Determining the Need for Rehabilitation Services Post Stroke

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EXECUTIVE SUMMARY

Access to specialized stroke rehabilitation is a best practice. According to the Canadian Stroke Strategy: Canadian Best Practice Recommendations for Stroke Care 2010, "All patients with stroke who are admitted to hospital and who require rehabilitation should be treated in a comprehensive or rehabilitation stroke unit by an interprofessional team (Evidence Level A). "

Multiple studies have identified that dedicated stroke rehabilitation can reduce post stroke complications and mortality, reduce hospital length of stay, and improve recovery helping survivors return home, thus reducing institutionalization[1]. Yet, in 2007/08 only 23% of all acute stroke survivors in Ontario accessed designated inpatient rehabilitation programs (SEAC Technical report 2010)[2]. Data from the South West LHIN have identified dramatic variations depending on where one is living at the time of the stroke, from as high as 37% gaining access to as little as 0%[3]. Specifically, patients in rural and smaller centres have reduced access to inpatient rehabilitation services.

These gaps in best practice across the South West LHIN led to the following question: Are stroke survivors in the South West LHIN getting the rehabilitation they need?

What is the need? An objective method for determining the proportion of stroke survivors who would benefit from inpatient rehabilitation was needed. According to Standard 14 of the Consensus Panel on the Stroke Rehabilitation System[4], "Stroke survivors of a moderate or severe stroke who are Rehab Ready and have rehabilitation goals will be given an opportunity to participate in inpatient stroke rehabilitation (Evidence Level 1)[2]." If severity alone is used to estimate the proportion of stroke survivors requiring inpatient rehabilitation, then the results derived from examining stroke admissions in southwestern Ontario over a two year period indicates that:

- 55% of stroke survivors experience moderate to severe disability according to the AlphaFIM®
- 70% of stroke survivors experience moderate to severe disability according to the modified Rankin Scale

The consensus panel recommends additional criteria (identified rehabilitation goals, willingness to participate in rehabilitation and demonstrated ability to learn) be used to determine candidacy. The Stroke Rehabilitation Candidacy Screening Tool (SRCST) was created based on these recommendations. When all stroke admissions were screened using the SRCST criteria, ***an estimated 40% of acute admissions qualified as appropriate candidates for inpatient rehabilitation***.

Are we meeting the need? In this study, one out of every four stroke survivors who were expected to benefit from inpatient rehabilitation did not receive it. For those individuals, lack of access to an available rehabilitation bed was the limiting factor impeding best practice. Discharge to Complex Continuing Care (CCC) was the most frequently utilized alternative.

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[1]Foley N, Teasell R, Bhogal S, Speechley M. The Efficacy of Stroke Rehabilitation. www.ebrsr.com, Section 5, 2008.
[2]Ontario Stroke System Stroke Evaluation Advisory Committee (SEAC); Ontario Stroke Evaluation Report 2010: Technical Report. April 2010
[3]Willems D. Southwestern Ontario Stroke Rehabilitation Action Planning Day Summary Report. Jan 2007
[4] The Ontario Stroke System Consensus Panel on Stroke Rehabilitation: Time is Function 2007

What is the impact? Delays in access to rehabilitation contribute to unnecessary health system cost. For those who were eventually discharged to inpatient rehabilitation, 66% were designated as Alternate Level of Care (ALC) in acute, with a mean number of days that was greater than for all other discharge destinations. For those not accessing rehabilitation, CCC was the alternative. Providing stroke survivors with hospital care that does not provide the necessary therapeutic services for achieving recovery reflects substantial inefficiency and cost to the health care system[5].

Testing the Tool: A further purpose of this study was to examine the utility of the SRCST. We found that the tool captured the thought processes used by expert clinicians, in a more consistent and replicable way. The majority of health care providers who used the tool felt that every stroke client admitted to acute care should be screened using the tool to assess rehabilitation candidacy. However the practical issue of using the screening tool with every person admitted with stroke was identified by the audit as a potential barrier. This report suggests potential modifications to the tool and processes to ensure rehabilitation needs are assessed for all stroke admissions.

CONCLUSIONS:

1. It is estimated that 40% of all acute stroke survivors are appropriate candidates for inpatient rehabilitation, yet within Ontario less than 23% receive it.
2. One in four stroke survivors in the study who qualified for inpatient rehabilitation did not receive it. System capacity was the primary limiting factor.
3. Delays in accessing rehabilitation contributed to a greater average number of acute ALC days than for all other discharge destinations.

Regarding the Stroke Rehabilitation Candidacy Screening Tool:

4. The SRCST is an objective method for identifying the need for inpatient rehabilitation which captures clinicians' implicit knowledge in a consistent and replicable way.
5. Application of a screening tool for rehabilitation candidacy on all acute stroke admissions is recommended but has practical limitations.

RECOMMENDATIONS:

1. Health care planners utilize 40% as an estimate of the percentage of all acute stroke admissions that will require inpatient rehabilitation.
2. The Ontario Ministry of Health and Long Term Care develop a conceptual framework for rehabilitation services based on population needs to address gaps in access.
3. In order to ensure rehabilitation needs are identified for all acute stroke admissions:
    - The Stroke Rehabilitation Candidacy Screening Tool, once revised, be incorporated into acute care pathways and/or admission protocols for stroke patients
    - The capacity for community rehabilitation services be enhanced to provide comprehensive outpatient assessment[6] for anyone whose

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[5] Bayley M. Maximizing the Impact of Rehab on Provincial Priority Issues. Mosaic of Stroke, Dec 2010; slide 69 presentation to the Central LHIN.

[6] Recommendation 5.1iii "All patients with acute stroke with any residual stroke-related impairments who are not admitted to hospital should undergo a comprehensive outpatient assessment(s) for functional impairment, which includes a cognitive evaluation, screening for depression, screening for fitness to drive, as well as functional assessments for potential rehabilitation treatment (Evidence Level A), preferably within 2 weeks (Evidence Level C)."Canadian Best Practice Recommendations for Stroke Care: 2010

rehabilitation needs are not assessed prior to being discharged from acute care.

