THE FUNCTIONAL OUTCOME AND LENGTH OF STAY OF ABORIGINAL PATIENTS IN SASKATCHEWAN INPATIENT REHABILITATION PROGRAMS

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ABSTRACT

The purpose of this study was to investigate the relationship between ethnicity, functional outcome and length of stay in Saskatchewan inpatient rehabilitation programs. The study identified and described the differences in theses rehabilitation outcome measures of Aboriginal and non-Aboriginal patients with disabilities resulting from the following causes (impairment groups): stroke, traumatic brain injury, spinal cord injury, amputation, and 'other' impairments. Using the Functional Independence Measure (FIM), the most commonly used measure of functional outcome in rehabilitation and indicator of the change in severity of disability during rehabilitation, the study identified the difference in the change in the Total, Motor, and Cognitive FIM scores at admission and discharge between Aboriginal and non-Aboriginal patients. The study also identified the differences in the length of stay for Aboriginal and non-Aboriginal patients within similar impairment groups, with similar disability and confounders. The final purpose of the study was to identify possible general strategies described in the literature that could potentially be implemented within Saskatchewan inpatient rehabilitation programs to improve the rehabilitation experience for Aboriginal patients.

The settings of the study were a university based tertiary rehabilitation centre in Saskatoon City Hospital, and the Wascana Rehabilitation Centre in Regina, Saskatchewan. Each of the programs under study provided comprehensive, multidisciplinary rehabilitation services. The independent and outcome variables used in this study had been collected in the FIM databases at each rehabilitation centre by the rehabilitation teams. The study population consisted of 1652 individuals admitted to the two rehabilitation programs between 1994 and 1999.

The primary independent variable used in the study was ethnicity. The independent covariables were gender, age, marital status, vocational category and effort, impairment group, comorbidities, admit from, pre-admission living with, discharge to living with, and Admission Total, Cognitive, and Motor FIM scores. The outcome variables used were Total FIM Change, Motor FIM Change, Cognitive FIM Change, and Length of Stay. The methods used to analyse the data were descriptive univariate, bivariate, and multivariate. The multivariate analysis consisted of the use of General Linear Models. The data was also analysed for the internal reliability of the FIM instrument with Aboriginal patients.

The results of the study indicated that significant differences existed between Aboriginal and non-Aboriginal patients in functional outcome and Length of Stay. Aboriginal patients had significantly lower Total FIM Change, Cognitive FIM Change and shorter lengths of stay than non-Aboriginal patients. These findings add to a very sparse evidence base regarding the rehabilitation experience of Aboriginal peoples in Saskatchewan. This study suggests that further research is required to gain a better understanding of the many factors involved in the differences between Aboriginal and non-Aboriginal functional outcome and length of stay. Further research is also needed to gain some understanding of the holistic experience of Aboriginal peoples in inpatient rehabilitation programs, which should result in opportunities for Aboriginal peoples to participate in the determination of culturally appropriate and relevant rehabilitation program planning. Based on the literature, this study concludes that rehabilitation administrators and staff, in general, should attempt to increase their cultural awareness and understanding to ensure the delivery of culturally sensitive and relevant services.

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LIST OF ABBREVIATIONS

APS	Aboriginal Peoples Survey
FIM	Functional Independence Measure
FSIN	Federation of Saskatchewan Indian Nations
LOS	Length of Stay
SCI	Spinal Cord Injury
TBI	Traumatic Brain Injury
WHO	World health Organization
RCAP	Royal Commission on Aboriginal Peoples
EM	Explanatory Model
SCH	Saskatoon City Hospital
UDSMR	Uniform Data System for Medical Rehabilitaiton

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Aboriginal* peoples in Canada are often expected to participate in health and social systems that are insensitive to Aboriginal peoples' socioeconomic status, cultures and beliefs.(1) The social and economic disparities that exist between Aboriginal and non-Aboriginal peoples, the differences in worldviews that often exist between Aboriginal and non-Aboriginal cultures, and the inadequacies of the current health care system, have led to a variety of concerns for Aboriginal peoples. Among these concerns are the differing patterns of health services utilization by Aboriginal clients, gaps in service delivery, and a perception among Aboriginal peoples that the present health care system is not meeting their needs.(2-6) When examining any Aboriginal health issue, it must be acknowledged that Aboriginal peoples face disparity and inequality within the dominant societies' health and social systems.(7)

Aboriginal peoples are among the most economically and socially disadvantaged groups in Canada. Aboriginal peoples attain lower levels of education, have higher rates of unemployment, and have lower income levels than non-Aboriginal people. In 1995, about 44% of the Aboriginal population in Canada lived in low-income

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* The Constitution of Canada defines Aboriginal peoples as all peoples of Indian, Inuit, and Metis heritage, including non-status Indians. This definition will be used in this thesis when referring to Aboriginal peoples in general. Appendix A describes the definitions for Aboriginal peoples. For the purposes of this study, 'Aboriginal' has been operationalized as Registered Indians in the analysis, and discussion sections.

situations(8).

This socio-economic disadvantage, in part, determines the general health status of Aboriginal peoples.(9) Canadians with low incomes are more likely to suffer illnesses and to die earlier than Canadians with high incomes.(10) Aboriginal peoples have higher death rates, higher rates of hypertension, alcoholism, substance abuse, diabetes, and injury than that of the general population.(10,11) Disability rates are also significantly higher among Aboriginal peoples.(6)

Results from the Aboriginal Peoples Survey (APS) in 1991 indicated that Aboriginal peoples are far more likely than Canadians overall to have a disability (defined as self-perceived limitations in sensory, mobility, agility, or other physical and psychological abilities, which had lasted or were expected to last six months or more) regardless of their cultural origin, geographic location, or treaty status. The age-standardized disability rate among the adult Aboriginal population in 1991 was more than double the national rate: 31% versus 13%. For both Aboriginal and the total Canadian adult population, higher levels of education were associated with lower rates of disability. For 15-24-year-olds, the Aboriginal disability rate was more than three times the corresponding Canadian figure: 22% and 7%. These rates are consistent with the relatively higher rates of illness and death for Aboriginal youth arising from accidents, violence, and suicide. The APS found that 38% of Aboriginal people with severe disabilities had unmet needs.(12) High rates of disability mean that Aboriginal peoples are frequently in contact with rehabilitation* services. The nature and success of

* For the remainder of the study, 'rehabilitation' refers to physical rehabilitation required as a result of an impairment (stroke, spinal cord injury (SCI), traumatic brain injury (TBI), amputation, or other) that caused a disability. 'Inpatient rehabilitation program' refers to programs offered through tertiary care facilities to patients with disabilities that require intensive physical rehabilitation.

Aboriginal peoples experiences within inpatient rehabilitation programs remains unclear. Some quantitative and anecdotal evidence exists to suggest that Aboriginal patients have less successful rehabilitation outcomes than non-Aboriginal patients. A number of researchers have indicated that traditional rehabilitation programs, which are offered within the context of the dominant culture, are inappropriate and ineffective with Aboriginal clients.(13-18) However, much of this research is anecdotal and is limited to the United States. The evidence that exists for differences in functional outcome between Aboriginal and non-Aboriginal clients in Saskatchewan is also anecdotal.

Observations by the by the staff at the Department of Physical Medicine and Rehabilitation at Saskatoon City Hospital, and the Wascana Rehabilitation Centre in Regina indicate that Aboriginal clients with disabilities resulting from impairments such as stroke, traumatic head injury, spinal cord injury, and amputations, appear to have different, and often less successful rehabilitation outcomes as compared to the non-Aboriginal patients presenting with similar disabilities.

Given the readily quantifiable health and socio-economic disparity, the less readily quantifiable cultural differences between Aboriginal and non-Aboriginal peoples, and the anecdotal evidence given by rehabilitation service providers, there exists the potential for Aboriginal and Non-Aboriginal clients in Saskatchewan inpatient rehabilitation programs to have different functional outcomes than non-Aboriginal clients. This study will use the Functional Independence Measure (FIM), the most commonly used measure of functional outcome in rehabilitation medicine, to compare the functional outcomes of Aboriginal and non-Aboriginal clients. The results of this study

will add to the evidence base that is required to impact rehabilitation service delivery and program development for Aboriginal patients within Saskatchewan.

1.2 Purpose of the Study

This epidemiological study was conducted to determine if there were differences in rehabilitation functional outcome, as measured by the Functional Independence Measure (FIM), between Aboriginal and non-Aboriginal patients. The Functional Independence Measure (FIM) is the most commonly used measure of functional outcomes of rehabilitation and is an indicator of the change in severity of disability during rehabilitation.

1.2.1 The Research Objectives

The objectives of this research were:

1) To identify and describe differences in the rehabilitation functional outcome and length of stay of Aboriginal and non-Aboriginal patients with disabilities resulting from the following causes (impairment groups): stroke, traumatic brain injury, spinal cord injury, amputation, and other, and;

2) To propose general strategies, as described in the literature, to improve the rehabilitation outcome of Aboriginal patients.

Using ethnicity as the independent variable, and Functional Independence Measure (FIM) Change-and its components Motor FIM Change, Cognitive FIM Change-and Length of Stay, as the four outcome variables, the research objectives will be implemented by answering the following questions:

1. Is there a difference in the overall change in the FIM scores (FIM Change) at admission and discharge between Aboriginal and non-Aboriginal patients? Is there a

difference in the change in the motor (Motor FIM Change) or cognitive FIM (Cognitive FIM Change) scores between Aboriginal and non-Aboriginal patients?

2. Length of stay in inpatient rehabilitation programs is used as an indicator of outcome. Generally, the longer a patient stays in rehabilitation, the less positive the outcome. Is there a difference in the length of stay for Aboriginal and non-Aboriginal patients within similar impairment groups, and with similar disability and confounders (e.g. co-morbidity)?
3. What strategies could be implemented within the Department of Physical Medicine and Rehabilitation, University of Saskatchewan, and the Wascana Rehabilitation Centre, Regina, to improve the rehabilitation experience of Aboriginal patients?

1.3 Relevance of the Study

In the absence of research pertaining to Saskatchewan Aboriginal peoples' rehabilitation outcomes, the results of this study may be used to begin building the necessary evidence base that will impact future research and, in turn, assist in the determination of potential changes to rehabilitation program delivery to Aboriginal patients.

The results of this study will be particularly relevant to the Department of Physical Medicine and Rehabilitation and the Wascana Rehabilitation centre. The programs are currently being offered without specific services for Aboriginal clients. The results of this study may assist the programs' administrators in the allocation of funds for culturally relevant and sensitive Aboriginal program development. The study may also impact the way the training of rehabilitation teams is offered in the area of cultural awareness and sensitivity.

Other organizations that provide services to Aboriginal clients with disabilities, such as the Federation of Saskatchewan Indian Nations (FSIN) Disability Clearinghouse and the Canadian Paraplegic Association, may benefit from the results of this study. These organizations may utilize the quantitative results as a tool to advocate for their Aboriginal clients.

This study may also be the starting point for future research with Aboriginal clients in the inpatient programs under study, and within other organizations that provide services to Aboriginal clients. Given that this study is only a description of the physical outcome of Aboriginal clients, further research will be necessary to examine the mental, spiritual, and emotional experiences of Aboriginal clients. This study, in combination with future studies that focus on the other aspects of one's being, may give an accurate and holistic description of Aboriginal clients' rehabilitation experiences, and in turn, lead to the development of appropriate rehabilitation programs for Aboriginal clients.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter consists of a review of the current literature regarding Aboriginal rehabilitation. In order to set the context in which the potential exists for Aboriginal peoples to have different rehabilitation experiences than non-Aboriginal people, this chapter describes and contrasts Aboriginal and non-Aboriginal worldviews, perception of health and wellness, and perceptions of disability and rehabilitation. Given the different perceptions and beliefs of Aboriginal peoples and non-Aboriginal peoples, as well as the lack of culturally sensitive rehabilitation programming, the possibility exists for Aboriginal peoples to be in conflict with current rehabilitation services. Having set the stage for the problem, it was then necessary to describe the quantitative and anecdotal evidence that was found in the literature to suggest that Aboriginal clients have less successful rehabilitation experiences than non-Aboriginal clients.

In order to answer the main question of the nature of the relationship between ethnicity and functional outcome and LOS in rehabilitation, two main subjects had to be reviewed. The first subject focused on the FIM instrument, and the second focused on Aboriginal peoples and rehabilitation. An extensive literature search of these two general subjects was conducted using the following databases: PubMed (1980-1999), MEDLINE (1966-1999), CINAHL (1982-1999), Bibliography of Native North Americans (1980-

1999), PsycLIT (1971-1999), Social Work Abstracts (1977-1999), Sociological Abstracts (1963-1999), HealthSTAR (1990-1999).

Inclusion Criteria: The criteria used for inclusion in the literature search were as follows:

- Indians, North American, or Aboriginal, or Registered Indian, or Native American, or North American Native, or Native Indian, or First Nations and Rehabilitation
- Indians, North America and
    - SCI, and rehabilitation
    - Stroke, and rehabilitation
    - Amputees, and rehabilitation
    - TBI, and rehabilitation
    - Head Injury, and rehabilitation
    - Disability
    - Disability and rehabilitation
    - FIM
    - Rehabilitation outcome
    - Utilization of health care services
    - Health care services
    - Traditional therapies
    - Traditional medicine
    - Alternative treatment
- Ethnic groups and rehabilitation
- Functional Independent Measure (FIM)
- FIM and
    - Reliability
    - Validity
    - Ethnicity
    - Race
    - Socioeconomic status
    - Income
    - Education
    - Length of Stay
    - FIM Change
    - Motor FIM Change
    - Cognitive FIM Change
    - Age
    - Gender
    - Sex
    - Marital Status

- Living Setting
- Pre-admission Living Setting
- Stroke
- TBI
- SCI
- Amputation

Exclusion Criteria: The criteria used for exclusion in the study were as follows:

- Not India
- Not drug or alcohol rehabilitation
- Non-English language

As a result of the search, over 1500 abstracts were reviewed on U-Search. Of these 1500 abstracts, 200 articles were deemed most relevant to this study and were obtained from journals for a more thorough review.

2.2 Overview of Rehabilitation

Rehabilitation philosophies and goals are holistic in nature. Unlike most services offered through contemporary health-care systems, rehabilitation practitioners work in multidisciplinary teams that address a broad range of needs in order to rehabilitate the entire individual. Rehabilitation providers acknowledge that, "disability is a natural part of the human experience...people with disabilities have the right to live in their communities, to interact with individuals in the broad mainstream of society, to be employed in meaningful jobs, to be independent, to make choices about daily living, and to participate in decisions about the services they receive".(14) Therefore, in theory, rehabilitation is concerned with more than simply reducing disability. Toubbeh describes the purpose of rehabilitation programs as follows:

> The viability of a health, habilitation, and rehabilitation delivery system is premised on its potential to provide a broad range of services based on the needs of a population within a particular geographic environment. By definition, such a system should provide comprehensive and continuous services to its clients, should be responsive to all of the needs of the individual, and should have the

> capacity to ensure that diseases or disabling conditions minimally impede the individual's optimal social, psychological, educational, vocational, and avocational development. Considering the totality of the individual's needs, the system should also ensure cultural-linguistic and family integrity, income maintenance, as well as the quality and quantity of services it renders.(13)

The goal of rehabilitation is to help individuals with handicaps live rewarding lives.(19) Another author suggests that the goal in rehabilitation practice, in a holistic sense, is to enhance total healing. There has been an increasing recognition of the value of a holistic framework for rehabilitation practice. Service providers acknowledge that it is imperative for rehabilitation providers to view clients, specifically Aboriginal clients, in their entirety rather than as a disease entity.(17)

In practice, however, the actual delivery of rehabilitation services is often not as holistic as espoused by its philosophies and goals. Emphasis is often placed on physical outcomes, with less concern for the patients' emotional, spiritual and mental outcomes. This idea is indicated by the significance rehabilitation practitioners attach to measures of functional outcome, which are most consistently used by rehabilitation programs to uniformly measure clinical progress and program effectiveness.(20,21)

This lack of effort to address the emotional, spiritual and mental components of one's being within rehabilitation medicine may be particularly significant to Aboriginal peoples. Rehabilitation medicine was developed within a Western bio-medical context, and as such, does not incorporate an Aboriginal perspective or worldview.(7)

Aside from the obvious domination of the Western bio-medical model, Aboriginal peoples face a number of other challenges within rehabilitation medicine. The disparity in socio-economic status between Aboriginal and non-Aboriginal people is a significant barrier to increased health status.(10) Aboriginal peoples are more likely than

Canadians overall to have a disability. A large proportion of these Aboriginal people with severe disabilities have unmet needs.(12) The First Nations and Inuit Regional Health Survey concluded that disparity exists in how rehabilitation services are distributed. Aboriginal peoples must often relocate to urban centres in order to seek intensive, multidisciplinary rehabilitation interventions. This relocation often means leaving behind their homes and support systems. Upon returning to their communities, Aboriginal peoples must depend on the support of their family, friends, and nursing personnel who may have inadequate resources to provide support.(7) As well, Aboriginal peoples often have to cope with racism and prejudice of rehabilitation service providers.(12)

In order to get a better understanding of the experience of Aboriginal peoples in rehabilitation medicine, this literature review will further examine the impact of socioeconomic disparity on Aboriginal peoples rehabilitation outcomes, and will compare and contrast the Aboriginal and non-Aboriginal perspectives of health, well-being and rehabilitation.

2.3 Health and Socio-Economic Status and Rehabilitation Outcomes

Waldram et al states that Aboriginal peoples today experience the kinds of health problems most closely associated with various types of social and economic disadvantage, yet they also suffer from problems linked to their historical position within the Canadian social system. The health of Aboriginal peoples of Canada is determined by a broad range of physiological, psychological, spiritual, historical, sociological, cultural, economic and environmental factors. Cultural differences are not the only cause of differences in health outcome and health care utilization between Aboriginal and non-Aboriginal people. Socioeconomic status and health are inextricably linked. Waldram et

al emphasise that, not only are cultural differences present, but that a significant risk factor to the health of Aboriginal peoples in Canada is lower socioeconomic status.(4)

This idea of Aboriginal health being determined by a broad range of variables is supported by current research. The determinants of health include the social environment, the economic environment, physical environment, human biology, access to health care, lifestyle and behaviour, nutrition, and maternal health, and early childhood development.(22,23) The socioeconomic environment refers to living and working conditions in both the economic and social realms. Key influences on health in the economic dimension of the environment include income and income distribution. Major determinants on the social side of the environment include education and literacy, employment and working conditions, levels of social support, violence in the community and in the home, civic participation, and voluntarism.(10) Socioeconomic status as a causal factor of health has been debated; however, the literature suggests that there is growing support for the recognition and importance of social and economic environments as being determinants of health.(24) It is argued that improvements in Aboriginal peoples' health will come about when, 1) the socio-economic conditions faced by Aboriginal peoples are improved, 2) more attention is given to the broad determinants of health, and 3) Aboriginal peoples directly participate in the health reform process.(25)

The socioeconomic disadvantage of Aboriginal peoples is evident by a number of indicators. The unemployment rate for Aboriginal peoples is almost 25 percent versus the 10 percent of the general population. Seventy-five percent of respondents to the 1992 Aboriginal Peoples Survey felt that unemployment was a major problem facing Aboriginal communities. Aboriginal peoples have lower income levels than non-

Aboriginal people. Almost 20 percent more Aboriginal peoples than non-Aboriginal peoples have annual incomes of less than $10,000.(9) The housing, living conditions and infrastructure of Aboriginal peoples are considerably lower than the national standards set by the federal government.(4) In 1995, about 44% of the Aboriginal population lived in low-income situations(8).

This socioeconomic disadvantage, in part, determines the general health status of Aboriginal peoples.(9) Canadians with low incomes are more likely to suffer illnesses and to die early than Canadians with high incomes.(10) In 1990 the death rate for Aboriginal peoples was 1.7 times greater than that of the general population, the leading cause of death for Aboriginal peoples were injury and poisoning. The rate of death due to unintentional injuries, which includes injuries because of motor vehicle accidents, firearms, drowning, fires, and suicide, in Aboriginal communities was two to seven times greater than for the general population. The Aboriginal death rate from circulatory disease was similar to that of the general population. However, the 1997 First Nations and Inuit Regional health Survey indicated that the age-adjusted prevalence rate of hypertension was 3 times greater, for both men and women, among Aboriginal peoples than non-Aboriginal peoples. Diabetes was identified as the most serious chronic disease among Aboriginal peoples in Western Canada. The age-adjusted prevalence rate for diabetes was 3 times greater for Aboriginal men than for non-Aboriginal men, and 5 times greater for Aboriginal women than for non-Aboriginal woman.(10) Rates of alcoholism and substance abuse were also greater among Aboriginal peoples than non-Aboriginal people.(11)

Results from the Aboriginal Peoples Survey (APS) in 1991 indicated that Aboriginal peoples are far more likely than Canadians overall to have a disability (defined as self-perceived limitations in sensory, mobility, agility, or other physical and psychological abilities, which had lasted or were expected to last six months or more) regardless of their cultural origin, geographic location, or treaty status. The age-standardized disability rate among the adult Aboriginal population in 1991 was more than double the national rate: 31% versus 13%. For both Aboriginal and the total Canadian adult population, higher levels of education were associated with lower rates of disability. For 15-24-year-olds, the Aboriginal disability rate was more than three time the corresponding Canadian figure: 22% and 7%. These rates are consistent with the relatively higher rates of illness and death for Aboriginal youth arising from accidents, violence, and suicide. The APS found that 38% of Aboriginal people with severe disabilities had unmet needs.(12)

The results of the literature search have revealed that very little, if any, research has been conducted using functional outcome measures to examine the relationship between socioeconomic status and rehabilitation outcomes. The findings of an American survey examining the racial differences in the risk of disability among black and non-black elderly Americans indicate that the differences may be largely attributable to socioeconomic and health-related factors and there were no consistent racial differences found in self-assessed recovery from disability.(26) Studies examining socioeconomic status and rehabilitation outcome of Aboriginal patients seem to be non-existent. How socioeconomic status effects the health of Aboriginal patients within inpatient rehabilitation programs is not clear.

Therefore, the proposed study may contribute in a limited way to the sparse evidence base examining the relationship between socioeconomic status and rehabilitation outcomes.

2.4 Comparison of Aboriginal and Non-Aboriginal Worldviews, and Perceptions of Health, Wellness, Disability and Rehabilitation

This study utilized a measurement instrument that was firmly rooted in the Western-biomedical model of rehabilitation and examines only one aspect of the rehabilitation experience—the physical outcome. However, this author acknowledges that in order to gain a thorough understanding of Aboriginal rehabilitation experiences as a whole, this literature review had to attempt to identify the cultures, values, and beliefs of Aboriginal peoples. One cannot address the health and healing of Aboriginal peoples without a broad understanding of Aboriginal peoples' holistic approach to health and wellness, worldviews and perceptions of disability and rehabilitation. Therefore, this literature review provides the broad context needed to better understand the findings of this study. It should be made clear at the outset that this study did not attempt to measure the concepts and perceptions of Aboriginal health, wellness, worldviews, disability and rehabilitation. Rather, this study measured only the functional outcome of rehabilitation among Aboriginal and non-Aboriginal patients. The broad context that is described in this chapter will only be used to inform the discussion of the results of this study, and to draw inferences from this context.

