

Has Ontario's Stroke System Really Made a Difference?

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Introduction

Stroke is the fourth leading cause of death in Canada. Almost 60% of stroke survivors are left with a moderate to severe impairment or are so severely disabled they need long-term care.¹ In addition to the toll on a person and his or her family and friends, it is estimated that stroke costs the Canadian economy \$2.7 billion a year.²

Stroke has been described as Canada's most "forgotten disease," a hopeless condition where little can be done to prevent and mitigate its potentially life-altering effects (Black et al. 2003). Less than 10 years ago, this perception was prevalent in Ontario not only with the public but within healthcare, research and government circles. In 1997, the Heart and Stroke Foundation of Ontario (Foundation) took on the challenge of changing the way stroke was viewed and treated in the province (Black et al. 2003). The Foundation championed a successful three-year demonstration project to develop and test a regional model of coordinated care in four pilot sites in Ontario. It also worked in partnership with the Ontario Ministry of Health and Long-Term Care (Ministry) and healthcare providers to develop *Towards an Integrated Stroke Strategy for Ontario*, a blueprint for a comprehensive provincial approach to stroke across the care continuum (Ontario Ministry of Health and Long-Term Care and the Heart and Stroke Foundation of Ontario 2000). By June

2000, the Ontario government had adopted the Ontario Stroke Strategy as the expected way to organize stroke services in the province. More important, the Ontario government committed \$70 million over four years for the implementation phase and \$30 million annually ongoing after implementation to support what has become known as the Ontario Stroke System (OSS).

The OSS aims to decrease the incidence of stroke and improve patient care and outcomes for persons who experience stroke. The assumption is that a reorganized stroke care delivery system will: (i) ensure that all Ontarians have access to appropriate diagnosis and quality stroke care in a timely manner and (ii) respond more effectively and efficiently to those who are at risk for or who have had a stroke. Has the significant investment of time, money and effort to develop the OSS really made a difference to Ontarians? This paper assesses the extent to which the OSS has influenced stroke prevention and stroke care in this province. The paper begins with an overview of the OSS followed by an evaluation of its impact to date and an assessment of the enablers for success; it ends with reflections on future opportunities and challenges.

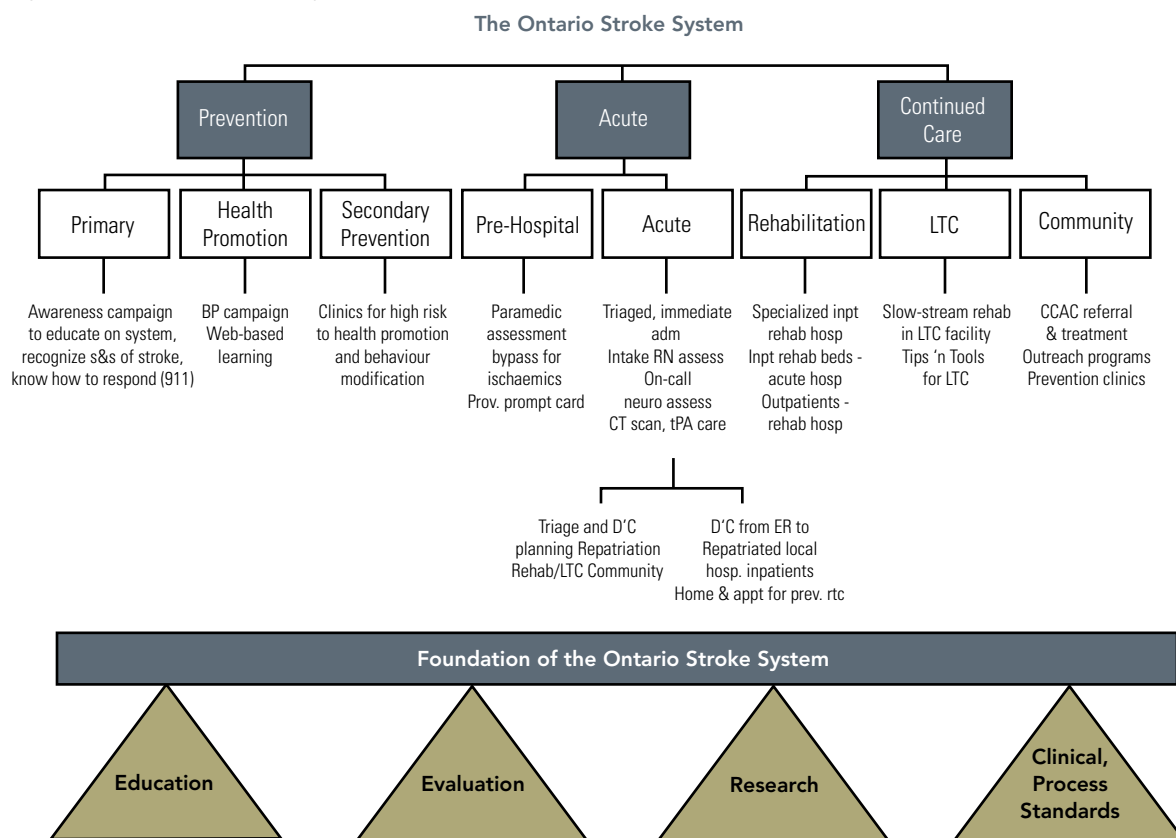
Overview of the Ontario Stroke System

The OSS is a comprehensive approach to organized stroke prevention and care that includes the full continuum of care

1 <www.heartandstroke.ca> (June 15, 2006).