SOUTHWESTERN ONTARIO STROKE NETWORK NEXT STEPS:

1. Revise the screening tool, building on the results from this study in order to optimize its utility prior to broader implementation.
2. Engage stakeholders to identify strategies and opportunities to incorporate the tool into their practice.

Why Now?

The opportunity for implementation of an early screening tool for rehabilitation needs is timely in that the tool could be integrated into the electronic patient record and resource matching and referral initiatives.

Furthermore, in June this year, the Ontario Ministry of Health and Long Term Care in partnership with Local Health Integration Networks and the Ontario Hospital Association held a roundtable to examine the role that rehabilitation and complex continuing care could play in addressing the ER/ALC issue. The resulting report "Maximizing the Impact of Rehabilitation and Complex Continuing Care on Reducing ER and ALC Lengths of Stay: Core Messages" recommended "a new philosophy of care should be created and focus on moving Ontario towards a system of care that responds to the functional ability of a patient."

Principles included:

- Plan, coordinate and access CCC and rehab services at a regional level with active involvement of medical leadership
- Facilitate earlier onset of rehab assessment and treatment (pull patients from acute care more aggressively)
- Expand access to rehab for increasingly complex patients (ALC)
- Disseminate best practice guidelines supported by appropriate accountability mechanisms to ensure and monitor uptake

Return on Investment

Teasell et al (2009)[7] identified that early access to stroke rehabilitation was a significant opportunity to contribute to health cost savings. Early admission of stroke patients to rehabilitation has the potential to reduce length of stay in acute care and rehabilitation, improve likelihood of discharge home and improve functional outcomes resulting in more independent and productive stroke survivors. Reducing the time to inpatient rehabilitation by two days, through more aggressive rehabilitation admission policies would have a value of about $1166.00 per patient[6]. In the South West LHIN, this would translate to $753,236 savings [in 2007-8: (1615 strokes x 40%) x $1166].

Reducing functional disability has significant impacts as well. Costs rise dramatically as levels of disability increase. People with non-disabling strokes – about 25 per cent of patients – personally expended about $2,000 in costs during the first six months. The costs for families increased from there to as much as $200,000 for the most severely affected. "The difference between merely having symptoms to requiring even minimal at-home assistance from others can mean a significant cost difference," says Dr.

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[7] Teasell, R. et al. A Blueprint for Transforming Stroke Rehabilitation in Ontario: Research Synthesis of Effectiveness and Cost Benefits. Dept of Physical Medicine and Rehabilitation, SJHC, London and Schulich School of Medicine and Dentistry, UWO. 2009

Sharma. “The need to have someone drive you around and help with shopping can double personal costs – as well as costs incurred by the person helping you.”[8]

In Conclusion

Overall, this study provides an objective estimate of the rehabilitation needs for stroke survivors and identifies significant system gaps in meeting those needs.

Properly sizing and resourcing rehabilitation services in Ontario will:

- reduce ALC wait times
- reduce disability and improve quality of life, lessening societal burden
- reduce longer term personal costs for persons with stroke and their families
- assist in achieving seamless transitions across the care continuum
- support obtaining the right service, at the right time, in the right place, by the right provider
- advance the Ministry of Health and Long Term Care’s vision to establish a patient-focused, results-driven, integrated and sustainable publicly funded quality health system.

[8] http://www.heartandstroke.com/site/apps/nlnet/content2.aspx?c=ikIQLcMWJtE&b=6074245&ct=8425975

BACKGROUND

Access to specialized stroke rehabilitation is a best practice. According to the Canadian Stroke Strategy: Canadian Best Practice Recommendations for Stroke Care 2010, "All patients with stroke who are admitted to hospital and who require rehabilitation should be treated in a comprehensive or rehabilitation stroke unit by an interprofessional team (Evidence Level A). "

Multiple studies have identified that dedicated stroke rehabilitation can reduce post stroke complications and mortality, reduce hospital length of stay, and improve recovery helping survivors return home, thus reducing institutionalization[9]. As a result, the Ontario Stroke System Report "Consensus Panel on the Stroke Rehabilitation System: Time is Function 2007"[10] has identified provincial standards for stroke rehabilitation. Standard #14 states "Stroke survivors of a moderate or severe stroke who are Rehab Ready and have rehabilitation goals will be given an opportunity to participate in inpatient stroke rehabilitation (Evidence Level A/1)."

Yet, in 2007/08 only 23% of all acute stroke survivors in Ontario accessed designated inpatient rehabilitation programs (SEAC Technical report 2010)[11]. While the percentage of acute stroke survivors that should access these services is unknown, it is expected to be much greater. Data from the South West LHIN have identified dramatic variations depending on where one is living at the time of the stroke, from as high as 37% gaining access to as little as 0%[12]. Specifically, patients in rural and smaller centres have significantly reduced access to inpatient rehabilitation services. SEAC 2010 reported that more than half (52%) of all stroke patients are admitted to non-designated centres (vs stroke centres) and that patients admitted to non-designated centres are less likely (only 18%) to be discharged to inpatient rehabilitation.

These gaps in best practice across the South West LHIN led to the following question:

Are stroke survivors in the South West LHIN getting the rehabilitation they need?

The first step in answering this question was to develop a standardized assessment and triage tool that could objectively identify appropriate candidates for inpatient rehabilitation, the Stroke Rehabilitation Candidacy Screening Tool (see Appendix A). Phase One of this study established the tool's reliability[13].In 2008/09 the Stroke Rehabilitation Candidacy Screening Tool (SRCST) was voluntarily implemented at facilities in the region. Building on the work in Phase One, and utilizing the information generated from implementation of the tool, this study was undertaken to address the following purpose.

STUDY PURPOSE: To objectively determine whether stroke survivors are getting the rehabilitation services they need.

