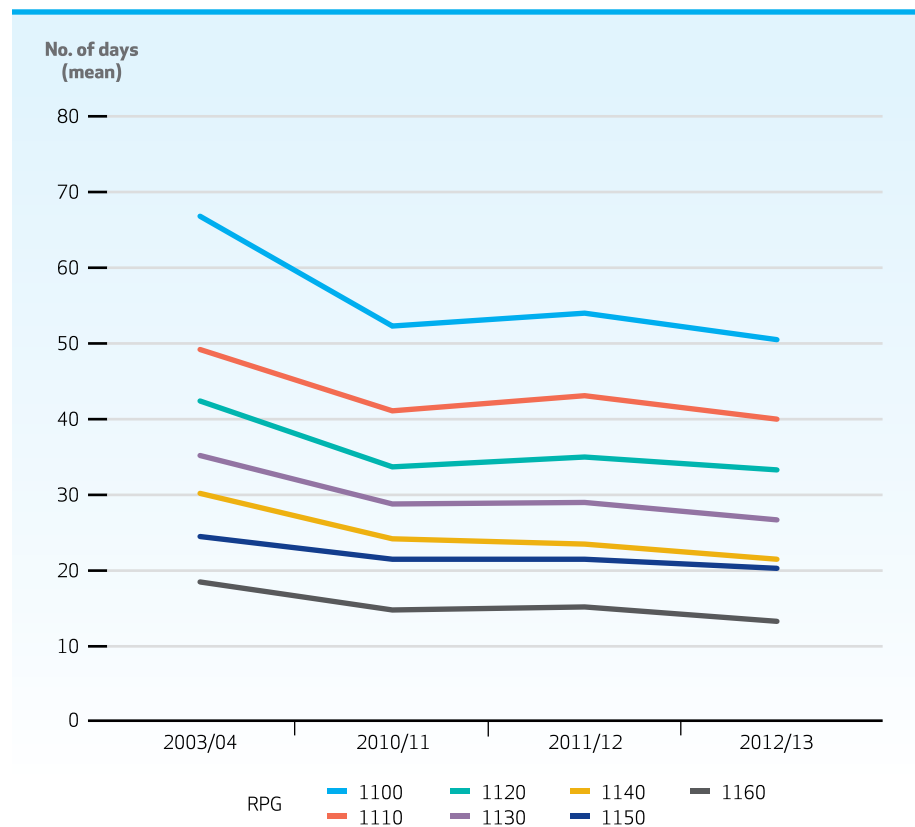


EXHIBIT 8.3D Variation in the proportion of adult stroke patients in inpatient rehabilitation with severe disability², in Ontario and by Local Health Integration Network, 2003/04 and 2010/11–2012/13



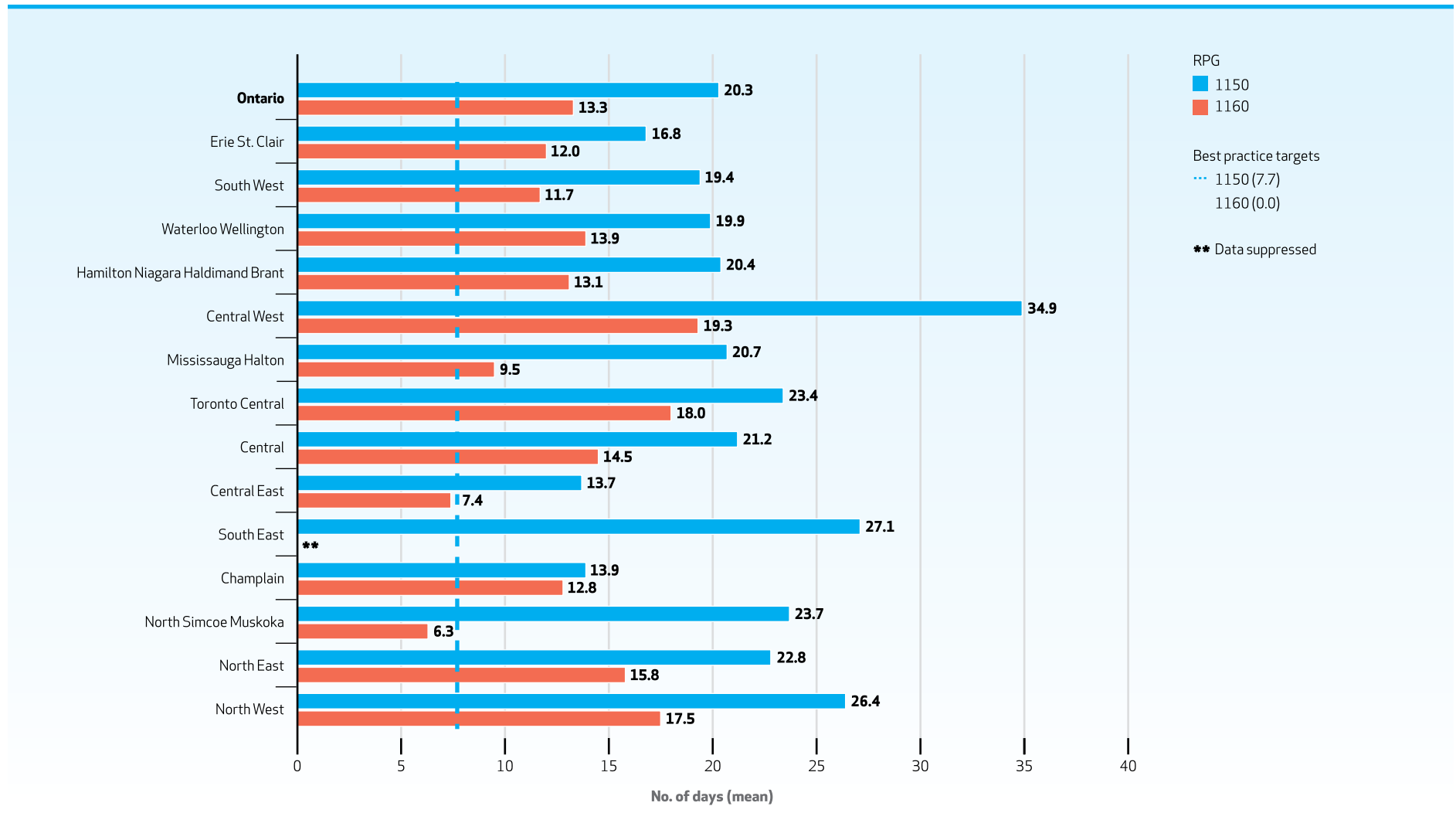
Data sources: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2003/04–2012/13.
 Inclusion criteria: All patients aged >18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.
 1 Includes Rehabilitation Patient Groups 1140, 1130 and 1120.
 2 Includes Rehabilitation Patient Groups 1110 and 1100.

EXHIBIT 8.4A Mean active length of stay¹ in a rehabilitation facility by adult stroke patients, by Rehabilitation Patient Group, in Ontario, 2003/04 and 2010/11–2012/13



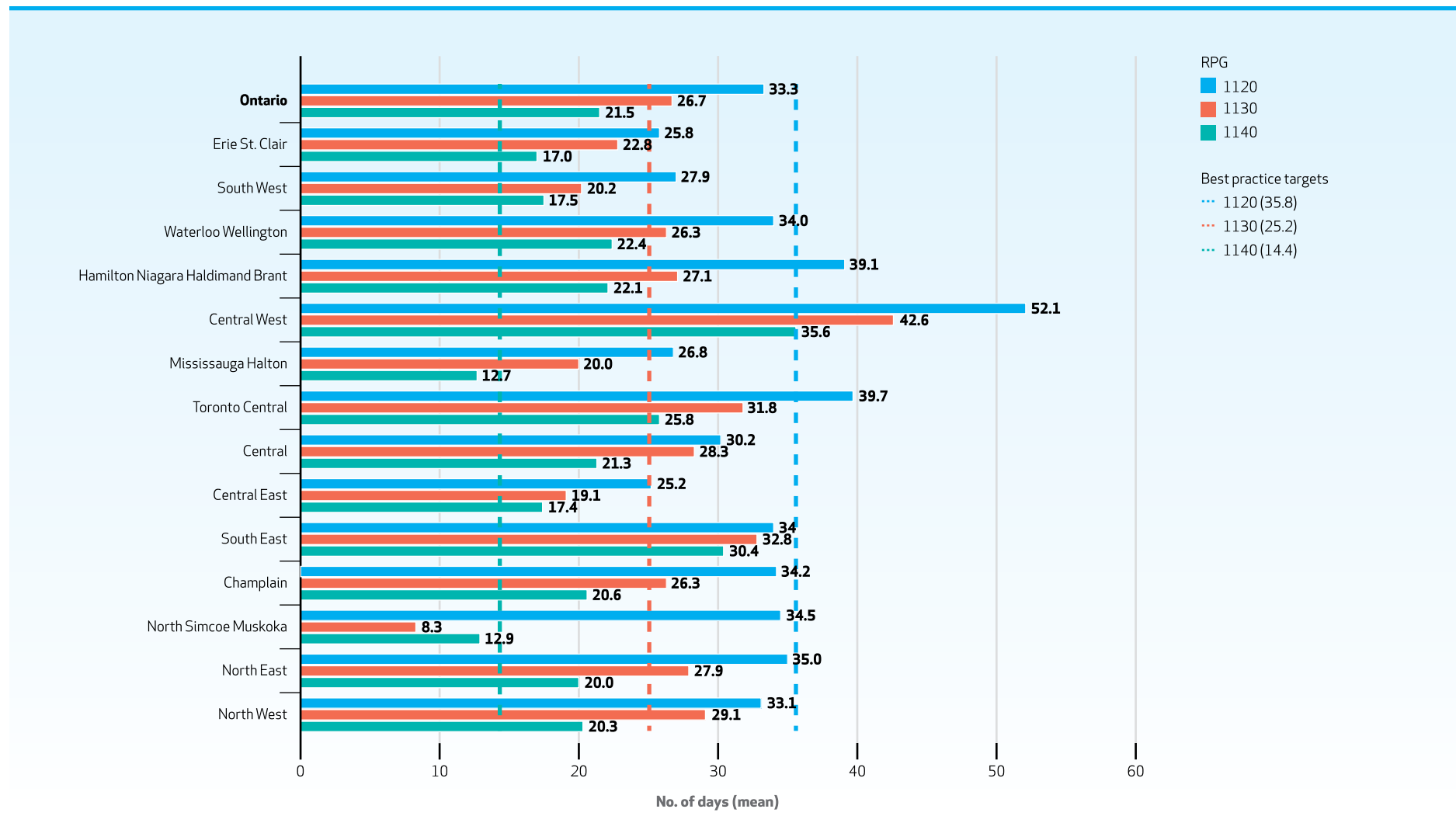
Data source: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2003/04–2012/13.
 Inclusion criteria: All patients aged ≥18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.
 Exclusion criteria: Patients discharged from one facility and admitted to another within 24 hours.
¹ Active length of stay (LOS) refers to the total time spent in inpatient rehabilitation excluding days waiting for discharge from inpatient rehabilitation and service disruptions (e.g., short readmissions into acute care) and was calculated using the admission and ready-for-discharge dates in the NRS database (active LOS = date ready for discharge – admission date).

EXHIBIT 8.4B Mean active length of stay¹ in inpatient rehabilitation by adult stroke patients with mild disability, in Ontario and by Local Health Integration Network and Rehabilitation Patient Group, 2012/13



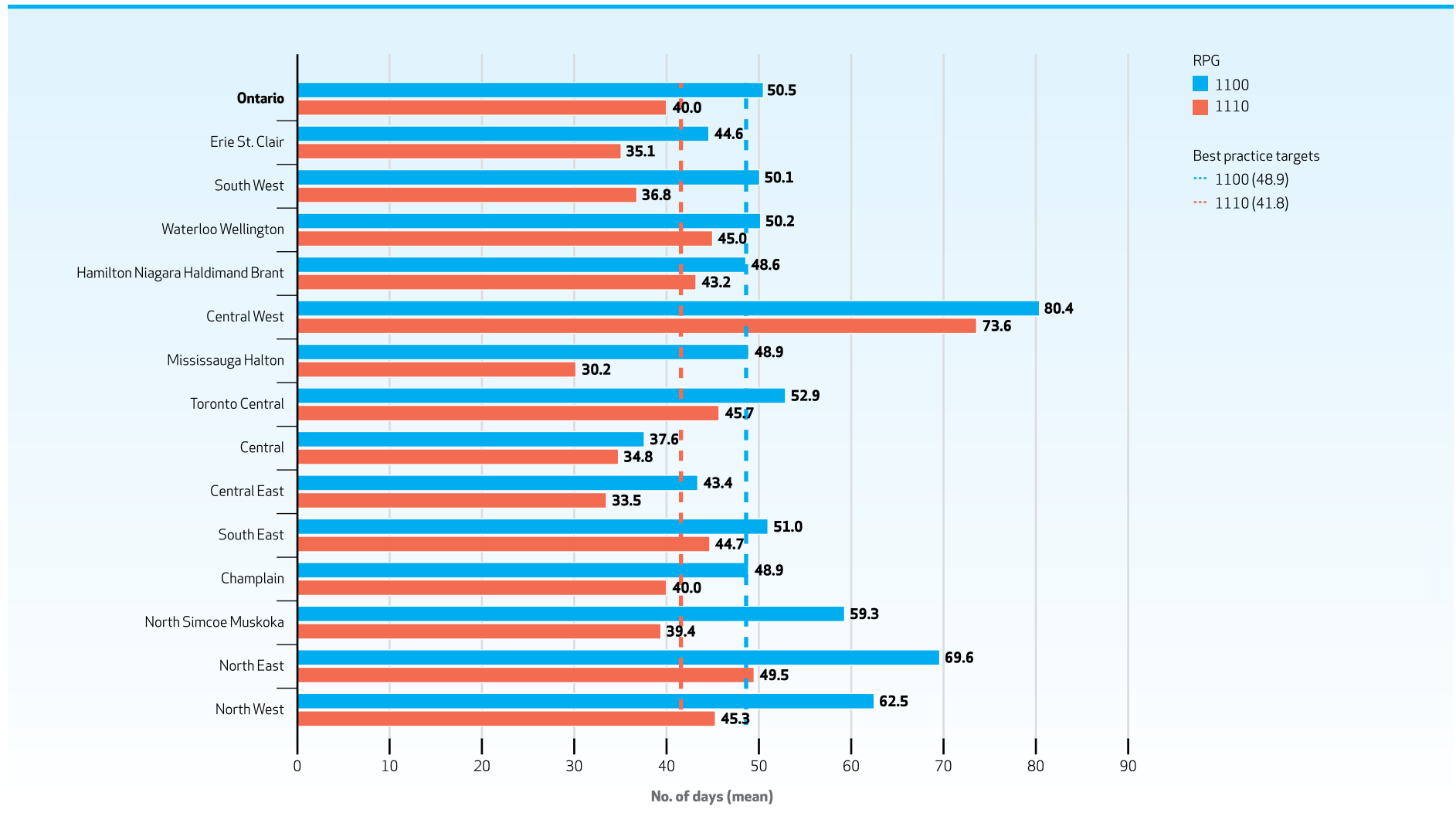
Data source: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2012/13.
 Inclusion criteria: All patients aged ≥18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.
 Exclusion criteria: Patients discharged from one facility and admitted to another within 24 hours.
 1 Active length of stay (LOS) refers to the total time spent in inpatient rehabilitation excluding days waiting for discharge from inpatient rehabilitation and service disruptions (e.g., short readmissions into acute care) and was calculated using the admission and ready-for-discharge dates in the NRS database (active LOS = date ready for discharge – admission date).

EXHIBIT 8.4C Mean active length of stay¹ in inpatient rehabilitation by adult stroke patients with moderate disability, in Ontario and by Local Health Integration Network and Rehabilitation Patient Group, 2012/13



Data source: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2012/13.
 Inclusion criteria: All patients aged >18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.
 Exclusion criteria: Patients discharged from one facility and admitted to another within 24 hours.
 1 Active length of stay (LOS) refers to the total time spent in inpatient rehabilitation excluding days waiting for discharge from inpatient rehabilitation and service disruptions (e.g., short readmissions into acute care) and was calculated using the admission and ready-for-discharge dates in the NRS database (active LOS = date ready for discharge - admission date).

EXHIBIT 8.4D Mean active length of stay¹ in inpatient rehabilitation by adult stroke patients with severe disability, in Ontario and by Local Health Integration Network and Rehabilitation Patient Group, 2012/13



Data source: Canadian Institute for Health Information, National Rehabilitation Reporting System (NRS), 2012/13.

Inclusion criteria: All patients aged ≥18 years admitted to inpatient rehabilitation and classified as Rehabilitation Client Group 1 (Stroke) in the NRS database.

Exclusion criteria: Patients discharged from one facility and admitted to another within 24 hours.

¹ Active length of stay (LOS) refers to the total time spent in inpatient rehabilitation excluding days waiting for discharge from inpatient rehabilitation and service disruptions (e.g., short readmissions into acute care) and was calculated using the admission and ready-for-discharge dates in the NRS database (active LOS = date ready for discharge – admission date).

EXHIBIT 8.5 Characteristics of adult patients with stroke or transient ischemic attack who were admitted to complex continuing care following inpatient discharge from an acute care facility, in Ontario and by Local Health Integration Network, 2008/09–2011/12

Characteristics, ¹ 2008/09	Ontario	Erie St. Clair	South West	Waterloo Wellington	Hamilton Niagara Haldimand Brant	Central West	Mississauga Halton	Toronto Central	Central	Central East	South East	Champlain	North Simcoe Muskoka	North East	North West
Patients, n	1,237	92	69	58	146	56	89	170	136	196	51	65	38	29	41
Female, n (%)	661 (53.4)	46 (50.0)	37 (53.6)	29 (50.0)	84 (57.5)	31 (55.4)	43 (48.3)	99 (58.2)	65 (47.8)	94 (48.0)	35 (68.6)	36 (55.4)	26 (68.4)	16 (55.2)	19 (46.3)
Age, mean (median)	76.2 (79)	79.9 (84)	79.1 (81)	73.2 (75.5)	76.1 (79)	73.9 (75)	75.8 (80)	77.0 (79)	76.7 (78.5)	73.6 (76)	76.2 (79)	75.8 (76)	78.6 (78.5)	74.5 (76)	80.2 (83)
Acute care length of stay in days, mean (median)	25.4 (16)	16.9 (10)	25.1 (15)	20.0 (9.5)	22.8 (15)	18.6 (12.5)	33.2 (16)	30.9 (23.5)	28.9 (21)	22.1 (16)	30.5 (16)	30.6 (27)	30.0 (21.5)	28.9 (15)	14.0 (12)
Alternate Level of Care length of stay in days, mean (median)	10.2 (2)	5.6 (0)	13.5 (0)	9.5 (0)	11.9 (5)	7.5 (3.5)	13.7 (1)	12.4 (5.5)	9.8 (1)	7.1 (1)	12.3 (3)	9.2 (1)	14.1 (7)	16.8 (3)	4.0 (2)
Length of stay in complex continuing care in days, mean (median)	112.2 (63)	74.8 (37)	125.8 (49)	74.3 (58)	114.2 (51)	79.8 (83)	109.9 (55)	161.9 (92)	107.7 (67.5)	81.6 (49.5)	142.6 (61)	198.9 (135)	89.1 (72.5)	97.4 (70)	82.1 (48)
Time from acute care admission to complex continuing care in days, mean (median)	49.8 (36)	52.2 (36)	48.8 (33)	39.0 (19.5)	49.6 (28.5)	32.7 (20)	63.4 (46)	48.6 (38.5)	50.2 (38)	49.2 (37)	49.6 (24)	50.3 (40)	57.1 (39)	58.7 (54)	49.1 (28)
Patients admitted from long-term care, n (%)	66 (5.3)	12 (13.0)	**	7 (12.1)	10 (6.8)	**	**	8 (4.7)	**	**	**	6 (9.2)	-	**	**
Dementia, n (%)															
Patients with dementia	189 (15.3)	18 (19.6)	15 (21.7)	**	20 (13.7)	**	15 (16.9)	34 (20.0)	20 (14.7)	28 (14.3)	12 (23.5)	12 (18.5)	**	**	**
Patients with Alzheimer's	41 (3.3)	8 (8.7)	**	-	7 (4.8)	**	**	**	**	**	**	**	**	-	**
Discharge Destinations from Complex Continuing Care, n (%)															
Inpatient acute care	151 (12.2)	11 (12.0)	**	**	15 (10.3)	6 (10.7)	11 (12.4)	30 (17.6)	21 (15.4)	20 (10.2)	6 (11.8)	12 (18.5)	**	**	**
Inpatient continuing care	34 (2.7)	**	**	6 (10.3)	**	**	**	**	**	**	**	-	**	-	**
Home with services ²	242 (19.6)	10 (10.9)	7 (10.1)	16 (27.6)	17 (11.6)	11 (19.6)	13 (14.6)	38 (22.4)	37 (27.2)	70 (35.7)	**	**	**	7 (24.1)	6 (14.6)
Home without services ³	109 (8.8)	**	**	**	16 (11.0)	**	15 (16.9)	16 (9.4)	12 (8.8)	**	8 (15.7)	12 (18.5)	**	**	**
Long-term care home	347 (28.1)	30 (32.6)	28 (40.6)	10 (17.2)	37 (25.3)	19 (33.9)	17 (19.1)	45 (26.5)	31 (22.8)	56 (28.6)	16 (31.4)	22 (33.8)	14 (36.8)	9 (31.0)	13 (31.7)
Retirement home	54 (4.4)	6 (6.5)	**	**	11 (7.5)	**	**	9 (5.3)	6 (4.4)	**	**	-	**	-	**
Died	176 (14.2)	20 (21.7)	13 (18.8)	6 (10.3)	30 (20.5)	**	20 (22.5)	24 (14.1)	18 (13.2)	17 (8.7)	7 (13.7)	**	6 (15.8)	**	**
Other	124 (10.0)	7 (7.6)	9 (13.0)	10 (17.2)	18 (12.3)	10 (17.9)	6 (6.7)	6 (3.5)	6 (4.4)	21 (10.7)	7 (13.7)	11 (16.9)	**	**	**