2 Ibid.

Figure 1. The Ontario Stroke System



within 11 regional stroke systems across the province. The OSS is guided by four principles.

- *Comprehensive:* Improve stroke services across the continuum of care from prevention to care in a long-term care or community setting.
- *Integrated:* Create an integrated or coordinated system of care where different services and sectors function as a unified whole across the continuum of care and across Ontario.
- *Evidence-based:* Promote the use of practices and care that have been supported by scientific evidence or are considered the gold standard according to prevailing knowledge.
- *Provincewide:* Benefit all Ontarians regardless of their geographic location.

The OSS is built on a foundation of education, evaluation, research and clinical and process standards. The three major components of the OSS continuum are prevention, acute response and continued care (see Figure 1).

Prevention

- Primary and secondary prevention and health promotion activities include public awareness on the signs and symptoms of stroke, extensive blood pressure campaigns, accessible Web-based tools to help the public reduce their risk of stroke and designated secondary prevention clinics (that focus on following up with patients who traditionally have been “lost” to the system after discharge).

Acute Response

- The pre-hospital care response includes paramedic assessment training, regional redirect and bypass protocols, provincial prompt cards for stroke, and a focus on meeting international benchmarks for “door-to-needle” times for access to tPA (the “clot busting” drug that can dramatically improve health outcomes in appropriate cases).
- The acute hospital response includes establishing a system of designated Regional Stroke Centres, District Stroke Centres/enhanced District Stroke Centres³ and community hospitals. All hospitals are to have written stroke protocols for

³ Enhanced district stroke centres provide leadership and ensure integration in regions where a Regional Stroke Centre does not exist.

their emergency services, emergency departments and acute care. In addition, Regional and District Stroke Centres are required to organize their human and medical resources so that stroke patients can be diagnosed and treated rapidly, effectively and appropriately. These centres are also required to meet guidelines and “readiness” requirements based on the current gold standard in acute stroke care.

Continued Care

- Rehabilitation includes stroke care in specialized inpatient rehabilitation hospitals, inpatient rehabilitation in acute hospitals and outpatient rehabilitation programs.
- Long-term care stroke programs include slow-stream rehabilitation and stroke education tailored to meet the needs of long-term care staff.
- Community stroke care programs include referral to and treatment for home-based stroke care (through Community Care Access Centres), community outreach programs and prevention clinics.

Currently, there are nine designated Regional Stroke Centres, two Enhanced District Stroke Centres, 16 District Stroke Centres and 24 secondary prevention clinics in Ontario. The OSS incorporates a regional model of care.

Each of the 11 regional systems has

- a Regional Stroke Centre or Enhanced District Stroke Centre responsible for coordinating regional stroke care, and one or more District Stroke Centres, as required;⁴
- a number of community hospitals;
- rehabilitation providers that may include specialty rehabilitation hospitals, and does include hospitals and community-based providers offering short- and long-term and/or ambulatory rehabilitation;
- community-based providers including Community Care Access Centres, primary care providers, community support agencies, health promotion practitioners and providers associated with long-term care facilities;
- pre-hospital care providers.

In addition to the 11 regional systems, the OSS has developed a Telestroke program that crosses regional boundaries. Telestroke uses live, two-way video conferencing and

... steering committees made up of representatives from the full continuum of stroke care engage in strategic planning and set regional stroke goals.

remote electronic access to emergency CT imaging (a key step in diagnosing stroke) to connect neurologists to hospitals that do not have these specialists on site. The Telestroke initiative, begun in 2000 with two referring pilot sites, now has nine referring sites connected to neurologists based in seven Regional Stroke Centres across Ontario. Since July 2002, Telestroke neurologists have conducted 250 consultations, of which 70 patients – who would not have had a neurologist assessment and care – received tPA.

The Ministry and the Foundation continue to support the OSS as partners. A well-developed infrastructure enables provincial and regional coordination of stroke care. The OSS Provincial Steering Committee and its five subcommittees provide provincial oversight and facilitate collaboration.⁵ Within each region, steering committees made up of representatives from the full continuum of stroke care engage in strategic planning and set regional stroke goals. Regional Stroke Centres have dedicated stroke staff who may also have network responsibilities.⁶ Well-established regional networks have helped newer networks develop more quickly by sharing resources and lessons learned.