As a starting point for this literature review, it was important to gain a basic understanding of Aboriginal peoples' perceptions of health by comparing Aboriginal and the dominant societies' concepts of health. In 1986 the World Health Organization defined health as:

> The ability to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment. Health is therefore a resource for everyday life, not the object of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities.(27)

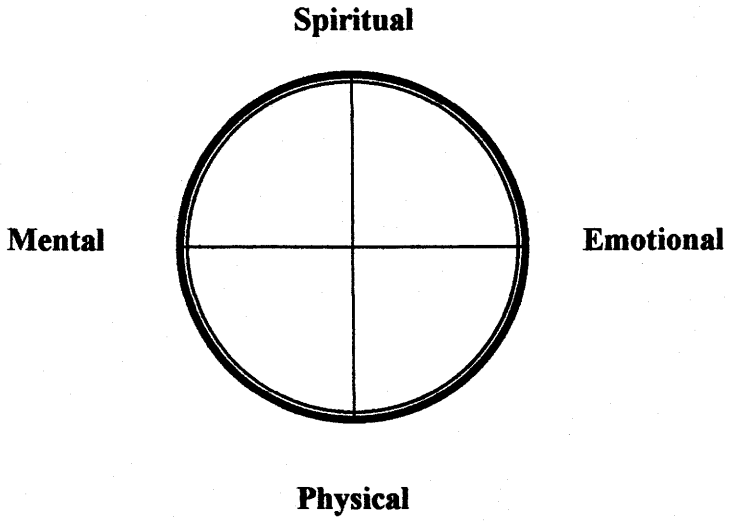
It was more difficult to arrive at an all-encompassing Aboriginal definition of health because of the diversity of Aboriginal cultures and beliefs. However, there is a holistic concept that is generally accepted among Aboriginal peoples. Aboriginal health may be defined as "...evolv[ing] around the whole being of each person—the physical, emotional, mental and spiritual aspects of a person being in balance and harmony with each other as well with the environment and other beings".(28) It is clear that the WHO and Aboriginal definitions are compatible. The Royal Commission on Aboriginal Peoples (RCAP) concluded that health and welfare systems should reflect the interconnectedness of body, mind, emotions and spirit—and of person, family, community and all life—which is essential to good health from an Aboriginal point of view:

> The Native concept of health...is said to be holistic because it integrates and gives equal emphasis to the physical, spiritual, mental and emotional aspects of the person. The circle is used to represent the inseparability of the individual, family, community and world...The circle (or wheel) embodies the notion of health as harmony or balance in all aspects of one's life....[Human beings] must be in balance with [their] physical and social environments...in order to live and grow. Imbalance can threaten the conditions that enable the person...to reach his or her full potential as a human being.(1)

The present study of functional outcome is a part of the physical component of the Medicine Wheel (Figure 1); therefore, should be considered as only the first stage of a balanced, holistic examination of Aboriginal peoples' experiences in rehabilitation. The Medicine Wheel makes evident the fact that Aboriginal peoples' rehabilitation experience can not be limited to the physical component, rather, a basic understanding of Aboriginal

peoples' worldviews, as described in this literature review, was also needed to appropriately inform the results of this study.

Figure 1. The Medicine Wheel (2)



One's worldview is very much dictated and influenced by culture and society. Some general commonalties exist among individuals within cultures and differences often exist between cultures. Pichette et al.(29) have outlined and contrasted basic components of Aboriginal peoples' world views with those of the non-Aboriginal dominant society:

Table 2.4.1: American Indian and Anglo Worldviews Contrasted(29)

American Indian	Anglo
Group-life is primary	The individual is primary
Respects elders, experts, and those with spiritual powers	Respects youth, success, and high social status
Time and place viewed as being permanent, settled	Time and place always negotiable; plans for change
Introverted; avoids ridicule or criticism of others if possible	Extroverted; seeks analysis and criticisms of situations
Pragmatic; accepts "what is"	Reformist: changes or "fixes" problems
Emphasizes responsibility for family and personal sphere	Emphasizes authority and responsibility over a wide area of social life
Observes how others behave; emphasis on how others "behave", not on what they say	Eager to relate to others, emphasize how others "feel" or "think"
Incorporates supportive non-family, or other helpers, into the family network	Keep the networks of family, friends, and acquaintances separate
Seeks harmony	Seeks progress

Society has also created the values, norms, attitudes, and perceptions that have shaped the nature and definition of disability.(30) A number of disablement models exist, which use differing terminology, however, all models tend to describe the three main domains of disablement: 1) organ system performance; 2) performance of activities of daily living (ADL) at the person level; and 3) role performance as a member of society.(31) The most common and accepted definitions of impairment, disability and handicap come from the World Health Organization's (WHO) International Classification of Impairments, Disabilities, and Handicaps:(32)

> **Impairment:** "any loss or abnormality of the psychological, or anatomical structure or function: Impairments are disturbances at the level of the organ.

> **Disability:** "any restriction or inability (resulting from an impairment) to perform an activity in the manner or within the range considered normal for a human being". This describes a functional limitation or activity restriction caused by an impairment. Disabilities are descriptions of disturbances in function at the level of the person.
>
> **Handicap:** "any disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfillment of a role that is normal...for that individual". The classification of handicap is a classification of circumstances that place individuals "at a disadvantage relative to their peers when viewed from the norms of society". The classification of handicap deals with the relationship that evolves between society, culture and people who have impairments or disabilities, as reflected in people's life roles.

Given that the WHO model of disablement is most widely accepted within rehabilitation, and that there is an absence of a formal Aboriginal model of disablement within rehabilitation, this study will use the WHO terminology to identify the above described three major domains of disablement.

Pichette (Table. 2.4.1) describes differing worldviews of Aboriginal clients in rehabilitaiton as possibly impacting how the clients approach challenges and problems, where they seek solace, what they accept as the cause of their disability, how they define their disability, from whom they seek care, how they relate to rehabilitation service providers, and with whom they place their trust.

Causation of an impairment and resulting disability may be viewed differently by Aboriginal people. Marshall et al.(33) explain that the Navajo culture believe that disability is a result of a breach of the natural laws. Some Aboriginal languages and cultures do not have a word for disability, or may define disability in a less rigid medical manner:

> ...a "true" disability in an American Indian may occur when a person has few or weak relationships with others within the tribal community. This definition may explain the reluctance of an American Indian family to seek additional or outside care for someone who has a severe disability. This reluctance may derive from

> the American Indian worldview in which the relationship or the network of relationships within the tribe is the most important factor for the person with the disability.(29)

Just as impairment, disability and handicap are defined by the culturally dominant society, the rehabilitation model is based on a set of values that determine the way rehabilitation services are organized and offered. Aboriginal clients who come into contact with rehabilitation services may also possess certain cultural values of rehabilitation. Often the values of the service provider and the client are not harmonious. The results of this disharmony are that service providers often view Aboriginal patients as uncooperative, unmotivated, disinterested and non-compliant.(34)

Lowrey has outlined the general values and culture of rehabilitation within the current health care system, and has described the nature of alternative values and cultural components of rehabilitation among Aboriginal populations.(35)

Table 2.4.2: Values of rehabilitation and alternative values(35)

Values of Rehabilitation	**Alternative Values**
Individual responsibility	Interdependence with family and community
Work whenever possible	Work as needed
As much education as possible	Education as needed
As much income as possible	Income as needed
Help from institutions	Help from family and friends
Concern for the future	Concern for the present
Security in the accumulation of material things	Security in mutual sharing
Success measured by individual achievement	Success measured by harmonious living

Table 2.4.3: Components of the culture of rehabilitation and alternative cultural components(35)

Culture of Rehabilitation	Alternative Culture
Individualized services	Community or family services
Linear and future oriented	Nonlinear and present oriented
Sequential and compartmentalized	Nonsequential and holistic
Specialized team	One person serving all needs
Scientific and objective	Supernatural, subjective
Written word	Spoken word
Goal/future orientation	Spontaneous/present orientation
Intervention	Nonintervention

Marshall et al.(36) caution against the "cookbook" approach or overgeneralization of Aboriginal cultures, values and belief systems. This approach, they suggest, results in the construction of an icon of a Pan-Indian culture and leads to the false assumption that all Aboriginal peoples hold the same values, beliefs and cultural identification. Instead, the researchers suggest that rehabilitation service providers develop cultural-competence, which is the ability of individuals to see beyond the boundaries of their own cultural interpretations and to remain sensitive when working with individuals from differing cultures. However, one may view a general understanding of Aboriginal cultures and worldviews as an essential first step to understanding the needs of individual Aboriginal patients. Rehabilitation service providers should acknowledge that generalization must be used with caution, and that in order for rehabilitation efforts to be successful the services must be culturally appropriate for *each* client.(37) This warning against the

'cookbook' approach is also true for the various multi-cultural groups that have been lumped into the category, 'non-Aboriginal' for the purposes of this study.

Having acknowledged that Aboriginal peoples generally tend to have lower socioeconomic status, and different worldviews, perceptions of health, wellbeing, healing, and rehabilitation than non-Aboriginal people, what evidence is there that would suggest that Aboriginal peoples have different rehabilitation experiences than non-Aboriginal people?

2.5 The Existing Evidence for the Differing Outcomes of Rehabilitation Programs between Aboriginal and Non-Aboriginal Patients

2.5.1 The Functional Outcome of Aboriginal Patients

Quantitative research examining the rehabilitation experience, specifically the functional outcome, of Aboriginal peoples is very limited. A study conducted between 1994 to 1997, at the Saskatoon City Hospital, with Aboriginal and non-Aboriginal rehabilitation patients, concluded that Aboriginal patients presenting with traumatic brain injury (TBI) differed from non-Aboriginal patients with respect to the rate of alcohol involvement in the initial injury, rate of pre-discharge planning, and availability of post-discharge resources.(38) Blackmer and Marshall did not find significant differences between the FIM scores for Aboriginal and non-Aboriginal patients; however, the researchers did not control for potential confounding variables in their analysis. Also, the Blackmer and Marshall study only examined patients with TBI. Therefore, a study examining all the major impairment groups and controlling for confounders is needed to get a better understanding of the differences between Aboriginal and non-Aboriginal patient outcomes.

2.5.2 Observational Accounts of Outcomes of Rehabilitation Programs Offered to Aboriginal Patients—The Significance of Culturally Sensitive Rehabilitation Program Delivery

There is a paucity of research that specifically examines the Aboriginal rehabilitation experience. Most of the existing research in this area is observational or anecdotal. Few studies have systematically studied the nature and the extent of the issue of Aboriginal peoples participating in intensive, multidisciplinary rehabilitation programs.(18) Giordano and D'Alonzo have suggested that traditionally organized rehabilitation programs have been largely unsuccessful with individuals from minority groups.(14) A number of researchers have argued that this apparent lack of success is because of the incongruity between the philosophy and assumptions of traditionally organized rehabilitation programs, and the world views and values of minority cultures.(14)

Baker et al. (39) state that, over a lifetime, each person develops an explanatory model (EM) as a result of socialization and cultural membership. The EM is a framework for organizing experience, knowledge, manifestation and expectations of illness:

> Explanatory models encompass the cultural idioms, labels, and metaphors that people use to talk about illness. In addition, they characterize beliefs about etiology, associated signs and symptoms, predisposing social situations, and perceived treatment alternatives...Physicians, nurses, and other allied health professionals possess their own distinct explanatory models, typically embodied in the *International Classification of Disease,* 9th edition. This "medical" explanatory model is acquired through extensive training: another form of socialization. Consequently, health care encounters can be seen as the negotiation of explanatory models between patient and provider. Patient satisfaction, compliance with medical regimens, and even recovery time appear to be closely tied to the successful alignment of these conceptual frameworks (p.187).

The researchers conclude that successful rehabilitation is dependent not only on the technical knowledge and skill of the service providers, but also on the rehabilitation team's appropriate acknowledgment of differing explanatory models among staff and patients. Locust argues that the provision of holistic rehabilitation services that promote strong harmony may be the critical difference between a successful or unsuccessful rehabilitation experience.(15)

A number of authors have suggested that many barriers exist to the delivery of successful rehabilitation programs to Aboriginal clients. Morgan et al.(16) conclude that the traditional rehabilitation model is likely inappropriate for use with American Indians because the model often does not take into consideration the values, beliefs, culture, language, and traditional healing practices of Aboriginal clients.

The results of a 1988 survey conducted among a sample of occupational rehabilitation counselors indicated that a lack of understanding of cultural differences was a major barrier to rehabilitation service delivery for both urban and rural Aboriginal peoples. It is interesting to note the differences found between the counselors who worked with urban Aboriginal clients and those who worked with on-reserve Aboriginal clients. Only 17% of the counselors on-reserve stated that their clients' cultural beliefs were often/almost always consistent with the philosophy of vocational rehabilitation compared to 41% of those counselors off-reserve. The majority of both groups agreed/strongly agreed that clients who are more acculturated to the dominant society are successful during rehabilitation.(40) McRae (17) concludes that, continued non-compliance, failure and frustration has occurred and will continue to occur in the

rehabilitation of Aboriginal clients unless rehabilitation staff work to develop more culturally relevant practice.

Based on the results of a survey administered to disability service directors and coordinators in the U.S., Xueqin Ma concluded that priority should be given to research that evaluates outreach and rehabilitation programs to determine their efficacy with Aboriginal patients.(18)

2.5.3 Observations by SCH Rehabilitation Program Staff

The staff of the Department of Physical Medicine and Rehabilitation has expressed support for the proposed study. Staff members have suggested that differences appear to exist in the rehabilitation of Aboriginal patients and non-Aboriginal patients; however, this pervasive idea has not been quantified or adequately examined. By determining 1) whether differences in rehabilitation experiences do exist, and 2) the nature of these differences, both Aboriginal patients and service providers will benefit.

CHAPTER THREE

THE FUNCTIONAL INDEPENDENCE MEASURE

3.1 Introduction

This chapter is the second part of the literature review, which focuses on the Functional Independence Measure. Included in this chapter is the rationale for the use of the Functional Independence Measure (FIM). This chapter also contains a description of the administration of the FIM instrument, the FIM measurements, the ordinal nature of the FIM data, the reliability, validity, sensitivity, predictive nature, and the limitations of the instrument. The chapter concludes with a description of the functional, biological, and sociodemographic variables chosen from the FIM database that were deemed clinically, biologically, or sociologically meaningful covariates in the primary relationship between ethnicity as a risk factor, and functional outcome and length of stay (LOS) as dependent variables.

3.2 Rationale for the Use of the FIM Measure

By defining the rehabilitation process as a series of interventions intended to minimize disablement (impairment, disability and handicap), each of the domains within the model of disablement may ultimately be viewed as the most relevant and significant outcome measurements for rehabilitation.(41) Whiteneck(31) outlines the goals of rehabilitation, using the WHO model of disablement, as follows: 1) acute rehabilitation's goal is effective medical management of impairment, 2) the immediate goal of

rehabilitation of medically stable patients is the maximization of functional independence and the minimization of disability for a given level of impairment, and 3) the ultimate goal of rehabilitation is to minimize handicap by reintegrating people with disabilities into their communities as active, independent, productive members of society. Because the proposed study examines an inpatient rehabilitation program, in which the patients are medically stable, the study will utilize the Functional Independence Measure (FIM)® to determine the functional independence at discharge, and change in severity of disability within the study population. The FIM is the most widely used functional assessment instrument in the world.

Due to a lack of uniform measurement and data on disability and rehabilitation, a national task force, sponsored by the American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation, developed the FIM to: 1) assess the level of disability among all impairment groups, 2) reflect the cost of disability in terms of consumption of social and economic resources, 3) be discipline-free, reliable, simple to use, and completed by clinicians within a short period of time, 4) be consistent with terminology used by clinicians to describe disability, 5) be sensitive to change over the course of a comprehensive medical rehabilitation program, and 6) be a meaningful element within the broader context of measurement of health status and quality of life.(20) The FIM instrument describes an individual's functional abilities and limitations in terms of activities required to support the physical aspects of daily living. The purpose of the FIM data set is to document the severity of a person's disability,

® The FIM instrument and its copyrights are owned and maintained by the Uniform Data System for Medical Rehabilitation (UDSMR℠)(42)

functional abilities and limitations, and the effectiveness and efficiency of the outcomes of medical rehabilitation.(21)

3.3 Administration of the FIM Instrument

The FIM instrument can be administered by clinician raters (occupational therapists, nurses, physical therapists, speech/language pathologists, physicians, and program evaluation/quality improvement coordinators) who are trained using independent study, training videos, or training workshops. In order for a facility to submit data to UDS_{MR} raters must undergo credentialing. Raters must have credentials renewed every two years. It is recommended that all personnel who have input into FIM scoring should be tested. In order to achieve credentials, 80% of clinicians tested must pass. The passing score of 80% or more is required.(42) The Department of Physical Medicine and Rehabilitation at SCH undertakes the recredentialing process regularly. In 1997, 29 raters were tested, all of which passed. In 1999, 40 staff were eligible to be tested, 36 were tested, and 33 passed. Therefore, the department has maintained its credentials. The FIM instrument may be administered in 10-40 minutes, depending on the rater's familiarity with the instrument.

3.4 Description of the FIM Measurements

The FIM instrument is comprised of 18 items, with a 7-level ordinal response scale that assesses the severity of disability. Disability is defined as, "any restriction or lack of ability to perform an activity in a manner or within a range considered normal for a person of the same age, culture and education."(42) Disability is operationally defined as the need for assistance (cost of disability or burden of care) for a disabled person to perform basic life activities effectively.(21) The FIM instrument measures activities in

the area of self-care, sphincter control, transfers, communication, and cognition. The seven-level scoring scale includes two independent levels and five helper levels.

The FIM scores for each of the 18 items may be summed to create the *Total FIM* or FIM-18. This score ranges from 18-126, with the higher score representing total functional independence. The FIM data may also be reported in terms of the FIM *motor score* (the sum of the first 13 item scores), or the FIM *cognitive score* (the sum of the last 5 item scores). FIM motor scores range from 13-91 and FIM cognitive scores range from 5-35. FIM item scores may be summed to produce the following six subscale scores: *Self-care, Sphincter Control, Transfers, Locomotion, Communication,* and *Social Cognition.*(43)

3.5 Functional Independence Measurements

The FIM measures a variety of activities of daily living. They include:

Self-Care
1. Eating
2. Grooming
3. Bathing
4. Dressing-Upper
5. Dressing-Lower
6. Toileting

Sphincter Control
7. Bladder
8. Bowel

Transfers
9. Bed, Chair, Wheelchair
10. Toilet
11. Tub, Shower

Locomotion
12. Walk/Wheelchair
13. Stairs

Communication
14. Comprehension
15. Expression

Social Cognition
16. Social Interaction

17. Problem Solving
18. Memory

The FIM admission score is typically assessed within 72 hours of admission, and the FIM discharge score is assessed within 72 hours prior to discharge. Functional Improvement is a measure of the difference between FIM admission score and FIM discharge score. The FIM is a useful and reliable instrument to follow-up 80-180 days after patient discharge from rehabilitation.(44)

3.6 The Ordinal Nature of FIM Data

A number of studies have concluded that ordinal-level FIM raw scores should be transformed to interval-level scores.(43,45) Rasch analysis is a statistical technique for constructing interval measures from ordinal data designed to be unidimensional. Rasch analysis provides a more meaningful representation of the range of functional ability demonstrated by a patient.(46) Analysis has shown that the FIM instrument includes a motor domain and a cognitive domain that could be transformed into two separate interval-level measures that can accommodate most impairment groups. A study conducted by Heinemann et al concluded that one motor scale can accommodate all impairment groups, except patients with back pain and burns. Also, one cognitive scale is useful for all impairment groups except patients with strokes, brain dysfunction, and congenital impairments.(45) Rasch FIM scores range from 0 to 100 with 100 being total assistance on all items. Bunch et al. concluded that for practical purposes FIM scores may be used as if they were of equal interval spacing, and the scores of the various sections may be added together.

3.7 The Reliability, Validity and Sensitivity of the FIM Instrument

In order for the FIM instrument to be useful, it must be reliable, valid and sensitive to change. Reliability refers to the instrument's capacity to provide consistent information. Validity refers to the instrument's ability to gather information that is true. Finally, sensitivity refers to the ability of the instrument to detect meaningful change. Multiple studies have shown that the FIM instrument demonstrates acceptable reliability across a wide variety of settings, raters, and patients.(47) Stineman et al. concluded that the psycometric properties of the summated FIM compare favorably to most standardized health measures used in medical practice. It has high internal consistency (Cronbach's Alpha greater than 0.89)(48,49) and inter-rater (interclass correlation coefficient, ICC, range between 0.83 and 0.99 for all impairment groups) and intra-rater reliabilities of the seven-level FIM instrument have been demonstrated (ICC greater than 0.90).(50,51-56) Median and mean reliability coefficients for FIM motor items have been shown to be generally higher than for items in the cognitive or communication subscales (ICC range from 0.78 to 0.95).(47) A number of studies have also demonstrated face, concurrent, construct, and predictive validities of the FIM instrument.(21,53,57,58) The sensitivity, or precision of the FIM has been observed to be high.(20)

3.8 The Predictive Nature of the FIM Instrument

The FIM instrument is useful for its ability to predict certain outcomes for groups of patients, not individuals. This is important for planning programs, optimizing allocation of human resources and planning discharges. Admission FIM score has been shown to be an effective predictor of length of stay, disposition location and functional

status.(54,59-62) Specifically, Motor FIM at admission is the strongest predictor of LOS (63-65) and a strong predictor of physical disability after stroke.(66)

3.9 The Limitations of the FIM Instrument

The limitations of the FIM instrument are as follows:

1. The ordinal nature of FIM data,(45)
2. The "floor" and "ceiling" effects.(67,48,60) Ceiling or floor effects are the result of lack of precision, the ability of an instrument to detect meaningful change in level of function at the upper or lower end of the scale. If patients reach the maximum or minimum rating on a measure, more subtle improvement will not be detected. It has been argued that because of ceiling effects among TBI patients, FIM is an imprecise measure of functional level at follow-up after discharge from inpatient rehabilitation, and potentially even at discharge.(68) This study did not use post discharge FIM scores. Furthermore, one researcher has given a rationale for the ceiling effect seen at discharge in her study. Hall stated the following: Therapists often set goals very consistent with the items on the FIM, and rehabilitation discharge is not deemed appropriate until the patient has achieved those goals. The recent trend toward decreasing lengths of stay in inpatient rehabilitation will most likely lessen the ceiling effect as patients are discharged before maximum goals are reached as long as continuous improvement is demonstrated.(68) Stineman et al conducted an analysis of scaling assumptions, structure, and reliability across 20 diverse impairment categories and concluded that the range of items in the FIM appear to be appropriate for the inpatient rehabilitation setting. However, they cautioned against the application of FIM among nursing home or outpatient populations.(48) Stineman

argued that an application of the FIM among populations that are too able-bodied or chronically disabled could lead to the false conclusion that a person functioning below the floor or above the ceiling is not improving.

3. FIM has lower sensitivity for persons with brain injury and persons with high-level spinal cord injuries (SCI).(21,60) Research has shown that FIM demonstrates good reliability for SCI as an overall assessment, but a more precise measurement of function is required for quadriplegic subjects.(69)
4. The potential that alterations in FIM scores might be measuring patients' adaptation to environments of different complexities, and not only outcomes of rehabilitation.(43)
5. Other limitations of the FIM instrument include a dimensional weakness in the social and cognitive part of the instrument,(60) its being limited to some aspects of the disability area,(60) its insensitivity to change in speech/language,(67) and lack of information on psychometric properties (reliability and validity) of FIM with Aboriginal patients specifically.

3.10 Risk Factor Specification

The comparison of the functional outcome and LOS of Registered Indians and non-Registered Indians is the purpose of this research. Given that ethnicity is the primary risk factor of interest, its relationship to functional outcome and LOS must be analysed in the presence of potential confounding variables. Therefore, this literature review, along with the information gathered from rehabilitation service providers at City Hospital, identified the most relevant risk factors. The risk factors for this study were restricted to those that were gathered in the FIM database, and were deemed clinically,

biologically or sociologically meaningful. The effect of the risk factors on functional outcome and length of stay is often dependent on the particular impairment groups. That is, the strength of the associations varies across impairment groups. Given that this study examined five major impairment groups, it was important to include in the analysis all risk factors that were potentially related to the functional outcome for all impairment groups.(63) It must also be stated that no one risk factor, in isolation, can sufficiently predict functional outcome and rehabilitation LOS.(62) Therefore, functional, biological, and sociodemographic characteristics were considered simultaneously in the examination of functional outcome and LOS.(54)

3.10.1 Demographic Determinants

Based on an extensive literature review compiled by Heinemann and Linacre, gender, race, marital status and age at onset of impairment should be considered as potentially important risk factors for functional outcome among all impairment groups. (63)

Gender: Gender may be considered a potentially significant risk factor of functional outcome and LOS.(63) However, gender had been included as a risk factor in a number of studies examining a variety of impairment groups and no research was found that indicated that gender was a significant determinant of functional outcome and LOS.(70) Therefore, it was concluded that gender would be included in this study as a risk factor based on its potential biological significance rather than based on evidence of its significance found in the literature.

