University of Alberta

The Use of Acute Health Care Services by Mentally-Ill Seniors of Newfoundland and Labrador: A Quantitative Investigation

By

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Dedication

Personally, to my husband, Shannon Adams, of 10 years, for your patience, commitment, support and repeated words of encouragement in my times of stress and uncertainty, I will forever cherish your undying and continued support for me in this academic journey. Love always, Lisa.

Professionally, I would like to dedicate my doctoral dissertation to the work and lifelong commitment of the late Dr. Howard Strong, one of Newfoundland's finest pioneer geriatric psychiatrists, whose work for seniors with mental illnesses was significant, respectful, immeasurable, and admirable.

Abstract

Background

The population of seniors is increasing rapidly. Currently, seniors represent 14.1% of the population of Canada and 14.4% of the population of Newfoundland and Labrador (NL), rates that are expected to further increase to 30% by 2041 and 2026, respectively. There is ongoing debate regarding whether mental illness (MI) is more or less prevalent in seniors compared with other age cohorts and whether or not they receive needed services. The purpose of this research study was to first compare the use of acute care in-patient hospital services (Length of stay (LOS), Acute LOS, ER wait time, Rate of admission (ROA), RIW and cost) of seniors with and without MI in the province of NL and explore key predictors of service use.

Method

This descriptive-comparative research design using aggregate population level data from the NL Center for Health Information (NLCHI) databases included all people aged 65 years and older admitted to an acute care hospital in the province of NL (12,502) with and without MI codes in 2008-2009. Dependent variables included LOS, ALOS, ROA, ER waiting time, RIW and cost. In addition, numerous other demographics and admission and discharge information were assessed.

Results

Results indicated that only 10% of seniors had a MI code applied to their hospital admission however, they had a significantly longer LOS, ALOS, ROA, ER wait time, RIW and cost than did seniors without MI codes. Even after controlling for co-morbidities, seniors with MI codes still used significantly more resources. Further, while female seniors with MI were

greater users of services, males were more expensive to maintain in hospital. Urban seniors most often had MI codes and consumed more hospital resources compared to seniors from rural areas.

Conclusion

Although the overall prevalence of MI in seniors in this study was low, their use of acute hospitals and associated costs was high and even excessive at times, compared to seniors without MI codes. Further, although acute care hospitals are the main focal point to stabilize seniors with MIs, the acute environment not only jeopardizes seniors' mental health, but their mental and physical health as well.

Acknowledgement

To my co-supervisors, Dr. Priscilla Koop and Dr. Colleen Norris, I am forever grateful for your support, patience, energy, respect, mentorship and most importantly, the faith you had in me to achieve the goal of completing my PhD. Your dedication to me will never be forgotten.

Table of Contents

Listing of Tables

Page

Listing of Figures

Listing of Graphs

Chapter One: Introduction

The Use of Acute Health Care Services by Mentally-Ill Seniors of Newfoundland and Labrador: A Quantitative Investigation

History/Background/Justification

The population of seniors is increasing rapidly (Statistics Canada, 2009; World Health Organization [WHO], 2009). Currently, seniors represent 14.1% of the population of Canada and 14.4% of the population of Newfoundland and Labrador (Statistics Canada, 2010); rates that are expected to further increase to 27.6% by 2041 (Statistics Canada, 2009), and 26% by 2026, respectively (Government of Newfoundland & Labrador, 2002). There is ongoing debate regarding whether mental illness is more or less prevalent in seniors compared with other age cohorts. Although this debate has not been settled, it is expected that as the population of seniors' increases, the population of seniors with mental illnesses will rise as well (Sambrook et al., 2004).

Mental illness occurs in all age groups, including seniors, and is characterized by alterations in thinking, mood or behaviour (or some combination thereof) associated with significant distress and impaired functioning (Health Canada, 2002). This is the definition used in this study.

When an individual's mental health becomes stressed beyond the normal limits of adaptability, the risk of developing or exacerbating a mental illness increases (Crabb & Hunsley, 2006; Frise, Steingart, Sloan, Cotterchio, & Kreiger, 2002; Nabalamba & Millar, 2007; Starkes, Poulin, & Kisely, 2005). For seniors, the range of stressors is extensive and varied. Challenges include illness or disability, multiple co-morbidities, loss/death of a family member or friend, and significant life and role changes that impact physical and mental health, and subsequently, hospital use (Canadian Mental Health Association [CMHA], 2005; McInnis & White, 2001). Together, the many stressors and age-related milestones that seniors experience increase their

risk of developing mental illnesses, the most common of which are dementia, delirium, anxiety disorders and depression (Conn, 2002; Whalen, 2007).

The current health care systems seem ill-prepared to receive and care for seniors who have one or more mental illnesses. Given the anticipation of the growing aging population (Barer, Evans, & Hertzman, 1995; Bay, Long, & Ross-Kerr, 1997) and the factors contributing to poor mental health; combined with the fact that the need has long been predicted (De Coster, Bruce & Kozyrskyi, 2004; Draper & Luscombe, 1998), decision-makers, policy planners and health care providers could have been better prepared to provide mental health services for seniors. Instead, there is a continued sense of denial that this rapidly aging population will impact the current and future health care systems (Burroughs et al., 2006; Higgins, Van Der Riet, Slater, & Peek, 2007). Ironically, the people who prepared the ground, served society, paid their taxes and built the structure upon which today's tax supported health care system was modelled, suffer because of deficiencies in services they need to be well. As mandated by the Canada Health Act (Madore, 2005), all Canadians, including seniors, are entitled to accessible and timely health care that is universal, comprehensive, publicly administered and portable. With the growing demand, it is imperative that we look at our aging population, their mental health needs, and how their needs could be met.

Over the last century, Canada has witnessed the evolution of many structural changes and transitions of health care organizations. Some of these included the delivery of specialized mental health services (Richman, 1985), the elimination of barbaric treatments of those with mental illnesses (O'Brien, 1989), and the shift towards deinstitutionalization of patients with mental illness (Koenig & Kuchibhatla, 1998). In more recent years, both Romanow (2002) and Kirby (2006) advocated for more changes to address the mental health needs and services of all

Canadians, including seniors. The Canadian government's response to the Kirby (2006) report was the creation of the Mental Health Commission of Canada in 2007 (Mental Health Commission of Canada, 2008). Its mission was to promote mental health in Canada, work with stakeholders to change the attitudes of Canadians toward mental health problems, and to improve services and support (Mental Health Commission of Canada, 2011).

Despite the many recommendations, it seems that any health care system changes that have been made do not adequately meet the needs of seniors (Burroughs et al., 2006; Higgins et al., 2007). Seniors with mental illness continue to interact with health care providers who lack expertise and are therefore unable to provide effective mental health services (Chen et al., 2007; Crabb & Hunsley, 2006; Knickman & Snell, 2002; Mackenzie, Gekoski, & Knox, 2006; Menec, Bruce & MacWilliam, 2004; Sorrell, 2010; Tucker et al., 2009). The result is inadequate assessments, inaccurate diagnoses, and inappropriate treatments (Chen et al., 2007; Draper & Luscombe, 1998; Fulop, Strain, Fahs, Schmeidler, & Snyder, 1998). Mental illnesses in seniors that are overlooked, misdiagnosed, and/or mistreated, result in needless admissions (Chen et al., 2007), unproductive lengths of hospital stay (Draper & Luscombe, 1998; Fulop et al., 1998) and hence, unnecessary costs to the health care system (Sayers et al., 2007). Addressing seniors' unmet mental health needs is particularly important given that trends of increased technology (McInnis & White, 2001), self-health promotion and education (Maclean, Glynn, Cao, & Ansara, 2004), standardized patient care protocols (Burroughs et al., 2006; Norvedt et al., 2008), and the ability to provide advanced treatments (Draper & Luscombe, 1998), have prolonged the lives of our seniors (Guiliano, 2011), and subsequently, likely also increased the number of those with mental health illnesses.

The failure to develop appropriate mental health services for seniors has occurred in part, because of the gaps in our understanding of how mentally-ill seniors use our health care system in comparison to seniors without a diagnosed mental illness. Population-based research that incorporates all mental illnesses, the entire age range of seniors and the factors that affect seniors' use of acute health care services is needed to understand where policy makers and administrators would be advised to focus their attention.

This study investigated, at an aggregate population level, how seniors with and without mental illnesses in the province of Newfoundland and Labrador compared in their use of acute hospital in-patient services. The outcome measures assessed represent primary indicators that are used to measure acute in-patient hospital use. These were total and acute length of stay, rate of re/admission, resource intensity weight, emergency room waiting time and relative costs. This study focused only on acute care hospitals and further examined critical factors that potentially impacted in-patient hospital use. The findings of this study aim to promote awareness of mental illness in seniors and provide direction and development for policies, programs, resource needs and service infrastructures that are most conducive to seniors and their mental health needs.

Significance of the Problem

The prevalence of mental illness in seniors and the rate at which seniors with mental illnesses use acute care hospital services were and still are a growing topic of interest. For several reasons, it was imperative to take a closer look at how seniors with mental illnesses use acute care hospitals. These reasons include an aging population, rising healthcare costs, and methodological problems with previous research.

Aging population. One of the primary impetuses for this study was the increasing aging population. The population of seniors has increased rapidly, and is anticipated to reach one third

of Canada's and Newfoundland's population by 2041 and 2026, respectively (Government of Newfoundland & Labrador, 2002; Statistics Canada, 2009). In addition, seniors have increased rates of co-morbidities and/or complex medical illnesses (Carriere, 2006), mental illnesses (Cole, McCusker, Sewitch, Ciampi, & Dyachenko, 2008), and significant life-altering events (Carriere, 2006; Nabalamba & Millar, 2007), all of which are thought to challenge their mental health. As the population of seniors increases, the number of seniors with mental health issues is also anticipated to rise, underlining the urgency of this study.

Healthcare costs. Assessing the costs incurred from seniors with mental illnesses using acute care hospitals was an important aim of this study. Acute care hospitals are costly for health care budgets and governments to sustain (Health Canada, 2006). In the recent past, 44% of Canada's total annual health care budget and spending was from seniors' use of health care services (CIHI, 2008). Although seniors in Canada represent only 14.1% of the population, they account for 40% of total acute care hospital days where two thirds of the long-stay patients are 75 and older (De Coster et al., 2004). Furthermore, seniors with mental illness have been found to stay in hospital three to four times longer than members of other age cohorts, with a 38% re/admission rate, which is double that of other populations (CIHI, 2006). Studies have shown that although seniors are often admitted appropriately (Moisier et al., 2010; Sorrell, 2010), they experienced longer hospital stays than needed because services and expertise to best assess their mental health status and address their needs are not readily available (Menec et al., 2004; Moisier et al., 2010; Sorrell, 2010). While there were weaknesses in these studies, the results suggest the possibility that the increased use of health care services by seniors, particularly by those with mental illnesses, is the result of the inaccessibility and unavailability of timely psycho-therapeutic expertise and services. The relatively high health care costs incurred by

mentally-ill seniors are thought to be due to systemic failures to meet their needs. If the increased use of acute care hospitals by seniors with mental illnesses continues in proportion to the growing aging population, it will place increasingly substantial pressure on Canada's already financially strained health care system (CIHI, 2007; CIHI, 2008c; CIHI, 2008e). The findings of this study should help stimulate government officials and health care administrators to identify the services needed for seniors, and to put health care resources precisely where they are most needed.

Methodological problems with previous research. The third reason why it was critical to undertake this study is because numerous studies conducted previously suggest that seniors with mental illnesses were high users of acute care hospital services. Independent of the age during which the older adult first developed mental illness, many authors suggest that seniors with mental illnesses incur a longer length of stay, and higher cost and admission rate in acute care hospitals compared to seniors without mental illnesses (Bressi, Marcus, & Solomon, 2006; Madi, Zhao & Li, 2007; Prince et al., 2008; Sajatovic, Friedman, Sabharwal, & Bingham, 2004; Saravay, et al., 2004). However, the results of these studies must be interpreted with caution.

The research gaps and methodological problems from previous studies were many and varied. Often the studies were limited to small, localized samples (Bressi, et al., 2006) or specific segments of the aging population, such as war veterans (Chen et al., 2007); used only one hospital setting (Bressi, et al., 2006; Prince et al., 2008; Sajatovic et al., 2004); failed to look at the full range of mental illnesses experienced by seniors (Madi et al., 2007; Prince et al., 2008); failed to include the complete age range of 65 and older (McCusker, Healey, Bellavance, & Connolly, 1997; Naughton, Moran, Kedah, Heman-Ackah, & Longano, 1995) or failed to make comparisons between seniors with and without mental illnesses (Prince et al., 2008).

Other problems from previous studies include independent limited number of variables and the practical application of findings. These studies focused on only one of the variables of length of stay, rate of admission or relative cost (Bressi, et al., 2006; Madi et al., 2007; McCusker, Cardin, Bellavance, & Belzile, 2000; Prince et al., 2008; Roos, Burchill, & Carriere, 2003; Sajatovic et al., 2004; Saravay et al., 2004), not all three simultaneously. Further, they did not cover any and/or many predictors of such use; nor did they suggest how deficiencies of services, poor policies, and lack of expertise should be planned for or tailored to best meet the needs of seniors with mental illnesses (Prince et al., 2008).

This study overcame many of the limitations of previous research on how seniors with mental illnesses use in-patient acute care hospitals. It encompassed a broader scope, by using aggregate level data which included all seniors of one province in Canada, all acute care hospitals whether they were general medical or psychiatric hospitals, within that geographical region. Further, it included all seniors aged 65 and over, all mental illnesses applicable to older adults, and many factors that potentially impact the total and acute length of stay, rate of admission, emergency room waiting time, resource intensity weight and cost incurred in all acute care hospitals by seniors with mental illnesses in the province of Newfoundland and Labrador. Finally, this study compared seniors with and without mental illnesses for how they used acute care in-patient hospital services, unlike many other studies that compared seniors with mental illness to other age cohorts in the use of acute care in-patient hospital services.

Statement of the Research Problem

For many reasons, seniors are at risk for increasing health problems. Seniors with mental illnesses are at an even greater risk. It is generally believed that seniors, especially those with a mental illness, are driving health care costs. But previous studies are limited. This study aims to

provide much needed information about the use of acute health care services by seniors with and without mental illnesses.

Conceptual Framework for Service Utilization

The Andersen Behavioural Model of Health Services Utilization (Andersen, 1995) provided the conceptual framework for this study. It is a widely used and inclusive model which includes health outcomes, behaviours and practices used to influence health policy, health care reform, cost and service efficiency (Andersen, 1995). Figure 1.0 and Figure 2.0 below, depicts Andersen's Behavioural Model of Health Care Service Utilization and the Proposed Model of Acute Care Hospital Service Use for Seniors with Mental Illnesses.

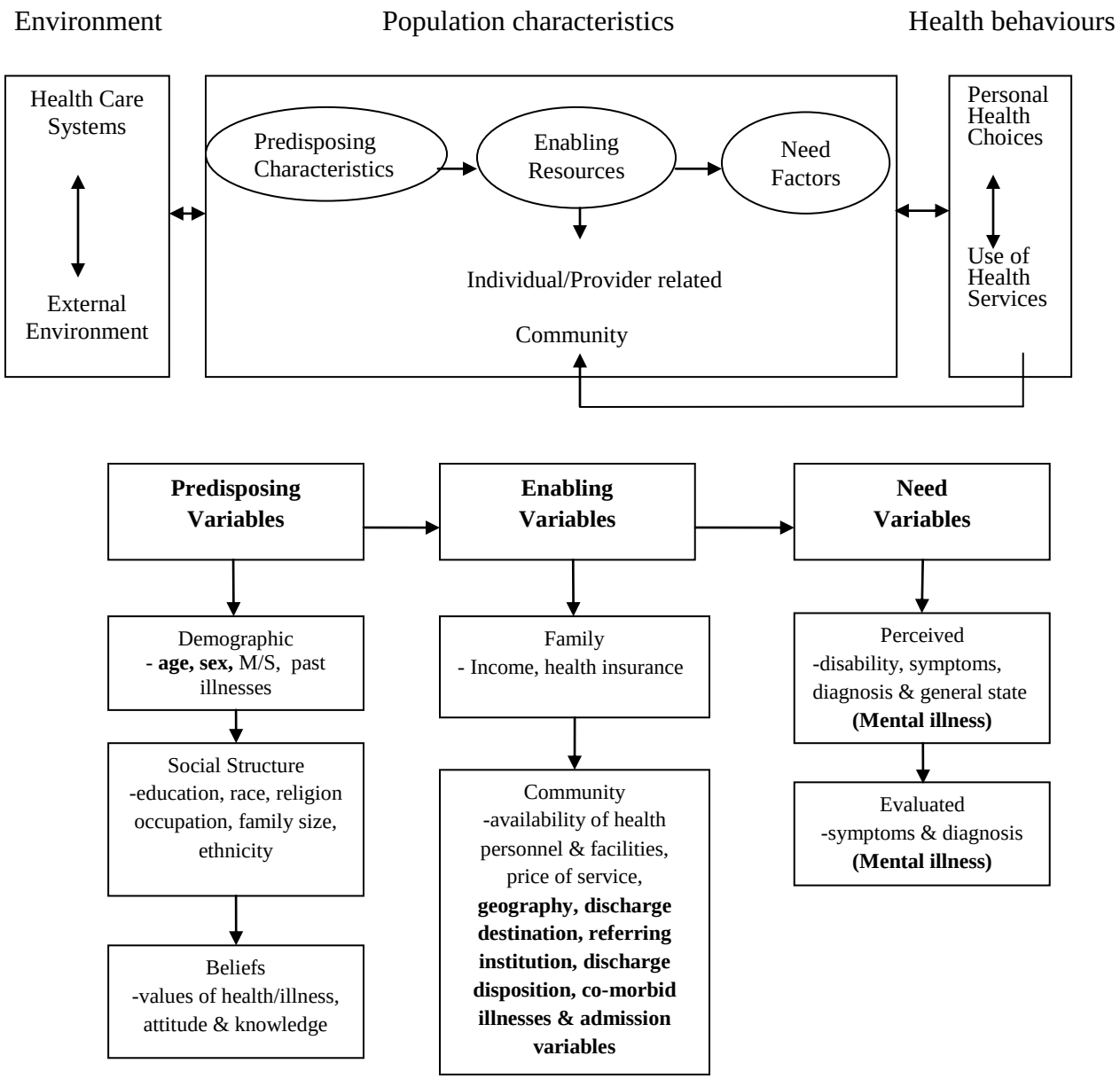


Figure 1.0- Andersen's Behavioural Model of Health Care Service Utilization (revised) [Adapted from Andersen, R. (1995). Revisiting the behavioural model and access to medical care: Does it matter? *Journal of Health and Social Behaviour, 36*(1), 1-10.]

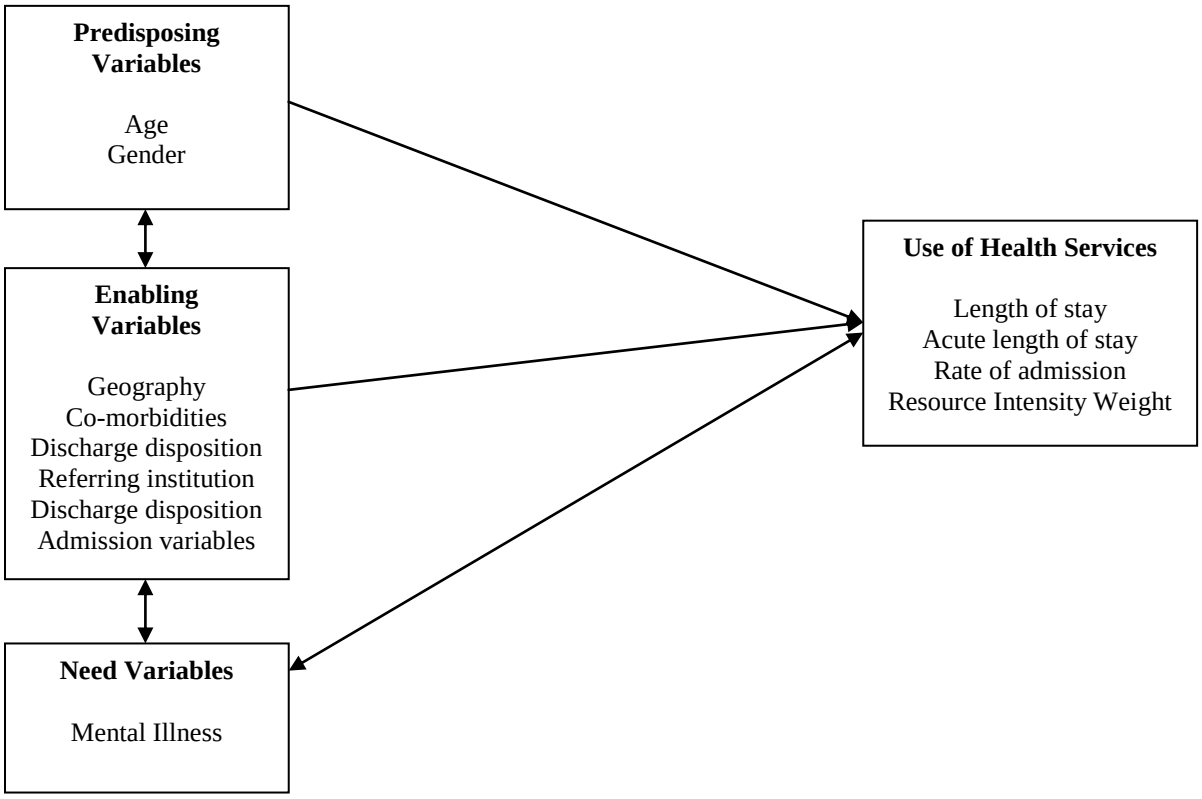


Figure 2.0- Proposed Model of Acute Care Hospital Service Use for Seniors with Mental Illnesses [Adapted from Andersen, R. (1995)].

The primary purpose of Andersen's model is to outline conditions and/or factors that facilitate or impede health service utilization. This model is especially valuable because it both explains and predicts health care service use (Andersen, 1995). Its inclusive listing of predictive variables that influence service use help healthcare researchers and administrators to assess, predict and understand why individuals and families use health care services the way they do (Bergeron, Poirier, Fournier, Roberge, & Barrette, 2005; UCLA, 2008; Vasiliadis, Lesage, Adair, & Boyer, 2005). The three categories of variables outlined in the model that help determine, explain and predict health care service use are the predisposing, enabling and need variables. An individual's access to and use of health services are believed to be a function of these three variables.

Predisposing variables. Predisposing variables, otherwise known as sociocultural factors, are present prior to the onset of a mental illness and influence the propensity to use health care service (Bergeron et al., 2005). These variables include age, gender, marital status, education, genetics/biology, culture/ethnicity, pre-existing health care practices and the values, beliefs and attitudes of the patient. Of these variables, only age and gender were available from the database and will be used in this study.