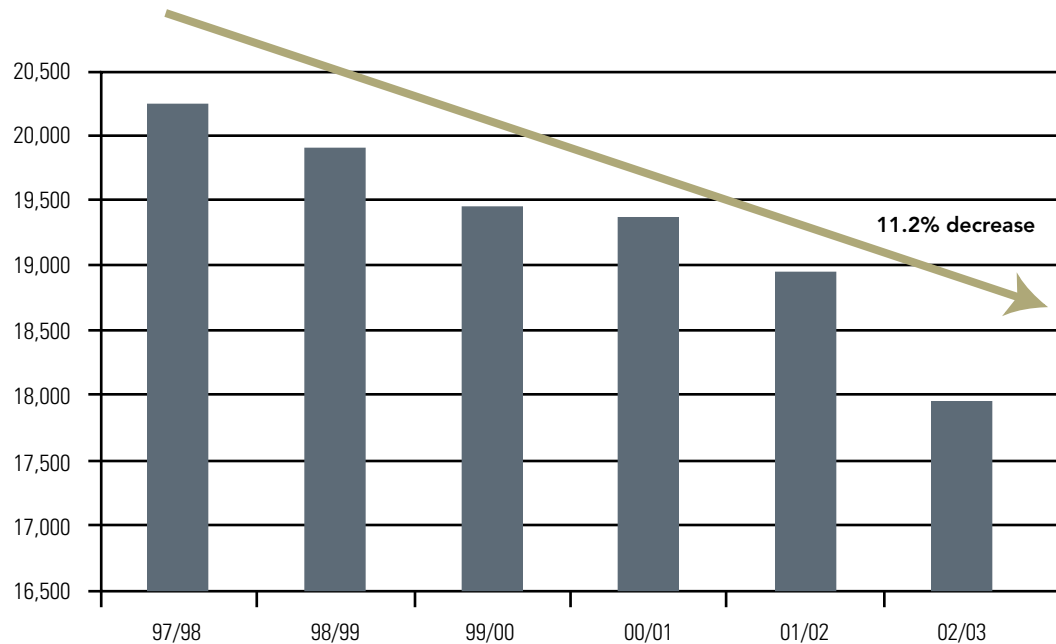
Evaluating the Impact of the OSS The Data and Methodology

Three years after the Ministry announced the Ontario Stroke System, there was anecdotal evidence to suggest that significant investments to develop the OSS were improving Ontario's stroke system. Since little measurable evidence existed, in the spring of 2003, the Ministry supported the development of a comprehensive stroke evaluation to monitor and assess the OSS's progress and impact in the implementation phase (2000–2004). Seventy indicators were used to measure stroke system performance in the areas of: (i) access to appropriate health information and care; (ii) integration of care across the continuum; (iii) outcomes of care; (iv) client and provider perceptions; (v) research and innovation (Stroke Evaluation Advisory Committee 2005).

4 Some regions – such as Toronto – have three Regional Stroke Centres to support the large population and no District Stroke Centres.

5 The five sub-committees are: (i) Stroke Evaluation; (ii) Health Promotion and Prevention; (iii) Research and Best Practices; (iv) Ontario Regional Education; and (v) Rehabilitation, Long-Term Care and Community. In addition, a Telestroke Working Group reports to the Provincial Steering Committee.

6 These staff include a program manager, education coordinator, rehabilitation coordinator, long-term care coordinator, administrative/team assistant, and clinical staff in stroke prevention (2.5 FTEs), case management (1FTE), stroke nurse specialists (2 FTEs), occupational and physical therapists (1 FTE), speech language pathologist (.5 FTE) and social work/dietician (.5 FTE).

Figure 2. Stroke Inpatient–Patient Separations (All Stroke Cases)

The evaluation also assessed baseline data for the four pilot site demonstration phase, where available (1997/98 to 1999/2000). The evaluation used numerous data sources to identify changes in stroke care.⁷ Where trend data were not available, the evaluation provided one-time data as a baseline for the future.

It must be noted that from 2000 to 2004, Ontario's stroke system was still being actively developed. Additional regional and District Stroke Centres and secondary prevention clinics continued to be designated, and complete final funding and supporting infrastructure were not fully implemented until fiscal 2004/05. Thus, the evaluation assesses the impact of a system in transition and not yet fully developed. Where possible, this paper presents more recent data from the Registry of the Canadian Stroke Network to assess the ongoing impact of the OSS in the post-implementation phase.

Clinical Impact **Pre-Hospital and Emergency Services**

Pre-hospital and emergency services are critically important, since the best outcomes occur if a patient is treated in hospital as soon

as possible after the onset of stroke. This is especially important for the use of tPA, which is time sensitive and must be administered within three hours of the onset of a non-bleeding stroke.

In 2002/03, 33.1% of stroke patients arrived in Regional Stroke Centre emergency departments within 2.5 hours of stroke onset. This rate varied across regions with Regional Stroke Centres having lower rates compared to other hospitals.