Age: Age is another independent variable that may be included in the study of functional outcome simply based on its potential biological significance; however, a

considerable amount of literature does exist that indicates that age is a significant predictor of functional outcome and LOS. Heinemann and Linacre stated that age should be considered within studies that examine functional outcome and LOS for all impairment groups. Younger patients attained greater motor function at discharge among most impairment groups that were examined, with TBI patients having the most significant relationship between age and discharge motor function. Age was also related to discharge cognitive function for patients with TBI and stroke, such that younger patients had higher levels of cognitive function at discharge.(63) Falconer et al. also concluded that age-associated factors may influence inpatient stroke rehabilitation referral, treatment, and outcome.(71) Another study examining stroke patients' outcome measures demonstrated that older age was a significant risk factor for slow rate of recovery and small FIM change.(70) Age was found to be a useful predictor of discharge FIM scores among rehabilitation patients presenting with TBI.(65) Older persons with TBI averaged a significantly longer rehabilitation length of stay, higher total rehabilitation costs, and lower rate of change on functional measures.(72) Differences in functional outcome existed between younger old (60s and 70s) and the older old (80s and 90+) patients in an inpatient geriatric rehabilitation program.(73)

The results of another study conducted among TBI patients concluded that there was no significant difference in the overall level of functioning at discharge among young, middle-aged and elderly individuals.(74) A study carried out among SCI patients aged 18 to 65+ concluded that functional outcome differed among younger and older patients. Younger patients showed the greatest improvement, while older patients showed the least change.(75) A number of studies concluded that age was a significant

predictor of LOS in stroke patients(54) and among TBI patients.(62) Older age among these patients was found to be predictive of shorter LOS.(63,70)

Ethnicity: The literature review compiled by Heinemann and Linacre demonstrated that ethnicity should be included as an independent variable for all impairment groups.(63) However, the literature search conducted for this study revealed that ethnicity was not often found to be significant determinant of functional outcome and LOS. A study conducted among firearm versus motor vehicle related SCI patients concluded that changes in FIM scores were not different among ethnic groups.(76) However, the ethnic groups included in the study were non-Latino white, African-American, and Latino. In a study conducted among TBI patients, minority status was not found to be a determinant of functional outcome.(77) A study examining black-white differences in risk of becoming disabled and recovering from disability found that there were no consistent racial differences in recovery from disability.(78)

A 1990 study conducted to predict stroke outcome among non-white and white patients in Michigan concluded that nonwhite patients had a greater risk of having a small change in functional status (<20 total FIM units). A study using three years of data from Rehabilitation Services Administration (RSA) in the United States concluded that Native Americans were significantly less likely to be rehabilitated than clients from the general population. It should be noted that FIM was not used as an outcome measure in the RSA study. The factors that contributed to the poor rehabilitation of Native Americans were identified as socioeconomic characteristics of the clients, the type of disabilities presented by the clients, and the inability of the counselors to locate clients and complete the rehabilitation plan.(79) In a 1999 study, Blackmer and Marshall examined differences in

initial injury, medical management and allocated resources among native North American and non-native North American patients admitted for inpatient rehabilitation following TBI. The researchers concluded that differences did exist between the two groups.(38) Once again, FIM was not used as the measure of outcome for the Blackmer study.

It is evident from the literature that ethnicity has the potential to be a determinant of functional outcome; however, the studies that analysed differences between ethnic groups were often limited to one impairment group, did not specifically compare Registered Indians and non-Registered Indians, and did not always use FIM as the outcome measure of interest.

Marital Status, and Living Arrangement Pre-admission and Post-discharge: The FIM instrument lacks any quantitative measurement of a patient's perceived social support. Therefore, measures of living arrangement are viewed among rehabilitation service providers as proxy measures of social support. The measures of living arrangement are considered to be linked to the physical and emotional support received by the patient prior to and post rehabilitation, which in turn may impact the functional outcome and LOS of the patient. These proxy measures must be viewed with caution in that some patients who are not married or are living alone may have perceptions of good social support, and those who are married may feel very much alone. However, for the purposes of this study, and because of the lack of any other social support indicator in the FIM, these measures will be loosely viewed as proxy measures.

Heinemann and Linacre suggested that marital status could be examined as a potential determinant of functional outcome and LOS for all impairment groups.(63)

Another study conducted in Michigan among stroke patients suggested that marital status was a determinant of stroke rehabilitation outcome. Stroke patients had a greater chance of being discharged to some setting other than home if they were not married and living alone.(70)

Vocational Category and Effort: Health status is directly related to economic status; therefore, the results of a study that does not examine the socio-economic status (SES) of the study population would have to be viewed with some skepticism. This is especially true when ethnicity is the main risk factor under study. As mentioned in the introduction, Aboriginal peoples in Canada are over-represented in the unemployed and low-income populations. Therefore, any examination of the differences between Aboriginal peoples and non-Aboriginal peoples should control for the potential confounding effect of economic status. The most commonly used measures of SES are education level, occupation and income level.(10) The only measures of economic status that are included in the FIM are vocational category and vocational effort. It goes without saying that a more accurate measurement of SES would have been appropriate for this study. However, vocational category and effort will be used as proxy measures of SES. As such, the results of this study must be viewed with this limitation in mind.

The literature review revealed a paucity of research that included vocational category and effort in the examination of functional outcome and LOS. One study conducted among stroke rehabilitation patients, concluded that vocational category was a significant determinant of functional outcome. Patients who were not working were more likely to be discharged to settings other than home, have a slower rate of recovery, and demonstrate small changes in functional status (<20 total FIM units).(70) The measures

of vocational category and effort must be used cautiously. It is important to take into account the possibility that disability affects employment and vocational status rather than employment and vocational status affecting disability.

3.10.2 Medical and Functional Determinants

Admit From: Patients in this study were either admitted from an acute unit of a medical facility, or from home. No literature was found that described the relationship between from where the patient was admitted and functional outcome; however, because it was assumed that a disparity in severity would exist between patients who did not have an acute impairment versus those who did, this risk factor was considered a possible confounder and clinically relevant.

Impairment Group: Impairment group is one of the most significant possible confounders in the relationship between ethnicity and functional outcome. The burden of care, functional outcome, and LOS vary depending on the impairment groups.(48) In 1992, the Uniform Data System for Medical Rehabilitation (UDS$_{MR}^{SM}$), compiled data for over 84,000 patients. Table 3.10.2.1 contains the total admission FIM mean, standard deviation, and mean age for major impairment groups for the study population.

Table 3.10.2.1: Total Mean FIM Scores and Mean Age of Patients At Admission(48)

Impairment Category	N	Total FIM Mean (SD)	Mean Age
Neurological			
Stroke	26,183	62.9 (21.5)	71.3
Nontraumatic brain injury	2,513	63.2 (24.3)	60.2
Traumatic brain injury	3,214	64.0 (29.0)	41.6
Nontraumatic spinal cord	2,609	75.2 (18.6)	64.6
Traumatic spinal cord	1,831	67.7 (21.5)	43.0
Guillain-Barré	388	71.9 (19.4)	55.7
Genderal neurological	3,558	74.3 (20.0)	62.2
Musculoskeletal			
Lower extremity fracture	12,445	76.4 (16.1)	77.6
Joint replacement	12,658	86.0 (14.2)	73.9
Other orthopedic	3,715	80.2 (16.2)	72.2
Lower limb amputation	3,256	83.9 (17.3)	68.3
Other amputation	211	84.3 (17.5)	67.3
Osteoarthritis	1,651	86.1 (16.2)	74.7
Rheumatoid arthritis	1,469	84.6 (18.5)	70.3
Miscellaneous			
Cardiac	1,038	81.9 (18.8)	74.2
Pulmonary	1,075	82.2 (21.2)	70.4
Pain	1,591	99.2 (21.1)	58.5
Major multiple trauma (MMT)	534	78.9 (16.7)	53.8
MMT with brain/spine	435	63.3 (24.4)	42.1
Other	4,163	76.9 (18.6)	71.4
Total	84,537		

The total admission FIM score range for the same five impairment groups that were examined in the present study was 62.9 ±21.5 (stroke) to 84.3 ±17.5 (amputations). The mean age of the patients in the five impairment groups also ranged from 41.6 (TBI) to 71.3 (stroke). Therefore, the potential effect modification of age on the relationship between impairment group and functional outcome and length of stay had to be considered in the multivariate analysis for the present study.

Comorbidity: The effect of comorbidities on the primary relationship between ethnicity and functional outcome and LOS is not examined in the literature. However, it may be assumed that the presence or absence of a comorbidity may confound the primary relationship. A number of studies have suggested that the presence or absence of

comorbidities may be a predictor of functional outcome and/or LOS in stroke, amputation and TBI rehabilitation patients.(71,62,66,80,81) One researcher, examining the rehabilitation outcome of stroke patients, commented that most research often erroneously neglects to include medical comorbidities as an independent variable.(64)

3.10.3 Including Admission FIM Scores as Baseline Data

Admission FIM Total, Admission Motor FIM, and Admission Cognitive FIM were all included in the analysis of the present study to control for the differences in the baseline scores of each patient. For example, a patient who had a very high admission FIM score would have a smaller FIM change than a patient with a lower admission FIM score but an equivalent discharge FIM score. The two patients would have the same level of functioning upon discharge, but the latter patient would have improved more. Controlling for these differences was particularly important for certain impairments where the proportion of Aboriginal peoples and non-Aboriginal peoples was significantly different. Also, a number of studies have demonstrated that admission FIM scores are strong predictors of patients' LOS for all impairment categories.(82)

Admission FIM: A number of studies examining stroke rehabilitation patients concluded that the absolute admission FIM score was the best predictor of outcome disability(61)and a good predictor of LOS.(54) A low admission FIM score was the most predictive factor for LOS, but was a poor prognosticator for an individual patient.(70) A study conducted among TBI patients indicated that admission FIM was the strongest predictor of functioning at discharge. (83) One study concluded that admission FIM score was not useful in predicting successful prosthetic rehabilitation in

lower extremity amputee patients and that only the motor subscore at discharge correlates with the use of prosthesis.(84)

Admission Motor FIM: Admission motor FIM was found to be the best predictor of LOS for nearly all impairment groups.(20,59,63) A study conducted among stroke rehabilitation patients concluded that motor FIM was a main predictor of LOS.(64) Admission Motor FIM was also found to be a useful predictor of discharge FIM scores, especially among rehabilitation patients presenting with TBI,(65) and stroke.(85)

Admission Cognitive FIM: Admission Cognitive FIM has been shown to be an important predictor of LOS among specific impairment groups. Greater cognitive function at admission was associated with shorter LOS for patients with TBI; however, less cognitive function was associated with shorter LOS for patients with stroke. Admission cognitive function was found to be the most powerful predictor of discharge cognitive function in that patients admitted with greater cognitive function were discharged with greater cognitive function. Impairment group-specific information was unrelated to discharge cognitive function. Admission cognitive function explained differences in impairment group differences. Greater admission cognitive function also had a significant relationship with discharge motor function in TBI, SCI, stroke and amputation impairment groups.(63)

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter describes the design, setting, data source, variables used, and data analysis methods used in this study. The study design section includes the inclusion/exclusion criteria used to control for the potential confounding of specific variables. The setting section describes the inpatient rehabilitation programs in the Department of Physical Medicine and Rehabilitation located in Saskatoon City Hospital, and Wascana Rehabilitation Centre in Regina. The data source and variables used sections are continuations of the description of the variables described in chapter two. Finally, the analysis section is a description of the data preparation, univariate analysis, bivariate analysis, and multivariate analysis procedures that were utilized for this study.

4.2 Study Design

This study utilized already existing data collected by the Department of Physical Medicine and Rehabilitation at the University of Saskatchewan, Saskatoon and the Wascana Rehabilitation Centre, Regina, between January 1, 1994 and August 31, 1999. The study population consisted of all patients who were admitted to the rehabilitation in-patient facilities between the above dates. The initial database consisted of 2450 patients, 1170 from Saskatoon and 1280 from Regina.

The retrospective data was used to examine the overall FIM scores of the study population in order to determine whether or not differences existed in the functional outcome of Aboriginal and non-Aboriginal patients within the inpatient rehabilitation program. The FIM Database contained a wide range of clinical and patient-related information (refer to Appendix B for a complete list of variables available in the FIM database).

In order to control for the potential confounding of the primary relationship between the independent variable, ethnicity, and the outcome measures by certain covariables, the exclusion criteria used for the study were as follows:

1. The patients' admission class had to be coded as '1=Initial Rehabilitation'. Patients who had the codes 2 to 5 (2-short stay evaluation, 3-readmission, 4-unplanned discharge, 5-continuing rehab) were excluded. Exceptions to this criterion were patients who were discharged over Christmas and Easter breaks, when the rehabilitation departments were closed, and then promptly readmitted at the end of the holiday breaks. For these cases the initial admission FIM and the final discharge FIM were counted as a single rehabilitation event. Therefore, the first discharge and the second admission FIM scores were omitted. Only the first Initial Rehabilitation event was included for patients who had two or more Initial Rehabilitation codes.
2. In order to control for confounding by reducing the heterogeneity of the data, cases were restricted to those cases who indicated that their pre-hospital living setting was at home (code=1).

3. Study cases were also restricted to those who were discharged to home (code=1). Cases were excluded if they died while an inpatient in the rehabilitation programs.
4. Cases were excluded if they were coded as having 'partial' or 'no' English skills. This exclusion criterion ensured that language as a potential barrier to functional independence (especially to cognitive FIM scores) applied equally to Non-Aboriginal and Aboriginal patients.

4.3 Setting of the Study

The study was based at two settings. First, a university based tertiary rehabilitation center in Saskatoon, Saskatchewan. The rehabilitation center is comprised of the University of Saskatchewan's Department of Physical Medicine and Rehabilitation and Saskatoon District Health's Rehabilitation Services. The rehabilitation center is based out of Saskatoon City Hospital (SCH) (the SCH program serves patients from the surrounding area and all of northern Saskatchewan). Second, The Wascana Rehabilitation Centre, Regina, Saskatchewan. The Wascana program serves the remainder of the province.

The inpatient rehabilitation programs under study provide comprehensive, multidisciplinary rehabilitation services offered by physiatrists, medical residents, nursing staff, physiotherapists, occupational therapists, speech pathologists, social workers, recreation therapists, therapy assistants, dietitians, porters, and medical and physical therapy students. The rehabilitation team offers each patient approximately three hours of supervised rehabilitation per day.

Physiatrists admit patients based on the results of an initial consultation with each patient. The specific admission criteria have not been standardized within the SCH program; however, the program administrators and staff are currently examining these criteria. In general, for admission, patients should present with the following: 1) a desire, willingness and motivation to participate in the program, 2) rehabilitation goals, 3) the cognitive capacity to learn and communicate, 4) a Functional Independence Measure (FIM) total score of approximately 50 or less, and 5) medical stability. However, exceptions are made for patients who are not medically stable in the following cases: 1) admission is a trial-run, 2) the patient's family needs to learn the necessary skills to care for the patient, 3) if the patient meets the first three general criteria, and the acute care facility from which the patient was discharged is willing to readmit the patient upon medical complications. The discharge criteria are as follows: 1) the rehabilitation team determines that the patient has reached a plateau in terms of functional ability for approximately one week, and 2) the patient is non-compliant. The proportion of patients being discharged for each of the criteria is not recorded within the inpatient programs.

The rehabilitation program does not formally offer culturally-specific services to Aboriginal patients. Any differences in service delivery to Aboriginal patients would be dependent on the particular staff's interaction with a patient. Aboriginal patients may request the involvement of Aboriginal Elders or traditional healers within the hospital setting; however, this request is made infrequently by Aboriginal clients of the SCH Rehabilitation Program.

4.4 Data Source

The independent and outcome variables used in this study were limited to the basic demographic, socioeconomic status, medical, admission and discharge variables that had been collected in the FIM database by the rehabilitation teams. Of those pre-collected variables, the variables that were selected for use in this study were those that had been deemed clinically, biologically or sociologically meaningful in the existing literature and by the rehabilitation staff. The variables that were used in this study are as follows:

4.4.1 Demograhic Variables and Case Information: The nurses in charge of admissions systematically collected demographic variables and case information. The nurses gathered the relevant information from the hospital charts, and from the patients when the charts were incomplete.

- Gender: 1-Male, 2-Female
- Ethnicity: 1-White, 2-Black, 3-Asian, 4-Native American (identified by the admissions nurse and refers only to Registered Indians), 5-Other, 6-Hispanic
- Marital Status: 1-Never Married, 2-Married, 3-Widowed, 4-Separated, 5-Divorced
- Age at admission

4.4.2 Medical Information: This information was collected by the attending physiatrist.

- Impairment Group: The condition requiring admission to rehabilitation.
- Comorbidities: Defined as those conditions that exist in the patient in addition to the primary condition of interest to the study. Comorbidities were coded with ICD-9 codes.

4.4.3 Admission Information and Discharge Information: This information was gathered by the rehabilitation team.

- Admit From: 01-Home, 02-Board and Care, 03-Transitional Living, 04-Intermediate Care, 05-Skilled Nursing Facility, 06-Acute unit of own facility,

07-Acute unit of another facility, 08-Chronic Hospital, 09-Rehabilitation Facility, 10-Other, 12-Alternate Level of Care Unit, 13-Subacute setting, 14-Assisted Living Residence

- Prehospital Living With: Only if Prehospital Living Setting is 01-Home. 1-Alone, 2-Family/Relatives, 3-Friends, 4-Attendant, 5-Other
- Prehospital Vocational Category: 1-Employed, 2-Sheltered, 3-Student, 4-Homemaker, 5-Not Working, 6-retired for Age, 7-Retired for Disability
- Prehospital Vocational Effort: Only if Prehospital Vocational Category is 1-4. 1-Full-time, 2-Part-time, 3-Adjusted Workload
- Discharge to Living With: Only if Discharge to Living Setting is 01-Home. Alone, 2-Family/Relatives, 3-Friends, 4-Attendant, 5-Other

4.4.4 Variables Used as Inclusion/Exclusion Criteria: In order to control for the potential confounding of a number of variables, cases were selected using the following variables:

- English Language: 1-Yes, 2-No, 3-Partial. This study included only patients who were coded as 'Yes'.
- Admission Class: This study only included patients with class 1-Initial Rehab
- Program Interruptions: This study included only patients without program interruptions.
- Prehospital Living Setting: Codes as listed for Admit From. Only cases with a prehospital living setting of 'home' were included in this study.
- Discharge to Living Setting: 01-Home, 02-Board and Care, 03-Transitional Living, 04-Intermediate Care, 05-Skilled Nursing Facility, 06-Acute unit of own facility, 07-Acute unit of another facility, 08-Chronic Hospital, 09-Rehabilitation Facility, 10-Other, 11-Died, 12-Alternate Level of Care Unit, 13-Subacute setting, 14-Assisted Living Residence. Only cases with discharge to living setting "home" were included in this study.

4.4.5 Incomplete Data Records: The researcher reviewed patient charts when FIM database records were incomplete for particular patients from Saskatoon. The administrator of the FIM database at Wascana reviewed patient charts in Regina. A very small proportion (just over 1%) of patient data was incomplete; therefore, only approximately 30 patient charts had to be reviewed.

4.5 Data Analysis

The purpose of this study was to examine the independent effect of ethnicity (Aboriginal and non-Aboriginal) on functional outcomes (FIM Change, Motor FIM Change, and Cognitive FIM Change) and length of stay (Figure 4.5.4.1). Descriptive univariate statistics, bivariate analysis, and multivariate analysis were used to achieve the goal of the study. SPSS version 10.0 was used for all the analysis.(86) FIM Change scores were selected for analysis because change scores control for the differences in the functional independence of patients at admission. Patients who have a high admission FIM will likely have a high discharge FIM and patients who have a low admission FIM may have either a low discharge FIM or a high discharge FIM. The actual improvement in functional independence may be assessed only when the FIM at admission anddischarge are taken into consideration.

4.5.1 Internal Consistency Reliability of FIM: The first stage of the analysis consisted of an examination of the internal consistency reliability of the FIM instrument when used with Aboriginal patients. The Cronbach's Alpha was used to estimate the correlation between the total score across a series of items from the FIM scale and the total score that would have been obtained had a comparable series of items been employed.(87) Cronbach's Alpha (or Alpha) is a coefficient that describes how well a group of items focuses on a single idea or construct, or how consistently individuals respond to the items within a scale. Alpha can range from a low of 0 to a high of 1.0, and if a scale has an alpha above .70, it is usually considered to have respectable to very good internal consistency. When a scale results in an alpha much above .90, the researcher should consider shortening the scale.(88)

4.5.2 Data Preparation and Univariate Analysis: The initial combined Saskatoon and Regina database consisted of 2450 cases. Initial descriptive analysis was conducted between the two data sets for all of the independent and dependent variables. Bivariate analysis indicated that there were no statistically significant differences between the Saskatoon and the Regina data sets for any of the independent or outcome variables. Therefore, the two data sets were combined for the remainder of the analysis. After completion of the data preparation stage, the study population was reduced to 1652 cases.

Many of the variables were recoded to reduce the number of categories within each variable. For instance, Ethnicity was reduced from six categories to two categories— Aboriginal and non-Aboriginal. The covariable, comorbidity, was regrouped to reduce over one thousand discrete ICD-9 codes to just ten major comorbidity groups. However, in order to control for comorbidity as a potential confounder, it was necessary to only identify comorbidity as being present or absent. Therefore, the covariable was further regrouped to a simple dichotomized variable.

The independent variable (ethnicity), the covariables and outcome variables were all assessed for missing data, and potential outliers. The problem of missing data was eliminated by the researcher's access to patient hospital charts at both Saskatoon City Hospital and the Wascana Rehabilitation Centre. When missing data was identified, the researcher was able to input the correct information into the database from the hospital charts. The data set was examined visually for errors. The frequency procedure was used to identify out of range or improbable values for the continuous outcome variables. Histograms and box-plots were used to visually identify the existence of

outliers. Frequency tables were used to examine the categorical variables in order to detect the presence of values out of the expected range.

The descriptive statistics of the independent variable, covariables and outcome measures included proportions, ranges, means, medians, standard deviations, skewness and kurtosis for the continuous variables, and frequency distributions and percentages for the categorical variables. One of the main assumptions of parametric statistical analysis is that of normality. Therefore, all of the continuous outcome variable distributions were examined for normality using histograms with normal distribution curves, skewness and kurtosis statistics. FIM Change, Motor FIM Change, and Cognitive FIM Change each had skewness and kurtosis values between –2 and +2 (except for Cognitive FIM Change that had a Kurtosis of 3.2 which was deemed to be acceptable). Case Length of Stay had skewness and Kurtosis values of much greater than +2, which would indicate a non-normal distribution of these variables. It was determined, using scatterplots, that the deviation of the variable was likely caused by outliers as opposed to a non-normal distribution of the entire variable. Because Case Length of Stay violated the normality assumption, the variable was transformed using a log transformation (Y'= log Y). Once transformed, the outcome variable had skewness and Kurtosis values between –2 and +2. Cook and Leverage statistics later revealed that the outliers did not significantly influence the fit of the multivariate model of the transformed outcome variables.