Enabling variables. The second category of variables in the Andersen model is enabling or impeding variables. These variables focus on the means, supports or logistical aspects by which individuals gain access to health services and/or the barriers they encounter (Andersen, 1995; Bergeron et al., 2005). These variables reflect actions by another person or an institution that intentionally or unintentionally facilitate or disrupt the continuation of patients' health care practices (UCLA, 2008). Such factors commonly include geography of residence, geography of facility, co-morbid illnesses, income, level of social support, organizational factors (e.g. health personnel), accessibility (e.g. transportation, services and health insurance benefits), and acceptability and availability of care and services (e.g. facilities). Given the limitations of the database used in this study, the enabling variables included in this study were geography of residence; co-morbidities; and acceptability, availability and accessibility of care and facilities; which further included discharge destination, referring institution, entry code, admission code, readmission code and the discharge disposition.

Need variables. Finally, need variables or those that reflect perceived health needs and level of psychological distress (Bergeron et al., 2005; Vasiliadis et al., 2005), were also assessed for how they predicted service use. These variables represent an individual's most immediate need for health care service use (Andersen & Newman, 2007) and can also pose as deterrents

that may or may not be under the control of the service user (Andersen, 1995). Commonly included in this category are the mental illness diagnosis/es, self-rated health, social stigma, and the attitude, values and beliefs of health care professionals. Due to the database limitations, only the mental illness diagnoses were in this study.

The variables included in the Andersen model of health services utilization are considered to be inter-related. Each category of variables represents one perspective of the human being, society and/or organization that impact health care service use. Collectively, this group of variables helps to explain a person's health care service use.

In summary, on an individual level, co-morbidities, mental illness, geography of residence, age and gender are thought to impact service use consumption. On a system or organizational level, the discharge destination, referring institution, entry code, admission code, readmission code and discharge disposition affect length of stay and rate of admission, and therefore impact acute care hospital use and total hospital costs. These variables can be used to predict and explain the use of acute hospital services.

Purpose

The purpose of this research study was two-fold. First, the study compared the use of acute care in-patient hospital services (total length of stay, acute length of stay, ER wait time, rate of admission, resource intensity weight and cost) of seniors with and without mental illnesses in the province of Newfoundland and Labrador. Second, this study explored key predictors of service use. These predictors or independent variables included demographic characteristics, diagnoses, discharge disposition, admission information, and institutions to which patients were discharged and admitted from. All variables are discussed and framed within the Andersen model and its appropriate nomenclature.

Research Questions

1. How do seniors with and without mental illnesses in the province of Newfoundland and Labrador compare in their use of acute care in-patient hospital services?
2. What is the influence of key demographic characteristics, diagnoses, involved institutions, admission information and discharge disposition on the use of acute care in-patient hospital services by seniors with and without mental illnesses?

Chapter Two: Literature Review

This literature review provides an overview of the empirical literature on the use of acute care hospital in-patient services by seniors with mental illnesses and the factors that contribute to

that use, using the Andersen model as an organizing framework for discussion. Although much research had been conducted in this area, there still exists a significant lack of consensus on the prevalence of mental illness in seniors as well as the rates at which seniors with mental illnesses use acute hospital services.

This chapter begins with a discussion of the epidemiology and health economics of mental illness in seniors which provide a context for the literature review. It is recognized that each of the studies referred to in this review has limitations but also unique strengths that contribute significantly to our understanding of how mentally-ill seniors use acute hospitals. Due to the many health care system changes over the last two decades, the review was limited, wherever possible, to literature published since 2000.

Search Strategy

The key words were used in multiple combinations to conduct the search: *seniors, older adults, elderly, aged, prevalence, hospital, predictors, utilization, hospitalization and mental illness, mental disease, psychiatric illness or psychiatric disease, length of stay, admission* and *costs.* The databases of Abstracts in Social Gerontology, PubMed, CINAHL, Embase, and Psych-info were searched, as were Google and Firefox. Reference lists of articles were further assessed for any additional relevant references.

The Epidemiology of Mental Illness in Seniors

According to Canada's population census, one in five (20%) of all Canadians develop a mental illness at some point in their lives (Health Canada, 2002). The question that remains is whether or not seniors are more or less susceptible than their younger counterparts to the development of mental illnesses. Estimates of the prevalence of mental illness in seniors vary

widely, ranging from 0.1% (Mosier et al., 2010) to 76% (Bryant, Jackson & Ames, 2009). These variations will be further explored in this section.

Measurement of mental illness. A number of studies that report a relatively low prevalence of mental illness in seniors relied on respondent recall and self-reports. For example, relying on recall, studies of data from the Canadian Community Health Survey (CCHS) (Cairney, Corna, Veldhuizen, Kurdyak, & Streiner, 2008; Corna et al., 2007; Mosier et al., 2010; Starkes et al., 2005), the National Population Health Survey (NPHS) (Rush et al., 2008) and the ESA Quebec survey (Enquête sur la santé des aînés) (Préville et al., 2008), reported a low prevalence rate of mental illness in seniors of 0.1-2.8%, 0.2-5.1% and 1.1-7.4%, respectively. Likewise, when self-reports were used to measure the use of acute hospital services for seniors with mental illnesses, those 65 years and older were not found to have a longer length of stay than seniors without mental illnesses ($p = .17$) (Connor et al., 2010). As well, Health Canada (2002) found that seniors with mental illness have one of the lowest rates of hospitalization (229.2/100,000 vs. 339.7-471.7), the lowest proportion of all hospitalizations (0.8 vs.0.9-11.9) and one of the shortest hospital stays (6,085 vs. 6,292- 6,599), compared to all other age cohorts. The lower numbers in these studies may be attributed to a number of reasons. First, the diagnoses used in the CCHS were based on algorithms developed by Statistics Canada (Gravel & Beland, 2005); algorithms which typically produce conservative population estimates. Second, the problem with recall is that participants may not accurately remember doctors' visits during which a diagnosis of mental illness was made. Further, stigma and fear has the potential to deter research participants from admitting to a mental illness (Berzins, Petch, & Atkinson, 2003; CMHA, 2005; Cochrane et al., 2000; Hamid, 2002; Rogers & Barush, 2000; Sadovoy, Meier, & Ong, 2004; Whalen, 2007; Wrigley, Jackson, Judd, & Komiti, 2005) hence affecting the accuracy of the results. Another

problem with self-report of mental illness in seniors is the lack of evidence of equivalence (reliability) between self-rated mental health and clinical assessments made by health care professionals (Mawani & Gilmour, 2010). Both under- (Mawani & Gilmour, 2010) and over-reports (Rhodes & Fung, 2002) have been attributed to self-reports of mental illness among seniors. These problems with self-reports of mental illness can be avoided by using ICD-10 diagnostic codes to more reliably measure mental illness in seniors.

Despite the limitations of the above studies, the large databases generated have the strengths of having sampled multiple regions, a range of ages and cultural backgrounds. Furthermore, the studies were conducted in a timely and cost-efficient manner.

Sampling issues. A number of studies have relied on localized samples, resulting in widely varying estimates of mental illnesses among seniors. Studies that sampled a single, general practitioner's office (Benazzi, 2000), one acute medical unit (Burn, Davies, Mckenzie, & Brothwell, 1993), or a sample of housebound seniors (Lindesay & Thompson, 1993) reported relatively low prevalence rates of mental illness in seniors, ranging from 3.2% to 11%. In contrast, other studies, with samples from the emergency department of an acute care hospital (Naughton et al., 1995), a single acute or specialty unit (Bryant et al., 2009; Cullum, Metcalfe, Todd, & Brayne, 2008; Shah, Evans & King, 2000; Shah, Hoxey, & Mayadunne, 2000; Unsar & Sut, 2010; Yohannes, Baldwin & Connolly, 2008), a personal care home (40-87.1%) (Martens et al., 2007), a private clinic (53.6-70.45%) (Benazzi, 2000), a hospital for war veterans (54.2%) (Chen et al., 2007), low income public housing areas (26-50%) (Fisher & Copenhaver, 2006; Robison et al., 2009), and a community of seniors (31-84.3%) (Bourgault-Fagnou & Hadjistavropoulos, 2009; Tranmer, Croxford & Coyte, 2003) found relatively higher, but still highly varying prevalence rates of mental illness in seniors that ranged from 22% to 87.1%.

Although the strength of these studies was that their populations included seniors from diverse settings (Bourgault-Fagnou & Hadjistavropoulos, 2009; Fisher & Copenhaver, 2006; Martens et al., 2007; Robison et al., 2009; Tranmer et al., 2003), and focused on only seniors (Benazzi, 2000: Bourgault-Fagnou & Hadjistavropoulos, 2009; Bryant et al., 2009; Cullum et al., 2008; Fisher & Copenhaver, 2006; Naughton et al., 1995; Robison et al., 2009; Shah, Evans et al., 2000; Shah, Moxey et al., 2000; Tranmer et al., 2003; Unsar & Sat, 2010; Yohannes et al., 2008) in their study population, the highly discrepant results undermine the generalizability of the findings from these studies. Policy-makers and administrators require a clear understanding of the prevalence of mental illness among seniors in order to justify the development of services to meet their needs. Population-based research is needed to generate valid and reliable evidence upon which decisions can be based.

In summary, the prevalence of mental illness in seniors continues to be unclear, in part because studies have used unreliable measures of mental illness, have focused on limited samples of seniors. This study attempted to overcome these limitations by including all mental illnesses (based on ICD-10 codes), all seniors 65 years of age and older and all acute hospitals within the province of Newfoundland and Labrador in Canada.

Misconception of Mental Illness in Seniors

Aging and mental illness. A common misconception is that mental illness is a normal part of aging. Whether or not growing older increases one's vulnerability to the development of mental illness (Crabb & Hunsley, 2006; Frise et al., 2002; Nabalamba & Millar, 2007; Starkes et al., 2005), it represents a "double whammy" (Kirby, 2006), or a double struggle of age change and threatened mental health, that impairs seniors' everyday functioning. Aging persons experience some normal declines in information processing speed, learning rates, attention span, and

memory recall for long term events, abstraction, mental flexibility and visual-spatial task ability (American Psychological Association, 1998; Barnes et al., 2007). These changes are concomitant with a decreased ability to transmit neurological impulses, loss of axons in spinal nerves, and decreased brain circulation. However, none of these changes is as significant as was previously thought (Salthouse, 2010), nor are they positively correlated with the onset of mental illnesses. Nevertheless, the misconception that mental illness is a normal part of aging has contributed to misdiagnosing and/or under-treating mental illness in seniors (Sternberg, Wolfson & Baumgarten, 2000).

Many seniors lead happy and fulfilling lives without significant cognitive changes and/or altered mental status (Barnes et al., 2007; CMHA, 2005; Fritsch et al., 2007). As a group, seniors have distinct advantages over other age groups in that they have more experiences with coping, problem solving and crisis management merely by virtue of the years they have lived. Many of today's seniors have lived and coped with experiences of immigration, deaths of family members and friends, and epidemics. Many have fought in or had family members fight in world wars and survived the Great Depression (Kimhi, Hantman, Goroshit, Eshel, & Zysberg, 2011); experiences that offered the opportunity to develop excellent coping skills (Cloyd & Dyer, 2010). Ironically, these strengthened coping mechanisms sometimes enable seniors to cover up the early signs of mental illness because they fear being threatened by restrictions on their freedoms and living situations (Ballard, 2010).

Older adulthood is a time of continued growth and development that provides opportunities to develop unique capacities (Fritsch et al., 2007; Penick & Fallshore, 2005). With increased age, although the body becomes increasingly challenged to actively engage in some of the activities it previously mastered, people do not necessarily become depressed, isolated and

rigid; in fact, seniors who were well adjusted and happy when they were young, are likely to remain so in late life (CMHA, 2005; Fritsch et al., 2007; Penick & Fallshore, 2005). Physically and mentally/ cognitively, the body experiences many normal age-related changes across the lifespan; but none of these is clearly or definitively related to the occurrence of mental illness.

In fact, older adults' cognitive and mental capabilities are likely to be enhanced (rather than threatened) by life events. Studies have shown that short term or primary memory remains relatively stable over the lifespan, vocabulary improves with age, and the accumulation of practical experience and wisdom continues to develop until the very end of life (American Psychological Association, 1998). In addition, personality is more stable across the second half of the adult lifespan than that across the first (Ferguson, 2010). The cognitive difficulties that were previously thought to be correlated with increased age are understood to be associated with other events such as physical and/or chronic illness (Han, Wilson & Ely, 2010), medication usage (Howland, 2009), elder abuse (Kahan & Paris, 2003), vitamin deficiencies (Wilkins, Sheline, Roe, Birge, & Morris, 2006), metabolic disturbances (Hendrickx, McEwan, & Ouderaa, 2005), and the experience of multiple concurrent stressors (Kave, Knafo, & Gilboa, 2010).

The presentation of mental illness in seniors. The presentation of mental illness in seniors often differs from that in other age cohorts (Depp et al., 2005). Instead of social withdrawal, indecisiveness and feelings of hopelessness and helplessness that typify depression in younger age cohorts (Souery et al., 2011), older adults present with anxiety, agitation, somatic complaints and complaints of physical and memory disorders (Shah, Evans et al., 2000), loss of appetite, difficulty sleeping, constipation and/or loneliness (American Psychiatric Association, 2003). These atypical presentations contribute to overlooking or misdiagnosing mental illness in seniors

(Sternberg et al., 2000). The availability of psycho-geriatric experts would facilitate a more accurate and timely diagnosis and treatment.

The Role of Hospitalization in the Treatment of Mental Illness in Seniors

Canada's health care system has undergone and continues to undergo significant transformation with respect to the treatment of mental illness. Deinstitutionalization has led to bed closures, while budgetary constraints and operational cost-cutting has led to hiring freezes, service cuts and staff lay-offs (Mansell, 2006). These changes have resulted in additional pressures on organizations, society and governments to manage care in the community, while many patients have tried to manage their own health care needs. Given the current climate of anticipated recession (CBC News, 2009), fiscal restraint (CIHI, 2007; Madi et al., 2007) and full occupancy rates (Romanow, 2002), as health care costs rise and waitlists grow, all measures indicate that the capacity of Canada's healthcare system has already been reached (CIHI, 2007a; CIHI, 2008; Health Canada, 2006; Romanow, 2002).

In spite of the health system changes, hospitalization remains an important means of stabilizing a mental illness, re-establishing discontinued or adjusting ineffective medication regimens and transitioning patients to outpatient and community-based services (Madi et al., 2007; Vasiliadis et al., 2005). Hospital use data helps health service planners and policy-makers organize and plan services to improve care, deliver services efficiently and address patients' needs (Kalant, Berlinguet, Diodati, Dragarakis, & Marcotte, 2000; Sheppard et al., 2002). The variables used in this study-length of stay in hospital, emergency room wait time, rates of admission to hospital and resource intensity weight or relative costs incurred- are some examples of performance measures of hospital utilization (Harman, Cuffel, & Kelleher, 2004;

Newfoundland and Labrador Center for Health Information [NLCHI], 2007), and offer insight into clinical efficiency (Clark & Ryan, 2002).

Research into how seniors with and without mental illnesses use acute care services is needed. As acute care hospitals are often the most costly of overall health care spending (Health Canada, 2006), the information from this study may assist in identifying specific targets and/or services for improved acute care hospital spending and areas where resources could be more efficiently utilized.

Health Care Economics

Although much research has been conducted on the economics of health care for seniors, the rate at which seniors with mental illnesses use acute care hospital services remains unclear. In spite of much methodological strength, a number of methodological flaws contribute to the lack of clarity and significantly reduces the confidence with which the results of these studies can be applied. Limitations of the studies significantly interfere with the representativeness and generalizability of the findings on how seniors with mental illnesses use acute hospital services.

Sampling issues. Whether studies report a high or low use of acute hospital services by seniors with mental illnesses, samples are often limited by clinical settings, hospital/s and/ or age range. For example, studies using only one emergency department found mentally-ill seniors had high rates of use compared to seniors without mental illnesses (6.5-7 vs. 5.0 days; 72% vs. 25%) (McCusker et al., 1997; Naughton et al., 1995). Furthermore, depressed seniors who visited an emergency room department during daytime hours were significantly more likely than non-depressed seniors to have more than three visits in a six-month period (12.2% vs. 5.8%) and 30-day returns (24.3%-17.4%) (McCusker et al., 2000). These studies were based on samples with limited age ranges; 65-69 (Naughton et al., 1995) and 65-74 (McCusker et al., 1997). Despite

sampling limitations, these studies contribute to the body of research on how mentally-ill seniors use acute hospital services (McCusker et al., 2000; Naughton et al., 1995). Nonetheless, studies focusing on the full age range of seniors are needed to provide more valid and reliable data upon which administrators and policy-makers can base interventions for seniors with mental illnesses.

A number of studies using only select hospitals and/or in-patient units found hospital use by seniors with mental illnesses to be high. For example, seniors with mental illness on select in-patient units and/or select hospitals experience a longer length of stay compared to seniors without mental illnesses (5.9-14.6 vs. 3.9-10.6) (Gonzalez et al., 2009; Saravay et al., 2004). Saravay et al. (2004) adds that seniors with mental illnesses also incur higher health care costs ($17,542 vs. $13,552) than do seniors without mental illnesses. Although both studies sampled only one or a select few medical units and/or hospitals (Gonzalez et al., 2009; Saravay et al., 2004), they provide useful data on mentally-ill seniors and health care costs incurred.

A number of other studies limited their sample by age range and population and found that mentally-ill seniors have a higher usage of acute hospitals compared to seniors without mental illness. Both Walter-Ginzburg et al. (2001) and Tranmer et al. (2003) focused on specific age groups of 75-94 and 70+, respectively and found that seniors with mental illnesses most often seek admission to hospital (37.1-39.7% vs. 25.2%), have overnight hospitalizations ($p > 0.01$) and greater costs ($1,710 vs. $1,111) than do seniors without mental illnesses (Tranmer et al., 2003; Walter-Ginzburg et al., 2001). Similarly, Freedberg, Dave, Kurth, Gaziano, and Bludau (2007) studied only seniors 85 years and older and found that cognitively impaired seniors are more likely to be admitted to and stay longer in hospital (5.5 vs. 4.7 days) with neurologic and psychiatric complaints than were non-cognitively impaired patients, however, this difference was not significant. On the other hand, with a focus on only seniors aged 75 years and older, Chi,

Brayne, Todd, O'Connor, and Pollitt (1995) reported no significant differences between cognitively impaired seniors and physically frail and physically healthy seniors in admission rates ($p > 0.05$), total days of stay ($p > 0.05$) or total hospital days/year ($p > 0.05$).

Lyketsos, Sheppard, and Rabins (2000) used a large national database and included those aged 60 to 64, in addition to seniors 65 and older, to find that seniors with mental illnesses have a significantly longer length of stay than do seniors without mental illnesses (10.4 days vs. 6.5 days); however, they included only seniors with dementia. Furthermore, studies looking specifically at war veterans also found that seniors with mental illnesses experience more admissions to acute care hospitals (OR= 1.34-2.14) and longer hospital stays (45%-34% vs. 5%-16%) than do veterans without mental illnesses (Chen et al., 2007; Kunik et al., 2003). Chen et al.'s (2007) use of a large national database and comparison between seniors with and without mental illness and Kunik et al.'s (2003) specific focus on seniors, were key attributes of their studies.

Studies reporting that mentally-ill seniors' use of acute care hospitals was high often limited their samples to one geographical location, to one gender or to seniors with one physical illness diagnosis. For example, Fernandez-Olano et al. (2006) found that seniors with depression are higher users of acute care hospital services (25.4%), than were seniors without depression (13.9%), however, they focused on a single city in Spain. As well, Frise et al. (2002) limited their sample by gender and found that mentally-ill women have higher rates of hospitalization (9.4 vs. 2.8) and longer stays (32.3 vs. 31.0) than do women without mental illness. However, while they use a very large provincial sample that was randomly stratified, their study was dependent on respondent recall and provided no specific analysis across age groups. Finally, Frassure-Smith et al. (2000) and Sayers et al. (2007) included only seniors who had heart failure.

Both studies found that seniors with heart failure and mental illness experience longer hospital stays (11.3 days; $p < 0.001$), more frequent readmissions (15.8%; $p < 0.001$) and greater costs ($479/person; $p < 0.001$), than do seniors with heart failure but without mental illness (9.2 days, 11.7% and $358/ person). The strengths of these studies lie in the fact that they used an aggregate level population database (Frassure-Smith et al., 2000) and included both seniors who did and those who did not have mental illnesses (Sayers et al., 2007).

Studies that found seniors with mental illnesses were lower users of hospital services than seniors without mental illnesses often had sampling limitations. For example, a number of studies using only one hospital sample reported that admission rates (OR=1.10-1.46 vs. 1.48 - 1.89; 34.3% vs. 34.2%) (Silverstein, Qin, Mercer, Fong, & Haydar, 2008; Snowden et al., 2004) and emergency visits (3-9 visits vs. 15-20) (Chaput & Lebel, 2007) for seniors with mental illnesses were no different than they were for seniors without mental illnesses. While Snowden et al. (2004) reports a longer length of stay for older adults with mental illnesses (16 days) compared to younger adults (10 days), the longer length of stay is actually a result of physical illness severity, not mental illness. While comparison between seniors and younger cohorts is valuable, what we really need to know more about is how age, within the cohort of seniors, influences service use.

Issues with measurement of mental illness. In order to glean an accurate picture of the use of acute health services by mentally-ill seniors, we need valid and reliable measures of mental illness and estimates that include the full range of mental illnesses. Furthermore, we need to move beyond results that are limited to seniors who have a mental illness as a primary diagnosis. For many seniors, mental illnesses are one of several co-morbid conditions. Therefore, we need to examine the use of acute health care services by seniors who have mental illness as

one of several diagnoses. Only then, can policy makers and administrators accurately predict the needs of seniors for mental health services.

Reports generated by the CIHI that explore acute hospital use by older adults with mental illnesses rely upon large national databases based on aggregate level data that include both primary and secondary diagnoses, however these reports exclude individuals who have mental illness as a tertiary and higher diagnosis. Studying seniors with mental illness as the primary or secondary diagnosis, CIHI found that seniors with organic disorders represented 44.8%-50.9% of all hospital discharges and had the longest average length of stay in both general and psychiatric hospitals at rates of 40.8-85.25 days (CIHI, 2005b; CIHI, 2006; CIHI, 2007a; CIHI, 2008b). Compared to younger cohorts with mental illness, seniors with other mental illnesses outside of organic disorders, had the longest length of stay in general hospitals for each of substance disorders (14.2 days vs. 8.3 and less), psychotic disorders (29.7 days vs. 24.2 and less), mood disorders (26.4 days vs. 17.2 and less), and other mental illnesses not specified (18.3 days vs.15.3 and less). Seniors with mental illnesses also had higher one year readmission rates (37%) compared to seniors without mental illness (27.3) (CIHI, 2008).