From 2000 to 2003, more stroke patients arriving in hospital emergency rooms received tPA. The increase in tPA administration to ischaemic stroke patients is particularly striking.*

- The number of patients arriving in pilot Regional Stroke Centre ERs who received tPA increased from 9.9% to 10.3%.
- In 2000, 3.2% of all ischaemic stroke patients received tPA across Ontario (5.1% of ischaemic stroke patients who arrived in the ER within 2.5 hours received tPA). By December 2005, tPA was administered to 31.7% of ischaemic stroke patients who arrived at regional or enhanced district stroke centres within 2.5 hours of symptom onset.

⁷ Canadian Institute for Health Information: National Ambulatory Care Reporting System (NACRS), Discharge Abstract Database (DAD), National Rehabilitation Reporting System (NRS). Registry of the Canadian Stroke Network: ongoing data from the Regional Stroke Centres, biennial data from all Ontario hospitals through the Ontario Stroke Audit. Ministry of Health and Long-Term Care internal databases (e.g., Ontario Home Care Administration System). Statistics Canada. Surveys were developed to assess the satisfaction of stroke service providers, and stroke and TIA clients.

* "From 2000 to 2003" is measured as May–December 2000 (four pilot Regional Stroke Centres in operation) and July–December 2003 (nine Regional Stroke Centres in operation or being developed).

- Initially, the median “door-to-needle” time for tPA administration was 75 minutes in the pilot Regional Stroke Centres and 99 minutes in newer designated centres. As of December 2005, all ischaemic stroke patients who arrived at Regional or Enhanced District Stroke Centres within 2.5 hours of symptom onset and were administered tPA received the medication within a median of 69 minutes (average 71 minutes).

Ontario's tPA rates are significant. Prior to the development of stroke pilot sites in 1998, tPA administration in Ontario's hospitals was relatively insignificant. Ontario's current tPA rate makes it a leading jurisdiction in acute stroke care nationally and internationally (the US national rate is 2–3%). Ontario is also moving towards the internationally established benchmark average of 60 minutes for door-to-needle time for access to tPA.

Despite the growth and aging of the population ... the number of hospitalizations for stroke has decreased.

Acute Stroke Care in Hospital

From 1997/98 to 2002/03, acute hospitalizations for stroke decreased.

- The number of acute inpatient hospitalizations in all stroke centres decreased 11.2% from 20,382 to 18,098 separations (see Figure 2).
- The number of acute inpatient hospitalizations for transient ischaemic attacks (TIA) decreased 18.5% from 3,592 to 2,926.

Despite the growth and aging of the Ontario population – which would suggest an increase in the incidence of stroke – the number of hospitalizations for stroke has decreased. It is hypothesized that the development of OSS-funded stroke prevention clinics has enabled individuals to be treated, supported and managed in the community rather than in hospital.

*From 2000 to 2003, * more stroke inpatients received a consultation from a stroke specialist or were under the care of these professionals (A Stroke Best Practice).*

- The number of stroke inpatients in the pilot Regional Stroke Centres who received an inpatient neurology or neurosurgical consultation or were under the care of these specialists increased significantly from 56% to 91%.

*From 2000 to 2003, * more stroke patients were assessed in the ER using neuroimaging technologies such as an MRI or CT scanner (A Stroke Best Practice).*

- The number of patients discharged from the emergency departments of pilot Regional Stroke Centres who received neuroimaging in the ER increased significantly from 39.7% to 73.8%.
- The number of stroke patients admitted in the pilot Regional Stroke Centres who received neuroimaging within 24 hours of admission increased from 85.9% to 95.2%.

*From 2000 to 2003, * stroke patients designated as “alternate level of care” spent fewer days in acute care.*

- Although the number of acute stroke patients who had at least one alternate level of care (ALC) day increased from 16.4% to 19.1%, the median number of ALC days decreased from 14 to 10 days.

From 1997/98 to 2003/04, stroke patients spent less time in the acute hospital and fewer stroke patients died in hospital.

- The average length of stay for acute care stroke separations decreased 2.3 days from 17 to 14.7 days.
- The average in-hospital 30-day mortality rate for stroke dropped from 17.2% to 15.9%.

From 1997/98 to 2002/03, hospital readmits within one year for stroke and TIA decreased. In 2002/03, readmits within three months for TIA were below experiences elsewhere.

- From 1997/98 to 2002/03, hospital inpatient readmission rates within one year for TIA and stroke patients decreased from 9.0% to 7.5% provincially, from 7.9% to 6.2% in Regional Stroke Centres and from 9.7% to 8.3% in District Stroke Centres.
- In 2002/03, the average hospital inpatient readmission rate within three months for TIA patients was 10% provincially, 9.7% in Regional Stroke Centres and 9.1% in District Stroke Centres.
- In 2002/03, 4.4% of TIA patients in Ontario were readmitted within three months because of a stroke. This low readmission rate is significant compared to an estimated 10–20% risk of stroke following TIA 90 days post-TIA (Hill et al. 2006). Studies have reported TIA-to-stroke readmission rates of 10.2% (Johnston et al. 2000) and 17% (Gladstone et al. 2004). These positive outcomes may be attributed to the OSS, which has developed stroke prevention clinics and other supports to ensure TIA clients receive timely access to follow-up diagnostics, specialized health services and stroke prevention services.