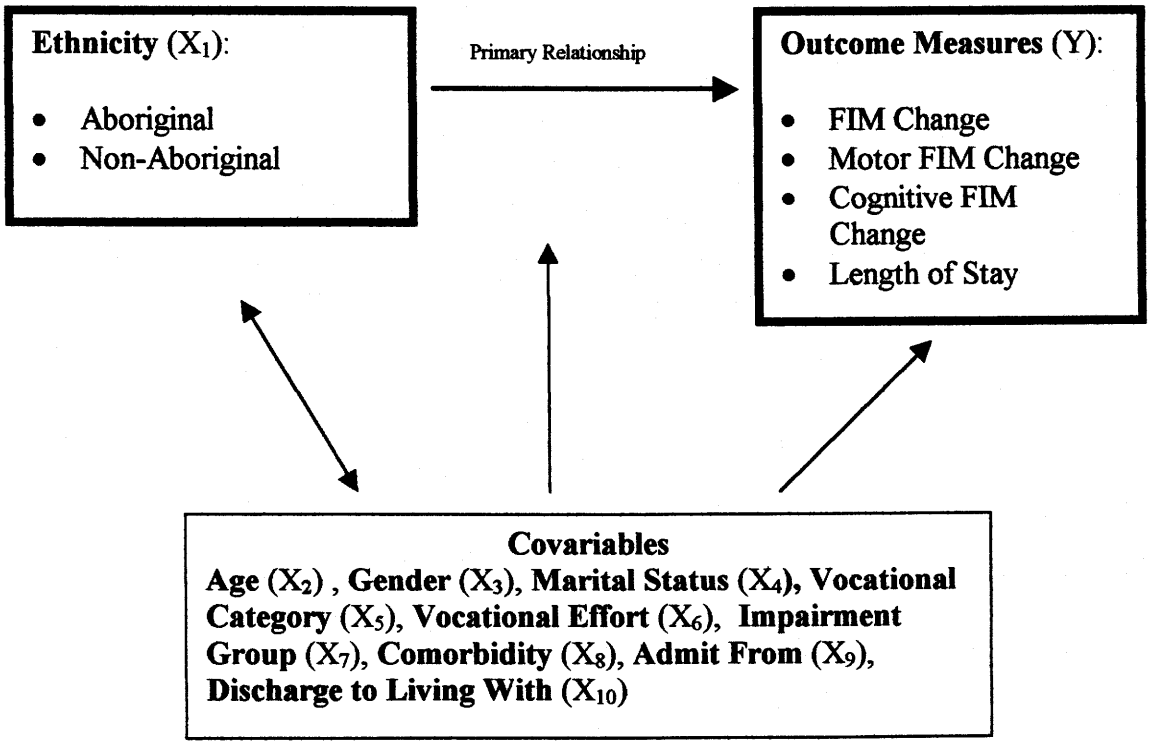
4.5.3 Bivariate Analysis: The bivariate analysis for ethnicity and the categorical covariables included tests for the homogeneity of variance, correlations, cross-tabulations, ANOVA, and multiple comparison procedures. Pearson chi-square testing of cross tabulations was conducted to examine the differences in distributions

between Aboriginal and non-Aboriginal for the remaining categorical covariables. If expected values were less than five in any of the cross-tabulation cells, then Fischer's exact-test was used. Pearson correlations were conducted to examine the association of the only continuous covariable, age, with the outcome variables. Bivariate analysis of the categorical independent variable, covariables and the continuous outcome variables was conducted using One-Way Analysis of Variance (ANOVA) in order to examine the association of each dependent variable with the independent variable and each of the covariables. ANOVA compared the population means of the outcomes for the categorical independent variable (ethnicity) and covariables. When an ANOVA F-test was significant for independent variables with more than two groups, it was important to determine among which groups the differences existed. Scheffe's tests were conducted to examine the differences in outcome means among the groups within each multinomial independent variable. Scheffe's compares all possible combinations of group means.

4.5.4 Multivariate Analysis: The purpose of the multivariate analysis was to examine the unconfounded relationship between the risk factor, ethnicity, and the outcome measures, FIM Change, Motor FIM Change, Cognitive FIM Change, and Length of Stay (Figure 4.5.4.1). The effect of ethnicity on the outcome measures was assessed using the General Linear Model (GLM) procedure. It was recognized that the outcome variables may have been affected by several covariables including age, gender, marital status, impairment group, from where the patients were admitted, with whom they were living before being admitted, and with whom they were living post-discharge. Therefore, the multivariate analysis was conducted to answer the question of whether or not there was a significant difference in outcome variable means between Aboriginal and

non-Aboriginal after holding the other covariables variables constant. The GLM was used to control for the possible confounding effects and to identify the possible interactions of the other independent variables by building parsimonious multivariate models that best described the primary relationship between ethnicity and the dependent variables. The GLM is a statistical model that incorporates analyses involving normally distributed dependent variables and combinations of categorical and continuous predictor variables. The GLM univariate model was used in order to examine each outcome variable independently. The categorical independent variables were entered as fixed variables, and age, when used as continuous, was entered as a covariate.

Figure 4.5.4.1. The primary relationship between the risk factor, ethnicity, and the outcome measures



Age at admission was the only continuous independent variable in the study. In order to determine the relationship of age to the outcome variables, the four beta (β) coefficients of the age quartiles were plotted versus the dependent variables. As a result of the line graphs, age was identified as having a curvilinear relationship with FIM Change, and Motor FIM Change. Because of this relationship, Age was left as a continuous variable, and was entered into the multivariate models with Age ^{2} as a product term. Age was recoded to a categorical variable for the multivariate analysis of Cognitive FIM Change. Finally, the first two age groups (<19, and 20-39) were combined for the transformed Length of Stay multivariate analysis.

The baseline admission FIM data were included in the multivariate analysis. Admission FIM Total, Admission Motor FIM, and Admission Cognitive FIM were all included as covariates in the GLM for LOS. However, only the corresponding baseline FIM measure was included in the GLM for FIM Change, Motor FIM Change, and Cognitive FIM Change. That is, the Admission FIM Total was included in the GLM for Total FIM Change as the dependent variable, the Admission Motor FIM change was included in the GLM for Motor FIM Change as the dependent variable, and the Admission Cognitive FIM was included in the GLM for the Cognitive FIM Change as the dependent variable.

The procedure used to develop multivariate models was as follows:

1. All independent variables were entered into the GLM model with one outcome variable. Independent variables that had a crude association of $p<0.25$ in the bivariate analysis were included at this stage in the model.(89)

However, variables that had a p-value of greater than 0.25, but were deemed biologically, clinically or sociologically relevant, were also included.

2. All independent variables with a p-value less than or equal to 0.25 were retained in the model. Others were eliminated in an iterative fashion. Variables that were deemed biologically significant were left in even if their p-value was greater than .25.
3. Once the initial round of elimination took place, product terms were created between ethnicity and the remaining independent variables. Each product term was entered independently. The product term was kept in if the p-value for the likelihood ratio test statistic was equal to or less than .05, and was excluded if p was greater than .05. Because this study focused on the description of the primary relationship between ethnicity and functional outcome, unnecessary complexity was eliminated by examining only the product terms of the remaining independent variables with ethnicity. The hierarchy principle was applied to all stages of model building. That is, given any variable in the model, all lower-order components of that variable were also present in the model.
4. Independent variables were removed if their p-value was greater than .05.
5. In the interest of parsimony, independent variables with p-values less than .05 were removed if the adjusted R squared value and the goodness of fit remained the same regardless of the presence or absence of the variable in the model.

4.6 Ethical Considerations

This study utilized confidential health records and patient information contained in the FIM databases; therefore, it was necessary to ensure that a high standard of ethics was maintained throughout the study. The researcher submitted an ethics application to the University of Saskatchewan Advisory Committee on Ethics and Human Experimentation. The committee approved the application in March 2000.

The FIM databases were owned by the rehabilitation departments in Saskatoon and Regina, and were used as administrative databases. The department heads themselves determined the use of the data. The researcher received the FIM data from the rehabilitation departments' administrators of the databases. The administrators had removed all identifiers from the data before passing the data sets on to the researcher.

CHAPTER FIVE

RESULTS

5.1 Introduction

The results of this study will be presented in three sections. The first section will present the main characteristics of the study population. The reader will gain an understanding of the sociodemographic variables (e.g., distribution of sex, age, ethnicity, marital status, vocational category and effort, living settings), as well as the clinical characteristics (e.g., comorbidity, distribution of impairments) of the study population. The second section will consist of an analysis of the Functional Independence Measure. This section will include the results of the reliability analysis, a description of FIM change scores, and the results of the analysis for each of the four outcome variables (Total FIM Change, Motor FIM Change, Cognitive FIM Change, and Length of Stay). The final section will include the results of the multivariate analysis of ethnicity and each of the outcome variables controlling for all of the covariables in the study.

5.2 Study Group Characteristics

5.2.1 Descriptive Characteristics of the Study Sample

The study population consisted of patients admitted to the inpatient rehabilitation programs at Saskatoon City Hospital and the Wascana Rehabilitation Centre between January 1,1994 and August 31, 1999 (see Chapter 4 for the inclusion/exclusion criteria). After selecting cases using the inclusion/exclusion criteria, 1652 cases remained in the

study sample. Information regarding the 1652 cases was extracted from the FIM database. Based on biological, clinical and sociological significance, fourteen independent variables (ethnicity was the primary independent variable, and the remaining thirteen variables were covariables) were selected from the FIM database for analysis.

Table 5.2.1.1 displays the important demographic characteristics of individuals in the study.

Table 5.2.1.1. Descriptive characteristics of the study population (N=1652)

Variable		Frequency	%
Total		1652	100
Gender			
	Male	968	58.6
	Female	684	41.4
Ethnicity			
	Non-Aboriginal	1527	92.4
	Aboriginal	125	7.6
Age			
	<19	61	3.7
	20-39	178	10.8
	40-59	327	19.8
	60-79	874	52.9
	80+	212	12.8
Marital Status			
	Never Married	305	18.5
	Married	996	60.3
	Widowed/Separated/Divorced	351	21.2
Vocational Category			
	Employed	373	22.6
	Student	61	3.7
	Homemaker	172	10.4
	Not Working	73	4.4
	Retired For Age	815	49.3
	Retired For Disability	158	9.6
Vocational Effort			
	Not Working	79	4.8
	Full-Time	517	31.3
	Part-Time/Adjusted Workload	83	5.0
	Retired	973	58.9
Pre-admission Living With			
	Alone	386	23.4
	Family/Relatives	1266	76.6
Post-discharge Living With			
	Alone	251	15.2
	Family/Relatives	1401	84.4

As expected from a clinical population, the distribution of sociodemographic characteristics of this study population was different from that of the general population. The sample was comprised of 58.6% males and 41.4% females. According to the 1996 Census, the gender distribution of the study sample differed from that of the general population of Saskatchewan, which was comprised of 49.4% males and 50.6% females. The study population had an overrepresentation of males.

The study sample was comprised of 92.4% Non-Aboriginal and 7.6% Aboriginal peoples. The ethnicity composition of the general population of Saskatchewan was 89.8% Non-Aboriginal and 10.2% Aboriginal.(90) Therefore, there was an under-representation of Aboriginal peoples in the study population. This under-representation could be attributed to a number of factors, such as lack of availability of on-reserve inpatient rehabilitation services, or lower incidence of cerebrovascular disease among Aboriginal peoples.

Generally, the study population was older than the general population. The age distribution of the study sample versus the general Saskatchewan population was as follows: 15-19 (3.7% vs. 7.7%), 20-39 (10.8% vs. 24.8%), 40-59 (19.8% vs. 22.4%), 60-79 (52.9% vs. 16.8%), and 80+ (12.8% vs. 4.0%). The mean age for the study population was 61.7. The under-representation of young people and the over-representation of older people in in-patient rehabilitation programs were to be expected given the nature of the impairment groups that cause disability. The majority of the study sample presented with the impairment group stroke (51.8%), which occurs among older individuals

The marital status of the study sample versus the general Saskatchewan population was as follows: never married (18.5% vs. 30.1%), married (60.3% vs. 54.3%), and widowed, separated or divorced (21.2% vs. 15.6%). Once again, the differences in marital status between the study sample and general population may be attributed to the older age of the study sample. It would be expected that a larger proportion of the study sample would have married or widowed status as opposed to never married status.

The distribution of vocational categories were as follows: employed (22.6%), student (3.7%), homemaker (10.4%), not working (4.4%), retired for age (49.3%), and retired for disability (9.6%). The distribution of vocational effort was as follows: not working (4.8%), full-time (31.3%), part-time or adjusted workload (5.0%), and retired (58.9%). As expected from an older population, the majority of the patients within the study population was retired, and under a quarter of the population was employed.

The entire study sample had been living at home prior to the onset of the impairment that caused disability and were discharged to home. Prior to the onset of impairment and post-discharge, the vast majority of the clients were living with family or relatives. This was again expected given that the study population was older and the majority was married. The majority of the clients in the study were admitted to the inpatient rehabilitation programs post-impairment onset from an acute unit or long-term care facility.

Table 5.2.1.2 displays descriptive statistics for the continuous covariables Admission Total FIM, Admission Motor FIM, and Admission Cognitive FIM.

Table 5.2.1.2. Descriptive statistics for the outcome variables Admission Total FIM. Admission Motor FIM, Admission Cognitive FIM (N=1652)

Outcome Variable	Mean	Median	SD*	Skewness	Kurtosis
Admission Total FIM	76.70	78.00	23.74	-0.21	-0.63
Admission Motor FIM	51.98	52.00	20.05	-0.02	-0.88
Admission Cognitive FIM	24.72	26.00	8.26	-0.62	-0.54

*Standard Deviation

The Admission Total FIM, Admission Motor FIM and Admission Cognitive FIM scores were all normally distributed with acceptable skewness and kurtosis for each of the variables.

5.2.2 Unadjusted Associations between Ethnicity and the Covariables

The bivariate descriptive statistics for ethnicity by each of the categorical covariables are summarized in Tables 5.2.2.1, 5.2.2.2, 5.2.2.3, and 5.2.2.4. Within each ethnic category of the study population, a slightly higher proportion of Aboriginals were males as compared to the smaller proportion of males within the Non-Aboriginal study population. In turn, the Non-Aboriginal study population had a higher proportion of females than did the Aboriginal study population. However, the different proportions of males and females between Aboriginal and non-Aboriginal was not found to be statistically significant (χ^2= 0.073).

The difference in age distribution between non-Aboriginals and Aboriginals was found to be statistically significant (χ^2= 0.000) (Table 5.2.2.1). The Aboriginal population was considerably younger than the non-Aboriginal population. The Aboriginal population had a higher proportion of patients within the three younger age categories (<19, 20-39, and 40-59) than did the Non-Aboriginal population (8.8% vs. 3.3%, 25.6% vs. 9.6%, and 24.0% vs. 19.4% respectively). The proportions 60-79 and 80+ year olds in the Non-Aboriginal population was greater than the proportions of those two age categories in the Aboriginal population (43.9% vs. 40.8%, and 13.8% vs. 0.8%).

The difference in the overall distribution of marital status between non-Aboriginal and Aboriginal was found to be statistically significant (χ^2= 0.000) (Table 5.2.2.1). A higher proportion of the Aboriginal study population had never been married as compared to the non-Aboriginal population (43.2% vs. 16.4%). Non-Aboriginals and

Aboriginals had similar proportions of people who identified themselves as being widowed, separated, or divorced (21.3 vs. 20.0%).

Table 5.2.2.1 Unadjusted associations between ethnicity and covariables—gender, age, and marital status

			Ethnicity		
Covariable		**Total (%) N=1652**	**Non-Aboriginal (%) n=1527**	**Aboriginal (%) n=125**	**χ^2 Significance**
Gender	**Male**	968 (58.6)	885 (58.0)	83 (66.4)	0.073
	Female	684 (41.4)	642 (42.0)	42 (33.6)	
Age	**<19**	61 (3.7)	50 (3.3)	11 (8.8)	0.00*
	20-39	178 (10.8)	146 (9.6)	32 (25.6)	
	40-59	327 (19.8)	297 (19.4)	30 (24.0)	
	60-79	874 (52.9)	823 (53.9)	51 (40.8)	
	80+	212 (12.8)	211 (13.8)	1 (0.8)	
Marital Status	**Never Married**	305 (18.5)	251 (16.4)	54 (43.2)	0.00*
	Married	996 (60.3)	950 (62.2)	46 (36.8)	
	Widowed/Sep./Div.	351 (21.2)	326 (21.3)	25 (20.0)	

* $p < 0.05$

The differences in the distribution of vocational categories between non-Aboriginal and Aboriginal patients was found to be statistically significant ($\chi^2 = 0.000$) (Table 5.2.2.2). Non-Aboriginals had a higher proportion of people who were employed than did the Aboriginal population (23.2% vs. 15.2%). The Aboriginal population had a higher proportion of people who identified themselves as students as compared to the proportion in the non-Aboriginal population (9.6% vs.3.2%). Aboriginals had a slightly higher proportion of homemakers than did the non-Aboriginal population (12.0% vs. 10.3%). The proportion of Aboriginals who identified themselves as not working was dramatically higher than the proportion of non-Aboriginals who identified themselves as not working (30.4% vs. 2.3%). The proportion of Non-Aboriginals who were retired for their age was over two times greater than the proportion of Aboriginals who identified themselves as being retired (51.4% vs. 24.0%). The proportion of patients who were

retired for disability was similar within both the non-Aboriginal and Aboriginal populations (9.6% vs. 8.8%).

The difference in the distribution of vocational effort between non-Aboriginals and Aboriginals was also found to be statistically significant (χ^2= 0.000) (Table 5.2.2.2). As with the 'not working' vocational category, the proportion of Aboriginals who identified themselves as not working was dramatically higher than the proportion of non-Aboriginals who self-reported as not working (30.4% vs. 2.7%). The proportion of non-Aboriginal patients who identified themselves as being retired was almost two times greater than the proportion of Aboriginals who self-identified as retired (61.0% vs. 32.8%).

Table 5.2.2.2 Unadjusted associations between ethnicity and covariables—vocational category and vocational effort

			Ethnicity		
Covariable		**Total (%) N=1652**	**Non-Aboriginal (%) n= 1527**	**Aboriginal (%) n= 125**	**χ^2 Significance**
Vocational Category	**Employed**	373 (22.6)	354 (23.2)	19 (15.2)	0.00*
	Student	61 (3.7)	49 (3.2)	12 (9.6)	
	Homemaker	172 (10.4)	157 (10.3)	15 (12.0)	
	Not Working	73 (4.4)	35 (2.3)	38 (30.4)	
	Retired for Age	815 (49.3)	785 (51.4)	30 (24.0)	
	Retired for Disability	158 (9.6)	147 (9.6)	11 (8.8)	
Vocational Effort	**Not Working**	79 (4.8)	41 (2.7)	38 (30.4)	0.00*
	Full-Time	517 (31.1)	476 (31.2)	41 (32.8)	
	Part-Time/ Adjusted workload	83 (5.0)	78 (5.1)	5 (4.0)	
	Retired	973 (58.9)	932 (61.0)	41 (32.8)	

* $p < 0.05$

The difference in distribution of impairment groups between non-Aboriginals and Aboriginals was also found to be statistically significant (χ^2= 0.000). The proportion of Non-Aboriginals presenting with stroke was two times greater than the proportion of

Aboriginals presenting with stroke (53.8% vs. 26.4%). Aboriginal patients presented with greater proportions of both traumatic brain injury (TBI) and spinal cord injury (SCI) than did the non-Aboriginal population. The proportion of Aboriginals presenting with TBI was almost two times greater than the proportion of non-Aboriginals presenting with TBI (16.8% vs. 8.7%). The proportion of Aboriginals presenting with SCI was two times greater than the non-Aboriginals presenting with the same impairment (17.6% vs. 8.8%). The proportion of Aboriginals presenting with amputations was almost three times greater than the proportion of non-Aboriginals presenting with amputations (25.6% vs.8.5%). The proportion of non-Aboriginals presenting with other impairments was greater than the proportion of Aboriginals presenting with other impairments (20.2% vs. 13.6%).

The differences in distribution of the presence or absence of a comorbidity between non-Aboriginals and Aboriginals was not found to be statistically significant (χ^2= 0.114) (Table 5.2.2.3). The proportion of non-Aboriginals presenting with a comorbidity was 67.3% versus the 60.0% of Aboriginals presenting with a comorbidity.

Table 5.2.2.3. Unadjusted associations between ethnicity and covariables— impairment group and comorbidity

			Ethnicity		
Covariable		**Total (%) n= 1652**	**Non-Aboriginal (%) n= 1527**	**Aboriginal (%) n= 125**	**χ^2 Significance**
Impairment Group	**Stroke**	855 (51.8)	822 (53.8)	33 (26.4)	0.00*
	TBI	154 (9.3)	133 (8.7)	21 (16.8)	
	SCI	156 (9.4)	134 (8.8)	22 (17.6)	
	Amputations	162 (9.8)	130 (8.5)	32 (25.6)	
	Other	325 (19.7)	308 (20.2)	17 (13.6)	
Comorbidity	**No**	550 (33.3)	500 (32.7)	50 (40.0)	.114
	Yes	1102 (66.7)	1027 (67.3)	75 (60.0)	

* $p < 0.05$

The differences in the distributions of pre-admission living arrangement, post-impairment onset living setting, and post-discharge living arrangement between non-Aboriginals and Aboriginals are found in Table 5.2.2.4 The difference in the distribution of pre-admission living arrangement was not found to be statistically significant (χ^2= 0.912). The proportions of non-Aboriginals and Aboriginals living alone prior to impairment onset were similar as were the proportions of non-Aboriginals and Aboriginals living with family or relatives prior to impairment onset.

The differences in the distribution of post-impairment onset living setting between non-Aboriginals and Aboriginals were found to be statistically significant (χ^2= 0.000). The proportion of Aboriginals who were admitted to the rehabilitation program from home was significantly greater than that of the non-Aboriginal population that was admitted to the rehabilitation program from home.

The differences in the distribution of post-discharge living arrangement between non-Aboriginals and Aboriginals were not found to be statistically significant (χ^2= 0.517). The proportion of non-Aboriginals and Aboriginals living alone post-discharge was similar, as was the proportion of non-Aboriginals and Aboriginals living with family or relatives.

Table 5.2.2.4 Unadjusted associations between ethnicity and covariables—pre-impairment onset living with (living with), post-impairment onset living setting (admit from), and post-discharge living with (discharge living with)

Covariable		Total (%) n= 1652	Ethnicity: Non-Aboriginal (%) n= 1527	Ethnicity: Aboriginal (%) n= 125	χ^2 Significance
Pre-Admission Living With					
	Alone	386 (23.4)	358 (23.4)	28 (22.4)	.912
	Family/Relatives	1266 (76.6)	1169 (76.6)	97 (77.6)	
Post-impairment onset Living Setting					
	Home	192 (11.6)	154 (10.1)	38 (30.4)	0.00*
	Acute Unit /Long-term Care	1460 (88.4)	1373 (89.9)	87 (69.6)	
Post-Discharge Living With					
	Alone	251 (15.2)	235 (15.4)	16 (12.8)	.517
	Family/Relatives	1401 (84.8)	1292 (84.6)	109 (87.2)	

* $p < 0.05$

The descriptive statistics for the continuous covariables (Admission Total FIM and its components, Admission Motor FIM and Admission Cognitive FIM) and ethnicity are contained in Table 5.2.2.5. The difference in the mean Admission Total FIM scores between non-Aboriginals and Aboriginals was found to be statistically significant (p = 0.001). The mean Admission Total FIM score was significantly lower for non-Aboriginals than for Aboriginals (mean = 76.1 vs. 83.7). The mean Admission Motor FIM scores was significantly higher, p = 0.000, for Aboriginals than for non-Aboriginals (mean = 58.7 vs. 51.4). The difference in the mean Admission Cognitive FIM scores between non-Aboriginals and Aboriginals was not found to be significant, p = 0.606 (mean = 24.7 vs. 25.1).