On the contrary, Madi and colleagues (2007), who also used CIHI data, did not find a statistically significant difference in hospital use between seniors with (38.7%) and without (40.7%) a primary diagnosis of mental illness. However this study included only seniors who had one-year readmissions. Although these results offer important information about the use of acute care services by seniors with a primary diagnosis of a mental illness and the relative use of services by seniors with different mental illnesses, additional information is needed regarding the use of services by seniors who have mental illnesses, but whose primary or secondary diagnosis is something other than a mental illness.

A number of studies of acute hospital service use by mentally-ill seniors relied upon respondent recall. Typically, these studies found relatively low service use by seniors with mental illnesses. When self-reports are used to measure the use of acute hospital services for seniors with mental illness, those 65 years and older do not have a higher length of stay than seniors without mental illness ($p = .17$) (Connor et al., 2010). As well, Health Canada (2002) found that seniors with mental illness have one of the lowest rates of hospitalization (229.2/100,000 vs. 339.7-471.7), the lowest proportion of all hospitalizations (0.8 vs.0.9-11.9) and one of the shortest hospital stays (6,085 vs. 6,292- 6,599), compared to all other age cohorts. However, in their study, they used only individuals who have mental illness listed as their primary admitting diagnosis.

Other methodological limitations. Other methodological limitations of studies that report seniors with mental illness are high users of acute hospital services relate to problems with statistical analysis and database selection. For example, to identify high users of hospital services, Roos et al. (2003) analyzed aggregate level data from the Canadian province of Manitoba and found that seniors and patients with mental illnesses are higher users (63% vs. 18.7%) and have longer hospital stays (71% vs. 19.9%), compared to seniors and other patients who did not have mental illnesses. Unfortunately, the researchers did not analyze the interaction effect of age and mental illness; therefore, we are unable to draw any definitive conclusions from this research about the use of acute hospital services by older seniors with mental illnesses.

Seniors' Predictors of Hospital Use

According to Andersen's conceptual model of health service use, in addition to the need variable of mental illness, predisposing and enabling variables also influence how seniors with mental illnesses use acute hospitals. These variables are discussed below.

Predisposing variables. Age and gender are the two predisposing variables that were included in this research study.

Age. Age is a key predisposing variable in Andersen's model of service use. As previously highlighted, there still remains much debate about the extent to which seniors use acute care hospital services. The lack of consensus is related to various methodological limitations in previous research studies. Because studies have limited their samples to specific age ranges of seniors (Tranmer et al., 2003; Walter-Ginzburg et al., 2001), select few hospitals (Chaput & Lebel, 2007; Freedberg et al., 2007; Snowden et al., 2004), select sub-populations of seniors (Frise et al., 2002; Kunik et al., 2003; Sayers et al., 2007) and specific methods of measuring/defining mental illness (Connor et al., 2010), it remains unclear if older age contributes significantly to acute care hospital use. Therefore, this study examined service use by all seniors aged 65 and older and also examined how age within that group influenced service use by seniors with and without a mental illness as one of their diagnoses. This helps to further our understanding of how all seniors with and without mental illnesses use acute hospital services.

Gender. According to Andersen's model of service use, gender is considered to be a significant predisposing variable of service use. Furthermore, gender is also considered to be a significant determinant of health (Health Canada, 2004).

The majority of research on this topic suggests that overall, females use more health care services than do males (Carriere, 2006; Crabb & Hunsley, 2006; Fernandez-Olano et al., 2006; Finkelstein, 2001; Humphries & Doorslaer, 2000; Mackenzie et al., 2006; Nabalamba & Millar, 2007; Redondo-Sendino, Guallar-Castilion, Banegas, & Rodriguez-Artalejo, 2006; Reid et al., 2003; Sajatovic et al., 2004; Starkes et al., 2005; Walter-Ginzburg et al., 2001; Weiss, Ernst,

Miller & Russell, 2002). As women live longer than men (Vina, Borras, Gambini, Sastre, & Pallardo, 2005), it was anticipated that this relationship between gender and acute care hospital services would also occur in this research study.

As for mental illness specifically, studies have shown that female seniors are more likely to be diagnosed with a mental illness than are males (McCusker et al., 2000; Streiner, Cairney, & Veldhuizen, 2006). In particular, female seniors with mental illnesses experience longer hospital stays and more hospital admissions than do male seniors with mental illnesses (Roos et al., 2003; Sajatovic et al., 2004; Sayers et al., 2007). The generalizability of the findings in these studies is limited however, because they restrict their samples to specific populations such as seniors with heart failure (Sayers et al., 2007), readmitted seniors (McCusker et al., 2000), a single hospital sample (Unsar & Sut, 2010), or they use no control group of seniors (Sajatovic et al., 2004) or lack the statistical interaction effect (Roos et al., 2003), which indicates the need for caution in the interpretation of findings. Despite these limitations, these studies contribute to the knowledge for how gender impacts acute care hospital services for mentally-ill seniors. Their strengths include a comparison between seniors with and without mental illnesses (McCusker et al., 2000: Sajatovic et al., 2004; Sayers et al., 2007; Unsar & Sut, 2010), and the use of aggregate level data (Roos et al., 2003; Streiner et al., 2006).

A small number of studies have found that gender has no influence or that males have higher use rates of acute care hospital use than do females (CIHI, 2006; Lai & Chau, 2007; Solway, Estes, Goldberg, & Berry, 2010). Again, these studies' results should be interpreted with caution as they were limited by their samples (Lai & Chau, 2007; Solway et al., 2010) and to those who only had a mental illness as their primary diagnosis (CIHI, 2006). Similar to the above studies on gender, despite the strengths of using a large national database (CIHI, 2006) and a

specific focus on both mental health and aging (Lai & Chou, 2007; Solway et al., 2010), these studies still produce differing results.

For others, when aggregate population data (CIHI, 2006) and a focus on just seniors is used (Tranmer et al., 2003), male seniors with mental illnesses are higher users of health care services than female seniors with mental illnesses. Tranmer et al. focused only on the diagnosis of dementia and found that female seniors with dementia received significantly fewer hospital services than did males. Others found that the female gender overall was not affiliated with significant increased use of services for both general (52.9% vs. 47.1%) and psychiatric hospitals (43.1% vs. 56.9%) (CIHI, 2006), however, the CIHI reports were limited to persons whose mental illness was a primary or secondary diagnosis.

Sampling seniors, aged 65-74, from a single emergency department, McCusker et al. (1997) found that while female seniors used emergency services more often than males (65.1% vs. 38.4%), it was the males who were more frequently admitted (32.3% for males vs. 31.6% for females) and had higher repeat visits back to the emergency department (27% vs. 22%). Although this study is somewhat dated, it has value because of its specific focus on seniors only, and its large sample of almost 4,500 seniors.

Enabling variables. The enabling variables outlined in the Andersen Behavioural Model of Health Services Utilization further inform our understanding about length of stay, rate of admission of seniors with mental illnesses to hospital and incurred costs. These variables typically include geography of residence, income, level of social support, organizational factors (e.g. health personnel), accessibility (e.g., transportation and health insurance benefits), availability barriers (e.g. facilities), and co-morbid illnesses (CMHA, 2005; Fernandez-Olano et al., 2006; Frank, 2002; Kirby, 2006; Kristjannson, Helliwell, Forbes, & Hill, 2000; Mackenzie et

al., 2006; McGee, Tuokko, Maccourt, & Donnelly, 2004; McInnis & White, 2001; Rice & Matsuoka, 2004; Rogers & Barush, 2000; Sadovoy et al., 2004). In this study, the enabling variables of geography, co-morbid illnesses, re/admission information, and the accessibility and availability variables of the discharge destination, discharge disposition, and the referring institution, were assessed for their influence on the use of acute in-patient hospital services by seniors with mental illnesses. The literature on enabling variables and availability variables is discussed below.

Geography of residence. The location of one's home/residence represents the proximity to an acute care hospital, therefore, it is considered to have significant influence on how seniors not only use acute care hospital services, but also how geography of residence impacts their mental well-being (Hebert et al., 2000; Mackenzie et al., 2006; McGee et al., 2004; Sadovoy et al., 2004; Sambrook et al., 2004; Shah et al., 2007; Tryssenaar & Tremblay, 2002).

Relying upon respondent recall, researchers found that rural seniors differ from urban seniors in their use of health services. In using a large, national database (CCHS), Nabalamba and Millar (2007) found that rural seniors are high users of general practitioners' offices. However, Sadovoy et al. (2004) whose focus on mental health in older Canadian Chinese immigrants found that rural seniors were lower users of health care services than were urban seniors. Given that rural areas have very few, if any, acute care and/or psychiatric hospitals (Herbert, 2010; Sadavoy et al., 2004), and that general practitioners are the most frequently sought after health care professional (Laurent, 2002); an accurate comparison of these results and health care service use in other populations of seniors is difficult to achieve.

Among the reasons for decreased use of services are lack of proximity to acute care hospitals (Mackenzie et al., 2006; McGee et al., 2004; Sambrook et al., 2004; Solway et al.,

2010), a shortage of physicians in rural and isolated regions of Canada (Finkelstein, 2001), lack of mental health services in rural areas (Hebert et al., 2000; Kirby, 2006; Mackenzie et al., 2006; McGee et al., 2004; Sadovoy et al., 2004; Sambrook et al., 2004), lengthy travel time to seek such services (Starkes et al., 2005), and the topography and weather experienced in isolated areas (McGee et al., 2004; Statistics Canada, 2001). It is evident that even though the proportion of people aged 65 and over is higher and growing faster in rural areas than in urban areas (Statistics Canada, 2006); [20.3% of Canadians and 42.3% of Newfoundlanders reside in rural areas (Statistics Canada, 2001)], accessing services becomes a major challenge for rural seniors.

A number of studies examined the use of services by urban and rural seniors and found that urban seniors with mental illnesses have a higher use of acute care hospital services (32.2% vs. 21.7%), higher rate of admission (84.7% vs. 15.3%) and higher total hospital days (6,242 vs. 624 days), than do rural mentally-ill seniors (Allan & Cloutier-Fisher, 2006; McCusker et al., 2007; Starkes et al., 2005). The relatively higher use in urban versus rural mentally-ill seniors is attributed to personnel shortages (McGee et al., 2004), inadequate modes of transportation (Health Canada, 2006; Palinkas et al., 2007; Pepin, Segal & Coolidge, 2009; Solway et al., 2010), and economic differences (Palinkas et al., 2007).

From the findings of previous studies, the relationship between geography and acute care hospital use for seniors with mental illnesses remains unclear. Therefore, by using aggregate level data that includes both urban and rural seniors in Newfoundland and Labrador, this research study aimed to clarify the relationship between geography and hospital use for seniors with mental illnesses.

Co-morbid illnesses. Co-morbid illnesses are associated with age, and significantly impact the use of acute in-patient hospital services by seniors with mental illnesses.

The presence of co-morbid illnesses is not only a significant determinant of health (Health Canada, 2002), but it also predicts an increased use of health care services in seniors (Braden et al., 2008; Carriere, 2006; Fernandez-Olano et al., 2006; Hansagi, Olsson, Sjoberg, Tomson, & Goransson, 2001; McCusker et al., 2000; Nabalamba & Millar, 2007; Redondo-Sendino et al., 2006; Reid et al., 2003; Rotermann, 2006; Walter-Ginzburg et al., 2001). As well, the majority of seniors have multiple co-morbid illnesses (Carriere, 2006).

When that co-morbid illness is a mental illness, service use increases even more (Braden et al., 2008; Choi, Marrow-Howell & Proctor, 2006; CIHI, 2008b; CMHA, 2005; Cole et al., 2008; Conn, 2002; Crabb & Hunsley, 2006; Dunlop, Coyte & McIsaac, 2000; Frise et al., 2002; Health Canada, 2006; Kunik et al., 2003; Nabalamba & Millar, 2007; Rogers & Barush, 2000; Sayers et al., 2007; Starkes et al., 2005); prolongs hospital stays (Carriere, Jin, Marrie, Predy, & Johnson, 2004; Patrick, Knoefel, Gaskowski, & Rexroth, 2001; Rogers & Barush, 2000), increases rates of admission/ readmission to hospital (Gao et al., 2005; McCusker et al., 1997; McCusker et al., 2000; McCusker et al., 2007; Wilber, Blanda & Gerson, 2006), and increases costs (CIHI, 2008; Lyketsos et al., 2000; Saravay et al., 2004). All of the studies found on this topic, however, have limitations of samples, settings and mental illness diagnoses, which make it difficult to generalize the findings.

In contrast to the majority of research that suggests mentally-ill seniors with co-morbidities use a lot of hospital services, McCusker et al. (2004) using data from billing claims, found that mentally-ill seniors with co-morbid illnesses related to respiration, circulation and digestion were not more likely to be admitted through the emergency department compared to mentally-ill seniors without these co-morbid illnesses. Using a single hospital sample, although length of stay was longer for the older adults with mental and co-morbid illnesses (16 days)

compared to younger adults (10 days), the older adults constituted only 5% of the admissions and their length of stay was attributed to the severity of their medical illnesses rather than their mental illnesses. In addition, mentally-ill seniors with co-morbid illnesses were no more likely to be readmitted (34.3%) within one year than were younger adults with mental illness and co-morbidities (34.2%) (Snowden et al., 2004).

The presence of medical co-morbidities in seniors who have mental illnesses impacts their use of acute hospital services even more. However, the nature and extent to which co-morbid illnesses influence acute hospital use for seniors with mental illnesses remains uncertain. One aim of this research was to help clarify our understanding of the impact that co-morbid illnesses have on seniors' acute hospital use by using aggregate level data from the province of Newfoundland and Labrador that includes all of the seniors' co-morbid illnesses.

Accessibility and availability of services: Discharge destination, referring institution and discharge disposition. According to Andersen's conceptual framework, enabling variables are defined as those that impede or facilitate the use of health care services. Accessibility and availability of services are treated as a single enabling variable. For the purposes of this study, the three variables of 'discharge destination', 'referring institution' and 'discharge disposition' were used to measure accessibility and availability of services. 'Discharge destination' referred to the facility or hospital to which the patient was transferred (NLCHI, 2005), 'referring institution' referred to the facility or hospital from which the patient was transferred (NLCHI, 2005) and 'discharge disposition' referred to the status of the patients separated (discharged) from the healthcare facility and includes one of the following: transferred to inpatient; transferred to continuing care; transferred to other institution; discharged home with support (homecare); discharged home; signed out; died (CIHI, 2004).

Ideally, Canada's universal health care system provides for multiple points of entry to access a variety of care providers for services and treatment. It should be a system that seniors can easily navigate without undue hardship or challenge. However, that is not always the case. The processes involved in discharging or transferring seniors with mental illnesses out of an acute care hospital to various locations and institutions (Discharge destination), placing seniors with mental illnesses into an acute care hospital setting from outside of the hospital (Referring institution) and discharge disposition pose many challenges for seniors with mental illnesses. Each of these variables is impacted by shortage of alternate level of care beds; minimal psychiatric services, supports and interventions; poor coordination and liaison efforts; inefficient discharge processes and practices; organizational bureaucracies; and professional practices of health care clinicians. As all three variables-- 'discharge destination', 'referring institution' and 'discharge disposition'-- represent potential barriers to the services needed by the population of seniors with mental illnesses, they clearly depict enabling variables.

Shortage of alternate levels of care beds. The availability of alternate levels of care beds influence seniors' discharge destination, referring institution and discharge disposition. A shortage of long-term-care, transition and rehabilitation beds contributes significantly to the service gaps for seniors with mental illnesses and prompts them to use acute care hospital services unnecessarily. The availability of alternate levels of care beds should provide more appropriate care for seniors. Seniors who occupy acute care hospital beds when an acute level of care is no longer needed (Bruce, De Coster, Trumble Waddell, Burchill, & De Handy, 2001; Menec et al., 2004), are using resources that do not meet their needs and could be put to better use (Menec et al., 2004; Silverstein et al., 2008). It is important to remind ourselves that seniors are not to blame for the deficiencies of the health care system. They are the victims.

Insufficient alternate levels of care beds for mentally-ill seniors in acute hospitals is significant, as it has been found that 31-60% of seniors who occupy acute care beds are deemed no longer acute after one week of being admitted (Menec et al., 2004). Further, the acute care setting for mentally-ill seniors is often busy, confusing, dysfunctional and structurally inadequate (Kozyrskyj, Black, Chateau, & Steinback, 2004; Nolan, 2007), non-conducive to their needs (Kihlgren, Nilsson, & Sorlie, 2005), oppressive to older adults who frequently get relegated to a lower status (Higgins et al., 2007) and infringes on their quality of life (Siddiqi, Stockdale, Britton, & Holmes, 2007). No literature to date suggests there is no shortage of alternate levels of care beds or that acute care settings are the most optimal place for seniors with a mental illness.

Many reasons have been postulated as to why seniors continue to occupy acute care beds when they no longer need to. These reasons include a shortage of designated long-term care beds available for seniors, lengthy wait times for discharge (Kozyrskyj, De Coster, & St. John, 2002; Ingold et al., 2000; Rogers & Barush, 2000) and healthcare restructuring, amalgamation and/or budgetary cutbacks that have decreased total acute care beds (Menec et al., 2004). For these reasons, seniors continue to occupy acute care beds when they no longer need to, which limits acute care bed availability for others. The needs of seniors with mental illnesses could be better met in a long-term care setting or by other tertiary care services (Burroughs et al., 2006; Menec et al., 2004; Silverstein et al., 2008; Wasylenki et al., 2000).

Minimal psychiatric services, supports and interventions. The relative lack of psychiatric services, treatments and interventions in both acute and long term care settings is another aspect of accessibility and availability of health care services within Andersen's conceptual service use model.

Insufficient mental health services for seniors is an issue that has been repeatedly echoed in the literature. Some of these insufficiencies include inadequate numbers of beds in long-term care facilities (Silverstein et al., 2008) and minimal psychiatric services in long-term care settings. Kirby (2006) and Conn (2002) report that long term care settings receive only 10 minutes/day and 3-5 hours of mental health care per month, respectively. Other researchers have found that psychiatric assessments are rarely updated on a regular basis in long-term care facilities (Hugo, Smout, & Bannister, 2002; Malone, Newron-Howes, Simmonds, Marriot, & Tyrer, 2007) and general practitioners are left to assess the mental health needs of seniors (Kirby, 2006). The use of a "one size fits all" approach prevails in long-term care settings, with no sensitivity or tailored approach to meet the mental health needs of residents (Whalen, 2007).

Likewise, acute care hospital settings typically lack sufficient mental health services and expertise to meet the needs of seniors with mental illnesses. These insufficiencies are often characterized by minimal or absent in-patient psycho-geriatric programs, assessment tools, and consultation services (Choi et al., 2006; Finkelstein, 2001; Hebert et al., 2000; Kirby, 2006; Mackenzie et al., 2006; Mausbach, Cardenas, McKibbin, Jeste, & Patterson, 2008; McGee et al., 2004; Sadovoy et al., 2004; Sambrook et al., 2004; Silverstein et al., 2008). In addition, the frequent use of chemical and physical restraints in the acute care setting is not conducive to the mental health of seniors with mental illnesses (Kirby, 2006).

Poor coordination and liaison efforts. To provide the most optimal service for seniors with mental illnesses there needs to be a coordinated and collaborative effort among attending physicians and hospitals and long-term-care facility administrators and staff (Rogers & Barush, 2000). Centralized single-entry processes to coordinate the assessment and placement of seniors from acute hospitals to long-term-care facilities (McDonald et al., 2005), and a patient-centered

discharge focus (Adelman et al., 2007; Hancock et al., 2003; Murray et al., 2006; Rydeman & Törnkvist, 2010; Sarkisian, Hays, Berry, & Mangione, 2001; Wetzels et al., 2004) are required to better meet the mental health needs of seniors (Mausbach et al., 2008). However, what is often found is poor and inconsistent referral practices (Burroughs et al., 2006; Cohen, Pringle, & LeDuc, 2001; Coyne & Katz, 2001; Crabb & Hunsley, 2006; Hinton et al., 2007; Kirby, 2006; Klap, Unroe, & Unutzer, 2003; Rogers & Barush, 2000; Van Eijken, Melis, Wensing, Rikkert, & Van-Achterberg, 2008; Wen, Hudak, & Hwang, 2007), inappropriate policies and resources (Chang, Chenoweth, & Hancock, 2003), poor interdisciplinary collaboration (Byles, Francis, & McKernon, 2002; Curran, Rourke, & Snow, 2010; Hinton et al., 2007; Rosemann et al., 2006; van Eijken et al., 2008; Walker, Hogstel, & Curry, 2007), and poor connections with supportive outside community agencies (Burroughs et al., 2006; Hinton et al., 2007; Walker et al., 2007). All of these factors hinder the discharge of seniors with mental illnesses out of acute care beds to appropriate community and/or long term care facilities in a timely and cost-effective manner. Involving older adults in their plan of care is vital from the time of admission (Adelman et al., 2007; Hancock et al., 2003; Murray et al., 2006; Rydeman & Törnkvist, 2010; Sarkisian et al., 2001; Wetzels et al., 2004), and particularly at the time of discharge (Adelman et al., 2007).

Inefficient discharge processes and practices. Effective discharge processes play a key role in successfully discharging mentally-ill seniors from acute care in-patient hospitals. Discharge processes need to be integrated into comprehensive care plans without which health care providers compromise patient care (Popejoy, 2010).

Many researchers found that discharge processes are either absent, have poor structure or lack compliance from health care clinicians (Hancock et al., 2003; Ingold et al., 2000; Menec et al., 2004; Walker et al., 2007). Specific processes that impede the effective and appropriate

discharge of mentally-ill seniors from acute hospitals include lengthy paperwork (Ingold et al., 2000; McDonagh, Smith, & Goddard, 2000), premature discharge (Silverstein et al., 2008) and absence of predictor models (Silverstein et al., 2008). Even the most clinically efficient hospitals have been found to have inefficient discharge practices (Menec et al., 2004).

Organizational bureaucracies. The bureaucracies of health care organizations also have the potential to influence the enabling variable of accessibility and availability of services for seniors with mental illnesses. Therefore, as Andersen's conceptual model of service use outlines, they too represent a potential barrier for this group to access the services to best meet their needs. Many organizational bureaucracies center on three key themes of philosophy, the politics of policies and the model of care delivery.