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[9]Foley N, Teasell R, Bhogal S, Speechley M. The Efficacy of Stroke Rehabilitation.www.ebrsr.com, Section 5, 2008.
[10] The Ontario Stroke System Consensus Panel on Stroke Rehabilitation: Time is Function 2007
[11]Ontario Stroke System Stroke Evaluation Advisory Committee (SEAC); Ontario Stroke Evaluation Report 2010: Technical Report. April 2010
[12]Willems D. Southwestern Ontario Stroke Rehabilitation Action Planning Day Summary Report. Jan 2007
[13] Willems D. Determining the Need for Rehabilitation Services Post Stroke, Phase One: Report on the Inter-Rater Reliability Project. August 2008

OBJECTIVES:

1. Retrospectively determine stroke severity (Rankin score) for all stroke admissions over a two year period.
2. Determine the need for inpatient rehabilitation as a percentage of all stroke admissions using an objective method (SRCST) to determine rehabilitation candidacy.
3. Describe actual services received upon discharge and compare these to recommendations for service.
4. Retrospectively determine to what extent documented practices for selection of rehabilitation candidates post stroke complies with best practices according to the 2007 Ontario Consensus Panel Report prior to implementation of the SRCST.
5. Determine if the percentage of all stroke patients discharged alive from acute care and identified as inpatient rehabilitation candidates differs with routine use of the SRCST.
6. Acquire a deeper understanding of barriers to best practices for identification of rehabilitation candidates.
7. Determine whether key informants report use of a rehabilitation candidacy screening tool for stroke improves the process for identification of inpatient rehabilitation needs.

METHODS:

This is a descriptive study utilizing a retrospective chart audit. A sample of convenience included eight facilities (two district stroke centres and six community hospitals) who had voluntarily implemented the SRCST in 2008/09. Health records from the participating facilities for all acute care admissions with an admitting diagnosis of stroke (ICD 10 codes I61-I69) and discharged alive were audited for two cohorts:

- Cohort 1:the calendar year prior to implementation of the SRCST
- Cohort 2: the calendar year after implementation of the SRCST

The auditors used results from the SRCST to determine eligibility for inpatient rehabilitation following stroke in Cohort 2. For Cohort 1, they applied the criteria from the SRCST retrospectively, if there was sufficient information regarding the criteria, to determine Cohort 1 patients' candidacy for inpatient rehabilitation. Auditors also noted acute discharge disposition and services received on discharge. Stroke severity was determined using the Modified Rankin Scale for both cohorts to allow comparison. The AlphaFIM®, also a measure of stroke severity, was collected as part of the SRCST in Cohort 2 (see Appendix A).

RESULTS:

Participating Facilities and Classification of Stroke Volumes

Participating facilities included local hospitals that had implemented use of the Stroke Rehabilitation Candidacy Screening Tool as of January 2009 and had used it for a full year as of January 2010 (see Table 1).

Institutions are categorized based on the annual number of admissions for stroke, as low (<34), medium (34–99) or high (>100) volume[14]. Actual stroke volumes for the study period are described in Table 1.

[14] Registry of the Canadian Stroke Network - Report on the Ontario Stroke Audit methodology June 2006

Table 1: Participating Facilities and Stroke Volumes

Community	Hospital	Classification	# Stroke D/C Alive	
			Cohort 1	Cohort 2
St Thomas	St Thomas Elgin General	Medium	41	40
Newbury	Four Counties	Low	10	4
Strathroy	Middlesex Healthcare Alliance	Medium	33	18
Tillsonburg	Tillsonburg District Memorial	Medium	34	33
Ingersoll	Alexandra	Low	5	14
Woodstock	Woodstock General	Medium	48	50
Stratford	Huron Perth Healthcare Alliance	Medium	85	90
Sarnia	Bluewater Health	High	138	147

Subjects:
Data were collected on a total of 788 subjects, described in Table 2. The mean length of stay in acute care was 12.4 days with a median length of stay of 7 days (range 0-177).

Table 2: Subjects

	Cohort 1	Cohort 2	Total
Number of Stroke Admissions	392	396	788
Age (mean +/-SD)	74.1 +/-12.4	73.3 +/- 12.3	73.7 +/- 12.4
Gender Male (%)	196 (49.6%)	207 (52.7%)	403 (51.1%)

Objective 1: Retrospectively determine stroke severity for all stroke admissions during the study period.

Rating stroke severity is an integral part of determining rehabilitation need. Standard 14 indicates that "Stroke survivors of a moderate or severe stroke who are Rehab Ready and have rehabilitation goals will be given an opportunity to participate in inpatient stroke rehabilitation (Evidence Level 1)[2]." Stroke severity was determined using the modified Rankin Scale for both cohorts; see Table 3.

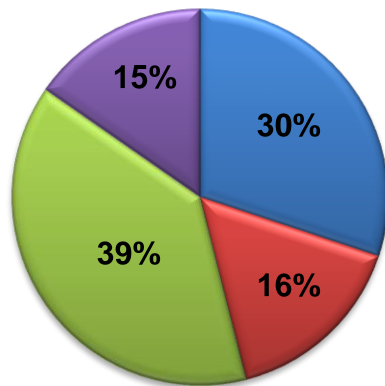
Modified Rankin Scale (mRS):
0=No symptoms at all
1=No significant disability despite symptoms; able to carry out all usual duties and activities
2=Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance
3=Moderate disability; requiring some help, but able to walk without assistance
4=Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5=Severe disability; bedridden, incontinent and requiring constant nursing care and attention

Table 3: Severity Rating for all Acute Stroke Admissions by mRS Category

N=772*	Cohort 1	Cohort 2	Total	%
mRS 0-2: Resolved or Mild	115	117	232	30%
mRS 3: Moderate	64	59	123	15.9%
mRS 4: Moderately Severe	156	143	299	38.7%
mRS 5: Severe	46	72	118	15.3%

* There was insufficient information to determine the mRS for 16 of the 788 subjects.

Proportion of All Stroke by mRS Severity Category



In Cohort 2, the AlphaFIM® was also used to describe stroke severity. However it is important to note that AlphaFIM® scores were completed on only 58% of all admissions in that cohort. Proportions of stroke by severity classification using the AlphaFIM® results are presented in Table 4.

Table 4: Severity Rating for Stroke using AlphaFIM® Categorization[15] (Cohort 2)	**N= 230**
AlphaFIM®>80: Mild	44.7%
AlphaFIM® 40-80: Moderate	32.8%
AlphaFIM®<40: Severe	22.6%

Modified Rankin Scale and AlphaFIM® scores were highly correlated; Spearman's rho (2 tailed) = -0.833, $p<0.001$ n=243. Thus supporting use of mRS scores as a proxy for the AlphaFIM® in the retrospective audit of the SRCST criteria.

