



Ontario Stroke Evaluation Report 2012

Prescribing System Solutions to Improve Stroke Outcomes

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About the Organizations Involved in This Report

The Ontario Stroke Network

With its vision of *Fewer Strokes, Better Outcomes*, the mission of the **Ontario Stroke Network** (OSN) is to provide provincial leadership and planning for the Ontario Stroke System (OSS) by measuring performance, partnering to achieve best practices, and supporting innovations for stroke prevention, care, recovery and reintegration. 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 the progress of the OSS, and administering the Ontario Stroke Network research and knowledge translation program. The Ontario Ministry of Health and Long-Term Care provides funding to the OSN to measure, monitor and evaluate stroke care in Ontario.

The Ontario Stroke System

The Ontario Stroke System is a client-centred collaboration of 11 regional stroke networks supporting Ontario's 14 Local Health Integration Networks. Each region has a regional stroke centre and many have one or more district stroke centres. Each stroke network is a collaborative partnership of health care organizations and providers that spans the care continuum from prevention to community re-engagement. The goal of the OSS is to coordinate equitable access and improve outcomes for stroke survivors and their families through the integration of stroke best practices across the care continuum.

The Canadian Stroke Network

The **Canadian Stroke Network** (CSN), one of Canada's Networks of Centres of Excellence, is a collaborative effort that brings together researchers, students, government, industry and the non-profit sector. First funded in 1999, the CSN is a not-for-profit corporation with headquarters at the University of Ottawa. The CSN puts Canada at the forefront of stroke research through its multidisciplinary research program, high-quality training for Canadian scientists and clinicians, and national and global partnerships.

The CSN is dedicated to decreasing the physical, social and economic consequences of stroke on the individual and on society. In pursuit of this goal, it aims to:

- promote research excellence,
- train researchers and practitioners,
- maximize economic benefits,
- build national consensus on stroke policy, and
- create added value through partnerships.

In partnership with the **Heart and Stroke Foundation of Canada**, the CSN formally launched the Canadian Stroke Strategy (CSS) in 2006. The strategy promotes education and awareness about stroke, the need to use effective treatments, best practices in providing coordinated care in integrated stroke programs, the importance of delivering rehabilitation at the right time and in the right intensity, and the need to support stroke patients and their families in the community.

Institute for Clinical Evaluative Sciences

The Institute for Clinical Evaluative Sciences (ICES) is an independent, non-profit organization that produces knowledge to enhance the effectiveness of health care for Ontarians. Internationally recognized for its innovative use of population-based health information, ICES' evidence supports health policy development and guides changes to the organization and delivery of health care services.

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 brings the best and the brightest together under one roof. Many ICES scientists are not only internationally recognized leaders in their fields but also practicing clinicians who understand the grassroots of health care delivery, making

the knowledge produced at ICES clinically-focused and useful in changing practice. Other team members have expertise in statistics, epidemiology, project management or communications. The variety of skill sets and educational backgrounds ensures a multidisciplinary approach to issues and engenders a real-world mosaic of perspectives that is vital to shaping Ontario's future health care system.

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. These combined resources enable ICES to have a large number of projects underway, covering a broad range of topics. The knowledge that arises from these efforts is always produced independent of funding bodies, which is critical to ICES' success as Ontario's objective, credible source of evidence guiding health care.

About This Report

Background and Purpose

In April 2003, the Ontario Ministry of Health and Long-Term Care launched the Ontario Stroke Strategy Monitoring and Evaluation Initiative. The initiative's goals include:

- measuring changes and outcomes attributable to the Ontario Stroke System (OSS);^a
- 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; and
- reporting on improvements and gaps in stroke prevention and care.

In August 2008, after a strategic planning process, the Ontario Stroke Network (OSN) was created as the governing body to provide coordination and leadership for the OSS, including evaluation and reporting responsibilities. The OSN is dedicated to driving system change and coordinating the implementation of best practices across the province. The Stroke Evaluation and Quality Committee (SEQC) is a committee of the OSN Board that, in collaboration with the OSN Evaluation Specialist, is responsible for measuring, monitoring, evaluating and reporting on the progress of the OSS.

Methods

Indicator Selection

To evaluate how well the Ontario Stroke System delivers best practice stroke care across the care continuum, in 2010 the SEQC reviewed over 150 performance indicators included in the Canadian Stroke Strategy's **2008 Performance Measurement Manual** and from them identified a set of 45 core performance indicators. The 2012 Stroke Evaluation Report provides a comprehensive look at each core performance indicator and the variation in stroke care by stroke care sectors, including Emergency Department, Acute Inpatient Care, Inpatient Rehabilitation, Complex Continuing Care, Long-Term Care, and Home Care Services in Ontario from 2003/04 to 2010/11.

The SEQC further identified a subset of 20 key indicators considered integral to system efficiency and effectiveness for presentation in a report card. The provincial and LHIN report cards can be found in Appendix B.

Data Sources

This report includes two main sources of data: data obtained through administrative datasets and data collected through biennial Ontario Stroke Audits.

Administrative Data

The following data sources, all housed at the Institute for Clinical Evaluative Sciences, were used to monitor the performance of the OSS:

- from the Canadian Institute for Health Information: the Discharge Abstract Database (CIHI-DAD), the National Ambulatory Care Reporting System (NACRS) Emergency Department subset, the National Rehabilitation Reporting System (NRS) and the Continuing Care Reporting System (CCRS); and
- from the Ontario Ministry of Health and Long-Term Care: the Home Care Database (HCD) and the Registered Persons Database (RPDB).

Encrypted health card numbers were used to link patients diagnosed with stroke or transient ischemic attack (TIA) across the various administrative databases.

Stroke Cohorts

Stroke cohorts were generated from the administrative databases using codes from the International Classification of Disease, 10th Revision, Canada (ICD-10-CA); the codes are listed in Appendix C. The most responsible or main problem diagnosis was used to identify adult stroke/TIA records in the CIHI-DAD and NACRS databases. For paediatric stroke/TIA records, all diagnostic code fields were searched. The first record for an individual in each fiscal year was used to measure the various indicators.

^a The OSS is a collaborative system of a provider organization and partners who deliver stroke care across the province and the care continuum.

Statistical Analyses

Process-based Indicators

Indicator analyses counted only unique patients for each fiscal year. 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). Time- and therapy-based indicators are reported as median values. Median time/service is the time required or service received by half of a patient population (e.g., length of stay, rehabilitation, home care-based rehabilitation therapy).

Most of the indicators in the report are observed proportions or median values. 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 for each fiscal year using the Ontario population as the standard population, and each region's rate was calculated as if it had the same age-sex distribution as the province.

Outcome Indicators

Revisit/readmission rates relate to patients who survived the initial stroke emergency department (ED) visit or hospitalization but revisited or were readmitted to hospital at least once within 30 days 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 then, 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. Readmission rate is a good indicator of the existence of appropriate discharge planning to prevent secondary complications or another stroke/TIA event.