Philosophy. Although promoted as free, available and accessible to all (Birch & Gafni, 2005; Madore, 2005), the organizational and administrative structure of Canada's health care system exerts a negative influence on how seniors with mental illnesses utilize health care services in Canada. Philosophical implications include the philosophy of "warehousing" the seniors and mentally-ill persons (Friday, 2007; Kirby, 2006). Constrained human and fiscal resources (Beck & Thomson, 2006; Chappell, Gee, McDonald, & Stones, 2003), a fragmentation of services (Cardin et al., 2003), negative incentives (Cardin et al., 2003), absence of accountability (Cardin et al., 2003), long waiting lists, inattention to patients' needs (Marwaha & Livingston, 2002; Palinkas et al., 2007), and lack of appropriate services (Choi et al., 2006) are among the bureaucracies that pose barriers to achieving mental health and well-being among seniors.

Further, models of care delivery impact how seniors with mental illnesses use acute hospitals. Hospital care delivery models that are based on the medical model and provider-driven

model represent much of Canada's delivery of health care services. The provider-driven model often suits only the needs of service providers, rather than the needs of clients (Friday, 2007). This model contributes to providers and funders that view seniors with mental illnesses as 'bed-blockers' and 'placement problems' and put seniors with mental illnesses out of sight, rather than focus on their recovery (MacCourt, 2004). Similarly, the biomedical model has numerous disadvantages for seniors with mental illness. Because it is based on a body systems approach, it do not promote holistic health care (Wade & Halligan, 2004). The narrow focus of care in our current health care system forces seniors to make repeat visits to hospitals, specialists, clinics, etc. to ensure that their body systems' needs get met but ignores the broader range of non-medical interventions needed to address all of the determinants of health (MacCourt, 2004).

Despite the concerns identified, not everything about our current health care system is negative. The literature reveals some beneficial and positive situations related to seniors with mental illnesses and their use of acute care hospital services. For example, the use of a case coordination care delivery model (Bierlein, Hadjistavropoulos, Bourgault-Fagnou & Sagan, 2006) has positive results, with the use of and access to appropriate health services contributing to an increase in patients' self-esteem, sense of control and psychological well-being (CMHA, 2005; Depla, Graaf & Heeren, 2006; Oliver, 2004; Sadovoy et al., 2004; Sullivan, Kessler, LeClair, Stolee & Berta, 2004).

The politics of policies. Politics and poorly structured policies create gaps that influence how seniors with mental illnesses use acute care hospitals. Examples where this becomes evident is in physicians' lack of acknowledgement of the policies (Silverstein et al., 2008), long term care policies that have strict admission criteria and guidelines that enable selective picking of seniors (Lane, McCoy, & Ewashen, 2010; Rogers & Barush, 2000), lack of administrative

responsibility and action (Lane et al., 2010), the failure to recognize the uniqueness of seniors who have mental illnesses (Cochrane et al., 2000; Kirby, 2006), and the lack of knowledge exchange amongst researchers in gerontology (Kirby, 2006).

Home care. Home care and community-based services are much needed resources to help keep seniors with mental illnesses optimally functioning in their own homes. Home-based mental health services for the elderly serve to promote seniors' autonomy, dignity and control. Additionally, the home setting provides an opportunity for health care professionals to conduct an accurate mental health assessment of seniors and their environment and to initiate prompt interventions when indicated (Kohn, Goldsmith, Sedgwick, & Markowitz, 2004). The receipt of home care is often cited as a predictor of institutionalization (Kozyrskyj et al., 2004; Silverstein et al., 2008), however, if readily available, home care would promote independent and community living, disease management and achievement of health tasks without the need for hospitalization and/or institutionalization (Kozyrskyj et al., 2004). The need for increased home care and community-based services for seniors with mental illnesses is repeatedly echoed in the literature (Kozyrskyj et al., 2004; MacCourt, 2004; Menec et al., 2004).

Geriatric psychiatry day hospitals. Geriatric psychiatry day hospitals are another important service that can help fulfill the goal of keeping seniors with mental illnesses out of hospital (Chiu, Lam, Lee, Lin, & Wong, 2009). However, they too, are often limited in number, and in the services they provide, or they are just not available at all (Mackenzie et al., 2006).

Community supports/programs. The availability of supportive community program teams influence appropriate use of acute hospital services. For example, Assertive Community Treatment (ACT) teams are community based teams whose primary goal is to promote and support patients with mental illness living in the community (Assertive Community Treatment

Association, 2010). Such community teams focus on mental health, supportive housing, psycho-geriatric assessment services and case management that help keep seniors with mental illnesses functioning optimally in the community, avoid stigma and prevent hospitalization. Unfortunately, there are often insufficient ACT teams to meet the needs of this growing population (Hugo et al., 2002; Malone et al., 2007; Mausbach et al., 2008; Puamau, 2006; Robbins et al., 2000).

Professional practices of health clinicians. Clinicians' professional practice is influenced by workload and resources, educational preparation and attitude, all of which influence service use for seniors with mental illnesses. In Andersen's model, these influences are key components of the enabling variable of accessibility and availability.

Health care clinicians are generally the major decision makers for what services seniors with mental illnesses are given access to, when those services exist. The professional practice and behaviours of health care clinicians are therefore important considerations in understanding acute care hospital service use by mentally-ill seniors (Rogers & Barush, 2000). Sadly, in the provision of care for seniors with mental illnesses professional practice is often substandard (Brown, Nolan, & Davies, 2008; Burroughs et al., 2006; Cook, Marshall, Masci, & Coyne, 2007; Hancock et al., 2003; Higgins et al., 2007; Norvedt et al., 2008), and fraught with ageist attitudes (Adelman et al., 2007; Courtney, Tong, & Walsh, 2000; Chua, Tan, Merchant, & Soiza, 2008; Higgins et al., 2007; Mackenzie, Scott, Mather, & Sareen, 2008; Oliver, 2004; Sadovoy et al., 2004; Solomons, 2002; Wen et al., 2007), high workloads (Beck & Thomson, 2006; Chappell et al., 2003; Higgins et al., 2007; Hinton et al., 2007; Lai & Chau, 2007; McCusker et al., 2007; McGee et al., 2004; Rogers & Barush, 2000; Rosemann et al., 2006; Van Eijken et al., 2008; Wen et al., 2007), limited resources (Crabb & Hunsley, 2006; Klap et al., 2003; Mackenzie et al.,

2006; McGee et al., 2004; Orell, Scurfield, Cloke & Renshaw, 2000; Sadovoy et al., 2004), lack of psycho-geriatric knowledge and skills (Adelman et al., 2007; Brown, Nolan, Davies, Nolan & Keady, 2008; Burroughs et al, 2006; Chua et al., 2008; Cook et al., 2007; Courtney et al., 2000; Crabb & Hunsley, 2006; Dahlke & Phinney, 2008; Fessey, 2007; Haddad et al., 2005; Hinton et al., 2007; McKinlay & Cowan, 2003; Mellor, Chew, & Greenhill, 2007; Nolan, 2007; Rosemann et al., 2006; Sadovoy et al., 2004; van Eijken et al., 2008; Yaffe, Orzeck, & Barylak, 2008) and failure to understand the specific needs of seniors with mental illnesses (Crabb & Hunsley, 2006; Marwaha & Livingston, 2002; Palinkas et al., 2007; Sadovoy et al., 2004).

The qualities of clinicians' professional practices significantly impact acute care hospital use for seniors with mental illnesses. Substandard practices, attitudes, lack of competency and education often lead to a missed diagnosis and inadequate treatment (Adelman et al., 2007; CMHA, 2005; Conn, 2002; Cook et al., 2007; Coyne & Katz, 2001; Crabb & Hunsley, 2006; Hinton et al., 2007; McCarthy, 2003; Sternberg et al., 2000; Solomons, 2002; Wen et al., 2007), lack of and inappropriate referrals (Collins, Katona, & Orrell, 1997; Coyne & Katz, 2001; Crabb & Hunsley, 2006; Fernando et al., 2010; Flint, 1997; Klap et al., 2003; Wen et al., 2007), prolonged hospital stays and increased re/admissions (CMHA, 2005; Conn, 2002; Crabb & Hunsley, 2006; De Coster et al., 2004; Frank, 2002; Kirby, 2006; Kisely et al., 2007; Klap et al., 2003; McGee et al., 2004; Mackenzie et al., 2006; Melby & Ryan, 2005; Oliver, 2004; Orell et al., 2000; Qualls, Segal, Norman, Niederehe & Gallagher-Thompson, 2002; Rogers & Barush, 2000; Sadovoy et al., 2004).

There is some evidence that attitudes towards seniors with mental illnesses are slowly improving (Byles et al., 2002; Haddad et al., 2005; McKinlay & Cowan, 2003; Mellor et al., 2007; Ryan & McCauley, 2004; Wetzels et al., 2004). Research has shown that practitioners with

some advanced psychiatry or gerontology academic preparation are better able to understand seniors with mental illnesses, have more positive attitudes and are more likely to coordinate care efficiently to address the hospitalization needs of seniors with mental illnesses (Scherer, Bruce, Montgomery, & Ball, 2008). Fostering enriched learning environments and making adjustments to academic curricula to raise awareness of and develop strategies to reduce ageism facilitates the development of more positive attitudes towards seniors (Brown et al., 2008; Happell, Robins, & Gough, 2008). Professionals' attitudes impact significantly how seniors with mental illnesses utilize health care services. Knowing the influence that accessibility and availability of health care services have on mentally-ill seniors' use of acute hospitals is important if services are to be improved.

Need variables. Most need variables outlined in the Andersen Behavioural Model of Health Services Utilization predict acute care hospital stays and rate of admission for seniors with mental illnesses. These variables include the mental illness diagnosis itself, perceived societal stigma, attitudes, values and beliefs of health care professionals and perceived self-rated health; and all significantly impact how seniors with mental illnesses use acute care in-patient hospital services (Dunlop et al., 2000; Finkelstein, 2001; Hamid, 2002; Lai, 2004; McCusker et al., 2000; McCusker et al., 2006; Nabalamba & Millar, 2007; Reid et al., 2003; Roos et al., 2003; Rotermann, 2006; Sadovoy et al., 2004; Solomons, 2002; Tranmer et al., 2003, Walter-Ginzburg et al., 2001; Wen et al., 2007). Mental illness was the only need variable included in this study. As mental illness is a core focus of this study, the reciprocal relationship between mental illness and acute hospital use for seniors was important to explore in-depth.

The Reciprocal Relationship

According to Andersen's conceptual model of service use the specific mental illness diagnosis constitutes a need variable. While mental illness prolongs a senior's hospitalization (Health Canada, 2002, Health Canada, 2006; Hunt, Weber, Showstack, Colby, & Callaham, 2006; Jacobs, Dewa & Bland, 2006; Jacobs et al., 2008), hospitalization itself, ironically precipitates or exacerbates a mental illness in seniors (Arend & Christensen, 2009; Saravay et al., 2004). In this section, I review the empirical literature on the relationship between mental illness in seniors and the use of acute care hospital services.

The impact of mental illness on hospitalization. The underlying physiological processes and symptomology of mental illnesses contribute to a series of events that increase a senior's risk for hospitalization. These underlying manifestations of a mental illness increase hospital stay, emergency room wait time, rate of admission/readmission, resource intensity weight and cost. Mental illnesses may trigger hospitalization through manifestations of physical illness, presentation of the mental illness itself, and/or the challenges of medication compliance.

Physical illnesses. Mental health directly affects a senior's physical health and vice versa (Health Canada, 2006). Mental illnesses involve bio-chemical changes that affect many normal bodily functions. For example, the neurotransmitters of dopamine, acetylcholine and serotonin that are involved in the manifestation of mental illnesses play a key role in cardiac function (Lychkova, 2004), sleep (Ursan, 2002) and movement (Korchounov, Meyer, & Krasnianski, 2010). As a result, any alteration in these neurotransmitters impacts other bodily processes that may prompt the necessity for acute care hospital services. In addition, mental illness increases the risk of developing physical problems because people who are mentally-ill sometimes make unhealthy food choices, and engage in risky lifestyle behaviours such as smoking and drinking.

Therefore, illnesses such as diabetes, heart disease, weight gain or loss, gastrointestinal problems, reductions in immune system efficiency, and blood biochemical imbalances, increasingly occur and further prompt the senior to use acute hospital services (Raedler, 2010; Vogelzangs et al., 2010).

Likewise, physical illnesses often lead to or exacerbate mental illnesses, as they decrease or impair seniors' normal physiological functions (U.S. Public Health Service, 2000) and/or the ability to care for themselves and rally social support. People with physical health problems often experience anxiety or depression to the extent that it hampers their recovery. Depression, for example, causes older adults to be apathetic and unwilling to care for their physical needs, which prolongs their recovery period (Holzapfel et al., 2009). Physically, seniors with mental illnesses are less able to engage in activities they previously mastered, resulting in lower confidence and self-esteem. In addition, signs and symptoms of mental illness that include paranoia, agitation, anxiety and disruptive behaviours (Saravay et al., 2004) further impair motivation and has anti-therapeutic effects on one's recovery or willingness to seek help (Olfsen, Marcus, Wilk, & West, 2006).

Presentation of mental illness. Seniors with mental illnesses often present differently to health care professionals than do younger cohorts. This makes it difficult for health professionals to assess and diagnose mental illnesses in seniors. When somatic and hypochondriac complaints are made by seniors, they are interpreted as inappropriate attention-seeking behaviours, masking mental health complaints and symptoms, and make the assessment and diagnostic process more difficult than it is already (Shahpesandy, 2005). In particular, signs and symptoms of depression often confound those of physical illness (Balsis & Cully, 2008; Shahpesandy, 2005). For other reasons such as fear, stigma and being ostracized by family and friends (Ballard, 2010; CMHA,

2005; Cochrane et al., 2000; Hamid, 2002; Rogers & Barush, 2000; Sadovoy et al., 2004; Whalen, 2007; Wrigley et al., 2005), seniors try to mask their psychiatric symptoms and/or are hesitant to talk openly about them. Hence, the delay and/or missed treatment not only increases morbidity, mortality and disability of seniors; it also increases their risk of institutionalization, hospitalization, and hospital stay (Carriere et al., 2004; CIHI, 2008b; Crabb & Hunsley, 2006; Frasure-Smith et al., 2000; Frise et al., 2002; Madi et al., 2007; Patrick et al., 2001; Starkes et al., 2005; Tranmer et al., 2003).

Lack of compliance to treatment. A third reason seniors with mental illnesses experience an increased use of hospital services is because many are non-compliant with treatment regimes, particularly medication usage. Seniors, who are already experiencing increased rates of co-morbid illnesses as a result of aging, often consume many medications. In Canada, seniors consume 40% of all prescribed medications (Holloway, 2001), of which 50% are not taken properly (Center for Addictions and Mental Health [CAMH], 2006). Poor cognitive status in seniors is a high predictor of both under-adherence (30.6%) and over-adherence (18.4%) to medication regimes (Gray, Mahoney, & Blough, 2001). Mental illness adds to the already growing list of co-morbid illnesses for seniors, however, medication compliance is pivotal for people who suffer with mental illness (Sewitch, Cole, McCusker, Ciampi, & Dyachenko, 2008; Zivin, Ratliff, Heisler, & Langa, & Piette, 2010). Therefore, compliance with psychiatric medications impacts how frequently seniors get admitted to hospital and for how long. Many factors contribute to high levels of non-compliance in seniors with mental illness; among these are adverse effects of the medications, physiologically impaired functioning, and pharmaco-kinetics which slow the body's processing of medications.

Medication non-compliance among seniors occurs as either an underuse or overuse of medications; not taking medications when they are due or not taking the full prescribed dosage, or taking medications more frequently or taking higher dosages medications than prescribed. Both under- and over-usage of medication impact seniors' utilization of hospital services. For the non-compliant senior, the physical illness and/or mental illness may become exacerbated which further compromises their overall mental health. The absence of the therapeutic effect of medications may cloud seniors' cognitive processes and produce difficulty concentrating and processing of information even more, such that they fail to see the significance of seeking help.

For the senior who is over-medicated, limited mobility, clouded judgment, and fatigue may challenge their motivation to keep appointments and/or follow treatment plans. This prolongs their hospital stay (Ingold et al., 2000) and results in more frequent re/admissions (Vik et al., 2006), and additional costs for the public and private health care sectors (Health Canada, 2002).

Adverse medication effects. Anti-psychotics, antidepressants and cognitive enhancers are instrumental in restoring the chemical imbalance and normalizing the senior's level of functioning. Unfortunately, the valued medications that keep individuals mentally stable and out of hospital, have negative side effects and non-compliance with their use is a widely recognized problem (Prukkanone, Vos, Burgess, Chaiyakunapruk, & Bertram, 2010), particularly in seniors (Haw & Stubbs, 2010; Sewitch et al., 2008). Use of atypical antipsychotics for example, causes significant weight gain (Case, Treuer, Karagianis, & Hoffman, 2010; Nasrallah, 2003), increases risk for falls (Lavsa, Fabian, Saul, Corman, & Coley, 2010), and stroke (Sachetti et al., 2008). The side effect of weight gain, in particular, precipitates other affiliated health issues such as

diabetes, cardiac disease and cardiovascular disease (Raedler, 2010); thus increasing the need for acute hospital services.

In addition, some psychiatric medications precipitate other mental illnesses. For example, anticonvulsants that are often used as mood stabilizers to decrease impulsivity in people with bi-polar illness and borderline personality disorders, may worsen their depression and precipitate suicidal ideations (Arana, Wentworth, Ayuso-Mateos, & Arellano, 2010). In addition, the adverse effects of antidepressants such as urinary retention, gastrointestinal upset, and agitation result in hospital stays which are 7.5 days longer than average (Draper & Luscombe, 1998).

Non-psychiatric medications may also precipitate mental illnesses. Medications used for cardiac conditions and hypertension create characteristic side effects of depression and anxiety (Huffman & Stern, 2007) that impact seniors' use of acute hospital services. Medication side effects and drug interactions have been reported to be higher in the elderly compared to younger patients, and hence contribute to a longer hospital stay (Kristensson, Modig, Midlöv, Hallberg, & Jakobsson, 2010).

Impaired functioning. When seniors with mental illnesses are non-compliant with their medications, as often occurs (Sewitch et al., 2008), their overall functioning becomes even more impaired mentally. So extreme does the subsequent impairment become, that it sometimes results in paranoia and obstructed judgement to the extent to which individuals fail to see the benefit of taking medications (Stoehr et al., 2008).

Pharmaco-kinetics. The pharmaco-kinetics of psychiatric medications also creates an issue for seniors. For older adults, who normally experience slowed bodily processes, drugs are absorbed, metabolized and eliminated more slowly, which prolongs medicinal effects and/or creates toxicity. The longer half-life of psychiatric medications for seniors results in lengthening

hospital stays. The pharmacological down-regulation of antidepressants, for example, is very time-consuming; and typically takes four to six weeks to reach therapeutic effectiveness (Mason & Pariante, 2006).

The impact of hospitalization on mental illness. Hospitalization may exert a negative influence on the development or exacerbation of mental illnesses. Hospitalization of seniors not only promotes recovery, intervention and healing; but paradoxically may compromise overall health physiologically (De Coster et al., 2004) and mentally, either by initiating a mental illness (Arend & Christensen, 2009; Saravay et al., 2004), or exacerbating an existing mental illness (Braden et al., 2008; Chen et al., 2006; Greene et al., 2001; Sayers et al., 2007).

The management of seniors in acute-care hospitals in Canada has long been a concern (Fisher, 2003). While hospitalization is beneficial for stabilizing illnesses, it is often identified as a sentinel event for seniors (De Coster et al., 2004; Parke & Stevenson, 1999). A sentinel event is an unexpected occurrence involving increased risk of, or death from, serious physical or psychological injury while one is hospitalized (Joint commission on Accreditation of Healthcare Organizations, 2011). Hospitalization and/or repeated admissions and lengthy stays symbolize a loss of independence for seniors (Kozyrskyj et al., 2004; Miller & Weissert, 2000), challenges their emotional well-being as bodily function decline (Kozyrskyj et al., 2004), and create frustration and discouragement (Kozyrskyj et al., 2004); all of which challenge their mental health. Loss of function increases a senior's incidence of adverse events, falls, and iatrogenic complications (Kozyrskyj et al, 2004). The confusion that occurs as a result of urinary tract infections, metabolic disturbances (Hendrickx et al., 2005), septicaemia, vitamin deficiencies (Wilkins et al., 2006), dehydration, medication side effects/interactions and anaesthetics post-operatively manifest themselves to the point of precipitating a delirium in the patient (Potter &

George, 2006). Further, the busy, fast-paced, confusing atmosphere and structural inadequacies that are often found in acute care in-patient settings also impact a senior's mental health (Kozyrskyj et al., 2004; Nolan, 2007) and are generally non-conducive to the needs of seniors (Kihlgren et al., 2006), so much so that the health care environment itself infringes on their quality of life (Siddiqi et al., 2007).

Summary of Predicting Variables

In summary, there are many predictors such as predisposing, enabling and need variables outlined by the Andersen model of health services utilization that potentially impact seniors' acute care hospital use. Service gaps, in particular, influence seniors with mental illnesses and other seniors' use of in-patient acute care hospital services that result in increased hospital stays and high admission rates. Organizational bureaucracies, inadequate community supports or insufficiencies in professional practice and discharge procedures all influence the extent to which seniors with mental illnesses and other seniors use acute care in-patient hospital services. Furthermore, these service gaps highlight the importance of accurately assessing, identifying and treating mental illness in seniors in a timely, comprehensive and effective manner.

Andersen's conceptual model of health service use provides the framework, along with an exhaustive listing and clearly defined variables, to help structure health services research. By any measure, there are still obviously many predictors to be identified, barriers to surmount and issues to be resolved for seniors with mental illnesses and other seniors so they may access and efficiently use in-patient acute care hospital services when needed. As identified by previous research in this area, there are many issues associated with the in-patient hospital services that seniors with mental illnesses receive. However, there persist many gaps in our understanding of how seniors with mental illnesses use acute hospital services. This research study aimed to

address some of these gaps by examining data at an aggregate population level and in a manner that was rigorous, complete, and inclusive.

Chapter 3: Method

Research Design

A descriptive-comparative research design was used for this study. There were five key reasons why this type of research design was considered to be most appropriate for a quantitative study on how seniors with mental illnesses compared to seniors without mental illnesses in how they used and the variables that influenced their use of acute care in-patient hospital services.

First, this study had a very specific focus on the topic of how seniors use acute hospital in-patient services. The purpose of the descriptive-comparative research design is to describe concepts or variables, identify possible relationships and describe differences among groups (Burns & Grove, 1999). Therefore, this design facilitated the achievement of the descriptive goals of this study.

Second, the aim of this study was to compare two groups of seniors; those with and without mental illnesses, for how they compared in their use of, and the factors that influenced their use of acute care hospital in-patient services. This comparative component of the descriptive-comparative design seemed most beneficial, as these two groups of seniors were compared on the variables of length of stay, acute length of stay, emergency room wait time, rates of re/admission to hospital, resource intensity weight and hospital costs.