EXHIBIT 8.5 *continued*

Characteristics, ¹ 2009/10	Ontario	Erie St. Clair	South West	Waterloo Wellington	Hamilton Niagara Haldimand Brant	Central West	Mississauga Halton	Toronto Central	Central	Central East	South East	Champlain	North Simcoe Muskoka	North East	North West
Patients, n	1,296	100	65	76	166	73	88	142	148	196	41	85	41	37	36
Female, n (%)	707 (54.6)	58 (58.0)	33 (50.8)	40 (52.6)	95 (57.2)	24 (32.9)	51 (58.0)	70 (49.3)	83 (56.1)	101 (51.5)	28 (68.3)	50 (58.8)	27 (65.9)	22 (59.5)	24 (66.7)
Age, mean (median)	76.3 (79)	78.2 (81)	78.0 (81)	75.6 (78)	77.7 (80)	73.4 (76)	77.3 (79)	77.0 (80.5)	74.8 (77)	75.5 (79)	79.4 (82)	71.9 (75)	76.4 (80)	78.5 (80)	78.5 (80.5)
Acute care length of stay in days, mean (median)	24.8 (16)	16.8 (14)	25.2 (15)	24.0 (17)	22.5 (15)	21.9 (15)	22.5 (17.5)	26.4 (20)	26.9 (16)	25.4 (15)	26.1 (17)	32.6 (28)	27.3 (21)	43.0 (14)	12.4 (12.5)
Alternate Level of Care length of stay in days, mean (median)	9.8 (3)	3.9 (0)	8.7 (1)	13.4 (4.5)	9.4 (3)	8.2 (3)	6.6 (1)	10.5 (6)	8.2 (4)	10.6 (0)	11.6 (1)	11.8 (4)	9.4 (5)	30.7 (2)	4.4 (3)
Length of stay in complex continuing care in days, mean (median)	102.4 (59)	76.6 (43)	83.7 (57)	79.5 (50.5)	106.4 (59)	76.1 (66)	152.1 (84.5)	118.6 (75.5)	100.4 (53.5)	87.8 (58)	67.0 (45)	158.6 (66)	84.0 (73)	120.4 (42)	103.7 (48)
Time from acute care admission to complex continuing care in days, mean (median)	47.1 (32)	43.3 (32)	51.9 (29)	41.4 (26)	47.6 (29.5)	42.6 (32)	42.2 (32.5)	42.1 (29.5)	50.6 (31.5)	47.2 (37)	43.6 (30)	47.0 (36)	52.0 (36)	71.8 (41)	58.1 (44)
Patients admitted from long-term care, n (%)	60 (4.6)	6 (6.0)	**	7 (9.2)	7 (4.2)	**	7 (8.0)	8 (5.6)	7 (4.7)	**	**	**	-	**	-
Dementia, n (%)															
Patients with dementia	191 (14.7)	24 (24.0)	6 (9.2)	7 (9.2)	32 (19.3)	7 (9.6)	11 (12.5)	25 (17.6)	25 (16.9)	23 (11.7)	6 (14.6)	9 (10.6)	9 (22.0)	**	**
Patients with Alzheimer's	32 (2.5)	**	**	**	**	**	8 (9.1)	-	**	**	**	**	**	-	**
Discharge Destinations from Complex Continuing Care, n (%)															
Inpatient acute care	153 (11.8)	6 (6.0)	6 (9.2)	**	13 (7.8)	7 (9.6)	9 (10.2)	28 (19.7)	14 (9.5)	27 (13.8)	**	20 (23.5)	**	**	7 (19.4)
Inpatient continuing care	20 (1.5)	**	-	**	**	-	**	**	**	**	**	-	-	-	**
Home with services ²	235 (18.1)	12 (12.0)	**	11 (14.5)	27 (16.3)	20 (27.4)	12 (13.6)	19 (13.4)	42 (28.4)	61 (31.1)	**	**	8 (19.5)	**	7 (19.4)
Home without services ³	130 (10.0)	**	**	10 (13.2)	14 (8.4)	**	18 (20.5)	21 (14.8)	19 (12.8)	17 (8.7)	**	9 (10.6)	**	**	-
Long-term care home	380 (29.3)	38 (38.0)	25 (38.5)	21 (27.6)	36 (21.7)	23 (31.5)	26 (29.5)	39 (27.5)	34 (23.0)	53 (27.0)	22 (53.7)	20 (23.5)	18 (43.9)	10 (27.0)	14 (38.9)
Retirement home	51 (3.9)	**	**	**	15 (9.0)	**	**	**	**	**	**	**	**	-	**
Died	188 (14.5)	26 (26.0)	16 (24.6)	12 (15.8)	35 (21.1)	**	11 (12.5)	20 (14.1)	20 (13.5)	21 (10.7)	**	6 (7.1)	**	10 (27.0)	**
Other	139 (10.7)	7 (7.0)	7 (10.8)	12 (15.8)	22 (13.3)	16 (21.9)	9 (10.2)	9 (6.3)	13 (8.8)	10 (5.1)	**	25 (29.4)	**	**	**

EXHIBIT 8.5 continued

Characteristics, ¹ 2010/11	Ontario	Erie St. Clair	South West	Waterloo Wellington	Hamilton Niagara Haldimand Brant	Central West	Mississauga Halton	Toronto Central	Central	Central East	South East	Champlain	North Simcoe Muskoka	North East	North West
Patients, n	1,294	91	58	72	179	70	76	134	149	200	44	115	37	39	29
Female, n (%)	710 (54.9)	49 (53.8)	30 (51.7)	45 (62.5)	94 (52.5)	34 (48.6)	45 (59.2)	69 (51.5)	79 (53.0)	109 (54.5)	28 (63.6)	68 (59.1)	20 (54.1)	20 (51.3)	19 (65.5)
Age, mean (median)	75.7 (78)	79.0 (79)	78.3 (79.5)	75.7 (80)	75.1 (79)	74.3 (77)	77.1 (78)	74.5 (78)	74.4 (76)	75.2 (78)	77.2 (79)	75.4 (77)	78.7 (81)	74 (76)	77.4 (79)
Acute care length of stay in days, mean (median)	22.1 (16)	21.2 (16)	18.7 (11)	18.8 (13.5)	19.8 (15)	16.6 (13)	22.4 (17.5)	31.1 (21)	26.8 (19)	17.6 (12)	16.3 (11.5)	23.0 (18)	25.4 (17)	27.4 (17)	26.3 (15)
Alternate Level of Care length of stay in days, mean (median)	7.6 (2)	7.3 (0)	6.3 (0)	8.5 (2)	6.8 (3)	6.1 (1)	5.3 (1)	10.9 (6)	9.2 (2)	5.8 (0)	3.3 (0)	6.7 (1)	11.9 (7)	11.3 (0)	13.2 (4)
Length of stay in complex continuing care in days, mean (median)	91.1 (58)	99.8 (62)	74.5 (35.5)	56.0 (42)	93.6 (71)	70.0 (49)	97.6 (71.5)	123.7 (78)	104.9 (75)	78.0 (53.5)	46.6 (34.5)	108.3 (57)	58.3 (38)	85.1 (50)	121.6 (59)
Time from acute care admission to complex continuing care in days, mean (median)	42.9 (28)	54.6 (42)	44.1 (31)	38.1 (19.5)	38.3 (22)	34.8 (21.5)	36.8 (30)	46.2 (33.5)	47.9 (33)	38.4 (24)	34.6 (14)	39.1 (24)	49.4 (33)	63.3 (50)	59.8 (57)
Patients admitted from long-term care, n (%)	60 (4.6)	**	**	10 (13.9)	12 (6.7)	**	**	**	**	**	**	7 (6.1)	-	-	**
Dementia, n (%)															
Patients with dementia	172 (13.3)	22 (24.2)	**	10 (13.9)	31 (17.3)	13 (18.6)	9 (11.8)	15 (11.2)	17 (11.4)	27 (13.5)	**	9 (7.8)	**	**	**
Patients with Alzheimer's	41 (3.2)	**	**	**	8 (4.5)	**	**	**	8 (5.4)	**	**	-	**	-	**
Discharge Destinations from Complex Continuing Care, n (%)															
Inpatient acute care	204 (15.8)	14 (15.4)	7 (12.1)	9 (12.5)	20 (11.2)	12 (17.1)	9 (11.8)	21 (15.7)	28 (18.8)	31 (15.5)	8 (18.2)	22 (19.1)	**	13 (33.3)	7 (24.1)
Inpatient continuing care	21 (1.6)	-	-	**	**	-	-	**	**	**	-	**	-	**	**
Home with services ²	290 (22.4)	7 (7.7)	12 (20.7)	10 (13.9)	43 (24.0)	19 (27.1)	21 (27.6)	27 (20.1)	42 (28.2)	75 (37.5)	9 (20.5)	8 (7.0)	7 (18.9)	6 (15.4)	**
Home without services ³	125 (9.7)	**	**	6 (8.3)	25 (14.0)	**	10 (13.2)	17 (12.7)	18 (12.1)	20 (10.0)	**	13 (11.3)	**	**	**
Long-term care home	286 (22.1)	29 (31.9)	21 (36.2)	12 (16.7)	30 (16.8)	15 (21.4)	9 (11.8)	37 (27.6)	34 (22.8)	46 (23.0)	6 (13.6)	21 (18.3)	9 (24.3)	9 (23.1)	8 (27.6)
Retirement home	66 (5.1)	6 (6.6)	-	9 (12.5)	19 (10.6)	**	**	6 (4.5)	**	**	**	**	**	**	**
Died	151 (11.7)	24 (26.4)	10 (17.2)	11 (15.3)	19 (10.6)	**	18 (23.7)	14 (10.4)	11 (7.4)	16 (8.0)	**	**	7 (18.9)	**	**
Other	151 (11.7)	8 (8.8)	7 (12.1)	12 (16.7)	19 (10.6)	11 (15.7)	7 (9.2)	9 (6.7)	10 (6.7)	**	10 (22.7)	44 (38.3)	**	**	**

EXHIBIT 8.5 *continued*

Characteristics, ¹ 2011/12	Ontario	Erie St. Clair	South West	Waterloo Wellington	Hamilton Niagara Haldimand Brant	Central West	Mississauga Halton	Toronto Central	Central	Central East	South East	Champlain	North Simcoe Muskoka	North East	North West
Patients, n	1,203	72	39	62	171	65	78	163	151	164	60	72	37	44	23
Female, n (%)	636 (52.9)	39 (54.2)	14 (35.9)	35 (56.5)	89 (52.0)	28 (43.1)	39 (50.0)	98 (60.1)	87 (57.6)	90 (54.9)	38 (63.3)	30 (41.7)	15 (40.5)	22 (50.0)	11 (47.8)
Age, mean (median)	76.2 (79)	77.9 (80)	77.6 (79)	76.2 (78.5)	78.3 (80)	71.7 (73)	73.4 (75)	76.5 (80)	75.2 (78)	76.5 (80)	77.0 (80)	75.0 (77)	78.1 (79)	76.1 (77)	76.8 (82)
Acute care length of stay in days, mean (median)	21.9 (15)	25.2 (18)	31.9 (13)	15.7 (11)	21.7 (13)	20.1 (15)	30.2 (19)	24.3 (18)	24.8 (17)	17.8 (12)	13.2 (10)	27.5 (21)	13.1 (10)	17.7 (15)	11.7 (10)
Alternate Level of Care length of stay in days, mean (median)	7.4 (1)	7.7 (1)	14.7 (1)	4.1 (1)	8.2 (2)	6.8 (2)	8.6 (1.5)	9.5 (5)	9.2 (3)	4.0 (0)	2.6 (0)	9.7 (0)	3.8 (0)	8.1 (3.5)	2.5 (1)
Length of stay in complex continuing care in days, mean (median)	83.6 (57)	95.1 (56.5)	115.5 (43)	60.7 (41)	69.7 (53)	68.2 (53)	93.6 (64.5)	102.3 (74)	83.1 (65)	77.2 (58.5)	55.5 (33.5)	110.3 (62)	85.4 (59)	84.8 (53)	73.0 (35)
Time from acute care admission to complex continuing care in days, mean (median)	43.6 (28)	61.1 (47.5)	61.3 (51)	35.3 (19.5)	42.7 (25)	33.2 (27)	55.5 (36)	43.4 (28)	45.7 (30)	36.4 (25)	30.2 (17)	39.1 (26)	44.7 (36)	53.1 (43)	47.7 (31)
Patients admitted from long-term care, n (%)	64 (5.3)	8 (11.1)	**	**	9 (5.3)	**	8 (10.3)	6 (3.7)	7 (4.6)	9 (5.5)	**	**	**	**	-
Dementia, n (%)															
Patients with dementia	149 (12.4)	12 (16.7)	**	7 (11.3)	27 (15.8)	**	9 (11.5)	26 (16.0)	9 (6.0)	19 (11.6)	12 (20.0)	7 (9.7)	6 (16.2)	7 (15.9)	**
Patients with Alzheimer's	28 (2.3)	**	**	**	**	-	**	**	**	**	-	**	-	-	**
Discharge Destinations from Complex Continuing Care, n (%)															
Inpatient acute care	169 (14.0)	9 (12.5)	**	9 (14.5)	21 (12.3)	7 (10.8)	13 (16.7)	35 (21.5)	23 (15.2)	18 (11.0)	10 (16.7)	9 (12.5)	**	6 (13.6)	**
Inpatient continuing care	20 (1.7)	**	-	**	**	-	**	**	**	**	-	-	**	-	**
Home with services ²	274 (22.8)	**	8 (20.5)	9 (14.5)	37 (21.6)	21 (32.3)	23 (29.5)	41 (25.2)	39 (25.8)	60 (36.6)	7 (11.7)	**	7 (18.9)	8 (18.2)	7 (30.4)
Home without services ³	121 (10.1)	**	-	**	24 (14.0)	**	6 (7.7)	19 (11.7)	28 (18.5)	12 (7.3)	6 (10.0)	11 (15.3)	**	**	**
Long-term care home	269 (22.4)	29 (40.3)	16 (41.0)	10 (16.1)	23 (13.5)	10 (15.4)	8 (10.3)	48 (29.4)	22 (14.6)	44 (26.8)	12 (20.0)	15 (20.8)	11 (29.7)	17 (38.6)	**
Retirement home	60 (5.0)	11 (15.3)	**	6 (9.7)	16 (9.4)	**	-	**	**	6 (3.7)	**	**	**	**	-
Died	132 (11.0)	10 (13.9)	6 (15.4)	**	30 (17.5)	**	18 (23.1)	11 (6.7)	18 (11.9)	7 (4.3)	7 (11.7)	**	**	7 (15.9)	**
Other	158 (13.1)	**	**	18 (29.0)	15 (8.8)	19 (29.2)	8 (10.3)	**	16 (10.6)	13 (7.9)	17 (28.3)	29 (40.3)	6 (16.2)	-	**

Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2008/09-2011/12 and Continuing Care Reporting System, Complex Continuing Care Database (CCRS-CCC), 2012/13.

Inclusion criteria: All patients discharged alive following an inpatient stroke/TIA (from CIHI-DAD, 2008/09-2011/12) who appeared in the CCRS-CCC database within 6 months of discharge from acute care.

1 Based on initial assessment closest to the stroke or TIA inpatient discharge date.

2 Includes home care service

3 Includes private homes (no home care)

** Cell value suppressed for reasons of privacy and confidentiality.

Note: Cells in which there were no reported or available data are marked with a hyphen (-).

EXHIBIT 8.6A Proportion of adult patients with stroke or transient ischemic attack receiving rehabilitation therapy in complex continuing care, by type of therapy, in Ontario, 2008/09–2011/12

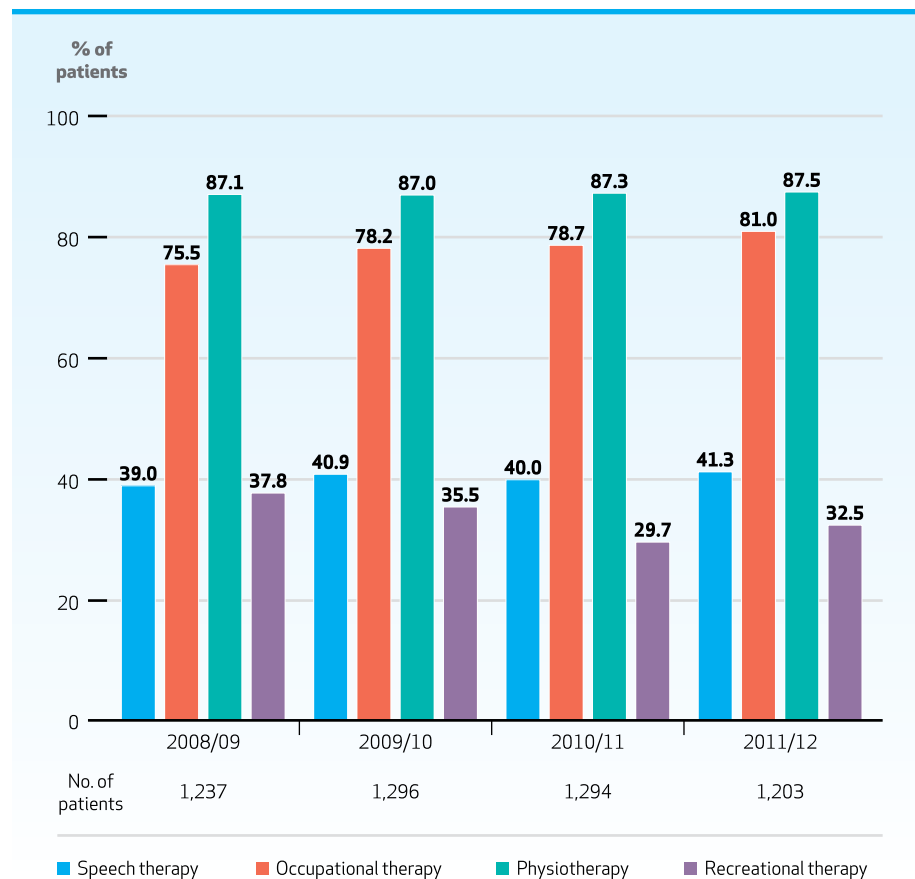
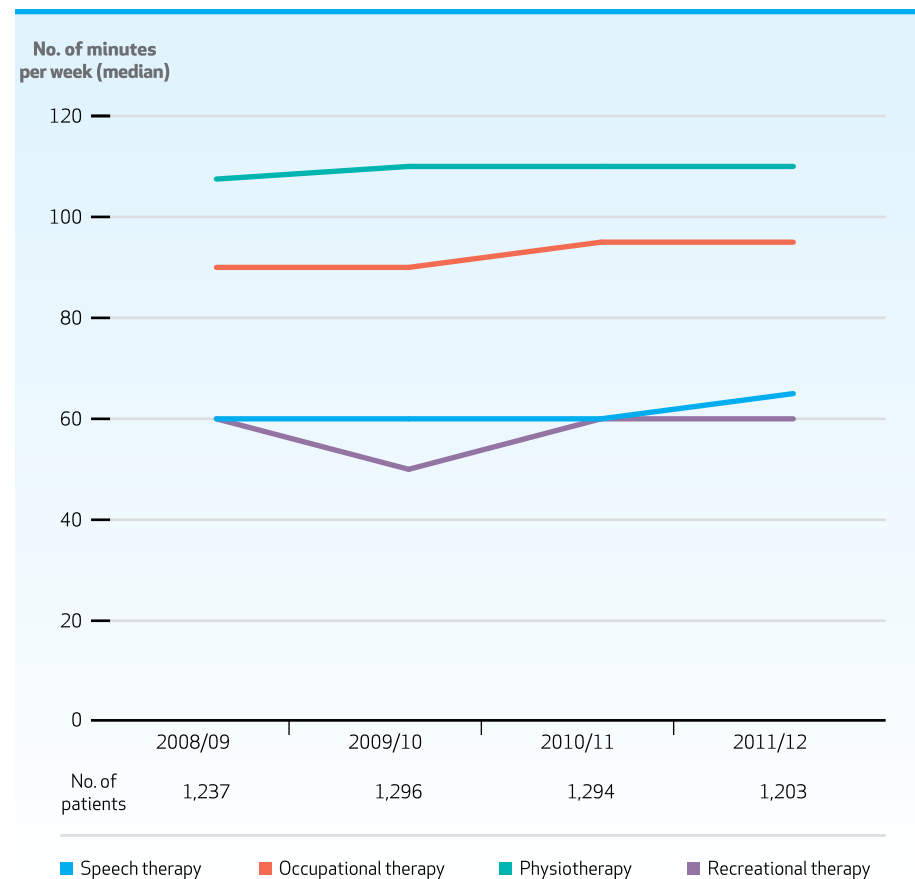


EXHIBIT 8.6B Intensity of rehabilitation therapy for adult patients with stroke or transient ischemic attack in complex continuing care, by type of therapy, in Ontario, 2008/09–2011/12



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2008/09–2011/12 and Continuing Care Reporting System, Complex Continuing Care Database (CCRS-CCC), 2012/13.
 Inclusion criteria: All patients discharged alive following an inpatient stroke or transient ischemic attack (from CIHI-DAD, 2008/09–2011/12) who appeared in the CCRS-CCC database within 6 months of discharge from acute care discharge.
 Note: Therapy time could include individual sessions as well as group sessions consisting of one therapist to four patients for occupational therapy and physiotherapy, and one therapist to eight patients for recreational therapy.

CONCLUSIONS

More patients were accessing inpatient rehabilitation in 2012/13. Following an acute stroke, 32.6% of stroke patients (3,628) received inpatient rehabilitation, an increase from 27.7% (2,929) in 2003/04. All inpatient rehabilitation facilities provided more timely access to rehabilitation; however, freestanding facilities had a dramatic improvement, from a median of 19 days in 2003/04 to 13 days in 2012/13. Additionally, a larger proportion of patients were discharged to the community. Therefore, better results were achieved within a shorter length of stay, despite lower total admission FIM scores, a decrease in active length of stay and discharge total FIM scores remaining stable.

These improvements resulted in more patients accessing inpatient rehabilitation even though there was no increase in the number of inpatient rehabilitation beds. Among patients admitted to inpatient rehabilitation, there was an increase in the number of patients with moderate to severe stroke, and a decrease in those with mild stroke. Additionally, more patients were referred to outpatient rehabilitation following a stay in acute care.

The number of patients in complex continuing care declined, and the median time from acute care admission to complex continuing care dropped from 36 days in 2008/09 to 28 days in 2011/12. Additionally, the median length of stay in complex continuing care decreased from 63 days in 2008/09 to 57 days in 2011/12, with minimal change in the intensity of rehabilitation therapy.

RECOMMENDATIONS

1. The OSN should continue to work with the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information to capture measurement of rehabilitation intensity with the National Rehabilitation Reporting System, because improvements in patient FIM efficiency scores and length of stay cannot be interpreted without a better understanding of the intensity of therapy provided.
2. The OSN should continue to work with the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information to develop a standard measure of rehabilitation intensity that will allow for the evaluation of rehabilitation outcomes across the care continuum.
3. The OSN should continue to collaborate with the Rehabilitation Care Alliance to establish a rehabilitation system evaluation framework that would drive system change to improve access, efficiencies and patient outcomes.
4. The OSN should continue to work with the Rehabilitation Care Alliance to develop common measures of patient outcomes across rehabilitation sectors.
5. Further evaluation of rehabilitation in complex continuing care is needed, given that admitted patients are typically older and less than a third of them are discharged to the community. Additionally, the role complex continuing care plays in stroke rehabilitation needs to be evaluated by the provincial Stroke Capacity Planning Committee.
6. The Central West LHIN has been a consistent outlier for key OSN rehabilitation indicators (e.g., timely access to inpatient rehabilitation, length of stay, access to inpatient rehabilitation by patients with severe stroke). A review of rehabilitation capacity for stroke patients living in this region is warranted.

9 Home Care Services

Key Findings

EXHIBIT 9.1A

- The total number of stroke patients referred to Community Care Access Centres (CCAC) increased, but the proportion receiving CCAC-based rehabilitation services declined from 57.8% in 2006/07–2007/08 to 51.3% in 2011/12–2012/13.
- Of the 7,101 patients who received CCAC services following an acute care hospitalization for stroke in 2011/12–2012/13, 14.1% received the services after an inpatient rehabilitation stay, and among these patients, 89.4% received rehabilitation services (data not shown).

EXHIBIT 9.1B

- Among patients with stroke or transient ischemic attack (TIA), 17.8% received CCAC nursing services, and 29.9% received personal support and homemaking services over 60 days.
- Among patients with stroke or TIA, 20.8% received physiotherapy, 38.0% received occupational therapy and 9.7% received speech therapy.
- All CCAC services to patients with stroke or TIA declined over time, with the exception of personal support and homemaker services (data not shown).

EXHIBIT 9.1C

- The proportion of stroke patients receiving CCAC rehabilitation services in 2011/12–2012/13 varied from 30.7% in the North East LHIN to 70.7% in the South East LHIN.
- The dramatic increase in the delivery of CCAC rehabilitation services in the South East LHIN, from 60.2% in 2006/07–2007/08 to 73.0% in 2010/11–2011/12, likely reflects the enhanced community-based rehabilitation initiative in this region; however, it dropped slightly in the most recent year.
- The Toronto Central LHIN had a dramatic increase in the proportion of patients receiving CCAC rehabilitation services, from 34.1% in 2010/11–2011/12 to 41.2% in 2011/12–2012/13.

EXHIBIT 9.1D

- In 2011/12–2012/13, the median number of days to provision of first CCAC rehabilitation service varied across the LHINS, ranging from 8.0 days in the Central West LHIN to 25.5 days in the North East LHIN.

EXHIBITS 9.2A, 9.2B

- From 2008/09–2009/10 onward, there was a steady increase in the intensity of personal support services provided, from a mean of 18.7 hours over two months in 2008/09–2009/10 to 35.9 hours over two months in 2011/12–2012/13. However, only a few LHINs provided personal support to stroke patients, while homemaking services were offered in most LHINs.

EXHIBIT 9.2C

- The mean number of CCAC rehabilitation service visits over two months in 2011/12–2012/13 varied from 2.7 in the Toronto Central LHIN to 6.3 in the South East LHIN.