If stroke severity (moderate and severe) alone was used as the criterion to determine rehabilitation need, then the potential proportion ranges from 55% (AlphaFIM®) to 70% (mRS).

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[15] WeenJE, Alexander MP, D'Esposito M, Roberts M. Factors predictive of stroke outcome in a rehabilitation setting. *Neurology.* 1996 Aug;47(2):388-92.

Objective 2: Determine the need for inpatient rehabilitation as a percentage of all stroke admissions using an objective method (SRCST) to determine rehabilitation candidacy.

Need for Inpatient Rehabilitation for All Stroke

A more accurate picture of rehabilitation need is revealed when all stroke admissions are screened using the rehabilitation candidacy criteria (stroke severity, identified rehabilitation goals, willingness to participate in rehabilitation and demonstrated ability to learn) in the SRCST to identify those who would benefit from inpatient rehabilitation; see Table 5.

Table 5a: Candidates for Inpatient Rehabilitation per SRCST criteria

	N	Rehab Candidates (N)	Rehab Candidates (%)
Cohort 1 (retrospective)	392	154	39%
Cohort 2 (prospective)	396	147	37%
Total	788	301	38.2%

The audit found insufficient information to determine rehabilitation candidacy in 71 (9%) of the788 charts. We know that the majority of individuals with a moderately severe stroke (mRS 4) require rehabilitation, as well as a percentage of moderate (mRS 3) and severe (mRS 5) stroke (see Table 6). A conservative estimate from those for whom we have insufficient information to determine candidacy would be to include all those with moderately severe stroke (mRS of 4; n=23) as appropriate rehabilitation candidates. If we add those to the previous numbers, then the estimate increases to:

Table 5b: Candidates for Inpatient Rehabilitation per SRCST criteria

	N	Rehab Candidates (N)	Rehab Candidates (%)
Cohort 1 (retrospective)	392	169	43.1%
Cohort 2 (prospective)	396	155	39.1%
Total	788	320	41.1%

Therefore, 41% of all acute stroke admissions discharged alive in this study qualified for inpatient rehabilitation. This lends support for the provincial benchmark of 39% set by the Ontario Stroke Evaluation Advisory Committee of the Ontario Stroke System[16].

The number of clients who declined rehabilitation (N= 15) represents 4.8% of those otherwise eligible.

Rehabilitation Candidates According to Stroke Severity

For all stroke, the proportion of rehabilitation candidates identified from each severity classification according to the mRS is listed in Table 6.

[16]Ontario Stroke System: Stroke Evaluation Report[2] Benchmark for Inpatient Rehabilitation: 39% was derived by looking at Stroke Registry data from the eleven Regional Stroke Centres over seven quarters (FY0607 and 0708) using the methodology described in Kiefe CI, Weissman NW, Allison JJ, Farmer R, Weaver M, Willams OD. "Identifying achievable benchmarks of care: concepts and methodology". International J for Quality in Health Care 1998; 10(5):443-447.

Table 6: Proportion of each mRS Stroke Severity Category identified as Inpatient Rehabilitation Candidates	
mRS 0-2: Mild	5.6%
mRS 3: Moderate	48%
mRS 4: Moderately Severe	64%
mRS 5 : Severe	32%

One third of severe (mRS 5), two thirds of moderately severe (mRS 4) and half of moderate (mRS 3) clients were identified as appropriate candidates for rehabilitation. This confirms the hypothesis that severity alone is not the only criterion on which to base rehabilitation candidacy.

The small proportion of candidates in the mild category (mRS 0-2) may be indicative of the need to admit clients for intensive therapy in the absence of access to intensive therapy in the community (e.g. speech therapy). Because of the subjective nature of the criterion Rehabilitation Goals which states "From your assessment, the patient requires inpatient rehabilitation to improve...*select goals*", if services or supports in the community are inadequate to meet the client's needs, clinicians may identify the need for inpatient admission.

Objective 3: Describe actual services received upon discharge and compare these to recommendations for service.

Services on Discharge for Rehabilitation Candidates

Discharge disposition for all patients determined to be candidates for inpatient rehabilitation according to the candidacy criteria are described in Table 7.

Table7: Actual Discharge Destination for Rehabilitation Candidates

Cohort	Home	Inpatient Rehab	LTC	CCC	Retirement Home	Other acute	Total
1	12 (7.8%)	113 (73.4%)	0	29 (18.8%)	0	0	154
2	10 (6.8%)	111 (75.5%)	1	23 (15.6%)	1	1	147

One out of every four stroke survivors deemed to be appropriate candidates for inpatient rehabilitation based on objective criteria did not receive it. The most frequently cited reason for not receiving inpatient rehabilitation was lack of access to an available bed. Admission to Complex Continuing Care was the most frequently utilized alternative.

Access to rehabilitation programs has been identified as a particular concern for those with severe stroke[3]. Our results indicate that 32% (Rankin 5) to 43% (AlphaFIM® <40) of severe stroke qualify as candidates for inpatient rehabilitation. In this study, 79% (n=30) of all individuals with severe stroke who were identified as rehabilitation candidates (n=38) accessed it. This represents a slightly greater percentage than that for all rehabilitation candidates (75%). It would appear that stroke severity was not a factor which significantly biased access in this sample.

Readiness

A small percentage of the patients admitted for rehabilitation, at the time of discharge from the acute unit, had not fulfilled the readiness criteria of adequate activity tolerance and medical stability; 5% and 1% respectively.

ALC in Acute Care
Of those discharged to inpatient rehabilitation (n=246), 66% (n=162) were designated Alternate Level of Care (ALC) for an average of 3.7 days (SD 13.6; range 1-166). The mean ALC days was greater when waiting for inpatient rehabilitation than for all other discharge destinations; the latter averaged 2.4 days (SD 9.0, range 0-106).

Services on Discharge for all Stroke Admissions
The services recommended on discharge by the acute care team, as documented in the health record, almost matched identically the services received on discharge from acute care (see below). It is likely that recommendations for service are influenced by staff's awareness of the availability of services.

