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Comprehensive Service Level Audit of Stroke Care across the Continuum in Central LHIN

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Table of Contents

Executive Summary

In March 2013, the Saint Elizabeth Research Department was commissioned by Mackenzie Health, with funding from the Central LHIN, to complete a service-level audit of stroke care across the continuum from prevention to post-acute stages. This report, which is a first step toward Central LHIN planning for best-practices in stroke patient flow, incorporates best-practice stroke flow from the Ontario Stroke Network's 2012 report, *The Impact of Moving to Stroke Rehabilitation Best Practices in Ontario.*[1]

Findings: According to identified current capacity and assuming best practice stroke flow principles will be adopted in the Central LHIN, the key findings are as follows:

- Best-practice stroke flow would reduce the need for acute care beds for stroke patients within the Central LHIN, but significant work would need to be done to ensure patients' smooth transitions to inpatient rehabilitation, outpatient or community-based rehabilitation and/or self-management, or stroke prevention services in the community.
- The number of bed-days required for stroke patients referred to best-practice inpatient rehabilitation in the Central LHIN would decrease, and there would be a modest adjustments required to eliminate "slow-stream" rehabilitation in complex continuing care. However, changes in the profile of patients in best-practice inpatient rehabilitation, complex referral patterns across LHIN boundaries, and current problems in transitions from acute to inpatient rehabilitation would require significant work before changes are made to inpatient rehabilitation beds in the Central LHIN.
- Best-practice stroke flow would result in a higher demand for outpatient and community-based rehabilitation. Already, there is limited current capacity to provide these services and therefore the projected demand for these services, assuming best practice, could not be met without substantial changes. CCAC funding for rehabilitation therapists is currently focused on safety assessments for clients rather than best-practice community-based rehabilitation, and outpatient capacity in the Central LHIN is constrained and complicated by referral patterns across LHIN boundaries. Significant planning would be required to accommodate the needs of stroke survivors.

Recommendations: It is recommended that future planning:

- adopt a person-centred approach;
- define, communicate and act on well-informed care trajectories across the continuum;
- redesign the flow from acute care to inpatient rehabilitation and redesign inpatient rehabilitation with a different patient profile in mind;
- initiate outpatient and community-based rehabilitation in accord with best practices; and
- integrate outpatient and community-based rehabilitation with community supports.

Planning structure: A structure to achieve the appropriate plan should involve leadership by a multi-disciplinary stakeholder group, supported by working groups focused on re-designing the system components (acute care, inpatient rehabilitation, etc.) and on the information, management and relational transitions between the system components.

Comprehensive Service Level Audit of Stroke Care across the Continuum in Central LHIN

Background

Stroke Care within the Central LHIN

Stroke is the leading cause of adult disability and the third leading cause of death in Canada.[2] More than 50,000 Canadians experience a stroke each year, with the incidence of stroke expected to rise due to the aging population and increased prevalence of diabetes and obesity.[3] In 2010/11, there were 19,570 people aged 18 years and older admitted to an emergency department or inpatient care unit at an acute care facility for stroke or Transient Ischemic Attack (TIA) in Ontario, with 1,361 of these admissions taking place within the boundaries of the Central LHIN.[4]

As stroke is a medical emergency, timely access to acute stroke care is essential for improved chances of survival and/or to minimize the physical and cognitive damage that results from the stroke. However, once the acute phase of a stroke is managed, patients often find themselves at the beginning of an unpredictable trajectory of stroke recovery and rehabilitation that is impacted not only by the effects the stroke had on their physical, mental, emotional and social functioning but that is also heavily directed by the services they are eligible to receive publicly or can access privately across the continuum of care from acute to self-management to rehabilitation to prevention. Longstanding issues resulting from stroke may include decreased mobility, aphasia, social isolation, restricted participation in leisure activities, delayed return to work, anxiety and depression.[5]

Adding to this complexity, within the Central LHIN, stroke care is in a unique situation where it interfaces with three separate Regional Stroke Networks within its geographic boundaries, each with their own requirements and responsibilities.

As the performance of stroke care is being measured at the LHIN level, the importance of developing a plan to integrate and monitor stroke care services across the Central LHIN has been recognized, and as a first step in this process, the Saint Elizabeth Research Department was commissioned by Mackenzie Health, with funding from the Central LHIN, to complete a service-level audit of stroke care across the continuum from the prevention to post-acute stages. The inventory will provide part of the foundation for LHIN-wide planning for best practice stroke care and patient flow.

Project Objective

The main objective of this project was to conduct an inventory of stroke care services throughout the Central LHIN for planning purposes and to develop a report that:

1. Identifies the current capacity of acute care, inpatient rehabilitation, outpatient rehabilitation and community rehabilitation providing stroke services to survivors within the Central LHIN.
2. Calculates the demand for stroke care services across the continuum in the Central LHIN assuming services are delivered according to best practice recommendations for stroke flow.
3. Makes recommendations for a planning structure for stroke care within the Central LHIN.

Guiding framework: Best practice stroke patient flow in Ontario

Stroke is a life-changing medical event that often leads to functional impairments that impact not only patients on their journey of rehabilitation, but also their families, especially once patients are discharged from formal hospital settings and must manage back in the community. The *Canadian Stroke Strategy Canadian Best Practice Recommendations for Stroke Care* (2010)[5] included an updated section on "Managing Stroke Care Transitions," which emphasizes that stroke care needed by patients and their families goes beyond best practices in acute medical management, but also must include strategies to promote access to and continuity of care as patients flow from acute, to inpatient, to outpatient, to community settings in order to enhance patient outcomes and quality of life.

Best practices in stroke patient flow across the continuum are also important in terms of system efficiency and reducing hospitalization in Ontario. In 2010, the Ministry of Health and Long Term Care convened a Rehabilitation and Complex Continuing Care Expert Panel (RCCCEP) to review the impact of rehabilitation in stroke, hip fracture, hip and knee replacement and acquired brain injury on system efficiency and reducing hospitalization in Ontario. The following recommendations were made by the RCCCEP in 2011 and were adopted by the Ontario Stroke Network[1] as guiding recommendations for stroke care patient flow in Ontario:

1. Timely transfer of appropriate patients from acute facilities to rehabilitation
    - Ischemic strokes to rehabilitation by day 5 on average
    - Hemorrhagic strokes to rehabilitation by day 7 on average
2. Provision of greater intensity therapy in inpatient rehabilitation
    - 3 hours of therapy per day
    - 7-day a week therapy
3. Timely access to outpatient/community-based rehabilitation for appropriate patients
    - Early Supported Discharge with engagement of CCAC allied health professionals
    - Mechanisms to support and sustain funding for outpatient and/or community-based rehabilitation

- 2-3 outpatient or Community-based allied health professional visits/ week (per required discipline) for 8-12 weeks
- In-home rehabilitation provided as necessary

4. Ensure that all rehabilitation candidates have equitable access to the rehabilitation they need

Project methods

In 2012, the Ontario Stroke Network released a publication titled, *The Impact of Moving to Stroke Rehabilitation Best Practices in Ontario.*[1] Building on the RCCCEP recommendations, this *Impact* report outlined a framework and assumptions for determining the financial impact of closing the gap between current-state capacity of stroke care in Ontario and the best-practice configuration of services integrated across the continuum of stroke care and recovery as patients flow through acute, inpatient rehabilitation, outpatient rehabilitation and prevention services.