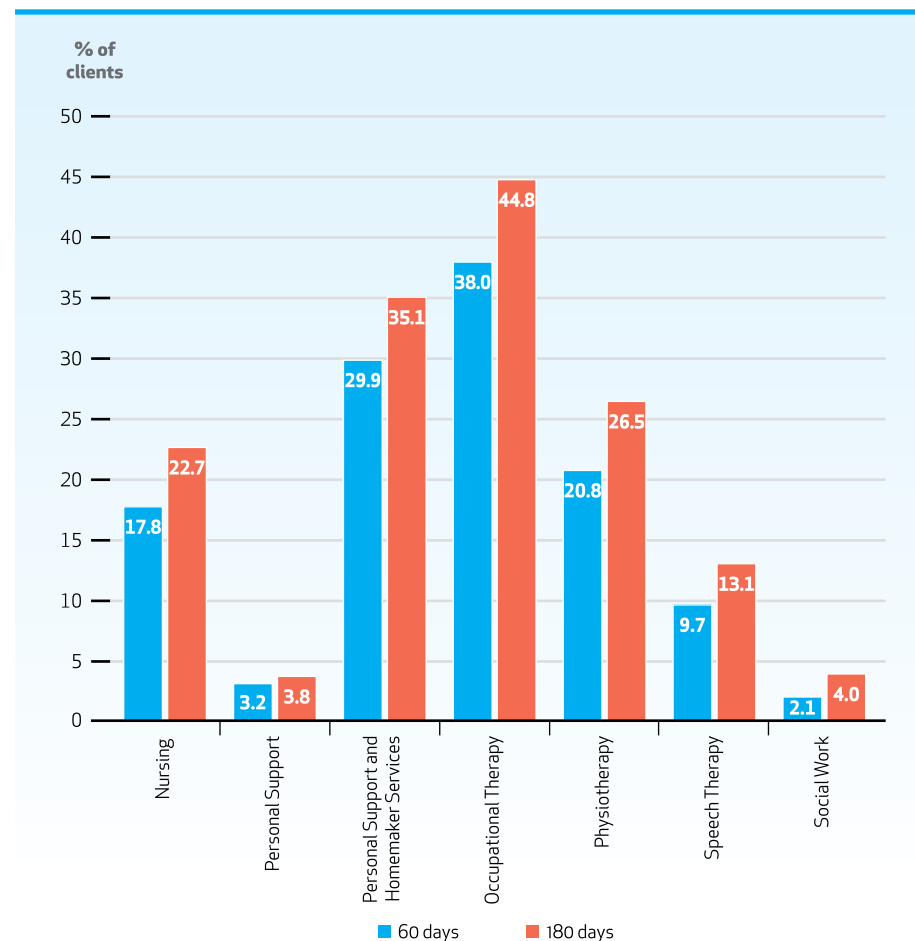
EXHIBIT 9.2D

- The mean number of rehabilitation service visits per patient (for occupational therapy, physiotherapy, speech therapy or social work) declined from 6.9 visits over 180 days in 2006/07–2007/08 to 5.8 visits over 180 days in 2011/12–2012/13.
- Between 2006/07 and 2012/13, the mean number of rehabilitation service visits per patient declined across the LHINs, except for the South East LHIN where the number increased from 7.5 to 12.1 visits and the North Simcoe Muskoka LHIN where the number increased from 8.1 to 10.4 visits.

EXHIBIT 9.1A Proportion of adult stroke patients¹ receiving Community Care Access Centre support services² following an acute stroke, in Ontario and by sex, 2006/07–2007/08 and 2009/10–2012/13



EXHIBIT 9.1B Proportion of adult stroke patients¹ receiving Community Care Access Centre services over 60 and 180 days, by type of service, in Ontario, 2011/12–2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2006/07–2011/12; Ontario Ministry of Health and Long-Term Care, Home Care Database, 2006/07–2012/13.

Inclusion criteria: All clients aged ≥18 years discharged from an acute care facility in 2006/07–2012/13 with a stroke-related diagnosis (based on ICD-10-CA codes) who received home care services within 60 days of discharge. Active clients included those receiving home care services 90 days before admission to acute care (N = 1,741, 1,903, 2,011 and 2,110 respectively). New clients included those not receiving home care services 90 days before acute care hospitalization for stroke (N = 4,118, 4,479, 5,065 and 4,991 respectively).

1 Based on patient visits (i.e., includes multiple patient-visits if they occurred in different LHINs).

2 Includes rehabilitation services only (physiotherapy, occupational therapy, speech therapy and social work).

Note: CCAC-based analysis (i.e., the location of the CCAC was used to report regional performance).

EXHIBIT 9.1C Variation in the proportion of adult stroke patients¹ receiving Community Care Access Centre rehabilitation services², in Ontario and by Local Health Integration Network, 2006/07–2007/08 and 2009/10–2012/13

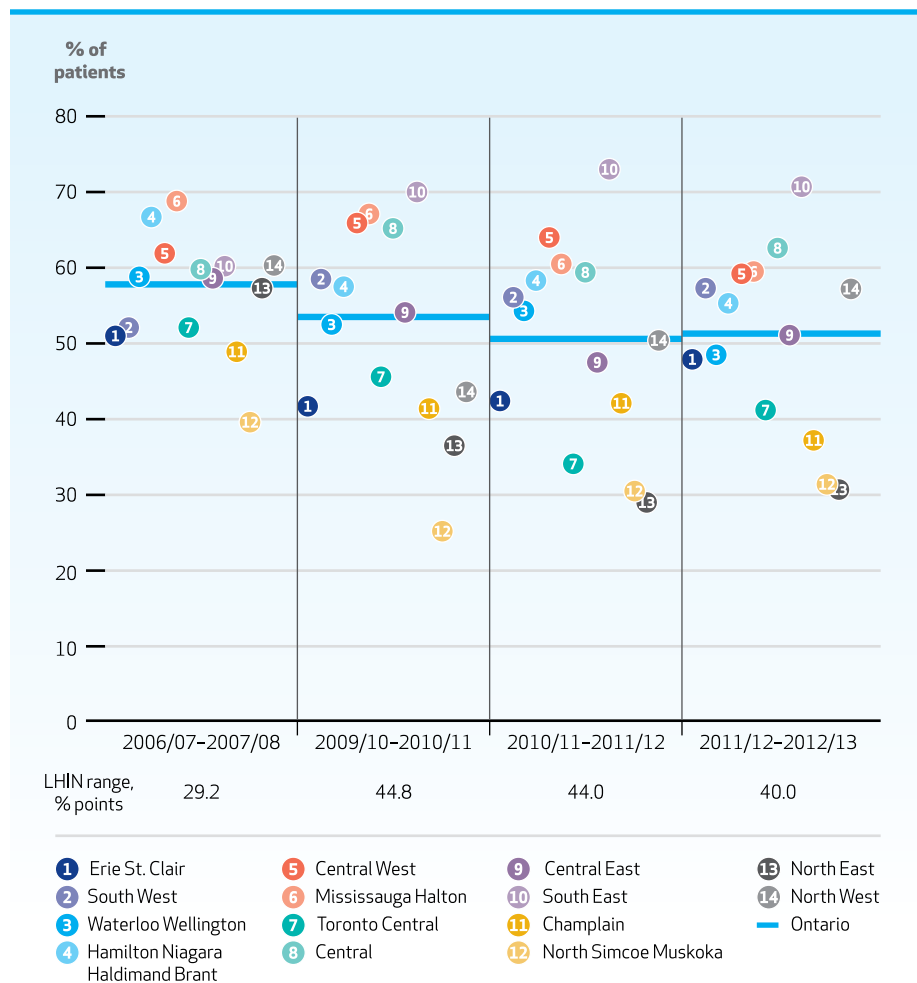
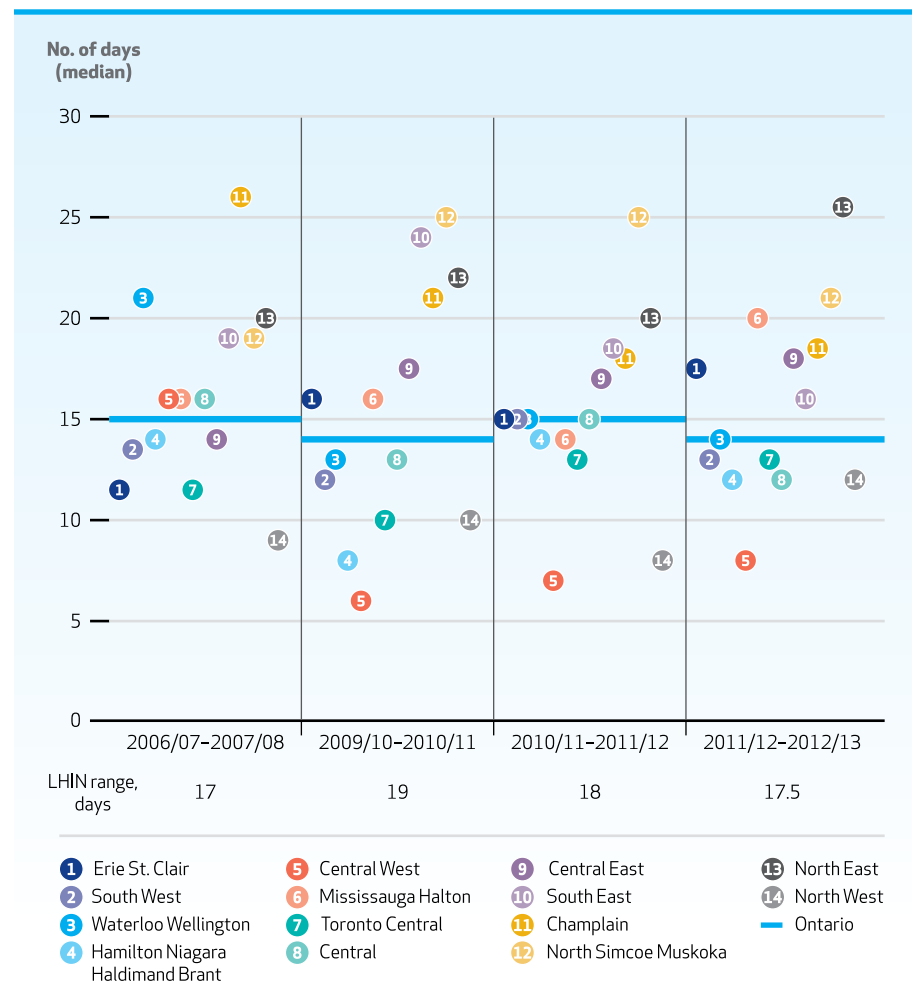


EXHIBIT 9.1D Variation in the median number of days to first Community Care Access Centre rehabilitation service^{1,2}, in Ontario and by Local Health Integration Network, 2006/07–2007/08 and 2009/10–2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2006/07–2011/12; Ontario Ministry of Health and Long-Term Care, Home Care Database, 2006/07–2012/13.

Inclusion criteria: All clients aged ≥18 years discharged from an acute care facility in 2006/07–2012/13 with a stroke-related diagnosis (based on ICD-10-CA codes) who received home care services within 60 days of discharge. Active clients included those receiving home care services 90 days before admission to acute care (N = 1,741, 1,903, 2,011 and 2,110 respectively). New clients included those not receiving home care services 90 days before acute care hospitalization for stroke (N = 4,118, 4,479, 5,065 and 4,991 respectively).

1 Based on patient visits (i.e., includes multiple patient-visits if they occurred in different LHINs).

2 Includes rehabilitation services only (physiotherapy, occupational therapy, speech therapy and social work).

Notes:

(1) CCAC-based analysis (i.e., the location of the CCAC was used to report regional performance).

(2) The calculated time in days to first CCAC rehabilitation visit was based on subtracting the acute care stroke or TIA discharge date from the first CCAC rehabilitation service date.

EXHIBIT 9.2A Mean number of Community Care Access Centre visits provided to adult home care clients¹ within 60 days following an acute care hospitalization, in Ontario, 2006/07–2012/13

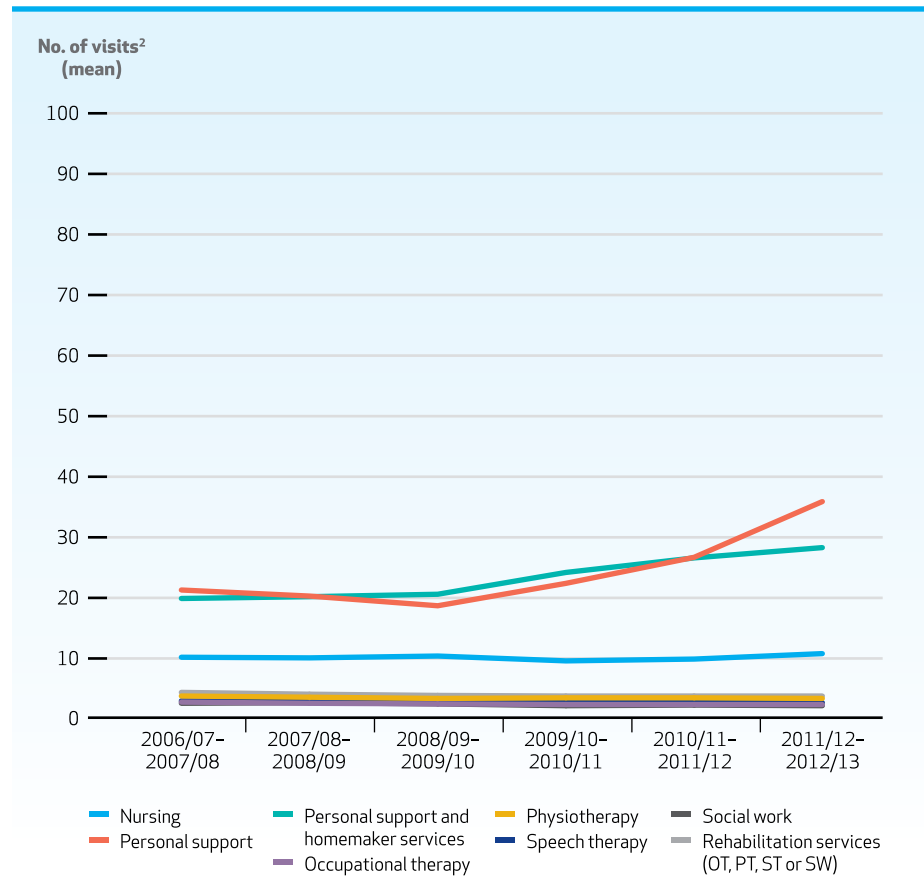
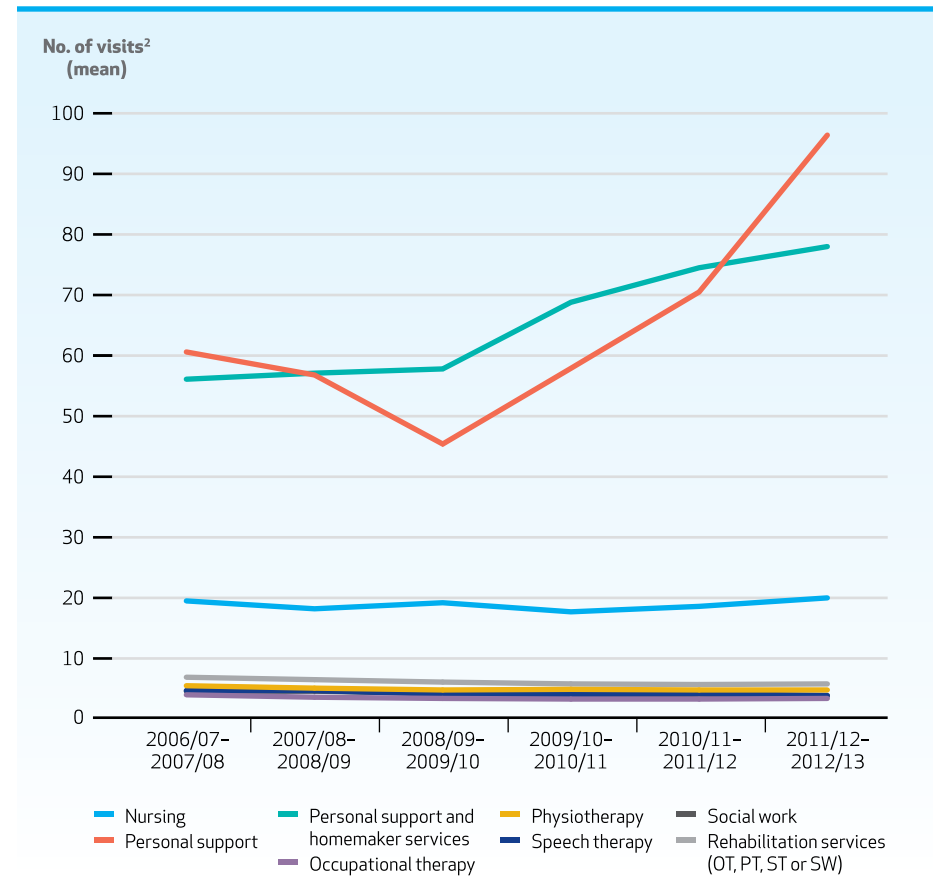


EXHIBIT 9.2B Mean number of Community Care Access Centre visits provided to adult home care clients¹ within 180 days following an acute care hospitalization, in Ontario, 2006/07–2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2006/07–2011/12; Ontario Ministry of Health and Long-Term Care, Home Care Database, 2006/07–2012/13.

Inclusion criteria: All clients aged ≥18 years discharged from an acute care facility in 2006/07–2012/13 with a stroke-related diagnosis (based on ICD-10-CA codes) who received home care services within 60 days of discharge. Active clients included those receiving home care services 90 days before admission to acute care (N = 1,741, 1,689, 1,709, 1,903, 2,011 and 2,110, respectively). New clients included those not receiving home care services 90 days before acute care hospitalization for stroke (N = 4,118, 4,268, 4,385, 4,479, 5,065 and 4,991, respectively).

¹ Based on patient visits (i.e., includes multiple patient-visits if they occurred in different LHINs).

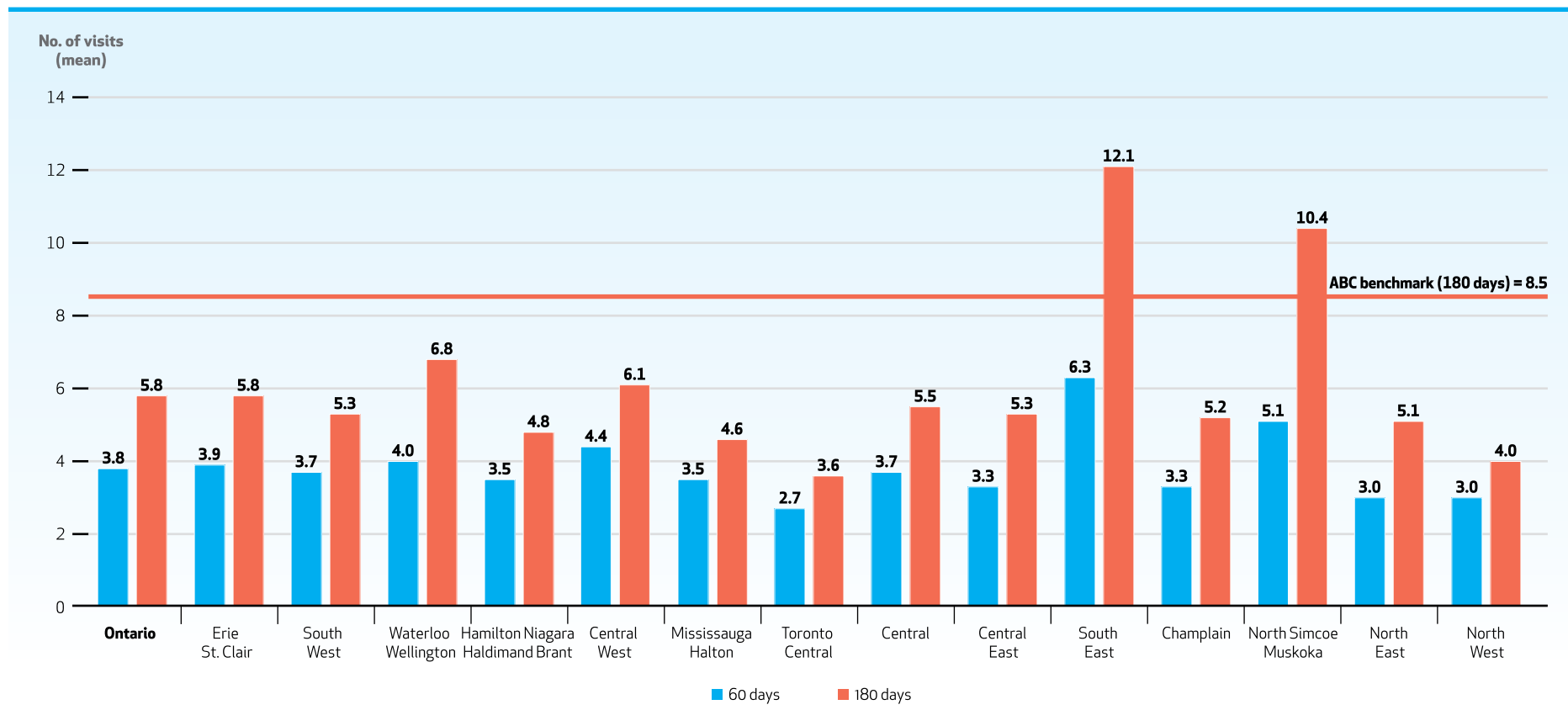
² Personal support and homemaker services are recorded in hours and therefore reported as mean number of hours.

Notes:

(1) A CCAC-based analysis (i.e., the location of the CCAC was used to report regional performance).

(2) The Home Care Database did not include data related to the community-based rehabilitation services initiative in the South East LHIN in 2009/10. This initiative provided, on average, 1.2 rehabilitation services per patient over a 60-day period.

EXHIBIT 9.2C Mean number of Community Care Access Centre rehabilitation visits^{1,2} over 60 and 180 days, in Ontario and by Local Health Integration Network, 2011/12-2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2011/12-2012/13; Ontario Ministry of Health and Long-Term Care, Home Care Database, 2011/12-2012/13.

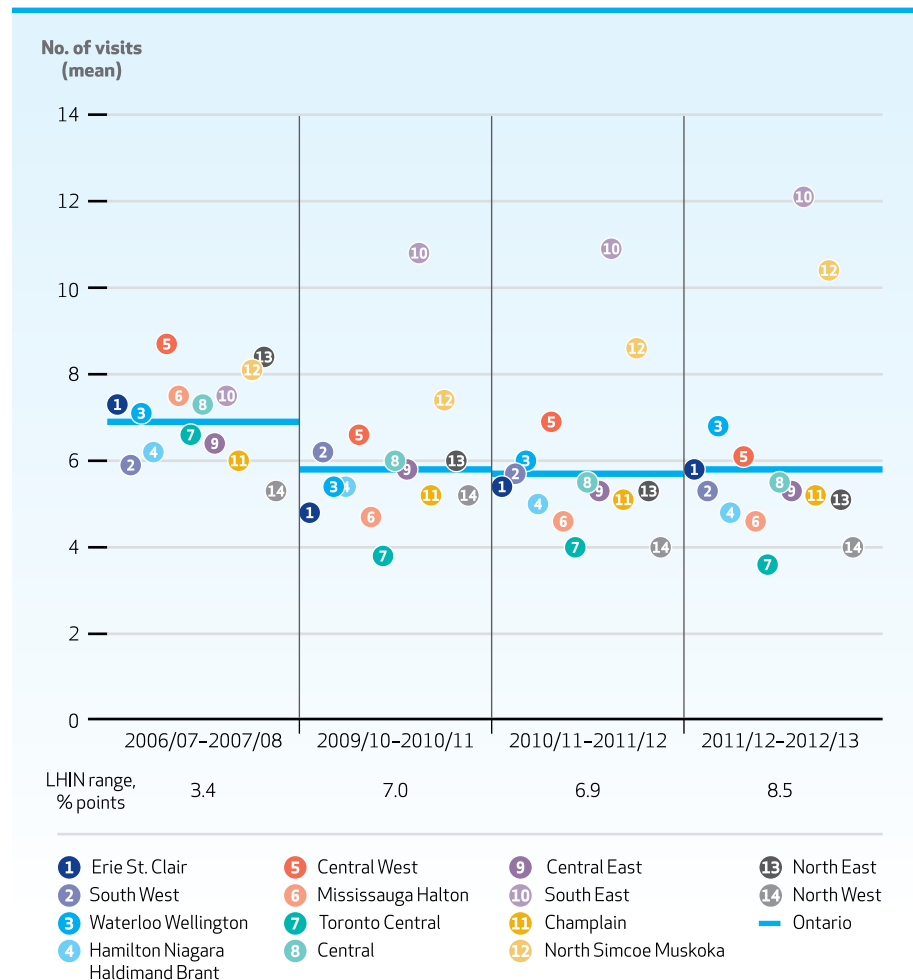
Inclusion criteria: All clients aged ≥18 years discharged from an acute care facility in 2011/12-2012/13 with a stroke-related diagnosis (based on ICD-10-CA codes) who received home care services within 60 days of discharge. Active clients included those receiving home care services 90 days before admission to acute care (N=2,110). New clients included those not receiving home care services 90 days before acute care hospitalization for stroke (N=4,991).