Table 5.2.2.5 Comparison of total and sub-scale admission FIM score means between Non-Aboriginal patients and Aboriginal patients (One-Way ANOVA)

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F- test statistic	Significance
Admission Total FIM						
Non-Aboriginal	1527	76.1	74.9	77.3	12.0	0.001*
Aboriginal	125	83.7	79.6	87.9		
Total	1652	76.7	75.6	77.8		
Admission Motor FIM						
Non-Aboriginal	1527	51.4	50.4	52.4	15.1	0.000*
Aboriginal	125	58.7	54.9	62.4		
Total	1652	52.0	51.0	52.9		
Admission Cognitive FIM						
Non-Aboriginal	1527	24.7	24.3	25.1	0.3	0.606
Aboriginal	125	25.1	23.6	26.6		
Total	1652	24.7	24.3	25.1		

* $p < 0.05$

5.3 Functional Independence Measures

5.3.1 Reliability of Functional Independence Measures

Cronbach's alpha was used to measure the extent of the correlation of item responses for the entire study population, for Aboriginals, and for Non-Aboriginals. Alpha measured how consistently individuals responded to the items within a scale. The more consistent within-subject responses were, and the greater the variability between subjects in the sample, the higher the Alpha.(88)

Table 5.3.1.1. Cronbach's Alpha for the Total FIM Scale , FIM Motor Sub-scale, and FIM Cognitive Sub-scale

	Non-Aboriginal and Aboriginal Combined (N=1652)	Non-Aboriginal (N=1527)	Aboriginal (N=125)
18-Item Total FIM Scale			
Admission	.926	.926	.915
Discharge	.926	.928	.905
13-Item FIM Motor Sub-scale			
Admission	.940	.939	.941
Discharge	.938	.939	.928
5-Item FIM Cognitive Sub-scale			
Admission	.926	.926	.938
Discharge	.914	.913	.921

The admission and discharge internal consistency for the entire study population, non-Aboriginals, and Aboriginals were all very good (above .90) within the total scale and the two sub-scales. Regardless of the slight differences in the Alphas for the different study groups, each of the groups had very good internal consistency for both admission and discharge scores. Therefore, each of the groups had very consistent within-subject responses and had high variability between subjects within the sample.

5.3.2 FIM Change Scores

The outcome variables selected for the analysis were FIM Change, Motor FIM Change, Cognitive FIM Change and Length of Stay (LOS) (transformed to logLOS). The 'change' outcome variables were created by subtracting the admission FIM scores from their respective discharge FIM scores. Descriptive statistics for the outcome variables are displayed in Table 5.3.2.1

Table 5.3.2.1. Descriptive statistics for the outcome variables FIM Change, Motor FIM Change, Cognitive FIM Change and Length of Stay (N=1652)

Outcome Variable	Mean	Median	SD*	Skewness	Kurtosis
FIM Change	26.41	24.00	17.09	0.70	0.32
Motor FIM Change	23.25	22.00	14.93	0.53	-0.16
Cognitive FIM Change	3.15	2.00	4.27	1.64	3.16
Length of Stay	39.21	30.00	32.48	4.08	31.16
logLOS	1.49	1.48	0.28	0.24	0.39

*Standard Deviation

The mean FIM Change for the study sample was 26.4 ± 17.1. That means that the study sample had an average improvement of 26.4 points in the total FIM score between admission and discharge assessments. Given that the Motor FIM sub-scale had more items than the Cognitive FIM sub-scale, the larger mean improvement in FIM score was within the 13-item Motor FIM sub-scale. The mean Motor FIM Change for the study sample was 23.3 ± 14.9. Because the scale had fewer items, the smaller improvement in

FIM score was within the 5-item Cognitive FIM sub-scale. The mean Cognitive FIM Change for the study sample was 3.2 ± 4.3.

Examining the non-transformed LOS variable gave more meaning at the univariate level. The non-transformed LOS descriptive statistics gave a better understanding of the number of days the study sample stayed in the inpatient rehabilitation program. The mean length of stay was 39.2 ± 32.5 days. However, given the very high values of skewness (4.1) and kurtosis (31.2) for this variable, it was necessary to log transform the variable to bring about the normal distribution of LOS for the bivariate and multivariate analysis. As a result of the transformation, the log of LOS had a much lower skewness (0.24) and kurtosis (0.39).

The skewness and kurtosis for the remaining three outcome variables indicated normal distribution for each of the variables. FIM Change and Motor FIM Change were both within the acceptable range for each of the values. Cognitive FIM change had borderline acceptability, with a skewness of 1.6 and a kurtosis of 4.5.

5.3.3 Total FIM Change

5.3.3.1 Sociodemographic Variables

The comparison of the Total FIM Change means by the sociodemographic variables is found in Tables 5.3.3.1 to 5.3.3.5. The difference in the Total FIM Change means between non-Aboriginals and Aboriginals was found to be statistically significant ($p = 0.000$). The mean Total FIM Change for non-Aboriginals was significantly higher than the mean for Aboriginals.

Table 5.3.3.1 Comparison of Total FIM Change means between Non-Aboriginal patients and Aboriginal patients (One-Way ANOVA)

Dependent Variable	N	Mean	95% Confidence Intervals for Means		F-test Statistic	Significance
			Lower Bound	Upper Bound		
Total FIM Change						
Non-Aboriginal	1527	26.9	26.1	27.8	18.3	.000*
Aboriginal	125	20.2	17.4	22.9		
Total	1652	26.4	25.6	27.2		

*$p \leq 0.05$

The difference in the mean Total FIM Change between males and females was not found to be statistically significant (p =0.317). The mean Total FIM Change for males was only slightly higher than the mean for females. The differences in the mean Total FIM Change among the age groups was found to be significant (p = 0.000). Scheffe's test for multiple comparisons indicated that the significant differences in means existed between the under 19 category, and each the 40-59 category, 60-79 category, and the 80+ category, with the under 19 population having a significantly higher mean Total FIM Change.

Total FIM Change means were significantly different among patients with differing marital status (p = 0.002). The significant differences exist between widowed, separated, or divorced patients, and each never married and married patients. Widowed/separated/divorced patients had a significantly lower Total FIM Change mean than did the other patients. Given that the widowed category contains older patients, it would be expected that the Total FIM Change would be less among that population.

Table 5.3.3.2. Comparison of Total FIM Change means by sociodemographic variables, gender, age, and marital status

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	26.4	25.6	27.2		
Gender						
Male	968	26.8	25.7	27.9	1.0	.317
Female	684	25.9	24.7	27.1		
Age						
≤19 [a,b,c]	61	34.1	28.0	40.1	5.5	.000*
20-39	178	27.9	25.1	30.7		
40-59 [a]	327	26.1	24.1	28.2		
60-79 [b]	874	26.5	25.4	27.6		
80+ [c]	212	23.1	21.2	24.9		
Marital Status						
Never Married [a]	305	28.2	25.9	30.5	6.1	.002*
Married [b]	996	26.8	25.7	27.8		
Separated/Divorced/ Widowed [a,b]	351	23.8	22.2	25.4		

[a,b,c] indicate significant differences between the sample means based on Scheffe's multiple comparison procedure

* $p \leq 0.05$

Table 5.3.3.3 presents the comparison of Total FIM Change means by vocational category and vocational effort. A statistically significant difference existed in the Total FIM Change means among the six vocational categories ($p = 0.000$). Students had the highest Total FIM Change mean, followed by those patients who were employed. Scheffe's tests revealed that the significant differences in outcome means were between the employed category, and each the retired for age category and the retired for disability category. The employed patients had a significantly higher mean than the retired categories. Significant differences in mean also were present between the retired for disability category (mean ± SD = ± 16.6), and each the student category, homemaker category, and retired for age category. Patients within the retired for disability category had the lowest Total FIM Change mean.

The differences in the mean Total FIM Change scores among the vocational effort categories were also statistically significant ($p = 0.000$). Patients who were not working

had a significantly lower mean than did the patients who worked part-time. Also, patients who were retired had a significantly lower mean than patients who worked full-time and part-time. The vocational effort category with the highest Total FIM Change mean was the part-time or adjusted workload, followed by the full-time category.

Table 5.3.3.3. Comparison of Total FIM Change means by vocational category and vocational effort

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	26.4	25.6	27.2		
Vocational Category						
Employed [a,b]	373	30.2	28.3	32.2	10.4	0.000*
Student [c]	61	31.8	25.9	37.8		
Homemaker [d]	172	26.8	24.3	29.4		
Not Working	73	24.6	21.0	28.2		
Retired For Age [a,e]	815	25.6	24.5	26.6		
Retired For Disability [b,c,d,e]	158	19.9	17.3	22.6		
Vocational Effort						
Not Working [a]	79	23.5	20.0	27.1	12.2	0.000*
Full-Time [b]	517	29.2	27.6	30.8		
Part-Time/Adjusted [a,c]	83	32.2	28.1	36.3		
Retired [b,c]	973	24.7	23.7	25.6		

[a,b,c,d,e] indicate significant differences between the sample means based on Scheffe's multiple comparison procedure

* $p \leq 0.05$

5.3.3.2 Living Arrangements

The comparisons of Total FIM Change means by pre-impairment onset living arrangement, living setting from which the patient was admitted to the rehabilitation program, and the post-discharge living arrangement are presented in Table 5.17. The difference in Total FIM Change means between patients who lived at home post impairment onset and patients who were admitted to the rehabilitation program from acute care or long-term care facility was found to be statistically significant ($p = 0.000$). Patients admitted to the rehabilitation program from home had significantly lower Total

FIM Change means than patients who were admitted to the program from an acute care or long-term care facility.

The difference in Total FIM Change means between patients who lived alone prior to impairment onset and patients who lived with family or relatives was not found to be statistically significant ($p = 0.496$). Patients who lived alone, or with family or relatives, had similar Total FIM Change means. The difference in Total FIM Change means between patients discharged to living alone, and patients discharged to living with family or relatives was not found to be statistically significant ($p = 0.688$). Patients who lived alone post-discharge had a very similar Total FIM Change mean to patients who lived with family or relatives post-discharge.

Table 5.3.3.4. Comparison of Total FIM Change means by living setting and living with

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	26.4	25.6	27.2		
Admit From Living Setting						
Home	192	10.3	9.1	11.6	217.2	0.000*
Acute Unit/ Other	1460	28.5	27.7	29.4		
Total	1652	26.4	25.6	27.2		
Pre-impairment onset Living With						
Alone	386	25.9	24.2	27.6	0.5	0.496
Family/Relatives	1266	26.6	25.6	27.5		
Total	1652	26.4	25.6	27.2		
Discharge Living With						
Alone	251	26.0	24.0	28.0	0.2	0.688
Family/Relatives	1401	26.4	25.6	27.4		

* $p \leq 0.05$

5.3.3.3 Impairment Group, Comorbidity

Table 5.3.3.5 presents the comparison of the Total FIM Change means by impairment group and comorbidity. The differences in Total FIM Change means among impairment

groups was found to be statistically significant ($p = 0.000$). Scheffe's tests revealed that significant differences existed between the stroke group, and each the amputation group and other impairments group, with the stroke group having a significantly higher Total FIM Change mean. Significant differences also existed between the TBI group, and each the amputation group and other impairment group, with TBI having a significantly higher Total FIM Change mean. Significant differences were also found between the SCI group, and each the amputation group and other impairment group, with SCI group having a significantly higher mean. Finally, significant differences were found between the amputation group and other impairment group, with amputation having the lowest Total FIM Change mean.

Significant differences in Total FIM Change mean were not found between patients who did and did not present with a comorbidity ($p = 0.564$). The Total FIM Change mean for patients with a comorbidity was for patients who did not present with a comorbidity.

Table 5.3.3.5 Comparison of Total FIM Change means by impairment group and comorbidity

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	26.4	25.6	27.2		
Impairment Group						
Stroke [a,b]	855	28.9	27.8	30.0	36.5	0.000*
TBI [c,d]	154	29.2	25.7	32.6		
SCI [e,f]	156	29.8	27.3	32.3		
Amputations [a,c,e,g]	162	13.1	11.6	14.7		
Other [b,d,f,g]	325	23.6	21.8	25.5		
Comorbidity						
No	550	26.1	24.6	27.5	0.3	0.564
Yes	1102	26.6	25.6	27.6		

[a,b,c,d,e,f,g] indicate significant differences between the sample means based on Scheffe's multiple comparison procedure

*$p \leq 0.05$

5.3.4 Motor FIM Change

5.3.4.1 Sociodemographic variables

The comparisons of the Motor FIM Change means by the independent variable and other sociodemographic covariables are found in Tables 5.3.4.1 to 5.3.4.5 The difference in the Motor FIM Change means between non-Aboriginals and Aboriginals was found to be statistically significant ($p = 0.000$) (Table 5.3.4.1). The mean Motor FIM Change for non-Aboriginals was significantly higher than for Aboriginals.

Table 5.3.4.1. Comparison of Motor FIM Change means between Non-Aboriginal patients and Aboriginal patients (One-Way ANOVA)

Dependent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total Motor FIM Change	1652	23.3	22.5	24.0		
Non-Aboriginal	1527	23.7	22.9	24.4	17.3	.000*
Aboriginal	125	17.9	15.4	20.5		

*$p \leq 0.05$

The difference in the mean Motor FIM Change between males and females was not found to be statistically significant (p =0.341) (Table 5.3.4.2). The mean Motor FIM Change for males was only slightly higher than the mean for females. The differences in the mean Motor FIM Change among the age groups was found to be significant (p = 0.045) (Table 5.55). Even though there was overall significance for the differences in Motor FIM Change means among age groups, Scheffe's test for multiple comparisons did not indicate any specific significant differences in means among the age categories. Each of the age categories had similar means, with under 19 having the highest mean Motor FIM Change.

Motor FIM Change means were not found to be significantly different among patients with differing marital status ($p = 0.110$) (Table 5.3.4.2). The means were similar for all three categories, with never married patients having the highest Motor FIM Change mean.

Table 5.3.4.2. Comparison of Motor FIM change means by gender, age, and marital status

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	23.3	22.5	24.0		
Gender						
Male	968	23.5	22.63	24.5	0.912	0.340
Female	684	22.8	21.8	23.9		
Age						
≤19	61	27.7	22.6	32.8	2.446	0.045*
20-39	178	23.5	20.9	26.1		
40-59	327	22.6	20.8	24.3		
60-79	874	23.6	22.7	24.5		
80+	212	21.4	19.8	23.1		
Marital Status						
Never Married	305	24.1	22.0	26.1	2.211	0.110
Married	996	23.5	22.6	24.4		
Separated/Divorced/ Widowed	351	21.8	20.4	23.3		

*$p \leq 0.05$

Table 5.3.4.3 presents the comparison of Motor FIM Change means by vocational category and vocational effort. A statistically significant difference existed in the Motor FIM Change means among the six vocational categories ($p = 0.000$). Students had the highest Motor FIM Change mean, followed by those patients who were employed. Scheffe's tests revealed that the significant differences in outcome means were between the group with the lowest Motor FIM Change mean, retired for disability, and each the employed category, the student category, and the retired for age category.

The differences in the mean Motor FIM Change scores among the vocational effort categories were also statistically significant ($p = 0.000$) (Table 5.3.4.3). The

significant differences were between the patients in the category with the lowest mean Motor FIM Change, not working, and the patients who worked part-time or had an adjusted workload. There were also significant differences in outcome means between those patients who were retired, and each the patients who worked full-time, and who worked part-time or with an adjusted workload, with retired patients having the lower Motor FIM Change mean. The vocational effort category with the highest Motor FIM Change mean was the part-time or adjusted workload, followed by the full-time category.

Table 5.3.4.3. Comparison of Motor FIM Change by vocational category and vocational effort

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	23.3	22.5	24.0		
Vocational Category						
Employed [a]	373	25.7	24.0	27.4	6.441	0.000*
Student [b]	61	26.2	21.1	31.3		
Homemaker	172	23.7	21.4	25.9		
Not Working	73	21.1	17.8	24.5		
Retired For Age [c]	815	23.0	22.1	23.9		
Retired For Disability [a,b,c]	158	18.3	15.9	20.7		
Vocational Effort						
Not Working [a]	79	20.2	17.0	23.5	7.506	0.000*
Full-Time [b]	517	24.9	23.5	26.4		
Part-Time/Adjusted [a,c]	83	27.9	24.3	31.4		
Retired [b,c]	973	22.2	21.4	23.1		

[a,b,c,] indicate significant differences between the sample means based on Scheffe's multiple comparison procedure

*$p \leq 0.05$

5.3.4.2 Living Arrangements

The comparison of Motor FIM Change means by pre-impairment onset living arrangement, living setting from which the patient was admitted to the rehabilitation program, and the post-discharge living arrangement are presented in Table 5.3.4.4. The difference in Motor FIM Change means between patients who lived at home post

impairment onset and patients who were admitted to the rehabilitation program from acute care or long-term care facility was found to be statistically significant ($p = 0.000$). Patients admitted to the rehabilitation program from home had significantly lower Motor FIM Change mean than patients who were admitted to the program from an acute care or long-term care facility.

The difference in Motor FIM Change means between patients who lived alone prior to impairment onset and patients who lived with family or relatives was not found to be statistically significant ($p = 0.910$). Patients who lived alone, or with family or relatives, had similar Motor FIM Change means.

The difference in Motor FIM Change means between patients discharged to living alone, and patients discharged to living with family or relatives was not found to be statistically significant ($p = 0.514$). Patients who lived alone post-discharge had a very similar Motor FIM Change mean to patients who lived with family or relatives post-discharge.

Table 5.3.4.4. Comparison of Motor FIM Change means by living setting and living with

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	23.3	22.5	24.0		
Admit From Living Setting						
Home	192	9.6	8.4	10.8	204.064	0.000*
Acute Unit/ Other	1460	25.0	24.3	25.8		
Pre-impairment onset Living With						
Alone	386	23.3	21.8	24.8	0.013	0.910
Family/Relatives	1266	23.2	22.4	24.1		
Discharge Living With						
Alone	251	23.8	22.0	25.7	0.427	0.514
Family/Relatives	1401	23.2	22.4	23.9		

* $p \leq 0.05$

5.3.4.3 Impairment Group, Comorbidity

Table 5.3.4.5 presents the comparison of the Motor FIM Change means by impairment group and comorbidity. The differences in Motor FIM Change means among impairment groups was found to be statistically significant ($p = 0.000$). Scheffe's tests revealed that significant differences existed between the stroke group, and each the amputation group and other impairments group, with the stroke group having the highest Motor FIM Change mean. Significant differences also existed between the TBI group, and each the SCI group, and amputation group. Significant differences were also found between the SCI group, and each the amputation group and other impairment group. Finally, significant differences were found between the amputation group and other impairment group. The lowest Motor FIM Change mean was for the amputation group.

Significant differences in Motor FIM Change mean were not found between patients who did and did not present with a comorbidity ($p = 0.210$). The Motor FIM Change mean for patients with a comorbidity was similar for patients who did not present with a comorbidity was similar.

Table 5.3.4.5. Comparison of Motor FIM Change means by impairment group and comorbidity

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	23.3	22.5	24.0		
Impairment Group						
Stroke [a,b]	855	25.2	24.3	26.2	32.910	0.000
TBI [c,d]	154	22.0	19.1	24.9		
SCI [c,e,f]	156	28.6	26.2	30.9		
Amputations [a,d,e,g]	162	12.7	11.2	14.1		
Other [b,f,g]	325	21.4	19.8	23.0		
Comorbidity						
No	550	22.6	21.3	23.9	1.572	0.210
Yes	1102	23.6	22.7	24.4		

[a,b,c,d,e,f,g] indicate significant differences between the sample means based on Scheffe's multiple comparison procedure

* $p \leq 0.05$

5.3.5 Cognitive FIM Change

5.3.5.1 Sociodemographic Variables

The comparisons of the Cognitive FIM Change means by the independent variable and the other sociodemographic covariables are found in Tables 5.3.5.1 to 5.3.5.5. The difference in the Cognitive FIM Change means between non-Aboriginals and Aboriginals was found to be statistically significant ($p = 0.010$) (Table 5.3.5.1). The mean Cognitive FIM Change for non-Aboriginals was significantly higher than for Aboriginals.

Table 5.3.5.1 Comparison of Cognitive FIM Change means between Non-Aboriginal patients and Aboriginal patients (One-Way ANOVA)

Dependent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total Cognitive FIM Change	1652	3.2	2.9	3.4		
Non-Aboriginal	1527	3.2	3.0	3.4	6.7	0.010*
Aboriginal	125	2.2	1.7	2.7		

* $p \leq 0.05$

The difference in the mean Cognitive FIM Change between males and females was not found to be statistically significant (p =0.503) (Table 5.3.5.2). The mean Cognitive FIM Change for males was only slightly higher than the mean for females.

The differences in the mean Cognitive FIM Change among the age groups was found to be significant (p = 0.000) (Table 5.3.5.2). Scheffe's test for multiple comparisons indicated that the significant differences in means existed between the under 19 category, and each the 20-39 category, 40-59 category, 60-79 category, and the 80+ category, with the under 19 category having the highest Cognitive FIM Change mean. Significant differences were also found between the 20-39 category, and each the 60-79 and the 80+ categories, with the 20-39 category having the higher mean. The Cognitive FIM Change mean for the 40-59 category was also significantly higher than the mean of the 80+ category. A significant differences was also found between the 60-79 and 80 + categories, with the 80+ having the lowest mean of any age group.

Cognitive FIM Change means were found to be significantly different among patients with differing marital status (p = 0.000) (Table 5.3.5.2). The widowed, separated, or divorced patients category had a significantly lower mean than the never married and married patients. The never married patients also had a significantly higher mean than the married patients. The marital status category with the highest Cognitive FIM Change mean was never married followed by married.

Table 5.3.5.2 Comparison of Cognitive FIM Change means by demographic variables, gender, age, and marital status.

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	3.2	2.9	3.4		
Gender						
Male	968	3.2	2.9	3.5	0.448	0.503
Female	684	3.1	2.8	3.4		
Age						
≤19 [a,b,c,d]	61	6.3	4.6	8.1	21.551	0.000*
20-39 [a,e,f]	178	4.4	3.7	5.0		
40-59 [b,g]	327	3.6	3.1	4.0		
60-79 [c,e,h]	874	2.9	2.6	3.2		
80+ [d,f,g,h]	212	1.6	1.3	2.0		
Marital Status						
Never Married [a,b]	305	4.2	3.6	4.7	22.920	0.000*
Married [a,c]	996	3.3	3.0	3.5		
Separated/Divorced/ Widowed [b,c]	351	2.0	1.7	2.3		

[a,b,c,d,e,f,g] indicate significant differences between the sample means based on Scheffe's multiple comparison procedure

* $p \leq 0.05$

Table 5.3.5.3 presents the comparison of Cognitive FIM Change means by vocational category and vocational effort. A statistically significant difference existed in the Cognitive FIM Change means among the six vocational categories ($p = 0.000$). Students had the highest Cognitive FIM Change mean, followed by those patients who were employed. Scheffe's tests revealed that the significant differences in outcome means were between the employed category, and each the homemaker category, retired for age category, and the retired for disability category, with employed having the highest mean. Significant differences in mean also were present between the highest category mean, student category, and each the homemaker category, retired for age category, and retired for disability category.

The differences in the mean Cognitive FIM Change scores among the vocational effort categories were also statistically significant ($p = 0.000$). The significant

differences were between the patients who were working full-time and the patients who were retired, with the full-time category having the highest mean. Significant differences also were found between patients who worked part-time or had an adjusted workload, and retired patients. The vocational effort category with the two highest Cognitive FIM Change means were the full-time and part-time or adjusted workload.

Table 5.3.5.3 Comparison of Cognitive FIM Change means by vocational category and vocational effort

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	3.2	2.9	3.4		
Vocational Category						
Employed [a,b,c]	373	4.5	4.0	5.1	20.025	.000*
Student [d,e,f]	61	5.7	4.1	7.2		
Homemaker [a,d]	172	3.1	2.5	3.8		
Not Working	73	3.5	2.6	4.3		
Retired For Age [b,e]	815	2.6	2.3	2.8		
Retired For Disability [c,f]	158	1.7	1.1	2.2		
Vocational Effort						
Not Working	79	3.3	2.5	4.1	24.167	.000*
Full-Time [a]	517	4.3	3.8	4.7		
Part-Time/Adjusted [b]	83	4.3	3.3	5.4		
Retired [a,b]	973	2.4	2.2	2.7		

[a,b,c,d,e,f] indicate significant differences between the sample means based on Scheffe's multiple comparison procedure

* $p \leq 0.05$

5.3.5.2 Living Arrangements

The comparisons of Cognitive FIM Change means by pre-impairment onset living arrangement, living setting from which the patient was admitted to the rehabilitation program, and the post-discharge living arrangement are presented in Table 5.3.5.4. The difference in Cognitive FIM Change means between patients who lived at home post impairment onset and patients who were admitted to the rehabilitation program from acute care or long-term care facility was found to be statistically significant ($p = 0.000$).

Patients admitted to the rehabilitation program from home had significantly lower Cognitive FIM Change means than patients who were admitted to the program from an acute care or long-term care facility.