The *Impact* report and the assumptions in it guided the methodology for this review of the capacity for and demand of stroke services across the Central LHIN. Building on this framework, the current capacity and projected demand to provide services to stroke survivors within the Central LHIN was identified using both qualitative and quantitative methods.

Quantitative analysis

Mackenzie Health facilitated access to LHIN level data as well as National Rehabilitation Reporting System (NRS) data and Discharge Abstract Database (DAD) data through the Intellihealth database to determine the physical capacity and projected demand on the following acute and/or inpatient facilities to provide stroke services to patients and/or their families:

- Mackenzie Health
- Humber River Regional Hospital
- Markham Stouffville Hospital
- North York General Hospital
- Southlake Regional Health Centre
- Stevenson Memorial Hospital
- St. John's Rehabilitation Hospital

Access to the Continuing Care Reporting System (CCRS) and Central Community Care Access Centre (CCAC) data was not able to be provided within the timeframe of the project and therefore the capacity of the above facilities to provide complex continuing care to stroke survivors across the Central LHIN was estimated based on 2009/10 Ontario level data and the capacity of the above facilities to provide home-based rehabilitation to stroke survivors across the Central LHIN was estimated based on 2009/10 data in the Institute of Clinical Evaluative Sciences' report called *Ontario stroke evaluation report 2012: prescribing system solutions to improve stroke outcomes.*[4]

Qualitative

Mackenzie Health facilitated introductions to frontline and managerial health care providers who were interested in participating in a key informant interview or focus group. Five frontline and two managerial staff who work either within the District Stroke Centre at Mackenzie Health or in the community within the Central LHIN participated in a focus group or individual interview to identify what services are presently available to stroke survivors within the Central LHIN including hospital associated outpatient rehabilitation and prevention services, services available through health services providers funded by the LHIN, private rehabilitation clinics, as well as community-based services and resources. Questions focused on gaining insight about where people usually go for services, what services are offered and referral patterns for services once patients have been discharged from hospital. These providers were also asked to share their perceptions of gaps and/or barriers in services for stroke survivors and their families across the continuum of care.

The interviews and focus group informed the development of a telephone survey that was administered to a sample of hospital-based outpatient, private community rehabilitation, LHIN health service providers and other community-based organizations identified as likely to serve stroke survivors and/or their families. Thirty-one community service providers were contacted to participate in the review, 15 of these providers completed the survey, two agreed to participate after the project deadline, one declined, and 13 did not respond. The telephone survey honed in on the details of these services, including whether they were targeted to stroke survivors, any costs involved, accessibility, as well as staff and training of service providers.

The Current Capacity of Stroke Services within the Central LHIN

Acute Care

The current capacity of the Central LHIN to provide acute care services to stroke patients was identified using several sources of data: information from individual hospitals about their acute care beds and summary quantitative data from Intellihealth.

Table 1 outlines the total number of ICU beds and inpatient stroke-specific beds in the acute care hospitals in the Central LHIN. As the York Region District Stroke Centre, Mackenzie Health is the only hospital within the Central LHIN to offer the "clot busting drug," Tissue Plasminogen Activator (t-PA), and offers this therapy not only to patients in its own area in Richmond Hill, but also to patients referred from areas served by Southlake Regional Health Centre and Markham Stouffville Hospital. Mackenzie Health is also the only hospital in the Central LHIN with a specialized integrated stroke unit (ISU). Within the ISU there are 8 beds designated to provide acute care to stroke survivors. Some hospitals have acute care beds that are routinely used to provide care to stroke survivors; for example, Southlake Regional Health Centre has 6 beds and Humber River Regional Hospital has 14 beds at its Church site.

Table 1. The capacity for treating stroke patients in acute care within the Central LHIN

	t-PA available	Total ICU beds	Inpatient beds dedicated to acute stroke care
Mackenzie Health	Yes	20	8
Humber River Regional Hospital	No	28	14
Markham Stouffville Hospital	No	8-9	0
North York General Hospital	No	21	11
Southlake Regional Health Centre	No	14	6
Stevenson Memorial Hospital	No	0	0

The average length of acute stay (LOS) in ED, inpatient acute, ICU, as well as ALC days were abstracted for patients who had a Transient Ischemic Attack (TIA), and hemorrhagic and ischemic strokes for the fiscal year 2011/12 (see Table 2). Current best practice recommendations for stroke flow indicate that ischemic stroke patients' length of stay in acute care (including TIA patients) should be on average 5 days and hemorrhagic stroke patients' length of stay should be 7 days on average.[1]

Table 2. Stroke patient flow through acute care within the Central LHIN 2011/12

	ED	ICU	Inpatient Acute			
Type of Stroke	LOS in hours (number of patients)	LOS in hours (number of patients)	Number of discharges	Mean LOS (days)	Total bed days	Total ALC days (number of patients)
Ischemic (ICD-10 163)	20.5 (393)	1,194 (99)	849	14.7	12,446	4,044 (324)
TIA (ICD-10 G45.9)	8.3 (1,358)	125 (13)	248	4.9	1,209	195 (14)
Haemorrhagic (ICD-10 160, 161)	12.5 (250)	409 (43)	179	18.3	3,284	415 (58)

Inpatient Rehabilitation

The current capacity of the Central LHIN to provide inpatient rehabilitation to stroke patients was uncovered in the following ways. Table 3 outlines the total number of inpatient rehabilitation beds for each hospital within the Central LHIN as well as for St. John's Rehabilitation Hospital (which, though located within the geographical boundaries of the Central LHIN, is part of Sunnybrook Health Sciences Centre in the Toronto Central LHIN).

A 2012 report by the Hay Group for the Toronto Central LHIN[6] indicated that Central LHIN hospitals refer 38% of the stroke patients at St. John's Rehabilitation Hospital; 48% of stroke rehabilitation patients were from Toronto Central LHIN hospitals.

Table 3 also highlights the number of inpatient rehabilitation beds that are dedicated specifically to stroke at each of the hospitals. Mackenzie Health has 5, in its integrated stroke unit, while Southlake has 14 beds and St. John's Rehabilitation Hospital has 30.

Table 3. The capacity for treating stroke patients in inpatient rehabilitation within the Central LHIN

Hospital	Inpatient Rehabilitation Beds	
	Total	Dedicated to Stroke
Mackenzie Health	17	5
Humber River Regional Hospital	18	0
Markham Stouffville Hospital	31 (16 rehab/ 15 reactivation)	0
North York General Hospital	0	0
Southlake Regional Health Centre	32	14
Stevenson Memorial Hospital	0	0
St. John's Rehabilitation Hospital	160	30

Additionally, the average length of acute stay (LOS) in number of days for inpatient rehabilitation units across the Central LHIN was abstracted for each Rehabilitation Patient Group (RPG) for the fiscal year 2011/12 (see Table 4). Best practices in stroke patient flow not only indicate that patients should be admitted to inpatient rehabilitation earlier on in their recovery, but they should also receive greater intensity therapy in inpatient rehabilitation equalling 3 hours of therapy per day and 7 days per week.[1] The average admission and discharge FIM™ (Functional Independence Measure) score for patients within each RPG for inpatient rehabilitation within the Central LHIN are reported in Table 4. It is notable that the best practices stroke flow for inpatient rehabilitation recommend that patients whose FIM™ is greater than 100 receive their rehabilitation services in the community, rather than on an inpatient basis.