Mortality rates were also calculated using indirect standardization based on a risk-adjustment model similar to the Get With The Guidelines ischemic stroke mortality risk-adjustment model.¹ This model allows death rates to be adjusted for differences across regions in sociodemographic comorbidity and condition-specific indicators of illness severity. The model adjusts for age, sex, stroke type, arrival by

ambulance and common risk factors (atrial fibrillation, previous stroke/TIA, coronary artery disease, PCI, CABG, carotid disease, CEA/CES, diabetes, hypertension, peripheral vascular disease, and hyperlipidemia). Mortality indicators were analyzed for inpatients only (see Appendix K for model specifications). In-hospital mortality is based on the CIHI-DAD separation in that fiscal year. Thirty-day mortality measures the number of deaths that occurred within 30 days from the first stroke/TIA admission date each fiscal year, with death being identified in the Registered Persons Database.

The Ontario Stroke Registry (formerly the Registry of the Canadian Stroke Network) – 2002/03, 2004/05, 2008/09 and 2010/11 Acute Ontario Stroke Audits

The Ontario Stroke Audit (OSA) is a biennial random sample of stroke/TIA patients seen at over 140 acute care facilities in Ontario.^b The OSA 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 and stroke unit admission.

Participating Institutions

All Ontario acute care institutions, excluding mental health care hospitals and those with fewer than 10 stroke or TIA separations per year, were invited to participate in the Acute Ontario Stroke Audit. Based on the annual number of visits or admissions for stroke or TIA, institutions were categorized as low volume (fewer than 33), medium volume (33–99) or high volume (100 or more). Institutions were also classified as regional stroke centres, district stroke centres, non-designated hospitals or non-designated hospitals with Telestroke^c capacity.

Patient Sample

All patients (including non-Ontario residents) discharged from the ED or inpatient hospital stay between April 1, 2010 and March 31, 2011 with a main problem or most responsible diagnosis of stroke or TIA (excluding questionable or suspected diagnoses) were eligible for inclusion in the 2010/11 Acute Ontario Stroke Audit. Stroke and TIA separations were identified from CIHI-DAD and NACRS. For individuals with stroke/TIA separations in both databases, only the CIHI–

^b Ontario Stroke Audits in 2002/03, 2004/05 and 2008/09 were conducted on a random sample of 20% of all eligible cases, 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 (18 years and older) and patients whose stroke occurred prior to hospital arrival were eligible for inclusion.

^c The Ontario Telestroke program is an emergency medicine application that provides emergency physicians with immediate access to neurologists with expertise in stroke care to support both the assessment and treatment of patients experiencing acute ischemic stroke. In 2010/11, the Ontario Telestroke program was supported by 12 stroke neurologists who provided emergency consultations for patients presenting to 17 referring hospitals with acute stroke symptoms (see Appendix D). The program is supported by the Ontario Telemedicine Network for connectivity, standard videoconferencing, imaging hardware and logistics. Ontario's Critical program provides a provincial call centre to initiate Telestroke consultations. The OSN provides oversight and governance.

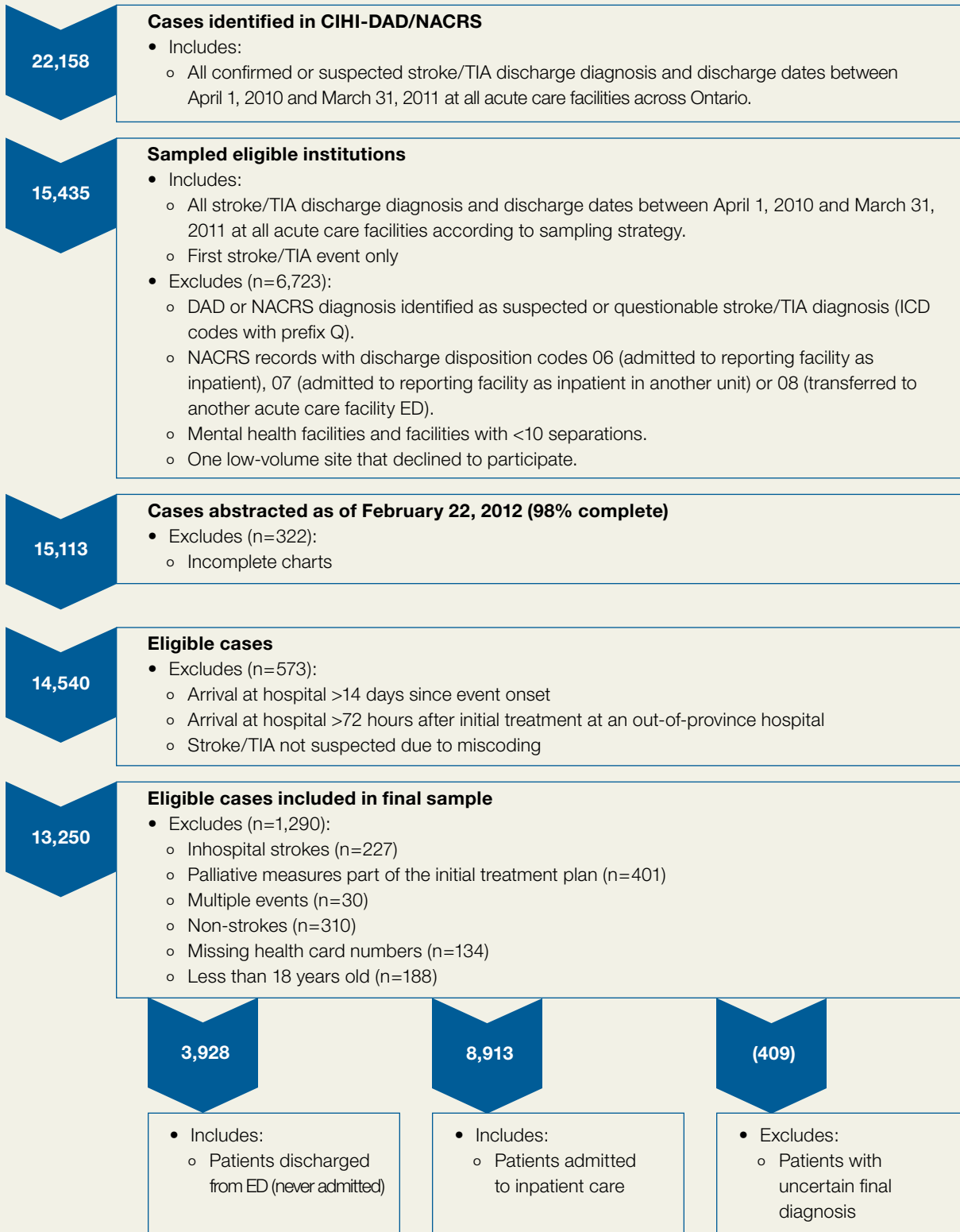
DAD separation was used. For individuals with more than one stroke/TIA during the sampling time frame, only the first stroke/TIA event was used. See Appendix C for the ICD-10-CA codes used to identify eligibility for inclusion in the 2010/11 OSA.