1 Based on patient visits (i.e., includes multiple patient-visits if they occurred in different LHINs).

2 Includes rehabilitation services only (physiotherapy, occupational therapy, speech therapy and social work).

Note: A CCAC-based analysis (i.e., the location of the CCAC was used to report regional performance).

EXHIBIT 9.2D Variation in the mean number of Community Care Access Centre rehabilitation visits^{1,2} provided to adult home care clients with stroke within 180 days following an acute care hospitalization, in Ontario and by Local Health Integration Network, 2006/07–2007/08 and 2009/10–2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2006/07–2011/12; Ontario Ministry of Health and Long-Term Care, Home Care Database, 2006/07–2012/13.
 Inclusion criteria: All clients aged ≥18 years discharged from an acute care facility in 2006/07–2012/13 with a stroke-related diagnosis (based on ICD-10-CA codes) who received home care services within 60 days of discharge. Active clients included those receiving home care services 90 days before admission to acute care (N = 1,741, 1,903, 2,011 and 2,110 respectively). New clients included those not receiving home care services 90 days before acute care hospitalization for stroke (N = 4,118, 4,479, 5,065 and 4,991 respectively).

1 Based on patient visits (i.e., includes multiple patient-visits if they occurred in different LHINs).
 2 Includes rehabilitation services only (physiotherapy, occupational therapy, speech therapy and social work).
 Notes:
 (1) A CCAC-based analysis (i.e., the location of the CCAC was used to report regional performance).
 (2) The Home Care Database did not include data related to the community-based rehabilitation services initiative in the South East LHIN in 2009/10. This initiative provided, on average, 12 rehabilitation services per patient over a 60-day period.

CONCLUSIONS

Over the two-year period from 2011/12 to 2012/13, half (51.3%) of patients with stroke or TIA received CCAC rehabilitation services after an acute care hospitalization; only 8 of 14 LHINs provided CCAC rehabilitation services to more than 50% of stroke patients. The variation in CCAC rehabilitation service provision across LHINs may reflect health care human resource availability, as well as variation in patient criteria to receive services.

Although there was wide variation in the proportion of stroke patients accessing CCAC rehabilitation services, the intensity of services provided was not sufficient to have an impact on functional outcomes. The OSN has recommended 2 to 3 community-based rehabilitation visits per week (per required discipline) for 8 to 12 weeks, but current data indicate that patients receive only 3 to 5 CCAC rehabilitation visits over an eight-week period.

RECOMMENDATIONS

1. The OSN should continue to work with Health Quality Ontario and the Ministry of Health and Long-Term Care to develop the phase 2 QBP funding model for best practice community care and outpatient rehabilitation.
2. The OSN should continue to collaborate with the Rehabilitation Care Alliance to develop measurements for community care and outpatient rehabilitation intensity.

10 Patient Outcomes – Stroke Quality-Based Procedures

Key Findings

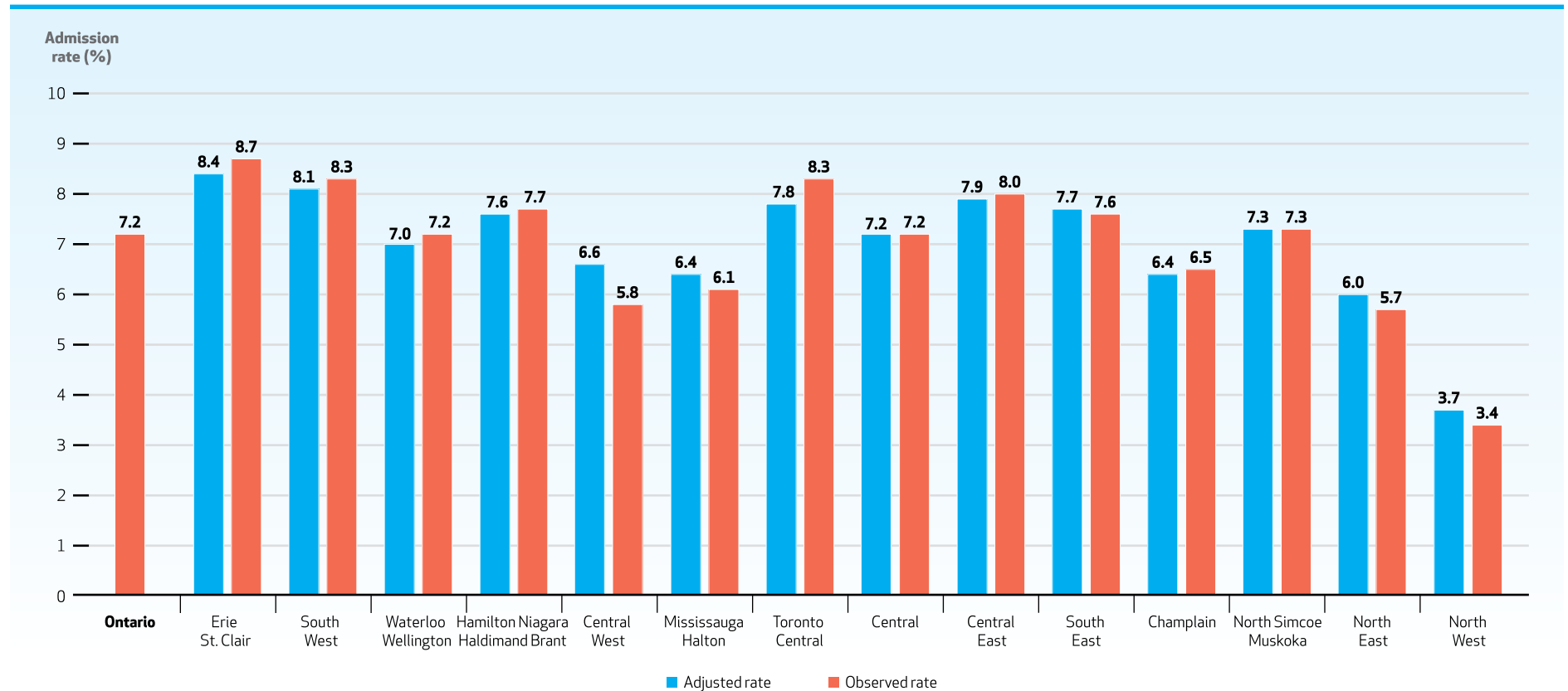
EXHIBIT 10.1

- In 2011, among QBP patients with stroke (excluding subarachnoid hemorrhage) or TIA, the age- and sex-adjusted rate of admission to long-term care within one year of discharge from acute care was 7.2%.
 - In 2011, the North West LHIN had the lowest age- and sex-adjusted rate of admission to long-term care (3.7%) and the Erie St. Clair LHIN had the highest (8.4%).
-

EXHIBIT 10.2

- The 30-day risk-adjusted mortality rate among QBP patients admitted for stroke (excluding subarachnoid hemorrhage) or TIA was 11.1%.
- In 2012/13, the Central West LHIN had the lowest 30-day risk-adjusted mortality rate (6.2%) and the North East LHIN had the highest (15.6%).

EXHIBIT 10.1 Age- and sex-adjusted¹ rates of adult patients with stroke or transient ischemic attack admitted to long-term care within one year following an acute care discharge, in Ontario and by Local Health Integration Network, 2011



Datasources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2011; Ontario Association of Community Care Access Centres, Client Profile Database.

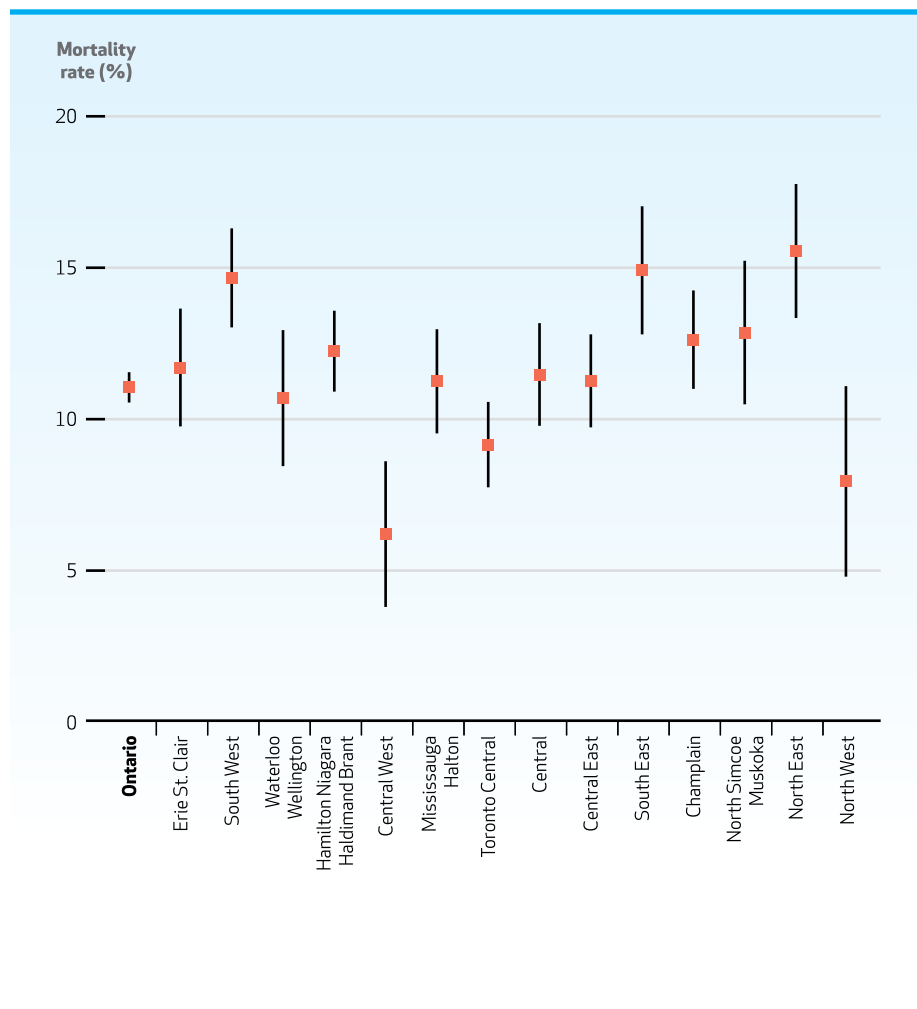
Inclusion criteria: All patients aged ≥18 years discharged alive following an inpatient acute care admission for stroke (excluding subarachnoid hemorrhage) or transient ischemic attack.

Exclusion criteria: Patients with palliative care as initial treatment plan and those that had submitted an application prior to their stroke admission.

¹ Indirect standardization based on an age-sex regression model was used to calculate adjusted rates.

Note: Population-based analysis (i.e., the location of the patient's residence was used to report regional performance).

EXHIBIT 10.2 Risk-adjusted mortality rate¹ at 30 days following an inpatient stay for stroke or transient ischemic attack, in Ontario and by Local Health Integration Network, 2012/13–2013/14



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2012/13; Ontario Ministry of Health and Long-Term Care, Registered Persons Database (RPDB), 2012/13–2013/14.

Inclusion criteria: All patients aged ≥18 years who died either in hospital or following discharge within 30 days of admission to an inpatient setting of an acute care hospital with a diagnosis of stroke (excluding subarachnoid hemorrhage) or transient ischemic attack.

¹ Adjusted rate is the observed mortality rate adjusted for risk [age + sex + ambulance arrival + atrial fibrillation + stroke/TIA + (coronary artery disease or percutaneous coronary intervention or coronary artery bypass graft) + (carotid disease or carotid endarterectomy/carotid artery stenting) + diabetes + hypertension + peripheral vascular disease + hyperlipidemia + stroke type].

11 Patient Outcomes

Key Findings

EXHIBIT 11.1

- In 2012/13, the age- and sex-adjusted revisit/readmission rate was lower at designated stroke centres (3.5% for regional stroke centres and 4.1% for district stroke centres) than at non-designated centres (4.8%).
- Consistently, TIA patients had the highest rate of stroke- or TIA-related revisits or readmissions, highlighting their need for improved care.
- In 2012/13, the Erie St. Clair LHIN and the North West LHIN had the lowest revisit/readmission rate (3.0%) and the Hamilton Niagara Haldimand Brant LHIN had the highest (5.8%).

EXHIBIT 11.2

- Following the first emergency department (ED) visit or inpatient admission for stroke or TIA, the rate of a related revisit or admission within 90 days remained stable at 6.7% in the three years between 2009/10 and 2011/12.

- Adjusted revisit or readmission rates for patients with intracerebral hemorrhage declined steadily from 5.4% in 2003/04 to 4.1% in 2011/12 ($p < 0.01$).
- TIA patients had the highest rate of revisits and readmissions at 8.5%.
- Non-designated centres consistently had the highest rate of readmission within 90 days; in 2011/12, the rate was 7.4%, compared to 5.9% at regional stroke centres and 6.2% at district stroke centres ($p < 0.05$).
- The Erie St. Clair and South East LHINs had the lowest 90-day revisit/readmission rate in 2011/12 (6.3%) and the North West LHIN had the highest (8.0%). Over time, the variation in rates among LHINs declined.

EXHIBIT 11.3

- The provincial age- and sex-adjusted 30-day revisit or readmission rate for stroke or TIA declined from 5.0% in 2003/04 to 4.3% in 2012/13 ($p < 0.01$). The 90-day rate decreased from 7.0% in 2003/04 to 6.7% in 2011/12 ($p < 0.05$).

EXHIBIT 11.4A

- For all stroke types, there was a decrease in age- and sex-adjusted all-cause non-elective readmission rates within 30 days of discharge from stroke acute care between 2003/04 and 2012/13.
- In 2012/13, patients with subarachnoid hemorrhage had the highest rate of all-cause readmission (8.9%).
- Non-designated centres had the highest all-cause readmission rate in 2012/13 (7.6%), followed by regional and district stroke centres at 7.3% and 7.0%, respectively.
- The Central West LHIN had the highest all-cause readmission rate in 2012/13 (8.4%). Variation across the LHINs increased in comparison to the 2010/11 OSN baseline target.

EXHIBIT 11.4B

- Following the first ED visit or inpatient admission for stroke or TIA, the rate of another non-elective inpatient admission for any cause within 30 days steadily declined in Ontario, from 8.8% in 2003/04 to 7.4% in 2012/13 ($p < 0.0001$).

EXHIBITS 11.5A, 11.5B

- Among patients with stroke or TIA provincially, the age- and sex-adjusted rate of admission to long-term care within one year of discharge from acute care declined from 11.1% in 2004 to 7.1% in 2011. However, this rate remained above the OSN target of 3.75%.
- In 2011, the North West LHIN had the lowest age- and sex-adjusted rate of admission to long-term care (3.5%) and the Erie St. Clair LHIN had the highest (8.5%). The variation across LHINs declined from 2004 onward.

EXHIBIT 11.6

- The in-hospital risk-adjusted mortality rate among patients admitted for stroke or TIA decreased for all hospital types and across most LHINs.
- From 2003/04 to 2012/13, a dramatic decline in the in-hospital risk-adjusted mortality rate was observed at district stroke centres (from 15.6% to 8.5%) and non-designated centres (from 16.1% to 10.3%).

EXHIBIT 11.7

- Regional stroke centres had the lowest 30-day risk-adjusted mortality rate (12.3%), followed by non-designated centres (12.5%) and district stroke centres (12.7%) ($p=0.05$).
- In 2012/13, the Central West LHIN had the lowest 30-day risk-adjusted mortality rate (7.2%) and the North East LHIN had the highest (16.6%).

EXHIBIT 11.8

- The one-year risk-adjusted mortality rate following stroke or TIA declined from 2003/04 to 2011/12 for all hospital types and among most LHINs.
- In 2011/12, district stroke centres had the lowest one-year risk-adjusted mortality rate (21.2%), compared to regional stroke centres (23.0%) and non-designated centres (24.1%) ($p<0.05$).
- In 2011/12, the North West LHIN had the lowest one-year risk-adjusted mortality rate (18.1%) and the North East LHIN had the highest (27.0%).

EXHIBIT 11.9

- The in-hospital risk-adjusted mortality rate among patients admitted for stroke or TIA decreased significantly from 14.2% in 2003/04 to 9.9% in Ontario in 2012/13 ($p<0.0001$).
- The 30-day risk-adjusted mortality rate among patients admitted to hospital for stroke or TIA declined from 15.8% in 2003/04 to 12.6% in 2012/13 ($p<0.0001$).
- The one-year risk-adjusted mortality rate following stroke or TIA declined steadily from 27.9% in 2003/04 to 23.3% in 2011/12 ($p<0.0001$).

EXHIBIT 11.1 Age- and sex-adjusted stroke- or TIA-related revisit or readmission rates within 30 days following a stroke or transient ischemic attack, in Ontario and by stroke type, Ontario Stroke Network designation and Local Health Integration Network, 2003/04 and 2010/11–2012/13

Group/Subgroup	30-Day Revisit/Readmission Rate							
	2003/04		2010/11		2011/12		2012/13	
	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)
Ontario	5.0	5.0 (4.7–5.2)	4.7	4.7 (4.5–5.0)	4.9	4.9 (4.6–5.1)	4.3	4.3 (4.0–4.5)
Stroke Type								
Intracerebral hemorrhage	3.7	3.7 (2.5–4.9)	3.0	3.0 (1.9–4.0)	2.3	2.2 (1.2–3.3)	1.6	1.6 (0.7–2.6)
Ischemic stroke	4.0	4.0 (3.6–4.4)	4.0	3.9 (3.6–4.3)	4.1	4.1 (3.7–4.5)	3.5	3.5 (3.1–3.8)
Subarachnoid hemorrhage	5.1	5.1 (3.4–6.7)	4.2	4.3 (2.8–5.8)	4.9	4.8 (3.3–6.3)	5.3	5.5 (4.0–6.9)
Transient ischemic attack	6.7	6.7 (6.3–7.2)	6.3	6.4 (5.9–6.8)	6.5	6.5 (6.1–7.0)	5.8	5.8 (5.4–6.2)
Ontario Stroke Network Designation								
Regional stroke centre	4.3	4.3 (3.7–4.9)	3.7	3.7 (3.2–4.2)	4.0	4.0 (3.5–4.5)	3.5	3.5 (3.0–4.0)
District stroke centre	5.0	5.0 (4.3–5.7)	4.6	4.7 (4.1–5.3)	4.2	4.2 (3.6–4.8)	4.1	4.1 (3.6–4.7)
Non-designated centre	5.2	5.2 (4.8–5.6)	5.4	5.4 (5.0–5.7)	5.6	5.7 (5.3–6.1)	4.8	4.8 (4.4–5.1)
Local Health Integration Network								
1. Erie St. Clair	4.9	4.9 (3.8–6.0)	3.7	3.8 (2.7–4.8)	4.3	4.3 (3.2–5.4)	3.0	3.0 (2.0–4.1)
2. South West	4.7	4.7 (3.7–5.7)	5.0	5.0 (4.0–5.9)	4.3	4.3 (3.4–5.3)	4.6	4.6 (3.7–5.5)
3. Waterloo Wellington	4.5	4.5 (3.2–5.9)	5.2	5.3 (4.0–6.5)	4.5	4.6 (3.4–5.7)	3.8	3.8 (2.6–4.9)
4. Hamilton Niagara Haldimand Brant	4.7	4.7 (3.9–5.5)	4.7	4.7 (3.9–5.4)	5.2	5.2 (4.4–6.0)	5.8	5.8 (5.1–6.5)
5. Central West	5.4	5.4 (3.9–6.8)	5.2	5.2 (3.8–6.5)	4.4	4.4 (3.0–5.7)	4.8	4.8 (3.5–6.0)
6. Mississauga Halton	5.0	5.0 (3.9–6.1)	4.7	4.7 (3.7–5.8)	4.9	4.9 (3.8–5.9)	3.7	3.7 (2.8–4.7)
7. Toronto Central	3.9	3.9 (3.0–4.8)	4.4	4.4 (3.6–5.2)	5.0	4.9 (4.1–5.7)	3.7	3.7 (2.9–4.4)
8. Central	5.0	5.0 (4.0–6.0)	5.0	5.0 (4.1–5.9)	5.2	5.2 (4.3–6.1)	4.0	4.0 (3.2–4.9)
9. Central East	5.6	5.6 (4.8–6.5)	5.3	5.3 (4.4–6.1)	5.2	5.3 (4.4–6.1)	4.5	4.5 (3.7–5.3)
10. South East	5.7	5.7 (4.5–7.0)	5.5	5.5 (4.2–6.9)	4.5	4.5 (3.2–5.8)	3.9	3.9 (2.7–5.1)
11. Champlain	5.4	5.4 (4.5–6.3)	5.3	5.3 (4.4–6.2)	5.4	5.4 (4.5–6.3)	4.4	4.4 (3.5–5.2)
12. North Simcoe Muskoka	5.6	5.6 (4.2–6.9)	4.4	4.4 (3.1–5.8)	4.8	4.8 (3.4–6.1)	4.6	4.6 (3.3–5.9)
13. North East	4.9	4.9 (3.8–6.0)	3.8	3.8 (2.6–4.9)	4.3	4.3 (3.1–5.4)	3.9	3.9 (2.8–5.0)
14. North West	4.1	4.1 (2.3–5.9)	3.0	3.0 (1.3–4.7)	5.3	5.2 (3.5–7.0)	3.0	3.0 (1.4–4.6)

Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and National Ambulatory Care Reporting System (NACRS), 2003/04–2013/14.

Inclusion criteria: All patients aged ≥18 years readmitted to an emergency department or acute care inpatient setting with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack within 30 days of the initial event (stroke or TIA) in each year.

Exclusion criteria: Patients with an elective admission, scheduled emergency department visit or transfer within a facility or between facilities within 24 hours, or those with palliative care as an initial treatment plan.

1 Indirect standardization based on an age-sex regression model was used to calculate adjusted rates.

Notes:

(1) No washout periods were applied; for example, if a patient's first hospitalization for stroke had a discharge date of March 31, 2009 (in the 2008/09 year), followed by another hospitalization for stroke/TIA on April 1, 2009 (in the 2009/10 year), the April 1 hospitalization would be considered the first hospitalization in 2009/10 and not a readmission related to the hospitalization in 2008/09.

(2) Indicates significant difference from the provincial rate. Significance is based on the 95% confidence interval falling entirely above or below the provincial rate.

CI = confidence interval (5th–95th percentile).