Table 4. Stroke patient flow through inpatient rehabilitation within the Central LHIN 2011/12

Rehabilitation Patient Group (RPG)	Total Number of Inpatient Rehabilitation Discharges (N)	Mean Length of Stay Inpatient Rehabilitation (number of days)	Average Admission FIM™ score	Average Discharge FIM™ score
1100	15	97.1	52	82
1110	37	89.8	55	81
1120	77	77.6	76	102
1130	38	46.2	87	105
1140	42	39.5	91	110
1150	64	41.3	97	113
1160	15	28.8	111	118
Total	288	59.9	80	102

The health care providers who were consulted for this project provided some additional observations about inpatient rehabilitation that are important to note. They talked about instances of attempted

referrals of patients from acute care to inpatient rehabilitation within and between hospitals that were unsuccessful because of information needs of the inpatient rehabilitation units had not been known and satisfied. They said that in such instances, the process of referral had to recommence with new "paperwork" when the required information was available. There was also some discussion about the intake criteria of inpatient rehabilitation units not being widely known, which has resulted in at least some incomplete referrals. These observations may have been based on some anecdotal information, but it clearly reflects what is known more generally in the health care system about the difficult nature of transitions of patients from one setting to another[7-10] and their effects on patients and providers.[11]

Complex Continuing Care

The current capacity of complex continuing care for stroke patients within the Central LHIN was estimated using two sources of data. First the total number of complex continuing care beds for each hospital was identified at each hospital within the Central LHIN (see Table 5).

Table 5. The capacity for treating stroke patients in complex continuing care within the Central LHIN

Hospital	Complex Continuing Care Beds	
	Total	Stroke
Mackenzie Health	79	9
Humber River Regional Hospital	0	0
Markham Stouffville Hospital	17 (5 closed)	0
North York General Hospital	0	0
Southlake Regional Health Centre	32	0
Stevenson Memorial Hospital	0	0

Additionally, the average length of acute stay (LOS) in number of days in complex continuing care across Ontario following an inpatient discharge for stroke or transient ischemic attack and the time from acute admission to complex continuing care for the fiscal year 2009/10 is reported in Table 6.

Table 6. Stroke patient flow through Complex Continuing Care across Ontario in 2009/10

	Length of Stay (days) mean (median)	Time from acute admission to complex continuing care (days) mean (median)
Ontario	84.4 (57)	45.7 (51)

Outpatient/Community Rehabilitation, Prevention and Support Services

Analysis of key informant interviews, stakeholder focus groups and the community provider telephone surveys pointed to four main contextual factors that affect the capacity of the Central LHIN to provide outpatient/community rehabilitation, prevention, self-management and support services.

Geography of community services

One of the major barriers to stroke survivors receiving services in the community is the widespread dispersion of services within the LHIN and even, in some cases, beyond the boundaries of the Central LHIN. Key informants identified accessibility of publicly funded transportation services as the main challenge to accessing community services. Further, it was shared that stroke survivors often have to take several different forms of transportation, at inconvenient hours, in order to get to their service appointments. In many cases, patients are left to arrange their own travel and must pay for these services. It was felt by stakeholders that this complexity in arranging transportation is a major deterrent to stroke survivors and their families who might benefit from community services.

Awareness of what services are available and how they compare to what services are needed

Another contextual factor that was discussed with key informants is the frequent misunderstanding of health care providers, patients and families alike that the stroke rehabilitation, prevention, self-management and support services that are available in the community match the needs of stroke survivors and their families. One stakeholder shared that many stroke survivors are under the impression that after they are discharged from publicly funded services, they have plateaued in their rehabilitation and have reached the highest level of recovery possible. In essence, there is concern from community stroke stakeholders that patients are unaware of services that exist beyond what is directly funded and might be too quick to discount their ability to continue to improve their functioning over time. As a result, patients may be missing out on services that may meet their ongoing needs, whether they are services that are publicly or privately funded.

Cost of supplemental rehabilitation services

Another limitation of the capacity for community and outpatient rehabilitation, self-management, prevention and support services is the cost of supplemental services. Many services required by stroke survivors in order to make functional gains in their rehabilitation on an ongoing basis are additional to the basic assessment and equipment services provided by the CCAC. Health care providers shared in key informant interviews that stroke survivors usually benefit from receiving services from multiple disciplines upon discharge to the community; however, CCAC funding currently within the Central LHIN generally limits services to one discipline only, and seldom two disciplines concurrently. Therefore, patients must either manage with receiving only one form of rehabilitation in the community, or must find the means to fund their own private rehabilitation.

Culture, age and severity of stroke

Additional contextual factors that impact community and outpatient rehabilitation, prevention, self-management and support services are patient demographics in terms of cultural background, age and the severity of stroke. It was shared that many community services are targeted specifically to older adults, while there are limited services available for younger stroke survivors, including children.

Further, within the Central LHIN there is a large south Asian population and Italian population and there are only a few services that specifically target these populations.

Further, while these culturally specific services are quite good and well known in the community, they are fairly exclusive and tend to not be well attended by patients outside of the cultural background that is targeted. Lastly, it was shared that there are not very many stroke specific services within the community. Therefore, any stroke specific services that do exist are either reserved for patients who have experienced a very dense stroke, or are very expensive.

Additionally, patients who have experienced a very mild stroke are able to attend general exercise programs and community services. There was concern expressed by stakeholders in terms of accessibility of services for patients who have experienced a moderate stroke and are unable to participate in general community services because they are not high functioning enough, but cannot access stroke specific services because their impairment is not severe enough.

Hospital-based outpatient/prevention services

Within the Central LHIN there are no acute care hospital-associated outpatient stroke rehabilitation services. Instead, Central LHIN stroke patients are referred to outpatient rehabilitation at St. John's Rehabilitation Hospital, and, outside the Central LHIN's boundaries, at Providence Healthcare, Toronto Rehab, Baycrest and West Park. While there are no outpatient rehabilitation services associated with hospitals within the Central LHIN, key informant interviews and the community provider survey revealed that there are several services offered through the hospitals within the Central LHIN, which are accessed by stroke patients.

The five southern acute care hospitals within the Central LHIN have a stroke prevention clinic. To access these clinics, patients must be referred from the emergency department, inpatient units or the community; however, key informant interviews indicated that referral for patients who have had a stroke is not automatic and more referrals should be made. There are also seven cardiac rehabilitation sites within the Central LHIN that stroke survivors may be referred to if appropriate, with one of these sites offering a program specific for TIA patients. Additionally, there are adult day programs at North York General Hospital and Mackenzie Health which are targeted to patients over the age of 65 and are typically accessed by family caregivers in need of respite time. While these programs are not specific to stroke, key informants indicated that stroke patients do attend and are accommodated based on their individual needs (i.e., communication, cognitive, functional impairment etc.). Finally, there are diabetes education and prevention programs at both Mackenzie Health and Southlake Regional Health Centre that may be accessed by patients at risk of having, or who have had a stroke. A variety of health care staff provide the above services including rehabilitation therapists, recreation therapists, registered dieticians, Personal Support Workers and social workers. The cost of these various outpatient services ranges from free to upwards of $55.00 per month.