The 2010/11 OSA is the largest to date, representing 15,435 patient charts. A population-based sampling strategy was used that included 100% of patients seen at regional, district and enhanced district stroke centres and Telestroke sites; 30% of patients at high-volume, non-designated hospitals; 30 patients from each medium-volume, non-designated centre; and 10 patients from each low-volume, non-designated facility. All strokes, including those that occurred during hospital admission, and both adult and paediatric stroke/TIA patients were eligible for inclusion. Data analyses for this report was done when completeness of chart abstraction was at 98%. The

table below reports the completeness rate by region at the time of the data analyses.

Ontario Stroke System Region	Abstraction Completed (%)
Central East	100
Central South	94
East – Champlain	98
Northeast	100
Northwest	100
South East	100
Southwest	96
Toronto – North & East	100
Toronto – Southeast	100
Toronto – West	94
West GTA	100

2010/11 Ontario Stroke Audit sample of adult patients



2010/11 Ontario Stroke Audit sample of paediatric patients

A total of 480 paediatric cases (representing patients younger than 18 years of age) were identified using CIHI–DAD and NACRS. Of these, 100% were abstracted and 188 (39.2%) were found to be eligible cases (they arrived less than 14 days after event onset, less than 72 hours after initial treatment at an out-of-province hospital, or where a stroke/TIA was suspected). Of the eligible cases, 43 had a final diagnosis of non-stroke and were excluded, resulting in a final paediatric sample of 145 patients.

Data Abstraction and Management

Centrally-trained neurology research nurses performed chart abstraction at the participating hospitals. Data were collected on all aspects of acute stroke management, including patient demographics, the use of pre-hospital emergency medical services, and in-hospital and emergency department management, complications and outcomes. Data were entered electronically into a custom-designed Microsoft Access database that enhanced data validity by checking ranges and internal data consistency at the time of data entry. The program anonymized and encrypted the data before transfer via a secure telephone line to the Institute for Clinical Evaluative Sciences (ICES) in Toronto. The aggregate dataset was managed and analyzed by the Ontario Stroke Registry (OSR) team at ICES. Unique patient identification numbers were used to link the OSR 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 where 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.

Statistical Analyses

Results are presented for the entire province and by sex, Ontario Stroke System (OSS) region, Local Health Integration Network (LHIN) and OSS hospital designation (includes 11 regional or enhanced district stroke centres, 17 district stroke centres, 107 non-designated hospitals and 7 Telestroke sites (non-designated hospitals). Telestroke is available in one of the 11 regional stroke centres and 9 of the 17 district stroke centres and was analysed as such for all indicators with the

exception of thrombolysis administration. Thrombolysis analyses report Telestroke performance based on all 17 participating facilities (1 regional stroke centre, 9 district stroke centres and 7 non-designated hospitals), as access to thrombolysis has been the primary role of the Telestroke program.

To account for oversampling at certain institutions, results were weighted based on hospital 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. See Appendix J for sample sizes for indicator calculations.

The characteristics, management and in-hospital outcomes of stroke patients by region and hospital designation were compared using Rao-Scott Chi-square tests for categorical variables. Tests for trends over time were performed using a survey logistic regression model. SAS version 9.2 was used for all data analyses. Analyses by region were based on facility rather than patient location for the majority of indicators.

Benchmark Calculations

Provincial benchmarks were calculated for a subset of indicators presented in the Ontario Stroke Report Cards (see Appendix B). The benchmarks were calculated using the Achievable Benchmarks of Care (ABC) methodology,^{2,3} 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) and therefore were attainable.

The following steps were used to calculate each benchmark:

1. Rank the care providers (facilities or subLHINs) in descending order of performance on the process indicator;
2. Beginning with the best-performing care provider, add the providers until at least 20% of the total number of patients are represented (in the denominator); and
3. Calculate the benchmark using only the selected providers in step 2 (20%) by dividing the total number of patients who received appropriate care by the total number of patients eligible for the care in the subset.

To ensure that high-performing care providers with low number of patients did not improperly influence the benchmark rates, the performance of facilities or subLHINs

with small sample sizes and high performance rates was adjusted, and rank order was based on the adjusted performance rates. The benchmark was calculated by ranking subLHIN performance, not facilities, for population-based indicators (report card indicators 1, 2, 11, 12 and 19). Report card indicators 3, 15 and 20 did not use the ABC methodology; the provincial performance rate was used.

Report Layout and Interpretation

This report provides **detailed information on progress across the care continuum** and at multiple levels of analysis, enabling the OSN and the OSS regions to compare performance to other LHINs/regions. This report highlights stroke system successes while pointing out inefficiencies and opportunities for improvement.

The *Review of System Solutions* section provides an overview of findings and recommendations by stroke care sector. The use of happy, neutral and sad faces was introduced in the 2010 Ontario Stroke Evaluation Report and is continued in this report. **A happy face indicates improvement, a neutral face indicates no change, and a sad face indicates a need for investigation and/or improvement.**

For the purposes of this report, paediatric stroke patients aged 0–17 years were identified and are reported on separately from adult stroke/TIA patients. The sections of the report pertaining to adult patients are divided into hospital and patient characteristics; emergency department care; acute inpatient care; inpatient rehabilitation, complex continuing care and long-term care; home care services; and patient outcomes.

Where possible, data are presented by the 14 LHINs, 11 OSS regions and four facility types (regional stroke centres, district stroke centres, non-designated centres and Telestroke sites). This year's report includes Telestroke data for the first time. The 2010/11 Ontario Stroke Audit included a 100% sample from hospitals providing access to Telestroke (see Appendix D) to better understand the impact of Telestroke at these hospitals.

Influenced by the establishment of Echo: Improving Women's Health in Ontario (an agency of the Ontario Ministry of Health and Long-Term Care) and the publication of recent research on sex differences in health care in the province⁴, for the first time this year, **data are presented by patient sex where possible.**

Executive Summary

Prescribing System Solutions to Improve Stroke Outcomes

The 2012 Ontario Stroke Evaluation Report provides an overview of stroke care across the care continuum. Compared to the 2011 edition, this report delivers a more comprehensive review of stroke care, including an examination of differences in care provided to men and women, a description of the care provided at complex continuing care facilities and long-term care homes, and an analysis of the acute care provided through the Telestroke program. In addition, this year's report includes the results of the largest acute stroke audit conducted in Ontario to date (over 15,000 charts), including data on paediatric stroke. This larger audit allows for better estimates of regional performance on stroke quality indicators not available from administrative databases and the distribution of functional disability following an acute stroke.

The information in this year's report is used to assess the progress of the Ontario Stroke System (OSS), identify gaps and prescribe solutions that will improve outcomes for stroke/TIA patients in Ontario. This report once again demonstrates how the regional stroke networks have improved access to stroke best practices since 2009.

Areas of continued progress include:

- Reduced LHIN variation and increased percentage of stroke/TIA patients arriving by ambulance;
- Reduced LHIN variation in the percentage of stroke/TIA patients receiving neuroimaging within 24 hours of hospital arrival;
- Increased percentage of patients receiving tPA (stroke thrombolysis) within 60 minutes with more LHINs achieving this benchmark;
- Increased percentage of patients accessing stroke unit care;
- Increased percentage of carotid imaging among patients without atrial fibrillation and decreased time to carotid intervention;
- Reduced inhospital, 30-day and one-year stroke mortality rate;
- Reduced wait times for admission to inpatient rehabilitation from acute care; and
- Increased percentage of patients undergoing dysphagia screening.