Third, descriptive research increases and illuminates knowledge that might not otherwise have been noticed or even encountered (Knupfer & McLellan, 2001). Although there existed no clear consensus on whether seniors with mental illnesses were or were not high users of acute hospital in-patient services, this study helped to describe and highlight the actual trends of use for seniors with mental illnesses. By including all seniors aged 65 and older, and including all mental illness codes, and by reporting on key contributing variables, this study is able to report acute care hospital service use with a great deal of confidence.

Fourth, the research design provided for a rich description of the issue and affiliated relationships being studied (Knupfer & McLellan, 2001). The description obtained from the data analysis helped to enrich understanding of the relationships that impact and exist among seniors, mental illness and health service use. The results of this study enhanced awareness of and understanding for all key stakeholders involved in providing health care/services for seniors in general and for seniors with mental illnesses, in particular, and has hopefully clarified usage trends.

Finally, descriptive research helps highlight or yield information that leads to important recommendations (Knupfer & McLellan, 2001). Given the recognition that rising health care costs are occurring at varying levels of government and society, and the belief that seniors with mental illnesses are one of the biggest liabilities, this study was of utmost value. Further, the investigation of the variables of age, gender, geography, co-morbidities, mental illnesses, re/admission variables, discharge destination, referring institution and discharge disposition all provided valuable information. This information should help health care administrators and government officials develop, tailor, enhance and implement amenable policies, services and programs to best address the needs of seniors with mental illnesses in a manner that is appropriate, fiscally responsible, and effective.

Challenges of the Design

1. Descriptive research can be misused by those who do not understand its purpose and limitations (Knupfer & McLellan, 2001). For example, the design cannot be used to determine a cause and effect relationship between seniors' use of acute hospital in-patient services and the factors impacting that use.

Operational Definitions

1. Length of stay (LOS) - the total number of days the patient was hospitalized (NLCHI, 2005), from the time of admission to the time of discharge (CIHI, 2005).
2. Acute length of stay (ALOS) - the total number of days contributing to the acute portion of the patient's hospitalization (NLCHI, 2005).
3. Discharge disposition- reflects the status of the patients separated (discharged) from the healthcare facility and includes one of the following: Transferred to inpatient; Transferred to continuing care; Transferred to other institution; Discharged home with support (Homecare); Discharged home; Signed out; Died; Cadaveric Donor admitted for organ retrieval; Stillbirth (CIHI, 2004).
4. Discharge destination- facility or hospital to which the patient was transferred (NLCHI, 2005).
5. Referring institution- facility or hospital from which the patient was transferred (NLCHI, 2005).
6. Hospital separation- reflects rate of admission (ROA) to hospital and is defined as the departure of an inpatient from hospital, due to either discharge or death (CIHI, 2006).
7. Resource intensity weight (RIW) - an indicator representing the relative resources used by a patient, it reflects relative values that describe the expected resource consumption of an "average" patient (CIHI, 2008d).
8. Costs- with the assistance of Dr. John Knight, Senior Epidemiologist with NLCHI, using the method suggested by CIHI (CIHI, 2008d), the costs per hospital stays were determined by multiplying the resource intensity weights provided for each hospital stay by the cost per weighted case value for NL.

9. Mental illness- patients with one or more ICD-10 codes for a mental illness diagnosis on discharge were deemed to have a mental illness. If no such codes were assigned at discharge, they were deemed to not have a mental illness.

Procedure

This proposed descriptive-comparative retrospective study involved the analysis of quantitative data. The data from this study defined two groups of seniors, those with and those without a mental illness code. Those with a mental illness had ICD-10 codes for mental illnesses entered upon their separation or discharge from hospital.

The independent variables considered in this study were age, gender, geography of residence, geography of facility, referring institution, discharge destination, discharge disposition, admission code, readmission code, entry code, all mental illness diagnoses and all medical co-morbid illnesses. These variables were considered in relation to the Andersen model of health service utilization using the categories of predisposing, enabling and need variables. The dependent variables in this study were length of stay, acute length of stay, rate of admission, resource intensity weight, hospital cost and emergency room waiting time.

The data in this study were aggregate population level data from the 2008-2009 NLCHI databases. Data for all people aged 65 years and older, who were admitted to an acute care hospital in the province of Newfoundland and Labrador, were obtained and analyzed. The statistical analysis of these variables using SPSS 15.0 ®, helped to determine the trends of acute care hospital use by seniors with and without mental illnesses, and the relationships and/or comparisons for all variables. These statistical tests explained how the independent variables of age, geography of residence, mental illness diagnosis, co-morbidities, gender, discharge destination, referring institution, discharge disposition related to and/or impacted the dependent

variables of length of stay, acute length of stay, rate of admission, emergency room wait time, resource intensity weight and overall hospital costs.

This research study helped to answer two research questions. First, "How do seniors with mental illness codes compare to seniors without mental illness codes in their length of stay, acute length of stay, emergency waiting time, rate of admission, resource intensity weight and total hospital cost?" And second, "What is the influence of age, gender, geography of residence, mental illness diagnoses, medical co-morbidities, referring institution, discharge destination, admission code, readmission code, entry code and discharge disposition on length of stay, acute length of stay, emergency room waiting time, rate of re/admission, resource intensity weight and hospital cost for both seniors with and without mental illness codes?"

It was hypothesized that in Newfoundland and Labrador seniors with mental illnesses experience a greater length of stay, acute length of stay, rate of admission, emergency room wait time, resource intensity weight and total hospital cost in an acute hospital than do seniors without a mental illness. It was further hypothesized that one or many of the independent variables (age, geography of residence, mental illness diagnosis, co-morbidities, gender, admission code, readmission code, entry code, discharge destination, referring institution, discharge disposition) significantly impact length of stay, acute length of stay, rate of admission, emergency room waiting time, resource intensity weight and total hospital cost. Ethical approval was obtained from both the Human Investigation Committee in Newfoundland and Labrador, and the Alberta Health Research Ethics Board before this research study began.

Participants

Inclusion criteria for this study ensured that all eligible participants in the CDMS database housed by NLCHI were included. Eligibility criteria included participants 1.were

permanent residents of Newfoundland and Labrador; 2. were 65 years of age and older; 3. had experienced an admission to one of the province's acute care hospitals between April 1, 2008 and March 31, 2009. The cases in this database were then divided into two groups on the basis of whether or not patients had an ICD-10 code for a mental illness as one of their discharge diagnoses. The first group were seniors who had no ICD-10 code for mental illness as one of their diagnoses entered on their hospital chart on separation from hospital, while the second group of seniors had at least one ICD-10 code for a mental illness as one of their diagnoses on separation or discharge from hospital.

The ICD-10 codes for mental illnesses included in this study were: organic mental disorder (F00- F09 inclusive); substance abuse disorder (F10-F19); schizophrenia, schizotypal and delusional disorders (F20-F29); mood/affective disorders (F30- F39); neurotic, stress related and somatoform disorders (F40-F48); behavioural syndromes associated with physiological disturbances and physical factors, such as eating disorders of anorexia nervosa, pica, etc.(F50-F59); disorders of adult personality and behaviour (F60- F69); mental retardation (F70-F79), or an unspecified mental disorder (F99) (World Health Organization [WHO], 2011). All of these ICD-10 codes for mental illnesses were selected to ensure complete coverage of all possible mental illnesses that seniors manifest. Cases excluded from this study were F80- F89 and F90-F98 because they pertain only to childhood development and behaviours. This sample obtained was representative of seniors with and without mental illnesses who used the province's acute care hospitals. For each case, all of the discharge diagnoses were obtained from the NLCHI database.

Setting

The setting for this study was the Canadian province of Newfoundland and Labrador. It has a population of approximately 509,700, and as previously stated one of the most rapidly aging populations in Canada (Statistics Canada, 2009). Data was retrieved from the NLCHI main office, located at 30 Pippy Place, St. John's, Newfoundland.

Data Collection

The primary source of data was the NLCHI's hospital discharge abstract database from the *Clinical Database Management System* (CDMS). The NLCHI is the provincial gate-keeper of all hospital data accrued by acute care hospitals in the province of Newfoundland and Labrador, and collates various reports to reflect the numerous societal and statistical trends in health care. It collaborates with Newfoundland and Labrador's regional health authorities to ensure quality health information is available for health care, system-wide planning, research, and policy development, and further shares this information and data with the Canadian Institute for Health Information (NLCHI, 2005).

In addition, a secondary analysis of the NLCHI data was completed. The Discharge Abstract Database from the CDMS contains aggregate level hospital data collected on all acute care patients admitted to the province's acute care hospitals (NLCHI, 2007). From the quantitative data collected there were six ratio-level dependent variables of interest. These included length of stay, acute length of stay, rate of re/admission, emergency room wait time, resource intensity weight and total hospital costs. From the hospital discharge abstracts of the CDMS database, total length of stay was identified by two measures, length of stay and acute length of stay. It was vital to capture both of these measures because a patient medically discharged and awaiting placement to a long term care facility still occupied an acute care

hospital bed. The third dependent variable of interest was rate of re/admission. Although no one CDMS database measure identified the rate of admission, hospital separations are used frequently to reflect this measure. Admissions and readmissions are chronologically arranged in the CDMS database and were therefore tabulated from this dataset. The fourth dependent variable was resource intensity weight. This variable reflects the relative cost associated with a person's hospital stay. The fifth dependent variable was emergency room wait time and reflects the amount of time spent in the emergency room while waiting admission to hospital. The sixth and final dependent variable was total hospital cost, which represents the total cost per weighted case or the dollar value associated with one's hospital stay.

Many independent variables were also obtained from the CDMS database. These variables were all nominal in nature with the exception of age, which was a ratio level. The independent variables included gender, age, geography of residence, discharge destination, referring institution, discharge disposition, entry code, readmission code, admission code and ICD-10 diagnoses codes (to reflect mental illness and other co-morbidities). It was hypothesized that these variables affected seniors' length of stay, acute length of stay, rate of admission, emergency wait time, resource intensity weight and total hospital cost. The primary diagnoses codes assessed were the ICD-10 codes that represented a mental illness (F00-F79 with the exception of F80-F98). To ensure completeness and to capture any other co-morbidity, all diagnoses were obtained for analysis, and again, the appropriate ICD-10 codes for them were recorded. This analysis also captured psychiatric co-morbidities. Primarily, the presence of a mental illness differentiated the population of seniors into two groups; those with an ICD-10 diagnosis code for a mental illness as one of their discharge diagnoses and those without an ICD-10 diagnosis code for a mental illness.

Data Analysis

The quantitative data analysis proceeded from univariate descriptive to bivariate analyses. The statistical tests used depended on the level of data analyzed. Both nominal and ratio levels of measurement were obtained from the quantitative data set of this research study.

Defining the Population under Study

Univariate statistics. To describe the population of this study, univariate descriptive statistics were used. For both dependent and independent variables that were either ratio or nominal levels of measurement, numerous descriptive and variability tests were used (Table 1).

Variable	Level	Descriptive Statistic	Variability
Age	Ratio	Mean, median, mode	Range, standard deviation, skewness/kurtosis
Length of Stay	Ratio	Mean, median, mode	Range, standard deviation, skewness/kurtosis
Rate of Admission	Ratio	Mean, median, mode	Range, standard deviation, skewness/kurtosis
Resource Intensity Weight Hospital Costs ER waiting time	Ratio	Mean, median, mode	Range, standard deviation, skewness/kurtosis
Mental Illness Diagnosis	Nominal	Frequency	
Discharge destination	Nominal	Frequency	
Gender	Nominal	Frequency	
Geography of residence	Nominal	Frequency	
Co-morbidities	Nominal	Frequency	
Discharge Disposition	Nominal	Frequency	
Referring institution	Nominal	Frequency	

Table 1- Univariate Statistics Proposed

Bivariate statistics. To determine the relationship between or comparison of various dependent and independent variables for the population of this study, bivariate statistical tests were used. These statistical tests analyzed the relationships between the independent and dependent variables so that conclusions or inferences could be made. In particular, two types of bivariate statistical tests were used; parametric and non-parametric tests.

Parametric tests. The parametric tests were applied to variables that had a ratio level of measurement (Table 2). T-tests helped to best answer the research question: How do seniors with mental illnesses compare to seniors without a mental illness in their length of stay, acute length of stay, emergency waiting time, rate of admission, resource intensity weight and total hospital cost?"

Tests of Pearson's correlation assessed for the magnitude and direction of relationships between the ratio level variables of age, length of stay, acute length of stay, emergency wait time, rate of re/admission, resource intensity weight and total hospital costs.

Multiple linear regressions were performed to determine the linear relationship between one dependent variable and two or more independent variables (Stevens, 2009). In this study, multiple linear regressions were used to determine the linearity and predictability of the relationship between each of the dependent variables of length of stay, acute length of stay, emergency wait time, rate of re/admission, resource intensity weight and hospital costs with the independent variables of age, gender, geography, mental illnesses, admission code, entry code, readmission code, co-morbid illnesses, discharge destination, referring institution and discharge disposition.

The Charleson Co-morbidity Index was also used in this study. The use of this index adjusted for co-morbid illnesses (Lu, Barratt, Vitry, & Roughhead, 2011) and determined the

predictive influence, if any, that a diagnosis of mental illness actually had on the use of acute hospital services by seniors when other co-morbid illnesses were controlled for.

Non-parametric tests. Non-parametric tests were applied to the many independent variables which were nominal in nature (Table 2). These non-parametric tests occurred as Chi-square tests for each of the nominal independent variables of gender, discharge destination, referring institution, geography of residence, geography of facility, admission code, entry code, readmission code, discharge disposition, medical co-morbidities, and mental illness diagnostic codes. Tests of Spearman's correlation were used to measure the magnitude and direction of these relationships. This was comparable to the tests of correlation for parametric statistics; however the results were obtained by applying the bivariate test of Phi's coefficient or Cramer's V. Cramer's V measures the strength of association or dependency between two categorical or nominal variables (Daniel, 1995). These tests helped to answer the research question: "What is the influence of age, gender, geography of residence, mental illness diagnoses, medical co-morbidities, referring institution, discharge destination, admission code, readmission code, entry code and discharge disposition on length of stay, acute length of stay, emergency room waiting time, rate of re/admission, resource intensity weight and hospital cost for both seniors with and without a mental illness?"

Variables	Level	Statistical Test	Meaning of findings
Age, Rate of admission	Ratio, Ratio	Pearson's correlation	Relationship
Age, Length of stay	Ratio, Ratio	Pearson's correlation	Relationship
Age, Acute length of stay	Ratio, Ratio	Pearson's correlation	Relationship
Age, Resource intensity weight	Ratio, Ratio	Pearson's correlation	Relationship
Gender, Rate of admission	Nominal, Ratio	t-test	Comparative
Gender, Length of stay	Nominal, Ratio	t-test	Comparative
Gender, Acute length of stay	Nominal, Ratio	t-test	Comparative
Gender, Resource intensity weight	Nominal, Ratio	t-test	Comparative
Geography, Rate of admission	Nominal, Ratio	t-test	Comparative
Geography, Length of stay	Nominal, Ratio	t-test	Comparative
Geography, Acute length of stay	Nominal, Ratio	t-test	Comparative

Geography, Resource intensity weight	Nominal, Ratio	t-test	Comparative
Mental Illness diagnosis, Rate of admission	Nominal, Ratio	t-test	Comparative
Mental Illness diagnosis, Length of stay	Nominal, Ratio	t-test	Comparative
Mental Illness diagnosis, Acute length of stay	Nominal, Ratio	t-test	Comparative
Mental illness diagnosis, Resource Intensity weight	Nominal, Ratio	t-test	Comparative
Referring institution, Rate of admission	Nominal, Ratio	t-test	Comparative
Referring institution, Length of stay	Nominal, Ratio	t-test	Comparative
Referring institution, Acute length of stay	Nominal, Ratio	t-test	Comparative
Referring institution, Resource intensity weight	Nominal, Ratio	t-test	Comparative
Discharge destination, Rate of admission	Nominal, Ratio	t-test	Comparative
Discharge destination, Length of stay	Nominal, Ratio	t-test	Comparative
Discharge destination, Acute length of stay	Nominal, Ratio	t-test	Comparative
Discharge destination, Resource intensity weight	Nominal, Ratio	t-test	Comparative
Discharge disposition, Rate of admission	Nominal, Ratio	t-test	Comparative
Discharge disposition, Length of stay	Nominal, Ratio	t-test	Comparative
Discharge disposition, Acute length of stay	Nominal, Ratio	t-test	Comparative
Discharge disposition, Resource intensity weight	Nominal, Ratio	t-test	Comparative
Gender, geography, mental illness diagnosis, co-morbid illness, referring institution, discharge destination, discharge disposition	Nominal, Nominal	Chi-Square test (Contingency table) Spearman's coefficient	Comparative Relationship
Gender, geography, mental illness diagnosis, co-morbid illness, referring institution, discharge destination, discharge disposition to be assessed against length of stay, acute length of stay, resource intensity weight & rate of admission	Nominal, Ratio	Multiple linear regression	Relationship
Other co-morbid illnesses with mental illness diagnoses	Nominal, Nominal	Charleson co-morbidity index	Relationship

Table 2- Bivariate Statistical Tests Proposed

All of the descriptive and comparative statistical tests as outlined above were completed through the use of the statistical software package, SPSS ®. The primary investigator has received graduate level training in SPSS ® from Memorial University's Faculty of Medicine and the University of Alberta and was well equipped to conduct the analysis.

Validity Approaches

Validity for this study was ensured through a number of ways. First, the aggregate population data was obtained from a legal and accredited agency, NLCHI, which cumulatively collects the data from all acute care hospitals across the province of Newfoundland and Labrador. Second, the sample size of this population was 12,502 subjects, which provided a great degree of power for the study and minimized the potential for extraneous effects. Given that increased statistical power of a study is most commonly obtained by increasing the size of the sample (Daniel, 1995), a sample size of 12,502 achieved this increased statistical power. Finally, the sampling of this population was non-biased. It was computer-generated, based primarily on age, and secondarily by diagnostic category, which further enhanced the validity of this study.

Ethical Considerations

Ethics approval for this research study was obtained from the Human Investigation Committee of Memorial University of Newfoundland and the Alberta Health Research Ethics Board. Furthermore, institutional approval from Eastern Health, the largest regional health authority in the province of Newfoundland and Labrador, and the NLCHI was also obtained before data collection began.

Many measures were in place to maintain the privacy and confidentiality of the organization providing the data and the information they shared. First, a statement of confidentiality from the researcher was provided to NLCHI. Second, the storage of the data and

its analysis was secured in a filing cabinet in a locked office, to which only the principal investigator had a key. Electronically, this data was housed on a computer that contained a McAfee ® Virus Scan protection program and could only be accessed through a password known only by the researcher. The graduate student assisting with this research had previously met with a senior epidemiologist of the NLCHI, Dr. John Knight, who had confirmed organizational support for the research.

Limitations

Like all other research studies, this study had limitations.

1. The data obtained from the NLCHI database was limited. As a result, not all of the variables suggested in the Anderson model were available and were retrieved for analysis.
2. This study did not describe or identify active internal efforts for treatment of concomitant physical illnesses, early exploration of placement options and offered few clues to aspects of inpatient treatment that were targeted to improve efficiency. A more detailed analysis of the processes and outcomes of inpatient care would be required to accomplish this.
3. This study did not capture those seniors who entered an emergency department seeking admission and were sent back home without being admitted to hospital.
4. Often, only the most severe forms of dementia or other mental illness got coded, therefore this cohort probably represented the more severe end of the disease spectrum.
5. The severity of the mental illness was not known.

6. Individual help-seeking behaviours of seniors with mental illnesses were not known to the researcher.
7. Reliance upon an administrative database meant that seniors presenting/admitted to hospital and diagnosed with mental illnesses were not validated by an in-person assessment.
8. Administrative data based on codes from medical record review are known to be less accurate than prospectively collected clinical data and tend to under-report chronic conditions.
9. There is a possibility for human error from medical record personnel during the coding and entry process.
10. It is not known if diagnostic assessment tools were consistently employed at various health care sites included in this study.

Item	Rationale for use	Anticipated Cost
Data	There was no cost to purchase this data as confirmed by NLCHI	$0
Stationary/supplies/cartridge	For general purposes relating to the preparation of this study	$ 200.00
Travel	Travel from NL to Alberta to defend research	$1000.00
SPSS Software	Data analysis (Personal copy of SPSS 15.0)	$0

Table 3: Research Budget

Target date	Task/responsibility
April 21, 2011	Candidacy Exam
April 21- April 30, 2011	Make any additional changes to proposal from feedback of candidacy exam members, complete ethics application & submit to both ethics boards in NL & Alberta
May 1- May 31, 2011	Ethics approval obtained & data received

June 1- June 30, 2011	Data analysis
July 1-July 31, 2011	Draft Chapter 4- Results & send out for feedback
August 1- August 30, 2011	Draft Chapter 5- Discussion & send out for feedback
September 1-September 31, 2011	Finalize chapters 4 & 5 with feedback incorporated, collate all chapters and resend to committee members

Table 4: Dissertation Timeline

Chapter Four: Results

This study investigated how seniors in the province of Newfoundland and Labrador, with and without mental illness diagnostic codes, compared in their use of acute care inpatient hospital services. To complete this investigation, a secondary analysis of an existing administrative database was done. Data was obtained from the Discharge Abstract Database at the Newfoundland and Labrador Center for Health Information for 2008-2009. It included data for all patients aged 65 years and older who were admitted to acute care hospitals/facilities in the province of Newfoundland and Labrador. Service utilization of acute care hospitals was measured using length of stay (LOS), acute length of stay (ALOS), rate of admission (ROA), ER waiting time, resource intensity weight (RIW) and hospital cost. Data for all seniors was first divided into two groups, those with and those without mental illness ICD-10 codes in at least one of their hospital admissions[1]. In addition to the presence or absence of mental illness diagnostic codes, many other independent variables were also assessed for their potential impact on acute hospital use. These independent variables were age, gender, geography of residence, hospital/facility geography, discharge disposition, referring institution, discharge destination, co-morbid illnesses, mental illnesses, entry code, admit code, readmit code, patient service and provider service.

This chapter presents the results of the data analysis in the following sections: descriptive statistics for demographic characteristics, the health economics behind seniors' length of stay, acute length of stay, resource intensity weight, rate of re/admission, ER waiting time and hospital costs; and the impact of numerous independent variables on that service use. The results presented in this chapter will help answer two main research questions; "How do seniors with mental illness codes compare to seniors without mental illness codes in their hospital length of

[1] For the purposes of these analyses seniors who had at least one mental health diagnosis in any hospital admission were categorized into the seniors with mental health illness group

stay, acute length of stay, emergency waiting time, rate of admission, resource intensity weight and total hospital cost?" and secondly, "What is the influence of age, gender, geography of residence, mental illness diagnoses, medical co-morbidities, referring institution, discharge destination, admission code, readmission code, entry code and discharge disposition on hospital length of stay, acute length of stay, emergency room waiting time, rate of re/admission, resource intensity weight and hospital cost for both seniors with and without mental illness codes?"