Table 8:
Services Recommended:

None	257
Inpatient	245
Complex	133
In home/ CCAC	66
OT	42
PT	37
Speech	9
Social work	0
Outpatient	29
OT	19
PT	18
Speech	8
Social work	5
Private	0
OT	0
None documented	57

Services Received:

None	257	32.6%
Inpatient	245	31.1%
Complex CC	133	16.9%
In home/ CCAC	66	8.4%
OT	45	
PT	38	
Speech	9	
Social work	0	
Outpatient	29	3.7%
OT	17	
PT	18	
Speech	9	
Social work	5	
Private	1	0.1%
OT	1	
None documented	57	7.2%

Also included are the percentages of each type of service received for all stroke clients. 31% of all stroke admissions, for the facilities participating in this study, were discharged to inpatient rehabilitation from acute care. This is higher than the provincial average of 23%, but lower than the identified benchmark of 39%[2]. Referral to rehabilitation services in the community is very low with only 8.4% receiving therapy at home, 3.7% as an outpatient and 0.1% accessing therapy privately. It is likely that the small numbers are a reflection of service availability rather than actual need. Overall, the results seem to indicate that the system is working in terms of transitions to other services, where those services exist.

Objective 4: Retrospectively determine to what extent documented practices for selection of rehabilitation candidates post stroke complies with best practices, according to the 2007 Ontario Consensus Panel Report.

In Cohort 1, prior to implementation of the Stroke Rehabilitation Candidacy Screening Tool, auditors were able to abstract most of the candidacy criteria for the majority of stroke clients. The one criterion cited most often as not documented was Rehabilitation Goals ($p<0.001$; when compared to charts audited after implementation of the screening tool). Therefore, clinicians' current practices met, for the most part, best practice.

Further, the SRCST was validated as accurately representing the thought processes used by expert clinicians, capturing it in a consistent and replicable way.

Objective 5: Determine if the percentage of all stroke patients discharged alive from acute care and identified as inpatient rehabilitation candidates differs with routine use of the SRCST.

Although the original intention was that the SRCST would be completed for all acute stroke admissions discharged alive in Cohort 2, retrospective audit results indicate that it was completed on only 58% of admissions. Therefore, rehabilitation candidacy was determined via retrospective audit using the SRCST candidacy criteria for both Cohort 1 (the year prior to implementation of the SRCST) and the 42% of Cohort 2 for whom the tool was not completed. When comparing the percentage of all acute stroke patients who met the eligibility criteria for inpatient rehabilitation between Cohort 1 and Cohort 2, there were no statistically significant differences observed. Nor was there a significant difference between the cohorts in percentage of qualified candidates who received inpatient rehabilitation.

Proportion of all acute stroke admissions discharged alive identified as candidates for inpatient rehabilitation:
Cohort 1: N=154 39.3%
Cohort 2: N=147 37.1%
No statistically significant difference; chi square p=0.58

Percentage of rehabilitation candidates discharged to inpatient rehabilitation:
Cohort 1: N=113 73.4%
Cohort 2: N=111 75.5%
No statistically significant difference; chi square p=0.866

However, we cannot say with confidence whether or not consistent use of the tool would have an impact. For those cases in which the tool was completed, 77% of persons identified as rehabilitation candidates were admitted to inpatient rehabilitation. Again, system capacity may be the greater determining factor.

Objective 6: Acquire a deeper understanding of barriers to best practices for identification of rehabilitation candidates.

Voluntary Use of the Stroke Rehabilitation Candidacy Screening Tool and AlphaFIM® Instrument

While it was intended for the tool to be completed on all stroke admissions to the facility where the tool was implemented, 42% of stroke admissions during the study period did not have the screening tool completed.

It appears that two factors contributed to the Screening Tool not being used:
1. The stroke severity rating (AlphaFIM®) was to be completed between Day 3-5; 59% of those not completed were for persons discharged on or before Day 5.

2. Clinicians made a decision not to complete the screening tool if it was apparent to them that the individual was not a candidate for inpatient rehabilitation. Of the 166 clients on whom the SRCST was not completed, 91% were discharged either home or to a dependent living setting (Long Term Care, Complex Continuing Care or Retirement Home).

58% of all stroke admissions had the AlphaFIM® completed. Of those, using the AlphaFIM® categories for severity, almost half of all stroke classified as severe or mild were candidates for inpatient rehabilitation, as well as ¾ of those with moderate stroke (see Table 9).

Table 9: Rehab Candidacy by AlphaFIM® Instrument Severity Category

Number and Percent of each AlphaFIM® Category determined to be Inpatient Rehabilitation Candidates N=235	
AlphaFIM® >80: Mild n=105	50 (48%)
AlphaFIM® 40-80: Moderate n=77	56 (73%)
AlphaFIM® <40: Severe n=53	23 (43%)

Rehabilitation candidacy was distributed across a wide range of stroke severity when categorized according to AlphaFIM® Instrument scores, with the largest proportion being in the moderate category. The higher percentages identified here when compared to the percentages based on using the modified Rankin scores for stroke severity (see Table 6) suggest the presence of a pre-selection bias by clinicians.

Objective 7: Determine whether key informants report use of a rehabilitation candidacy screening tool for stroke improves the process for identification of inpatient rehabilitation needs.

A survey of key informants at facilities in which the SRCST had been implemented was conducted. Participants were asked to compare current practice, after having implemented the SRCST on all stroke admissions for a period of more than one year, against previous practice. 29 health care providers were invited to complete the survey. 22 provided complete responses to the questions resulting in a response rate of 81.5%. Respondents included acute care charge nurses, district stroke centre nurses, rehabilitation managers/coordinators, physiotherapists, occupational therapists, speech language pathologists, rehabilitation admissions staff, and bed management staff. The majority of respondents (64%) identified acute care as the area of the stroke care continuum in which they primarily worked.

Strongest agreement (77%) was recorded supporting the tool as having increased the use of objective criteria to determine rehabilitation candidacy. 73% agreement was recorded for the following statements:
“Use of the screening tool resulted in improved documentation of the information needed to determine rehabilitation needs.”
“In my opinion, the benefits derived from using the tool are worth the time required to complete it.”