However, improvements are needed in a number of areas: TIA inpatient admissions, the clinical management of atrial fibrillation, the proportion of severe stroke patients accessing inpatient rehabilitation facilities, home care provision of rehabilitation therapy, and 30- and 90-day non-elective stroke/TIA revisit/readmission rates. In addition, stroke/TIA patients admitted to hospital have almost one-third of their total length of stay considered Alternate Level of Care (ALC), and almost one in four admitted stroke/TIA patients have a median of six ALC days.

Given the complexity of making change in health care, it is impressive that steady progress is being made year over year. The OSN and the Regional Stroke Networks are well positioned to make further progress, particularly in those areas that have been challenging to improve. The planned work on improving and integrating prevention efforts through the Ontario Vascular Health Integration Strategy, the ER/ALC Rehab/CCC Expert Panel work on stroke rehabilitation, and the planned stroke patient-based funding initiative for 2013/14 should help continue the progress.

Prescribed Solutions

1. Rx: Improve public awareness of stroke risk factors and the signs and symptoms of stroke

Risk Factors

The 2010/11 Ontario Stroke Audit revealed that the prevalence of modifiable risk factors for stroke had increased: 69.3% of patients had documented high blood pressure, 26.4% had diabetes, 15.0% currently smoked and 41.8% had hyperlipidemia. This trend is consistent with the overall increase in prevalence of chronic disease risk factors and is associated with an aging population. If the trend continues, the positive results observed with stroke hospitalization rates will reverse.

Recommendation

The OSN should continue to partner with other networks to address the increased prevalence of risk factors for stroke and other vascular diseases. The Ontario Integrated Vascular Health Strategy Blueprint is an important step in addressing the rising tide of vascular risk factors.

Signs and Symptoms

The proportion of stroke/TIA adults arriving at the emergency department by ambulance increased from 52.8% in 2003/04 to 57.1% in 2010/11. This improvement was observed for the majority of LHINs and with decreased variation across LHINs. The steady improvement is associated with the implementation of provincial medical redirect protocols the public awareness and education campaigns of the Heart and Stroke Foundation and regional stroke networks. However, as two of every five stroke victims do not call 911 for emergency assistance, more needs to be done. Related to this, stroke thrombolysis rates are increasing steadily; the most recent data show that 9.6% of all ischemic stroke patients received tissue plasminogen activator (tPA) in 2010/11.

Recommendations

The OSN should continue to partner with the Heart and Stroke Foundation on its warning signs campaign. Awareness efforts should be enhanced and expanded. In addition, current work with the Ontario Telemedicine Network to develop LHIN/regionally-driven Telestroke plans should further increase access to tPA.

2. Rx: Improve access to secondary prevention clinics for TIA patients

The data show that over the past three years, there has been minimal change in inpatient admissions (approximately 18%) or length of stay (3 days) for patients with TIA, while referrals for TIA patients to secondary stroke prevention clinics (SPC) following discharge from the emergency department (ED) increased from 62.3% in 2008/09 to 72.6% in 2010/11 ($p=0.0001$). TIA patients had the highest 30-day (6.5%) and 90-day (8.3%) age- and sex-adjusted stroke/TIA-related readmissions. The rate of thirty-day all-cause readmissions among TIA patients decreased from 8.9% in 2003/04 to 7.9% in 2009/10 ($p=0.0002$). These rates are notably lower than an earlier study by Gladstone et al. reporting a 30-day all-cause readmission rate of 12%.⁵

Recommendations

These findings further underline the importance of the OSN-directed call for research to examine how Ontario's TIA patients are diagnosed and managed. The findings also align with the identification of TIA as a priority for the development of provincial care protocols by the OSN's Secondary Prevention and Acute Care Subcommittee. Similarly, the findings support the OSN's decision to conduct an audit of all secondary stroke prevention clinics in the province to evaluate

adherence to best practice TIA care and effectiveness of the clinics in reducing recurrent strokes/TIA.

3. Rx: Improve stroke inpatient access to stroke unit care

The findings of the 2010/11 Ontario Stroke Audit show that regional stroke networks have made great strides in improving access to stroke units. In 2010/11, 38.3% of admitted stroke/TIA patients spent some part of their inpatient stay on a stroke unit, whereas in 2008/09, only 30.3% were admitted to a stroke unit. However, of the 62% of stroke patients that did not receive stroke unit care, the majority (68%) were in non-designated hospitals. Ontario's results are dramatically lower than those observed in the 2010 Scottish Stroke Care Audit where 82% of admitted stroke patients were admitted to a stroke unit during their stay.⁶

Recommendations

These findings support the OSN's call for a detailed examination of stroke unit care and its structural variations within Ontario's regional stroke networks. The findings also support a decision by the OSN's Secondary Prevention and Acute Care Subcommittee to make stroke unit care a priority, as well as its plan to develop a stroke unit implementation tool kit. Health Quality Ontario's stroke care mega-analysis, which is focused in part on stroke unit care, will also be critical in driving change.

4. Rx: Improve access to appropriate rehabilitation following acute stroke

In 2010/11, the median time from admission to inpatient rehabilitation following an acute stroke hospitalization was 10 days, a 23% relative decrease from 2003/04 (13 days). Freestanding rehabilitation facilities demonstrated the greatest improvement, from a median time of 20 days in 2003/04 to 14 days in 2010/11.

Of the 3,337 patients admitted into inpatient rehabilitation following an acute stroke hospitalization in 2010/11, Alternate Level of Care days represented 24% of their total acute inpatient length of stay and 6% of their total length of stay in rehabilitation.

The proportion of inpatient stroke rehabilitation patients considered severely disabled has decreased over time, dropping from 37.6% in 2003/04 to 31.2% in 2010/11, with a corresponding increase in moderately disabled patients and a small decrease in mildly disabled patients being admitted. Severely disabled stroke patients admitted into more intense inpatient rehabilitation had lengths of stay of just over a

month compared to stroke patients admitted to complex continuing care where the median length of stay was 52 days and the extent of rehabilitation therapy was less than 30 minutes per day for each therapy (provided individually or in a group setting). The best practice recommendation is that inpatients receive three hours of therapy each day.

Community-based rehabilitation delivered through Community Care Access Centres reveals an inadequate amount of therapy to stroke patients: an average of six visits from all therapies over a 60-day period, with the first visit occurring, on average, more than two weeks after discharge from hospital.

Recommendations

The OSN's current work in support of the ER/ALC Rehab/CCC Expert Panel^d should continue. The standards of care identified by the OSN, if implemented, would effectively allow access to best practice rehabilitation and reduce Alternate Level of Care days and costs of care while improving patient outcomes. In particular, the development of the OSN stroke rehabilitation economic analysis and the collaborative work with Health Quality Ontario should provide decision makers with the tools to support change. The Stroke Rehabilitation Resource Portal^e will support knowledge transfer of leading provincial models for achieving access to stroke rehabilitation. Greater availability of ambulatory rehabilitation services through Community Care Access Centres or other service models could reduce ALC days.

