Perception of Recovery of Stroke Survivors and their Physiotherapists at Discharge: A Multiple

Methods Approach

by

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ABSTRACT

Background: Stroke is a disabling condition affecting millions across the globe. There may be varied neurological deficits that result in impairment and activity limitations, thus affecting the individual's perception of recovery.

Purpose: To examine perceptions of recovery among stroke survivors participating in an in-patient rehabilitation program and their physiotherapists.

Methods: A total of 31 stroke survivors and 6 physiotherapists at an in-patient rehabilitation centre participated in the study. A multiple methods design was used. Data on 31 participants with stroke included information from chart review and self-reported measures. (Functional Independence Measure (FIM), Chedoke McMaster Stroke Assessment Activity Inventory (CMSA – AI) and self-reported measures (Hospital Anxiety Depression Scale (HADS), Montreal Cognitive Assessment (MoCA) and Stroke Impact Scale (SIS) recovery). Nineteen patients also had a short interview and physiotherapists answered 2 written questions regarding their perception of recovery from stroke.

Results: The patients' SIS recovery scores had a positive relationship with FIM motor change scores (r = 0.41; p = 0.019), FIM total change scores (r= 0.37; p = 0.039) and the physiotherapists' SIS recovery scores (r = 0.50; p = 0.004). A paired t-test of the means of SIS recovery scores was not statistically significantly different. Regression analyses showed that both FIM motor change scores (R^2 = 0.17) and FIM total change scores (R^2 = 0.13) partially predicted recovery with univariate regression but not with multiple regression.

Conclusion: Similarities exist between the perceptions of recovery of both physiotherapists and patients. Additional variables were reported by the patients beyond those derived from the observed measures typically assessed in rehabilitation.

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DEDICATION

To John, Ian and Ariel Atama

I could not have asked for a better life-mate. This is for believing in me, always and for giving

me two little ones to call my own. My angels, always you both make me smile even after a long

tiring day.

Tolulope I. Atama

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CHAPTER 1

BACKGROUND

Epidemiology of Stroke

Globally, stroke is one of the leading causes of death and disability. Annually, stroke affects about 20 million people, a quarter of these die and another quarter have varying degrees of disabilities (Clarke and Foster, 2015). In the United States, it is the third leading cause of death and serious long-term disability. In 2006, 1 in 17 deaths was associated with stroke. England and Germany follow a similar trend; over a million people in England have had a stroke and a considerable number have associated disabilities (Clarke and Foster, 2015). In Germany, a minimum of one in five people have had stroke at one time in their life (Knecht et al., 2011).

Canada is not any different, stroke has been shown to have significant impact on the country's healthcare system, costing an estimate of 3.6 billion in the year 2000 (PHAC, 2011). Not including those in institutions, 1.1% of Canadians have had an episode of stroke. In 2005 and 2006, stroke accounted for the main reason for 38,341 hospitalizations and over 10,000 deaths in 2007 were attributed to stroke (PHAC, 2011). In 2014 and 2015, Manitoba reported that 3 in 1000 Manitobans 40 years old and above have had a stroke. Across the provincial health regions, there is a disparity in the rates with Winnipeg presenting a similar rate as the overall Manitoban average while Northern regions show a much higher rate of 5 in 1000 (Manitoba Health, Seniors and Active Living, 2015).

Stroke, Risk Factors and Clinical Features

The aforementioned statistics have shown the degree to which stroke can affect the population; what then is stroke? Stroke as defined by World Health Organization (WHO) (2001) is "rapidly developed clinical signs of focal disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin" (Pedersen et al., 1997). There are two main types of stroke –ischemic and hemorrhagic; ischemic stroke is 4 times more common than hemorrhagic stroke. Ischemic stroke is caused by obstruction of blood vessels leading to inadequate blood and oxygen supply to a part of the brain, while hemorrhagic stroke occurs due to the rupture of a blood vessel (Caplan et al., 2016). Stroke primarily occurs in older adults; the risk of having a stroke increases with age. About 60 percent of stroke occurs at 65 years of age and above (Moore, 2017). Also, women are more predisposed to stroke than men, while men have higher incident rates in younger ages; higher prevalence has also been found among people of black and Hispanic origins than Caucasians (Mozaffarian et al., 2016). Factors such as history of transient ischemic attack (Lovett et al., 2003), age, gender and race are non-modifiable risk factors of stroke (Stacco et al., 1997), while hypertension, diabetes, obesity, hyperlipidemia and smoking are the modifiable risk factors (Romero et al., 2008; Stacco et al., 2006). Of these, hypertension is the most prevalent with one in five Canadians having high blood pressure (Moore, 2017).

Always and Cole (2009) documented the clinical features of stroke as "paresis or paralysis commonly of one mirror half of the body known as hemiparesis or hemiplegia, facial droop, numbness, disturbed level of consciousness, vision loss, diplopia, dysarthria, aphasia, vertigo, loss of balance and coordination and gait disorders" (p. 11) These neurological deficits can lead to varying degrees of activity limitation post-stroke; decreased muscle strength and

reduced (or increased) tone are impairments which may lead to activity limitations (Levine et al., 2012). Cognitive deficits may also occur post stoke and can involve problems with memory recall, attention, orientation and language. Consequently, this makes activity performance difficult (Tatemichi et al., 1994).

Stroke Deficits and Recovery

Examples of areas where activity may be limited after stroke include: selfcare – eating, dressing, grooming, toileting, bathing; sphincter control – bladder and bowel management; transfers – from bed to chair, lying to sitting; and, locomotion – walking, walking up and down the stairs (Granger et al., 1993; Gowland et al., 1995). Of these, recovery is noted sooner in eating, grooming, and bowel management while recovery in transfers, stair climbing, and walking occur later (Granger et al., 1993; Grimby et al., 1996). Activity limitations are assessed using tools that assess activity or function such as the Functional Independent Measure (FIM), Barthel Index, or the Chedoke McMaster Stroke Assessment Activity Inventory (CMSA-AI) (Granger et al., 1993; Gowland et al., 1995).

The degree of the neurological deficits is determined by the type of stroke, site of lesion and the extent of stroke severity, these in turn are predictors of recovery (Knecht et al., 2011). While there is no exact way of defining recovery, it may be assessed in terms of: body structure and function, activity and participation. Per the World Health Organization (WHO) International Classification of Functioning, Disability and Health (ICF) framework definitions: "body functions are physiological functions of body systems (including psychological functions). Body structures are anatomical parts of the body such as organs, limbs and their components. Impairments are problems in body function or structure such as a significant deviation or loss" (WHO, 2001, p.12). "Activity is the execution of a task or action by an individual and activity

limitation is the difficulties an individual may have in executing activities. Participation is the involvement in a life situation and participation restrictions are problems an individual may experience in involvement in life situations" (WHO, 2001, p.14). Included in this framework are contextual factors which constitutes personal and environmental factors. The latter "make up the physical, social and attitudinal environment in which people live and conduct their lives" (WHO, 2001).

For stroke survivors, impairments are the neurological deficits associated with stroke and functional/activity limitations are associated with these neurological deficits, which in turn may restrict participation (Duncan, Min Lai & Keighley, 2000). The stroke recovery process is divided into two phases: neurological recovery and functional recovery. Neurological recovery "is defined as recovery of neurological impairments and is often the result of brain recovery/reorganization" and functional recovery "is defined as improvement in mobility and activities of daily living" (Teasell and McClure., 2017, p. 3). The former is usually targeted in the early stage of rehabilitation and the latter commences from the early stage to the entire duration of the rehabilitation process (Lee et al., 2015).

Stroke rehabilitation begins during the acute phase of hospitalization, often leading to a tailored inpatient or outpatient interdisciplinary programme, and continues after discharge (Gresham et al., 1996). What remains debatable, however, is the actual time to commence rehabilitation. It is generally acceptable to start as early as 3-30 days after stroke, provided the patient is medically stable (Maulden et al., 2005). Also, Dobkin and Dorsch (2013) have similarly documented that, worldwide, rehabilitation commences within the first 6 weeks post stroke. Likewise, studies have shown that early and intensive rehabilitation is beneficial to patients (Gresham et al., 1996; Horn et al., 2005). These reports were corroborated by the

Canadian stroke practice guidelines (2015) which records that rehabilitation typically begins from 7 – 25 days post stroke with an average of 12 days. Again, early and intensive therapy was reported as advantageous along with the impact of taking an interdisciplinary team approach. Also, incorporating patients' goals into rehabilitation was recognized as a significant factor in achieving better outcomes post stroke.

However, other factors such as cognitive impairment, depression, social isolation and other social and psychological factors can affect recovery rates regardless of how soon rehabilitation begins (Gadidi et al., 2011). For example, Stuart-Shor et al. (2003) reported that older adult stroke survivors, without the support of family and friends, tended to stay in the hospital longer compared to the other cohort of older adults who were also stroke survivors but had support from family and friends. The latter spent not only less time in the hospital but also experienced an increased rate of recovery.

Psychological Effects of Stroke

Depression is one of the leading psychological problems affecting at least 30 percent of stroke survivors. Risk factors such as history of pre-stroke depression, stroke severity, activity limitation, severe cognitive impairment and lack of social support have been frequently associated with Post Stroke Depression (PSD) (Volz et al., 2016). PSD can be progressive even one-year post stroke, delaying recovery. Therefore, early detection and management is key to optimum recovery and improvement of quality of life (QoL) (Narushima and Robinson, 2002).

Cognitive impairment is not an unusual occurrence following a stroke (das Nair et al., 2016) and because it is associated with memory, orientation, language, and attention, stroke survivors with cognitive impairment often have higher functional disability and difficulties with Activities of Daily Living (ADL) performance (Tatemichi et al., 1994). A study by Hackett and

Anderson (2005) showed that cognitive impairment is associated with depression, stroke severity and functional ability, thereby delaying overall improvement and inadvertently promoting activity limitation.

Predictors and Perception of Recovery Post Stroke

Several predictors of recovery post stroke have been documented in the literature, with ADL admission score among them; others include: age, previous stroke, severity of limb paresis, balance in sitting, urinary and bowel management, and previous disability (Jongbloed, 1986; Kwakkel et al., 1996; Tilling et al., 2001). Despite these predictors of recovery, patients may interpret their recovery post stroke differently. A study by Mckevitt and colleagues (2001) documented that, although patients had discernible recovery in function, they did not think that they had recovered. Similarly, in a study by Gadidi et al. (2011), stroke survivors with a Barthel index score of >90, which indicates functional independence, still reported that they had not recovered from stroke. On the other hand, post stroke survivors with onset of stroke ranging from 6 weeks to 13 months perceived that they had recovered if they could perform functional activities such as dressing, bathing, and walking (Jones et al., 2008).