Private Community Rehabilitation

Focus groups and interviews with key stroke stakeholders in the hospital and community setting pointed to a sample of five private rehabilitation clinics within the Central LHIN that stroke survivors might access once they have been discharged from hospital and publically funded rehabilitation services and/or to supplement their hospital rehabilitation services. Surveys with several of these private clinics indicated that the services offered include not only basic rehabilitation therapy, but also very specialized neuro-rehabilitation services that focus on helping stroke patients continue to make progress in their physical and cognitive functioning long after they have had a stroke. These types of services include naturopathy, specialized upper extremity therapy, pilates, massage, fine motor re-training, and vestibular assessments to name a few. Staff who work at these clinics have specialized training and experience in neuro-rehabilitation. Although very specialized, these services are also quite expensive. Clinic managers shared their concern that there is not enough public funding available to stroke survivors to receive basic physiotherapy and occupational therapy services and therefore patients tend to be seeking their clinics out and paying for non-specialized rehabilitation rather than being able to take advantage of their specialized services.

Additionally, clinic managers described the current disconnect between the public and private sector, indicating their experience of treating patients who are are not getting the right information early enough in their stroke recovery journey in order to get the services they need for as long as they need them. When patients do not meet the criteria for outpatient or home-based rehabilitation services, hospital staff is unable to formally refer patients to private rehabilitation clinics within the LHIN, and only sometimes is a list of potential private rehabilitation options shared with patients, at their request. It is then up to the patients themselves to take the initiative in the continuity of their stroke care in the community, both physically and financially.

CCAC Home Care Rehabilitation

Best practices in stroke flow indicate that stroke patients should have access to 2-3 outpatient or community-based allied health professional visits per week (per required discipline) for 8-12 weeks[5]. This means that stroke patients should be receiving between 16 and 36 rehabilitation visits in the community; however, Table 7 indicates the mean and median number of visits for each type of therapy funded by the CCAC to stroke clients at home in the Central LHIN in 2009 and 2010 were significantly lower than what is recommended in best practice.

Table 7. Patient flow through home care rehabilitation services from Central CCAC 2009/10

	Number of clients	Mean number of visits per client	Median number of visits per client
Physiotherapy	216	6	4
Occupational Therapy	345	3.9	3
Speech Language Pathology	169	4.6	3
Social Work	39	4.4	3

Focus groups and key informant interviews with frontline health care providers in the hospital and community setting validated that patients are in fact not receiving home-based rehabilitation services funded by the CCAC for two main reasons. First, hospital staff expressed concerns about recent restrictions put in place by the CCAC that limit staff to referring a single rehabilitation discipline for a stroke survivor at their discharge from hospital. It was expressed by key informants that most stroke survivors benefit from at least two types of therapies and make the most gains when these therapies are delivered concurrently.

Further, the home visits a stroke patient is able to receive from a therapist tend to focus on conducting assessments, particularly focusing on safety and equipment assessments, rather than on rehabilitation. Key informants of this project indicated that the limited services that are available tend to be reserved for patients who have had a really dense stroke, even though these services are often not frequent or intense enough to make a significant difference. On the other hand, patients who had a mild or moderate stroke who could make significant improvements in their functioning with some home-based rehabilitation, do not tend to meet criteria because they are "too well" to receive services. Overall, there was consensus across key informants that there is a significant dearth in publicly-funded home-based rehabilitation for stroke survivors.

Community self-management, support services and resources

Key informant interviews, focus groups and a telephone survey of community service providers and resources indicated that there is a significant lack of stroke-specific community self-management, prevention and resources available within the Central LHIN. The *Building On Our Strengths Together* (BOOST) program is one of the only stroke specific community programs available within the Central LHIN. The BOOST program is an adult day program targeted specifically to stroke survivors who have neurological impairments and is mainly attended by stroke survivors who are of Italian background. There is a general chronic disease self-management program available in several community locations across the LHIN which is targeted to older adults and focuses on general principles of healthy living. Stroke patients might access this program, however they must be able to participate in a workshop format and sit for an extended period of time.

In terms of prevention, there are no specific stroke prevention programs available in the community within the Central LHIN. Several programs surveyed in the community offer seated exercise programs that are sometimes attended by stroke survivors; however, many lack the resources and staff to offer specialized equipment and exercises specific to stroke. There are also a few diabetes prevention initiatives within the community across the LHIN that may be valuable to stroke survivors, as diabetes is a risk factor for having a stroke, but again, they are not specific to the prevention of stroke itself.

The Demand for Stroke Services within the Central LHIN

Acute Care

In the OSN *Impact* report, the focus for acute care was on the LOS for stroke survivors (including those who have had a TIA) in acute care before discharge. While an individual patient's characteristics will

dictate the day he or she should be appropriately discharged from acute care, the OSN's Stroke Reference Group indicated that on average, ischemic stroke survivors (along with those who have had a TIA) should be discharged by their fifth day in acute care, and hemorrhagic stroke survivors should be discharged by their seventh day.

In key informant interviews and focus group, the reasonableness of the 5- and 7-day targets were discussed. While all were in support of the targets, particularly when they are targets for the *average* discharge date from acute care and not a fixed date for every individual, there was some concern that discharging patients within these timeframes could mean that patients with co-morbidities or with some medical instability would be referred for inpatient rehabilitation, and that the capacity of inpatient rehabilitation departments to handle some level of medical instability might be necessary. Furthermore, informants also urged that to implement these discharge timelines, more clarity would be required regarding the intake criteria and information needs of inpatient rehabilitation departments to ensure smooth transitions and progression through the system.

The OSN's method for calculating demand – adopted in this report[*] – was to examine the impact of the best practices by destination of patients (home and inpatient rehabilitation) and by type of stroke (ischemic, TIA and hemorrhagic). In addition, the best practice stroke flow indicates that patients who historically have been referred to Complex Continuing Care (CCC) for "slow-stream" rehabilitation should be discharged from acute care to inpatient rehabilitation and so a proportion of patients referred to CCC would also benefit from the 5- and 7-day acute care discharge targets.

Table 8 indicates the changes to the experience in 2011/12 if the best practices in patient flow had been in place. Overall, best practices suggest that there would be better outcomes for stroke survivors and there would be a reduction of 4,039 bed days and 1,484 ALC bed days.

Table 8. Demand for acute care from 2011/12 based on best practice stroke flow

Patient discharged home	
Ischemic (N)	360
Potentially "avoidable" acute bed days	43
Total acute ALC	61
TIA	23
Potentially "avoidable" acute bed days	360
Total acute ALC	0
Hemorrhagic stroke (N)	0
Mean acute LOS	6.9
Potentially "avoidable" acute bed days	50
Total acute ALC	353

[*] Additional assumptions made for the purposes of this report are in Appendix A.