The difference in Cognitive FIM Change means between patients who lived alone prior to impairment onset and patients who lived with family or relatives was also found to be statistically significant ($p = 0.002$). Patients who lived alone had a significantly lower Cognitive FIM Change mean than did patients who lived with family or relatives.

The difference in Cognitive FIM Change means between patients discharged to living alone, and patients discharged to living with family or relatives was found to be statistically significant ($p = 0.000$). Patients who lived alone post-discharge had significantly lower Cognitive FIM Change mean than patients who lived with family or relatives post-discharge.

Table 5.3.5.4. Comparison of Cognitive FIM Change means by living setting and living with

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	3.2	2.9	3.4		
Admit From Living Setting						
Home	192	0.7	0.5	1.0	72.3	0.000*
Acute Unit/ Other	1460	3.5	3.2	3.7		
Pre-impairment onset Living With						
Alone	386	2.6	2.2	2.9	9.8	0.002*
Family/Relatives	1266	3.3	3.1	3.6		
Discharge Living With						
Alone	251	2.2	1.8	2.6	15.3	0.000*
Family/Relatives	1401	3.3	3.1	3.6		

* $p \leq 0.05$

5.3.5.3 Impairment Group, Comorbidity

Table 5.3.5.5 presents the comparison of the Cognitive FIM Change means by impairment group and comorbidity. The differences in Cognitive FIM Change means among impairment groups was found to be statistically significant ($p = 0.000$). Scheffe's tests revealed that significant differences existed between the stroke group, and each the TBI group, SCI group, amputation group, and other impairments group. Significant differences also existed between the TBI group, and each the SCI, amputation group, and other impairment group. Significant differences were also found between the SCI group, and each the amputation group and other impairment group. Finally, significant differences were found between the amputation group and other impairment group. The impairment group with the highest Cognitive FIM Change mean was TBI, followed by stroke.

Significant differences in Cognitive FIM Change mean were found between patients who did and did not present with a comorbidity ($p = 0.038$). The Cognitive FIM Change mean for patients with a comorbidity was significantly lower than the mean for patients who did not present with a comorbidity.

Table 5.3.5.5 Comparison of Cognitive FIM Change by impairment group and comorbidity

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance
Total	1652	3.2	2.9	3.4		
Impairment Group						
Stroke [a,b,c,d]	855	3.6	3.4	3.9	76.778	0.000*
TBI[a,e,f,g]	154	7.2	6.3	8.1		
SCI [b,e]	156	1.3	0.8	1.7		
Amputations [c,f,h]	162	0.5	0.2	0.7		
Other [d,g,h]	325	2.2	1.9	2.6		
Comorbidity						
No	550	3.5	3.1	3.9	4.310	0.038*
Yes	1102	3.0	2.8	3.2		

[a,b,c,d,e,f,g,h]indicate significant differences between the sample means based on Scheffe's multiple comparison procedure

* $p \leq 0.05$

5.3.6 Length of Stay

5.3.6.1 Sociodemographic Variables

The comparisons of the length of stay means by the independent variable and the other sociodemographic covariables are found in Tables 5.3.6.1 to 5.3.6.5. For ease of interpretation, each of the tables consists of the mean and confidence intervals for the untransformed length of stay variable. The F-statistic and significance are based on the log transformed length of stay variable. The difference in the LOS means between non-Aboriginals and Aboriginals was found to be statistically significant ($p = 0.002$) (Table 5.3.6.1). The mean LOS for non-Aboriginals was significantly higher than for Aboriginals.

Table 5.3.6.1 Comparison of Length of Stay means between Non-Aboriginal patients and Aboriginal patients (One-Way ANOVA)

Dependent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance**
Total	1652	39.2	37.6	40.8		
Log Length of Stay						
Non-Aboriginal	1527	39.8	38.1	41.4	10.0	.002*
Aboriginal	125	32.2	28.0	36.4		

*$p \leq 0.05$
**Significance of log transformed length of stay

The difference in the mean LOS between males and females was not found to be statistically significant (p =0.913) (Table 5.3.6.2). The mean LOS for males was similar to the mean for females.

The differences in the mean LOS among the age groups was not found to be statistically significant (p = 0.085) (Table 5.3.6.2). In the LOS bivariate and multivariate analysis, age was grouped into four categories: <19-39, 40-59, 60-79, and 80+.

LOS means were not found to be significantly different among patients with differing marital status (p = 0.494) (Table 5.3.6.2). The means for the three marital status categories were similar.

Table 5.3.6.2 Comparison of LOS means by demographic variables, gender, age, and marital status

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance**
Total	1652	39.2	37.6	40.8		
Gender						
Male	968	39.7	37.7	41.7	0.012	0.913
Female	684	38.5	36.0	40.9		
Age						
≤19-39	239	47.2	40.5	53.9	2.214	0.085
40-59	327	40.4	37.0	43.8		
60-79	874	37.9	36.1	39.8		
80+	212	33.5	30.8	36.3		
Marital Status						
Never Married	305	43.9	38.7	49.1	0.705	0.494
Married	996	38.8	36.9	40.6		
Separated/Divorced/ Widowed	351	36.4	33.8	38.9		

**Significance of log transformed length of stay

Table 5.3.6.3 presents the comparison of LOS means by vocational category and vocational effort. A statistically significant difference existed in the LOS means among the six vocational categories ($p = 0.011$). Students had the highest LOS mean. The remaining five categories had similar LOS means. Even though the F-statistic for vocational category and LOS was significant, Scheffe's tests revealed no specific significant differences in outcome means between vocational categories.

The differences in the mean LOS scores among the vocational effort categories were also statistically significant ($p = 0.005$). The significant differences were between the patients who were working full-time and the patients who were retired.

Table 5.3.6.3. Comparison of LOS means by vocational category and vocational effort

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance**
Total	1652	39.2	37.6	40.8		
Vocational Category						
Employed	373	43.4	39.5	47.3	2.999	0.011*
Student	61	58.6	40.5	76.7		
Homemaker	172	40.4	36.6	44.3		
Not Working	73	35.5	29.5	41.5		
Retired For Age	815	36.5	34.7	38.4		
Retired For Disability	158	36.0	32.0	39.9		
Vocational Effort						
Not Working	79	35.6	30.0	41.2	4.329	0.005*
Full-Time [(a)]	517	44.2	40.6	47.8		
Part-Time/Adjusted	83	44.2	37.3	51.1		
Retired [(a)]	973	36.4	34.8	38.1		

[a]indicates significant differences between the sample means based on Scheffe's multiple comparison procedure

* $p \leq 0.05$

**Significance of the log transformed length of stay

5.3.6.2 Living Arrangements

The comparisons of LOS means by pre-impairment onset living arrangement, living setting from which the patient was admitted to the rehabilitation program, and the post-discharge living arrangement are presented in Table 5.3.6.4. The difference in LOS means between patients who lived at home post impairment onset and patients who were admitted to the rehabilitation program from acute care or long-term care facility was found to be statistically significant ($p = 0.000$). Patients admitted to the rehabilitation program from home had significantly lower LOS means than patients who were admitted to the program from an acute care or long-term care facility.

The difference in LOS means between patients who lived alone prior to impairment onset and patients who lived with family or relatives was not found to be

statistically significant ($p = 0.998$). Patients who lived alone had similar LOS mean as patients who lived with family or relatives.

The difference in LOS means between patients discharged to living alone, and patients discharged to living with family or relatives was also not found to be statistically significant ($p = 0.690$). Patients who lived alone post-discharge had a similar LOS means as patients who lived with family or relatives post-discharge.

Table 5.3.6.4. Comparison of logLOS means by living setting and living with

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance**
Total	1652	39.2	37.6	40.8		
Admit From Living Setting						
Home	192	25.0	22.9	27.0	74.815	0.000*
Acute Unit/ Other	1460	41.1	39.3	42.8		
Pre-impairment onset Living With						
Alone	386	37.7	35.2	40.3	0.000	0.998
Family/Relatives	1266	39.7	37.8	41.5		
Discharge Living With						
Alone	251	38.1	35.0	41.2	0.160	0.690
Family/Relatives	1401	39.4	37.6	41.2		

*$p \leq 0.05$
**Significance of log transformed length of stay

5.3.6.3 Impairment Group, Comorbidity

Table 5.3.6.5 presents the comparison of the LOS means by impairment group and comorbidity. The difference in LOS means among impairment groups was found to be statistically significant ($p = 0.000$). Scheffe's tests revealed that significant differences existed between the stroke group, and each the SCI group, and other impairments group. Significant differences also existed between the TBI group, and the SCI group. Significant differences were also found between the SCI group and each the amputation

group, and other impairment group. The impairment group with the highest log LOS mean was SCI, followed by stroke and TBI.

Significant differences in LOS mean were not found between patients who did and did not present with a comorbidity ($p = 0.103$). The LOS mean for patients with a comorbidity was similar to the mean of patients who did not present with a comorbidity.

Table 5.3.6.5. Comparison of LOS means by impairment group and comorbidity

Independent Variable	N	Mean	95% Confidence Intervals for Means Lower Bound	Upper Bound	F-test Statistic	Significance**
Total	1652	39.2	37.6	40.8		
Impairment Group						
Stroke [a,b]	855	39.2	37.3	41.1	16.439	.000*
TBI[c]	154	43.2	35.0	51.4		
SCI [a,c,d,e]	156	56.5	49.0	64.1		
Amputations [e]	162	33.4	29.9	36.9		
Other [b,d]	325	31.9	29.5	34.3		
Comorbidity						
No	550	38.6	35.7	41.4	2.664	.103
Yes	1102	39.5	37.6	41.4		

[a,b,c,d,e] indicate significant differences between the sample means based on Scheffe's multiple comparison procedure

* $p \leq 0.05$

**Significance of the log transformed length of stay

5.4 Ethnicity, FIM Change Scores and Length of Stay

5.4.1 Ethnicity and Total FIM Change Score

Many of the results from the bivariate analysis indicated significant associations between the independent variable, covariables and the outcome, Total FIM Change. Multivariate analysis was conducted to determine if there was a true, unconfounded association between the independent variable, ethnicity, and Total FIM Change. Controlling for potential confounding by covariables of the primary relationship ensured that the association between ethnicity and Total FIM Change was a true association rather

than an association brought about by the relationship between another covariable and the outcome of interest.

The covariables that remained in the final GLM were selected based on their F-statistic and the significance of the F-statistic. Covariables were eliminated if their *p*-value was less than 0.05. Exceptions were made for covariables with *p*-values larger than 0.05 if its inclusion in the model resulted in a better fit (higher Lack of Fit Test Statistic) and a higher Adjusted R Square. Impairment group remained in the final GLM for Total FIM Change even though its F significance was 0.177.

The covariables that remained in the GLM with ethnicity were age (continuous), vocational category, impairment group, admit from, discharge living arrangement, and admission Total FIM score. The Adjusted R Square, which represents the corrected proportion of variation in the outcome variable, Total FIM Change, which can be explained by the model in Table 5.19, was 0.496. That is, 50% of the variation in Total FIM Change can be explained by this GLM with ethnicity and each of the above covariables. The lack of Fit Test Statistic was not significant ($p = 0.964$), which meant that this GLM had very good fit.

The final General Linear Model indicated that, when all of the above mentioned confounding variables were held constant, there was a significant relationship between ethnicity and Total FIM Change ($p = 0.039$). The magnitude of the beta coefficient indicated that there was a –2.603 difference in Total FIM Change on average between Aboriginals and non-Aboriginals, when non-Aboriginal was the referent group and all of the other covariables mentioned above were held constant.

Table 5.4.1.1. Final General Linear Model describing the relationship between ethnicity, covariables and Total FIM Change

Variables in the Model*†	Beta Coeff. (ß)	Std. Error	*t*	sig.	95% Confidence Interval for B Lower Bound	Upper Bound	F_{14df}	Sig. F
Ethnicity							4.285	0.039
Non-Aboriginal	--	--	--	--	--	--		
Aboriginal	-2.603	1.257	-2.070	0.039	-5.069	-0.137		
Age (continuous)	-0.101	0.028	-3.572	0.000	-0.157	-4.565 E-02	12.761	0.000
Vocational Category							6.060	0.000
Employed	--	--	--	--	--	--		
Student	-3.105	1.825	-1.676	0.094	-6.738	0.529		
Homemaker	-6.958 E-02	1.228	-0.057	0.955	-2.477	2.338		
Not Working	-2.846	1.657	-1.717	0.086	-6.097	0.405		
Retired for Age	-2.263	1.041	-2.173	0.030	-4.305	-0.221		
Retired for Disability	-6.011	1.245	-4.829	0.000	-8.452	-3.569		
Impairment Group							1.579	0.177
Stroke	--	--	--	--	--	--		
TBI	-0.176	1.230	-0.143	0.886	-2.589	2.236		
SCI	-1.037	1.125	-0.922	0.357	-3.243	1.169		
Amputations	-1.408	1.162	-1.212	0.226	-3.688	0.871		
Other	-1.949	0.839	-2.324	0.020	-3.595	-0.304		
Admit From							42.452	0.000
Home	--	--	--	--	--	--		
Acute Unit/ Long-Term Care	6.847	1.051	6.515	0.000	4.785	8.908		
Discharge To Living With							30.312	0.000
Alone	--	--	--	--	--	--		
Family/Relatives	-4.700	0.854	-5.506	0.000	-6.374	-3.025		
Admission FIM	-0.454	0.014	-33.342	0.000	-0.481	-0.428	1111.700	0.000

Referent group in italics
*Goodness of Fit Test Statistic = 0.964
† Adjusted R Squared = 0.496

5.4.2 Ethnicity and Motor FIM Change Score

As with the multivariate analysis of Total FIM Change, the covariables that remained in the final GLM were selected based on their F-statistic and the significance of the F-statistic. Covariables were eliminated if their *p*-value was less than 0.05. Exceptions were made for covariables with *p*-values larger than 0.05 if its inclusion in the model resulted in a better fit (higher Lack of Fit Test Statistic) and a higher Adjusted R

Square. Impairment group remained in the final GLM for Total FIM Change even though its F significance was 0.054.

The covariables that remained in the GLM with ethnicity were gender, vocational category, impairment group, admit from, discharge living arrangement, comorbidty, and admission Motor FIM score. The Adjusted R Square, which represents the corrected proportion of variation in the outcome variable, Motor FIM Change, which can be explained by the model in Table 5.26, was 0.527. That is, 53% of the variation in Cognitive FIM Change can be explained by this GLM with ethnicity and each of the above covariables. The lack of Fit Test Statistic was not significant ($p = 0.867$), which meant that this GLM had very good fit.

The final General Linear Model indicated that, when all of the above mentioned confounding variables were held constant, there was not a significant relationship between ethnicity and Motor FIM Change ($p = 0.244$). The t-value for ethnicity in the GLM was -1.166, which indicates the relative lack of importance of ethnicity in the model. The magnitude of the beta coefficient indicated that there was only a -1.239 difference in the Motor FIM Change on average between Aboriginals and non-Aboriginals, when non-Aboriginal was the referent group and all of the other covariables mentioned above were held constant.

Table 5.4.2.1. Final General Linear Model describing the relationship between ethnicity, covariables and Motor FIM Change

Variables in the Model*†	Beta Coeff. (ß)	Std. Error	*t*	sig.	95% Confidence Interval for B Lower Bound	Upper Bound	F_{15df}	Sig. F
Ethnicity							1.360	0.244
Non-Aboriginal	--	--	--	--	--	--		
Aboriginal	-1.239	1.062	-1.166	0.244	-3.322	0.845		
Gender							6.065	0.014
Male	--	--	--	--	--	--		
Female	-1.412	0.573	-2.463	0.014	-2.536	-0.287		
Vocational Category							8.131	0.000
Employed	--	--	--	--	--	--		
Student	-1.114	1.466	-0.760	0.448	-3.990	1.762		
Homemaker	-0.307	1.064	-0.289	0.773	-2.394	1.779		
Not Working	-1.415	1.407	-1.006	0.315	-4.174	1.345		
Retired for Age	-2.944	0.692	-4.255	0.000	-4.301	-1.587		
Retired for Disability	-5.656	1.037	-5.453	0.000	-7.691	-3.622		
Impairment Group							2.333	0.054
Stroke	--	--	--	--	--	--		
TBI	0.836	1.010	0.828	0.408	-1.145	2.817		
SCI	-1.431	0.937	-1.528	0.127	-3.268	0.406		
Amputations	-1.815	0.975	-1.862	0.063	-3.727	9.719E-02		
Other	-1.285	0.700	-1.835	0.067	-2.658	8.878E-02		
Admit From							34.067	0.000
Home	--	--	--	--	--	--		
Acute Unit/ Long-Term Care	5.196	0.890	5.837	0.000	3.450	6.942		
Discharge To Living With							35.769	0.000
Alone	--	--	--	--	--	--		
Family/Relatives	-4.343	0.726	-5.981	0.000	-5.767	-2.919		
Comorbidity							4.615	0.032
No	--	--	--	--	--	--		
Yes	-1.189	0.553	-2.148	0.032	-2.274	-0.103		
Admission Motor FIM	-0.503	0.014	-36.568	0.000	-0.530	-0.476	1337.194	0.000

Referent group in italics
*GLM Goodness of Fit Test p-value = 0.867
† Adjusted R Squared = 0.527

5.4.3 Ethnicity and Cognitive FIM Change

The covariables that remained in the GLM with ethnicity were age (continuous), marital status, vocational category, impairment group, admit from, discharge living arrangement, and admission Cognitive FIM score, and the ethnicity by Admissiom Cognitive FIM

product term. The Adjusted R Square, which represents the corrected proportion of variation in the outcome variable, Cognitive FIM Change, which can be explained by the model in Table 5.33, was 0.461. That is, 46% of the variation in Cognitive FIM Change can be explained by this GLM with ethnicity and each of the above covariables. The lack of Fit Test Statistic was not significant ($p = 0.980$), which meant that this GLM had very good fit.

The final General Linear Model indicated that, when all of the above mentioned confounding variables were held constant, there was a significant relationship between ethnicity and Cognitive FIM Change ($p = 0.000$). The magnitude of the beta coefficient indicated that there was a –4.558 difference in Cognitive FIM Change on average between Aboriginals and non-Aboriginals, when non-Aboriginal was the referent group and all of the other covariables mentioned above were held constant.

Table 5.4.3.1 Final General Linear Model describing the relationship between ethnicity, covariables and Cognitive FIM Change

Variables in the Model*†	Beta Coeff. (ß)	Std. Error	*t*	sig.	95% Confidence Interval for B Lower Bound	Upper Bound	F_{17df}	Sig. F
Ethnicity							18.738	0.000
Non-Aboriginal	--	--	--	--	--	--		
Aboriginal	-4.558	0.951	-4.329	0.000	-5.984	-2.252		
Age (continuous)	-3.880E-02	0.008	-5.004	0.000	-5.401E-02	-2.359E-02	25.042	0.000
Marital Status							4.335	0.013
Never Married	--	--	--	--	--	--		
Married	6.327E-02	0.262	0.241	0.809	-0.451	0.578		
Widowed/ Separated/ Divorced	-0.596	0.299	-1.992	0.047	-1.184	-9.011 E-03		
Vocational Category							2.972	0.011
Employed	--	--	--	--	--	--		
Student	-0.345	0.488	-0.708	0.479	-1.302	0.611		
Homemaker	0.155	0.318	0.487	0.626	-0.469	0.778		
Not Working	-0.708	0.431	-1.644	0.100	-1.553	0.137		
Retired for Age	-0.416	0.269	-1.546	0.122	-0.945	0.112		
Retired for Disability	-0.965	0.321	-3.005	0.003	-1.595	-0.335		
Impairment Group							6.417	0.000
Stroke	--	--	--	--	--	--		
TBI	0.772	0.322	2.402	0.016	0.142	1.403		
SCI	-0.917	0.304	-3.022	0.003	-1.513	-0.322		
Amputations	-0.362	0.303	-1.195	0.232	-0.957	0.233		
Other	-0.585	0.219	-2.672	0.008	-1.014	-0.156		
Admit From							21.275	0.000
Home	--	--	--	--	--	--		
Acute Unit/ Long-Term Care	1.229	0.266	4.612	0.000	0.706	1.752		
Discharge To Living With							7.020	0.008
Alone	--	--	--	--	--	--		
Family/Relatives	-0.676	0.255	-2.649	0.008	-1.176	-0.176		
Admission Cognitive FIM	-0.298	.011	-27.384	0.000	-0.319	-0.277	159.770	0.000
Ethnicity *Admission Cognitive FIM								
Non-Registered Indian Admission Cognitive FIM*	--	--	--	--	--	--		
Registered Indian * Admission Cognitive Fim	0.124	0.036	3.484	0.001	5410E-02	0.193	12.139	0.001

Referent group in italics
*GLM Lack of Fit Test p-value = 0.980
† Adjusted R Squared = 0.461

The interaction term of ethnicity with Admission Cognitive FIM was statistically significant (F= 12.139, p= 0.001 for 17df) and was left in the model (Adjusted R Squared = 0.461, p= 0.980). The model without the interaction term had an adjusted R squared of 0.458 and a p-value of .977 for 16df. Even thought the adjusted R squared and the p-value were similar for the two models, it was considered more important to leave the interaction term in the model in order to arrive at a better understanding of the relationship between ethnicity and Cognitive FIM Change. The t-value of 3.484 with a significance of 0.001 indicates that the interaction term is relatively important within the model. The magnitude and direction of the interaction between ethnicity with Admission Cognitive FIM and Cognitive FIM Change was examined by stratifying the data by ethnicity and conducting a correlation procedure between Admission Cognitive FIM and Cognitive FIM Change.

Table 5.4.3.2 The correlation coefficient for Admission Cognitive FIM and Cognitive FIM Change, stratified by ethnicity

	Pearson's Correlation Coefficient	**Significance (2-tailed)**
Non-Aboriginal	-0.635	0.000
Aboriginal	-0.603	0.000

The linear relationship between Admission Cognitive FIM and Cognitive FIM Change by both Non-Aboriginals and Aboriginals is significant (p= 0.000) (Table 5.34) and negative. As Admission Cognitive FIM increases, Cognitive FIM Change decreases and vise versa. The degree of the relationship for both ethnic groups is good; however, the correlation for Aboriginals (r = -0.603) is less than that for the Non-Aboriginals (r = -0.635).

5.4.4 Ethnicity and Length of Stay

The covariables that remained in the GLM with ethnicity were age (categorical), marital status, vocational category, impairment group, admit from, discharge living arrangement, admission Total FIM score, admission Motor FIM score, and the product term of ethnicity and admission Total FIM. The Adjusted R Square, which represents the corrected proportion of variation in the outcome variable, log LOS, which can be explained by the model in Table 5.41, was 0.401. That is, 40% of the variation in log LOS can be explained by this GLM with ethnicity and each of the above covariables. The lack of Fit Test Statistic was not significant ($p = 0.405$); however, the p-value indicates that the present GLM does not have goodness of fit.

The final General Linear Model indicated that, when all of the above mentioned confounding variables were held constant, there was a significant relationship between ethnicity and log LOS (p =0.000). The t-value for ethnicity in the GLM was –3.569, which indicates the relative importance of ethnicity in the model. The magnitude of the beta coefficient indicated that there was a –0.273 difference in the log LOS on average between Aboriginals and non-Aboriginals, when non-Aboriginal was the referent group and all of the other covariables mentioned above were held constant.