Furthermore, Chong and colleagues (2006) explored gender differences in self-report of recovery after stroke by evaluating the relationship between the Barthel Index Activities of Daily Living scores and self-reported recovery outcomes of stroke survivors. Two recovery questions were asked: "Since your stroke, do you think you have made a complete recovery?" and "Do you feel you need help from another person for everyday activities?" Forty-five percent reported that they were not fully recovered and required help, eight percent reported that they were fully recovered and required help, 23 percent reported no recovery and required no help, and 24 percent reported that they were fully recovered and required no help. The self-perceived

response of being fully recovered and requiring no help was associated with higher ADL scores. Moreover, the response of not requiring help had a stronger association with greater ADL scores than the fully recovered response. Also, there was a gender difference in the responses with more female respondents in the "not fully recovered and need help" category. Depression was associated with need for help, suggesting that post stroke, in the ratio of 2:1 women more than men have depression.

Just as patients' view of recovery may differ from observed measures, the clinician's perspective could also vary from that of their patients. Gowland, Huijbregts et al. (1993) and Gowland et al. (1995) documented that the CMSA Minimal Clinically Important Difference (MCID), as determined by the therapist and the patient was 7 and 8 points respectively, indicating a similarity between what the patients and the therapists perceived as an important change.

Additionally, Gavin and colleagues (2009) explored the experiences of stroke survivors and their physiotherapists. The participants included 10 patients: four females and six males with a mean age of 73 years, with post stroke duration of about 2 months, and 10 physiotherapists with experience in stroke rehabilitation were interviewed to gain insight into their experiences post stroke. The patients reported walking, lower extremity activities, and family support as factors that influence their recovery experience and the physiotherapists reported age, motivation, cognitive impairment, and family support as factors.

Clinicians usually focus on assessing the impairments and activity limitations associated with stroke and quality of life is often not considered a measurable outcome, hence patients post stroke are not usually asked to assess their quality of life (Duncan et al., 2000). However, the use of Patient Reported Outcome Measures (PROM) are currently on the rise because they provide

insight about a person's opinion of health status and quality of life (Torkia et al., 2016). PROMs are "measurement instruments that patients complete to provide information on aspects of their health status that are relevant to their quality of life, including symptoms, functionality and physical, mental and social health". The information is provided solely by the client and is reflective of the effectiveness of treatment. Also, it can facilitate clinician – client interactions about plan of care. The instruments are either generic or specific to a health condition (Canadian Institute of Health Information, 2015).

Moreover, Steenhuisen (2016) examined associations between the SIS global perception of recovery as a self-perceived measure and 6-minute walk test (6MWT), Timed Up and Go test, Motricity Index, Hospital Anxiety Depression Scale (HADS) and Fatigue Severity Scale observed measures of 250 stroke patients in a stroke rehabilitation centre to determine factors related to self-perceived overall recovery of stroke survivors. The following were significantly associated with SIS global perception of recovery of the patients: walking ability, depression and anxiety, fatigue, and peripheral muscle strength. Using the MCID of both measures, 154 patients with improved walking ability in the observed measure (6MWT) also had increases in their global perception of recovery scores with a significant association.

Following stroke and its associated ambulatory deficits, participation and functioning in physical activity are greatly reduced, adversely affecting the quality of life of stroke survivors; for this reason, it is vital to measure quality of life (Min and Min, 2015). Per the Wilson and Cleary (1995) model, "Quality of life" (QoL) is "subjective and relative to everyone" and consists of "biological and physiological variables, symptom status (emotional, cognitive and physical), functional status (physical, social and psychological), general health perceptions and overall quality of life."

Perception of recovery, as a component of health-related quality of life (HRQoL), is often measured using a HRQoL scale in the form of a Visual Analogue Scale (VAS) or questionnaire. HRQoL involves an individual's perception of physical and mental health and how it relates to one's health condition, level of function and strength of social support (Centre for Disease Control and Prevention (2016). The SIS is a HRQoL measure of which recovery, that is, the Global Perception of Recovery Scale is one component. Also, perceived recovery is defined as "the perception an individual has about the magnitude of his/her recovery post stroke" (Torkia et al., 2016, p.1065). Wolf and Koster (2013) used the SIS Global Perception of Recovery Scale and documented that perceived recovery was associated with physical activity participation and implications for rehabilitation suggesting that perceived recovery be considered by clinicians. Additionally, perception of recovery can be explored by qualitative means through an interview (Hartigan et al., 2011).

An example of a tool used to measure an individual's perception of recovery is the Global Perception of Recovery Scale (a Visual Analogue Scale {VAS}) within the Stroke Impact Scale. The SIS global perception of recovery has been used frequently in intervention studies as a self-perceived measure of recovery (Askim et al., 2010; Chua et al., 2016; Combs et al., 2010; Macko, 2008; Marsden et al., 2010; Reisman et al., 2010; Sandberg et al., 2016; Shaughnessy et al., 2012; Wang et al., 2015). In the SIS Global Perception of Recovery Scale, a difference of 10 – 15 points is estimated to be a clinically important change (Duncan et al., 1999).

Although there are a small number of studies that have assessed self-perceived recovery post stroke, this study will be unique in that it will incorporate a multiple methods approach. Also, no study has used the combination of SIS global perception of recovery scale, CMSA-AI,

and FIM to quantitatively assess stroke recovery and in the same study embed both the perspectives of the patients and their physiotherapist, making it a union of measures and voices.

Purpose of Study

This study addressed the perception of recovery of stroke survivors participating in an in-patient rehabilitation program and their physiotherapists. A multiple methods design was used in which the data were collected using more than one method: chart review to obtain information on the FIM and CMSA-AI, physiotherapists' structured questionnaire and patient in-person structured questionnaire related to recovery, as well as assessing the SIS recovery, HADS and Montreal Cognitive Assessment (MoCA) with the participants.

Objectives

The specific objectives were as follows:

1. *To measure the perception of recovery of adult stroke patients using the global perception of recovery scale (0-100) of the SIS and its association with the CMSA-AI at discharge from a stroke rehabilitation unit.*

2. *To determine whether the CMSA-AI scores predict perception of recovery.*

3. *To measure the perception of recovery of adult stroke patients using the global perception of recovery scale of the SIS and its association with the Functional Independence Measure (FIM) at discharge from a stroke rehabilitation.*

4. *To determine whether the FIM scores predict perception of recovery.*

5. *To determine the perception of recovery of the therapist relative to the patients using the global perception of recovery scale of the SIS.*

6. *To examine factors that contribute to recovery post stroke from the perspective of stroke survivors and physiotherapists and their alignment with the ICF.*

7. *To examine how stroke survivors' and physiotherapists' perspectives of recovery post stroke align with the content of outcome measures used to assess recovery (CMSA-AI, FIM, MoCA, and HADS).*

CHAPTER 2

METHODS

Setting and Inclusion Criteria

Adult stroke patients who were one week from discharge from an in-patient stroke

rehabilitation unit (or transferred to a local hospital with the intention of returning home), who

had a stroke with hemiparesis and who did not have significant cognitive impairment were

included in the study. Only those patients who were able to understand and answer questions and

provide informed consent (as determined by rehabilitation staff interactions) were included in the

study.

Exclusion Criterion

Patients to be discharged to a nursing home.

Study Design

A multiple methods design was used. It involves using more than two methods which

examine different aspects of the same research questions where the results are then triangulated

to create a complete entity (Esteves and Pastor, 2004).

Data on all participants with stroke included information from observed measures from

chart review (FIM, CMSA – AI) and self-reported measures from interview (HADS, MoCA and

SIS recovery). Some patients also had a short interview and physiotherapists answered two

written questions regarding the interpretation of recovery from stroke (Brewer and Hunter,

2006).

Recruitment Methods

　Recruitment methods included enlisting the aid of the physiotherapists in the unit to identify and screen potential candidates who were one week away from being discharged. The physiotherapists spoke to each patient to determine if they were interested in participating. Once identified, the researcher interacted with potential participants and explained the purpose of the study, what it involved, and obtained informed consent from willing participants. The consent form contained information about the project in simple language and the choice of opting out at any point. The participants who were also interviewed were recruited based on their willingness to participate.

Sample Size Calculation

　A-priori sample size calculation for multiple regression has an anticipated effect size (f^2) of 0.35, desired statistical power level of 0.8 with the number of predictors being 3 and a probability level of 0.05, the minimum sample size is 36. The anticipated effect size was derived from Cohen's formula: $f^2 = R^2/1 - R^2$ (Soper, 2017).

　Patients who agreed to participate in the study were interviewed until there was no new information (Walker, 2012). However, rather than participating in an interview, the physiotherapists gave short answers to two written questions due to time constraints.

Ethics

　Ethics approval was obtained from the Health Research Ethics Board (HREB): HS21206(H2017:348)

Data Collection

Demographic data was collected by interview and chart review. The perception of recovery, a component of health-related quality of life of participants and their physiotherapists, was obtained using the global perception of recovery scale of the SIS (Duncan et al., 1999) prior to discharge. A questionnaire regarding perception of recovery was administered to the physiotherapists and an in-person structured interview was conducted with the patients. The MoCA and HADS scores (Dunbar et al., 2000; Nassarudine, 2005) were collected via patient interview, as well. The CMSA-AI (Gowland, Stratford, et al., 1993) and the FIM (Granger et al., 1993) scores from admission and discharge (routinely measured during rehabilitation) were collected from the chart.

Patient In-Person Questionnaire

The patients in this study were asked two open-ended questions:

1. What contributed to your recovery experience post stroke?

2. What does recovery mean to you?

These questions were generated to identify factors that influence the patients' perspective of their recovery post-stroke. The questions were general recovery questions and were not specifically motor related. The patients' interviews were conducted by the researcher at the stroke rehabilitation unit at the location of the clients' choosing (for example, the clients' room, the gymnasium and the cafeteria) and were approximately 10 minutes long and audio recorded.

Physiotherapist Questionnaire

In recognition of the physiotherapists' busy schedules, they were asked to give a short-written response. The questions were on a form with the responses hand written on the form and

the researcher notified the therapists via telephone, email and in-person when onsite to collect the forms at the department.

The two questions asked that were related to the patient's general recovery were:

1. What contributed to the patient's recovery post stroke?

2. What does the patient's recovery mean to you?

The patient in-person questionnaire and physiotherapist questionnaire data were kept in a file and collected in person from the department concurrently with the chart review and outcome measure data. The former enhanced the interpretation of the latter and examined stroke survivors and their physiotherapists' perceptions of recovery post stroke.

Outcome Measures

The Stroke Impact Scale (SIS) version 3.0

SIS is a stroke-specific, self-report, health status measure. It has 59 items and 8 domains which assess strength, hand function, activities of daily living/instrumental activities of daily living (ADL/IADL), mobility, communication, emotion, memory and thinking, and participation. The last item on the SIS is the global perception of recovery scale – a VAS which measures the percentage of recovery of patients ranging from $0 - 100$, the higher the percentage the better the recovery. The SIS can be used both in clinical and research settings (Duncan et al., 1999).

The psychometric properties of the SIS have been well documented in literature (Carod-Artal et al., 2008; Duncan et al., 1999; Duncan et al., 2003; Edwards and O'Connell, 2003). Sensitivity to change for most SIS domains, including the global perception of recovery, was suggested to be within the range of 10-15 points to be considered minimally clinically important (Duncan et al., 1999).