For the questions related to the implementation processes, half of all respondents felt the tool was easy to complete and 37.5% of respondents indicated it was quick to complete, while four (25%) disagreed that the tool was quick to complete. The majority (71.4%) felt that every stroke client admitted to acute care should be screened using the tool to assess rehabilitation candidacy.

The complete survey and responses are provided in Appendix B.

DISCUSSION:

The main purpose of this study was to objectively determine whether stroke survivors in the South West LHIN are getting the rehabilitation they need. Utilizing a standardized assessment tool, 38% of all acute admissions for stroke were identified as appropriate candidates for inpatient rehabilitation. This figure would increase to 41% if we included those with a moderately severe stroke from the 71 (9%) for whom insufficient information was available to determine rehabilitation candidacy. This finding corroborates the benchmark of 39% set by the Ontario Stroke Evaluation Advisory Committee derived from current rehabilitation admission data, and stands in contrast to the 23% of all stroke patients in Ontario and the South West LHIN that currently access inpatient rehabilitation[3].

The results indicate that 75% of those identified as appropriate candidates for inpatient rehabilitation were admitted to a designated rehabilitation program. It has been well established that organized inpatient rehabilitation provides the greatest opportunity for recovery following stroke[1], yet one of every four individuals did not receive the services they required. For those individuals, lack of access to an available rehabilitation bed was the limiting factor impeding best practice. Discharge to Complex Continuing Care was the most frequently utilized alternative, resulting in hospital care without the therapeutic services necessary for achieving recovery. This reflects significant inefficiency and cost to the health care system.

In this study, 41% of the 788 persons admitted with stroke were discharged directly home from acute care; the majority of whom (80%, N=257) received no rehabilitation services. Only twelve percent of all persons with stroke in our sample received post acute rehabilitation services in the community (CCAC, outpatient and private combined). While this study was not designed to determine the need for rehabilitation services in the community, it has identified a significant number of persons (29% mRS and 45% AlphaFIM®) experiencing stroke that resulted in mild deficits. We suspect the low numbers accessing either ambulatory or community rehabilitation services post stroke are more likely a reflection of service availability rather than actual need. A small investment in these services has the potential to address much of this gap as well as improve flow through both acute and inpatient rehabilitation.

A secondary purpose of this study was to examine the utility of the SRCST. While the retrospective audit of individual health records identified that the majority of criteria necessary for determining stroke rehabilitation candidacy were documented, use of the SRCST supported more consistent documentation of all criteria in a readily accessible format. Prior to implementation of the SRCST, documentation of potential goals for rehabilitation (a candidacy criterion according to the 2007 Ontario Stroke Rehabilitation Consensus Panel Report) was not consistently available. This work validated that clinicians' judgment met, for the most part, best practice and that the SRCST accurately represents the thought processes used by expert clinicians to determine eligibility for rehabilitation. The tool, then, serves to capture tacit knowledge in a consistent and replicable way, thereby facilitating the potential for pooling data to identify gaps and planning strategies. It provides a way for clinicians to contribute their knowledge to assist system level decision making.

An area of concern is that the tool was not always completed for those discharged home or to a dependent living setting following acute care when clients were discharged by

Day 5. Potential exists for missing those needing inpatient rehabilitation, especially given the number of moderately severe stroke patients (mRS 4; n=23) that this included. It is important to ensure all acute admissions for stroke are screened for rehabilitation needs. Community follow-up for those discharged prior to Day 5 for whom rehabilitation needs were not addressed while in acute care should be provided as described in Canadian Best Practice Recommendations for Stroke Care: 2008 recommendation 5.1ii "All people with acute stroke with any residual stroke-related impairments who are not admitted to hospital should undergo a comprehensive outpatient assessment for functional impairment, which includes a cognitive evaluation, screening for depression, screening of fitness to drive, as well as functional assessments for potential rehabilitation treatment (Evidence Level A), preferably within 2 weeks (Evidence Level C)."

It is also possible that some clients may have had a pre-existing functionally dependent condition that precluded the benefits of rehabilitation. This might account for a number of those discharged by Day 5 (n=139) to a dependent living setting. Consideration should be given to adding a candidacy criterion of pre-stroke functional status and/or living setting.

Limitations

There are several limitations to this study. The poor compliance with the use of the screening tool required a greater reliance on a retrospective determination of candidacy than we had hoped, thus limiting our confidence in the estimated number of patients who require inpatient rehabilitation services. Although all the auditors were trained by the same individual, we cannot ensure consistency in applying the tool across auditors. For those on whom the tool was completed prospectively by clinicians, our results seem to indicate that there may have been a pre-selection bias. In particular, clinicians appear to have taken the early determination of discharge destination into consideration prior to completing the tool.

The results of this study may not be generalizable. Although patients from eight hospitals were included, they may not be representative of all others; patients in this study were from district stroke centres and community hospitals rather than regional centres.

CONCLUSIONS:

1. It is estimated that 40% of all acute stroke survivors are appropriate candidates for inpatient rehabilitation yet within Ontario less than 23% receive it.
2. One in four stroke survivors in this study who qualified for inpatient rehabilitation did not receive it. System capacity was the primary limiting factor.
3. Delays in accessing rehabilitation contributed to a greater average number of acute ALC days than for all other discharge destinations.

Regarding the Stroke Rehabilitation Candidacy Screening Tool:

6. The SRCST is an objective method for identifying the need for inpatient rehabilitation which captures clinicians' implicit knowledge in a consistent and replicable way.
7. Application of a screening tool for rehabilitation candidacy on all acute stroke admissions is recommended but has practical limitations.

RECOMMENDATIONS:

1. Health care planners utilize 40% as an estimate of the percentage of all acute stroke admissions that will require inpatient rehabilitation.
2. The Ontario Ministry of Health and Long Term Care develop a conceptual framework for rehabilitation services based on population need to address gaps in access.
3. In order to ensure rehabilitation needs are identified for all acute stroke admissions:
   - The Stroke Rehabilitation Candidacy Screening Tool, once revised, be incorporated into acute care pathways and/or admission protocols for stroke patients.
   - The capacity for community rehabilitation services be enhanced to provide a comprehensive outpatient assessment[17] for anyone whose rehabilitation needs are not assessed prior to being discharged from acute care.