EXHIBIT 11.2 Age- and sex-adjusted stroke- or TIA-related revisit or readmission rates within 90 days following a stroke or transient ischemic attack, in Ontario and by stroke type, Ontario Stroke Network designation and Local Health Integration Network, 2003/04 and 2009/10–2011/12

Group/Subgroup	90-Day Revisit/Readmission Rate							
	2003/04		2009/10		2010/11		2011/12	
	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)
Ontario	7.0	7.0 (6.6–7.3)	6.6	6.6 (6.3–7.0)	6.6	6.6 (6.3–6.9)	6.7	6.7 (6.4–7.0)
Stroke Type								
Intracerebral hemorrhage	5.3	5.4 (4.0–6.8)	4.6	4.6 (3.3–5.8)	4.4	4.5 (3.2–5.7)	4.1	4.1 (2.9–5.4)
Ischemic stroke	6.0	6.0 (5.6–6.5)	5.9	5.9 (5.5–6.3)	5.8	5.8 (5.4–6.2)	5.8	5.8 (5.4–6.3)
Subarachnoid hemorrhage	5.8	6.0 (4.0–8.0)	4.0	4.1 (2.3–5.9)	5.1	5.3 (3.6–7.1)	5.4	5.5 (3.8–7.3)
Transient ischemic attack	8.9	8.9 (8.3–9.4)	8.3	8.3 (7.8–8.8)	8.3	8.3 (7.8–8.8)	8.5	8.5 (8.0–9.1)
Ontario Stroke Network Designation								
Regional stroke centre	6.1	6.2 (5.5–6.9)	5.7	5.7 (5.1–6.3)	5.5	5.6 (5.0–6.2)	5.9	5.9 (5.3–6.5)
District stroke centre	7.4	7.4 (6.6–8.2)	6.8	6.8 (6.1–7.5)	6.9	6.9 (6.2–7.6)	6.2	6.2 (5.5–6.9)
Non-designated centre	7.2	7.2 (6.7–7.6)	7.1	7.1 (6.6–7.5)	7.1	7.1 (6.6–7.5)	7.4	7.4 (6.9–7.8)
Local Health Integration Network								
1. Erie St. Clair	7.7	7.7 (6.4–9.0)	7.0	7.0 (5.7–8.2)	6.0	6.1 (4.8–7.3)	6.3	6.3 (5.0–7.5)
2. South West	6.2	6.2 (5.0–7.4)	6.7	6.7 (5.6–7.7)	6.9	6.9 (5.8–8.0)	6.5	6.5 (5.4–7.6)
3. Waterloo Wellington	6.5	6.5 (4.9–8.1)	7.9	7.9 (6.4–9.3)	7.1	7.1 (5.7–8.6)	6.7	6.6 (5.3–8.0)
4. Hamilton Niagara Haldimand Brant	6.9	6.9 (6.0–7.8)	5.8	5.8 (4.9–6.7)	6.7	6.7 (5.8–7.6)	6.7	6.7 (5.8–7.6)
5. Central West	7.7	7.8 (6.1–9.5)	5.9	5.9 (4.3–7.6)	7.5	7.5 (5.9–9.0)	6.3	6.4 (4.8–7.9)
6. Mississauga Halton	7.1	7.1 (5.8–8.4)	5.9	5.9 (4.7–7.1)	6.1	6.1 (4.9–7.3)	6.6	6.6 (5.4–7.9)
7. Toronto Central	5.7	5.7 (4.7–6.8)	6.4	6.4 (5.5–7.3)	6.2	6.2 (5.3–7.2)	6.9	6.9 (6.0–7.9)
8. Central	7.1	7.1 (6.0–8.3)	7.1	7.1 (6.0–8.2)	6.4	6.4 (5.3–7.5)	6.4	6.4 (5.3–7.4)
9. Central East	7.5	7.5 (6.5–8.5)	6.7	6.7 (5.7–7.7)	7.1	7.1 (6.1–8.1)	7.0	7.0 (6.0–8.0)
10. South East	7.2	7.2 (5.7–8.7)	6.0	6.0 (4.4–7.5)	7.4	7.3 (5.8–8.9)	6.3	6.3 (4.8–7.9)
11. Champlain	7.1	7.1 (6.1–8.2)	6.6	6.6 (5.6–7.7)	7.0	7.0 (6.0–8.1)	6.7	6.7 (5.6–7.7)
12. North Simcoe Muskoka	8.1	8.1 (6.5–9.6)	7.8	7.8 (6.2–9.4)	6.4	6.4 (4.8–8.0)	6.8	6.8 (5.2–8.4)
13. North East	6.8	6.8 (5.5–8.1)	8.1	8.1 (6.8–9.4)	6.3	6.3 (5.0–7.7)	7.0	7.0 (5.7–8.3)
14. North West	6.4	6.4 (4.3–8.5)	5.8	5.8 (3.8–7.9)	3.8	3.8 (1.9–5.8)	8.0	8.0 (6.0–10.0)

Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and National Ambulatory Care Reporting System (NACRS), 2003/04–2012/13.

Inclusion criteria: All patients aged ≥18 years readmitted to an emergency department or acute care inpatient setting with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack within 90 days of the initial event (stroke or TIA) in each year.

Exclusion criteria: Patients with an elective admission, scheduled emergency department visit or transfer within a facility or between facilities within 24 hours or those with palliative care as initial treatment plan.

1. Indirect standardization based on an age-sex regression model was used to calculate adjusted rates.

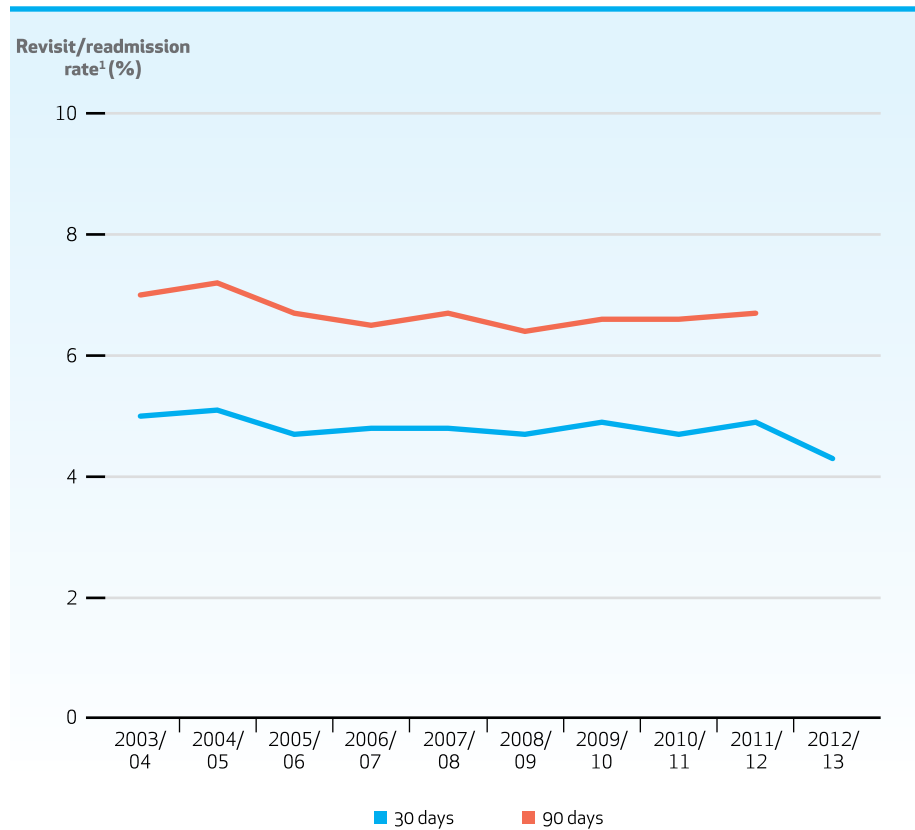
Notes:

(1) No washout periods were applied; for example, if a patient's first hospitalization for stroke had a discharge date of March 31, 2009 (in the 2008/09 year), followed by another hospitalization for stroke or transient ischemic attack on April 1, 2009 (in the 2009/10 year), the April 1 hospitalization would be considered the first hospitalization in 2009/10 and not a readmission related to the hospitalization in 2008/09.

(2) **Indicates significant difference from the provincial rate. Significance is based on the 95% confidence interval falling entirely above or below the provincial rate.**

CI = confidence interval (5th–95th percentile).

EXHIBIT 11.3 Age- and sex-adjusted stroke- or TIA-related revisit or readmission rates within 30 and 90 days following a stroke or transient ischemic attack, in Ontario, 2003/04–2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and National Ambulatory Care Reporting System (NACRS), 2003/04–2013/14.

Inclusion criteria: All patients aged ≥18 years readmitted to an emergency department or acute care inpatient setting with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack within 30 and 90 days of the initial event (stroke or TIA) in each year.

Exclusion criteria: Patients with an elective admission, scheduled emergency department visit or transfer within a facility or between facilities within 24 hours, or those with palliative care as an initial treatment plan.

1. Indirect standardization based on an age-sex regression model was used to calculate adjusted rates.

Note: No washout periods were applied; for example, if a patient's first hospitalization for stroke had a discharge date of March 31, 2009 (in the 2008/09 year), followed by another hospitalization for stroke or TIA on April 1, 2009 (in the 2009/10 year), the April 1 hospitalization would be considered the first hospitalization in 2009/10 and not a readmission related to the hospitalization in 2008/09.

EXHIBIT 11.4A Age- and sex-adjusted all-cause readmission rates within 30 days following a stroke or transient ischemic attack, in Ontario and by stroke type, Ontario Stroke Network designation and Local Health Integration Network, 2003/04 and 2010/11–2012/13

Group/Subgroup	30-Day All-Cause Readmission Rate							
	2003/04		2010/11		2011/12		2012/13	
	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)
Ontario	8.9	8.8 (8.5–9.2)	8.1	8.1 (7.7–8.4)	8.1	8.1 (7.7–8.4)	7.4	7.4 (7.0–7.7)
Stroke Type								
Intracerebral hemorrhage	7.8	8.0 (6.4–9.6)	8.5	8.6 (7.2–10.0)	7.3	7.4 (6.1–8.8)	5.5	5.5 (4.3–6.8)
Ischemic stroke	9.0	8.9 (8.4–9.4)	8.2	8.1 (7.6–8.6)	8.4	8.4 (7.9–8.8)	7.7	7.6 (7.2–8.1)
Subarachnoid hemorrhage	8.4	9.9 (7.5–12.3)	7.6	8.4 (6.4–10.4)	8.0	9.2 (7.1–11.2)	7.9	8.9 (6.9–10.8)
Transient ischemic attack	8.9	8.9 (8.3–9.5)	7.9	7.9 (7.3–8.5)	7.7	7.7 (7.1–8.2)	7.3	7.2 (6.7–7.8)
Ontario Stroke Network Designation								
Regional stroke centre	7.9	8.1 (7.4–8.9)	7.8	7.9 (7.3–8.6)	7.7	7.9 (7.2–8.6)	7.2	7.3 (6.7–7.9)
District stroke centre	8.7	8.7 (7.8–9.6)	7.5	7.5 (6.7–8.2)	7.8	7.7 (7.0–8.5)	7.0	7.0 (6.3–7.7)
Non-designated centre	9.3	9.2 (8.7–9.7)	8.5	8.4 (7.9–8.9)	8.4	8.3 (7.8–8.8)	7.7	7.6 (7.2–8.1)
Local Health Integration Network								
1. Erie St. Clair	9.6	9.6 (8.2–11.1)	7.7	7.7 (6.3–9.1)	7.9	7.9 (6.5–9.3)	6.7	6.7 (5.3–8.1)
2. South West	8.9	8.8 (7.5–10.1)	7.2	7.2 (6.0–8.4)	8.0	7.9 (6.7–9.1)	7.8	7.8 (6.7–8.9)
3. Waterloo Wellington	6.9	6.9 (5.1–8.6)	7.9	7.9 (6.4–9.5)	7.2	7.1 (5.6–8.6)	5.7	5.7 (4.2–7.2)
4. Hamilton Niagara Haldimand Brant	8.5	8.5 (7.4–9.5)	7.4	7.4 (6.4–8.4)	7.7	7.6 (6.6–8.6)	7.1	7.1 (6.2–8.1)
5. Central West	10.2	10.3 (8.4–12.2)	8.9	9.0 (7.3–10.7)	7.8	7.8 (6.1–9.6)	8.3	8.4 (6.8–10.0)
6. Mississauga Halton	8.5	8.7 (7.2–10.1)	7.6	7.6 (6.3–9.0)	8.2	8.3 (7.0–9.7)	7.4	7.4 (6.2–8.7)
7. Toronto Central	8.8	9.0 (7.8–10.2)	8.6	8.7 (7.6–9.7)	8.3	8.5 (7.5–9.6)	8.1	8.2 (7.3–9.2)
8. Central	8.9	8.7 (7.5–10.0)	7.9	7.9 (6.7–9.1)	8.1	8.0 (6.9–9.2)	6.9	6.9 (5.8–8.0)
9. Central East	9.6	9.5 (8.4–10.7)	8.5	8.4 (7.3–9.5)	8.6	8.5 (7.4–9.6)	7.6	7.6 (6.5–8.6)
10. South East	8.3	8.2 (6.6–9.9)	8.4	8.3 (6.6–10.0)	8.3	8.2 (6.5–9.9)	8.0	7.9 (6.4–9.5)
11. Champlain	8.4	8.4 (7.2–9.6)	7.8	7.8 (6.7–9.0)	7.5	7.5 (6.4–8.6)	6.8	6.8 (5.7–7.8)
12. North Simcoe Muskoka	9.6	9.5 (7.7–11.2)	9.1	9.0 (7.2–10.7)	8.3	8.3 (6.6–10.0)	8.3	8.2 (6.6–9.9)
13. North East	10.4	10.5 (9.1–12.0)	9.2	9.3 (7.8–10.8)	8.8	8.9 (7.4–10.3)	7.5	7.5 (6.1–9.0)
14. North West	5.9	5.9 (3.5–8.2)	8.7	8.7 (6.5–10.9)	8.5	8.6 (6.4–10.8)	7.4	7.4 (5.3–9.5)

Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and National Ambulatory Care Reporting System (NACRS), 2003/04–2013/14.

Inclusion criteria: All patients aged ≥18 years readmitted for any cause to an acute care inpatient setting within 30 days of initial stroke (ischemic or hemorrhagic) or transient ischemic attack event in each year.

Exclusion criteria: Patients with an elective admission or transfer within a facility or between facilities within 24 hours or those with palliative care as initial treatment plan.

1. Indirect standardization based on an age-sex regression model was used to calculate adjusted rates.

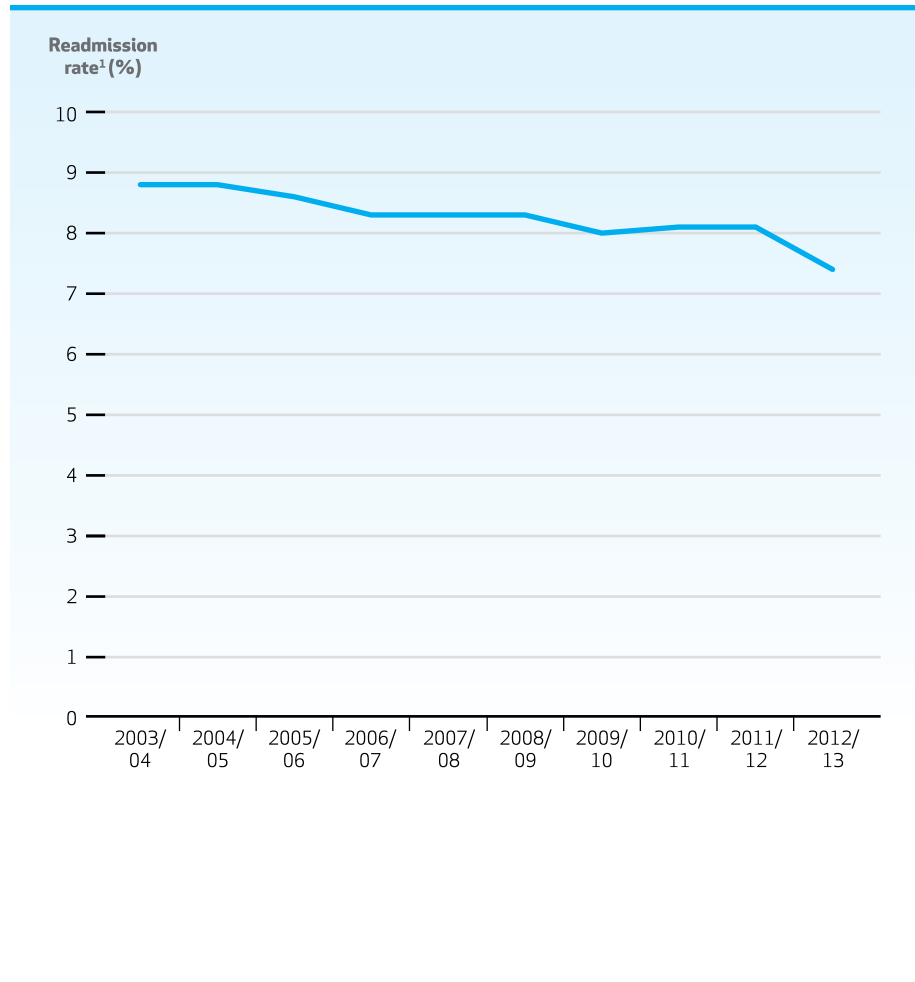
Notes:

(1) No washout periods were applied; for example, if a patient's first hospitalization for stroke had a discharge date of March 31, 2009 (2008/09 year), followed by another hospitalization for stroke or transient ischemic attack on April 1, 2009 (2009/10 year), the April 1 hospitalization would be considered the first hospitalization in 2009/10 and not a readmission related to the hospitalization in 2008/09.

(2) **Indicates significant difference from the provincial rate. Significance is based on the 95% confidence interval falling entirely above or below the provincial rate.**

CI = confidence interval (5th–95th percentile).

EXHIBIT 11.4B Age- and sex-adjusted all-cause readmission rates within 30 days following a stroke or transient ischemic attack, in Ontario, 2003/04–2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD) and National Ambulatory Care Reporting System (NACRS), 2003/04–2013/14.

Inclusion criteria: All patients aged ≥18 years readmitted for any cause to an acute care inpatient setting within 30 days of the initial event (ischemic or hemorrhagic stroke or transient ischemic attack) in each year.

Exclusion criteria: Patients with an elective admission or transfer within a facility or between facilities within 24 hours or those with palliative care as an initial treatment plan.

¹ Indirect standardization based on an age-sex regression model was used to calculate adjusted rates.

Note: No washout periods were applied; for example, if a patient's first hospitalization for stroke had a discharge date of March 31, 2009 (in the 2008/09 year), followed by another hospitalization for stroke or TIA on April 1, 2009 (in the 2009/10 year), the April 1 hospitalization would be considered the first hospitalization in 2009/10 and not a readmission related to the hospitalization in 2008/09.

EXHIBIT 11.5A Age- and sex-adjusted long-term-care admission rates within one year following discharge for an acute stroke or transient ischemic attack, in Ontario and by Local Health Integration Network, 2004 and 2009–2011

Group/Subgroup	Long-Term Care Admission Rates, %							
	2004		2009		2010		2011	
	Observed	Adjusted ¹	Observed	Adjusted ¹	Observed	Adjusted ¹	Observed	Adjusted ¹
Ontario	11.2	11.1	7.3	7.3	7.6	7.6	7.1	7.1
Local Health Integration Network								
1. Erie St. Clair	10.6	10.6	6.1	6.1	8.0	7.9	8.8	8.5
2. South West	12.5	12.1	9.1	8.6	9.0	8.5	8.1	7.9
3. Waterloo Wellington	13.8	13.9	8.7	8.8	7.8	8.0	7.1	6.9
4. Hamilton Niagara Haldimand Brant	12.7	12.2	6.6	6.5	7.2	7.0	7.6	7.5
5. Central West	12.7	14.4	7.9	8.9	6.6	7.5	5.4	6.3
6. Mississauga Halton	10.9	10.8	5.5	5.7	5.2	5.2	5.8	6.1
7. Toronto Central	11.9	11.6	6.7	6.4	7.9	7.7	8.0	7.5
8. Central	10.0	9.9	6.6	6.7	7.9	7.9	7.1	7.1
9. Central East	13.0	13.1	7.5	7.5	7.8	7.9	7.7	7.7
10. South East	10.7	10.5	9.6	9.9	10.7	10.7	7.6	7.6
11. Champlain	5.1	5.0	7.5	7.3	7.9	7.8	6.2	6.2
12. North Simcoe Muskoka	12.4	12.4	9.1	9.1	9.4	9.3	7.0	7.0
13. North East	10.9	11.6	6.9	7.1	5.0	5.2	5.7	5.9
14. North West	6.5	7.4	5.5	6.0	5.1	5.3	3.3	3.5

Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2004–2011; and Ontario Association of Community Care Access Centres, Client Profile Database.

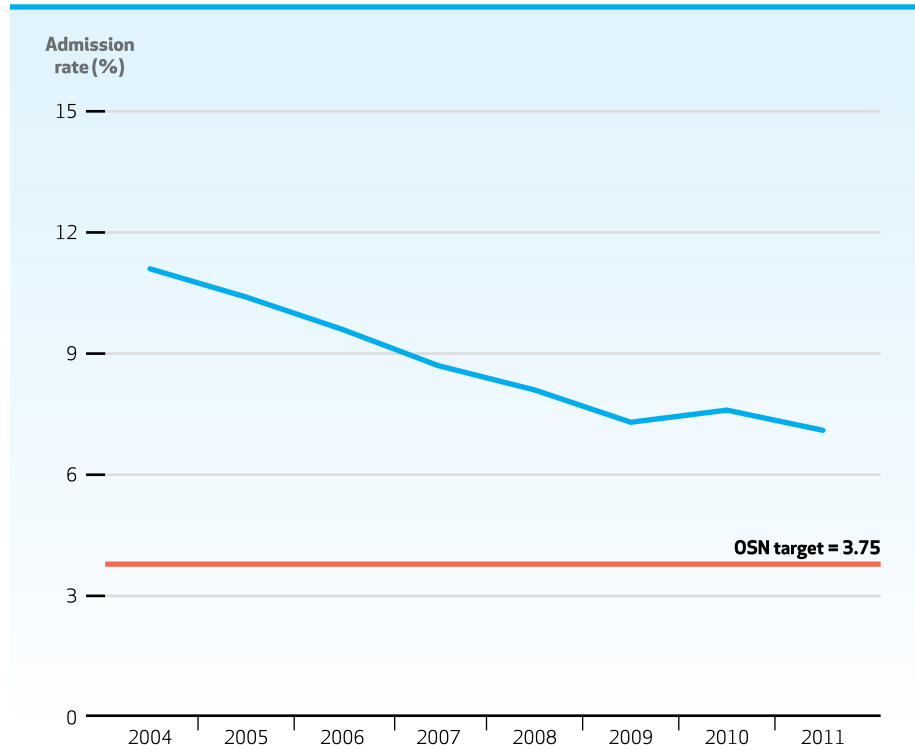
Inclusion criteria: All patients aged ≥18 years discharged alive following an inpatient acute care admission for stroke or transient ischemic attack.

Exclusion criteria: Patients with palliative care as an initial treatment plan and those that had submitted an application prior to their stroke admission.

1 Indirect standardization based on an age-sex regression model was used to calculate adjusted rates.

Note: A population-based analysis (i.e., the location of the patient's residence was used to report regional performance).

EXHIBIT 11.5B Age- and sex-adjusted¹ long-term-care admission rates within one year following discharge for an acute stroke or transient ischemic attack, in Ontario, 2004–2011



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2004–2011; and Ontario Association of Community Care Access Centres, Client Profile Database.
 Inclusion criteria: All patients aged ≥18 years discharged alive following an inpatient acute care admission for stroke or transient ischemic attack.
 Exclusion criteria: Patients with palliative care as an initial treatment plan and those that had submitted an application prior to their stroke admission.
 1 Indirect standardization based on an age-sex regression model was used to calculate adjusted rates.
 Note: A population-based analysis (i.e., the location of the patient’s residence was used to report regional performance).