*From 2000 to 2003, * more stroke inpatients were referred to interdisciplinary care providers (A Stroke Best Practice).*

- The number of stroke inpatients referred to interdisciplinary care providers increased significantly, with rehabilitation medicine and social work more than doubling their number of referrals (see Figure 3).

Figure 3. Percentage of Inpatient Referrals to Interdisciplinary Care

	May–December 2000	July–December 2003
Social Work	22%	50%
Occupational Therapy	38%	71%
Physical Therapy	45%	74%
Speech Therapy	31%	52%
Nutrition/Dietetics	28%	34%
Rehabilitation Medicine	16%	42%

Secondary Stroke Prevention

Stroke prevention clinics have the potential to reduce stroke incidence and stroke recurrence.

From 2000 to 2003, more stroke patients discharged from the emergency departments of pilot Regional Stroke Centres were referred to stroke prevention clinics for education and follow-up.*

- The number of stroke-related discharges from the emergency departments of pilot Regional Stroke Centres that were referred to a stroke prevention clinic increased significantly from 9% to 63.4% (and continues to increase as more clinics become operational).

Stroke Rehabilitation

Stroke rehabilitation is an integral component of stroke care and essential to maximizing the stroke survivor's quality of life physically, emotionally and socially.

In 2003/04, fewer stroke inpatients received rehabilitation compared to an expected guideline target.

- Only 24% of inpatient stroke patients received rehabilitation (regional variation of 13–32%) compared to an expected guideline target of 60% (Teasell et al. 2003).
- The average waiting time from onset of stroke to being admitted to inpatient stroke rehabilitation was 31 days, with a median of 14 days.

From 1998/99 to 2001/02, access to rehabilitation facilities increased for stroke survivors; however, access continued to be inequitable and at low levels across the province.

- The number of acute stroke patients in Regional Stroke Centres who were discharged to a rehabilitation facility increased from 16.3% to 18.8%. (The range of services in 1998/99 was 3.6–18.0%, compared to a range of 6–31% in 2001/02.)
- There is inequitable access to rehabilitation beds across the province, with some regions having none of these beds.

From 2002/03 to 2003/04, stroke patients spent less time in inpatient rehabilitation.

- The average length of stay for inpatient rehabilitation decreased five days from 43 to 38 days.

In 2003/04, the average Functional Independence Measure (FIM) score of stroke patients improved from admission to rehabilitation to discharge.

- The average FIM score from rehabilitation admission to discharge improved 34% (regional variation of 30–41%). It is hypothesized that stroke rehabilitation is making a significant difference in functional independence.

In 2003/04, patients more severely affected by stroke may have had difficulties accessing rehabilitation.

- The average FIM score at admission for inpatient rehabilitation was 75. Guidelines suggest that clients with an Admit FIM of 40 to 80 have the maximum opportunity to benefit from stroke rehabilitation care (Teasell et al. 2003). The relatively high average FIM score upon admission suggests that clients more severely affected by stroke (i.e., those with lower FIM scores) may be having difficulties accessing inpatient rehabilitation services.

Home Care

From 1997/98 to 2002/03, fewer stroke patients discharged from hospital were referred for home care services.

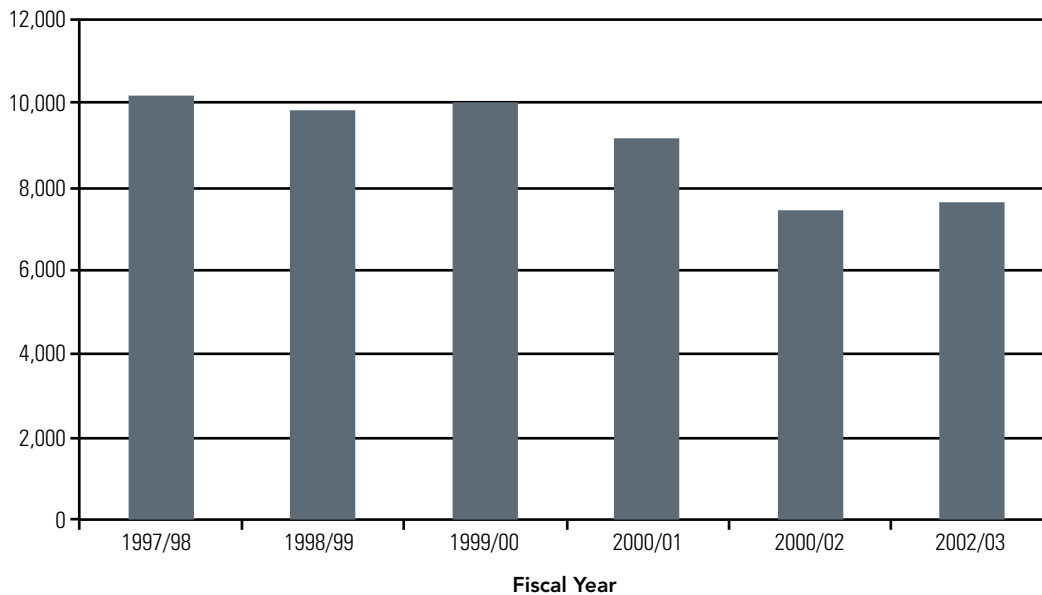
- The number of stroke patients discharged from hospital who were referred for home care services through Ontario's community care access centres (CCACs) decreased from 35% to 28%. This reflects a 25% decrease in the number of stroke clients admitted to CCACs (see Figure 4). The decline between 2000/01 and 2001/02 was statistically significant.