Patient discharged to inpatient rehabilitation	
Ischemic (N)	160
Potentially "avoidable" acute bed days	3,518
Total acute ALC	419
TIA (N)	36
Potentially "avoidable" acute bed days	36
Total acute ALC	528
Hemorrhagic stroke (N)	32
Potentially "avoidable" acute bed days	32
Total acute ALC	123
Patients discharged to CCC and then home (N)	42
Potentially "avoidable" acute bed days	487
Total acute ALC	210
Total potentially "avoidable" acute bed days	**4,039**
Total ALC days	**1,484**

Inpatient Rehabilitation/Complex Continuing Care

The OSN's *Impact* report made some important assumptions about the effect on inpatient rehabilitation volumes. The best practice recommendations focused on a different approach to inpatient rehabilitation than currently provided for three reasons:

1. best practices would increase the intensity of therapy provided in this setting (moving to 3 hours of therapy per day, 7 days a week);
2. the earlier referral of patients from acute care into inpatient rehabilitation would increase the acuity of the needs of patients in the inpatient setting; and,
3. patients whose FIM™ is greater than 100 would not be referred to inpatient rehabilitation and would be referred to outpatient or community-based rehabilitation instead, and patients who achieve a FIM™ score of 100 while in inpatient rehabilitation would be discharged to continue their rehabilitation as an outpatient or in the community.

To estimate the effect of the change in therapy intensity, the OSN estimated that LOS would be reduced by 1 day for every week in rehabilitation (14% less). Also, the OSN took Ontario inpatient rehabilitation data from 2010/11 and adjusted LOSs to reflect the absence of the patients with FIM™ scores of greater than 100. To reflect the greater acuity of patients, the LOS from each patient's next more severe RPG was used, and a best-practice LOS was calculated for each RPG. In this report, the OSN's best-practice LOSs have been used. Table 9 shows the result of the analysis for the Central LHIN – an overall reduction of 10,150 bed days in inpatient rehabilitation.

As noted above, in our interviews and focus group with health care providers in the Central LHIN, there was a concern that the changes in the patient profile (higher potential medical acuity and more co-morbidities and a shorter LOS) would likely require changes in how inpatient rehabilitation is understood and managed.

Table 9. Demand for inpatient rehabilitation from 2011/12 inpatient rehabilitation patient RPGs, based on best practice stroke flow

Rehabilitation Patient Data	
RPG 1160	
Discharges	15
2011/12 LOS	28.8
Best-practice expected LOS	0
Impact on rehabilitation bed days	-432.0
RPG 1150	
Discharges	64
2011/12 LOS	41.3
Best-practice expected LOS	7.7
Impact on rehabilitation bed days	-2,151.2
RPG 1140	
Discharges	42
2011/12 LOS	39.5
Best-practice expected LOS	14.4
Impact on rehabilitation bed days	-1,053.2
RPG 1130	
Discharges	38
2011/12 LOS	46.2
Best-practice expected LOS	25.2
Impact on rehabilitation bed days	-797.4
RPG 1120	
Discharges	77
2011/12 LOS	77.6
Best-practice expected LOS	35.8
Impact on rehabilitation bed days	-3,215.4
RPG 1110	
Discharges	37
2011/12 LOS	89.8
Best-practice expected LOS	41.8
Impact on rehabilitation bed days	-1,777.4
RPG 1100	
Discharges	15
2011/12 LOS	97.1
Best-practice expected LOS	48.9
Impact on rehabilitation bed days	-723.5

Outpatient/Community Rehabilitation, Prevention and Support Services

There are a number of assumptions in the calculation of the demand for outpatient or community rehabilitation by stroke survivors that the OSN made in the *Impact* report that were challenged as not applicable in the Central LHIN in our interviews and focus group of health care providers.

First, the OSN made the assumption (based on two research studies, one in Montreal and one in southwest Ontario) about the need for rehabilitation for 13% of stroke survivors discharged directly from acute care. The Central LHIN health care providers said this proportion seemed low, but they did not have a specific alternative proportion to suggest. In the estimates for this report, therefore, the OSN's assumption of 13% was retained.

Second, there was an assumption made by the OSN that half of stroke survivors who need rehabilitation after discharge from acute care are already able to find the care they need. The Central LHIN health care providers said that cost and transportation barriers exist in the Central LHIN that prevent more than half of stroke survivors to seek out the rehabilitation they need. Even the most generous private insurance plans for physical therapy, occupational therapy or speech language therapy would not, in their estimation, cover anywhere near the costs of therapy three times a week for 8 to 12 weeks. Furthermore, there is no significant provision of outpatient rehabilitation in the Central LHIN, and what there is requires a wait of up to 4 weeks, rendering its effectiveness much lower.

The OSN's main assumption about publicly-funded therapy services provided through CCACs was supported by the health care providers in the interviews and focus group. The OSN observed that, with a total of 3 or 4 in-home visits for any individual client (see Table 7 above for the figures for the Central LHIN), "these services primarily consisted of home evaluations and assessments that, although important and necessary, did not qualify as 'rehabilitation'." [1] [p.37]

Based on the comments from the health care providers in the Central LHIN and the OSN's assumption about CCAC-funded services, Table 10 includes an estimate of the demand for outpatient or community-based rehabilitation by stroke survivors discharged from acute care or inpatient rehabilitation without any deduction for rehabilitation deemed to be being provided today to these groups.

Table 10. Demand for outpatient or community-based rehabilitation among 2011/12 from stroke survivors, based on best practice stroke flow

Acute discharges	
Patients discharged to home from acute care requiring additional rehabilitation (13% of total discharges to home)	81
Inpatient rehabilitation discharges	
Patients discharged from inpatient rehabilitation to home	228
Patients discharged to home from CCC	42
Total number of patients requiring outpatient or community-based rehabilitation	**309**

As for the precise demand for individual therapy services, the OSN report estimated that all of these patients would need both physiotherapy and occupational therapy and half would require speech-language pathology. The health care providers in the interviews and focus group suggested strongly that the proportion of patients requiring speech-language pathology would be closer to 100% in the Central

LHIN rather than 50%. Assuming, therefore, 3 hours a week of the various therapies for an average of 10 weeks, the additional demand would be 9,270 hours of therapy for the 309 patients.

Observations about stroke care across the continuum in the Central LHIN

Based on identified LHIN level capacity to provide services to stroke survivors and their families across the continuum of care and calculated demand of best practices in stroke care on acute care, inpatient rehabilitation, complex continuing care, outpatient and community rehabilitation and support, the following emerged as key priorities for Central LHIN stroke care planning initiatives:

1. Stroke care should be person-centred
2. Stroke care should occur along well-informed trajectories that are linked across settings
3. The transition from acute care to inpatient rehabilitation should be realigned to take into account the demand for best practice stroke flow inpatient rehabilitation
4. Outpatient and community stroke rehabilitation and support services should be integrated and community-specific

1. Stroke care should be person-centred

In this review of stroke care services within the Central LHIN, health care providers (in interviews, focus group and in telephone surveys) said that current stroke patient care trajectories tend to be dictated by service availability, criteria and available funding/resources rather than directed by individual patient needs for medical treatment and/or rehabilitation.

Stroke stakeholders across the continuum, particularly those working in inpatient rehabilitation and the community, shared the concern that patients may not be receiving the right services in the right place at the right time and lack the autonomy to make decisions about their care according to their physical functioning.

Further, health care providers perceive the current state of stroke care in the Central LHIN to be more amenable to providing services to those with very dense strokes or very mild strokes (e.g., TIAs). Therefore, patients who experience moderate impairment or loss of function as a result of their stroke and who may be in a position to make the most gains in terms of recovery and rehabilitation, may not be getting the services they need.