Descriptive Characteristics of Study Population

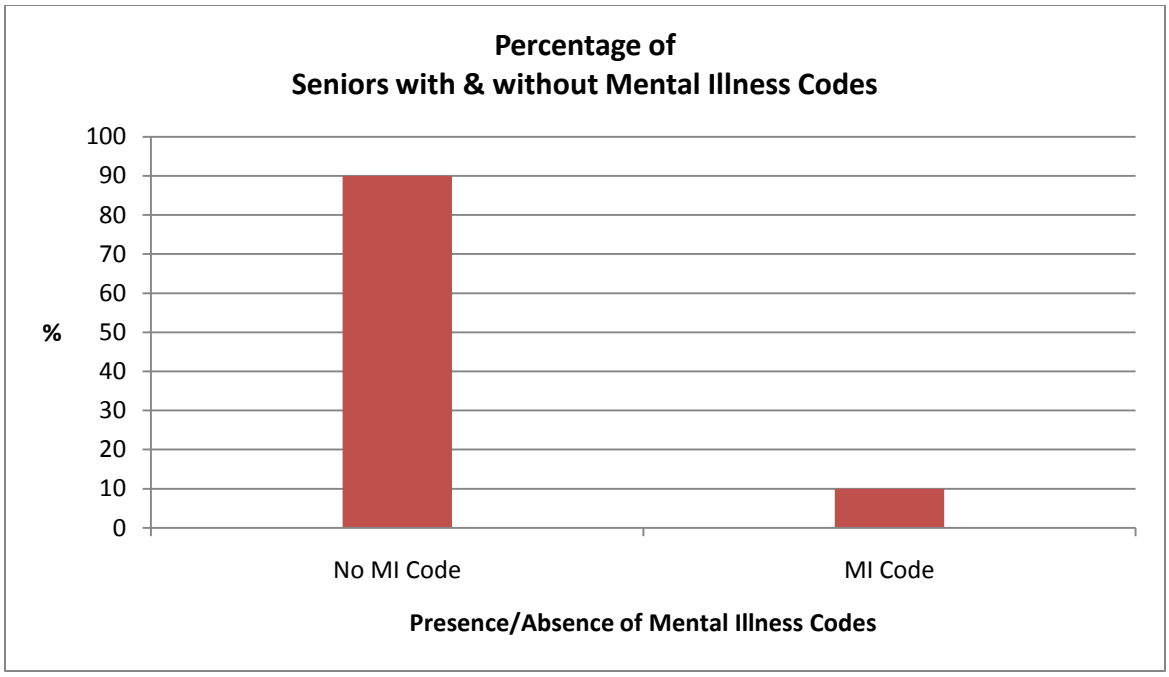
A total of 12,502 seniors were admitted to acute care hospitals/facilities in the province of NL during the year 2008-2009. These 12,502 patients had a total of 74,885 diagnoses and 19,093 admissions.

The population of seniors in this study had numerous descriptive characteristics that will help contextualize the overall findings. The average age of seniors admitted to acute care hospitals was 76.85 years (SD= 7.676) and ranged from 65-101 years old. Seniors admitted to acute care hospitals were slightly more often females (6,412; 51.3%), were more often from rural (60.9%), compared to urban (39.1%) residential settings, and used mostly urban (73.7%), as opposed to rural hospitals/facilities (26.3%). In addition, most seniors in the study population were admitted to an acute care hospital through the emergency department (67%) on an urgent basis (83.8%), as an unplanned readmission (63%), from another acute care in-patient unit (5%), and were most often discharged back to their own home (50.1%). Seniors in this study had a mean of 1.53 (SD = 1.04) admissions to an acute care hospital/facility, an average hospital stay and acute stay of 18.25 (SD = 28.18) and 14.31 (SD = 19.28) days, respectively, and a mean resource intensity weight and cost of 2.30 (SD = 4.45) and $9,817.60 (SD = 21,433.51), respectively. Further, seniors admitted to acute care hospitals were most often admitted under the

care of either a family practitioner (29.2%) or an internist (25.4%), and admitted under the patient service of general medicine (50.1%). The percentage of mental illness codes in seniors is discussed below, more specifically how seniors with and without mental illness diagnostic codes compared in their hospital service use and how other variables impacted service use.

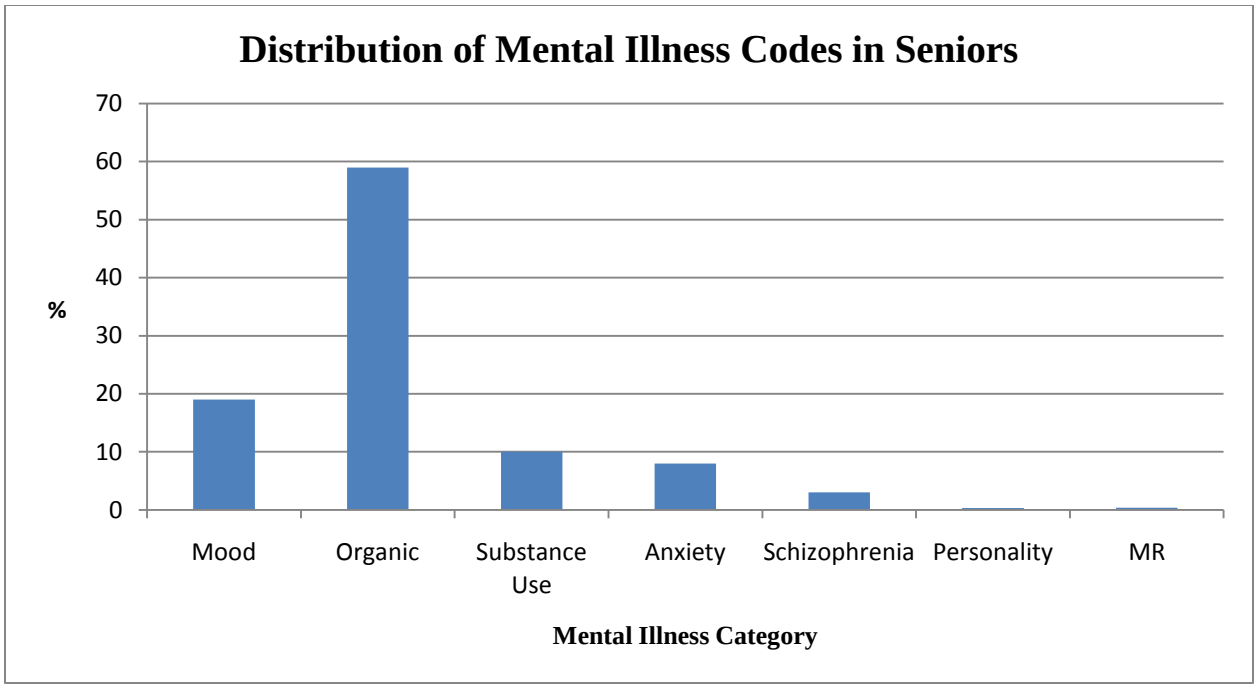
Percentage of Seniors with and without Mental Illness codes

Of the total 74,885 ICD-10 diagnoses for seniors in this study, only 1,644 (2.2%) ICD-10 codes indicated a mental illness. Overall, most or 90% (n= 11,267) of seniors did not have a mental illness diagnostic code during any of the recorded hospital stays. Only 10% (n= 1,235) of the total number of seniors (n = 12,502) had a mental illness diagnostic code (Graph 1). For the purposes of these analyses, seniors were considered to have a mental illness if they had one or more ICD-10 diagnostic code for mental illness in at least one of the recorded hospital stays during the year of analysis.



Graph 1: Percentage of seniors with and without mental illness codes

Mental illness diagnostic codes. Mental illness diagnostic codes in seniors were assessed across many dimensions. The most frequently recorded mental illness diagnostic codes in seniors included organic brain disorders (n = 970; 59%) and mood disorders (n = 307; 18.7%). These were followed by substance abuse (n =166; 10%), anxiety or stress-related disorders (n =126; 8%) and schizophrenia type disorders (n =46; 3%), personality disorders (n =9; 0.5%) and mental retardation (n =8; 0.4%) (Graph 2). Further, the top three "single" most commonly occurring mental illness diagnostic codes in seniors overall were organic disorders, including unspecified dementia (F03) (n=319), unspecified delirium (F059) (n= 187) and dementia in Alzheimer's disease (F009) (n= 142), which occurred at rates of 19.4%, 13.7% and 8.6%, respectively.



Graph 2: Distribution of mental illness diagnostic codes in seniors

Within "categories" of mental illness diagnostic codes, the occurrence of specific illnesses is important to mention. More specifically, 74% of mood disorders were for depression, dementia (58%) and delirium (38.5%) were the most common occurring organic brain disorders, and alcoholism (79%) was the most common substance use disorder.

Service utilization by seniors with and without mental illness diagnostic codes

Utilization of acute care in-patient hospital services for all seniors was explored to determine how seniors with and without mental illnesses compared in their use of acute care hospital services. In spite of the fact that only 10% of seniors had mental illness diagnostic codes, their mean LOS, ALOS, RIW, ER waiting time, number of re/admissions, and total hospital costs, for seniors with mental illness diagnostic codes were significantly greater than for seniors without mental illness diagnostic codes. Table five describes the service utilization by seniors with and without mental illness diagnostic ICD-10 codes.

Service Utilization	Seniors with Mental Illness Diagnostic Codes	Seniors without Mental Illness Diagnostic Codes	p- value
LOS (days)	42.68 (Median = 14)	15.57 (Median = 6)	$p < 0.001$
ALOS (days)	26.96 (Median = 10)	12.92 (Median = 6)	$p < 0.001$
Rate of Admission	1.74 (Median = 1)	1.50 (Median = 1)	$p < 0.001$
ER Wait Time (hours)	5.95 (Median = 2)	3.81 (Median = 2)	$p < 0.001$
RIW	4.69 (Median = 2.08)	2.04 (Median = 1.05)	$p < 0.001$
Cost (Cdn$)	$19,849 (Median = 7,454)	$8,718 (Median = 4,650)	$p < 0.001$

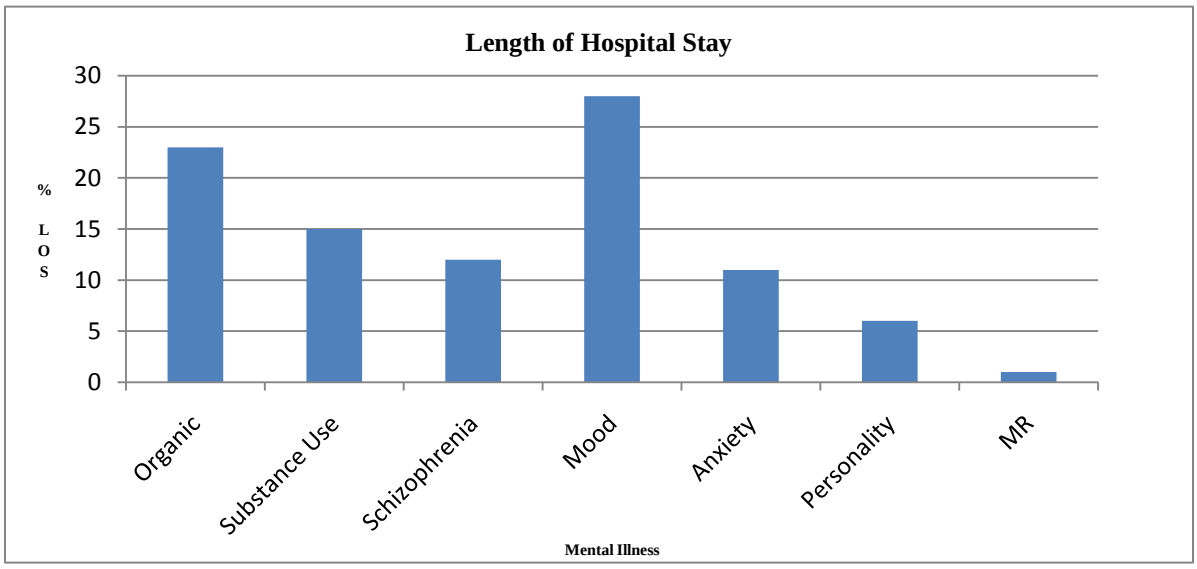
(LOS = length of stay; ALOS = acute length of stay; Rate of Admission = Number of hospital admissions; ER wait time = emergency room waiting time; RIW = Resource intensity weight; Cost = Total hospital cost using cost per weighted case)

Table 5: Outcome variables by mental health status

Total length of hospital stay. The overall total length of stay in acute care hospitals/facilities in the province of Newfoundland and Labrador was one indicator of hospital use assessed for seniors. It ranged from one day to 408 days, with a mean of 18.25 (SD= 28.18) days. Seniors admitted with mental illness diagnostic codes had a significantly longer mean hospital stay (42.68 days, SD = 46.69) compared to seniors without mental illness diagnostic codes (15.57 days, SD = 23.88) ($t = -33.493$, $p < 0.001$).

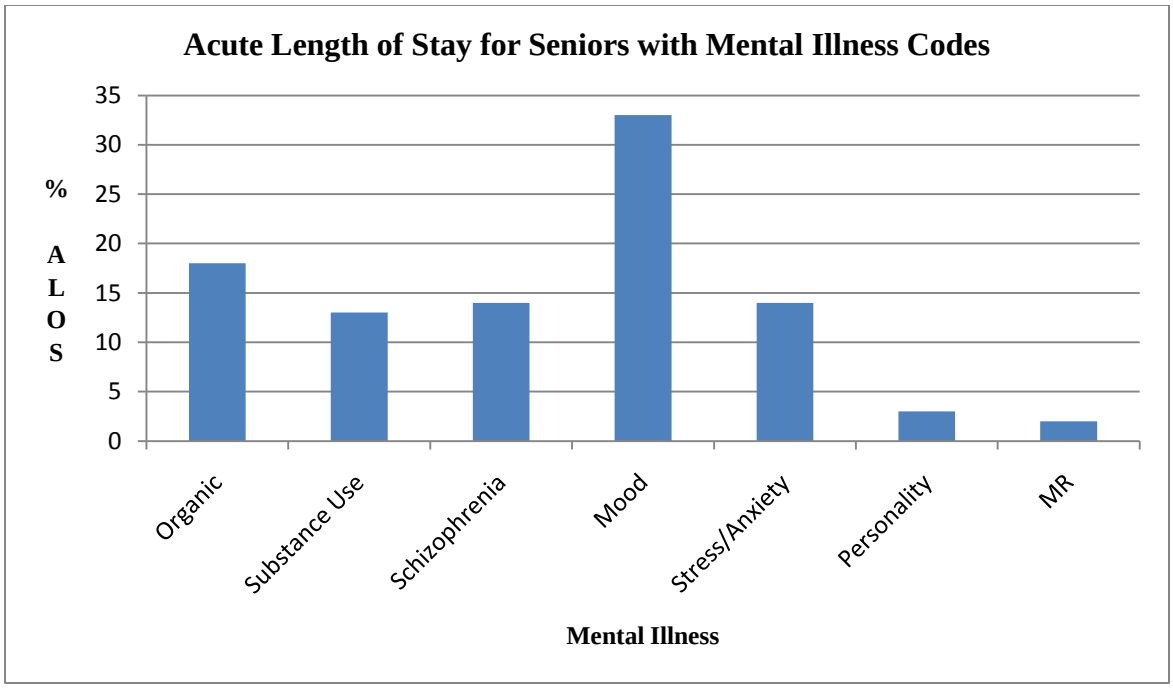
A more in-depth examination of the length of stay for specific mental illness diagnostic codes in seniors was also completed. The “single” diagnosis that had the longest hospital stay was a mental or behavioural disorder due to psychoactive substance use that precipitated a psychotic disorder. This single disorder was associated with a total hospital stay of 158 days. Mood disorders accounted for 28% (939 days) of all mental illness days. This was followed closely by organic disorders at 23% (776 days) and mental disorders due to psychoactive substance use at 15% (477 days). To a lesser extent, schizophrenia (12%; 407 days), anxiety disorders (11%; 365 days), personality disorders (6%; 207 days) and mental retardation (1.5%;

50 days), contributed to hospital stays (Graph 3).



Graph 3: Length of hospital stay for seniors with mental illness codes

Acute length of stay. The overall acute length of stay for all seniors admitted to acute care hospitals in the province of Newfoundland and Labrador ranged from one to 346 days, with a mean of 14.31 days (SD= 19.28). Seniors admitted with mental illness diagnostic codes had a significantly longer acute hospital stay (26.96 days, SD = 29.28) than did seniors without mental illness diagnostic codes (12.92 days, SD = 17.30) ($t = -24.880$, $p < 0.001$). Seniors with mood disorders had the longest acute hospital stay (33%; n = 797 days) of all mental illness diagnostic codes. This was followed by organic brain disorders (18%; n = 439 days), schizophrenia, schizotypal and delusional disorders (14%; n = 338 days), neurotic, stress-related/anxiety and somatoform disorders (14%; n = 332 days) and psychoactive substance use disorders (13%; n = 314 days). To a lesser extent seniors with personality disorders (3%; n = 80 days) and mental retardation (2%; n = 37 days) occupied acute care beds (Graph 4).



Graph 4: Acute length of stay for seniors with mental illness diagnostic codes

Rate of admissions/readmission to hospital. The overall rate of admission for all seniors admitted to acute care hospitals in the province of Newfoundland and Labrador ranged from one to 18 admissions with a mean of 1.53 (SD = 1.04)). Of all 19,093 acute hospital admissions, seniors with mental illness diagnostic codes accounted for 11.3% (n= 2,150) of them. More specifically, seniors admitted with mental illness diagnostic codes had significantly more mean re/admissions (1.74, SD = 1.14) than did seniors without mental illness diagnostic codes (1.5, SD = 1.03) ($t = -7.605$, $p < 0.001$).

Seniors with only one admission to hospital were more often seniors without mental illness diagnostic codes (69.8% vs. 57.8%). Seniors who had mental illness diagnostic codes were more likely to experience two (24.1% vs. 19.0%), three (10% vs. 6.6%), four (4.7% vs. 2.6%), and five (1.8% vs. 1.0%) re/admissions compared to seniors without mental illness diagnostic codes.

Within the group of seniors with mental illness diagnostic codes, 87% (n= 1,076) had only one admission to hospital; 10% (n = 125) of these seniors were re/admitted to hospital twice in the year of this study. The most common occurring diagnoses identified during these two re/admissions were dementias (35%), mood disorders (24%), deliriums (15%), substance use (13%), schizophrenia type disorders (3%), anxiety (5%), mental retardation (2%), brain damage (1%) and personality disorders (.6%). It is noteworthy that 31% of all dementias were Alzheimer's disease, and 76% of substance use disorders were due to alcoholism. For the mood disorders identified, depression (71%) was the most common, followed by bipolar disorder (25%) and unspecified mood disorders (4%).

A total of 24 (2%) seniors with mental illness diagnostic codes were re/admitted to acute hospitals three times. The most common occurring diagnoses identified during these re/admissions were organic disorders (49%), dementia (32%), mood disorders (25%), delirium (17%), substance use (10%), anxiety (8%) and schizophrenia (8%). Again, more specifically, depression (53%) and bipolar disorders (47%) were the most common mood disorders documented. Of all organic disorders, 66% were dementias and 34% were deliriums; 75% of substance use disorders were attributed to alcoholism.

Nine seniors (0.7%) with mental illness diagnostic codes were re/admitted to hospital four times in the year of this study. The most common occurring diagnostic categories were for organic disorders (32%), mood disorders (27%), substance use disorders (20%), anxiety (16%), delirium (7%), and schizophrenia-type illnesses (4%). More specifically, 79% of organic disorders were related to dementias, while depression constituted 75% of mood disorders, followed by bipolar illness (17%) and mania (8%). Alcoholism, again, constituted the majority (89%) of substance use disorders.

Placement of mental illness diagnostic codes. In this study, each patient could have up to 20 diagnostic codes, and the codes were ordered according to their relative contribution to hospital resource use, from most responsible diagnostic code to least responsible. Therefore, mental illness diagnostic codes were assessed in terms of their placement in the coding scheme and the extent to which they contributed to total hospitalizations. Only 9% (n= 150) of mental illness diagnoses were coded as the primary diagnosis, with organic disorders (n=30; 21%) most frequent. Substance use disorders, mood disorders, stress/anxiety disorders each had the same likelihood of being entered as a primary diagnosis for the seniors' admission at a rate of 19% (n= 29).

Nine percent (n= 148) of mental illness diagnoses were entered as a secondary diagnosis for seniors' admissions. In this position, mood disorders were most often responsible for a senior's hospital admission (30%), followed by organic disorders (20%), substance use disorders (19%), schizophrenia (14%), and anxiety/stress (12%).

As a third diagnosis of importance, only 6% (n= 98) of hospital admissions had a mental illness coded. Substance use had the highest chance (at a rate of 19%) of being coded as the third code for a senior's admission, followed closely by organic disorders (18%), schizophrenia (18%), mood disorders (17%), personality disorders (11%), anxiety/stress disorders (9%), and mental retardation (5%).

In the position as the fourth main diagnosis, only 5% (n= 82) of all mental illness diagnoses were captured. Seniors admitted to hospital were primarily coded for mood disorders (32%) and substance use (28%) as the fourth diagnosis. To a lesser extent, anxiety/stress disorders (17%), organic disorders (15%) and personality disorders (8%) were other prevalent admission diagnoses at this level.