Knowledge Transfer to the Public and Providers

Public Knowledge Transfer

The OSS's public knowledge transfer activities have focused on provincial public awareness campaigns on the signs and symptoms of stroke. Beginning in 2003, the awareness advertising campaign has included a series of "campaign" and "blackout" periods (no advertising). An evaluation of the public's awareness of two or more stroke warning signs indicated that

Figure 4. Number of Admissions to Ontario's Community Care Access Centres for Home Care Services with a Primary Diagnosis of Stroke, 1997/98 – 2002/03



- the campaign ending in August 2005 significantly increased awareness from 52% to 72% of the public.
- after a six-month blackout period (August 2005–February 2006), awareness of two or more warning signs of stroke decreased from 72% to 64% of the public. By April 2006, awareness increased slightly to 68% of the public. The blackout period eroded the public's awareness of stroke warning signs.

Data from the Registry of the Canadian Stroke Network indicate a direct correlation between public awareness campaign periods and the number of stroke patients arriving at hospital emergency departments in a timely manner. During the first advertising campaign, the number of stroke patients presenting at Regional Stroke Centre emergency departments increased significantly, followed by a significant decrease in the total number of cases during the subsequent blackout period. The same pattern occurred during the second advertising period.

Provider Knowledge Transfer

The OSS has developed and distributed information and education materials on stroke and best practice stroke care, and conducted education sessions, including the following.

- In 2003/2004, various educational programs were offered to over 3,620 healthcare providers.

Critical success factors for the uptake of guidelines were sufficient personnel, financial support for clinicians, local stroke champions and a supportive organizational climate.

- Approximately 40,000 copies of stroke-related resources were distributed to stroke care providers across Ontario and, increasingly, Canada since the OSS began.
- A professional *Stroke Education Atlas* – with over 35 resources for stroke care providers across the continuum – was developed and made accessible across Ontario. *Best Practice Guidelines for Stroke Care: A Resource for Implementing Optimal Stroke Care* was also developed and widely disseminated.

An evaluation of the dissemination and uptake of the stroke best practice guidelines concluded that the OSS's dissemination methods – face-to-face meetings, dissemination and education approaches tailored to needs, local champions – were consistent with available research evidence in knowledge translation (Rappolt et al. 2006). Critical success factors for the uptake of guidelines were sufficient personnel, financial support for clinicians, local stroke champions and a supportive organizational climate. The evaluation concluded that knowledge translation would be more effective if organizational decision-makers were

engaged in developing, disseminating, implementing and evaluating guidelines.

OSS's knowledge transfer activities have increased the capacity of healthcare providers to treat stroke survivors more effectively. In the 2004 provider evaluation survey, 86% of hospital providers and 57% of community-based providers strongly agreed or agreed that the stroke education program has helped them provide better care. Of the long-term care facilities surveyed, over 45% of respondents reported participating in the OSS's educational programs to improve their quality of care and service standards. In addition, long-term care managers who implemented the *Tips and Tools* program in their facility reported a 90% improvement in knowledge, skills and attitudes of staff who care for stroke survivors.⁸

Satisfaction

Satisfaction surveys were conducted of a cross-section of providers in 2003 (e.g., physicians, health professionals, community hospitals, rehabilitation facilities, community care access centres, long-term care homes), physicians (2004) and patients (2004). The surveys focused on the extent to which the stroke system meets the expectations of providers, and clients and their families/caregivers. The data are limited by low survey response rates and, thus, the current findings are suggestive only.

- Generally, providers appear to be moderately satisfied with stroke care, with physicians and hospital-based providers more satisfied than providers working in CCACs and long-term care facilities. Providers also appear to be moderately satisfied with the coordination of activities and information sharing when stroke patients transition from one type of care to another.
- Generally, stroke survivors and their caregivers appear to be highly satisfied with their stroke care, as measured by such factors as information and care received in the emergency department and acute care hospital, and communications with the emergency department team, acute care hospital team and stroke prevention clinic.