Future reports need to evaluate the effectiveness of the OSN Stroke Reference Panel's recommendations for rehabilitation. The OSN should consider a directed research effort for 2013/14 that focuses on the development of knowledge to support implementation of the established Stroke Rehabilitation Recommendations.^f

5. Rx: Provide comprehensive data for stroke care outside of the acute setting

Data sources beyond the acute stroke care sector provide limited data to evaluate access and appropriateness of stroke rehabilitation duration, intensity and mix of rehabilitation providers. Different assessment tools are used to measure patient functional improvement in Community Care Access Centres, complex continuing care facilities and long-term care homes, and thus it is difficult to determine the appropriateness of these settings for stroke rehabilitation.

Without a source of data to assess outpatient rehabilitation beyond what Community Care Access Centres provide, we do not have a full picture of access to outpatient rehabilitation in Ontario.

Recommendations

The OSN should advance its work with the ER/ALC Rehab/CCC Expert Panel to advocate for the collection of provincial data on outpatient rehabilitation and intensity of rehabilitation therapy. The OSN should continue to partner with the Ministry of Health and Long-Term Care and the Canadian Institute for Health Information in addressing these data gaps. In addition, the OSN should continue to advocate for the inclusion of the AlphaFIM^g in the provincial Discharge Abstract Database.

^d The panel is focused on how best to reduce ALC lengths of stay throughout the stroke system by properly utilizing the capacity, role and expertise available in rehabilitation and complex continuing care.

^e The portal is comprised of resources that will support organizations implementing the Stroke Rehabilitation Recommendations.

^f Recommendations include: timely transfer of appropriate patients from acute facilities to inpatient rehabilitation; the provision of more intensive therapy in inpatient rehabilitation; and timely access to outpatient/community-based rehabilitation for appropriate patients.

^g AlphaFIM is a standardized assessment tool used to evaluate the disability and functional status of patients in acute care 3–5 days following stroke admission.

Review of System Solutions

Prescribing System Solutions to Improve Stroke Outcomes

The following is an overview of solutions that assist in achieving better outcomes for stroke patients in Ontario.

Improve awareness of stroke risk factors and the signs and symptoms of stroke

National Best Practices⁷

Stroke can be prevented by better management of risk factors, such as hypertension, heart disease, diabetes, atrial fibrillation and smoking.

Stroke is a medical emergency; the faster patients get to hospital, the better their chances of receiving treatments that could help reverse the effects of the stroke. There should be a coordinated emergency response system, and all members of the public should be able to recognize the signs and symptoms of stroke; these include the sudden onset of weakness, difficulty speaking, vision problems, headache and dizziness.

Findings

Hospitalization: There has been a significant reduction in hospitalization rates; however, more “baby boomers” are being hospitalized with stroke.



The annual age- and sex-adjusted rate of first hospital visit for stroke/TIA per 1,000 adults dropped by 5%, from 2.0 visits in 2003/04 to 1.9 visits in 2010/11 ($p < 0.0001$). In addition, the annual incidence rate of inpatient hospitalization for stroke/TIA per 1,000 adults dropped by 12%, from 1.7 hospitalizations in 2003/04 to 1.5 hospitalizations in 2010/11 ($p < 0.0001$). This may reflect several trends, including a reduction in smoking, better blood pressure control and increased availability of secondary stroke prevention clinics.



The proportion of stroke/TIA patients in the 46–65 year age group (the largest proportion of the Ontario population, known as the “baby boomers”) has increased, emphasizing the need to address modifiable risk factors, such as hypertension, diabetes, obesity, hyperlipidemia and tobacco smoking. In 2010/11, the first of the baby boomers turned 65. In the next 10 years, an increase in the prevalence of stroke/TIA may be expected as this large segment of the population moves into the 66–75 year age group, an age at which strokes are most likely to occur.

Calling 911: Public awareness has increased; significantly more people are calling 911, receiving clot-busting drugs and being cared for at stroke centres.



Overall, there was an increase in the proportion of stroke patients arriving at acute care hospitals by ambulance: from 52.8% in 2003/04 to 57.1% in 2010/11 ($p < 0.0001$). This is associated with an improvement in the proportion of stroke patients arriving at the emergency department in time to be considered for thrombolysis: from 34.0% in 2003/04 to 42.3% in 2010/11 ($p = 0.0001$). The benchmark is 52.0%, based on data from the 2010/11 Ontario Stroke Audit.



There was an increase in the proportion of patients arriving by ambulance to designated stroke centres: At regional stroke centres, this ranged from 57.4% in 2003/04 to 66.4% in 2010/11 ($p = 0.0001$), and at district stroke centres, from 53.7% in 2003/04 to 63.6% in 2010/11 ($p = 0.0001$). There was also a reduction in the range of variation across LHINs. These improvements may reflect the positive impact of new stroke centre designations, pre-hospital medical redirect protocols and the provincial paramedic prompt card, all improvements occurring since 2003/04.

Acute Thrombolysis: The provincial medical redirect protocol, the Telestroke program and greater public awareness are contributing to significant improvements in stroke thrombolysis rates.



Acute thrombolytic therapy (in the form of tissue plasminogen activator or tPA) was delivered to one in 10 (9.6%) ischemic stroke patients, which is higher than the national rate of 8%,¹¹ making Ontario one of the country's leading jurisdictions for this intervention. The provincial thrombolysis rate for eligible ischemic stroke patients presenting to hospital within the treatment window (within 3.5 hours of stroke onset in 2010/11 and within 2.5 hours in previous years), increased from 10.8% in 2002/03 to 29.6% in 2008/09 to 32.4% in 2010/11 ($p < 0.0001$).



Rates of tPA administration were highest at regional stroke centres (47.4%). At district stroke centres, there was a three-fold increase in the tPA administration rate: from 14.0% in 2002/03 to 41.8% in 2010/11. The 2010/11 benchmark for administering tPA to patients arriving within the treatment window is 61.2%. The observed improvements are likely attributable to the Heart and Stroke Foundation's public awareness campaign resulting in more stroke victims calling 911, the provincial stroke medical redirect protocol, the provincial paramedic prompt card and the Telestroke program.



In 2010/11, the median door-to-needle time (the time from ED arrival to administration of tPA) was 70.1 minutes, which was a minimal change from 2008/09 (69.7 minutes) but an improvement from 2004/05 (82.6 minutes), and higher than the benchmark of 60 minutes.⁷ Telestroke sites delivered tPA the fastest at 62.4 minutes. In Ontario, 38.1% of all ischemic patients received tPA within 60 minutes, which is higher than the national rate of 34%.¹¹

Prevention: The initial improvement in prescribing secondary prevention medication has plateaued, and there is a particular need for improvements for patients with atrial fibrillation.



The proportion of patients who were prescribed antithrombotic/anticoagulant, antihypertensive and anti-lipid drug therapies at discharge increased significantly, from 19.9% in 2002/03 to 52.1% in 2008/09 ($p \leq 0.0001$). In 2010/11, the results were unchanged at 51.4%.