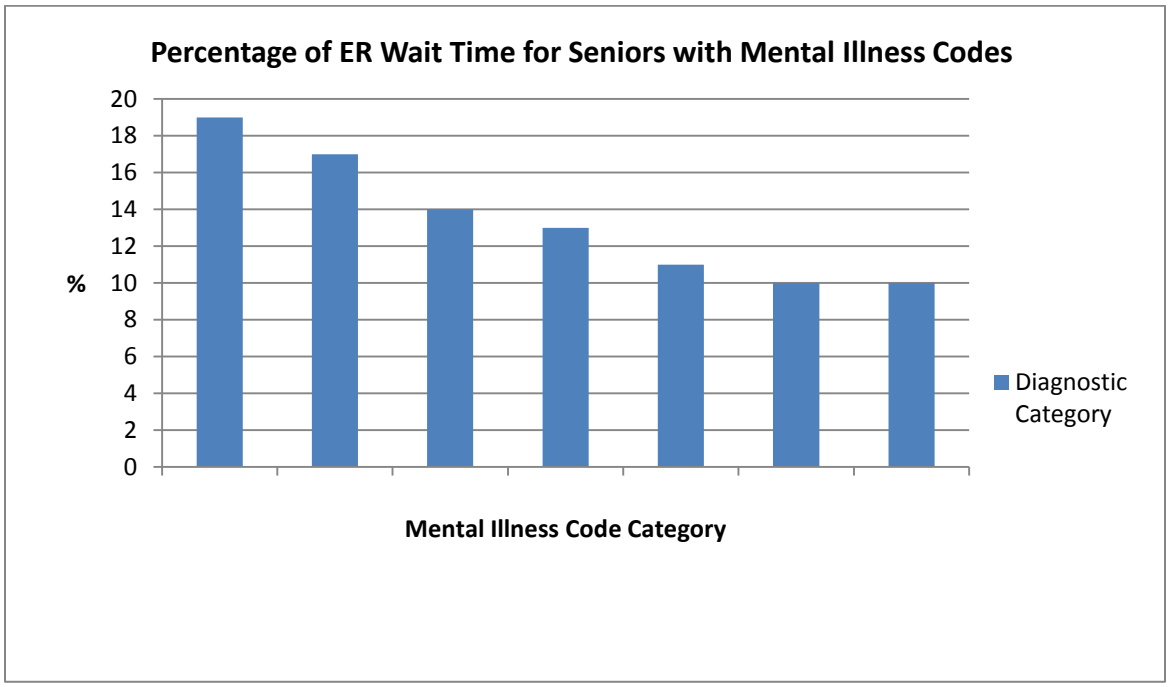
As a fifth diagnoses coded per admission, only three percent (n = 49) were admissions with a mental illness diagnosis. Mood disorders (42%) and substance use (29%) were most prevalent, with organic disorders (12%), anxiety disorders (10%) and personality disorders (6%) coded less often.

As a mental illness diagnosis coded in sixth place, only one percent (n = 16) represented seniors' admissions at this level. Delirium (41%) was the most prevalent and only organic disorder coded, followed by depression (35%) and anxiety (24%). When mental illness diagnoses were coded for seniors' admissions in the seventh and eighth positions, depression was the only diagnosis coded.

Emergency room waiting time. Not only did seniors with mental illness diagnostic codes have significantly more re/admissions to hospital than seniors without such codes, in the process of trying to get admitted they also incurred a longer waiting time in the emergency department. The overall average emergency room waiting time for all seniors was 4.03 hours (SD= 9.36). However, seniors admitted through the emergency department had a mean wait of 5.95 (SD= 12.16) hours if they had a mental illness code. This was significantly higher than the emergency room wait time for seniors without mental illness diagnostic codes (3.81 hours, SD = 8.98) ($p < 0.001$; $t = -7.629$).

Several variations were noted for specific mental illness diagnostic codes and/or categories. The top three single diagnoses or illnesses that had the most lengthy emergency room waits were mental retardation (71 hours), personality disorder of sexual preference (42 hours) and stress related dissociative disorders (41 hours). The proportion of total emergency room wait time for the top three mental illness diagnostic categories were organic disorders (19%), mood disorders (17%) and mental retardation (14%). To a lesser extent, anxiety/stress related disorders

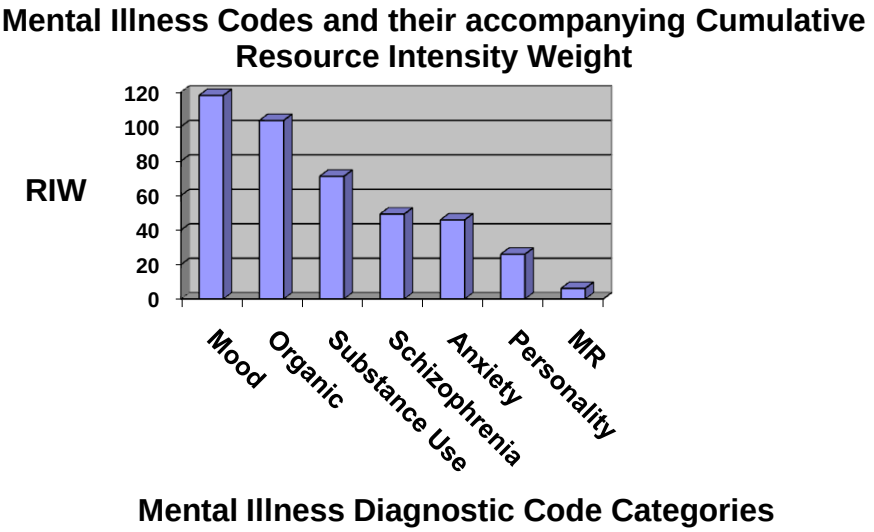
(13%) and schizophrenia (11%) incurred lengthy emergency room waits, with personality disorders and substance use each responsible for 10% of total emergency room wait times (Graph 5).



Graph 5: Percentage of total emergency room wait time for seniors with mental illness codes

Resource Intensity Weight (RIW). The resource intensity weight or relative weighted measure of for seniors staying in hospital also revealed some differences. The overall resource intensity weight for all seniors' hospitalizations in the province of Newfoundland and Labrador ranged from 0.129 to 168.80, with a mean of 3.57 (SD= 8.01). Given that seniors with mental illness diagnostic codes had a higher mean length of stay, acute length of stay and more re/admissions, they were expected to incur an increased resource intensity weight as well. Seniors with mental illness diagnostic codes did incur a significantly higher mean RIW while admitted to hospital (4.69, SD = 8.93) than did seniors without mental illness diagnostic codes (2.04, SD = 3.54) ($p < 0.001$; $F = 2651.372$). When looking in-depth at specific mental illness diagnostic codes, clearly mood disorders had the highest cumulative mean RIW (118.04),

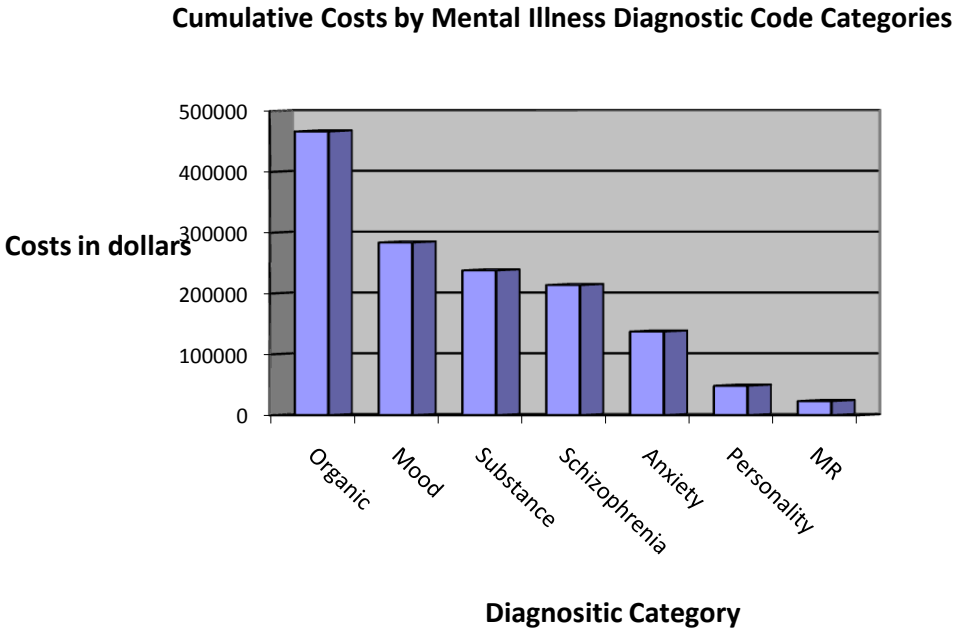
compared to organic disorders (103.50), substance use disorders (71.13), schizophrenia (49.23), anxiety/stress disorders (45.83), personality disorders (25.92) and mental retardation (6.12) (Graph 6). Among some of the more common mental illness diagnostic codes assigned to seniors, mental and behavioural disorders due to depression (56.21), dementias (40.72), delirium (26.30) and alcoholism (20.07) had the most resource intense hospital stays.



Graph 6: Cumulative resource intensity weight for seniors with various mental illness diagnostic code categories

Hospital Costs Incurred. In this study, costs for hospitalizing seniors in Newfoundland and Labrador ranged from $695 to $908,294 with an overall mean cost of $11,797/person/admission (SD= 22,304). When comparing seniors with and without mental illness diagnostic codes, seniors with mental illness diagnostic codes incurred significantly higher average costs while hospitalized ($19,849, SD= 45,332), than did seniors without mental illness diagnostic codes ($8,718, SD= 16,505) ($t = -20.378$, $p < 0.001$). Hospital cost differences across specific mental illness diagnostic categories were evident. For example, seniors with organic disorders were the most costly to hospitalize, at a cumulative cost of $466,625: this was followed by mood

disorders ($283,990), substance use ($238,115), schizophrenia disorders ($214,011) and anxiety/ stress disorders ($137,553). The least costly mental illness diagnostic codes for hospitalization of seniors with mental illnesses were personality disorders ($48,462) and mental retardation ($23,162) (Graph 7).



Graph 7: Cumulative costs by mental illness diagnostic code categories

Correlation of outcome variables

Relationships between all outcome variables were assessed in this study. For each of length of stay, acute length of stay, resource intensity weight and costs, statistically significant moderate to strong correlations were found. While positive correlations between cost and acute length of stay (.590), and resource intensity weight and acute length of stay (.685) were moderate, those between total length of stay and acute length of stay (.766), total length of stay and resource intensity weight (.763), total length of stay and cost (.720) and cost and resource

intensity weight (.880) were strong. Time spent in the emergency room either had a very low correlation or a negative correlation (Table 6).

Variable	LOS	ALOS	RIW	Cost	ER wait time
LOS	1	.766*	.763*	.720*	.023
ALOS	-	1	.685*	.590*	.033
RIW	-	-	1	.880*	-.001
Cost	-	-	-	1	-.003
ER wait time	-	-	-	-	1

* $P < 0.001$

Table 6. Correlations of outcome variables

Power

Before closing this section of the results, it is important to comment on the power of this study. The power of this study, or the probability that we would find a statistically significant difference in our findings was 78%. This level of power that is deemed to be of good magnitude (Stevens, 2009) was obtained using the G-power (R) statistical software program and was obtained using the measures of effect size, sample size and alpha level of significance.

Relationships Between Independent Variables, Seniors with/without Mental Illness Codes and Service Use. For the purposes of the regression modeling, the relationships between the independent (predictor) variables and group designation (seniors with/without mental illness diagnostic codes) were explored. These variables included age, gender, discharge disposition, referring institution, discharge destination, entry code, admit code, re-admit code, geography of residence, hospital/facility geography, medical co-morbidities and mental illness diagnostic codes (Table 7).

Variable	Seniors with mental illness diagnostic codes	Seniors without mental illness diagnostic codes	P- value
Age (Mean)	78.21 years	76.67 years	P < 0.001
Gender (% Female)	52.6%	51.1%	p = 0.32
Discharge disposition			
-Acute care facility	5.2%	3.1%	P < 0.001
-Continuing care/LTC	28.1%	7.1%	
-Other	1.9%	.8%	
-Home with supports	12.3%	16.6%	
-Home	41.5%	63.8%	
-Left against med advice	.4%	.2%	
-Died	10.6%	8.3%	
-No return from pass	0%	0%	
Referring institution			
-Acute care	6.1%	4.9%	P < 0.001
-General rehab	0.1%	.1%	
-Chronic care facility	.7%	.2%	
-Nursing home facility	5.1%	2%	
-Unclassified facility	0%	0%	
-Day Surgery	.3%	.6%	
-Community Care	.2%	0%	
-Emergency Room	4%	3.2%	
-Personal Care Home	7.5%	2.5%	
Discharge destination			
-Acute Care	5.2%	3.1%	P < 0.001
-General Rehab	1.5%	1.3%	
-Chronic Care	3.6%	.6%	
-Nursing Home	16%	3.1%	
-Community Care	.2%	0%	
-Personal Care Home	8.3%	2.7%	
Entry code			
-Admitted via clinic or reporting facility	1.4%	2.2%	P < 0.001
-Direct admit via dept. Or unit	19.3%	28.5%	
-Admitted via ER	79%	67.8%	
-Admitted via day surgery	0.3%	1.5%	
Admit code (% Urgent)	91.2%	78.6%	P < 0.001
Re-admit code			
-Planned readmission	5%	12.1%	P < 0.001
-Acute ≤ 7 days unplanned within	2.7%	2.6%	
-Acute 8-28 days unplanned	6%	4.7%	
-Acute ≤ 7 days from day surgery	5%	12.1%	
-New patient to acute unit	15.3%	18.7%	
-Unplanned > 28 days	70.6%	61%	
Geography of Residence (% urban)	44.3%	38.5%	p < 0.001
Geography of Facility (% rural)	75.6%	73.4%	p = 0.10

Table 7. Comparison of independent variables for seniors with and without mental illness diagnostic codes.

Age. The independent variable of age was explored for how it may impact acute inpatient hospital service use by seniors with and without mental illness diagnostic codes. The overall mean age of seniors admitted to acute care hospitals in NL was 76.85 years, with a range of 65 to 101. The overall age distribution of seniors admitted to acute care hospitals in the province of NL was quite diverse and revealed much variability (Median= 76; Mode= 72; SD= 7.79). The mean age of seniors hospitalized with mental illness diagnostic codes (78.57 years, SD = 7.89) was significantly higher ($t= -8.615$, $p < 0.001$) than that for seniors without mental illness diagnostic codes (76.57 years, SD = 7.74) (Graph 8).

To explore the independent variable of age with the dependent variables of total length of stay, acute length of stay, rate of re/admission, ER wait time, resource intensity weight and overall hospital cost, correlations were completed. As an independent variable, age had a modest influential relationship on how all seniors used acute care in-patient hospital services. Overall, although weak, age was positively correlated with length of stay (.116), acute length of stay (.046), hospital cost (.029), resource intensity weight (.039), total number of re/admissions (.017), and ER wait time (.004).

Graph 8: Distribution of Ages for Seniors with and without Mental Illness Diagnostic Codes

Gender. Overall, there were significantly more females (6,412; 51.3%) than males (6,089; 48.7%) (p= 0.00) admitted to acute care hospitals in the province of Newfoundland and Labrador. Although more females than males were admitted to acute hospitals, males had a significantly longer length of stay overall (t = 1.999, p =.009) and resource intensity weight (t = 1.402, p = 0.041) than did females. Females experienced a higher mean length of stay (13.04 days, SD = 23.13) and acute length of stay (9.73; SD = 14.03) compared to males at 11.81 days (SD = 21.34) and 9.47 days (SD = 13.94), respectively. However, males incurred a higher resource intensity weight of 2.37 (SD = 5.33) and cost/hospitalization of $10,023 (SD = 24,301) than did females at a resource intensity weight of 2.18 (SD = 3.99) and cost of $9,623 (SD = 16,965). While differences in acute hospital stay (p = 0.309, t = -1.017) and mean cost/admission (t = 1.044; p = .297) were not statistically significant, differences in total hospital stay (t = -3.07; p = 0.002) and resource intensity weight were (t = 2.26; p = 0.024).

In the presence of mental illness diagnostic codes, male and female seniors continued to vary. Seniors with mental illness diagnostic codes were slightly more often females (52.6%), than were seniors without mental illness diagnostic codes (51.1%) (Graph 9). These differences between gender prevalence, however, were not significant ($F = 6.072$; $p = .32$). Females with mental illness codes had the highest mean hospital stay of 30.97 (SD = 41.08) compared to females without mental illness codes (11.01, SD = 19.10), males with mental illness codes (28.21, SD = 40.45), and males without mental illness codes (10.07, SD = 17.28). These differences, however, were not significant ($F= 1.973$, $p = 0.160$).

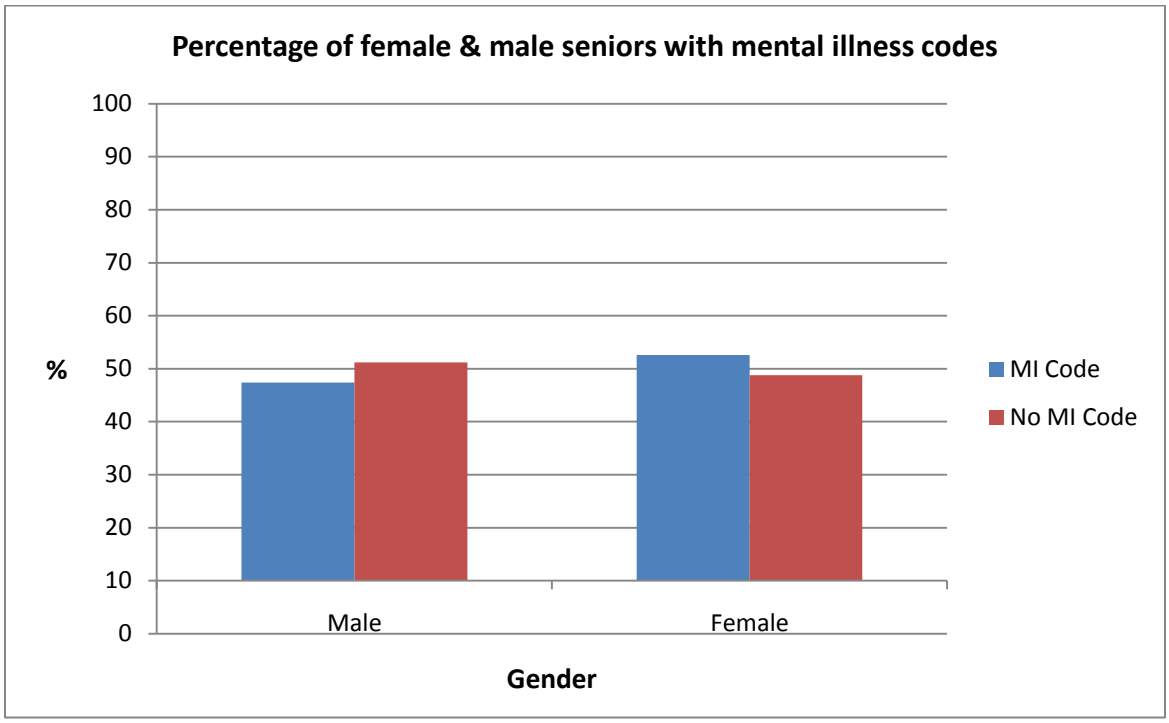
For acute care hospital stay, female seniors with mental illness codes had the longest acute hospital stay (18.54 days, SD = 25.01) compared to the shorter acute stays found in female seniors without mental illness codes, males with mental illness codes, and males without mental illness codes at rates of 8.73 days (SD = 11.78), 17.45 days (SD = 22.05), and 8.62 days (SD = 12.48), respectively. These differences, however, were not significant ($F = 1.411$, $p = 0.235$).

For resource intensity weight, males with mental illness codes had the highest mean (5.10, SD = 11.90), compared to the lower resource intensity weights found for males without mental illness, females with mental illness codes and females without mental illness codes at rates of 2.08 (SD = 3.94), 4.26 (SD = 6.28), and 1.95 (SD = 3.56), respectively. These differences in resource intensity weights were significant ($F = 6.447$, $p = 0.011$).

When comparing hospital cost/admission, males with mental illness codes were the most costly to hospitalize ($21,876, SD = 57,781). This hospital cost far exceeded that incurred for males without mental illness codes ($8,763, SD = 18,367), females with mental illness codes ($18,023, SD = 29,934) and females without mental illness codes ($8,675, SD = 14,508). These differences in cost were significant ($F = 8.778$; $p = 0.003$).

When comparing the rate of re/admission to hospital, males with mental illness codes had the most frequent hospitalizations (1.79, SD = 1.20). This compared to lower re/admissions rates for males without mental illness codes (1.55, SD = 1.07), females with mental illness codes (1.69, S. D. = 1.09) and females without mental illness codes (1.46, S. D. = 0.988). Overall, although females with mental illness diagnostic codes accounted for 53% (n= 650) of re/admissions to hospital and males accounted for 47% (n= 585), this difference in re/admission rates was not significant (F = 0.067, p= .796).

Finally, for ER wait time, males with mental illness codes incurred an ER wait of 6.33 hours compared to females with mental illness codes who had a 5.61 hour wait. However, these differences were not statistically significant (F = 1.752; p = .186).



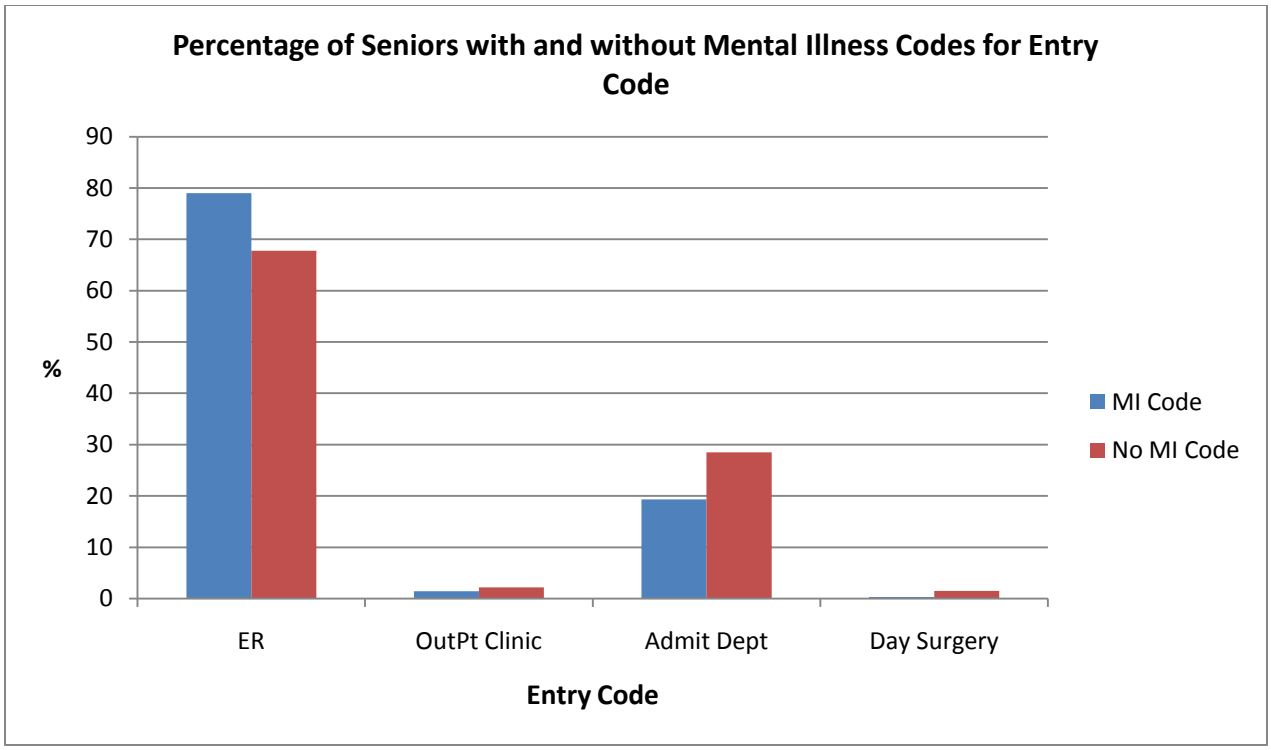
Graph 9: Distribution of gender in hospitalized seniors with and without mental illness

Re/admission Variables

Of relevance to the discussion on rate of re/admissions, the entry codes, admit codes and readmit codes were assessed for seniors with and without mental illness diagnostic codes.