Enablers for Success

Over 10 years ago, the Foundation took on the challenge of changing the way stroke was viewed and treated in this province. Since then, the Foundation has continued to be involved in the ongoing development of the OSS in partnership with the Ministry. The ongoing involvement of the Foundation is an enabler for ongoing success (Black et al. 2003):

- Stroke is but one of many priorities for the Ministry, which has an increasingly crowded agenda. Various stakeholders have expressed concerns that without the Foundation strongly advocating for stroke, it would get lost among the "competing voices."
- Individuals involved in the OSS have always perceived the Foundation as an "honest broker." The Foundation has been able to capitalize on the commitment and participation of this broad range of volunteers, including clinical and program experts, for the benefit of the system.
- The Foundation and the Ministry have developed an effective working partnership. Indeed, collaboration between government and a non-government decision-maker – together with healthcare sector and research leaders – appears to have been the foundation of the OSS's success.

A dedicated infrastructure – including staff and active committees – has been another enabler for success. Staff who are explicitly responsible for OSS-related activities in healthcare organizations, the Ministry and the Foundation have focused on developing and sustaining this provincial initiative. Furthermore, a provincial and regional committee structure has successfully engaged a wide range of providers in developing stroke policy and best practices.

Champions in government and in the field have also enabled the OSS's success. An extensive network of individuals has promoted the OSS clinically, publicly and politically. This has resulted in tangible improvements in stroke care, greater public awareness of stroke and a significant investment of funds to support stroke prevention and treatment.

Finally, knowledge transfer has been and continues to be a critical enabler of success. The OSS's knowledge transfer activities have focused on equipping current human resources with the skills to work better and smarter for the benefit of patients.

Future Opportunities and Challenges

The OSS has made significant inroads into improving stroke prevention, diagnosis and treatment across the full continuum of care, and has made a tangible difference to Ontarians who want to prevent or who have suffered a stroke. Although a great deal has been accomplished, there is still a great deal of work that still needs to be done. Some of these future opportunities and challenges include the following.

Continuing to Evaluate and Improve Performance: It has been difficult to obtain clear evidence on the impact of the OSS in certain areas. The lack of standardized data has limited the opportunities to evaluate performance and target quality

⁸ *Tips and Tools for Everyday Living: A Guide for Stroke Caregivers* is designed to provide practical knowledge and skills to caregivers who work in the community with stroke survivors. The 70- page document is accompanied by a 13-minute video that depicts the practical knowledge and skills needed by front-line workers.

improvements in areas such as stroke-prevention clinics, rehabilitation in local community hospitals and the impact of professional education on practice. Initiatives to improve access to quality data include: (1) developing a comprehensive performance measurement framework for stroke using national consensus- and evidence-based best practice indicators; (2) developing a Web-based system to collect data on secondary prevention clinics; (3) collaborating with the Canadian Institute of Health Information and the Public Health Agency of Canada.

Strengthening the Continuum of Stroke Care: The evaluation identified a number of “weak links” in the continuum of integrated stroke care that need further work. These include rehabilitation, home care, the uptake of stroke best practices (particularly in community hospitals), emergency response rates to stroke and the transition of stroke survivors from hospital back to the community.

Organizing Paediatric Stroke Care within the OSS: To date, the OSS has focused on the adult stroke population. One in every 4,000 neonates is affected by stroke (deVeber 2005), and about 25% of childhood stroke survivors are at risk for a recurrent stroke (Lanthier et al. 2004). Similar to adults, childhood stroke can result in motor, cognitive and sensory impairments and reduced quality of life. The OSS regional program managers are working in partnership with the five specialized paediatric hospitals in Ontario to draft an action plan for an organized approach to paediatric stroke within the OSS. As well, paediatrics is being incorporated into the performance measurement framework.

Strengthening Professional Education Efforts: The OSS will expand its professional education audience through the use of various technologies (e.g., e-based learning, video conferencing) and by promoting stroke content in community college and university curricula.

Sustaining the OSS in Ontario's Transformed Healthcare System: Ontario's Ministry of Health and Long-Term Care is undergoing a fundamental reorganization and is shifting its focus to being stewards of the healthcare system. Local Health Integration Networks (LHINs) will become responsible for regional and local planning, integrating and funding of health services. In Ontario's transformed healthcare system, there is an ongoing role for the Ministry, the Foundation and the 14 LHINs in sustaining and building on the wins of the OSS.

- The Ministry needs to provide continued leadership and stewardship to ensure equitable access to the best possible stroke care for all Ontarians. This includes providing oversight for provincial services – such as Telestroke – and facilitating linkages with other related initiatives. For example, the Ministry of Health Promotion is focusing efforts on hypertension, which is a leading cause of stroke.
- The Foundation needs to have an ongoing role to keep the

management of stroke a healthcare priority in Ontario and be the “honest broker” that continues to bring a wealth of expertise together for the benefit of the system.