The global perception of recovery scale correlated significantly with the SIS composite physical domain (0.43) – a combination of all the physical related domains which includes hand function, strength, ADL/IADL and mobility domains and the discriminant validity across three levels of stroke severity (Carod-Artal et al., 2008). Also, the SIS domains and global rating of recovery had good correlations ranging from 0.53 - 0.63 (Duncan et al., 1999).

Chedoke-McMaster Stroke Assessment (CMSA)

The Chedoke-McMaster Stroke Assessment is a performance-based measure that consists of two inventories: the impairment inventory and the activity inventory. The impairment inventory classifies clients based on stages of motor recovery and addresses 6 domains; the arm, the hand, the leg, the foot, postural control, and shoulder pain. All except shoulder pain is measured on a 7-point scale of motor recovery (1 = most impairment to 7 = no impairment). Shoulder pain is measured in accordance with pain severity (1 = most severe to 7 = no pain) (Gowland et al., 1995).

The activity inventory (formerly known as the disability inventory) measures the degree of physical function and is made up of two indices: the gross motor function index and the walking index. The gross motor function index contains 10 items measuring bed mobility, sitting, standing and transfers, and the walking index has 5 items assessing walking indoors, outdoors, and taking the stairs and gait efficiency. Items 1-14 are scored on a 7-point scale (7 = complete independence; 6 = modified independence; 5 = supervision; 4 = minimal assist; 3 = moderate assist; 2 = maximal assist; 1 = total assist), with the exception of item 15 which assesses gait efficiency and ambulation. To score this item, a 2-minute walk test is carried out and a bonus of 2 points awarded if the distance walked in meters within the timeframe corresponds to the age stipulated. The inventory has a maximum score of 100, 70 from the gross

motor index and 30 from the walking index (Gowland et al., 1995). CMSA has excellent psychometric properties as established in the literature.

Reliability. Intrarater reliability was 0.93-0.98 and interrater reliability was 0.85-0.96 (Gowland, Stanford, et al., 1993) for Impairment Inventory and 0.99 (Gowland et al., 1995) for Activity Inventory. Test-retest reliability for the total scores ranged from 0.95-0.99 (Gowland et al, 1995).

Validity.

Concurrent validity. The total score of the impairment inventory correlates with the Fugl-Meyer Test ($r = 0.95$, $p < 0.001$), and the activity inventory with the FIM ($r = 0.79$, $p < 0.05$) (Gowland, Stranford, et al., 1993; Gowland et al., 1995).

Construct validity. Some items on the Impairment inventory of the CMSA – shoulder, postural control, leg and foot, arm and hand – were compared with certain items on the Fugl-Meyer – upper limb, balance, balance and shoulder, elbow, forearm, wrist and hand; the correlations were 0.76, 0.84, 0.84, 0.95, respectively. Likewise, the walking index of the CMSA correlated with locomotion of the FIM ($r=0.85$) and gross motor index correlated with mobility ($r=0.99$) of the FIM (Gowland, Standford, et al., 1993).

Responsiveness. Although the CMSA does not measure all of the same items as the FIM, it was found to be more responsive to change than the FIM and 1.92 times greater in relative efficiency than the FIM (Gowland, Stanford, et al., 1993). MCID, the smallest difference in a score perceived as meaningful, was 8 points when scored by the client and 7 points by the healthcare professional (Barclay-Goddard, 2000; Gowland, Huijbregts, et al., 1993; Gowland et al., 1995; Huijbregts et al., 1993; Huijbregts et al., 2000).

Functional Independence Measure (FIM)

The FIM is an instrument used to measure patients' capability in performing ADL with varying amounts of assistance relative to their disability; the higher the disability the higher the assistance required to perform ADL. The FIM consists of two domains with 18 items, the motor domain called FIM-motor with 13 items and the cognitive domain called FIM-cognitive with 5 items. The FIM-motor consists of items under self-care, sphincter control, transfers and locomotion while the FIM-cognitive consists of items under communication and social cognition. The FIM is scored on a 7-point scale indicative of the amount of assistance for ADL performance (1= total dependence in all areas and 7 = total independence in all areas). Summative scores range from 18 to 126, where 18 signifies total dependence and 126 signifies total independence; the subscales scores for motor-FIM and cognitive-FIM can also be calculated (Granger et al., 1993).

The FIM has been correlated with the CMSA-AI. The gross motor index of the CMSA-AI correlated highly with mobility on the FIM (r=0.90, p<0.001), the walking index of the CMSA-AI also correlated excellently with the locomotion sub-score of the FIM (r=0.85, p<0.01), and the total score of the CMSA-AI has high correlation with the total score of FIM (r=0.79, p<0.05), thus establishing the concurrent validity of the FIM and CMSA-AI (Gowland et al., 1995).

Reliability. In a study by Hsueh and colleagues (2002) on post-stroke in-patients in a rehabilitation facility, the FIM motor subscale had excellent internal consistency of Cronbach's alpha 0.88 on admission and 0.91 on discharge. Moreover, the reliability of the FIM is generally high; FIM total (ICC=0.98), FIM motor (ICC= 0.95), and FIM cognitive (ICC=0.89) (Hobart et al., 2001).

Responsiveness. The FIM motor was compared to both the 10 item and 5 item Barthel Index and was found to be highly responsive with Standardized Response Mean (SRM) of 1.2 in adult inpatient stroke survivors in a rehabilitation facility (Hsueh et al., 2002). Additionally, the FIM was compared with the CMSA-AI and the latter was found to be 1.92 times more responsive (Gowland et al., 1995).

When using the FIM in a stroke population, Beninato et al. (2006) established the MCID for the FIM as 22, 17 and 3 for FIM total, FIM motor and FIM cognitive, respectively.

Hospital Anxiety and Depression Scale (HADS)

A tool used in the screening of depression and anxiety, it can typically be used in a variety of settings and can be completed by the client within 5 minutes. HADS can be used with populations other than stroke survivors and has two subscales: anxiety and depression. There are 14 items in total—7 items address depression and another 7 anxiety—and each item is scored on a 4-point scale (0- no, not at all to 3- yes definitely); higher scores imply higher distress. The summative score of each subscale are denoted as HADS-A and HADS-D and the total score as HADS-T (Dunbar et al., 2000). Originally, for each subscale, a score of 0-7 is normal, 8-10 is borderline abnormal, and 11-21 is abnormal (Zigmond & Snaith, 1983). However, a study by Aben and associates (2002) on a sample of stroke population recommended a cut-off point of 11 on HADS-T and 8 on HADS-D.

Reliability. HADS has an excellent internal consistency with a Cronbach alpha 0.85 (Aben et al., 2002). Also, Johnston and colleagues (2000) documented an adequate to excellent internal consistency (Cronbach alpha 0.79 and 0.89) of the overall HADS 1-month post stroke and 6 months, respectively.

Validity.

Concurrent validity. Bjelland et al. (2002) documented excellent correlation (r = 0.61 to 0.83) between the HADS and Beck Depression Inventory (BDI), adequate to excellent (r = 0.50 to 0.68) with the General Health Questionnaire, excellent (r = 0.69 to 0.75) with the Clinical Anxiety Scale, the Spielberger's State-Trait Anxiety Inventory (r = 0.64-0.81), and the Montgomery Asberg Depression Rating Scale (0.62 – 081). They also found adequate to excellent (r = 0.49 to 0.73) correlations between the HADS and the Symptom Checklist-90 Scale and adequate correlations (r = 0.34 - 0.44) between the HADS-A and the Hamilton Anxiety Rating Scale. Another study by Clark and Steer (1994), also documented that excellent correlation exists (r=0.73) between HADS and the cognitive subscale of BDI. Likewise, Aben and colleagues (2002) reported the mean correlation between the anxiety and depression subscales to be excellent (r=0.67). Sensitivity and specificity was determined and found to be excellent in detecting changes in patients with depression and anxiety (Aben et al., 2002; O'Rourke et al., 1998).

Montreal Cognitive Assessment (MoCA)

MoCA is a screening tool used to detect cognitive impairment, can be used with stroke patients, and takes about 15 minutes to administer. MoCA domains involve attention and concentration, executive functions, memory, language, visuospatial skills, conceptual thinking, calculations, and orientation. It includes tasks such as drawing a line from a letter to a number, drawing a cube, drawing a clock and setting it to 11:10, identifying animals, repeating words, reading lists of letters, subtraction, recall of words and orientation in terms of time and place (Nasreddine et al. 2005).

Reliability. The MoCA has an internal consistency of Cronbach's alpha 0.83 and test-retest reliability of (r = 0.92). The mean change score between two evaluations was 0.9 points (Nasreddine et al., 2005).

Validity.

Concurrent validity. The correlation was excellent (r=0.87) between MoCA and the Mini Mental State Examination (MMSE) (Nasreddine et al. 2005).

Responsiveness. Koski, Xie and Finch (2009) determined that in addition to the MoCA being used as a screening tool, it can equally be used to measure a client's level of cognition and monitor alterations over a period.

Sensitivity and Specificity. Four studies (Dong et al., 2010; Luis, Keegan and Mullan, 2009; Nasreddine et al., 2005; Smith, Gildeh and Holmes, 2007) determined that the MoCA is more sensitive than the Mini-Mental State Examination (MMSE) in detecting different levels of cognitive ability.

Analyses

Descriptive analysis was used to report the demographics of the participants using SPSS version. 24. The statistics included mean, standard deviation, range, frequencies and percentages.

The inferential analysis included: Pearson moment correlation coefficient to determine objective 1, 3, 5 using linear correlation between the scores of the global perception of recovery of the SIS and the CMSA-AI – the admission, discharge and change score was analyzed as well as the gross motor function index and the walking index subscale. Global perception of recovery of the SIS and FIM – the admission, discharge and change score were correlated with the FIM motor and FIM cognitive subscales. The global perception of recovery of the SIS (patient) and global perception of recovery of the SIS (therapist) were also correlated.

Univariate linear regression analysis involved global perception of recovery scale as outcome, components of the CMSA-AI and FIM as explanatory variables. Multiple linear regression analysis; model 1 – Global perception of recovery scale as outcome, with CMSA-AI as explanatory variable, for objective 2 – to determine whether CMSA-AI scores predict perception of recovery. Model 2 – Global perception of recovery as outcome, with FIM as explanatory variable, for objective 4 – to determine whether FIM scores predict perception of recovery. Cognition (MoCA score) and depression (HADS score) was used as control variables for all models. Assumptions of normality were tested using normality probability plot and histogram.

Transcripts were anonymized and transcribed verbatim. A representational text analysis method was used where categories are assigned to portions of the text from the patients' transcriptions and physiotherapists' short answers. The categories created were further combined

to form groupings called 'category groupings' and represent a broad overview of the phenomenon (Popping, 2015).