Table 5.4.4.1. Final General Linear Model describing the relationship between ethnicity, covariables and Length of Stay

Variables in the Model*†	Beta Coeff. (ß)	Std. Error	*t*	sig.	95% Confidence Interval for B Lower Bound	Upper Bound	F_{20df}	Sig. F
Ethnicity							12.740	0.000
Non-Aboriginal	–	–	–	–	–	–		
Aboriginal	-0.273	0.076	-3.569	0.000	-0.422	-0.123		
Age							3.221	0.022
<19-39	–	–	–	–	–	–		
40-59	-1,284 E-02	0.023	-0.564	0.573	-5.746 E-02	3.178 E-02		
60-79	-4.886E-02	0.025	-1.938	0.053	-9.831 E-02	5.897 E-04		
80+								
Marital Status							1.504	0.223
Never Married	–	–	–	–	–	–		
Married	-1.487 E-02	0.018	-0.807	0.420	-5.100E -02	2.126 E-02		
Widowed/ Separated/ Divorced	1,248E -02	0.021	0.602	0.547	-2.818E -02	5.314E – 02		
Vocational Category							1.840	0.102
Employed	–	–	–	–	–	–		
Student	-1.080E -02	0.034	-0.322	0.747	-7.657E -02	5.497E – 02		
Homemaker	3.682E –02	0.022	1.662	0.097	-6.640E -03	8.028E – 02		
Not Working	-1.577E -02	0.030	-0.527	0.598	-7.441E -02	4.288E – 02		
Retired for Age	-1.416E -02	0.019	-0.747	0.455	-5.137E -02	2.304E – 02		
Retired for Disability	-2.684E -02	0.022	-1.198	0.231	-7.077E -02	1.710E – 02		
Impairment Group							14.541	0.000
Stroke	–	–	–	–	–	–		
TBI	1.872E -02	0.023	0.811	0.418	-2.657E –02	6.401E – 02		
SCI	6.117E -02	0.022	2.832	0.005	1.880E -02	0.104		
Amputations	9.979E -02	0.021	4.732	0.000	5.834E -02	0.141		
Other	-5.202E -02	0.015	-3.416	0.001	-8.188E -02	-2.215 E –02		
Admit From							6.948	0.008
Home	–	–	–	–	–	–		
Acute Unit/ Long-Term Care	4.988E -02	0.019	2.636	0.008	1.276E -02	8.700E – 02		
Discharge To Living With							8.332	0.004
Alone	–	–	–	–	–	–		
Family/Relatives	-5.128E -02	0.018	-2.886	0.004	-8.612E -02	-1.643 E –02		
Admission Total FIM	-2.543E -03	0.001	-3.250	0.001	-4.077E -03	-1.008 E-03	2.097	0.148
Admission Motor FIM	-5.992E -03	0.001	-6.465	0.000	-7.810E -03	-4.174 E-03	41.799	0.000
Ethnicity *Admission Total FIM							8.730	0.003
Non-Registered Indian Admission Total FIM*	–	–	–	–	–	–		
Registered Indian* Admision Total FIM	2.588E -02	0.001	2.955	0.003	8.701E -04	4.306E – 03		

Referent group in italics
*GLM Lack of Fit Test p-value = 0.401
† Adjusted R Squared = 0.405

The interaction term of ethnicity with Admission Total FIM was statistically significant (F= 8.730, p= 0.003 for 20df) and was left in the model (Adjusted R Squared = 0.401, p= 0.405). The model without the interaction term had an adjusted R squared of 0.402 and a p-value of .394 for 19df. Even thought the adjusted R squared and the p-value were similar for the two models, it was considered more important to leave the interaction term in the model in order to arrive at a better understanding of the relationship between ethnicity and log LOS. The t-value of 2.955 with a significance of 0.003 indicates that the interaction term is relatively important within the model. The magnitude and direction of the interaction between ethnicity with Admission Total FIM and Cognitive FIM Change was examined by stratifying the data by ethnicity and conducting a correlation procedure between Admission Total FIM and log LOS.

Table 5.4.4.2. The correlation coefficient for Admission Total FIM and log LOS, stratified by ethnicity

	Pearson's Correlation Coefficient	**Significance (2-tailed)**
Non-Aboriginal	-0.594	0.000
Aboriginal	-0.429	0.000

The linear relationship between Admission Total FIM and log LOS by both Non-Aboriginals and Aboriginals is significant (p= 0.000) (Table 5.42) and negative. As Admission Total FIM increases, log LOS decreases and vise versa. The degree of the relationship for both ethnic groups is moderate; however, the correlation for Aboriginals (r = -0.429) is less than that for the Non-Aboriginals (r = -0.594)

5.5 Other Independent Risk Factors for Functional Outcome and Length of Stay

By utilizing GLM multivariate analysis a number of significant independent risk factors for functional outcome and length of stay were identified. The General Linear Model describing the relationship between independent risk factors and Total FIM

Change demonstrated that age was a risk factor for poorer Total FIM Change. The vocational categories 'Retired for Age' and 'Retired for Disability', the impairment group 'Other', discharge to family/relatives, and Admission FIM were also significant independent risk factors for poorer Total FIM Change.

The independent risk factors identified within the Motor FIM Change model were gender, vocational category, admit from, discharge to living with, comorbidity and Admission Motor FIM. Females had significantly poorer Motor FIM Change than males. Those who were retired for age and disability had significantly poorer Motor FIM Change than those who were employed. Patients discharged to family or relatives had significantly poorer Motor FIM Change than those who were discharged to living alone. Patients presenting with a comorbidity also had significantly poorer Motor FIM Change. Patients admitted from acute care had significantly better Motor FIM Change than those admitted from home.

The independent risk factors identified in the GLM for Cognitive FIM Change were age, marital status, vocational category, impairment group, admit from, discharge to living with, and Admission Cognitive FIM, and the interaction term between ethnicity and Admission Cognitive FIM. Patients who had been widowed, separated or divorced had significantly poorer Cognitive FIM Change than patients who had never been married. Patients retired for disability had significantly poorer Cognitive FIM Change than employed patients. Patients presenting with TBI had significantly better Cognitive FIM Change than those presenting with stroke. Patients presenting with SCI, and 'Other' impairments had significantly lower Cognitive FIM Change than those presenting with stroke. Patients admitted from acute care had significantly better Cognitive FIM Change

than those admitted from home. Those patients discharged to family or relatives had significantly poorer Cognitive FIM Change than patients discharged to living alone. The interaction between Aboriginals and Admission Cognitive FIM had a significantly better Cognitive FIM Change than the interaction term with non-Aboriginals.

The significant independent risk factors identified in the GLM for Length of Stay were impairment group, admit from, discharge to living with, Admission Total FIM, Admission Motor FIM, and the interaction term between ethnicity and Admission Total FIM. Patients presenting with SCI, and amputations had significantly longer lengths of stays than those presenting with stroke. Patients presenting with 'other' impairments had significantly shorter lengths of stay than those presenting with stroke. Patients admitted from acute care had significantly longer lengths of stay than those admitted from home. Patients discharged to family and relatives had significantly shorter lengths of stay than those discharged to living alone. The interaction between Aboriginals and Admission Total FIM had significantly longer length of stay than the interaction with non-Aboriginals

CHAPTER SIX

DISCUSSION

6.1 Introduction and Summary of Results

This study investigated the relationship between ethnicity and rehabilitation functional outcomes. The research objectives were to: 1) identify and describe differences in the rehabilitation experiences between Aboriginal and non-Aboriginal patients with disabilities resulting form stroke, traumatic brain injury, spinal cord injury, amputation, and other impairment groups, and 2) propose strategies to improve the rehabilitation outcome of Aboriginal patients. Objective 1 was addressed by determining differences between Aboriginals and non-Aboriginals in each of the following Functional Independence Measure outcomes: Total FIM Change, Motor FIM Change, and Cognitive FIM Change. Differences in Length of Stay between Aboriginal and non-Aboriginal patients were also analysed to address objective one.

This chapter consists of a discussion of the results pertaining to Objective 1. The discussion will focus on the significant results, the meaning of these results, what possible explanations exist for these findings, and how the results compare to what is generally found in the literature.

Results from chapter five indicate that significant relationships were found between the primary independent variable, ethnicity, and each of the outcomes: Total FIM Change, Cognitive FIM Change, and Length of Stay. For each of these outcomes,

patients with Aboriginal status showed poorer rehabilitation outcomes and shorter length of stay compared to those who were non-Aboriginals. These differences held when controlling for all of the covariables in the study. No significant relationship was found between ethnicity and Motor FIM Change.

Because Objective 2 was dependent on the results of Objective 1, Objective 2 will be addressed in chapter seven: Recommendations for Further Research and Strategy Implementation. Chapter seven will describe potential research projects and strategies found in the literature that could be implemented within the in-patient rehabilitation programs to improve the rehabilitation experience of Aboriginal patients.

The results and discussion of this study pertain to Aboriginal and non-Aboriginal patients who were admitted for initial rehabilitation, who lived at home prior to impairment onset, who were discharged to home, and who had adequate English skills.

6.2 Reliability of the Study Results

An abundance of literature exists describing the reliability, validity and sensitivity of the FIM instrument (refer to section 3.6). However, the literature lacked any specific reference to the reliability of FIM with an Aboriginal population. In order for the results of the study to be of any use, the FIM instrument had to be shown to be reliable among both the Aboriginal and non-Aboriginal populations. Therefore, this study utilized Cronbach's alpha to measure how consistently individuals responded to the items within the FIM scale. Analysis was run for each of the total, motor and cognitive scales for both the Aboriginal and non-Aboriginal subgroups. The results indicated that the use of FIM among Aboriginal and non-Aboriginal populations was equally reliable.

6.3 Generalizability of the Study Results

Generalizability of the study results refers to the applicability of the results to other populations.(91) The description of the study group characteristics found in section 5.1 indicates that the distribution of sociodemographic characteristics of this study population differs from that of the general population. The differences can be readily explained by acknowledging that the study group is from a clinical population. Therefore, the results of this study should not be applied to the general population, but to populations within similar in-patient rehabilitation programs.

The proportion of Aboriginals in the study population was lower than that of the general population. As mentioned in chapter five, this underepresentation could be due to a number of factors, such as: the location of the inpatient rehabilitation programs in relation to Aboriginal communities, the lower incidence of cerebrovascular disease among Aboriginal peoples, and an aging general adult population as opposed to a growing youthful Aboriginal population.(92)

Almost sixty percent of the study population consisted of males. This observation is not unusual in that males in Canada tend to have higher rates of hospitalization due to all causes than females. (93) Saskatchewan has the highest stroke hospitalization rates for both sexes in the country: within Saskatchewan, males having a higher rate of hospitalization for stroke than females. In terms of the differences in age distribution between the study population and the general population, the vast majority of the study population was over the age of 60. The relatively older study population can be explained by the fact that males and females over the age of 65 are at greatest risk of

stroke, and that majority of the study population presented for inpatient rehabilitation had a diagnosis of stroke.

Over ninety-six percent of the study population was over the age of twenty; therefore, one could assume that this study population, as compared to the general population, would tend to demonstrate differences in other sociodemographic factors such as marital status, vocational category and effort, and living situation. The study population had a smaller proportion of never married people, and a larger proportion of married, widowed, separated and divorced individuals than those of the general population. The study population also tended to have fewer students, and more people retired for age or with disability. Because a large proportion of the study population was either married, widowed, separated, or divorced, it would be expected that, the patients admitted to the in-patient rehabilitation program would have a spouse or family member at home prior to the admission and post-discharge.

In summary, the results of this study may be cautiously generalized to an inpatient rehabilitation program with a population that consisted of similar sociodemographic and clinical factors such as gender, ethnicity, age, marital status, vocational category, living situation, comorbidity and impairment groups. However, the specific factors related to the administration of and type of service delivery in an inpatient program would need to be taken into consideration before comparisons could be made with this study.

6.4 The Unadjusted Associations between Ethnicity and the Covariables

The bivariate analysis between ethnicity and each of the covariables was performed in order to familiarize the investigator with the distributions of the covariables and patterns in the data. The use of unadjusted associations may be viewed as simply a

preliminary step to addressing the main research objectives. Multivariate analysis had to be utilized in order to control for confounding bias while answering the main research question of whether significant differences in functional outcome and length of stay existed between Aboriginals and Non-Aboriginals.

Section 5.1.2 contains the results of the analysis of the covariables by ethnicity. The covariables that are selected are those that are clinically relevant. Aboriginals present with significantly different impairment groups than non-Aboriginals. Explanations for these findings are related to the differences in the causes of the impairments. Unintentional injuries are the leading cause of death among Canadians age 1 to 44. Aboriginal peoples in general are 3.8 times more likely to suffer from unintentional injuries (i.e.,TBI or SCI) than the general population. Injuries and poisonings are the number one cause of death among Aboriginal peoples.(10) In the present study, Aboriginals have two times the proportion of both TBI and SCI than non-Aboriginals.

In the present study, Aboriginals represent half the proportion of those with strokes. In Canada, Stroke is the second and fourth leading cause of hospitalization in men and women, respectively, over the age of 65.(93) There is very little information regarding the epidemiology of stroke among Aboriginal peoples in Canada. A study conducted among Native Americans in 1990 indicated that the stroke death rates were similar in Native Americans and whites under age 65 but lower in Native Americans at ages 65 years and over.(94) In the conclusion of an extensive literature review, Waldram et al. stated that stroke was a considerable health risk for Aboriginal peoples

over the age of 65. They conclude that mortality and or morbidity among Aboriginal peoples as a result of stroke was higher than among other Canadians.

The proportion of Aboriginals presenting with amputations is almost three times greater than the proportion of non-Aboriginals presenting with the same impairment group. This result could be due to increased injuries among Aboriginal peoples, but more likely is due to the results of increased rates of diabetes and its complications. Waldram et. al state that diabetes results in a greater risk of mortality and/ or morbidity among Aboriginal peoples aged 15 to 65+ than non-Aboriginal peoples in the same age range.(4) Aboriginal men and women have a two and four times, respectively, greater risk of dying from diabetes than non-Aboriginal people. In 1997, the age-adjusted prevalence rate for diabetes among Aboriginal men was three times greater than non-Aboriginal men, and five times greater among Aboriginal woman than non-Aboriginal women.(10) In 1989, the results of a national survey indicated that the risk of chronic renal failure (or end-stage renal disease) was three times greater in Aboriginal Canadians than non-Aboriginal Canadians.(4) Aside from greater prevalence of diabetes among Aboriginal peoples, does access or willingness to access the rehabilitation programs by Aboriginal patients impact on the proportion of Aboriginal patients in the inpatient programs for rehabilitation of amputations. Could a possible explanation be that Aboriginal peoples find fewer resources and support (for instance, from family, community and traditional healers) for amputation rehabilitation than for other types of rehabilitation?

Another interesting unadjusted finding is the significant difference in the proportion of Aboriginals and non-Aboriginals being admitted from home after the onset of the impairment. The proportion of Aboriginals being admitted to the inpatient

programs from home is three times greater than the proportion of non-Aboriginals. There could be a number of explanations for this observation. For instance, the type of impairments, which allow one to return home more easily from an acute unit prior to admission to the program, may be more prevalent in Aboriginal patients than non-Aboriginal patients. Perhaps local/rural hospitals, from which off-reserve Aboriginals would be discharged, are more likely to discharge patients to home from acute care instead of waiting for a bed in the inpatient rehabilitation programs. Also, patients from these local hospitals may be discharged more quickly (especially is family support is available) than in an urban centre. Another issue raised by these results is the possibility of Aboriginal patients having to wait longer, more likely at home, in the admission process than non-Aboriginal patients.

The unadjusted associations between covariables and the independent variable, ethnicity, have raised number of issues regarding the distributions of the potential confounding variables in the study. The next stage of the analysis, the comparison of the FIM Change means by the independent variable and each of the covariables, gives a better understanding of how the potential counfounders effected functional outcome.

6.5 The Unadjusted Associations between Ethnicity, the Covariables and FIM Change

Significant differences in the Total, Motor, and Cognitive FIM Change means existed within some of the independent variable and covariable categories. Because these means changed across categories, it was acknowledge that multivariate analysis had to be carried out in order to control for the potential confounding effects of the variables in the study.

Significant differences in means existed between the Aboriginal and non-Aboriginal sub-populations for each Total FIM Change, Motor FIM Change, and Cognitive FIM Change. Aboriginals tended to have significantly lower means than non-Aboriginals. No other studies regarding the functional outcome of Aboriginals versus non-Aboriginals were found to which the results of the present study could be compared.

Significant differences in means existed among age categories for all three change outcomes. Means appeared to decrease with increasing age. The current literature indicates that age is a significant predictor of functional outcome and length of stay for all impairment groups.(63) The results of the study by Heinemann and Linacre indicated that younger patients attained greater motor and cognitive function at discharge than older patients for most impairment groups. The results of this study are comparable to the results found in the Heinemann and Linacre study and a number of other studies. (65,70,71)

Significant differences also existed among marital status categories for each Total FIM Change and Cognitive FIM Change. Means decreased with marital categories associated with increasing age. That is, the never married category had the highest means, while the separated/divorced/widowed categories had the lowest means. These results are comparable to the results found in other studies.(63,70)

Each of the change outcomes had significant differences within vocational category and effort categories. Significant differences tended to exist between the employed, student, and homemaker categories and the retired for age and disability categories. Significant differences in vocational effort were generally between the 'not working' and full-time work categories and the part-time work and retired categories.

This was true for all three of the FIM change outcomes. No significant differences existed between the employed and not working categories for either of the vocational covariables. There is a paucity of research that included vocational category and effort in the examination of functional outcome and length of stay. Only one study concluded that patients who were not working were more likely to demonstrate small changes in functional status.(70) However, the results of the present study do not indicate that those patients who are not working have a significantly better functional outcome than those who are working. The significant differences in this study are found mainly between the retired categories and the other categories.

The Total FIM Change, Motor FIM Change and Cognitive FIM Change means were all significantly different for the 'admit from living setting' categories. Those who were admitted from home tended to have dramatically lower FIM Change means. The 'pre-impairment onset living with' and 'discharge living setting' categories had significantly different Cognitive FIM Change means within categories. Those patients who lived alone had a significantly lower Cognitive FIM Change mean than those patients who lived with family/relatives.

Significant differences existed in all three change outcome means for impairment group categories. The highest Total FIM change mean was for SCI, followed closely by TBI, and stroke. 'Other' comorbidities and amputations had significantly lower means than the other three categories. Motor FIM Change means were the highest for SCI impairment group, followed by stroke, TBI, other, and amputations. The greatest Cognitive FIM Change mean was in the TBI impairment group, followed by stroke, other, SCI, and amputations.

A significant difference in Cognitive FIM Change mean was found between the comorbidity category. Patients who did not present with a comorbidity had a significantly higher Cognitive FIM Change mean. A number of studies have suggested that comorbidities and medical complications are predictors of both functional outcome and length of stay.(62,71,80,95,96)

No significant differences existed in any of the change outcomes for gender. This result was consistent with what was found in the literature. Gender has been found to be not a significant determinant of functional outcome.(70)

6.6 The Unadjusted Associations between Ethnicity, the Covariables and Length of Stay

The results of this study indicated that Aboriginals had a significantly shorter mean length of stay than did non-Aboriginals. No other research comparing Aboriginals' and non-Aboriginals' length of stay could be found to which these results could be compared.

The mean length of stay within vocational category was found to be significantly different. The student category mean length of stay was the highest, while each of the other categories remained similar. There was a significant difference in mean length of stay between those who worked full-time and those who were retired. The mean length of stay for those patients admitted to the inpatient program from home was significantly shorter than the mean length of stay for patients admitted from acute care.

The mean length of stay for patients presenting with SCI was significantly higher than the means for stroke, TBI, amputations, and Other. The mean was also significantly higher for stroke patients than for patients presenting with Other impairments.

The mean length of stay within Gender, age, marital status, pre-impairment onset living with, discharge living with, and comorbidity categories were similar. These unadjusted results regarding age and comorbidity found in this study cannot be compared to the adjusted results found in other studies examining age and comorbidities as a predictor of length of stay. In two studies, older patients with TBI averaged a significantly longer rehabilitation length of stay than the younger patients.(65,62) A number of studies concluded that age was a significant predictor of length of stay in stroke patients.(97,70,64,63)Studies have indicated that comorbidity is a predictor of length of stay. If comorbidities are present among TBI patients, length of stay tends to increases.(62,81)

6.7 The Adjusted Relationship between Ethnicity and Total FIM Change, Motor FIM Change, Cognitive FIM Change and Length of Stay

Evidence of unadjusted associations between the independent variable, the covariables and the outcomes could not answer the question of whether or not differences in functional outcome and length of stay existed between Aboriginals and non-Aboriginals. As stated earlier, the unadjusted associations simply describe the distributions of and patterns in the data. The objective of this study was to determine the adjusted associations between ethnicity and Total FIM Change, Motor FIM Change, Cognitive FIM Change, and Length of Stay. The results of the General Linear Models indicate that, while controlling for the relevant confounding covariables, an association exists between ethnicity and each of Total FIM Change, Cognitive FIM Change, and Length of Stay. However, no research was found to compare, substantiate or corroborate the results found in this study. As described in chapter two there is a paucity of literature that uses Aboriginal status and non-Aboriginal status as the independent variable and

FIM as the measure of outcome. This study, therefore, makes an original contribution to our understanding of differences in rehabilitation outcome between Aboriginal and non-Aboriginal peoples.

6.7.1 The Adjusted Relationship between Ethnicity and Total FIM Change and Cognitive FIM Change

The multivariate model for ethnicity and Total FIM Change controlled for the confounding variables, age, vocational category, impairment group, admit from and discharge to living with, and Admission FIM. The difference between Aboriginals and non-Aboriginals, controlling for confounding variables, was significant (p= 0.039) with a beta coefficient of –2.603.

The multivariate model for ethnicity and Cognitive FIM Change controlled for the confounding variables, age, marital status, vocational category, impairment group, admit from, discharge to living with, and Admission Cognitive FIM, and the interaction term Admission Cognitive FIM and Ethnicity. The difference between Aboriginals and non-Aboriginals, while the confounding covariables were held constant, was very significant (p= 0.000) with a beta coefficient of –4.558.

Aboriginal patients had a statistically significant lower Total FIM Change and Cognitive FIM Change means than those for non-Aboriginal patients, thus indicating a poorer rehabilitation outcome. The greatest difference between Aboriginal and non-Aboriginal patients was for Cognitive FIM Change. The clinical relevance of these findings is potentially significant. These results will have implications for future research and the delivery of the inpatient rehabilitation program to Aboriginal clients. Future research will be required in order to gain a better understanding of the factors involved with Aboriginals having lower FIM changes. The factors involved in the differences in

Cognitive FIM Change will be of particular relevance. The implications of these results may be that the Cognitive Sub-scale of the FIM instrument is not sensitive to cultural differences. Further research examining the cultural appropriateness of the cognitive sub-scale among Aboriginal clients is required.

6.7.2 The Adjusted Relationship between Ethnicity and Motor FIM Change

The multivariate model for ethnicity and Motor FIM Change controlled for the confounding variables, gender, vocational category, impairment group, admit from, discharge to living with, comorbidity and Admission Motor FIM. The difference between Aboriginals and non-Aboriginals, while the confounding covariables were held constant, was not found to be significant (p= 0.244) with a beta coefficient of only – 1.239. The small t-value, -1.166, demonstrated the lack of importance of ethnicity within the model. The difference in Motor FIM Change means between Aboriginals and non-Aboriginals indicated that Aboriginals had a lower Motor FIM Change mean, but this difference was not statistically significant. However, the fact that a difference did exist may raise relevant questions relating to the delivery of the inpatient program to Aboriginal clients. Aboriginal clients may do as well, or slightly less well, than the non-Aboriginal clients in the motor sub-scale of the FIM. The implications of these results, combined with the literature and the observations made by the inpatient rehabilitation staff, may be that Aboriginal clients have their physical needs met within the inpatient program, but may not have their mental, emotional, and spiritual needs met.

6.7.3 The Adjusted Relationship between Ethnicity and Length of Stay

The multivariate model for ethnicity and Length of Stay controlled for the confounding variables, age, marital status, vocational category, impairment group, admit

from, discharge to living with and Admission Total FIM, Admission Motor FIM, and the interaction term Admission Total FIM and ethnicity. The difference between Aboriginals and non-Aboriginals, while the confounding covariables were held constant, was significant (p= 0.000) with a beta coefficient of –0.273. Aboriginals had a significantly shorter mean length of stay than did non-Aboriginals. Shorter length of stay may be a result of a number of factors such as the lack of cultural sensitivity and culturally appropriate programming. The extensive distances between reserves and Aboriginal communities, and the inpatient rehabilitation programs may result in the absence of family and community support. Further research is required to determine the factors involved in the differences in length of stay.