EXHIBIT 11.6 Risk-adjusted in-hospital mortality rates following a stroke or transient ischemic attack, in Ontario and by Ontario Stroke Network designation and Local Health Integration Network, 2003/04 and 2010/11–2012/13

Group/Subgroup	In-hospital Mortality Rate							
	2003/04		2010/11		2011/12		2012/13	
	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)
Ontario	15.9	14.2 (13.7–14.6)	12.0	11.2 (10.7–11.6)	11.0	10.3 (9.8–10.8)	10.4	9.9 (9.4–10.4)
Ontario Stroke Network Designation								
Regional stroke centre	15.6	14.1 (13.2–15.1)	13.3	11.7 (10.9–12.5)	13.2	11.4 (10.6–12.1)	12.7	11.0 (10.3–11.7)
District stroke centre	15.7	15.6 (14.4–16.8)	10.2	10.4 (9.4–11.5)	8.6	8.6 (7.6–9.6)	8.3	8.5 (7.6–9.5)
Non-designated centre	16.0	16.1 (15.4–16.8)	12.0	12.7 (12.0–13.4)	10.5	11.3 (10.6–12.0)	9.7	10.3 (9.6–11.0)
Local Health Integration Network								
1. Erie St. Clair	12.0	12.8 (10.7–14.9)	12.1	12.4 (10.3–14.4)	9.3	8.9 (7.0–10.9)	12.3	11.3 (9.5–13.1)
2. South West	15.5	14.9 (13.2–16.6)	13.7	13.4 (11.8–15.1)	13.5	13.0 (11.4–14.5)	14.0	13.2 (11.7–14.7)
3. Waterloo Wellington	18.5	17.7 (15.3–20.1)	9.9	10.6 (8.3–12.9)	7.0	7.3 (5.2–9.5)	6.2	7.1 (4.9–9.2)
4. Hamilton Niagara Haldimand Brant	16.5	15.8 (14.4–17.2)	12.3	11.6 (10.3–12.9)	10.5	9.5 (8.3–10.8)	11.3	10.4 (9.2–11.6)
5. Central West	12.2	11.2 (8.5–13.9)	8.8	8.5 (6.1–10.8)	9.7	10.1 (7.7–12.5)	5.9	5.9 (3.6–8.2)
6. Mississauga Halton	13.4	12.7 (10.7–14.6)	13.2	12.2 (10.5–13.9)	14.6	13.7 (12.0–15.3)	11.2	11.1 (9.5–12.7)
7. Toronto Central	15.1	13.9 (12.3–15.4)	11.4	10.4 (9.1–11.7)	11.1	10.0 (8.7–11.2)	9.2	8.5 (7.3–9.7)
8. Central	20.3	17.7 (16.0–19.3)	11.7	12.7 (11.0–14.5)	8.6	9.6 (7.9–11.3)	8.8	9.5 (7.9–11.1)
9. Central East	16.9	15.3 (13.8–16.8)	10.7	10.7 (9.1–12.3)	9.5	9.5 (7.9–11.0)	8.7	8.8 (7.4–10.3)
10. South East	19.1	20.0 (17.6–22.5)	16.6	14.4 (12.3–16.6)	15.1	13.4 (11.3–15.5)	13.9	12.2 (10.2–14.1)
11. Champlain	16.9	15.8 (14.0–17.5)	13.6	12.2 (10.6–13.8)	11.1	10.3 (8.7–11.8)	12.0	10.6 (9.2–12.1)
12. North Simcoe Muskoka	12.4	15.5 (12.6–18.3)	10.2	11.0 (8.5–13.5)	10.7	10.8 (8.6–13.1)	10.4	10.3 (8.0–12.5)
13. North East	13.9	16.9 (14.6–19.1)	11.9	15.0 (12.9–17.2)	13.0	15.0 (13.0–16.9)	11.5	13.8 (11.8–15.9)
14. North West	17.0	19.1 (15.6–22.6)	11.0	12.2 (9.2–15.2)	8.3	10.5 (7.3–13.7)	6.0	7.0 (4.1–9.9)

Data source: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2003/04–2012/13.

Inclusion criteria: All patients aged ≥18 years who died in an inpatient setting of an acute care hospital with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack in each 365-day period.

Exclusion criteria: Patients with palliative care as an initial treatment plan.

1. Adjusted rate is the observed mortality rate adjusted for risk [age + sex + ambulance arrival + atrial fibrillation + stroke/TIA + (coronary artery disease or PCI or CABG) + (carotid disease or CEA/CES) + diabetes + hypertension + peripheral vascular disease + hyperlipidemia + stroke type].

Note: Indicates significant difference from the provincial rate. Significance is based on the 95% confidence interval falling entirely above or below the provincial rate.

CI = confidence interval (5th–95th percentile).

EXHIBIT 11.7 Risk-adjusted mortality rates at 30 days following a stroke or transient ischemic attack, in Ontario and by Ontario Stroke Network designation and Local Health Integration Network, 2003/04 and 2010/11-2012/13

Group/Subgroup	30-Day Mortality Rate							
	2003/04		2010/11		2011/12		2012/13	
	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)
Ontario	17.0	15.8 (15.3-16.3)	14.0	13.5 (13.0-14.0)	13.1	12.8 (12.3-13.3)	12.7	12.6 (12.1-13.2)
Ontario Stroke Network Designation								
Regional stroke centre	16.0	14.6 (13.6-15.7)	14.6	13.1 (12.2-13.9)	14.9	13.2 (12.3-14.0)	13.9	12.3 (11.5-13.1)
District stroke centre	17.5	17.3 (16.0-18.5)	13.9	14.0 (12.9-15.2)	12.1	12.0 (10.9-13.1)	12.4	12.7 (11.7-13.7)
Non-designated centre	17.3	17.4 (16.7-18.1)	13.6	14.1 (13.4-14.9)	12.3	13.1 (12.3-13.8)	12.1	12.5 (11.8-13.3)
Local Health Integration Network								
1. Erie St. Clair	15.0	15.9 (13.8-18.1)	14.2	14.4 (12.2-16.5)	12.1	11.7 (9.6-13.8)	13.6	12.7 (10.7-14.7)
2. South West	18.3	17.6 (15.9-19.4)	16.0	15.4 (13.7-17.1)	15.6	15.0 (13.3-16.6)	16.4	15.3 (13.7-16.9)
3. Waterloo Wellington	18.7	17.9 (15.4-20.3)	13.8	14.4 (11.9-16.8)	10.8	11.2 (8.9-13.5)	10.7	11.9 (9.6-14.3)
4. Hamilton Niagara Haldimand Brant	17.3	16.5 (15.1-18.0)	15.3	14.3 (13.0-15.7)	12.9	11.8 (10.4-13.2)	14.0	12.9 (11.6-14.2)
5. Central West	15.6	14.3 (11.6-17.0)	11.4	10.9 (8.5-13.4)	11.1	11.4 (8.8-13.9)	7.2	7.2 (4.8-9.7)
6. Mississauga Halton	14.2	13.4 (11.3-15.4)	15.0	13.8 (12.0-15.6)	16.4	15.6 (13.8-17.4)	12.3	12.3 (10.6-14.0)
7. Toronto Central	15.0	14.2 (12.6-15.8)	13.1	12.2 (10.8-13.6)	12.9	11.9 (10.5-13.2)	10.3	9.8 (8.5-11.2)
8. Central	20.4	17.6 (15.9-19.3)	12.9	13.9 (12.1-15.7)	9.8	10.8 (9.0-12.6)	11.3	12.1 (10.4-13.8)
9. Central East	18.6	17.5 (15.9-19.2)	11.9	11.8 (10.1-13.4)	12.0	11.9 (10.3-13.6)	12.2	12.2 (10.7-13.8)
10. South East	19.6	20.2 (17.7-22.8)	18.8	16.1 (13.8-18.3)	16.2	14.4 (12.2-16.6)	17.0	14.9 (12.8-17.0)
11. Champlain	18.3	17.1 (15.3-18.9)	15.1	13.6 (11.9-15.3)	13.4	12.4 (10.8-14.1)	14.4	12.7 (11.1-14.3)
12. North Simcoe Muskoka	13.0	15.7 (12.9-18.6)	12.7	13.4 (10.8-16.0)	14.4	14.4 (12.0-16.8)	14.0	13.6 (11.1-16.0)
13. North East	14.3	17.0 (14.7-19.3)	13.1	16.0 (13.8-18.3)	14.9	17.0 (14.9-19.0)	14.1	16.6 (14.4-18.8)
14. North West	18.3	20.4 (16.8-24.0)	11.7	12.9 (9.7-16.0)	9.4	12.0 (8.6-15.5)	7.8	9.1 (5.9-12.2)

Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2003/04-2012/13; Ontario Ministry of Health and Long-Term Care, Registered Persons Database (RPDB); 2003/04-2013/14.

Inclusion criteria: All patients aged ≥18 years who died either in hospital or following discharge within 30 days of admission to the inpatient setting of an acute care hospital with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack in each 365-day period.

Exclusion criteria: Patients with palliative care as an initial treatment plan.

1. Adjusted rate is the observed mortality rate adjusted for risk [age + sex + ambulance arrival + atrial fibrillation + stroke/TIA + (coronary artery disease or PCI or CABG) + (carotid disease or CEA/CES) + diabetes + hypertension + peripheral vascular disease + hyperlipidemia + stroke type].

Note: **Indicates significant difference from the provincial rate. Significance is based on the 95% confidence interval falling entirely above or below the provincial rate.**

CI = confidence interval (5th-95th percentile).

EXHIBIT 11.8 Risk-adjusted mortality rates at one year following a stroke or transient ischemic attack, in Ontario and by Ontario Stroke Network designation and Local Health Integration Network, 2003/04 and 2009/10–2011/12

Group/Subgroup	One-Year Mortality Rate							
	2003/04		2009/10		2010/11		2011/12	
	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)	Observed, %	Adjusted ¹ , % (CI)
Ontario	29.0	27.9 (27.3–28.6)	26.0	25.3 (24.7–25.9)	25.0	24.8 (24.1–25.4)	23.3	23.3 (22.7–24.0)
Ontario Stroke Network Designation								
Regional stroke centre	27.0	27.0 (25.7–28.2)	25.7	24.5 (23.4–25.6)	23.9	23.6 (22.5–24.7)	23.8	23.0 (21.9–24.0)
District stroke centre	29.2	28.8 (27.4–30.3)	26.3	26.4 (25.0–27.8)	24.6	24.7 (23.3–26.1)	21.7	21.2 (19.9–22.5)
Non-designated centre	29.9	29.5 (28.7–30.4)	26.0	26.6 (25.6–27.5)	25.9	26.1 (25.1–27.0)	23.7	24.1 (23.2–25.1)
Local Health Integration Network								
1. Erie St. Clair	26.8	27.9 (25.4–30.5)	28.2	29.9 (27.3–32.5)	26.7	26.9 (24.2–29.5)	23.3	22.2 (19.7–24.8)
2. South West	28.7	28.2 (26.0–30.3)	26.8	24.9 (22.9–27.0)	27.0	26.1 (24.0–28.2)	24.5	23.7 (21.7–25.8)
3. Waterloo Wellington	32.3	30.4 (27.5–33.3)	26.6	26.1 (23.2–29.0)	23.5	24.2 (21.2–27.1)	20.4	20.3 (17.5–23.0)
4. Hamilton Niagara Haldimand Brant	30.5	29.7 (28.0–31.4)	28.5	26.8 (25.1–28.5)	26.3	25.6 (23.8–27.3)	25.1	23.7 (21.9–25.4)
5. Central West	26.8	26.1 (22.8–29.5)	22.2	23.4 (20.1–26.8)	24.9	24.5 (21.4–27.6)	21.1	21.5 (18.3–24.7)
6. Mississauga Halton	26.1	26.0 (23.5–28.6)	25.0	24.7 (22.4–26.9)	25.7	25.1 (22.8–27.3)	24.3	24.2 (21.9–26.5)
7. Toronto Central	26.6	27.1 (25.1–29.1)	23.7	23.9 (22.2–25.7)	23.3	24.0 (22.2–25.8)	22.4	22.4 (20.7–24.2)
8. Central	33.2	29.5 (27.5–31.5)	24.2	25.8 (23.5–28.1)	24.8	25.8 (23.6–28.0)	21.2	22.2 (20.0–24.4)
9. Central East	30.2	28.3 (26.4–30.3)	25.7	25.6 (23.6–27.7)	23.3	22.8 (20.8–24.9)	24.9	24.3 (22.3–26.3)
10. South East	31.5	32.0 (29.0–35.0)	29.2	27.9 (24.8–30.9)	27.9	24.9 (22.2–27.7)	27.4	24.9 (22.2–27.7)
11. Champlain	30.4	29.2 (27.0–31.4)	28.2	26.1 (24.0–28.3)	25.5	24.4 (22.2–26.5)	22.5	21.5 (19.5–23.6)
12. North Simcoe Muskoka	24.5	27.3 (24.0–30.6)	26.2	24.9 (21.9–27.9)	24.3	24.8 (21.6–27.9)	24.1	23.7 (20.8–26.7)
13. North East	26.5	30.5 (27.7–33.2)	24.7	27.3 (24.7–29.9)	23.3	27.0 (24.3–29.7)	24.6	27.0 (24.5–29.5)
14. North West	29.5	32.5 (28.2–36.8)	21.5	24.1 (20.1–28.0)	21.6	23.5 (19.6–27.4)	15.2	18.1 (14.0–22.2)

Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2003/04–2011/12; and Ontario Ministry of Health and Long-Term Care, Registered Persons Database (RPDB), 2003/04–2012/13.

Inclusion criteria: All patients aged ≥18 years who died either in hospital or following discharge within 365 days of admission to an inpatient setting of an acute care hospital with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack, in each fiscal year.

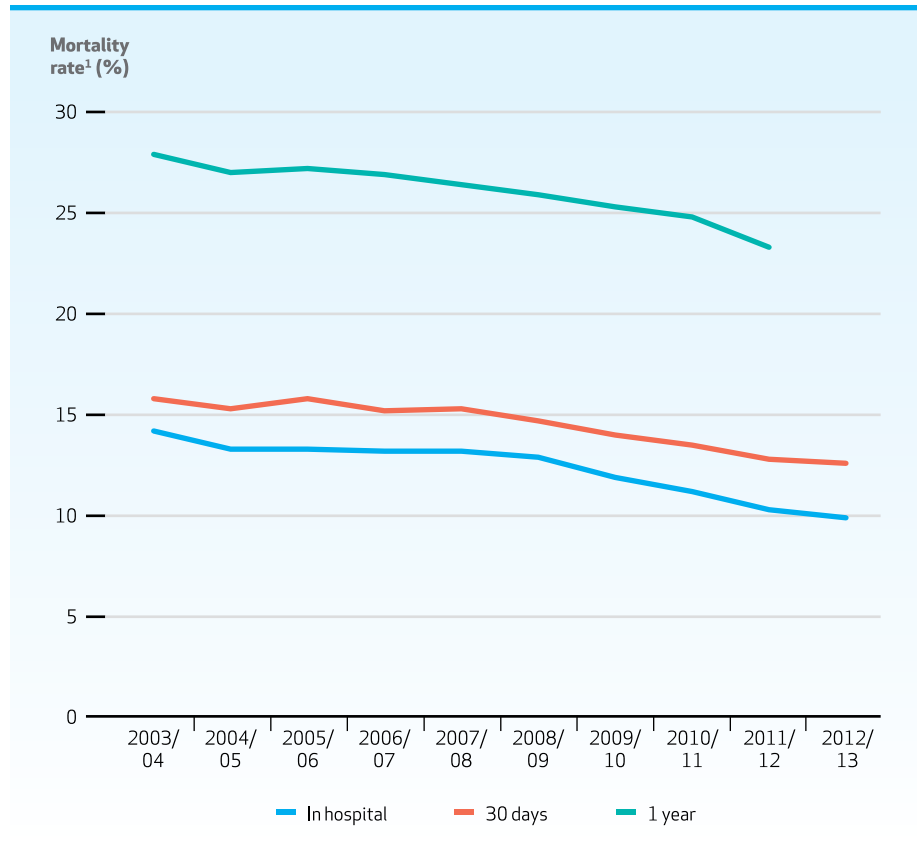
Exclusion criteria: Patients with palliative care as an initial treatment plan.

1. Adjusted rate is the observed mortality rate adjusted for risk [age + sex + ambulance arrival + atrial fibrillation + stroke/TIA + (coronary artery disease or PCI or CABG) + (carotid disease or CEA/CES) + diabetes + hypertension + peripheral vascular disease + hyperlipidemia + stroke type].

Note: Indicates significant difference from the provincial rate. Significance is based on the 95% confidence interval falling entirely above or below the provincial rate.

CI = confidence interval (5th–95th percentile).

EXHIBIT 11.9 Risk-adjusted mortality rates in hospital and at 30 days and one year following a stroke or transient ischemic attack, in Ontario, 2003/04–2012/13



Data sources: Canadian Institute for Health Information, Discharge Abstract Database (CIHI-DAD), 2003/04–2012/13; and Ontario Ministry of Health and Long-Term Care, Registered Persons Database (RPDB), 2003/04–2013/14.

Inclusion criteria: All patients aged ≥18 years who died either in hospital or following discharge within 30 or 365 days of admission to an inpatient setting of an acute care hospital with a diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack, in each 365-day period.

Exclusion criteria: Patients with palliative care as an initial treatment plan.

1 Adjusted rate is the observed mortality rate adjusted for risk [age + sex + ambulance arrival + atrial fibrillation + stroke/TIA + (coronary artery disease or PCI or CABG) + (carotid disease or CEA/CES) + diabetes + hypertension + peripheral vascular disease + hyperlipidemia + stroke type].

CONCLUSIONS

Between 2010/11 and 2012/13, there was a relative decline in the in-hospital, 30-day and one-year mortality rates following a stroke or TIA: 30.3%, 20.3% and 16.5%, respectively. Between 2003/04 and 2011/12, there was a 4.6% decrease in the risk-adjusted mortality rate at one year following stroke or TIA. With approximately 15,600 stroke admissions per year, this decline represents 718 survivors.

After adjusting for differences in patient age and sex, substantial variation remains among the LHINs. Admission to long-term care beds is influenced by their availability in the regions, which may be a contributing factor.

RECOMMENDATIONS

1. The OSN should continue to evaluate stroke mortality risk-adjustment models based on administrative data. Further, the OSN should continue to work with the Ministry of Health and Long-Term Care, Health Quality Ontario and the Canadian Institute for Health Information to develop a common risk-adjustment model for reporting stroke mortality using administrative data.
2. The OSN should examine readmission indicators to determine the need to include emergency department visits within their indicator as this limits the ability to apply a more comprehensive risk-adjustment model.
3. The OSN should continue to monitor its provincial target of 3.75% of patients admitted to long-term care following acute care by 2015/16.

References

1. Ontario Stroke Network. Accessed August 11, 2014 at <http://ontariostrokenetwork.ca/>.
2. Turner S, Merchant K, Kania J, Martin E. Understanding the value of backbone organizations in collective impact. Part 1. *Stanford Social Innovation Review* blog. Accessed September 22, 2014 at http://www.ssireview.org/blog/entry/understanding_the_value_of_backbone_organizations_in_collective_impact_1.
3. Williams P. The competent boundary spanner. *Public Adm.* 2002; 80(1):103-24. Accessed August 11, 2014 at <http://onlinelibrary.wiley.com/doi/10.1111/1467-9299.00296/pdf>.
4. Levina N, Vaast E. The emergence of boundary spanning competence in practice: implications for implementation and use of information systems. *MIS Q.* 2005; 29(2):335-63.
5. Heart and Stroke Foundation. Canadian Stroke Best Practice Recommendations. Accessed August 11, 2014 at <http://www.strokebestpractices.ca/>.
6. Ontario Ministry of Health and Long Term Care. *Ontario's Action Plan For Health Care*. Toronto, ON: Queen's Printer; 2012. Accessed August 11, 2014 at http://www.health.gov.on.ca/en/ms/ecfa/healthy_change/docs/rep_healthychange.pdf.
7. *Quality-Based Procedures: Clinical Handbook for Stroke* (Updated September 2013). Toronto, ON: Health Quality Ontario and Ministry of Health and Long-Term Care; 2013. Accessed September 5, 2014 at http://health.gov.on.ca/en/pro/programs/ecfa/docs/qbp_stroke.pdf.

8. CSS Information and Evaluation Working Group. *Canadian Stroke Strategy Performance Measurement Manual: A Supplement to the Canadian Stroke Strategy Best Practices Recommendations for Stroke Care (Update 2008)*. Accessed August 11, 2014 at http://www.strokebestpractices.ca/wp-content/uploads/2012/07/CSS-Performance-Manual-2008_EN.pdf.
9. The POWER Study (*Project for an Ontario Women's Health Evidence-Based Report*). Accessed August 11, 2014 at <http://powerstudy.ca/>.
10. Weissman NW, Allison JJ, Kiefe CI, et al. Achievable benchmarks of care: the ABCs of benchmarking. *J Eval Clin Pract*. 1999; 5(3): 269-81.
11. Hennsge U, Hoffman A, Kavanagh S, Roughton M, Rudd A, Cloud G for the Intercollegiate Stroke Working Party. *National Sentinel Stroke Clinical Audit 2010, Round 7. Public Report for England, Wales and Northern Ireland*. London, UK: Royal College of Physicians; 2011. Accessed August 11, 2014 at https://www.rcplondon.ac.uk/sites/default/files/national-sentinel-stroke-audit-2010-public-report-and-appendices_0.pdf.
12. Australian Institute of Health and Welfare. *Stroke and Its Management in Australia: An Update. Cardiovascular Disease Series No. 37*. Canberra, Australia: The Institute; 2013. Accessed August 11, 2014 at <http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129543611>.
13. Cumbler E, Wald H, Bhatt DL, et al. Quality of care and outcomes for in-hospital ischemic stroke: findings from the National Get With The Guidelines–Stroke. *Stroke*. 2014; 45(1):231-8.
14. Iguchi Y, Kimura K, Sone K, et al. Stroke incidence and usage rate of thrombolysis in a Japanese urban city: the Kurashiki stroke registry. *J Stroke Cerebrovasc Dis*. 2013; 22(4):349-57.
15. Swedish Stroke Register. *Riks-Stroke Annual Report 2012* [English summary]. Stockholm, Sweden: Västerbotten County Council; 2013. Accessed September 5, 2014 at <http://www.riks-stroke.org/content/english/pdf/Riks-Stroke%20annual%20report%202012.pdf> and <http://www.riks-stroke.org/content/english/pdf/Graphs%20Riks-Stroke%20annual%20report%202012.pdf>.
16. Meretoja A, Strbian D, Mustanoja S, et al. Reducing in-hospital delay to 20 minutes in stroke thrombolysis. *Neurology*. 2012; 79(4):306-13.
17. Kapral MK, Fang J, Silver FL, et al. Effect of a provincial system of stroke care delivery on stroke care and outcomes. *CMAJ*. 2013; 185(10):E483-E491.
18. Kapral MK, Ben-Yakov M, Fang J, et al. Gender differences in carotid imaging and revascularization following stroke. *Neurology*. 2009; 73(23):1969-74.
19. Stiell IG, Smaggus K, Clement CM, et al. Implementation of the revised provincial acute Stroke Redirect Protocol in urban and rural settings. *Can J Emerg Med*. 2013; 15(Suppl 1):OP20.
20. Accreditation Canada. *Distinction Core Performance Indicator Protocols*. Ottawa, ON: Accreditation Canada; 2010.
21. Accreditation Canada. *Stroke Distinction*. Accessed September 22, 2014 at <http://www.accreditation.ca/stroke-distinction>.
22. Xian Y, Holloway RG, Chan PS, et al. Association between stroke center hospitalization for acute ischemic stroke and mortality. *JAMA*. 2011; 305(4):373-80.
23. Schwamm LH, Ali SF, Reeves MJ, et al. Temporal trends in patient characteristics and treatment with intravenous thrombolysis among acute ischemic stroke patients at Get With The Guidelines–Stroke hospitals. *Circ Cardiovasc Qual Outcomes*. 2013; 6(5):543-9.

24. Lees KR, Bluhmki E, von Kummer R, et al. Time to treatment with intravenous alteplase and outcome in stroke: an updated pooled analysis of ECASS, ATLANTIS, NINDS, and EPITHET trials. *Lancet*. 2010; 375(9727):1695-703.
25. Hall R, Khan F, O'Callaghan C, et al. *Ontario Stroke Evaluation Report 2012: Prescribing System Solutions to Improve Stroke Outcomes*. Toronto, ON: Institute for Clinical Evaluative Sciences; 2012. Accessed September 22, 2014 at <http://www.ices.on.ca/~media/Files/Atlases-Reports/2012/Ontario-stroke-evaluation-report/Full%20Report.ashx>.
26. Canadian Stroke Network. *The Quality of Stroke Care in Canada, 2011*. Accessed September 22, 2014 at <http://canadianstrokenetwork.ca/en/wp-content/uploads/2014/08/QoS-EN.pdf>.
27. Fonarow GC, Smith EE, Saver JL, et al. Timeliness of tissue-type plasminogen activator therapy in acute ischemic stroke: patient characteristics, hospital factors, and outcomes associated with door-to-needle times within 60 minutes. *Circulation*. 2011; 123(7):750-8.
28. Xian Y, Smith EE, Zhao X, et al. Strategies used by hospitals to improve speed of tissue-type plasminogen activator treatment in acute ischemic stroke. *Stroke*. 2014; 45(5):1387-95.
29. Fonarow GC, Smith EE, Saver JL, et al. Improving door-to-needle times in acute ischemic stroke: the design and rationale for the American Heart Association/American Stroke Association's Target: Stroke initiative. *Stroke*. 2011; 42(10):2983-9.
30. Wahlgren N, Ahmed N, Davalos A, et al. Thrombolysis with alteplase for acute ischaemic stroke in the Safe Implementation of Thrombolysis in Stroke-Monitoring Study (SITS-MOST): an observational study. *Lancet*. 2007; 369(9558):275-82.
31. Stroke Unit Trialists' Collaboration. Organised inpatient (stroke unit) care for stroke. *Cochrane Database Syst Rev*. 2013; 9:CD000197.
32. *Quality-Based Procedures Indicators: An Implementation Guidance Document*. Toronto, ON: Ministry of Health and Long-Term Care; 2014. Accessed September 22, 2014 at http://health.gov.on.ca/en/pro/programs/ecfa/docs/qbp_indicator_guidance_en.pdf.
33. *Scottish Stroke Care Audit: 2013 National Report Stroke Services in Scottish Hospitals*. Edinburgh, UK: NHS National Services Scotland; 2013. Accessed August 11, 2014 at http://www.strokeaudit.scot.nhs.uk/Downloads/2013_report/SSCA-report-2013-web.pdf.
34. Fonarow GC, Liang L, Smith EE, et al. Comparison of performance achievement award recognition with primary stroke center certification for acute ischemic stroke care. *J Am Heart Assoc*. 2013; 2(5):e000451.