There was little change in the proportion of ischemic stroke/TIA patients with atrial fibrillation who were prescribed or recommended warfarin upon discharge from acute care in 2010/11 compared to 2008/09 (72.1% vs. 73.8%; $p = 0.0394$). The benchmark is 86.0%, based on data from the 2010/11 OSA. Ontario's performance rate is better than rates observed in the 2010 Scottish Stroke Care Audit, where only 48% of stroke/TIA patients were found to be on anticoagulants at discharge.⁶ Women with atrial fibrillation were prescribed anticoagulant therapy at lower rates than men (70.9% vs. 73.4%), yet the prevalence of atrial fibrillation, hypertension and previous stroke/TIA was higher among women.

Recommendations

- 1.** The Ontario Stroke Network (OSN), regional stroke networks, Local Health Integration Networks and other organizations involved in vascular prevention should continue to build on current prevention strategies because they are associated with lower stroke hospitalization rates. In particular, a focus on improving access to best practice stroke prevention and care and to designated stroke facilities should help ameliorate the effect of the burgeoning baby boomer population.
- 2.** The decision by the Ontario Ministry of Health and Long-Term Care to fund the Heart and Stroke Foundation of Ontario's 2010/11 warning signs campaign is to be commended, as more stroke patients arrive at hospital by ambulance than patients who have heart attacks. The campaign needs to be sustained. The OSN should continue to support the Heart and Stroke Foundation in providing evidence of the campaign's impact.
- 3.** The impact of the revised prompt card (fully implemented in September 2011 to reflect the extended stroke thrombolysis treatment window) should be assessed in the next iteration of this report.
- 4.** The decline in the prescribing of warfarin to patients with atrial fibrillation upon discharge from a stroke/TIA hospitalization needs to be investigated, with particular attention given to differences between male and female patients. The recommendation by the Ontario Integrated Vascular Health Strategy Blueprint for the establishment of an atrial fibrillation task team is supported by these findings.
- 5.** The OSN should continue its collaboration with the Ontario Telemedicine Network to improve access to Telestroke services across the province and consider ways to evaluate Telestroke outcomes in the various care settings.

Improve access to secondary prevention clinics for TIA patients

National Best Practices⁷

Patients who present with symptoms suggestive of minor stroke or transient ischemic attack **must undergo a comprehensive evaluation** to confirm the diagnosis and begin treatment to reduce the risk of major stroke as soon as is appropriate to the clinical situation.

Patients with transient ischemic attack or non-disabling stroke and internal carotid artery stenosis (narrowing) of 70–99% should be offered **carotid endarterectomy within two weeks of the attack or stroke**, unless contraindicated.

Findings

Access: Significantly more patients are accessing stroke prevention clinics; however, inpatient admission rates for transient ischemic attack are unchanged.



In 2010/11, almost three of every four patients (72.6%) with transient ischemic attack (TIA) were referred to stroke secondary prevention clinics following an emergency department visit; this was an improvement from 62.3 % of patients in 2008/09 ($p \leq 0.0001$).



In 2010/11, almost one in five inpatient admissions (17.8%) was for TIA, a stable trend since 2003/04. Annually, this represented over 2,500 potentially avoidable inpatient stays. District stroke centres had the highest rate of TIA admissions at 20.6%. Admitting TIA patients signals an opportunity to increase access from emergency departments to outpatient clinics offering coordinated and rapid TIA assessment.

TIA Hospitalization: Fewer TIA patients than expected are being readmitted, and for those that are admitted, LOS and ALC is higher than other stroke subtypes.



Median length of stay for TIA patients remained stable at three days. Compared to other stroke subtypes, TIA patients with at least one Alternate Level of Care (ALC) day had the highest proportion of their total acute length of stay considered to be ALC: 66.2%, compared to 56.9% for ischemic stroke patients.



Rates of revisits/readmissions among TIA patients decreased from 2003/04 onward. From 2003/04 to 2009/10, the non-elective stroke/TIA revisit/readmission rate for TIA patients at 30 days dropped from 6.7% to 6.5% ($p=0.02329$); at 90 days, the rate dropped from 8.9% to 8.3% ($p=0.007$). The 30-day all-cause readmission rate for TIA patients decreased from 8.9% in 2003/04 to 7.9% in 2009/10 ($p=0.0002$). These rates are notably lower than the 30-day all-cause readmission rate of 12% reported by Gladstone et al.⁵

Diagnostic Testing: Significantly more patients are receiving diagnostic testing (carotid imaging); however, the trend is lower for females.



In 2010/11, 82.0% of ischemic stroke patients without atrial fibrillation either had carotid imaging done in hospital or were scheduled for imaging following hospital discharge, a marked increase from 56.3% in 2002/03 ($p \leq 0.0001$). Based on data from the 2010/11 Ontario Stroke Audit, the benchmark for carotid imaging being done prior to discharge is 92.8%. This remarkable improvement reflects efforts to implement best practice stroke care.



The inhospital carotid imaging rate was lower for women than for men (77.0% vs. 80.2%; $p = 0.0311$).



The extent of variation in rates of carotid imaging across LHINs decreased from 40.0 percentage points in 2002/03 to 21.4 percentage points in 2010/11.

Surgical Wait Times: Surgical wait times have significantly improved.



The time to a carotid intervention (carotid stenting or carotid endarterectomy) within six months of an initial stroke among adults decreased dramatically between 2003/04 and 2010/11. The median wait time was 51 days in 2003/04, dropping to 18 days in 2010/11 ($p \leq 0.0001$). In some LHINs, patients waited less than 7 days in 2010/11. This dramatic improvement may be associated with the implementation of stroke prevention clinics and increased awareness of surgical best practices.



In 2010/11, regional stroke centres continued to have the shortest wait times for carotid intervention with a median time of 10 days. District stroke centres had a median wait time of 22 days compared to 26 days at non-designated centres. The higher rate at district stroke centres is unexpected and should be monitored closely.

Readmission Rates: Ninety-day unplanned revisits/readmissions have decreased.



The ninety-day unplanned revisit/readmission rate for adult stroke or TIA decreased from 7.0% in 2003/04 to 6.6% in 2009/10 ($p = 0.007$). Rates of unplanned stroke-related revisits/readmission at 90 days varied from 5.8% to 8.1% across LHINs in 2009/10. There was minimal change in the provincial 30-day unplanned revisit/readmission rate for adult stroke or TIA: 5.0% in 2003/04 and 4.9% in 2009/10.

Recommendations

1. Continued effort is needed to ensure timely carotid artery imaging and prompt surgeon referral. The longer time to carotid intervention for patients at district stroke centres needs to be improved upon. The OSN needs to continue its efforts to understand the prolonged delayed to carotid intervention among patients seen at district stroke centres despite these centres having 80% of patients receiving imaging while in hospital.
2. Expanded accessibility to existing secondary prevention clinics and opening more clinics may further reduce hospital readmission rates for stroke.
3. Almost one in five inpatient stays were for TIA, a level that has remained consistent over time despite an increase in the number of secondary stroke prevention clinics in Ontario. These findings provide further support for the OSN-directed research call for an examination of the management of TIA patients across the province and for the OSN's Secondary Prevention and Acute Care Subcommittee identifying TIA as a priority. The findings also support the OSN's decision to conduct an audit of all secondary stroke prevention clinics in the province to evaluate best practice stroke/TIA care, as well as the clinics' effectiveness in reducing recurrent strokes/TIAs.
4. All individuals with mild stroke who are not admitted to hospital should be followed up in secondary prevention clinics, as the time of highest risk for major stroke is within 48 hours after the event.