SOUTHWESTERN ONTARIO STROKE NETWORK NEXT STEPS:

1. Revise the screening tool, building on the results from this study in order to optimize its utility prior to broader implementation.
2. Engage stakeholders to identify strategies and opportunities to incorporate the tool into their practice.

[17]Recommendation 5.1ii "All people with acute stroke with any residual stroke-related impairments who are not admitted to hospital should undergo a comprehensive outpatient assessment for functional impairment, which includes a cognitive evaluation, screening for depression, screening of fitness to drive, as well as functional assessments for potential rehabilitation treatment (Evidence Level A), preferably within 2 weeks (Evidence Level C)."Canadian Best Practice Recommendations for Stroke Care: 2008

Appendix A: STROKE REHABILITATION CANDIDACY SCREENING TOOL

Inpatient Stroke Rehabilitation Candidacy Screening Tool
Date of Stroke: ________________

Addressograph

Part I ***Rehabilitation Candidacy:***

Functional Status: AlphaFIM® Has the patient been observed walking 150 feet? ☐ Yes ☐ No

Please circle score for each item

Eating/Walking	1	2	3	4	5	6	7
Grooming/Bed Transfer	1	2	3	4	5	6	7
Bowel Management	1	2	3	4	5	6	7
Toilet transfer	1	2	3	4	5	6	7
Expression	1	2	3	4	5	6	7
Memory	1	2	3	4	5	6	7

Motor conversion score: ___ Cognitive conversion score: ___ Total FIM score: ___/126
Help Needed: ___ hours Date Part 1 completed: ______________

Part 2

Ability to Follow Commands: ☐ Yes ☐ No Date achieved: ________________
Verbal: "Close your eyes"
Nonverbal: Follows written command "Close your eyes" **and/or**
Follows addition of gestural cue for "Close your eyes"

Rehabilitation Goals: Does the patient have rehabilitation goals that require **inpatient** care?
NO → ☐ No goals ☐ Appropriate for **community** rehabilitation services
YES→ specify; from your assessment, the patient requires inpatient rehabilitation to improve:

- ☐ communication
- ☐ return to oral diet (swallowing)
- ☐ arm and hand function
- ☐ self care (bathing, dressing, toileting)
- ☐ cognitive, perceptual ability
- ☐ continence (bowel/bladder control)
- ☐ mobility (transfers, ambulation, sitting with comfort)
- ☐ ability to perform role (home & money management, organizational, socialization, vocational skills)
- ☐ caregiver/family's ability to manage the patient's care after discharge
- ☐ other: ______________________________ Date: ________________

Demonstrates Change: ☐ Yes ☐ No Date achieved: ________________
Demonstrates improvement in function over time that is **related to rehabilitation goals**.
Time over which change will be demonstrated will vary depending on the severity of the stroke.

Verbal Consent to Participate In Rehabilitation: ☐ Yes ☐ No Date: ______________
Patient/Substitute Decision Maker has agreed to Rehabilitation Goals as identified above and indicates willingness to participate in rehabilitation intervention post acute care.
"If accepted, would you be willing to participate in rehabilitation services (cite relevant services e.g. PT, OT, SLP, SW or rehabilitation program) to (cite patient/family goals as listed above) after the doctors feel you are ready to leave this acute care service?"

Patient meets all candidacy criteria; should be considered for referral to inpatient rehabilitation: ☐Yes ☐ No

Rehabilitation Readiness:
All qualifying candidates will be followed to determine when rehabilitation readiness is achieved as follows:

Tolerance: Tolerates a minimum of one hour sitting up in a wheelchair (or upright out of bed) twice per day. Tolerance achieved: ☐ No ☐ Yes; Date: ______________

Medical Stability:
To guide you in your decision about medical stability, please consider the following:

- MRP identifies that patient no longer requires acute care
- Cause of stroke explored; medical investigations completed or in process
- Secondary prevention/medication plan initiated
- Comorbid medical conditions managed/stable
- Patient is not palliative (life expectancy > 6 months)

Medical Stability achieved: ☐ No ☐ Yes; Date: ________________

Readiness Achieved: ☐ No ☐ Yes Date ready: ____________________

How to complete the form: Not all criteria must be directly observed. It is acceptable to consult the patient's care team to obtain the necessary information.

Part 1

AlphaFIM®: Please score according to the AlphaFIM® Instrument Guide and FIM™ System Decision Trees within 3 to 5 days of admission. You will need to enter these raw scores into the web-based system to get the conversion scores (see box below). Add the motor and cognition conversion scores for the Total FIM score. You may also note the hours of Help Needed if you wish.

AlphaFIM® Scoring System:

No Helper
7 Complete Independence (no device, timely, safely)
6 Modified Independence (device, not timely, or not safely)
Helper - Modified Dependence
5 Supervision (patient performs 100% of the effort)
4 Minimal Assistance (patient performs 75% or more of the effort)
3 Moderate Assistance (patient performs 50% to 74% of the effort)
Helper - Complete Dependence
2 Maximal Assistance (patient performs 25% to 49% of the effort)
1 Total Assistance

Entering the AlphaFIM® website to get the conversion scores:
Go to www.udsmr.org

1. Click on the tab "Software Portals" and select "AlphaFIM® Software Entry"
2. Complete login info as follows:
   Facility Code:
   User Name:
   Password:

Part 2

Based on the resulting FIM score classifying the stroke survivors' severity, an appropriate time frame will be selected for **final** completion of Part 2 (see "Demonstrates Change"). All items in Part 2 may be completed at any time, especially if achieved earlier, but the time frame is meant to specify the latest date for completion.

Ability to Follow Commands: Give the verbal command "close your eyes". If the patient does not respond appropriately, show them the written command "close your eyes". If the patient is still unable to respond appropriately, repeat the command verbally "close your eyes" and, while keeping your eyes open, point to your eyes and make a gesture to close them (four fingers horizontally lower as if lowering a blind). Do not close your eyes as this would be testing the patient's ability to copy your action versus follow a command.