Appendices

APPENDIX A Stroke Evaluation and Quality Committee Stroke Care Performance Indicators, 2011–2014

No.	Indicator	Exhibit No.	Report Card Indicator No.
Public Awareness and Patient Education			
1	Proportion of patients who sought medical attention within 3.5 hours of stroke symptom onset	3.4a,b	1
2	Proportion of suspected/confirmed stroke patients who arrived in ED via EMS	3.3a,b	-
Prevention of Stroke			
3(A)	Annual emergency department admissions of stroke/TIA by stroke type (age- and sex-adjusted)	3.1a,b	-
3(B)	Annual inpatient admissions of stroke/TIA by stroke type (age- and sex- adjusted)	6.1a,b	2
4(A)	Risk-adjusted in-hospital stroke mortality rates	11.6, 11.9	-
4(B)	Risk-adjusted 30-day stroke mortality rates	11.7, 11.9	3
4(C)	Risk-adjusted 1-year stroke mortality rates	11.8, 11.9	-
5	Proportion of eligible stroke/TIA patients with atrial fibrillation who were prescribed or recommended anticoagulant therapy on discharge from acute care	6.5a,b	4
6	Proportion of ischemic stroke patients without atrial fibrillation who received carotid imaging prior to hospital discharge	2.2a-c	5
Acute/Hyperacute Stroke Management			
7	Proportion of stroke/TIA patients who received a brain CT/MRI scan within 24 hours of hospital arrival (ED)	2.1a,b	6
8(A)	Proportion of eligible patients ¹ who received acute thrombolytic therapy (tPA)	4.1a-e	7
8(B)	Door-to-needle time: Median time in minutes from patient arrival in the ED to administration of acute thrombolytic agent	4.1f,g	-
9	Number of stroke/TIA patients treated on a stroke unit at any time during their inpatient stay	5.1b,c	8
10	Proportion of ALC days to total length of stay in acute care (active LOS + ALC)	6.6a-d	10
11	Proportion of stroke patients with documentation that an initial dysphagia screening was performed during admission to acute care	6.4a,b	9
Stroke Rehabilitation			
12	Number of stroke patients treated on a stroke unit at any time during their inpatient rehabilitation stay	n/a	-
13	Proportion of patients achieving RPG active length of stay in inpatient rehabilitation	7.3a,b	15
14(A)	Proportion of stroke patients discharged from acute care who received a referral for outpatient/community rehabilitation	6.8a,b	12 ²
14(B)	Proportion of stroke inpatient rehabilitation patients who received a referral for outpatient/community rehabilitation	n/a	-
15(A)	Length of time between stroke onset and admission to stroke inpatient rehabilitation	8.1a,c; 8.2a,b	13
15(B)	Length of time between stroke onset and delivery of first CCAC rehabilitation service	9.1d	-
15(C)	Mean number of minutes per day of direct therapy that inpatient stroke rehabilitation patients received	-	14
16(A)	Length of stay (days) in rehabilitation stratified by RPG (i.e., stratified by admission RPG or FIM®)	8.1a ³ , 8.1e ³ , 8.4a-d	-
16(B)	Mean number of rehabilitation visits provided to CCAC patients	9.2a-d	17
16(C)	FIM efficiency for moderately disabled stroke patients in inpatient rehabilitation (mean)	8.1a ³	16
17	Inpatient rehabilitation admissions by stroke severity (RPG)	7.2a-c, 8.1a, 8.3b-d	18
18	AlphaFIM® assessments	5.3a,b	-
19	Complex continuing care patient profiles	8.5a, 8.6a,b	-

No.	Indicator	Exhibit No.	Report Card Indicator No.
System Integration			
20	Time to carotid intervention within 6 months of hospitalization for stroke or transient ischemic attack	6.9a-c	-
21(A)	Proportion of patients discharged alive from acute care to each discharge destination: 1) Home 2) Home with services 3) Inpatient rehabilitation 4) Complex continuing care 5) Long-term care	6.8a,b	19 ²
21(B)	Proportion of patients discharged alive from acute care and admitted to inpatient rehabilitation	7.1; 8.1a,b; 8.3a	11
21(C)	Proportion of patients discharged alive from inpatient rehabilitation to each discharge destination: 1) Home 2) Home with services 3) Acute care facility 4) Complex continuing care 5) Long-term care	8.1f	-
22(A)	Readmission/revisit for stroke or transient ischemic attack within 30 days following an initial stroke-related event	11.1, 11.3	-
22(B)	Readmission/revisit for stroke or transient ischemic attack within 90 days following an initial stroke-related event	11.2, 11.3	-
22(C)	Readmission for any cause within 30 days following an initial stroke-related event	11.4a,b	20

1 Patients who arrived within 3.5 hours of stroke symptom onset without contraindications, including blood pressure >185/110, PTT >40 seconds, INR >1.7, platelet count <100,000/mcL, glucose level <2.7 or >22, recent bleeding/trauma/surgery, major changes in CT scans, suspicion of subarachnoid hemorrhage or previous intracerebral hemorrhage, seizure at onset, and recent stroke or head injury.

2 The indicator analysis in the 2014 Ontario Stroke Report Cards is different from the analysis in the exhibit.

3 Stratified results are not presented in the exhibit but are available on request.

Notes:

(1) Data for Ontario Stroke Report Card indicator 14 are not included in this report.

(2) FIM® and AlphaFIM® are registered trademarks of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

ALC = Alternate Level of Care

CCAC = Community Care Access Centre

CT = computed tomography

EMS = Emergency Medical Services

FIM = Functional Independence Measure

INR = international normalized ratio

LOS = length of stay

MRI = magnetic resonance imaging

PTT = partial thromboplastin time

RPG = Rehabilitation Patient Group

TIA = transient ischemic attack

n/a = not available

APPENDIX B Quality-Based Procedures – Stroke Indicators, 2012/13–2013/14

No.	Quality-Based Procedures Indicator ¹	Exhibit No.
Performance Dimension: Effectiveness		
1	Age- and sex-adjusted rates of adult patients with stroke or transient ischemic attack admitted to long-term care within 1 year of acute discharge	10.1
2	Risk-adjusted mortality rates at 30 days following a stroke or transient ischemic attack	10.2
3	Ninety-day stroke/TIA readmission rate following hospitalization for stroke or transient ischemic attack	n/a
4	Proportion of patients with a completed AlphaFIM® who were discharged to inpatient rehabilitation (function score 40–80) or outpatient rehabilitation (function score > 80)	5.3a,b
Performance Dimension: Appropriateness		
5	Proportion of adult patients with stroke discharged alive from acute care and admitted to inpatient rehabilitation ²	7.1
6(A)	Proportion of patients admitted to inpatient rehabilitation with mild strokes (RPG 1150 and 1160)	7.2a
6(B)	Proportion of patients admitted to inpatient rehabilitation with moderate strokes (RPG 1120, 1130 and 1140)	7.2b
6(C)	Proportion of patients admitted to inpatient rehabilitation with severe strokes (RPG 1100 and 1110)	7.2c
7	Hours of rehabilitation therapy provided in inpatient rehabilitation	n/a
8	Proportion of adult patients with stroke achieving RPG active length of stay target in inpatient rehabilitation	7.3a,b
Performance Dimension: Integration		
9	Proportion of adult patients with stroke or transient ischemic attack admitted to an acute care hospital and treated on a stroke unit at any time ³ during their stay	5.1b,c
10	Proportion of total inpatient length of stay spent in Alternate Level of Care for adult patients with stroke or transient ischemic attack	5.2
11	Proportion of adult patients with ischemic stroke who arrived within the treatment window and received acute thrombolytic therapy (tPA)	4.1d,e
Performance Dimension: Access		
12	Proportion of adult patients with ischemic stroke or transient ischemic attack who were prescribed antithrombotic therapy on discharge from the emergency department	4.3a,b
13(A)	Proportion of adult patients with stroke or transient ischemic attack who received neuroimaging within 24 hours of presenting to the emergency department	2.1a,b
13(B)	Proportion of admitted adult ischemic stroke ⁴ patients without atrial fibrillation who received carotid imaging while in hospital	2.2a–c

1 Indicator statements are not as listed in the QBP clinical handbook; they have been modified for ease of understanding the analysis.

2 The 2014 stroke evaluation report includes one of the discharge destinations listed in the QBP clinical handbook.

3 The QBP clinical handbook indicator specifies stroke unit use for more than 80% of inpatient length of stay. This information is not available in administrative or audit datasets and was not included in the indicator criteria. Additionally, the SEQC report does not include neurological ICU as stroke unit admission.

4 The QBP clinical handbook indicator includes ischemic stroke patients with an anterior circulation event. This information was not collected in the Ontario Stroke Audit and therefore not included in the indicator criteria.

n/a = not available

Note: AlphaFIM® is a registered trademark of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

APPENDIX C ICD-10-CA Codes Used in the Report

Administrative Health Datasets

Category	ICD-10-CA Code
Stroke Type	
Transient ischemic attack	G45 (excl. G45.4)
Acute stroke	H34.0, H34.1, I60 (excl. I60.8), I61, I63 (excl. I63.6), I64 ¹
Subarachnoid hemorrhage ¹	I60 (excl. I60.8)
Intracerebral hemorrhage	I61
Ischemic stroke	I63 (excl. I63.6), H34.0, H34.1
Not specified/undetermined	I64 ²
Vascular surgery	
Carotid stenting	1JE50
Carotid endarterectomy	1JE57, 1JE87

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Category	ICD-10-CA Code
Description	
Intracerebral hemorrhage	I61
Cerebral infarction	I63
Stroke, not specified as hemorrhage or infarction	I64
Transient cerebral ischemic attacks and related syndromes, including amaurosis fugax (excluding transient global amnesia)	G45 (excl. G45.4)
Central retinal artery occlusion	H34.1

¹ Excluded from the Stroke Quality-Based Procedures cohort.

² I64 (stroke type not specified/undetermined) is included as ischemic stroke in cases where it is not shown as a separate stroke type.

APPENDIX D Institutional Resources for Stroke in Ontario, 2012/13¹

Legend	
Regional stroke centre	A facility that meets all the requirements of a district stroke centre and has neurosurgical facilities and interventional radiology.
District stroke centre	A facility with written stroke protocols (e.g., transport and triage, thrombolytic therapy, neuroimaging), clinicians with stroke expertise, and linkages to rehabilitation and secondary prevention.
Non-designated centre	An acute care hospital that does not fit the definition of district or regional stroke centre.

LHIN/Institution (Site) ²	Institution Number	Location	Ontario Stroke Network Region	Stroke Unit ³	CT Scanner	MRI Scanner	Telestroke Centre ⁴	Stroke Prevention Clinic	AlphaFIM® Assessment	Outpatient/ Ambulatory Rehabilitation Clinics
Ontario, n				34	99	59	22	46	89	62
1. Erie St. Clair										
Bluewater Health (Sarnia)	4415	Sarnia	Southwestern Ontario	X	X	X		X	X	X
Bluewater Health (Charlotte Eleanor Englehart)	4418	Petrolia	Southwestern Ontario							X
Chatham-Kent Health Alliance (Chatham)	1223	Chatham	Southwestern Ontario	X ⁵	X	X		X	X	X
Chatham-Kent Health Alliance (Sydenham)	1239	Wallaceburg	Southwestern Ontario							
Leamington District Memorial Hospital	1067	Leamington	Southwestern Ontario		X					
Windsor Regional Hospital (Metropolitan)	1079	Windsor	Southwestern Ontario							
Windsor Regional Hospital (Ouellette Campus)	3707	Windsor	Southwestern Ontario	X	X	X		X	X	
2. South West										
Alexandra Hospital	1696	Ingersoll	Southwestern Ontario						X	X
Alexandra Marine and General Hospital	1206	Goderich	Southwestern Ontario		X		X		X	X
Four Counties Health Services Corporation	1507	Newbury	Southwestern Ontario						X	X
Grey Bruce Health Services (Lion's Head)	1030	Lion's Head	Southwestern Ontario						X	
Grey Bruce Health Services (Markdale)	4025	Markdale	Southwestern Ontario						X	X
Grey Bruce Health Services (Meaford)	4027	Meaford	Southwestern Ontario						X	X
Grey Bruce Health Services (Owen Sound)	3944	Owen Sound	Southwestern Ontario	X	X	X		X	X	X
Grey Bruce Health Services (Southampton)	4030	Southampton	Southwestern Ontario						X	
Grey Bruce Health Services (Warton)	4033	Warton	Southwestern Ontario						X	X
Hanover and District Hospital	1124	Hanover	Southwestern Ontario							X
Huron Perth Healthcare Alliance (Clinton)	1199	Clinton	Southwestern Ontario							
Huron Perth Healthcare Alliance (Seaforth)	1213	Seaforth	Southwestern Ontario							
Huron Perth Healthcare Alliance (St. Marys)	1748	St. Marys	Southwestern Ontario							
Huron Perth Healthcare Alliance (Stratford)	1754	Stratford	Southwestern Ontario		X	X		X	X	X
Listowel Memorial Hospital	1740	Listowel	Southwestern Ontario							X
London Health Sciences Centre (University)	3850	London	Southwestern Ontario	X	X	X		X	X	
London Health Sciences Centre (Victoria)	4359	London	Southwestern Ontario		X	X				
South Bruce Grey Health Centre (Chesley)	4042	Chesley	Southwestern Ontario						X	
South Bruce Grey Health Centre (Durham)	4036	Durham	Southwestern Ontario							

LHIN/Institution (Site) ²	Institution Number	Location	Ontario Stroke Network Region	Stroke Unit ³	CT Scanner	MRI Scanner	Telestroke Centre ⁴	Stroke Prevention Clinic	AlphaFIM® Assessment	Outpatient/ Ambulatory Rehabilitation Clinics
South Bruce Grey Health Centre (Kincardine)	3907	Kincardine	Southwestern Ontario							
South Bruce Grey Health Centre (Walkerton)	4039	Walkerton	Southwestern Ontario		X					
South Huron Hospital	1203	Exeter	Southwestern Ontario							X
St. Joseph's Health Care London	1497	London	Southwestern Ontario		X	X				
St. Thomas-Elgin General Hospital	1059	London	Southwestern Ontario		X				X	
Strathroy Middlesex General Hospital	1515	Strathroy	Southwestern Ontario		X				X	X
Tillsonburg District Memorial Hospital	1709	Tillsonburg	Southwestern Ontario		X				X	
Wingham and District Hospital	1217	Wingham	Southwestern Ontario							X
Woodstock General Hospital	1716	Woodstock	Southwestern Ontario		X	X			X	X
3. Waterloo Wellington										
Cambridge Memorial Hospital	1905	Cambridge	Central South		X					
Grand River Hospital (Kitchener-Waterloo)	3734	Kitchener	Central South	X ⁵	X	X	X ⁶	X	X	X
Groves Memorial Community Hospital	1936	Fergus	Central South		X				X	
Guelph General Hospital	1946	Guelph	Central South	X ⁵	X	X			X	
North Wellington Health Care (Louise Marshall)	4323	Mount Forest	Central South						X	
North Wellington Health Care (Palmerston and District)	4326	Palmerston	Central South						X	
St. Mary's General Hospital	1921	Kitchener	Central South		X					
4. Hamilton Niagara Haldimand Brant										
Brant Community Health Care System (Brantford)	4675	Brantford	Central South	X	X	X	X	X	X	X
Haldimand War Memorial Hospital	1146	Dunnville	Central South		X					
Hamilton Health Sciences Corp (General)	1982	Hamilton	Central South	X ⁵	X	X		X	X	X
Hamilton Health Sciences Corp (Juravinski)	1983	Hamilton	Central South		X	X			X	
Hamilton Health Sciences Corp (McMaster)	1994	Hamilton	Central South		X	X				
Joseph Brant Memorial Hospital	1160	Burlington	Central South	X	X	X			X	X
Niagara Health System (Douglas Memorial)	4210	Fort Erie	Central South							
Niagara Health System (Greater Niagara)	4213	Niagara Falls	Central South	X ⁵	X	X	X	X	X	X
Niagara Health System (Port Colborne)	4219	Port Colborne	Central South							
Niagara Health System (St. Catharines General)	4224	St. Catharines	Central South		X	X				
Niagara Health System (Welland County)	4227	Welland	Central South		X					
Norfolk General Hospital	1591	Simcoe	Central South		X			X		
St. Joseph's Health Care System (Hamilton)	2003	Hamilton	Central South		X	X		X	X	
West Haldimand General Hospital	1149	Hagersville	Central South							
West Lincoln Memorial Hospital	1538	Grimsby	Central South							
5. Central West										
Headwaters Health Care Centre (Dufferin)	3684	Orangeville	West GTA		X				X	
William Osler Health System (Brampton)	4016	Brampton	West GTA		X	X		X ⁷	X	X
William Osler Health System (Etobicoke)	3929	Etobicoke	West GTA		X	X		X ⁷	X	
6. Mississauga Halton										
Halton Healthcare (Georgetown)	4622	Georgetown	West GTA						X	X
Halton Healthcare (Milton)	4022	Milton	West GTA		X				X	
Halton Healthcare (Oakville)	3926	Oakville	West GTA		X	X			X	X

LHIN/Institution (Site) ²	Institution Number	Location	Ontario Stroke Network Region	Stroke Unit ³	CT Scanner	MRI Scanner	Telestroke Centre ⁴	Stroke Prevention Clinic	AlphaFIM® Assessment	Outpatient/ Ambulatory Rehabilitation Clinics
Trillium Health Partners (Mississauga)	4752	Mississauga	West GTA	X ⁵	X	X		X	X	X
Trillium Health Partners (Queensway)	4759	Toronto	West GTA		X					
Trillium Health Partners (Credit Valley)	4747	Mississauga	West GTA		X	X			X	
7. Toronto Central										
The Hospital for Sick Children	1406	Toronto	Toronto West		X	X		X		X
Mount Sinai Hospital	1423	Toronto	Toronto West		X	X			X	
St. Joseph's Health Centre	1443	Toronto	Toronto West	X	X	X			X	
St. Michael's Hospital	1444	Toronto	Toronto - Southeast	X ⁵	X	X		X		
Sunnybrook Health Sciences Centre	3936	Toronto	Toronto - North and East	X ⁵	X	X		X	X	X
The Toronto East General Hospital	1302	Toronto	Toronto - Southeast		X	X		X		
University Health Network (Toronto General)	3910	Toronto	Toronto West		X	X			X	
University Health Network (Toronto Western)	3910	Toronto	Toronto West	X ⁵	X	X		X	X	
8. Central										
Humber River Regional Hospital (Church)	3883	Weston	Toronto West	X ⁵	X				X	
Humber River Regional Hospital (York-Finch)	1343	Downsview	Toronto West		X	X		X		
Mackenzie Health (Mackenzie Richmond Hill Hospital)	2046	Richmond Hill	Central East	X ⁵	X	X		X	X	
Markham Stouffville Hospital (Markham)	3587	Markham	Central East		X	X		X		
North York General Hospital	1330	Toronto	Toronto - North and East	X	X	X		X	X	
Southlake Regional Health Centre	2038	Newmarket	Central East	X	X	X		X	X	
Stevenson Memorial Hospital	1817	Alliston	Central East		X				X	
9. Central East										
Campbellford Memorial Hospital	1597	Campbellford	Central East		X				X	
Haliburton Highlands Health Services (Haliburton)	3737	Haliburton	Central East		X					
Lakeridge Health Corporation (Bowmanville)	4008	Clarington	Central East		X				X	X
Lakeridge Health Corporation (Oshawa)	3932	Oshawa	Central East	X ⁵	X	X	X	X	X	
Lakeridge Health Corporation (Port Perry)	4005	Port Perry	Central East						X	X
Markham Stouffville Hospital (Uxbridge)	4465	Uxbridge	Central East		X	X			X	
Northumberland Hills Hospital	3860	Cobourg	Central East		X	X				
Peterborough Regional Health Centre	1768	Peterborough	Central East	X ⁵	X	X	X	X ⁶	X	X
Ross Memorial Hospital	1893	Lindsay	Central East		X				X	X
Rouge Valley Health System (Ajax)	4014	Ajax	Toronto - Southeast		X	X	X		X	
Rouge Valley Health System (Centenary)	3943	Scarborough	Toronto - Southeast		X	X	X		X	X
Scarborough Hospital (Birchmount)	4154	Scarborough	Toronto - North and East		X	X			X	
Scarborough Hospital (Scarborough General)	4152	Scarborough	Toronto - North and East	X	X	X			X	
10. South East										
Brockville General Hospital	1273	Brockville	South East		X			X		
Hotel Dieu Hospital	4601	Kingston	South East		X					
Kingston General Hospital	1100	Kingston	South East	X ⁵	X	X		X	X	
Lennox and Addington County General Hospital	1295	Napanee	South East						X	X
Perth and Smiths Falls District (Perth)	3732	Perth	South East		X ⁹			X		X
Perth and Smiths Falls District (Smith Falls)	1269	Smiths Falls	South East		X ⁹					

LHIN/Institution (Site) ²	Institution Number	Location	Ontario Stroke Network Region	Stroke Unit ³	CT Scanner	MRI Scanner	Telestroke Centre ⁴	Stroke Prevention Clinic	AlphaFIM® Assessment	Outpatient/Ambulatory/Rehabilitation Clinics
Quinte Healthcare Corporation (Bancroft)	3991	Bancroft	South East						X	
Quinte Healthcare Corporation (Belleville)	3988	Belleville	South East	X	X	X	X	X	X	X
Quinte Healthcare Corporation (Picton)	3992	Picton	South East						X	
Quinte Healthcare Corporation (Trenton)	3994	Trenton	South East						X	
11. Champlain										
Almonte General Hospital	1254	Almonte	East - Champlain						X	
Arnprior and District Memorial Hospital	1799	Arnprior	East - Champlain							
Carleton Place and District Memorial Hospital	1256	Carleton Place	East - Champlain							X
Children's Hospital of Eastern Ontario	1657	Ottawa	East - Champlain		X	X				X
Cornwall Community Hospital (McConnell)	4451	Cornwall	East - Champlain		X		X	X	X	
Deep River and District Hospital	1803	Deep River	East - Champlain							X
Glengarry Memorial Hospital	1870	Alexandria	East - Champlain						X	
Hawkesbury and District General Hospital	1777	Hawkesbury	East - Champlain		X		X	X		
Hôpital Montfort	1661	Ottawa	East - Champlain		X	X			X	
Kemptville District Hospital	1284	Kemptville	East - Champlain							
The Ottawa Hospital (Civic)	4046	Ottawa	East - Champlain	X	X	X		X	X	
The Ottawa Hospital (General)	4048	Ottawa	East - Champlain	X	X	X			X	
Pembroke Regional Hospital Inc.	1804	Pembroke	East - Champlain	X	X		X	X	X	X
Queensway-Carleton Hospital	1681	Ottawa	East - Champlain		X	X		X		
Renfrew Victoria Hospital	1813	Renfrew	East - Champlain		X				X	
St. Francis Memorial Hospital	1801	Barry's Bay	East - Champlain							X
Winchester District Memorial Hospital	1885	Winchester	East - Champlain		X					X
12. North Simcoe Muskoka										
Collingwood General and Marine Hospital	1833	Collingwood	Central East		X				X	
Georgian Bay General Hospital	1844	Midland	Central East		X				X	X
Muskoka Algonguin Healthcare (Bracebridge)	4619	Bracebridge	Central East		X				X	X
Muskoka Algonguin Healthcare (Huntsville)	4616	Huntsville	Central East		X				X	X
Orillia Soldiers' Memorial Hospital	1853	Orillia	Central East		X	X			X	X
Royal Victoria Regional Health Centre	1825	Barrie	Central East	X	X	X	X	X	X	X
13. North East										
Anson General Hospital	2084	Iroquois Falls	Northeast							
Bingham Memorial Hospital	2090	Matheson	Northeast							
Blind River District Health Centre/Pavillion Santé	2057	Blind River	Northeast							X
Englehart and District Hospital	2204	Englehart	Northeast							
Espanola Regional Hospital and Health Centre	2174	Espanola	Northeast							
Health Sciences North/Horizon Santé-Nord	4059	Sudbury	Northeast	X	X	X	X	X	X	
Hornepayne Community Hospital	2061	Hornepayne	Northeast							
Kirkland and District Hospital	2211	Kirkland Lake	Northeast							
Lady Dunn Health Centre	2076	Wawa	Northeast							X
The Lady Minto Hospital	2078	Cochrane	Northeast							
Manitoulin Health Centre (Little Current)	2121	Little Current	Northeast							