- The 14 LHINs need to develop effective working partnerships with the regional stroke networks. The current 11 stroke networks may need to be expanded to 14, consistent with the number of LHINs.

Concluding Comments

The progress that has been made in preventing and treating stroke since 2000, when the Joint Stroke Strategy Working Group tabled its blueprint report, *Towards an Integrated Stroke Strategy*, is very encouraging. The evaluation results demonstrate that the OSS has had positive measurable impacts on access to stroke-related services, the integration and coordination of stroke care, treatment for stroke, and client and provider satisfaction. In addition, the OSS is improving access by supporting the recruitment and retention of health human resources. The Regional Stroke Centres reported that having a stroke centre designation has helped attract and keep neurosurgeons and neurologists. As well, over 50 stroke specialist physicians – who are not neurologists but have received additional training – are now providing specialized stroke care in rural and urban regions across the province. In addition, Telestroke is helping to “transport” neurological expertise to assist medical staff in hospitals that do not have neurologists on site. These results are very promising considering that the OSS – as a major provincial change management initiative – is still evolving.

The OSS is being recognized as a successful model to emulate across Canada. Recently, the Canadian Stroke Network and the Heart and Stroke Foundation of Canada established the Canadian Stroke Strategy with the goal of ensuring that all Canadians have access to organized stroke care by 2010. The Canadian Strategy will provide tools and support to provinces to build stroke strategies appropriate to each province's needs and resources. The OSS will be actively sharing its experiences, knowledge and accomplishments with others to help achieve the goal of the Canadian Strategy.

Within Ontario, the OSS's regional approach to stroke prevention and care, its dedicated regional infrastructure that is focused on stroke, its engagement of local community partners committed to building an integrated system for stroke and its emphasis on the full continuum of stroke care make the OSS a winning strategy for Ontario's LHINs. Indeed, the OSS is an excellent disease management model that the LHINs can emulate for other services.

The significant investment of time, money and effort to develop the OSS has made a tangible difference to Ontarians who want to prevent or who have suffered a stroke. It is anticipated that further improvements will occur as the OSS continues to develop fully and mature.

References

Black D., M. Lewis, B. Monaghan and J. Trypuc. 2003. "System Change in Healthcare: The Ontario Stroke Strategy." *Hospital Quarterly* 6(4): 44–47.

deVeber, G. 2005. "In Pursuit of Evidence-Based Treatments for Paediatric Stroke. The UK and Chest Guidelines." *Lancet Neurology* 4: 432–36.

Gladstone, D.J., M.K. Kapral, J. Fang and A. Laupacis. 2004. "Management and Outcomes of Transient Ischemic Attacks in Ontario." *Canadian Medical Association Journal* 170(7): 1099–1104.

Hill, M.D. and D.J. Gladstone. 2006. "Patients with TIA or Minor Stroke Should Be Admitted to Hospital." *Stroke* 37:1137–38.

Johnston, S.C., D.R. Gress, W.S. Browner and S. Sidney. 2000. "Short Term Prognosis After Emergency Department Diagnosis of TIA." *Journal of the American Medical Association* 284: 2901–06.

Lanthier, S., F.J. Kirkham, L.G. Mitchell, R.M. Laxer, E. Atenafu, C. Male, M. Prengler, T. Domi, A.K. Chan, R. Liesner and G. deVeber. 2004 (January 27). "Increased Anticardiolipin Antibody IgG Titres Do Not Predict Recurrent Stroke or TIA in Children." *Neurology* 62(2): 194–200.

Ontario Ministry of Health and Long-Term Care and the Heart and Stroke Foundation of Ontario. 2000. *Towards an Integrated Stroke Strategy for Ontario*. Report of the Joint Stroke Strategy Working Group.

Rappolt S., J. Goldman and D. Davis. 2006. "Evidence in Action, Acting on Evidence: Guideline Dissemination Through Integrated Care Networks: Lessons from Ontario's Best Practice Guidelines for Stroke Care." In Canadian Institutes of Health Research, *A Casebook of Health Services and Policy Research Knowledge Translation Stories*. CIHR Institute of Health Services and Policy Research. Retrieved July 16, 2006. <<http://www.cihr-irsc.gc.ca/e/30660.html>>.

Registry of the Canadian Stroke Network. 2002/03. *Report of the 2002/2003 Ontario Stroke Audit*.

Stroke Evaluation Advisory Committee (Ontario Stroke System). 2005 (October). *Achievements of the Ontario Stroke System 2000–2004*. Ontario Ministry of Health and Long-Term Care.

Teasell, R., T. Doherty, M. Speechley, N. Foley and S.K. Bhogal. 2003. *Evidence-Based Review of Stroke Rehabilitation*. Heart and Stroke Foundation.

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