Outcome Measures Category Grouping

The items on CMSA-AI, FIM, HADS and MoCA were grouped into categories for each outcome measure. The tools were compared to the category groupings from the patients' and physiotherapists' data. This explains whether the tools support the responses from the patients and physiotherapists. In essence, a combination of two approaches was used in the development of the categories. First, categories were created based on the words of the patients and the physiotherapists and secondly, categories were based on the outcome measures and ICF (Popping, 2015). Figure 1 summarizes the analyses.

Figure 1. Analyses
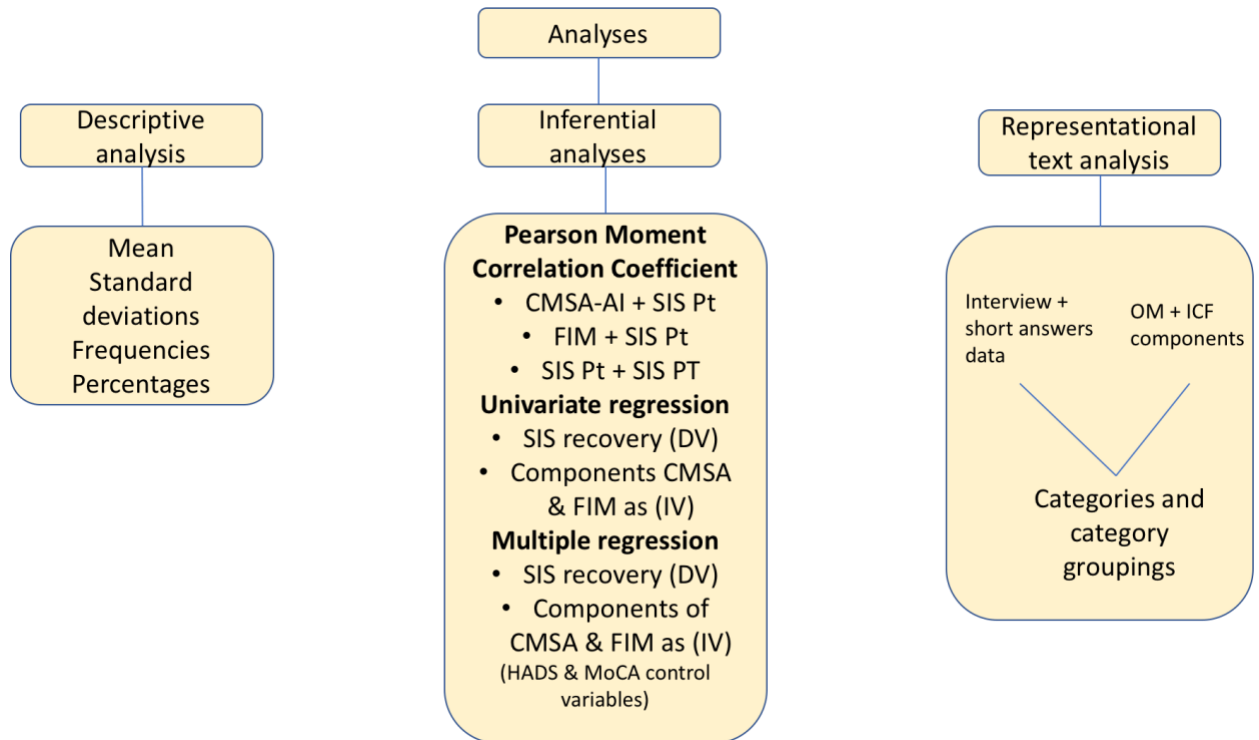
Note: CMSA -AI = Chedoke McMaster Stroke Assessment Activity Inventory; FIM = Functional Independence Measure; HADS = Hospital Anxiety Depression Scale; MoCA = Montreal Cognitive Assessment; SIS PT = Stroke Impact Scale (global perception of recovery score) physiotherapists; SIS Pt = Stroke Impact Scale (global perception of recovery score) patients; DV = Dependent variable; IV = Independent variable; OM = Outcome measures

CHAPTER 3

RESULTS

Participants

The Patients

A total of 33 participants were asked to participate in this study. One participant did not want to participate and declined, and another had consented, but it was later determined that he no longer fit the inclusion criteria because he was going to a nursing home and was excluded (Figure1). Thirty-one patients participated in the study who had a stroke within the previous four months and stayed in the rehabilitation hospital for 6-8 weeks. Age ranged from 42 - 86 years and the mean age was 66.55 years (10.68). There were 20 (65%) male participants; 21 (68 %) of the participants had an ischemic stroke, 9 (29 %) had hemorrhagic strokes and 1 (3 %) had cerebellar stroke. Sixteen (52%) had left side hemiparesis, 14 (45%) had right side hemiparesis, and 1 (3%) had bilateral paresis.

Two patients (7%) had prior TIA and 5 (16%) patients had a previous stroke with a minimum of 5 years and a maximum of 10 years between the first and second stroke. The participants had 3 common comorbidities; ranked from highest to lowest were hypertension (29%), high cholesterol (16%) and diabetes (10%); a combination of hypertension and diabetes (35%); or, hypertension, diabetes and high cholesterol (10%). Along with these predominant comorbidities, participants also had cardiac conditions, arthritis, and asthma. The majority of the participants

reported that they lived with family and were married 19 (61%), with others living alone with varying marital statuses 12 (39%) (Table 1).

Participants screened by physiotherapists:
- N = 33

Participants screened by researcher:
- N = 33

Excluded N= 2
- One declined after screening
- One did not meet inclusion criteria

Participants included and analyzed:
- N = 31

Participants interviewed:
- N= 19
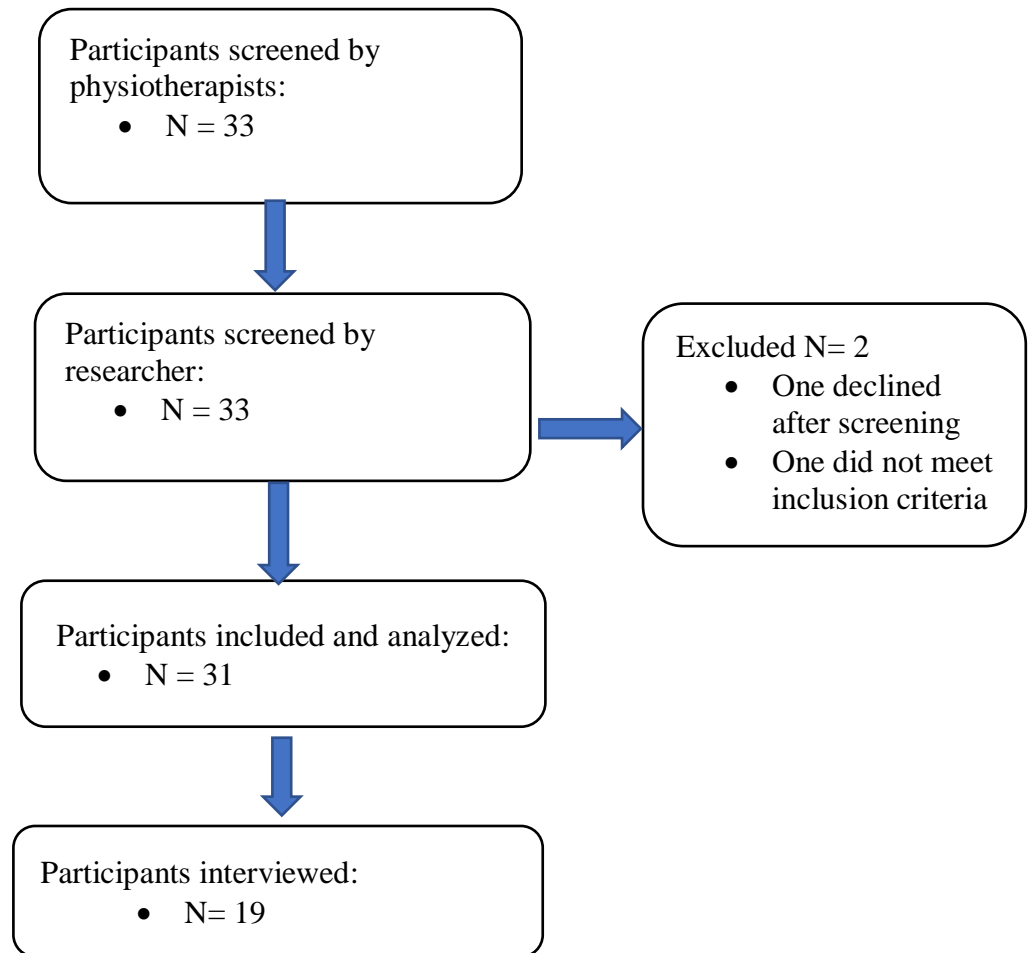
Figure 2. Flow chart of Participants

The Physiotherapists

A total of 6 physiotherapists, including three males (50%) with a mean age of 34.77 (3.98) years participated in the study. The number of years practicing as a physiotherapist ranged from 6.5 – 22 years with an average of 9.59 (4.11) years; most of the physiotherapists had over 10-years of experience working in a stroke rehabilitation unit (Table 1).

Table 1

Social Demographics of Participants

	Patient	Physiotherapist
Number	31	6
Gender n (%)	Male n – 22 (65)	Male n – 3 (50)
	Female n – 9 (35)	Female n – 3 (50)
Age (years) mean (SD)	66.55 (10.68)	34.77 (3.98)
Type of stroke n (%)	Ischemic – 21(68)	•
	Hemorrhagic - 9 (29)	
	Cerebellar – 1 (3)	
		•
Affected side n (%)	Left side hemiparesis 16 (52)	
	Right side hemiparesis14(45)	
	Bilateral– 1 (3)	
		•
Time since stroke (days) mean (SD)	62.03 (25.57)	
Range (days)	28 – 134	
Time spent in rehab (days) mean (SD)	43.84 (17.33)	•
Range (days)	19 – 87	
		•
Common comorbid conditions n (%)	HTN – 9 (29)	
	DM – 3 (10)	
	High Cholesterol – 5 (16)	
	HTN & DM – 11 (35)	
	High cholesterol, DM & HTN – 3 (10)	
Marital status n (%)	Single – 3 (10)	•
	Married – 19 (61)	
	Divorced – 4 (13)	
	Separated – 1(3)	
	Widowed – 3 (10)	
	Common law – 1 (3)	
Number of years as PT	•	6.5 - 22 years
Mean (SD)		9.59 (4.11)
Number of years working in stroke rehabilitation; mean (SD)	•	3 months – 19 years
		6.53 (4.13)

Note: LE – Lower Extremity; PT – Physiotherapist; HTN = Hypertension, DM = Diabetes, SD= Standard deviation

There were primarily three physiotherapists working on the stroke unit, however, while therapist 1 was on vacation, therapist 6 took over the caseload; therapist 2 changed jobs mid-way through the study and therapist 5 took over the caseload towards the end of the study; a new

therapist (4) joined towards the end of the study. The number of patients assessed by each therapist is shown on table 2.