LHIN/Institution (Site) ²	Institution Number	Location	Ontario Stroke Network Region	Stroke Unit ³	CT Scanner	MRI Scanner	Telestroke Centre ⁴	Stroke Prevention Clinic	AlphaFIM® Assessment	Outpatient/Ambulatory Rehabilitation Clinics
Manitoulin Health Centre (Mindemoya)	2123	Mindemoya	Northeast							
Mattawa General Hospital	2126	Mattawa	Northeast							
North Bay Regional Health Centre	4730	North Bay	Northeast	X	X	X	X	X	X	X
Notre Dame Hospital	2082	Hearst	Northeast							
Sault Area Hospital	4407	Sault Ste. Marie	Northeast	X	X	X	X	X	X	X
Sensenbrenner Hospital	2088	Kapuskasing	Northeast							
Service de Santé de Chapleau Health Service	2173	Chapleau	Northeast							
Smooth Rock Falls Hospital	2094	Smooth Rock Falls	Northeast							
St. Joseph's General Hospital	2058	Elliot Lake	Northeast							
Temiskaming Hospital	2207	New Liskeard	Northeast		X		X			
Timmins and District General Hospital	3414	Timmins	Northeast	X	X	X	X	X	X	X
Weeneebayko Area Health Authority	4698	Moose Factory	Northeast							
West Nipissing General Hospital	2812	Sturgeon Falls	Northeast							
West Parry Sound Health Centre	3729	Parry Sound	Northeast		X				X	
14. North West										
Atikokan General Hospital	2147	Atikokan	Northwest							X
Dryden Regional Health Centre	2103	Dryden	Northwest		X		X		X	X
Geraldton District Hospital	2175	Geraldton	Northwest							X
Lake-of-the-Woods District Hospital	2110	Kenora	Northwest		X		X	X	X	
Manitouwadge General Hospital	2176	Manitouwadge	Northwest							X
McCausland Hospital	2180	Terrace Bay	Northwest							X
Nipigon District Memorial Hospital	2178	Nipigon	Northwest							X
The Red Lake Margaret Cochenour Memorial Hospital	2115	Red Lake	Northwest							X
Riverside Health Care Facilities (La Verendrye)	2150	Fort Frances	Northwest		X		X	X	X	X
Sioux Lookout Meno-Ya-Win Health Centre (District)	4353	Sioux Lookout	Northwest		X		X ⁶	X	X	X
Thunder Bay Regional Health Sciences Centre	3853	Thunder Bay	Northwest	X	X	X		X	X	
Wilson Memorial General Hospital	2177	Marathon	Northwest					X		X

1 Based on Ontario Stroke Network hospital resources survey as of June 2013.

2 Sites in boldface participated in the 2012/2013 Ontario Stroke Audit of Acute Care Facilities.

3 A stroke unit is defined as a specialized, geographically-located hospital unit with a dedicated stroke team and stroke resources (e.g., a care pathway, educational materials, monitored beds). A stroke unit does not need to have all of these resources nor does it have to be exclusive for stroke patients, but it must be in one location in the hospital.

4 A funded Ontario Telemedicine Network site in 2012/13.

5 Stroke unit (revised definition, February 2014): A geographical unit with identifiable co-located beds (e.g., 5A-7, 5A-8, 5A-9, 5A-10) that are occupied by stroke patients 75% of the time, and has a dedicated interprofessional team with expertise in stroke care including, at a minimum, nursing, physiotherapy, occupational therapy and speech-language pathology.

6 This site was not a funded Telestroke site for all of 2012/13.

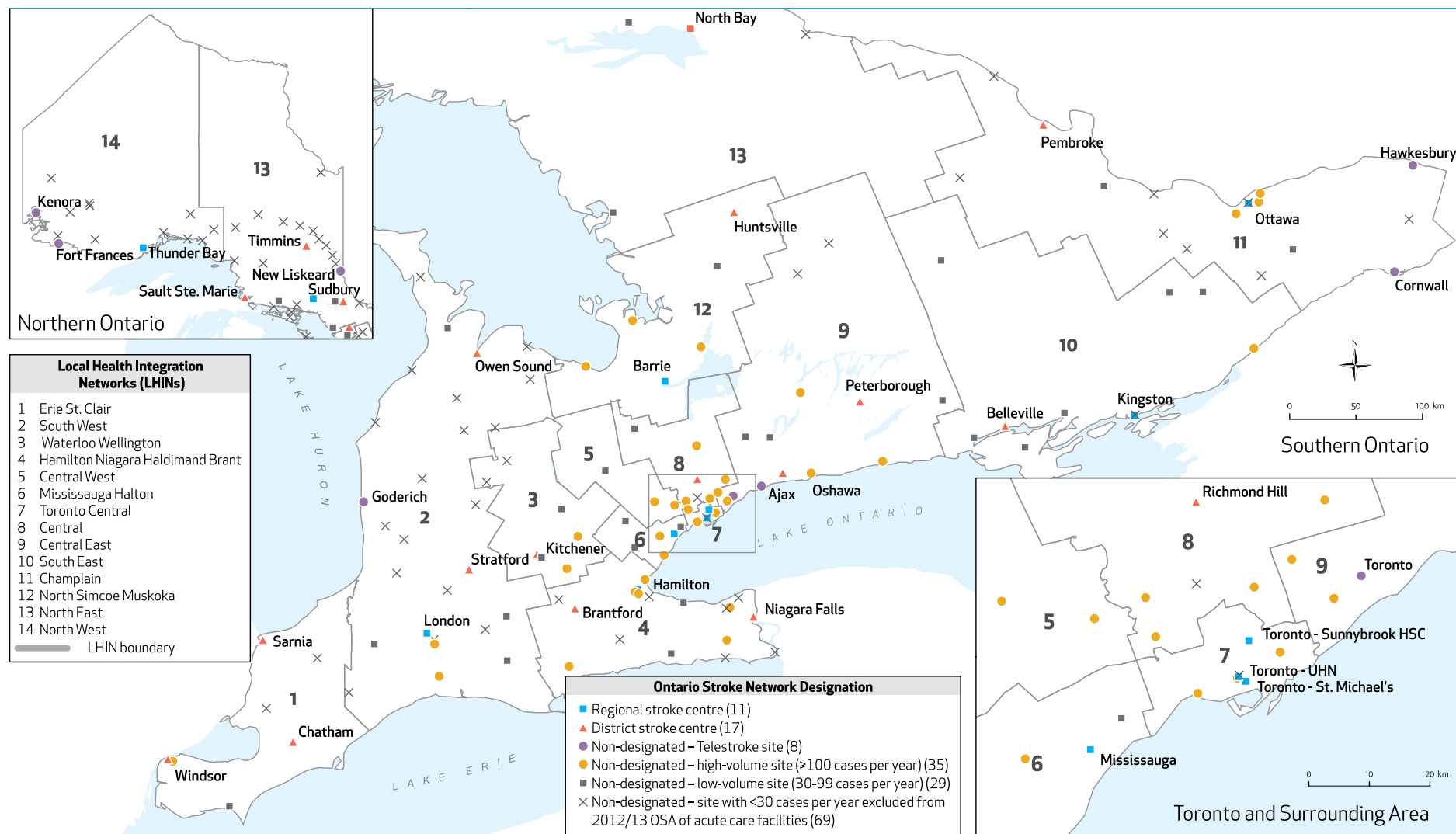
7 A cardiovascular clinic; not specific to stroke.

8 Patients at Peterborough Regional Health Centre have access to a stroke prevention clinic through the Peterborough Regional Vascular Health Network.

9 CT scanner shared between the Perth and Smiths Falls sites.

Note: AlphaFIM® is a registered trademark of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

APPENDIX E Map of Acute Care Facilities in Ontario, by Local Health Integration Network and Ontario Stroke Network Designation, 2012/13

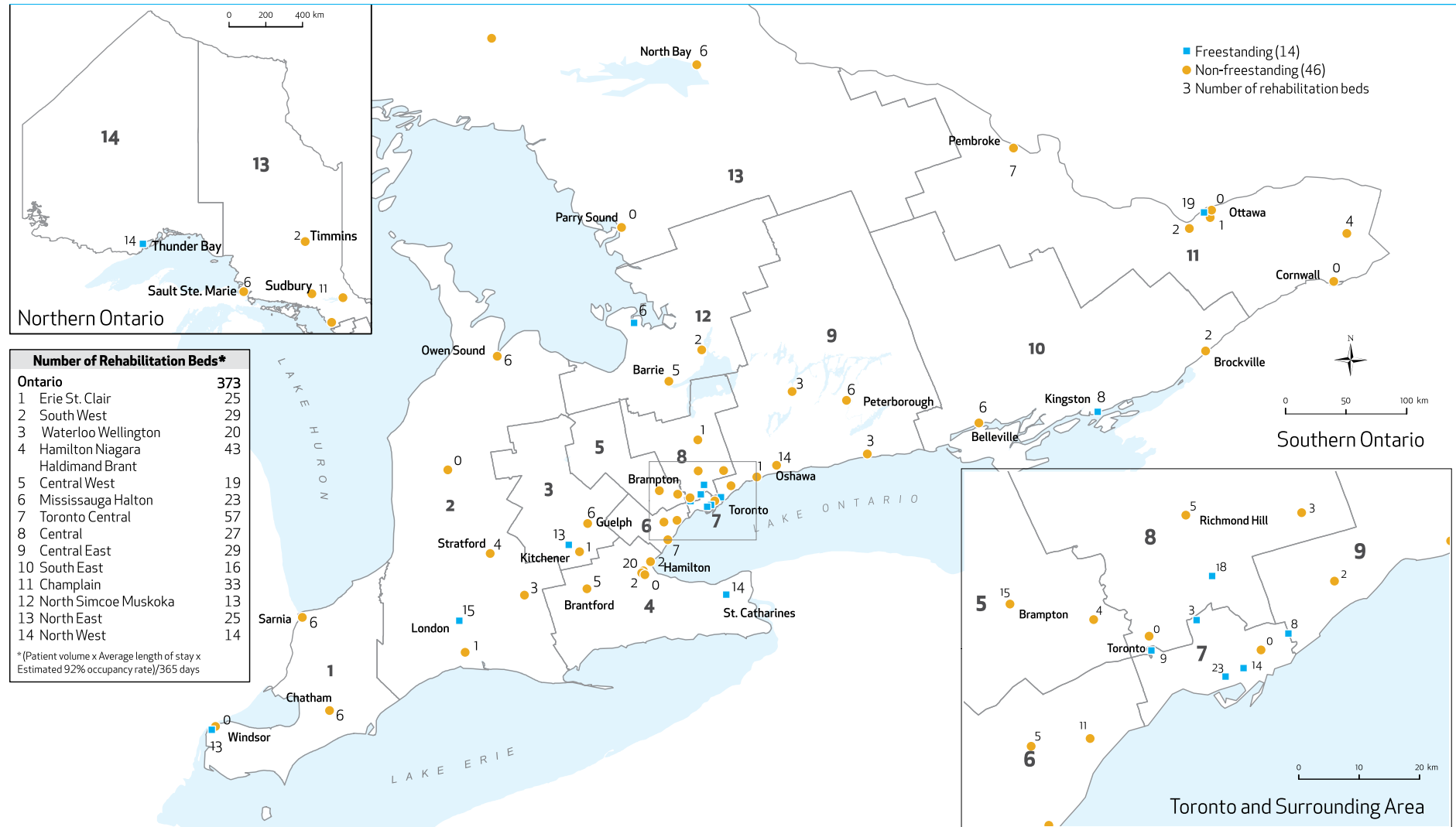


APPENDIX F Calculation of Patient Discharge Disposition

Inpatient Rehabilitation: National Rehabilitation Reporting System

Discharge Disposition	Coding Algorithm
Home without services	Disch Living Setting Code (dliveset) = Home without health services (1)
Home with services	Disch Living Setting Code (dliveset) = Home with paid health services (2)
Other community services	Disch Living Setting Code (dliveset) = Boarding house (3); Assisted living (4); Shelter (6); Public place (7)
Long-term care facility	Disch Living Setting Code (dliveset) = Residential care (5)
Acute care facility	Referred to Code (referto) = Inpatient acute care unit, same facility (02); Inpatient acute care unit, different facility (03)
Died	Discharge Reason Code (dreason) = Person deceased (8)
Unavailable/unknown	Disch Living Setting Code (dliveset) = Not available, temporarily (-50); Asked, unknown (-70)

APPENDIX G Map of Designated Rehabilitation Facilities and Beds in Ontario, by Local Health Integration Network and Facility Type, 2012/13



APPENDIX H Glossary of Terms

Term/Acronym	Definition
ABC methodology	Achievable Benchmarks of Care methodology
AF	Atrial fibrillation
AlphaFIM®	A standardized assessment tool used to evaluate the disability and functional status of patients in acute care 3 to 5 days following hospital admission for stroke. AlphaFIM® is a registered trademark of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.
Alternative level of care (ALC)	An ALC patient is one who has finished the acute care phase of his/her treatment but remains in an acute bed. This classification is invoked when the patient's physician gives an order to change the level of care from acute care and requests a transfer for the patient.
Canadian Neurological Scale (CNS)	Designed to assess neurological function in conscious stroke patients, the scale ranges from 0 to 11.5, with a higher score indicating less impairment. A CNS score of 8 or less indicates severe stroke.
CCAC	Community Care Access Centre
CCC	Complex continuing care
CCRS	Continuing Care Reporting System
Charlson Comorbidity Index	An index commonly used in health services research to capture the effect of any of 22 diseases, such as diabetes or congestive heart failure, a patient may have in addition to the disease of interest that affects an outcome (e.g., mortality, length of stay, cost). Each of the diseases is assigned a value, and the sum of the values produces a patient's Charlson comorbidity index.
CIHI	Canadian Institute for Health Information
CIHI-DAD	CIHI's Discharge Abstract Database; captures administrative, clinical and demographic information on hospital discharges (including deaths, sign-outs and transfers). Some provinces and territories also use the DAD to capture day surgery
CIHI-NACRS	CIHI's National Ambulatory Care Reporting System; contains data for all hospital-based and community-based ambulatory care
CIHI-NRS	CIHI's National Rehabilitation Reporting System; contains client data collected from participating adult inpatient rehabilitation facilities and programs across Canada
CSN	Canadian Stroke Network
CSS	Canadian Stroke Strategy (or System)
CT	Computed tomography
District stroke centre	A facility that has written stroke protocols for emergency services, emergency department and acute care including: transport and triage protocols; ability to offer thrombolytic therapy to suitable ischemic stroke patients; timely computed tomography (CT) scanning and expert interpretation; clinicians with stroke expertise; and linkages to rehabilitation and secondary prevention.
Dysphagia	Difficulty swallowing
ED	Emergency department
FIM®	Functional Independence Measure; an instrument used to assess a patient's physical and cognitive abilities. FIM® is a registered trademark of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

Term/Acronym	Definition
GTA	Greater Toronto Area
HCD	Home Care Database, from the OACCAC
Hemorrhagic stroke	Stroke caused by the interruption of blood flow to the brain due to uncontrolled bleeding in the brain
ICD-10-CA	An enhanced version of ICD-10 (International Classification of Diseases and Related Health Problems, 10th Revision), developed by CIHI for morbidity classification in Canada
ICES	Institute for Clinical Evaluative Sciences
ICH	Intracerebral hemorrhage
Ischemic stroke	Stroke caused by the interruption of blood flow to the brain due to a blockage or constriction of the arteries that supply it
LHIN	Local Health Integration Network
Local Health Integration Network	One of 14 not-for-profit corporations established in Ontario by the MOHLTC, each with specific geographic boundaries. Each LHIN is responsible for planning, integrating and funding local health services.
LOS	Length of stay
LSN	Last seen normal; time prior to the onset of stroke symptoms
LTC	Long-term care
MOHLTC	Ministry of Health and Long-Term Care
MRI	Magnetic resonance imaging
Networks of Centres of Excellence	Large-scale, academic-led virtual research centres that bring together multidisciplinary partners from academia, industry, government and not-for-profit organizations
Non-designated centre	An acute care hospital that does not meet the requirements of the definition of a district or regional stroke centre
OACCAC	Ontario Association of Community Care Access Centres
OHA	Ontario Hospital Association
OSA Acute	Ontario Stroke Audit of Acute Care Facilities
OSN	Ontario Stroke Network; provides provincial leadership and coordination for the Ontario Stroke System
OSS	Ontario Stroke Strategy (or System). A collaborative system of a provider organization and partners who deliver stroke care across the province and care continuum
Quality-based procedure (QBP)	Condition-specific patient groups identified for funding based on the provision of evidence-based care. Ten patient groups have been launched, with stroke being one of them, as quality-based procedures and are supported with detailed clinical handbooks to assist with clinical implementation. For further information, see http://www.health.gov.on.ca/en/pro/programs/ecfa/funding/hs_funding_qbp.aspx .
RCG	Within the CIHI-NRS, the Rehabilitation Client Group (RCG) describes the primary reason for admission to rehabilitation

Term/Acronym	Definition
Rehabilitative Care Alliance	An Ontario-wide collaborative established to build on the work of the Rehabilitation and Complex Continuing Care Expert Panel
Regional stroke centre	A facility that has all the requirements of a district stroke centre plus neurosurgical facilities and interventional radiology
RPDB	Registered Persons Database
RPG	Within the CIHI-NRS, the Rehabilitation Patient Group describes stroke severity
SAS	Statistical Analysis System software; used for advanced data analytics
Separation	The release of a patient from a course of care
SEQC	Stroke Evaluation and Quality Committee
SPC	Secondary stroke prevention clinic; an ambulatory clinic that aims to reduce recurrent vascular events following an initial stroke
Stroke	Rapidly developing clinical signs of focal (at times global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin (from the strokebestpractices.ca website)
Stroke unit	<p>Definition revised in 2014; obtained through consensus with Ontario Stroke Network regional directors (February 2014): A stroke unit is a geographical unit with identifiable co-located beds (e.g., 5A-7, 5A-8, 5A-9) that are occupied by stroke patients 75% of the time and has a dedicated interprofessional team with expertise in stroke care including, at a minimum, nursing, physiotherapy, occupational therapy and speech-language pathology.</p> <p>Definition prior to 2014; obtained through the Ontario Stroke Network Resource Survey (November 2012): A stroke unit is a specialized, geographically-located hospital unit with a dedicated stroke team and stroke resources (e.g., care pathway, educational materials, monitored beds). The unit does not need to have all of these resources nor does it have to be exclusive to stroke patients, but it must be in one location in the hospital.</p>
Sub-LHIN	A subdivision of a Local Health Integration Network. Collectively, these are defined by each LHIN as the areas that best suit its need for planning and reporting purposes.
Telestroke	A telemedicine application that provides emergency physicians with immediate access to neurologists who can support both the assessment and treatment of patients experiencing acute ischemic stroke
Thrombolysis	The administration of a drug, such as tPA, to dissolve dangerous clots in blood vessels, improve blood flow, and prevent damage to tissues and organs
TIA	Transient ischemic attack, or 'mini-stroke'; an episode of temporary and focal cerebral dysfunction of vascular origin, variable in duration, commonly lasting from 2 to 15 minutes but occasionally lasting as long as a day (24 hours), which leaves no persistent neurological deficit (from www.strokebestpractices.ca).
tPA	Tissue plasminogen activator; a protein used to break down blood clots in people having an ischemic stroke
UTD	Unable to determine; based on available data in the patient's medical records, or on clinical presentation and/or findings

APPENDIX I Progress on Ontario Stroke Network 2016/17 Targets

	Reduction in Strokes	Access to Stroke Units	Access to Inpatient Rehabilitation	Improved Outcomes
Metric	Incidence stroke/TIA inpatient admission rate	Increase in the number of stroke patients admitted to stroke units	Median time from stroke inpatient admission to inpatient rehabilitation admission	Proportion of stroke/TIA patients admitted to a long-term care facility within 1 year following discharge ¹
OSN Target	1.14 per 1,000	52.6%	5 days	3.75%
LHIN Variation Target	0.45	35	3.5	2.8
2010/11 Baseline	1.3 per 1,000 LHIN variation = 0.7 (range 1.2-1.9)	26.3% ² LHIN variation = 71.2 (range 0.0-71.2)	10 days LHIN variation = 8 (range 8-16)	7.5%
2012/13 Update	1.28 per 1,000 LHIN variation = 0.8 (range 1.2-2.0)	Not applicable	10 LHIN variation = 8 (range 8-16)	7.3% LHIN variation = 4.7 (range 3.7-8.4)

1 Target recalculated in 2012/13 using Client Profile Database (CPRO) to identify long-term care admissions.

2 Baseline is 2012/13 using revised stroke unit definition.

APPENDIX J List of Supplementary Exhibits

The following exhibits and facility-level data for most exhibits included in this report are available upon request.

1. Number and proportion of adult patients arriving at the emergency department with a stroke or transient ischemic attack, in Ontario and by sex and age group, 2003/04 and 2010/11–2012/13
2. Proportion of adult patients with ischemic stroke who arrived at hospital within 4.5 hours of symptom onset and received acute thrombolytic therapy (tPA) and the door-to-needle time, in Ontario and by sex, Ontario Stroke Network designation and Local Health Integration Network, 2012/13
3. Proportion of referrals from emergency department to secondary stroke prevention services among adult patients with stroke or transient ischemic attack, in Ontario and by facility performance, 2012/13 (Map)
4. Proportion of admitted adult patients with ischemic stroke or transient ischemic attack who were prescribed antithrombotic therapy on discharge from acute care, in Ontario and by Local Health Integration Network and facility performance, 2012/13 (Map)
5. Number and proportion of adult patients admitted to acute care hospitals with stroke or transient ischemic attack, in Ontario and by sex and age group, 2003/04 and 2010/11–2012/13
6. Proportion of adult patients with stroke and with documentation that an initial dysphagia screening was performed during admission to acute care, in Ontario and by Local Health Integration Network and facility performance, 2012/13 (Map)
7. Proportion of adult patients with ischemic stroke or transient ischemic attack and atrial fibrillation who were prescribed or recommended anticoagulant therapy on discharge from acute care (excluding those with contraindications), in Ontario and by Local Health Integration Network and facility performance, 2012/13 (Map)
8. Total mean inpatient length of stay for patients with ischemic stroke, in Ontario and by Local Health Integration Network, 2012/13
9. Total mean inpatient length of stay for patients with transient ischemic attack, in Ontario and by Local Health Integration Network, 2012/13
10. Total mean inpatient length of stay for patients with intracerebral hemorrhage, in Ontario and by Local Health Integration Network, 2012/13
11. Total mean inpatient length of stay for patients with subarachnoid hemorrhage, in Ontario and by Local Health Integration Network, 2012/13
12. Inpatient length of stay for adults with stroke or transient ischemic attack who had at least one Alternate Level of Care day, in Ontario and by sex, stroke type, Ontario Stroke Network designation, discharge destination and Local Health Integration Network, 2010/11–2012/13
13. Characteristics and outcomes of adult stroke patients in inpatient rehabilitation, in Ontario and by Local Health Integration Network and facility type, 2003/04 and 2010/11–2012/13

14. Length of time to provision of Community Care Access Centre support services to adult home care clients (active and new) following an acute care hospitalization for stroke, in Ontario and by sex and Local Health Integration Network, 2006/07–2007/08 and 2009/10–2012/13

15. Community Care Access Centre support services provided to adult home care clients (active and new) within 180 days following an acute care hospitalization for stroke, in Ontario and by Local Health Integration Network, 2006/07 and 2008/09–2011/12

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