Rehabilitation Goals: Please check off any goals that, based on your assessment and clinical judgment, apply to the patient and require treatment in an **inpatient** rehabilitation setting. Community rehabilitation services refer to any rehabilitation services provided for patients living in the community, including ambulatory (outpatient, clinic, day hospital, community health centre) or home-based (CCAC) services.

Demonstrates Change: improvement in function over time that is **related to** rehabilitation goals.
The time over which change in function should be observed is based on stroke severity as follows:

Mild (FIM™>80) over 3 days
Moderate (FIM™ 40-80) over 7 days
Severe (FIM™ <40) over 14 days

Verbal Consent to Participate in Rehabilitation: Obtain the patient/substitute decision maker's consent using the question provided in the tool.

Candidacy: Patient meets all criteria above. Select Yes, if the patient is able to follow commands, has rehab goals, demonstrates change over time and consents to participate according to the criteria above. The AlphaFIM score will be used to select the appropriate service.

Readiness:
Tolerance: Identify the length of time that a patient is able to tolerate sitting up out of bed in a wheelchair by observation, or from discussion with the patient's care team, to determine if they meet the minimum requirement. 'Tolerate' refers to remaining awake and alert, and reasonably comfortable.

Medical Stability: The points under medical stability are meant to guide you in your decision. It is not meant to be a checklist. MRP refers to the most responsible physician. Select yes or no based on the information you are able to gather from the chart and patient care team. Patients designated 'ALC' should meet the criterion.

Appendix B: QUALITATIVE SURVEY QUESTIONS AND RESPONSES

Q1.Use of the screening tool promoted the INCREASED USE OF OBJECTIVE CRITERIA to determine individual need for rehabilitation.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	1	1	3	10	7	3.95	22
						answered question	**22**
						skipped question	**3**

Q2. Use of the screening tool promoted CONSISTENT APPLICATION OF OBJECTIVE CRITERIA.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	0	2	7	9	4	3.68	22
						answered question	**22**
						skipped question	**3**

Q3. Use of the screening tool resulted in IMPROVED DOCUMENTATION of the information needed to determine rehabilitation needs.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	0	2	4	11	5	3.86	22
						answered question	**22**
						skipped question	**3**

Q4. Use of the screening tool promoted EARLIER IDENTIFICATION of need for rehabilitation following stroke.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	1	4	3	10	4	3.55	22
						answered question	**22**
						skipped question	**3**

Q5. Implementation of standardized screening resulted in IMPROVED COMMUNICATION between team members.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	1	1	5	13	2	3.64	22
						answered question	**22**
						skipped question	**3**

Q6. Implementation of standardized screening resulted in IMPROVED COMMUNICATION between team members and family regarding the need for rehabilitation.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	0	5	7	9	1	3.27	22
						answered question	22
						skipped question	3

Q7. Use of the screening tool has IMPROVED ACCESS TO INFORMATION about the need for rehabilitation for the Acute Care Charge Nurse.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	0	4	10	8	0	3.18	22
						answered question	22
						skipped question	3

Q8. Use of the screening tool has IMPROVED ACCESS TO INFORMATION about the need for rehabilitation for the Rehabilitation Intake Coordinator.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	0	3	6	10	3	3.59	22
						answered question	22
						skipped question	3

Q9. Implementation of standardized screening resulted in IMPROVED TRANSFER OF INFORMATION from acute care to inpatient rehabilitation.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	0	3	6	10	3	3.59	22
						answered question	22
						skipped question	3

Q10. Since implementation of standardized screening, access to inpatient rehabilitation services is MORE TIMELY.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	1	2	6	10	3	3.55	22
						answered question	22
						skipped question	3

Q11. Since implementation of standardized screening, I feel MORE CONFIDENT that patients who need inpatient rehabilitation services are accessing these services.							
Answer Options	1 (Strongly Disagree)	2	3 (Neutral)	4	5 (Strongly Agree)	Rating Average	Response Count
Level of agreement with this statement:	1	3	4	11	3	3.55	22
						answered question	22
						skipped question	3

Q12. In my opinion, the benefits derived from using the tool are worth the time required to complete it.							
Answer Options	1 (Strongly Disagree)	2	3 (Neutral)	4	5 (Strongly Agree)	Rating Average	Response Count
Level of agreement with this statement:	0	3	3	10	6	3.86	22
						answered question	22
						skipped question	3

Q13. In my opinion, the information provided by the screening tool is sufficient to determine rehabilitation needs in the majority of cases.							
Answer Options	1 (Strongly Disagree)	2	3 (Neutral)	4	5 (Strongly Agree)	Rating Average	Response Count
Level of agreement with this statement:	0	4	2	14	2	3.64	22
						answered question	22
						skipped question	3

Q14. Are there factors that you consider important in determining need for rehabilitation that do not appear on the tool?		
Answer Options	Response Percent	Response Count
No	57.9%	11
Yes (please list)	42.1%	8
	answered question	19
	skipped question	6

Q16. If you are the person completing the tool: In my opinion, the Stroke Rehabilitation Candidacy Screening Tool is EASY TO COMPLETE.							
Answer Options	1 (Strongly Disagree)	2	3 (Neutral)	4	5 (Strongly Agree)	Rating Average	Response Count
Level of agreement with this statement:	0	2	6	5	3	3.56	16
						answered question	16
						skipped question	9

Q17. If you are the person completing the tool: In my opinion, I found the Stroke Rehabilitation Candidacy Screening Tool QUICK TO COMPLETE.							
Answer Options	**1 (Strongly Disagree)**	**2**	**3 (Neutral)**	**4**	**5 (Strongly Agree)**	**Rating Average**	**Response Count**
Level of agreement with this statement:	0	4	6	4	2	3.25	16
						answered question	16
						skipped question	9

Q18. Who should be screened? In your opinion, the tool should be used to assess rehabilitation candidacy for:		
Answer Options	**Response Percent**	**Response Count**
Every stroke client admitted to acute care	71.4%	15
All stroke clients being considered for inpatient rehabilitation	19.0%	4
All stroke clients being considered for community rehabilitation	0.0%	0
All stroke clients being considered for rehabilitation	9.5%	2
	answered question	21
	skipped question	4