Table 2

Number of patients to therapist

Therapist	1	2	3	4	5	6
Pts assessed	11	3	13	2	1	1

Note: Pt = patients; 31 patients were assessed by 6 physiotherapists

The means, standard deviation, and range of all the outcome measures are illustrated in Table 3. Two participants had HADS depression scores within the range of $11 - 21$ which is an abnormal score implying depression. Their physiatrist was notified for further assessment.

Table 3

Means of all Outcome Measures

Variables	Means(SD)	Minimum	Maximum
FIM admission	73.23 (21.03)	28	112
FIM discharge	101.16 (19.90)	41	125
FIM change	27.94 (13.21)	4	53
FIM motor change	26.52 (11.90)	3	51
FIM cognition change	2.35 (3.52)	-2	14
CMSA – AI admission	56.77 (21.82)	17	97
CMSA – AI discharge	80.35 (19.54)	25	100
CMSA – AI change	23.58 (13.26)	2	54
CMSA – AI WF	9.65 (6.06)	0	22
CMSA – AI GMF	13.94 (10.10)	0	42
SIS Pt	71.45 (14.21)	40	100
SIS PT	67.90 (18.29)	20	90
HADS anxiety	5.23 (3.48)	0	16
HADS depression	5.06 (3.10)	0	11
MoCA	22.89 (5.69)	10	30

Note: CMSA -AI = Chedoke McMaster Stroke Assessment Activity Inventory; WF = Walking Function; GMF = Gross Motor Function; FIM = Functional Independence Measure; HADS = Hospital Anxiety Depression Scale; MoCA = Montreal Cognitive Assessment; SIS PT = Stroke Impact Scale (global perception of recovery score) physiotherapists; SIS Pt = Stroke Impact Scale (global perception of recovery score) patients

<p style="text-align: center;">**Findings**</p>

The normality of all the variables was assessed using histograms and scatterplots and normal probability (p-p) plots. All the variables were normal, therefore, a correlation analysis using parametric tests could be performed.

Correlation Analyses – Objectives 1, 3, 5

Objective 1. *To measure the perception of recovery of adult stroke patients using the global perception of recovery scale (0-100) from the SIS and its association with the CMSA-AI at discharge from a stroke rehabilitation unit.*

A Pearson moment correlation coefficient was computed to determine whether the global perception of recovery score of the SIS is associated with the admission, discharge, and change scores of the CMSA-AI. There was no statistically significant association between the global perception of recovery score of the SIS with the admission ($r = 0.23$), discharge ($r = 0.20$), and change scores of the CMSA-AI ($r = -0.08$). Also, there was no statistically significant association between the global perception of recovery score of the SIS with the gross motor function index score and the walking index score of the CMSA-AI (Table 4).

Table 4

Pearson Product Moment Correlations Between CMSA-AI Scores And Patient SIS Score

CMSA-AI Score	SIS Score (Patient)
CMSA-AI admission	0.23
CMSA-AI discharge	0.20
CMSA-AI change score	-0.08
CMSA-AI gross motor index admission	0.28
CMSA-AI gross motor index discharge	0.22
CMSA-AI gross motor index change score	-0.17
CMSA-AI walking index admission	0.06
CMSA-AI walking index discharge	0.13
CMSA-AI walking index change score	0.09

Note: N=31; All not significant
CMSA-AI – Chedoke McMaster Stroke Assessment Activity Inventory
SIS – Stroke Impact Scale (global perception of recovery scale)

Objective 3. *To measure the perception of recovery of adult stroke patients using the global perception of recovery scale (0-100) from the SIS and its association with the FIM at discharge from a stroke rehabilitation unit.*

A Pearson moment correlation coefficient was computed to determine whether the global perception of recovery score of the SIS is associated with the admission, discharge, and change scores of the FIM. There was a statistically significant association between the global perception of recovery score of the SIS and the FIM total change score ($r = 0.37$; $p = 0.039$) as well as FIM motor change score ($r = 0.41$; $p = 0.019$). However, there were no statistically significant associations between all other subscales of the FIM and the SIS global perception of recovery (Table 5).

Table 5
Pearson Product Moment Correlations Between FIM Scores and Patient SIS Score

FIM Scores	SIS Score (Patient)
FIM admission	-0.01
FIM discharge	0.23
FIM change score	*0.37
FIM motor admission	-0.05
FIM motor discharge	0.21
FIM motor change score	*0.41
FIM cognition admission	-0.05
FIM cognition discharge	0.17
FIM cognition change score	0.25

Note: N=31; *P< 0.05; Significant (2-tailed);
FIM – Functional Independence Measure
SIS – Stroke Impact Scale (global perception of recovery scale)

Objective 5. *To determine the perception of recovery of the therapist relative to the patient using the global perception of recovery scale (0-100) within the Stroke Impact Scale (SIS).*

A Pearson product moment correlation coefficient was used to assess the relationship between the global perception of recovery of the patients and the global perception of recovery of the physiotherapists.

The mean and (SD) for the SIS patient (Pt) and SIS physiotherapist (PT) are 71.45 (14.21) and 67.90 (18.29) respectively; details of the descriptive statistics for both groups are shown in Table 6.

Table 6

Descriptive Statistics Stroke Impact Scale PT and Pt

	Patient (Pt)	Physiotherapist (PT)
Number of responses	31	31
Mean (SD)	71.45 (14.21)	67.90 (18.29)
Minimum	40	20
Maximum	100	90

Note: 31 Physiotherapist responses from 6 Physiotherapists

Although the mean of both groups appears to be close, their frequency bar charts show variation in the spread of the data of both groups (Figure 3).
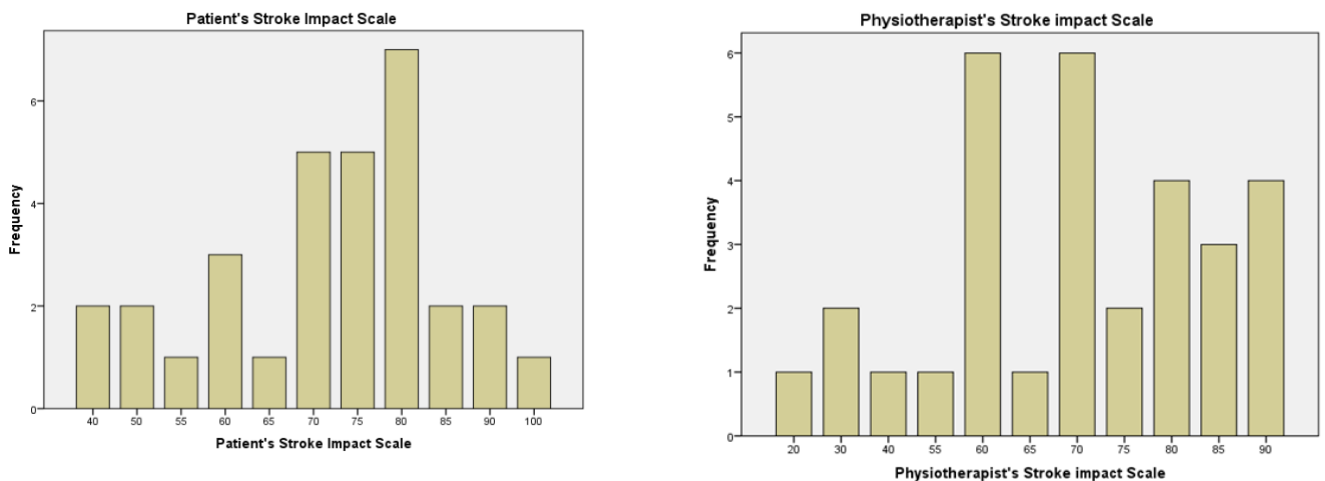
Figure 3: Frequency bar chart for SIS PT and SIS Pt

Therefore, a Post hoc analysis was computed to determine whether there is a significant difference in the means of the SIS PT and SIS Pt. A paired t-test was used to compare the means of SIS Pt scores and SIS PT scores. There was no statistically significant difference in the means for SIS Pt and SIS PT; $t_{(30)} = 1.19$, $p = 0.24$. Table 7 summarizes these findings.

Table 7

Results of paired t-test and Descriptive Statistics for Stroke Impact scale Pt and Stroke Impact Scale PT

Variables	SIS Pt			SIS PT			95% CI for Mean Difference	t	df
	M	SD	n	M	SD	n			
	71.45	14.21	31	67.90	18.29	31	-2.51, 9.61	1.19♣	30

Note: SIS = Stroke Impact Scale; Pt = Patient; PT = Physiotherapist; df= degree of freedom; M = Mean; SD= Standard Deviation; n = number; ♣Not significant.

Furthermore, there was a statistically significant positive correlation between global perception of recovery of the patients and the global perception of recovery of the physiotherapists ($r = 0.50$; $p = 0.004$).

Regression analysis: Objective 4

Objective 4. *To determine whether FIM scores predict perception of recovery.*

FIM motor change and FIM total change scores were the only variables with statistically significant correlations to the patients' perception of recovery, therefore, only those regression models were tested. A univariate regression and multiple regression analyses were tested.

Univariate regression analysis. Model 1: Perception of recovery as dependent variable (DV) and FIM motor change as independent variable (IV). A significant regression equation was found ($F_{(1, 29)} = 6.14$, $P = 0.01$), with an R^2 of 0.17. Participants' predicted perception of

recovery scale scores is equal to 58.21 + 0.49 (FIM Motor change scores). Participants'

perception of recovery scores increased 0.49 units for each unit of increase on the FIM motor

change score; perception of recovery increased with increases on the FIM motor change score.

Therefore, FIM-Motor change scores predicted perception of recovery scores and about 17% of

the variance in perception of recovery is accounted for by FIM Motor change score.

Similarly, Model 2: Perception of recovery as DV and FIM total change scores as IV;

FIM total change scores significantly predicted perception of recovery with a statistically

significant regression equation ($F_{(1, 29)} = 4.69$, P = 0.03), and R^2 of 0.13. Participants'

predicted perception of recovery scores is equal to 60.24 + 0.40 (FIM Total change scores).

Participants' perception of recovery scores increased 0.40 unit for each unit of increase in the

FIM total change score. Participants' perception of recovery increased with each increase in the

FIM total change score. Thus, FIM-Motor change scores predicted perception of recovery scores

and about 13% of the variance in perception of recovery is explained by FIM Total change. See

Table 8.