Improve stroke inpatient access to stroke unit care

Best Practice

Acute stroke patients should be cared for by a team of experts in stroke, preferably in a special dedicated unit. Expert care results in reduced complications and decreased death and disability.

Findings

Readmissions and Mortality: Significantly fewer Ontarians are dying after a stroke.



The age- and sex-adjusted rate of all-cause non-elective readmissions following stroke/TIA at 30 days decreased from 8.8% in 2003/04 to 8.0% in 2009/10 ($p=0.0002$). Rates of all-cause non-elective readmissions at 30 days varied across LHINs, ranging from 5.6% to 9.6% in 2009/10. The extent of variation across LHINs decreased from 4.6 to 4.0 percentage points between 2003/04 and 2009/10.



Ontario's risk-adjusted in-hospital stroke/TIA mortality rate decreased from 14.4% in 2003/04 to 11.4% in 2010/11 ($p=0.0002$). District stroke centres had the lowest in-hospital mortality rates (10.4%), followed by regional (11.8%) and non-designated centres (12.8%). This supports the best practice that stroke/TIA patients have better immediate outcomes when cared for within designated stroke centres. Efforts to implement stroke unit care and reduce complications seem to be having an effect in reducing the in-hospital mortality rate.



The risk-adjusted all-cause mortality rate for adults within 30 days of inpatient discharge for stroke/TIA decreased from 16.0% in 2003/04 to 14.3% in 2009/10 ($p<0.0001$).



Variation in the risk-adjusted in-hospital mortality rate ranged from 8.5% to 15.0% across LHINs in 2009/10. The reasons for this variation should be explored.

Neuroimaging: Significantly more patients are receiving required diagnostic testing.



In 2010/11, 89.6% of patients underwent neuroimaging within 24 hours of hospital arrival, a significant improvement from 47.4% in 2002/03 ($p \leq 0.0001$). Regional stroke centres had the highest rate of inpatient neuroimaging prior to discharge (99.7%), followed by district stroke centres (99.5%), non-designated centres (98.1%), and Telestroke hospitals that were not considered district stroke centres (96.2%); ($p < 0.0001$). The benchmark for neuroimaging to be done within 24 hours of hospital arrival is 97.7%, based on data from the 2010/11 Ontario Stroke Audit.



In addition, the variation in neuroimaging across the LHINs decreased from 24 percentage points in 2008/09 to 19 percentage points in 2010/11.

Stroke Unit Access: There has been significant improvement in the proportion of patients receiving best practice care in stroke units.



In 2010/11, over half (53.8%) of stroke patients in Ontario were admitted to designated stroke centres, a 22.0% relative increase from 2003/04. This development is related to efforts across the province to increase access to stroke centres, the facilities where patients are more likely to receive best practice stroke care.



In 2010/11, 38.3% of patients admitted to hospital with stroke or TIA spent some part of their hospital stay in a stroke unit—an improvement from 30.3% in 2008/09, 18.6% in 2004/05 and 2.7% in 2002/03 and one that was seen across all hospital types and in virtually all regions ($p < 0.0001$). The benchmark is 87.5%, based on data from the 2010/11 OSA. There was little difference in rates of admission to stroke units by sex: 38.6% of women and 37.9% of men were admitted. Stroke unit access was equivalent at regional and district stroke centres, whereas less than one in 10 patients (7.2%) admitted to non-designated stroke centres received stroke unit care.



Provincially, 64.8% of stroke patients admitted to hospital in 2010/11 underwent screening for dysphagia (a swallowing disorder), an increase from 47.9% in 2002/03 ($p \leq 0.0001$) and a modest increase from 62.3% in 2008/09. The benchmark is 83.7%, based on data from the 2010/11 OSA. Improvements in screening for dysphagia were observed for all hospital types. In 2010/11, dysphagia screening rates were highest at district stroke centres (74.7%), followed by regional stroke centres (69.4%) and non-designated centres (56.8%).



Unfortunately, there was no evidence of a corresponding decline in the inpatient pneumonia rate across hospital designations. In-hospital pneumonia rates increased from 1.9% in 2003/04 to 2.1% in 2010/11. However, a rate of 2.1% is much lower than rates reported in the literature.^{8,9}

Recommendations

1. The data support the view that patients admitted to designated stroke centres have better outcomes in relation to rates of thrombolysis administration, neuroimaging, dysphagia screening, readmissions, inhospital mortality, and having a confirmed diagnosis at discharge. Efforts to increase access to care at specialized stroke centres should continue.
2. The findings support OSN's recent call for research proposals to further investigate the existence of a dose-response relationship for stroke unit care, and to compare outcomes of patients admitted to stroke units in the regional stroke networks and LHINs with outcomes of similar unadmitted patients.
3. The OSN's support of Health Quality Ontario's "stroke mega-analysis" focusing on stroke unit care will be critical to driving system change in stroke patient care in the province.
4. These findings also support the identification of stroke unit care as a priority by the OSN's Secondary Prevention and Acute Care Subcommittee and its work to develop a stroke unit implementation tool kit.
5. The OSN should continue to support acute hospital participation in Accreditation Canada's Stroke Services Distinction Program as a means of ensuring stroke units are implemented and sustained in this setting.
6. Efforts should continue toward the implementation of best practices for the screening and management of dysphagia.

Improve access to appropriate rehabilitation following acute stroke

National Best Practices⁷

All patients with stroke who are admitted to hospital and who require rehabilitation **should be treated in a comprehensive or rehabilitation stroke unit** by an interdisciplinary team.

Survivors of severe stroke **should be reassessed at regular intervals** for their rehabilitation needs.

People with stroke living in the community who have difficulty with activities of daily living **should have access, as appropriate, to therapy services** to improve or prevent deterioration in these activities.

Findings: Rehabilitation

Inpatient Rehabilitation: There has been significant improvement in the proportion and timeliness of patients accessing rehabilitation; however, the rate is approximately 10% lower than expected, fewer severe stroke patients are being admitted and ALC rates in acute care remain high.



There was a significant improvement in the proportion of stroke patients discharged from acute stroke hospitalization and admitted to inpatient rehabilitation: from 27.7% in 2003/04 to 30.7% in 2010/11 ($p < 0.0001$). The benchmark for this indicator is 42%, based on data from the 2010/11 OSA. Patients admitted to non-designated centres for inpatient acute stroke care were less likely to be discharged to inpatient rehabilitation than those admitted to designated stroke centres (19.4% compared to 26.3% at regional stroke centres and 29.9% at district stroke centres).



Over the eight-year study period, there was a 21.7% relative increase in admissions of moderately disabled patients into inpatient rehabilitation.