In addition, there was a concern that rehabilitation services – as well as primary and secondary prevention services – generally have a single focus on stroke (or other conditions) and do not address the needs of stroke survivors who have multiple conditions that make their rehabilitation and reintegration into the community more complex.

Finally, there was concern that the services stroke survivors may access, particularly in the community, assume stroke survivors are older adults, and there is less emphasis on the needs of younger persons who experience a stroke, and even on children who experience a stroke.

Exploration of more individualized approaches to service provision in stroke care is warranted based on these shared observations by stakeholders across the continuum.

An important component of Ministry of Health and Long-Term Care's Action Plan for Health Care[12] is ensuring that health care is person-centred. A person-centred approach to planning for and re-designing stroke care in the Central LHIN would address a number of the issues mentioned above. Therefore a key priority area for moving forward in stroke planning within the Central LHIN would be to adopt person-centred care principles and embed them in the planning process and in the health services. In addition, stroke survivors and their family members should be engaged directly in the planning process and inform decision-making about services.

2. Stroke care should occur along well-informed trajectories that are linked across settings

Recommendation 6.1 in The *Canadian Stroke Strategy Canadian Best Practice Recommendations for Stroke Care* (2010)[5] indicate that "Patients, families, and caregivers should be prepared for their transitions between care environments by being provided with information, education, training, emotional support, and community services specific to the transition they are undergoing." [p.132]

Assessing patient, family and caregiver needs to determine readiness for information and supports, and helping them preparation with appropriate and realistic expectations about care environments and availability of services, are also recommended as best practice. Written discharge instructions, direct referrals, access to a contact person and social service organization are indicated as necessary supports for stroke survivors.[5]

Health care providers in interviews, focus groups and surveys said that care settings within the Central LHIN often function in isolation of each other with regards to stroke care. There was particular concern about the linkage between acute care and inpatient rehabilitation, as a result of the often delay in getting patients into rehabilitation in a timely fashion a result of poor communication of informational needs and lack of understanding of admission criteria. Further, concerns were expressed about frontline hospital staff have a limited understanding of what services are available in the community and how to link patients with these services, and vice versa.

While acute, inpatient rehabilitation, complex continuing care and community services are often separated physically and operate independently from each other, health care providers said that efforts should be made to enhance health provider awareness of services across the continuum as well as

develop linkages between settings to promote informational, relational, and managerial continuity of care[13] in order to enhance stroke survivor experiences and outcomes.

Informational continuity means that health care providers have access to up to date information on previous events and personal context to ensure appropriate services are provided to the patient. Relational continuity means that patients experience a seamless ongoing relationship with health care providers, even when transitioning between providers and across settings. Relational continuity requires enhanced communication practices and role clarity between health care staff. Further, management continuity indicates that a patient's overall stroke care should be managed in a consistent way across health care setting and be flexible according to a patient's needs. This requires collaboration and defined linkages between health care providers across settings.[13]

The best practice stroke flow recommendations suggest that there are several common trajectories that stroke survivors may take – for example:

- acute care to home without need for outpatient or community-based rehabilitation
- acute care to home with outpatient or community-based rehabilitation
- acute care to inpatient rehabilitation to home and outpatient or community-based rehabilitation
- acute care to inpatient rehabilitation to long-term care.

It is understood that stroke survivors in the Central LHIN area often access services outside the LHIN, particularly for inpatient rehabilitation and community supports, and these referral and service patterns make it complex for stroke survivors and their caregivers – and for health care providers in the various settings – to navigate.

The different possible trajectories for stroke survivors require that multiple linkages be established and maintained across and between different settings, and across the LHIN's boundaries. It is therefore recommended that in addition to re-designing the specific service delivery ***components*** of the continuum of care, planning efforts be specifically focused on enhancing care transitions ***between and across*** the service delivery components.

3. The transition from acute care to inpatient rehabilitation should be realigned to take into account the demand for best practice stroke flow inpatient rehabilitation

In comparing the identified current capacity and projected demand for inpatient rehabilitation within the Central LHIN it is clear that there is room for improvement in terms of ensuring all stroke patients across the Central LHIN have equitable access to inpatient rehabilitation services. Health care providers in interviews and a focus group indicated that historical referral patterns send patients outside of LHIN

boundaries to receive services, most often to the southern end of the Central LHIN within the Toronto Central LHIN (e.g., Toronto Rehab, Sunnybrook, Providence Health Care, West Park, etc.).

Further, the capacity that does exist within the Central LHIN to deliver inpatient rehabilitation services to stroke survivors is unevenly dispersed. While Mackenzie Health's integrated stroke unit and several other hospitals within the LHIN have some inpatient rehabilitation beds designated specifically to stroke, other hospitals do not have this capacity and therefore must rely on services from other hospitals or refer outside of the LHIN. While aligning current inpatient rehabilitation services with best practice stroke flow will mean more health professionals be involved, overall bed-days would be expected to decline significantly.

As well, as noted above, the expectations of patients and providers in acute care and providers in inpatient rehabilitation are not well aligned. Information and process improvements are need to assist in the transitions from acute care to inpatient rehabilitation.

Therefore it is recommended that stroke care planning efforts hone in on the need for inpatient rehabilitation within the LHIN. As well, if it is necessary to serve patients' needs by helping them access inpatient rehabilitation outside the Central LHIN boundaries, to enhance accessibility and additional partnerships to those services.

4. Outpatient and community stroke rehabilitation and support services should be integrated and community-specific

Based on the best practice stroke flow and the qualitative and quantitative data collected in this review, it appears that there is a significant lack of available outpatient and/or community rehabilitation services specific to stroke survivors, and the few stroke specific services that do exist are geographically isolated, targeted to a particular patient demographic, or are costly to access.

However, more work is necessary to determine what types of services will best address the demand. For example, in the OSN *Impact* report, assumptions were made about outpatient rehabilitation being most cost-effective if available within a 30-minute drive from stroke survivors' homes. The OSN's assumption was qualified:

> A 30-minute driving distance from hospital is an arbitrary determinate of suitability for outpatient versus community-based rehabilitation. Numerous other factors need to be taken into consideration including the patient's physical status and availability of transportation. For illustrative purposes, this cut off has been used to infer investment needs, but further research is necessary to refine this estimate and to determine the proportion of patients living within a 30 minute drive for whom other issues limit their ability to get to outpatient rehabilitation.

It is consequently recommended that a community-specific approach be taken to planning the balance between outpatient and community-based rehabilitation services and the costs for each.

While other services in the stroke care continuum can be conceived as being provided sequentially (for example, inpatient rehabilitation comes after acute care), community supports often should be available and provided at the same time and in conjunction with outpatient or community-based rehabilitation, and vice versa.

However, in the Central LHIN, there seems to be a lack of integration of services within the community that either address the needs of stroke survivors and their caregivers specifically or are accessed by stroke survivors even though the services are not specifically stroke-related. A recently-developed Community Resource Guide provides a good listing of services that may be relevant to stroke survivors, but could be enhanced by providing the eligibility criteria for the services, and indicating whether they are specific to stroke survivors, are geographically within reach, or are targeting prevention, rehabilitation, self-management or simply provide resources and/or support.

Underpinning the next steps in planning for stroke care in the Central LHIN should be an investigation or "mapping" of how the support services in the community overlap and complement each other and outpatient and community-based rehabilitation.