Table 8

Univariate Regression Analysis Between SIS Pt; FIM Motor Change and FIM Total Change Scores. Outcome Variable (DV) = Patients' Perception of Recovery

	Variables	R	R-square	Unstandardized Beta	df	F	P-value
Model 1	SIS Pt	-		(intercept) 58.21 (5.83)	1	-	0.001*
	FIM Motor Change	0.41	0.17	(Slope) 0.49 (0.20)	29	6.14	0.01*
Model 2	SIS Pt	-	-	(intercept) 60.24 (5.70)	1	-	0.001*
	FIM Total Change	0.37	0.13	(Slope) 0.40 (0.18)	29	4.69	0.03*

NOTE: N = 31; *P<0.05; SIS = Stroke Impact Scale; Pt = Patient; FIM = Functional Independence Measure; STD = Standard; df = Degree of freedom

Assumptions of Multiple Regression Analysis

The assumptions of linearity, homoscedasticity (the spread/variance of the residuals across the model and the assumptions that the values of the residuals are independent from each other (i.e. no significant outliers) were assessed using a residual scatterplot. The assumption of normality was assessed using a normality probability plot and histogram and the assumption of multicollinearity was assessed using correlation of analysis. None of the assumptions were violated, the data was normal. Multiple regression analysis for objective 2 was not assessed because there was no statistically significant correlation between CMSA – AI scores and perception of recovery. There was some missing data, as 3 people declined being assessed using the MoCA; because SPSS uses the list-wise deletion method for regression, the sample size reduced to 28 for the multiple regression analysis. The cognitive levels of all participants, for the purpose of determining eligibility, were determined by consultation with the physiotherapists regardless of whether or not they were assessed on the MoCA.

Multiple regression analysis. A multiple regression analysis was computed to determine whether Model 1: FIM motor change scores predict perception of recovery while controlling for HADS and MoCA scores and Model 2: FIM total change scores predict perception of recovery also controlling for HADS and MoCA scores.

The results for model 1 indicated that the model was not a significant predictor of perception of recovery, $F_{(3, 24)} = 1.05$, $P = 0.38$, the individual variables did not contribute significantly to the model. The R^2 showed that about 11% variation in perception of recovery is

accounted for by the model, however, after adjusting for the HADS and MoCA, it dropped to about 0.6%.

The results of model 2 revealed that the overall model for FIM total change scores, HADS and MoCA scores was not significant, $F_{(3, 24)} = 0.99$, $P = 0.41$, and none of the individual variables contributed significantly to the model. Also, the R^2 showed that about 11 % of variation of perception of recovery is explained by the model and a reduction of this variation to 0% is observed after adjusting for HADS and MoCA.

Overall, both models were no longer predictors of recovery; adjusted R was low. Table 9 represents the summary of these results.

Table 9

A multiple regression analysis for SIS Pt, FIM Motor change score and FIM Total change score
Outcome variable (DV) = Patients' perception of recovery

Variables	Mean (SD)	R	R-square	Adjusted R²	Unstandardized Beta (STD error)	F (p-value)
Model 1		0.34	0.11	0.006	57.80 (12.78)	1.05 (0.38)
FIM Motor Change	26.52 (11.90)	0.31	-	-	0.34 (0.24)	-
HADS Depression	5.06 (3.10)	- 0.14	-	-	- 0.46 (0.89)	-
MoCA	22.89 (5.69)	0.13	-	-	0.25 (0.46)	-
Model 2		0.33	0.11	- 0.001	58.44 (12.73)	0.99 (0.41)
FIM Total Change	27.94 (13.21)	0.28	-	-	0.28 (0.20)	-
HADS Depression	5.06 (3.10)	- 0.14	-	-	- 0.59 (0.89)	-
MoCA	22.89 (5.69	0.13	-	-	0.30 (0.46)	-

Note: N = 28; SIS = Stroke Impact Scale; FIM = Functional independence Measure; Pt = Patient; STD = Standard.

Objective 6

To examine factors that contribute to recovery post stroke from the perspective of stroke survivors and physiotherapists and their alignment with the ICF.

The patients were interviewed by asking two open ended questions to understand factors that could have influenced their recovery. In the process of interviewing the patients, similar responses were reported, therefore, the interviews were discontinued at the time the number of the interviewees was 19. Thus, a total of 19 patients and 6 physiotherapists were interviewed and answered two questions. The patients were asked: 1. What contributed to your recovery? 2. What does recovery mean to you? And the physiotherapists were asked: 1. What contributed to the patient's recovery? 2. What does the patient's recovery mean to you?

The data generated from these questions were analyzed, categories were created and further grouped to form a broad overview called category grouping. The category groupings were then related to the ICF categories: impairment, activity, participation, environmental and personal factors. The number and percentages of respondents to each category for both the patient and physiotherapy group were generated. The results are summarized in Table 10.

Table 10

Categories from patients and physiotherapists

ICF categories	Groupings of patients' categories	Patients' categories	N (%)	Groupings of physiotherapists' categories	Physiotherapists' categories	N (%)
Environmental factors	Supportive environments	Supportive staff/team	17 (90)	Supportive environments	Supportive Staff/team	1 (17)
		Support from spouse	6 (32)		Support from spouse	2 (33)
		Family support	6 (32)		Family support	1 (17)
		Being in a rehabilitation facility	19 (100)		Early intervention post stroke	1 (17)
		Being able to have home visits	3 (16)			
		Faith and religious support	1(5)			
		Good food and nutrition	3 (16)			
		Continuing therapy at home	3 (16)			
Impairment	Maintenance or improvement in body functions	Healthy cognition	3 (16)	Maintenance or improvement in body functions	Lack of cognitive deficit	2 (33)
		Improvement in arm and leg function	10 (52)			2 (33)

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					Improvement in upper and lower extremity function	
		Being able to maintain balance	3 (16)		Improvement in balance	1 (17)
		Being able to communicate with family	2 (10)		Lack of communication deficits	2 (33)
		Being able to see/improved vision	1 (5)		Physical/motor improvement	2 (33)
		Reduction/lack of pain	2 (10)		Improved endurance	1 (17)
Activity and participation	Participation in daily activities	Being able to participate in leisure activities	1 (5)	Participation in daily activities	Able to return to community activities	2 (33)
		Being able to perform Self-care – washing, grooming, feeding and dressing	8 (42)		Able to return to previous activities	2 (33)
		Being able to participate in faith-based activities	1 (5)			
		Being able to read and write	2 (10)			

		Being able to complete household chores (cleaning, gardening etc.)	2 (10)			
		Being able to drive/travel	6 (32)			
		Being able to cook for self/others	3 (16)			
		Being able to return home/being with family	4 (21)		Able to return home	3 (50)
		Being able to work/return to work	2 (10)		Able to return to work	3 (50)
		Being independent	3 (16)		Able to live independently	2 (33)
		Being able to participate in physical therapy intervention	19 (100)		Participation in physical therapy intervention	4 (67)
		Participation in physical exercises	4 (21)		Good exercise tolerance	1 (17)
		Being able to walk w/without assistive device.	19 (100)		Improved mobility	2 (33)
Personal factors	Having a positive attitude	Positive outlook	3 (16)	Having a positive attitude	Finding value in challenging patients to improve	1(17)

		N (%)			N (%)
	Motivation to improve	3 (16)		Motivation to improve	4 (67)
	Getting inspired from watching/hearing about another person's recovery	2 (10)			
	Adjusting to change	1 (5)			
Personal factors	Being active and healthy before stroke	1 (5)	Personal factors	Active and healthy before stroke	4 (67)
				Cardiac comorbidity	1(17)
	Being able to achieve recovery goals	3 (16)		Work ethic/ adherence	1(17)

Note: N = number; ICF = International Classification of Functioning; 6 Physiotherapists assessed 31 patients, of which 19 were interviewed

Category groupings and categories. The patients' category groupings and physiotherapists' category groupings were mostly similar with some overlap. However, both groups had distinct categories that spoke only to each group.

According to the percentages in the patients' group shown in table 10, the following categories had more weight considering patients' recovery post stroke: being in a rehabilitation facility and being able to walk with or without assistive device had 100%; second to this was supportive staff/team 90%; improvement in arm and leg function 52%; self-care/ADL 42%; support from spouse, family support and being able to drive/travel 32% and participation in physical exercises and being able to return home/being with family being 21%, all other categories had percentages ranging from 5 -16% .

In the physiotherapists' group, consistent participation in physical therapy intervention, good functional/fitness status pre-stroke and motivation to improve had equal weight which was 67%; next was able to return home/return to work 50%; physical/motor improvement, lack of communication and cognitive deficit, support from spouse, improved mobility, able to live independently and able to return to community activities all had 33%, other categories had 17%.

Supportive environments. Overall, this spoke to the various environmental conditions that participants felt supported their recovery, which also relates with the International Classification of Functioning (ICF) contextual factors where environmental factor is a sub-component. When referring to the importance of the rehabilitation facility to their recovery, all the participants expressed that being cared for in a rehabilitation facility, including the help of a competent physiotherapist and other health care staff, contributed to their recovery in addition to their support network; this was echoed by the physiotherapists as well. The supportive environment category group for the patients showed some categories different from the

physiotherapist group such as being in a rehabilitation facility, good food and nutrition, being able to have home visits, continuing therapy at home and faith and religious support. While the physiotherapist group considered early intervention post stroke a crucial component contributing to patients' recovery.

Maintenance or improvement in body functions. This grouping relates to the impairment component of the ICF. The patients related the meaning of recovery to the maintenance and improvement of their body structures and functions. Unlike the supportive environment category not everyone who participated indicated that this was important. However, having good functional motor and cognitive recovery were considered by some as significant recovery factors regardless of the disproportional rate in the recovery of both upper and lower extremities. Similarly, the physiotherapists also felt that better body functions equated to greater recovery. However, in this grouping, being able to see/improved vision and reduction or lack of pain categories for the patients' group was different from the physiotherapist group where improved endurance and physical/motor improvement was reported.

Participation in daily activities. With this category grouping, activity and participation components of the ICF were the most important elements associated with recovery. A majority of the participants answered that being able to participate in activities of daily living (ADL) as well as instrumental activities of daily living (IADL), such as washing, grooming, feeding, dressing, gardening and driving, were activities which signified recovery post stroke. It is worth noting that all the participants expressed their perception of recovery post stroke as being able to walk with or without assistive device, although the physiotherapists did not note this to the same extent. Also, participating in physical therapy activities, community activities, and returning to work were noted as important, as well. Likewise, the physiotherapists felt that being able to live

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independently and return to previous activities and participation in physical therapy interventions were important markers of recovery.

Having a positive attitude. This grouping demonstrates a favourable approach towards the recovery process and relates to the personal factor sub-component of the contextual factor of the ICF. The participants were optimistic towards their recovery process, finding courage to carry on with life in general, regardless of the limitation imposed by the stroke and believing in themselves. Getting inspired from watching/hearing about another person's recovery and adjusting to the changes brought on by the stroke demonstrates a positive outlook. Likewise, the physiotherapists viewed patients' motivation to improve as a key contributor towards recovery post stroke and found value in challenging the patients to improve.

Personal factors. This grouping portrays the importance of having a good function or fitness level prior to stroke. Participants and physiotherapists perceived that being healthy and active before stroke can improve the recovery process post stroke. However, only the participants related goal achievement to how recovery was perceived. Furthermore, personal factors such as cardiac comorbidity and patients' compliance with work, that is, work ethic/adherence which is similar to motivation were considered only by the physiotherapists. This grouping relates to personal factors category of the ICF. The perspectives of the participants and their alignment with ICF components are further summarized in figure 4.