A 17.0% relative decrease was observed in admissions for severely disabled patients between 2003/04 and 2010/11. Over the eight years, freestanding inpatient rehabilitation facilities had the most dramatic decrease in admissions of severely disabled patients: from 34.2% in 2003/04 to 26.5% in 2010/11. Yet, the severe stroke patients that did access freestanding inpatient rehabilitation improved faster than those in integrated facilities, as measured by a higher median Functional Independence Measurement (FIM) efficiency score (0.7 vs. 0.6).



In 2010/11, the admission FIM score was 78, compared to 76 in 2003/04. It is generally agreed that the target FIM score for admission to stroke inpatient rehabilitation is in the range of 40 to 80. This also suggests that patients with mild disability were going to inpatient rehabilitation due to a lack of outpatient services and/or pressures on inpatient rehabilitation centres to reduce length of stay.



The median time from stroke onset to admission to an inpatient rehabilitation facility was 13 days in 2003/04, dropping to 10 days in 2010/11 ($p < 0.0001$). The marked regional variation in wait times for rehabilitation admission decreased over the eight years: from an 18-day difference across the LHINs in 2003/04 to a 7-day difference in 2010/11.



The proportion of patients going to long-term care facilities following inpatient rehabilitation decreased from 13.5% in 2003/04 to 9.8% in 2010/11.

Recommendations

1. The OSN's current work in support of the ER/ALC Rehab/CCC Expert Panel should continue. The standards of care identified by the OSN, if implemented, would effectively address access to best practices, thereby reducing ALC days and costs of care while improving patient outcomes. In particular, the development of the OSN's stroke rehabilitation economic analysis and its collaborative work with Health Quality Ontario will provide decision-makers with the tools to support change. The Stroke Rehabilitation Resource Portal will support knowledge transfer of leading provincial models for achieving stroke rehabilitation access to care.
2. The Stroke Reference Group is recommending adoption of the AlphaFIM assessment on day 3 following inpatient admission to facilitate decision-making for access to rehabilitation. The admission FIM score trend should be monitored closely, as there is province-wide adoption of the AlphaFIM.
3. Rehabilitation programs should identify and reduce barriers to admission for patients with severe stroke, as evidence indicates these patients stand to benefit from rehabilitation. Without access to rehabilitation services, they will continue to be a major source of acute care Alternate Level of Care days. Stroke patients in complex continuing care have, on average, 19 acute ALC days compared to 3 such days for patients receiving inpatient rehabilitation.

Findings: Complex continuing care and long-term care

Complex Continuing Care: Patients admitted to CCC have a longer length of stay and do not receive the appropriate intensity of rehabilitation compared to those admitted to inpatient rehabilitation.



Annually, close to 1,200 stroke patients are admitted into CCC following an acute stroke; they stay for a median of 57 days and receive less than 30 minutes of daily rehabilitation therapy (speech, occupational, physical or recreational). For those stroke patients discharged to CCC who do receive rehabilitation, the intensity does not meet the best practice recommendation of three hours per day.



In 2009/10, 28.7% of patients in complex continuing care were discharged to long-term care; this was experienced by only 10.2% of patients in inpatient rehabilitation. It appears that complex continuing care does not achieve the same outcomes as more intense inpatient rehabilitation.

Long-Term Care: The majority of stroke patients in long-term care homes are female. Very limited therapeutic services are offered to patients in long-term care.



In 2009/10, over 600 stroke patients resided in long-term care homes within six months of an acute stroke/TIA inpatient discharge; 20.6% had been residing in long-term care prior to their stroke/TIA. Their median age was 82 years, and almost two of every three residents (63.0%) were women. On average, residents received approximately 5–10 minutes per rehabilitative therapy (occupational, physical or recreational) per day, with physical therapy being the dominant treatment; 61% of residents received, on average, 10 minutes of physical therapy per day.



In 2010/11, patients in long-term care (LTC) homes post-stroke had a higher rate of discharge back into an acute care hospital compared to LTC residents in general: 37.4% vs. 15.3%.

Recommendations

1. The OSN should advance its work with the ER/ALC Rehab/CCC Expert Panel to advocate for the collection of data pertaining to standardized measurements of the intensity of rehabilitation provided (i.e., FIM scores). It is not known how many of the cohort received low-intensity, long-duration rehabilitation services in CCC.
2. The OSN should continue to work with the LTC sector to better understand rehabilitation expectations and trajectories of stroke patients residing in LTC homes and to develop appropriate infrastructure and services to meet the needs and expectations of stroke/TIA patients residing in LTC facilities.

Provide comprehensive data for stroke care delivered outside of the acute care setting

Best Practices in Outcome Measurement⁷

Patients should be regularly assessed throughout their recovery. The acquired data can be used to identify resource needs across the stroke care system.

Findings

Community Care Access Centres



The mean number of rehabilitation services offered by Community Care Access Centres (CCACs) declined over the last three years of the audit, dropping from an average of 4.4 visits in 2007/08 to 3.9 visits in 2009/10. Each rehabilitation therapy decreased by one visit over a six-month period. There was little variation in service intensity across the LHINs. CCAC service intensity was low and likely inadequate to achieve functional changes in those who had difficulty living independently. The median number of rehabilitation services (occupational therapy, physical therapy, speech therapy or social work) per client remained the same over time (three visits in 60 days).



The median time for a CCAC to provide home-based rehabilitation was two weeks from discharge from an acute stroke/TIA hospitalization (15 median days) in 2008/09.



Over the eight-year study period, there was only a 10.5% relative decrease in the proportion of mildly disabled stroke patients admitted to inpatient rehabilitation. The 2010/11 Ontario Stroke Audit revealed a 58.7% relative increase in the proportion of patients discharged to outpatient rehabilitation (4.6% in 2008/09 and 7.3% in 2010/11). There is no data source to validate these findings or determine patient functional improvement or intensity of therapy.



Data sources to evaluate stroke care beyond the acute care sector provide limited and non-comparable measures of functional improvement, making it difficult to evaluate access, appropriateness and outcomes of stroke rehabilitation care and integration back into the community.

Recommendations:

1. The OSN should continue to partner with CIHI and MOHLTC in addressing these data gaps. In addition, the OSN should continue to advocate for inclusion of the AlphaFIM assessment in the provincial Discharge Abstract Database.
2. The OSN should continue to work with the National Ambulatory Care Reporting System to capture data on ambulatory rehabilitation being delivered at inpatient facilities (both acute and rehabilitation).
3. Investment in CCAC rehabilitation services could potentially reduce rates of readmission to hospitals and admission to long-term care homes.
4. The findings of OSN research projects examining the impact of enhanced community-based rehabilitation in the South East and South West LHINs should be reported in order to share the knowledge gained through these initiatives.
5. Future evaluation reports should look at time to CCAC rehabilitation services following an acute stroke hospitalization or inpatient rehabilitation separately to better understand the role of CCAC services in stroke patient rehabilitation.
6. The OSN should advance its work with the ER/ALC Rehab/CCC Expert Panel to advocate for the collection of provincial data on outpatient rehabilitation and intensity of rehabilitation therapy.
7. Standardized measurements of functional independence and intensity of rehabilitation therapy provided across all rehabilitation settings are needed to evaluate the appropriateness and effectiveness of rehabilitation.