Potential features for a planning structure for stroke care services within the Central LHIN

1. Stroke Flow Steering Committee

Other LHINs, including the Waterloo-Wellington LHIN[14] and the Toronto Central LHIN[6] have completed LHIN level reviews of stroke services across the continuum. Their efforts have been guided by diverse steering committees that include key stroke stakeholders from across the continuum of care settings. The objectives of such a steering committee could include the following:

1. Govern the planning process in an organized fashion across the continuum using a consistent approach, maintain a clear direction, and adhere to person-centred care principles
2. Building on the best practice stroke flow calculations from this project, obtain more detailed DAD, CCRS and NRS data in addition to CCAC data to calculate the demand for acute, inpatient rehabilitation, complex continuing care, outpatient rehabilitation, and home care services at the patient level
3. Based on patient-level demand calculations, develop patient algorithms/pathways and design integrated services based on patient needs for medical management/rehabilitation/support rather than solely on services currently available

Based on the experiences of other LHINs, it is recommended that the Central LHIN consider the following potential representatives to comprise a Central LHIN stroke flow steering committee:

- Senior LHIN planners
- Representatives from Regional Stroke Networks
- Executives from LHIN hospitals
- Representatives from the CCAC
- LHIN health service provider representatives
- Non-LHIN funded community support service representatives
- Clinical Managers of the District's Integrated Stroke Unit, and hospital cardiac rehabilitation programs and stroke prevention clinics
- Stroke survivors and/or their family members
- Frontline rehabilitation therapists (i.e., OT, PT, SLP) Social workers, medical staff (i.e., nursing, physicians)
- Representatives from private community rehabilitation sector
- Primary care providers in the community

For more detailed work, it is also suggested that two subgroups be established to address the two major issues in improving stroke care: redesigning the individual services within the Central LHIN and ensuring efficient and effective transitions between the services.

2a. System redesign

Based on the patient level demand calculations according to best practices in stroke patient flow, a review of the infrastructure of the system as experienced by stroke survivors will be required to determine changes necessary to accommodate different types of patients in different settings across the continuum of care. It is recommended that a group be formed to lead this planning and include the following representation from each of the settings across the continuum:

- Facilities managers
- Human Resource personnel
- Decision Support/Information Management
- Representative from the Steering Committee

The objectives of the working group could include the following:

1. Based on patient-level demand calculations and the algorithms/pathways developed by the steering committee, determine additional facility, staff and information flow requirements for each setting across the continuum
2. Engage additional stakeholders in each setting across the continuum to work on these objectives:
    (a) determine referral criteria for inpatient rehabilitation and outpatient and community-based rehabilitation, and streamline administrative processes to improve efficiency

(b) explore referral patterns outside of the LHIN and capacity within the LHIN to meet inpatient demand
(c) determine the effects of a discontinuing "slow stream" rehabilitation
(d) conduct a cost analysis of outpatient versus home based rehabilitation considering contextual factors such as geography, costs incurred by patients, costs to the system, the need for individualization, culture etc.;
(e) map community services (public and private) in the Central LHIN according to whether they are stroke specific, whether they target prevention, self-management, rehabilitation, or are purely supportive and/or resource-based, and whether they target certain geographic areas of the LHIN.

2b. Transitions

In addition to ensuring that each individual care setting across the continuum is designed to meet patient needs, an emphasis must also be placed on enhancing care transitions that patients experience as they move between acute, inpatient rehabilitation and community settings. It is recommended that a group be formed with potential presentation from each of the settings across the continuum:

- Frontline rehabilitation therapists (OT, PT, SLP)
- Social work
- Medical Staff (nursing, physicians)
- Clinical managers
- Representative from steering committee

The objectives of the working group could be as follows:

1. Work with stroke survivors and their family members from across the LHIN to review patient-centred care principles and determine what is important to them based on their experiences of stroke care services within the Central LHIN
2. Based on patient-level demand calculations, preferences and algorithms/pathways developed by the steering committee, determine the informational, relational and managerial requirements to enhance transitional support for stroke survivors and their families across the continuum
3. Engage additional stakeholders in each setting across the continuum to work on these objectives:
    (a) improve patient awareness of changing expectations in inpatient rehabilitation; enhance communication between providers across settings; determine clear criteria for referrals

(b) raise hospital staff awareness of what is available in the community; build capacity for direct referrals to community services; enhance messaging to patients about their recovery in terms of their needs for service rather than service availability

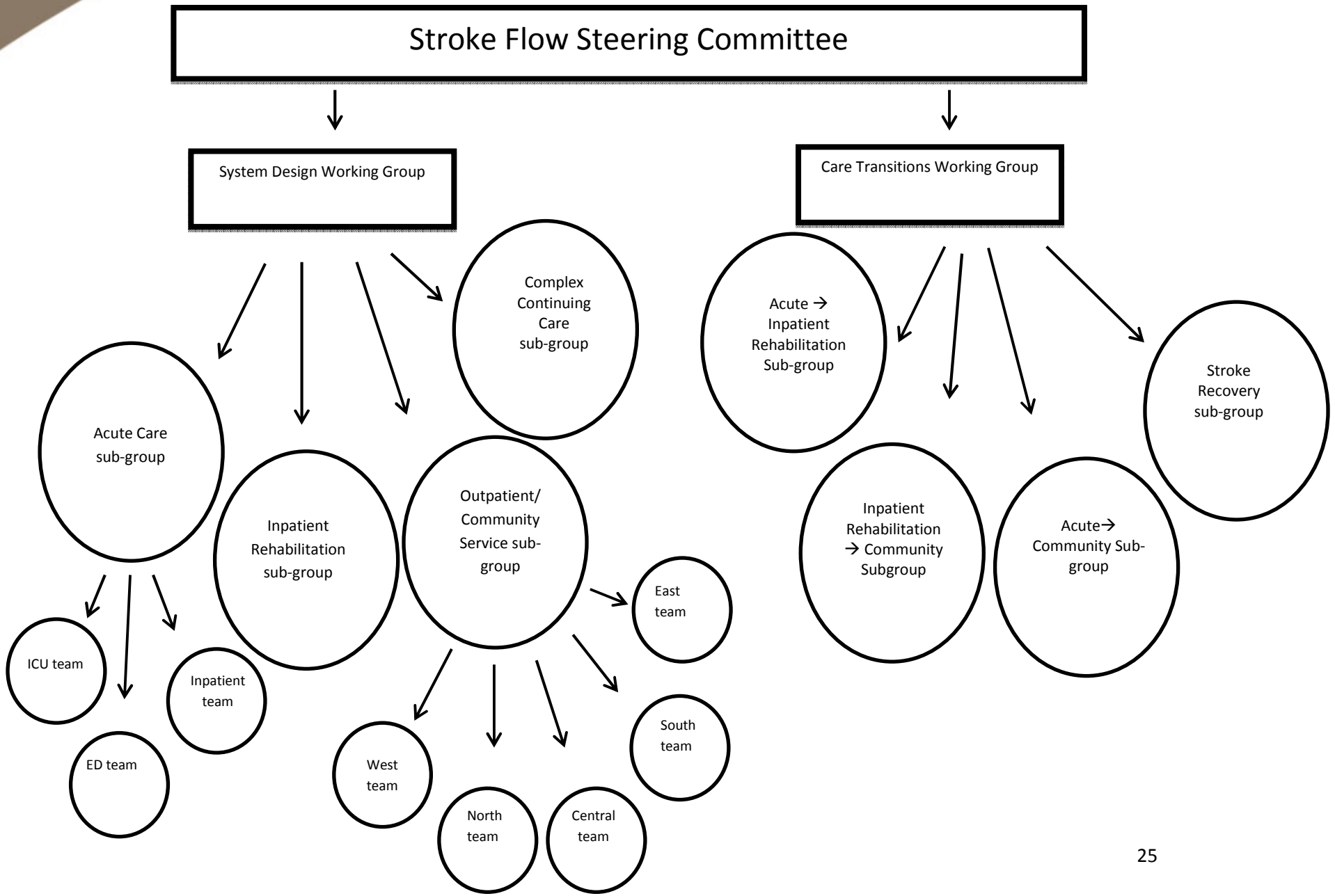
Figure 1 on the next page outlines the features of a proposed planning structure to assist the Central LHIN in developing an action plan to hone in on the above recommendations for stroke care planning across the continuum from acute to inpatient rehabilitation to complex continuing care to outpatient and community rehabilitation and support services. While it may appear complex, it reflects the complexity of the system.