Figure 4. Alignment of the ICF components with the participants' categories

Health condition (STROKE)

Body structure & function (impairment)

Maintenance or improvement in body functions. E.g.
- Healthy cognition
- Improvement in arm and leg function
- Being able to maintain balance
- Being able to see/improved vision
- Lack/reduction in pain
- Physical/motor improvement
- Improved endurance

Activity (limitation)

Participation in daily activities. E.g.
- Being able to perform selfcare
- Being able to walk w/without assistive device
- Being independent
- Being mobile
- Participation in physical therapy activities

Participation (restriction)

Participation in daily activities. E.g.
- Being able to return to community activities
- Being able to return to work
- Participation in leisure activities
- Able to participate in faith based activities

Environmental and personal factors

Supportive environment: e.g. Supportive staff/team, supportive spouse and family, being in a rehabilitation facility, early intervention post stroke
Having a positive attitude: **e.g.** Motivation, optimism, adjusting to changes
Personal factors: **e.g**. Being active and healthy before stroke, work ethics, cardiac comorbidity,

Objective 7

To examine how stroke survivors' and physiotherapists' perspectives of recovery post stroke align with the content of outcome measures used to assess recovery (CMSA-AI, FIM, MOCA, and HADS).

Items on the outcome measures were grouped into categories and compared with categories created from the interview and questionnaire data to observe how both perspectives align with the tools. Table 11 shows the categories associated with the outcome measures.

Table 11

Outcome measure categories

CMSA-AI	FIM	HADS	MoCA
Bed mobility From weak side, from strong side	Self-care Eating, grooming, bathing, dressing upper and lower body, toileting		Visuospatial/Executive Naming Memory
Balance Standing	Sphincter control Bladder management, bowel management		Attention Language Abstraction
Transfers Horizontal transfers Vertical transfers	Transfers Bed, chair, wheelchair, toilet, tub, shower		Delayed Recall Orientation
Locomotion Walk indoor, walk outdoor, walk up and down stairs	Locomotion Walk, wheelchair, stairs Communication Comprehension Expression		
	Social cognition Social interaction Problem solving Memory	Anxiety Depression	

Note: CMSA -AI = Chedoke McMaster Stroke Assessment Activity Inventory; FIM = Functional independence measure; HADS = Hospital Anxiety Depression Scale; MoCA = Montreal Cognitive Assessment.

In comparing the categories for both the patients and the physiotherapists with the outcome measures categories, some categories within the groupings: maintenance/improvement in body functions, participation in daily activities, and having a positive attitude—aligned with the categories within the tools. This shows that some of the responses from both patients and physiotherapists were also captured by the tools, but maintenance/improvement in body functions category grouping was most captured because it aligned with 3 of the 4 tools;

participation in daily activities group aligned with 2 and, lastly, having a positive attitude aligned with one.

Despite this some categories within the above-mentioned groupings did not align with the outcome measures. For example, maintenance/improvement in body functions grouping with categories such as being able to see/ improved vision, reduction/lack of pain and improved endurance; participation in daily activities grouping with categories such as able to return to work, participation in leisure activities, being able to return home and being able to cook for others; as well as the positive attitude grouping with categories such as adjusting to change, being inspired by people and finding value in challenging patients to improve did not align with the tools.

Moreover, supportive environments grouping with categories such as family support, spousal support, supportive staff/team, being in a rehabilitation facility, good food and nutrition; personal factors such as pre-stroke functional status and achieving recovery goals and the category unique to physiotherapists with categories such as early intervention, work ethics/adherence and cardiac comorbidity did not align with the categories within the outcome measures used to assess recovery. Tables 12 illustrates the comparison.

Table 12

Comparison between categories for both patients and physiotherapists and outcome measure categories

Category grouping	Participants' categories	CMSA-AI	FIM	HADS	MoCA	Physiotherapists' categories	CMSA-AI	FIM	HADS	MoCA
Supportive environment	Supportive staff/team Support from spouse Family support Being in a rehabilitation facility Being able to have home visits Faith and religious support Good food and nutrition Continuing therapy at home					Supportive Staff/team Support from spouse Family support Early intervention post stroke				
Maintenance or improvement in body functions	Healthy cognition		X		X	Lack of cognitive deficit		X		X
	Improvement in arm and leg function	X	X			Improvement in upper and lower extremity function	X	X		
	Being able to maintain balance	X				Improvement in balance	X			
Category grouping	**Participants' categories**	**CMSA-AI**	**FIM**	**HADS**	**MoCA**	**Physiotherapists' categories**	**CMSA-AI**	**FIM**	**HADS**	**MoCA**

Category grouping	Participants' categories	CMSA-AI	FIM	HADS	MoCA	Physiotherapists' categories	CMSA-AI	FIM	HADS	MoCA
	Being able to see/improved vision					Physical/motor improvement	X	X		
	Reduction/lack of pain					Improved endurance	X			
	Being able to communicate with family/be with family		X			Lack of communication deficit		X		
Participation in daily activities	Being able to participate in leisure activities					Able to return to community activities				
	Being able to perform Self-care – washing, grooming, feeding and dressing		X			Able to perform self-care		X		
	Being able to return home/being with family					Able to return home				
	Being able to work/return to work					Able to return to work				
Category grouping	**Participants' categories**	CMSA-AI	FIM	HADS	MoCA	**Physiotherapists' categories**	CMSA-AI	FIM	HADS	MoCA
Participation in daily activities	Being independent	X	X			Able to live independently	X	X		

Category grouping	Participants' categories	CMSA-AI	FIM	HADS	MoCA	Physiotherapists' categories	CMSA-AI	FIM	HADS	MoCA
	Being able to Participate in physical therapy intervention					Participation in physical therapy intervention				
	Participation in physical exercises					Good exercise tolerance	X			
	Being able to participate in faith-based activities					Improved mobility	X	X		
	Being able to read and write		X							
	Being able to complete household chores (cleaning, gardening etc.)									
	Being able to drive/travel									
	Being able to cook for self/others									
	Being able to walk w/without assistive device	X	X							

Category grouping	Participants' categories	CMSA-AI	FIM	HADS	MoCA	Physiotherapists' categories	CMSA-AI	FIM	HADS	MoCA
Having a positive attitude	Positive outlook			X		Finding value in challenging patients to improve				
	Motivation to improve			X		Motivation to improve			X	
	Getting inspired from watching/hearing about another person's recovery Adjusting to change					Finding value in challenging patients to improve				
Personal factors	Being active and healthy before stroke					Active and healthy before stroke				
	Being able to achieve recovery goals					Work ethics/adherence				
						Cardiac comorbidity				

Note: CMSA -AI = Chedoke McMaster Stroke Assessment Activity Inventory; FIM = Functional independence measure; HADS = Hospital Anxiety Depression Scale; MoCA = Montreal Cognitive Assessment

CHAPTER 4

DISCUSSION

This study's sociodemographic profile is consistent with that of the study conducted by O'Donnell and associates (2016) in 32 countries across North America, South America, Africa, Asia and Australia, which showed similar results in the sociodemographics of over 13,000 participants, with the incidence of ischemic stroke being twice as high as hemorrhagic stroke. Cerebellar stroke may have been included in the category of stroke classified as "undetermined" in the study and there were more males than females, with a mean age of 62.2 years. There were similarities in the risk factors associated, with stroke and hypertension ranked highest as well. Also, in this study, the FIM mean change and the CMSA-AI mean change scores meets and exceeds the cut-off of MCID for each measure, respectively.

This study assessed and explored the perception of recovery of stroke survivors and their physiotherapists at discharge; the correlation analyses tested the relationship between perceptions of recovery and CMSA – AI scores, as well as perceptions of recovery and FIM scores. CMSA – AI total and subscale scores were not significantly associated with perception of recovery but some components of the FIM significantly correlated with perception of recovery. This may be because although similarities exist between the CMSA – AI and the FIM, the content of the former is very focused on gross motor function and walking while the latter assesses broader components such as self-care, communication and cognition.

Hinkle et al. (2003) defined correlations as: little correlation 0 – 0.3; low positive 0.3 – 0.5; moderate positive 0.5 – 0.7; high positive 0.7 – 0.9 and very high positive 0.9 – 1.0.

Therefore, there was a low positive (Hinkle et al., 2003) correlation between SIS global perception of recovery and FIM change score and FIM motor change score. This is in contrast to a study by Ostwald et al. (2008) where 97 participants who had stayed in a stroke rehabilitation facility as inpatients for an average of 45.5 days were assessed immediately after discharge to determine the relationship between FIM scores and perception of recovery; the correlation between FIM motor at discharge and perception of recovery which was measured using the SIS global perception of recovery was statistically significant with a moderate positive correlation ($r = 0.5$, $p<0.0001$).

To further illustrate the relationship between FIM motor change and perception of recovery, as well as FIM total change scores and perception of recovery, a univariate regression analyses was tested. Both models predicted perception of recovery and were statistically significant. With the addition of other variables in a multiple regression analyses, there was a drop in the variation accounted for by the models; both models were not statistically significant. Along with this, there was missing data and the sample size was too small for a regression model with the number of independent variables included in the models. These results differ from the univariate regression analyses where both models were statistically significant and were predictors of recovery. This suggests that the addition of cognition and mood which made the models not statistically significant in the multiple regression analyses may have been important.

Also, the findings from the perception of recovery structured questionnaire showed some factors that were not assessed in this study. This may account for the negligible percentage of variance accounted for by the models. For instance, the supportive environments grouping with categories such as supportive staff/team, being in a rehabilitation facility, spousal/family support network and food and nutrition and the physiotherapist specific grouping of early intervention

post stroke, and personal factors such as work ethics/adherence are categories within the grouping, and pre-stroke functional status, and goal achievement were not assessed. Similarly, some categories within the activity and participation grouping such as return to work, resuming community activities and performing instrumental activities of daily living were not assessed. All of these factors contribute to recovery from both the patients' and physiotherapists' perspectives and were not assessed with standardized outcome measures used at the rehabilitation facility.

Although the above-mentioned groupings were not assessed, previous studies have reported their importance in recovery. A study by Morris and researchers (2007) explored the experiences of patients, caregivers and staff and reported mostly positive reviews about staff support in a stroke rehabilitation facility. Likewise, previous studies have concluded that good social support networks of spouse, family and friends markedly improves recovery (Glass et al. 1993; Tsouna-Hadjis et al., 2000). Moreover, a study by Camicia et al. (2016) reported that a stay at an in-patient rehabilitation facility post stroke increases functional gains. Also, Aquilani et al. (2011) documented that some neurological deficits of stroke are rescinded with proper food and nutrition, thus improving functional outcomes. In addition, Stroud and researchers (2009) found that those who were active prior to stroke had high functional scores on admission and, typically, rehabilitation goal achievement is often associated with higher perception of recovery and quality of life (Rice et al., 2017).