6.7.4 Other Significant Independent Predictors of Functional Outcome and Length of Stay

The purpose of this study was not to create predictive models for functional outcome and length of stay. However, each of the multivariate models created had reasonable predictive value (Adjusted R Squared of over 0.40). Within each of these models, significant independent risk factors of functional outcome and length of stay were identified. These models help give a better understanding of the array of factors that contribute to functional outcome and length of stay. Section 5.4.4.1describes the independent risk factors for functional outcome and length of stay identified in the literature. The findings of this study corroborate the conclusions of a number of the studies described earlier (section 5.4.4.1). Age,(63,65,70,71,98) gender, (63) marital status,(63,70) vocational category,(70) impairment group,(99) admit from, discharge to living with, Admission Total FIM,(61,83) Admission Cognitive FIM,(63) and Admission

Motor FIM,(65,95)were all found to be significant independent risk factors for functional outcome.

Section 5.4.4.1 also identifies the independent risk factors for Length of Stay. This study also corroborates with some findings in the literature by identifying impairment group,(99) admit from, discharge to living with, Admission Total FIM,(70,100) and Admission Motor FIM,(20,63,64,82) as independent predictors of Length of Stay.

6.8 Study Limitations

The most significant limitation to this study was the inability to control for potential confounders. The confounding variables that were controlled for in this study were limited to the variables collected through the administration of the FIM instrument. Potential confounding variables such as caregiver characteristics, depressive symptomatology(101,102) of the patients, and socioeconomic status of the patients were not controlled.

Another potential confounding variable that was not controlled for in this study was length of time between onset of impairment and admission into inpatient rehabilitation ('onset days'). A 1993 meta-analysis of 36 clinical trials involving stroke outcome indicated that improvement in performance appeared to be related to early initiation of treatment.(103) Unadjusted bivariate results of the data from the present study revealed that there was a difference in 'onset days' between Aboriginal and non-Aboriginal patients. However, confounders such as impairment group, severity of the impairment, and Admission FIM were not controlled for in this analysis. Therefore, it is difficult to conclude that 'onset days' is a potential confounder of functional outcome and

length of stay without further analysis being conducted. The present study has examined five major impairment groups. There has only been recent discussion on the impact of 'onset days' in the area of stroke. Therefore, further evidence is required to determine the relationship between 'onset days' and functional outcome and length of stay for all other impairment groups.

Other significant limitations to this study are the limitations inherent in the FIM instrument. The 'floor' and 'ceiling' effects attributed to the FIM instrument may have resulted in the inability of the instrument to detect meaningful change in the level of functioning of patients at the upper or lower end of the scale. However, the result of this limitation would be an underestimation of the change. The FIM is also said to have lower sensitivity for persons with brain injury and high-level spinal cord injuries. This may have biased the results in that a greater percentage of patients presented with these impairments.

CHAPTER SEVEN

RECCOMENDATIONS FOR FUTURE RESEARCH AND STRATEGY IMPLEMENTATION

The results of this study have added to a sparse evidence base regarding the rehabilitation outcomes of Aboriginal peoples in Saskatchewan. This study quantified two components of the rehabilitation experience— functional outcome and length of stay. Aboriginal patients were found to have lower Total FIM Change and Cognitive FIM Change, indicating poorer outcomes, compared to non-Aboriginal patients. The study also found shorter length of stay for Aboriginal than for non-Aboriginal patients. The identification of a comprehensive array of factors, which may have contributed to these differences between Aboriginals and non-Aboriginals, is beyond the scope of this study. However, given the results of this study and an understanding of the context within which this study took place, this chapter will attempt to outline some general strategies as described in the literature, which, if implemented, may lead to an improvement of the overall rehabilitation experience of Aboriginal clients in inpatient rehabilitation programs in general. These strategies are not based on the results of this study and therefore, do not necessarily reflect how services are provided in the inpatient rehabilitation programs under study. Therefore, the following chapter is only to be used as a general guide for ensuring that rehabilitation services are adequately delivered to minority groups, and more specifically, to Aboriginal clients in all inpatient rehabilitation programs.

7.1 General Strategies to Improve the Rehabilitation Experience of Aboriginal Clients

As described in Chapter Two, traditional Aboriginal peoples and non-Aboriginal people often have differing worldviews, values beliefs and perceptions of health and wellness, which in turn impact perceptions of disability and rehabilitation. Therefore, it should not come as a surprise that Aboriginal peoples have a different, most often poorer, experience within a health care system that is organized and is being delivered to Aboriginal peoples based upon a non-Aboriginal worldview.

7.1.1 The Need for Culturally Appropriate Rehabilitation Services

Given that traditional Aboriginal peoples have different worldviews, and perceptions of health, wellness, disability and rehabilitation, it seems only logical that rehabilitation services delivered to Aboriginal peoples be culturally sensitive and appropriate. McRae argues that health is enhanced through acceptance and integration of a client's cultural values. Health care should not be focused on the isolation and treatment of only the symptoms of an illness process while ignoring the individual's belief system.(17) The following are a few examples of the differences in Aboriginal culture and socioeconomic status that may impact Aboriginal clients' rehabilitation experience.

Aboriginal peoples often have a strong sense of extended family. That is, all blood relatives are considered to be a part of the family. This family structure becomes even more important during times of stress when the family is viewed as a source of strength, security, and emotional support. Ignoring the family of an Aboriginal client within a rehabilitation program may lead to a poor rehabilitation experience. Therefore, the extent of the family support system for each client should be investigated at

admission to the inpatient rehabilitation programs and again in the discharge planning.(17,104,105) Rehabilitation service providers must also be aware that many Aboriginal clients are forced to choose between their families and the rehabilitation programs because of the physical distance of the rehabilitation programs from rural Aboriginal communities. Aboriginal peoples who leave their Northern communities are forced to distance themselves from their sociocultural support systems.(79)

Aboriginal peoples are often known for having a different concept of time and punctuality than that of the non-Aboriginal culture. Many aboriginal cultures view time as being nonlinear and 'present-oriented'. Concern is for the present, not the future.(35) It is argued that Aboriginal peoples relationships with family and friends are more important than being punctual for an appointment.(79) Aboriginal clients who may have a different concept of time than the non-Aboriginal rehabilitation service providers (as demonstrated by lack of punctuality in keeping appointments) may be perceived by service providers as disinterested in their own rehabilitation process.

Aboriginal peoples often are admitted to the inpatient rehabilitation programs from rural communities, and urban areas, with substandard infrastructure, inadequate and poorly heated housing, limited indoor plumping, unsafe water supplies, limited access to telephones, lack of vehicles, poor roads, and high unemployment. The physical environments from which Aboriginal clients enter rehabilitation programs may impact their reaction to and participation in these programs. If a client is returning to a community that cannot offer the infrastructure and services that would support his or her disability, the client may see the rehabilitation program as a futile effort. Therefore, a detailed needs assessment of the individual client at admission and prior to discharge

must be made in order for the rehabilitation plan and service providers to take into account the living conditions and accessibility of required resources upon the clients return to his or her community.(16,17)

Language and communication patterns are often seen as major barriers to rehabilitation service delivery to Aboriginal clients.(35,79) The misunderstandings which result from an inability to communicate may give rise to a misinterpretation of the rehabilitation process and inhibit the close working relationship between client and service provider that is necessary for effective rehabilitation.(79) Ideally, having service providers who speak Aboriginal clients' mother tongue would potentially eliminate much of the miscommunication and misunderstanding that results from a language barrier. However, having service providers who are proficient in a number of Aboriginal languages is not very likely. Therefore, language barriers could be some what remedied by the use of trained and supervised interpreters/ translators.(106) Also, participation of Aboriginal Elders in the rehabilitation process could enhance the communication between service providers and clients.

Differences in communications patterns between Aboriginal clients and service providers may also result in misunderstandings, confusion, and prejudice. A number of authors have stated that the communication patterns of Aboriginal peoples include complex nonverbal behaviors.(17,79) Service providers may perceive Aboriginal clients' lack of eye contact as lack of attention or disinterest. However, in many Aboriginal cultures, eye contact is considered a sign of disrespect. Also, many Aboriginal cultures view long periods of silence as appropriate in order for one to organize his or her thought processes before speaking. Silence may be perceived by service providers as lack of

interest, attention and understanding on the part of the Aboriginal client. Probing, direct, factual or personal forms of questioning by a service provider, who is a relative stranger, and is most likely in a hurry, are also considered inappropriate in Aboriginal cultures. Many Aboriginal cultures view this type of questioning as a violation of the dignity of the person being questioned. Aboriginal clients may choose not to answer these questions, or answer them in a cursory or meaningless manner, or answer them more comprehensively days later, if the service providers and the client have begun to develop a trusting relationship. These differences in communication patterns can lead to misunderstandings by the service provider as to why Aboriginal clients do not freely disclose personal information about themselves or do not think that it is important to develop a plan for rehabilitation delivery.(79)

The collaboration of traditional medicine and Western bio-medicine within rehabilitation programs in Saskatchewan is virtually non-existent. It is difficult for service providers who were educated in the Western bio-medical model to give up ethnocentric ideas and accept more traditional healing practices that have been successful over the past generations.(17) However, studies have indicated that the use of traditional medicine allows the client to be treated within his or her social support system and within the healer's support system.(79,35,105) The First Nations and Inuit Regional Health Survey concluded that the vast majority of those surveyed wanted to return to traditional ways and wanted a health care system that more adequately met the needs of First Nations and Inuit people. Returning to traditional ways meant returning to traditional approaches to healing, renewal of native spirituality, revival of traditional roles of women, revival of traditional roles of men, and traditional ceremonial activity.(7) This

may be particularly relevant to clients who enter the inpatient rehabilitation programs from reserve communities. A study conducted among rehabilitation service providers in the United States concluded that on-reserve service providers identified the importance of supporting Aboriginal healing services for their clients.(40)

7.1.2 Delivery of Culturally Appropriate Rehabilitation Services

The delivery of culturally appropriate rehabilitation services is a difficult issue. There is a lack of information and knowledge on the part of service providers regarding the rehabilitation needs of Aboriginal peoples in Canada. McRae argues that it is crucial that health professionals recognize and accept the unique beliefs and needs of the Aboriginal population. Aboriginal clients will continue to resist, feel frustrated or that they are failing, unless rehabilitation service providers work to develop more culturally relevant practices. McRae also states that there is an increasing recognition of using a holistic framework for rehabilitation practice in order to enhance total healing. Therefore, the delivery of holistic, culturally sensitive and appropriate programming to Aboriginal peoples should fit in with the rehabilitation framework.(17) Total healing of the physical, mental, spiritual and emotional cannot occur unless the culture and traditions of Aboriginal peoples are incorporated into the rehabilitation process. This means incorporating the concept of the Medicine Wheel, or some similar theory, that acknowledges the interconnectedness of and need for balance among all aspects of the physical, mental, spiritual and emotional well-being.

A study conducted by Xueqin Ma et al.(18) among rehabilitation service providers in the United States concluded that the majority of the service providers strongly agreed that Aboriginal values were important considerations for effective service

delivery. Most of these service providers believed that the incorporation of Aboriginal traditional healing practices would enhance rehabilitation services. Xueqin Ma et al concluded that there is a need for continuing professional staff development and the expansion of cross-cultural training efforts. These training efforts must address not only cultural issues, but issues of poverty, lack of employment, geographical isolation, and discrimination.(18) If rehabilitation services are to be effective with Aboriginal clients, there must be an awareness among service providers that there are individual, cultural and environmental differences among Aboriginal people which requires unique, sensitive and relevant models of service delivery.(40) The goal of these developments among rehabilitation service providers, in general, should be to develop cultural competence.

Cultural competence is defined as the ability of individuals to see beyond the boundaries of their own cultural interpretations and remain objective when working with individuals from differing cultures. To change one's cultural paradigm in order to interpret and understand the behaviors and intentions of people from other cultures, non-judgmentally and without bias, is the basis of cultural competence.(107) The following is a summary of the literature pertaining to the knowledge, skills and attitudes that could be developed by rehabilitation service providers, in general, in order to increase cultural competence.(15-17,36,105,107-113)

Knowledge: Knowledge required by rehabilitation service providers in order to achieve some degree of cultural competence.

- Increase knowledge pertaining to differences in Aboriginal cultures
- Develop a knowledge base for understanding and appreciating cultural differences

- Educate through focused course work to view culture and diversity as a value in the delivery of health services
- Increase knowledge of culturally specific health beliefs and practices
- Develop knowledge of the diversity among and within Aboriginal groups, especially regarding regional and local differences
- Increase one's knowledge of the history of Aboriginal peoples in Canada, specifically in Saskatchewan, in order to understand how history has impacted the present struggles of Aboriginal peoples
- Continued training of rehabilitation service providers in language, culture, and values of Aboriginal peoples

Skills: Skills that would be required by service providers for culturally appropriate rehabilitation.

- Technical skills
- Skills for work in non-Western cultural context
- Develop acceptable communication techniques and acknowledge potential differences in communication patterns.
- Use clients' primary language when possible
- The service provider must be attentive to body language
- Find links between Western-biomedical ways and traditional ways and incorporate them into the rehabilitation plan
- Support the use of peer-counseling for Aboriginal clients
- Seek out and take advantage of the feedback provided to service providers by Aboriginal leaders, Elders, and advocates

- Service providers should develop a tolerance for silence

Attitudes/Values: Attitudes and values that should be held by rehabilitation service providers in order to deliver culturally appropriate services.

- Awareness of one's own belief system and culture in order to understand one's own biases and subjectivity
- Being open-minded to other belief systems in order to develop respect and understanding
- Being non-judgmental
- Being non-ethnocentric
- Respect for diversity and cultural traditions
- Caring and compassion
- Establish relationships of trust
- Establish rapport—the service provider must not give the impression of being hurried
- Be prepared to compromise and be flexible
- Sensitivity to the difficulties and challenges Aboriginal peoples face within the rehabilitation programs and what they will face when they return to their communities
- Service providers should not always judge Aboriginal clients on their frequency of direct eye contact. Some clients may be comfortable with eye contact, others might not be
- Service providers should be sensitive to differences in comfort levels when probing for personal information. The service provider should acknowledge that what he or she might not find extremely personal, Aboriginal clients might find too personal

- Service providers should be sensitive to Aboriginal clients' perceptions of time and scheduling
- Service providers must respect the importance of the extended family
- Avoid condescending statements, stereotypes and generalizations

It is very important to acknowledge that rehabilitation program administrators and service providers must be cautious of the 'cookbook' approach to overgeneralization of Aboriginal cultures, values, attitudes, and belief systems. The above summary of recommended service providers' knowledge, skills and attitudes is only meant to be used as a general overview. Each person that enters the rehabilitation program is different, regardless of his or her culture of origin. Therefore, to remedy the potential for over-generalization of Aboriginal peoples, the implementation of a Culturally Sensitive Rehabilitation Assessment is recommended in inpatient rehabilitation programs.

7.1.3 Culturally Sensitive Rehabilitation Assessment

Culturally Sensitive Rehabilitation Assessment is defined by McRae as: a systematic appraisal of beliefs, values, and practices conducted in order to determine the context of client needs and to tailor interventions. The assessment helps in the determination of the degree of affiliation with the ethnic group, patterns of decision-making and communication styles. The assessment is problem-specific to discover the base of information and determine past experiences and expected treatment. A determination is made of how intervention strategies that are established will be seen in light of cultural factors and living conditions to which the client will be returning.(17) A number of cultural assessment tools exist. Selecting an appropriate tool is the first step in the process of conducting a culturally sensitive assessment. Data obtained from these

tools will assist clients and rehabilitation service providers in formulating a mutually acceptable, culturally responsive treatment plan.(114)

7.2 Recommendations for Further Research

This study has identified the need for extensive research in the area of rehabilitation of Aboriginal peoples. The present study has added to a very sparse evidence base regarding Aboriginal peoples and the effectiveness of rehabilitation programs. This study concluded that differences exist in the Total FIM Change, Cognitive FIM Change, and Length of Stay between Registered Indian and non-Registered Indian clients in the inpatient rehabilitation programs in Regina and Saskatoon. However, it was beyond the scope of this study to address the comprehensive array of factors involved in these differences. Therefore, further research is required in order to identify these factors involved in the differences in functional outcome and length of stay. However, as acknowledged earlier in this study, the functional outcome is only one component of the rehabilitation experience for Aboriginal peoples. Further research is required to examine whether or not the inpatient programs are meeting not only the physical, but equally important, the mental, emotional and spiritual needs of Aboriginal patients. It is recommended that a qualitative study be carried out within the rehabilitation departments with Aboriginal clients and the rehabilitation teams. In order to develop effective and relevant programming, it is vitally important to have all stakeholders, especially the Aboriginal clients, involved in the process. Aboriginal clients must be given the opportunity to identify their needs and priorities within the rehabilitation programs. This may be done through in-depth interviews with the clients, formal needs assessments, and full program evaluations.

Further research is also required to examine the administration of the FIM instrument to Aboriginal clients. The significant differences in Cognitive FIM Change may be a result of actually differences in cognitive outcomes in Aboriginals and non-Aboriginals, or it may be a result of bias in the administration of the instrument.

CHAPTER EIGHT

CONCLUSION

This study has demonstrated that significant differences existed between Aboriginals and non-Aboriginals, admitted to the Saskatoon and Regina inpatient rehabilitation programs, in Total FIM Change, Cognitive FIM Change, and the Length of Stay. However, significant differences did not exist between Aboriginals and non-Aboriginals in Motor FIM Change. Aboriginals had a significantly lower Total FIM Change, Cognitive FIM Change and Length of Stay than non-Aboriginals. These results add to a very sparse evidence base regarding the rehabilitation experience of Aboriginal peoples in Canada, especially in Saskatchewan. Further research is required to 1) gain a better understanding of the many factors involved in the differences between Aboriginal and non-Aboriginal functional outcome and length of stay, 2) gain some understanding of the holistic experience of Aboriginal peoples in inpatient rehabilitation programs in Saskatchewan, and 3) give Aboriginal peoples an opportunity to participate in the determination of culturally appropriate and relevant rehabilitation program planning.

While waiting on the results of further research and input from Aboriginal clients, it was suggested in the literature that rehabilitation administrators and staff, in general, could begin to increase their cultural awareness and understanding. This understanding and awareness is achieved by assuring that one's knowledge, skills, attitudes and values are acceptable and appropriate in a multicultural environment.

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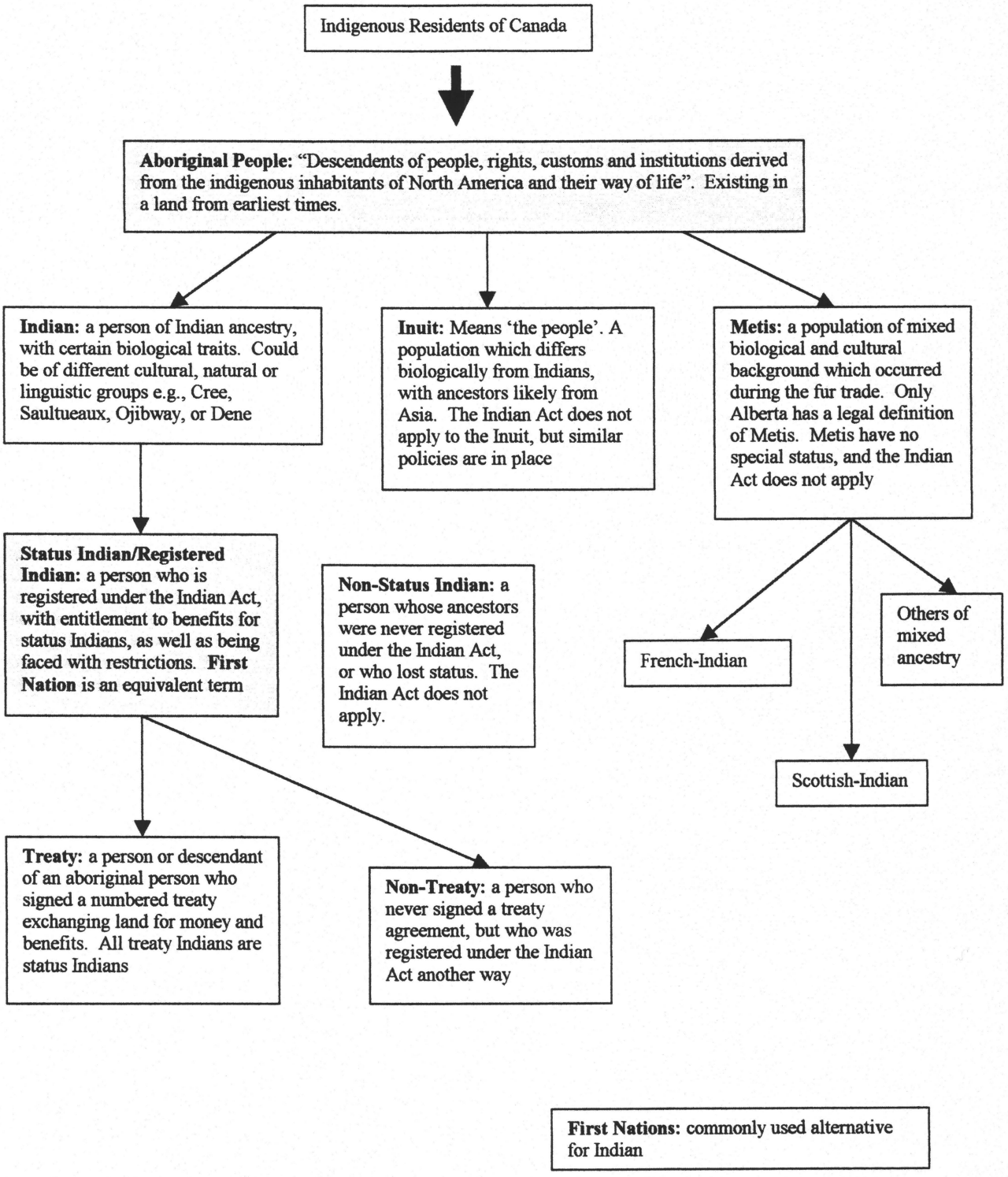
APPENDIX A: Definitions of Aboriginal Subgroups(115)



APPENDIX B

- Assessment Admit From Living Setting
- Assessment Bathing FIM Score
- Assessment Bed/Chr/Whlchr Transfer FIM Score
- Assessment Bladder Management FIM Score
- Assessment Bowel Management FIM Score
- Assessment Cognitive FIM
- Assessment Comprehension FIM Mode
- Assessment Comprehension FIM Score
- Assessment Date
- Assessment Dressing (Lower) FIM Score
- Assessment Dressing (Upper) FIM Score
- Assessment Eating FIM Score
- Assessment Expression FIM Mode
- Assessment Expression FIM Score
- Assessment FIM
- Assessment Grooming FIM Score
- Assessment Living With
- Assessment Memory FIM Score
- Assessment Motor FIM
- Assessment Problem Solving FIM Score
- Assessment Social Interaction FIM Score
- Assessment Stair Locomo FIM Score
- Assessment Toilet Transfer FIM Score
- Assessment Toileting FIM Score
- Assessment Tub/Shower Transfer FIM Score
- Assessment Type
- Assessment Vocational Category
- Assessment Vocational Effort
- Assessment Wlk/Whlchr/Crwl FIM Mode
- Assessment Wlk/Whlchr/Crwl FIM Score
- Case 1st Return Date
- Case 1st Transfer Date
- Case 2nd Return Date
- Case 2nd Transfer Date
- Case 3rd Return Date
- Case 3rd Transfer Date
- Case Admission Date
- Case Age at Admission
- Case ASIA Scale
- Case Comorbidity Diagnosis
- Case Comorbidity Diagnosis 2
- Case Comorbidity Diagnosis 3

- Case Death Diagnosis
- Case Discharge Date
- Case Etiologic Diagnosis
- Case Impairment Group Code
- Case Impairment Onset Date
- Case Length of Stay
- Case Other Diagnosis 1
- Case Other Diagnosis 2
- Case Other Diagnosis 3
- Case Program Interruption
- Case Therapy End Date
- Case Therapy Start Date
- Patient Birth Date
- Patient City
- Patient Code
- Patient Country
- Patient English Skill
- Patient Ethnicity
- Patient First Name
- Patient Gender
- Patient Last Name
- Patient Marital Status
- Patient Middle Initial
- Patient Postal Code
- Patient SSN
- Patient State/Province
- Patient Street
- Patient Telephone