Conclusions

There is a significant opportunity for the Central LHIN to embrace the best practices in stroke flow as adopted by the Ontario Stroke Network. The goal of working toward best practices is to improve the quality of care provided to stroke survivors, to improve their outcomes, and to improve their experience of the health care system. The expectation is, as well, that adopting the best practice stroke flow recommendations will result in a more efficient and effective use of health care resources.

The challenges to be faced when adopting best practices should not be underestimated, because they involve reorienting current services associated with stroke care, and the expectations and processes associated with those services. However, the lessons learned and the experiences in making the changes are likely to have considerable carry-over impact to other areas of health care as person-centred principles are adopted, and more effective and integrated services are achieved.

Figure 1


Stroke Flow Steering Committee
System Design Working Group
Care Transitions Working Group
Complex Continuing Care sub-group
Acute Care sub-group
Inpatient Rehabilitation sub-group
Outpatient/ Community Service sub-group
Acute → Inpatient Rehabilitation Sub-group
Stroke Recovery sub-group
Inpatient Rehabilitation → Community Subgroup
Acute→ Community Sub-group
ICU team
Inpatient team
ED team
East team
West team
North team
Central team
South team

References

1. Meyer M, O'Callaghan C, Kelloway L, Hall R, Teasell R, Meyer S, et al. The impact of moving to stroke rehabilitation best practices in Ontario. Toronto: Ontario Stroke Network, 2012.
2. Statistics Canada. Mortality, Summary List of Causes 2009. Ottawa: Statistics Canada, 2012.
3. Public Health Agency of Canada. Tracking heart disease & stroke in Canada. Ottawa: Public Health Agency of Canada, 2009.
4. Hall R, Khan F, O'Callaghan C, Kapral M, Hodwitz K, Fang J, et al. Ontario stroke evaluation report 2012: prescribing system solutions to improve stroke outcomes. Toronto: Institute for Clinical Evaluative Sciences, 2012.
5. Lindsay M, Gubitz G, Bayley M, Hill M, Davies-Schinkel C, Singh S, et al. Canadian best practice recommendations for stroke care (update 2010). Ottawa: Canadian Stroke Network, 2010.
6. Hay Group. Implementing stroke best practices in the Toronto Central LHIN: analysis of system impacts. Toronto: Toronto Central Local Health Integration Network, 2012.
7. Baker GR. Care transitions: impact, interventions and implementation: Presentation to the Central Local Health Integration Network, 2011. [Internet]. Accessed on March 26, 2012. Available from http://www.centrallhin.on.ca/uploadedFiles/Public_Community/Advancing_Quality/2011-03-03_Presentation_RossBaker.pdf.
8. Change Foundation. Having their say & choosing their way: Helping patients and caregivers move from hospital to 'home': A quality improvement project on patient transitions. Toronto: Change Foundation, 2009.
9. McLeod J, McMurray J, Walker J, Heckman G, Stolee P. Care transitions for older patients with musculoskeletal disorders: continuity from the providers' perspective. *International Journal of Integrated Care* 2011(Apr-Jun; 12:):e13.
10. Toscan J, Mairs K, Hinton S, Stolee P. Integrated transitional care: patient, informal caregiver and health care provider perspectives on care transitions for older persons with hip fracture. *International Journal of Integrated Care* 2012;12((April 2012)):Available at: http://www.ijic.org/index.php/ijic/article/view/797. Date accessed: 01 Apr. 2013.
11. Avoidable Hospitalization Advisory Panel. Enhancing the continuum of care: report of the Avoidable Hospitalization Advisory Panel. Toronto: Ontario Ministry of Health and Long-Term Care, 2011.
12. Ministry of Health and Long-Term Care. Ontario's action plan for health care: better patient care through better value from our health care dollars. 2012. Toronto: Ministry of Health and Long-Term Care. Available at http://www.health.gov.on.ca/en/ms/ecfa/healthy_change/docs/rep_healthychange.pdf. [Accessed March 4, 2013].
13. Haggerty JL, Reid RJ, Freeman GK, Starfield BH, Adair CE, McKendry R. Continuity of care: a multidisciplinary review. *British Medical Journal* 2003;327(7425):1219-21.
14. Morrison S. Community Engagement Plan – Draft 3: Improving access to quality stroke care in Waterloo Wellington. 2012. Kitchener: Waterloo-Wellington Local Health Integration Network. Available at http://www.waterloowellingtonlhin.on.ca/uploadedFiles/Public_Community/Current_Projects/Stroke%20Review%202010%20-%202011%20%20-%20Planning%20Worksheet%20-%20FINAL%20-%20March%202012.pdf. Accessed on March 19, 2013.

Appendix A - Assumptions used to examine the effects of best practice stroke flow on acute care in the Central LHIN

The method and basic premises of the OSN's *Impact* analysis for acute care were followed, but there were some limitations due to project timelines and availability of data that required additional assumptions to be made:

1. The data used for this report were not at the patient level; instead, the data were aggregated to the stroke type, hospital and fiscal quarter-year. Thus, it was not possible to assess the actual LOS for each of the relevant patients (those who were discharged to home, inpatient rehabilitation or complex continuing care with an ultimate destination of home). Instead, the mean LOS was used for both the acute stay and the ALC stay for patients grouped by stroke type.
2. One of the categories for discharge destination for patients was "Transferred to continuing care facility (incl. mental health, rehab, nursing home, chronic care, etc." and it was key for the purposes of the analysis of the effects of best practice stroke flow on acute care to distinguish between these destinations in this category. The total number of discharges from inpatient rehabilitation in 2011/12 (288) was distributed proportionately as the discharge destination for patients with each stroke type at each Central LHIN hospital. With respect to referrals from acute care to complex continuing care that ultimately resulted in the patients returning home, the data from the relevant Complex Care Reporting System database was not available. The proportion of patients in this category was assumed to be the same as reported for 2010 in the OSN's *Impact* report, page 15, 3.3%. The acute care LOS and ALC LOS for these patients was assumed to be the same as for survivors of hemorrhagic strokes.