The findings from the participants' interviews and questionnaire corroborates the objective assessments from the outcome measures. Participants perceived that maintenance or improvement in body functions and participation in daily activities where the upper and lower extremity function, mobility, being able to maintain balance, being able to perform self-care

activities (dressing, grooming, eating and toileting), being able to communicate with their family, and walking, established recovery. All of these are components within the FIM and some are components of CMSA – AI (mobility, being able to maintain balance and walking). This supports previous studies where performing ADL and general return to pre-stroke status were important markers of perception of stroke recovery (Jones et al., 2008; Tornbom et al., 2017).

Perception of recovery was measured for both patients and physiotherapists and, on average, both patient and physiotherapy group had a mean percentage of recovery score of about 71 percent and 67 percent respectively. This shows that both the patient and physiotherapy group perceived that a reasonable amount of recovery above 65% percent had been achieved following therapeutic interventions at an inpatient rehabilitation facility. This is in contrast to (Ostwald et al., 2008) where only 50 percent recovery was recorded, even though the same SIS global perception of recovery tool was used to assess recovery and a similar average stay at the rehabilitation facility was reported. Perhaps the severity of stroke accounts for the lower recovery score.

The patients' and physiotherapists' perception of recovery scores had a moderate (Hinkle et al., 2003) positive relationship. Also, they had a similar mean score on the descriptive statistics and there was no statistically significant difference between the PT and pt scores on the paired t-test analysis which indicates that both perception of recovery scores are similar. However, the category groupings created from the patient in-person interviews and physiotherapists' questionnaire help explain the meaning of the perception of recovery scores for both the patient and physiotherapist groups. These showed mostly similarities among the category groupings with some categories unique to the patients' and physiotherapists' groups. The categories and category groupings are related to the ICF components.

Perception of recovery varies from one person to another as shown by the categories created from the participants' data. Each individual perceived recovery post stroke differently with emphasis placed on various aspects of recovery. Although the participants were asked general questions about recovery that were not motor specific, and two tools used in the study primarily measured motor recovery (CMSA-AI and FIM), the responses from participants, however, showed that recovery is very contextual and personal exceeding the motor aspects of recovery that were not captured by the tools.

For instance, some participants considered supportive environments such as family and spousal support, being in a rehabilitation centre and having good nutrition as remarkable contributors to recovery. Others felt that recovery meant being able to return home, participating in community and faith-based activities, being able to return to work, adjusting to changes post stroke, getting inspiration from other survivors and being able to perform IADLs.

Indeed, per person recovery goals differ and are based on life experiences and stage in life, therefore, to harness functional gain during rehabilitation, client goals should be consistently incorporated into rehabilitation to facilitate recovery. Three participants related their perception of recovery scores to how well their goals have been met, where high perception of recovery scores was paired with goal achievement and lower scores with goal under achievement. Brock and researchers (2009) reported that stroke survivors who achieved their recovery goals had favourable view of community engagement/participation, and mood. Also, both the patients and physiotherapists perceived the meaning of recovery to be improvement in body function such as upper and lower extremity recovery; activity such as walking, dressing, grooming and eating; and, participation such as being able to return to work, and community activities.

The 3 ICF categories (impairment, activity limitation, and participation restriction) consistently featured in the responses of both groups (WHO, 2001). The findings in this study are similar to a study by Demir and researchers (2015) who explored three different perspectives – patient, caregiver, and physiotherapist in an in-patient rehabilitation setting using two questions. However, this study is also distinct from the study by Demir et al. (2015) because in this study, the physiotherapists answered two questions specific to each patient while those in the Demir et al. (2015) study answered two questions that were general rather than specific. The responses were then classified using the International Classification of Function (ICF) categories. The first question was: "What are the problems faced by the patients after stroke?" and the second: "What does recovery after stroke mean to you?" A total of 159 participants were included in the study: 53 stroke patients, 53 caregivers and 53 physiotherapists. When Q1 was explored, the patients ranked difficulties associated with body function and structure as the major problem encountered post stroke (limb paresis, difficulty in the use of hands), and the physiotherapists and the caregivers felt difficulties associated with activity and participation were more profound (self-care, dressing, bathing, grooming, and walking), thus ranking it as more important. Interestingly, exploring Q2 revealed the reverse; the patients and caregivers viewed recovery as being able to return to their pre-stroke status, emphasizing activity and participation, while the physiotherapists viewed recovery as being able to use the affected limbs, emphasizing body function and structure.

Furthermore, in this study all the participants and physiotherapists stressed the importance of physical therapy intervention acknowledging its role in the functional progress achieved. Also, both groups recognized positive attitude as instrumental parts of recovery—motivation, optimism, hope, positive thinking and the inspiration derived from other stroke

survivors' level of functioning. The knowledge that they can also achieve that level of recovery, if not more gave them courage to take an active role in their recovery journey. A similar finding was reported by Jones and researchers (2008) who explored reasons for recovery post stroke from the patient's perspective and found that physical therapy interventions, motivation and optimism were clearly facilitators of recovery. Also, in this study the physiotherapists perceived that pre-stroke functional level contributes to recovery and the youngest participant in this study agreed with them. A study by Gavin and colleagues (2008) reported that both the patients and physiotherapists considered age, walking, family support, motivation and cognitive impairment as influential factors of recovery post stroke where those with good family supports were reported to have a shorter length of stay in rehabilitation centres and better recovery outcomes (Stuart-Shor et al. 2003).

The differences were that the physiotherapists considered personal and environmental factors such as early intervention, associated comorbidities and work ethics /adherence as important components of stroke recovery as well as physical/motor improvement and improved endurance. Their perspectives regarding recovery stems from a clinician's view and typically focused on therapeutic components of recovery. On the other hand, the participants had a more robust perspective with their responses reflecting their respective approach to recovery even as being in a rehabilitation centre, being able to achieve recovery goals, diet and nutrition were considered, for example.

Overall, the distinct outcome of this study is that following a stay at a rehabilitation facility, stroke survivors and their physiotherapists perceived that functional recovery had been achieved to some extent. Perception of recovery of clinicians and patients were examined even as a biopsychosocial approach was considered. Therefore, when examining recovery post stroke

emphasis should be placed not only on physical impairment but other factors need to be considered such as: family supports, early access to a rehabilitation team, ongoing rehabilitation, ability to resume community activities or instrumental activities of daily living, work, motivation, etc. There are several areas that contribute to patient recovery that were not captured by the FIM and CMSA – AI. Personal goals may better facilitate recovery from the patient's perspective. Use of goal attainment scaling in the clinical setting would help capture this information.

Implications for Therapist, Clinical Practice and Research

Perception of recovery of patients should be assessed clinically to evaluate treatment outcomes and assess congruency or disparity between patients' and clinicians' view of recovery, assess goal achievement and promote discharge planning. Findings in this study may make clinicians amenable to assessing aspects of the quality of life of adult stroke patients in a short time using the global perception of recovery scale of the SIS (0-100%, 0 = no recovery and 100 = full recovery) which involves asking just one question "how much have you recovered from your stroke?" This effectively eliminates time as a much-stated barrier to achieving evidence-based practice and promoting patient-centered care (Ramírez-Vélez et al., 2015; Salbach et al., 2007). Clinicians can incorporate the use of the SIS global perception of recovery scale as a formal documentation of patients' views, by using a form of patient reported outcomes with regards to their progression from admission to discharge as well as their perceived satisfaction with interventions during their stay at the rehabilitation centre.

This study contributes to the literature involving stroke as well as perception of recovery of stroke survivors. Also, findings of this study are appreciable additions to studies related to the CMSA-AI, FIM and SIS. In examining the views of both the patients and the physiotherapists,

categories outside of what the outcome measures evaluate were revealed, suggesting that research into these categories and why they are important to stroke survivors and physiotherapists could be further explored. Also, some of these categories could be regularly measured clinically, if not already measured by the other members of the rehabilitation team. Although, this study focuses on an in-patient setting, future research could take other settings, such as community and outpatient care, into consideration. Along with this, assessing the perception of recovery of other team members as well as the caregivers of stroke survivors could be examined.

<p style="text-align:center">Strength and Limitation of the Study</p>

A strength of this study is its approach of using two or more diverse methods of collecting and analyzing data related to stroke and perception of recovery. The multiple method approach of utilizing chart review to obtain information on the FIM and CMSA – AI, assessing the HADS, MoCA and SIS with the participants, and administering questionnaires, and in-person interview questions to the physiotherapists and patients, gives weight to the study. Consequently, producing a broad and expansive result inclusive of different viewpoints assessed using more than one method reflects a more robust and comprehensive study compared to a single method study.

To reduce the burden placed on the physiotherapists, they gave short answers to the two recovery questions which were not detailed and the in-person interview with the participants were not in-depth. Therefore, both the questionnaire and in-person interview data were not rich because the questions were not rigorously probed, thus, the study was limited. An in-depth, qualitative exploration of the patients and providers' experiences and perceptions of recovery would be warranted. Also, in comparison to similar studies on stroke and perception of recovery,

the sample size of this study was small. Hence, the findings of this study were limited by the number of participants recruited as well as the clinical setting where the participants were recruited. The focus of this study was only on in-patient rehabilitation stroke survivors; therefore, the results of this study is streamlined to perception of stroke survivors and their physiotherapists at discharge following their stay at a stroke rehabilitation centre.

Furthermore, the participants were a subset of the stroke population who are expected to return home and are likely to recover. Therefore, the results are not generalized to all people with stroke, for example, approximately 30% of stroke patients in Winnipeg, Manitoba (S. Pooyania, personal communication, September 19, 2018) and about 20% in Canada get admitted into inpatient rehabilitation centres (Canadian Stroke Network, 2011). Of these patients, not all were without some speech and cognitive deficits, and these may have prevented them from participating in the study (Canadian Stroke Network, 2011). Also, results from outcome measures that other members of the rehabilitation team might have used that may have provided additional information were not considered.

Conclusion

Stroke, with its associated neurological deficits and activity limitations, makes the process of recovery for stroke survivors a complex journey. The different phases of recovery, each with its own challenges and expectations of functional recovery further exacerbates this complexity. Tools such as the FIM and CMSA-AI help measure motor and functional recovery from admission to discharge, and global perception of recovery, a one item SIS component, measures the percentage of overall recovery. However, without the patients and physiotherapists view of what contributed to recovery and what it means, the picture is not complete.

Our health care delivery system is evolving to an evidence-based approach with a strong emphasis on a patient-centered plan of care; thus, patients' perspective of their health status is of utmost importance. This study focuses on the assessment of a component of quality of life and promotes Patient Reported Outcomes (PRO) – a report of a patient's health condition from the patient's view. This provides insight into the effectiveness of treatment and/or care from a patient's perspective as was shown by the categories created by the in-patient interview data, which went over and beyond the categories within the observed measures, confirming that other factors outside of physical/motor recovery are considered important by the patients. Additionally, patients related their recovery to rehabilitation goal achievement which was very contextual and individualized based on different events distinct to each person. Therefore, to have a patient-centered care approach to rehabilitation, the views of the patients should be taken into consideration, as they may be different from what is reported by observed measures typically used in rehabilitation settings. Also, a client tailored goal setting process should be considered in rehabilitation to improve outcomes.

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