Entry Code. The results of this study demonstrated that the department through which seniors entered an acute care hospital had an influential impact on seniors' hospital use. Overall, most seniors entering an acute care hospital did so by entry through the emergency department (67%). The second most popular medium through which all seniors came into hospital was directly through the admitting department as a direct admission to the in-patient unit (28.9%).

Comparisons between seniors with and without mental illness diagnostic codes showed that seniors without mental illness diagnostic codes were more likely to be admitted to an acute care hospital through outpatient clinics (2.2% vs. 1.4%), admitting departments (28.5% vs. 19.3%) and via day surgery (1.5% vs. 0.3%) (Graph 10). Seniors with mental illness diagnostic codes, however, were significantly more likely to be primarily admitted through emergency departments (79% vs. 67.8%). A chi-square analysis revealed that the differences in entry to hospital between seniors with and without mental illness diagnostic codes were statistically significant ($p < 0.001$; $Chi^2 = 462.28$). For all mental illness diagnostic categories of organic (82%), mood (71%), substance use (86%), anxiety/stress (82%), personality (78%), schizophrenia (67%), mental retardation (88%) and behavioural/emotional disorders (71%), the emergency room was the most frequent point of entry into the hospital.

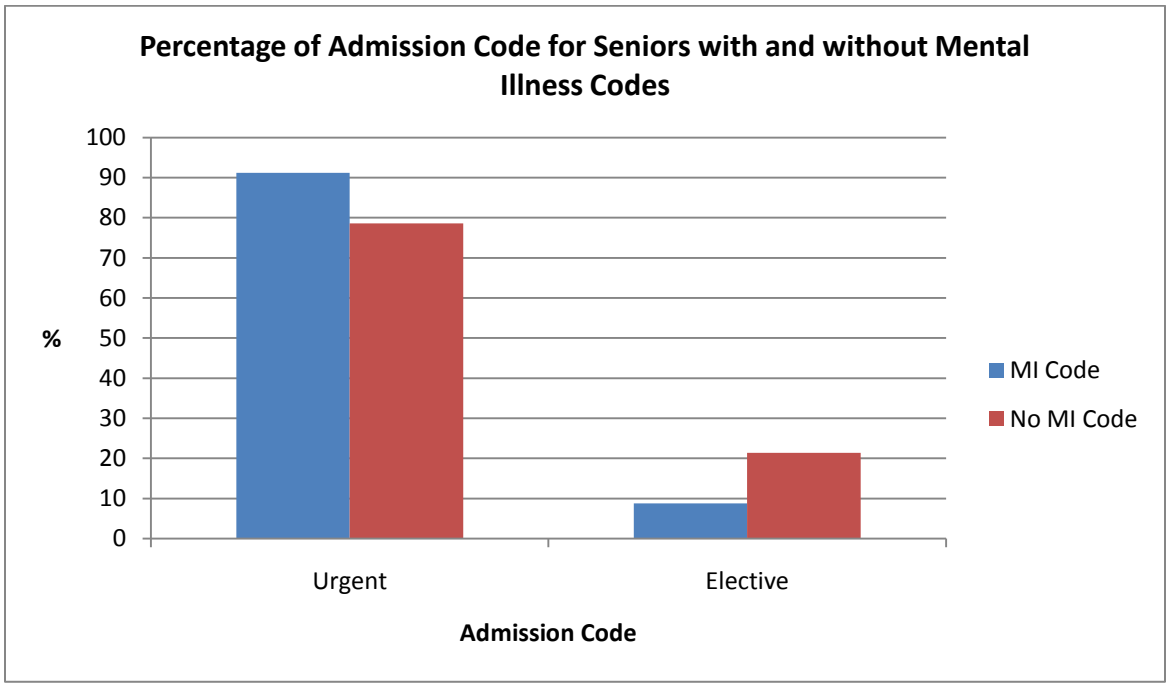


Graph 10: Entry Code Comparisons for Seniors with & without Mental Illness Codes

Admit Code. The degree of urgency with which seniors were admitted to acute care hospitals was also investigated. In general, most seniors were admitted to an acute care hospital on an urgent (79%), as opposed to an elective basis (21%). A chi-square analysis showed these differences in urgency of admission were significant ($p < 0.001$; $Chi^2 = 4{,}075.43$).

Comparisons of admit code between seniors with and without mental illness diagnostic codes also revealed differences. A chi-square analysis showed seniors hospitalized with mental illness diagnostic codes were significantly more likely to be admitted on an urgent basis than were seniors without mental illness diagnostic codes (91.2% vs. 78.6%; $p < 0.001$) (Graph 11). To the contrary, seniors without mental illness diagnostic codes were significantly more likely to be admitted on an elective basis (21.4% vs. 8.8%; $p < 0.001$) than were seniors with mental illness diagnostic codes. For all mental illness diagnostic categories of organic (93%), mood (91%), substance use (95%), anxiety/stress (94%), and schizophrenia (98%), admissions were

done primarily on an urgent, not elective basis. All admissions of seniors with personality disorders, mental retardation and behavioural/emotional disorders were done only on an urgent basis.



Graph 11: Comparison of Admission Codes for Seniors With and Without Mental illness Codes

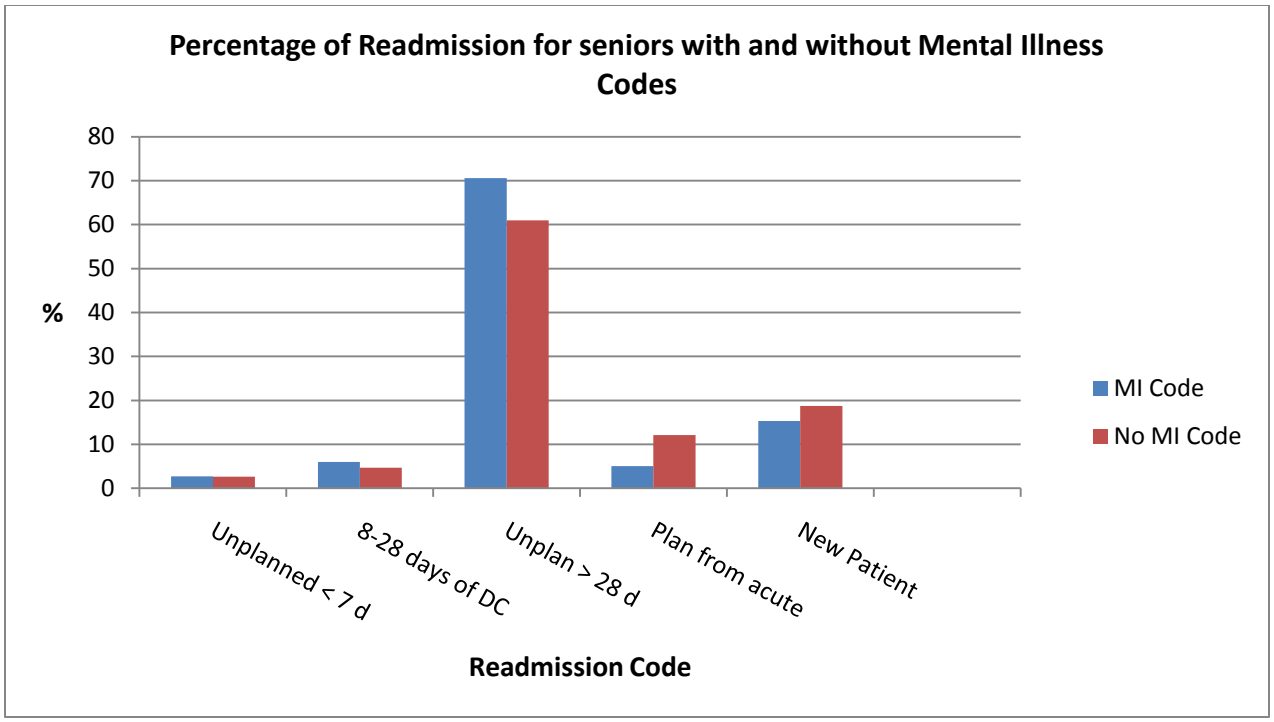
Readmit Code. The readmit code or the manner in which an individual was readmitted to an acute care hospital revealed some differences across the general population. Overall, seniors were more likely to have unplanned readmissions to hospital (63%). The differences in readmission codes for all seniors were significant ($p < 0.001$).

When compared across seniors with and without mental illness diagnostic codes, significant differences were also found. Compared to seniors without mental illness diagnostic codes, seniors hospitalized with mental illness diagnostic codes were more likely to have an unplanned readmission in less than seven days of being discharged (2.7% vs. 2.6%), between eight and 28 days of being discharged (6% vs. 4.7%), and after 28 days of being discharged (70.6% vs. 61%) (Graph 12). However, seniors hospitalized without mental illness were more

likely to have planned readmissions from other acute care units (12.1% vs. 5%) and were more likely to be a new patient to an acute care unit (18.7% vs. 15.3%). These differences in readmission codes for seniors with and without mental illness diagnostic codes were significant ($p < 0.001$).

For those with mental illness diagnostic codes, the majority were readmitted to hospital with an unplanned readmission more than 28 days since their last discharge (72.3%). Further variations included seniors with mental illness diagnostic codes who were new patients to acute care (18.1%), had an unplanned readmission in 8-28 days since discharge (4.4%), a planned readmission from another acute care unit (2.9%), or had an unplanned readmission in less than seven days since their last discharge (1.9%).

Consistencies and variations across specific diagnostic categories were also noted. All seniors admitted to hospital with organic (72%), substance use (69%), mood (76%), stress/anxiety (73%), personality (82%), schizophrenia (67%), mental retardation (88%) and behavioural/emotional disorders (57%) were done so primarily as an unplanned readmission more than 28 days after their last discharge.



Graph 12: Comparison of Readmit Codes for Seniors with and without Mental Illness Diagnostic Codes

Discharge Disposition

Discharge disposition played an influential role in how seniors with and without mental illness diagnostic codes used acute in-patient hospital services. In general, all seniors admitted to acute care hospitals were most likely discharged back to their own home (50.1%), discharged home with support services (15.7%) or died (14.3%). Infrequently, they were transferred to a continuing care or long term care facility (11.5%), another acute care facility (6.7%), transferred elsewhere (1.4%) or left against medical advice (0.2%). These differences in discharge disposition for all seniors were significant ($p < 0.001$; $Chi^2 = 29{,}759.50$).

Seniors with and without mental illness diagnostic codes were also compared for their discharge disposition. Compared to seniors without mental illness diagnostic codes, seniors with mental illness diagnostic codes were more likely to be discharged to another acute care facility (5.9% vs. 7.3%), continuing care/long term care (6.9% vs. 23.6%), transferred to other facilities

(0.8% vs. 2.0%), to leave against medical advice (0.2% vs. 0.6%) and to die in hospital (9.1% vs. 11.5%) (Graph 13). As well, seniors with mental illness diagnostic codes admitted to acute care hospitals were less likely to be discharged home (42.7% vs. 62.5%) or discharged home with supportive services (12.1% vs. 14.5%) compared to seniors admitted without mental illness diagnostic codes. These differences were significant ($p < 0.001$; $t = 16.57$). There were negligible variations for both groups due to those who did not return from a hospital pass.

Within the group of mentally-ill seniors admitted to hospital, there were variations across discharge disposition. Many of these seniors were discharged back home (40.1%) or were transferred to a long term care or continuing care facility (29%). Other mentally-ill seniors were discharged home with support services (12.1%), died in hospital (11.1%), transferred to another acute care in-patient facility (5.1%), transferred to other location (2.1%) or left against medical advice (.4%).

Some discharge disposition differences across specific mental illness diagnostic codes were found. Seniors leaving hospital with organic disorders were primarily transferred to a long term care or continuing care facility (37%), discharged home (27%) or died (15%). In addition, 43% of those with dementia were transferred to a long term care or continuing care facility.

Seniors admitted with substance use disorders were primarily discharged back home (67%). Less frequently, they were discharged home with support services (16%), transferred to a long term care or continuing care facility (6%) or died in hospital (5%).

Seniors admitted with mood disorders were also primarily discharged home (56%) or transferred to a long term care or continuing care facility (21%). Smaller percentages were discharged home with support services (11%), died in hospital (5%), transferred to another acute

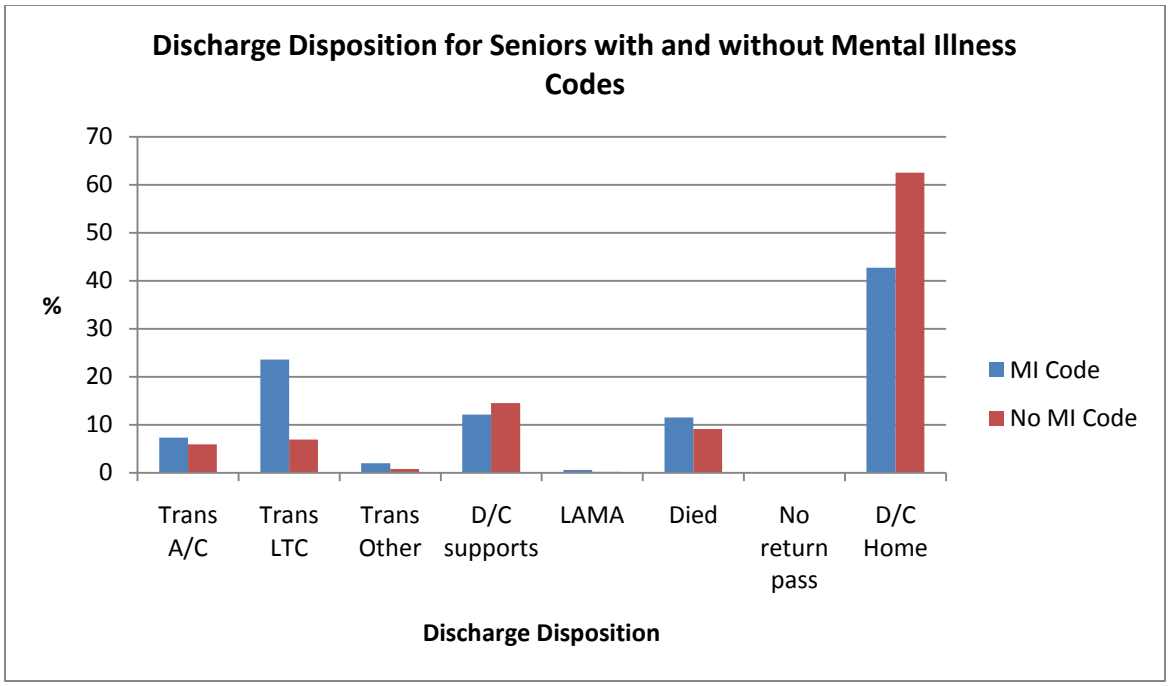
care in-patient facility (4%), transferred to another facility (2%) or left against medical advice (.9%).

Seniors in hospital with schizophrenia or other psychotic disorders were also primarily discharged home (48%) or transferred to a long term care or continuing care facility (24%). Otherwise, they were most likely to die in hospital (11%), or be discharged home with support services (6%). Further, they had an equal likelihood of either being transferred to another facility (4%) or transferred to another acute care in-patient facility (4%).

Seniors admitted to hospital with stress or anxiety- related disorders were primarily discharged home (64%). Alternatively, they were discharged to a long term care or continuing care facility (13%), discharged home with support services (12%), died (5%), transferred to another acute care in-patient care facility (4%) or were transferred to another facility (2%).

Seniors with personality disorders in hospital were most often discharged home (67%). Otherwise, they had an equal probability of leaving against medical advice (11%), being discharged home with support services (11%) or being transferred to another acute care in-patient facility (11%).

Seniors admitted with mental retardation to hospital had an equal probability of being discharged home (37.5%) or to a long term or continuing care facility (37.5%). The remainder were discharged home with support services (25%).



Graph 13: Comparison of Discharge Disposition for Seniors with and without Mental Illness Diagnostic Codes

Institution To (Discharge Destination)

The proportions of data entered for the variable, discharge destination, were compared for seniors with and without mental illness codes and some distinct differences were found. Compared to hospitalized seniors without mental illness codes, seniors with mental illness codes were more often discharged to nursing home facilities (3.1% vs. 16%), personal care homes (2.7% vs. 8.3%), other acute care facilities (3.1% vs. 5.2%) and chronic care facilities (.6% vs. 3.6%). As well, although negligible in the difference, seniors with mental illness were discharged to general rehabilitation (1.3% vs. 1.5%) and community care (0% vs. 0.2%) compared to seniors without mental illness codes. These differences in discharge destination between seniors with and without mental illness codes were significant ($p < 0.001$; $Chi^2 = 751.97$).

Institution From (Referring Institution)

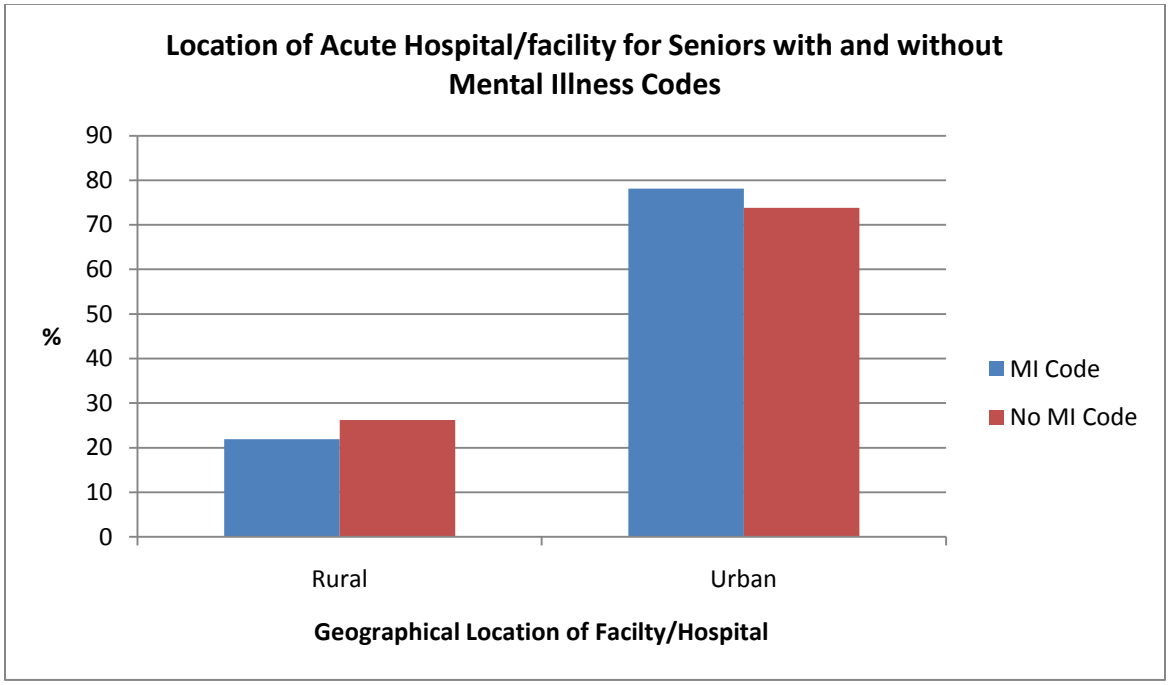
The proportions of data entered for the variable, referring institution, were also compared for seniors with and without mental illness codes and again, differences were found. Seniors with mental illness codes were more likely than seniors without mental illness codes to be admitted to hospital from personal care homes (7.5% vs. 2.5%), nursing homes (5.1% vs. 2.0%), emergency rooms (4% vs. 3.2%) and community care settings (.2% vs. 0%). To the contrary, seniors without mental illness codes were more likely to be admitted from day surgery than were seniors with mental illness codes (0.6% vs. 0.3%). These differences in referring institution between seniors with and without mental illness codes were significant ($p < 0.001$; $Chi^{2 =} 183.02$).

Geography of Residence

Overall, most of the seniors admitted to acute care hospitals in the province of Newfoundland and Labrador were from rural (60.9%), compared to urban (39.1%) geographical areas. This difference was significant ($t = -4.395$; $p < 0.001$). Similarly, the location of one's home or residential geography varied significantly between seniors with and without mental illness diagnostic codes. Seniors without mental illness diagnostic codes most often lived in rural settings of the province of Newfoundland and Labrador (91.1% vs. 87.3%). To the contrary, seniors with mental illness diagnostic codes were, unequivocally, more likely to reside in urban, not rural settings (11.3% vs. 8.9%). These differences in the location of residence among seniors with and without mental illness diagnostic codes admitted to acute care hospitals were significant ($p < 0.05$).

Geographical Location of Facility

Generally speaking, all seniors in the province of Newfoundland and Labrador who were admitted to acute care hospitals/facilities were significantly more likely to be admitted to urban (73.7%), as opposed to rural facilities/hospitals (26.3%) ($p < 0.001$). More specifically, seniors with mental illness diagnostic codes were also most likely to seek admission to acute care urban facilities than were seniors without mental illness diagnostic codes (78.1% vs. 73.8%). Reciprocally, greater usage of rural acute care hospitals was by seniors without mental illness diagnostic codes, as opposed to seniors with mental illness diagnostic codes (26.2% vs. 21.9%) (Graph 14). These differences in the use of either rural or urban acute care facilities by seniors with and without mental illness diagnostic codes were significant ($p < 0.001$).



Graph 14: Location of Acute Hospital/Facility for Seniors with and without Mental Illness Codes

In terms of overall hospital use, seniors with mental illness codes from urban areas more often had a significantly higher use of hospital services than did seniors with mental illness codes from rural areas. Seniors with mental illness codes from urban areas had a significantly higher

total hospital stay (32.18; SD = 45.13), acute hospital stay (18.77; SD = 24.52), resource intensity weight (5.58; SD = 12.43), and cost (24,765; SD = 61,839) than did seniors with mental illness codes from rural areas, at rates of 27.58 (SD = 36.73), 17.41 (SD = 22.91), 3.90 (SD = 5.65) and 15,796 (SD = 23,748), respectively. All of these differences were significant ($p < 0.05$). Their differences in emergency room wait time (4.89 vs. 6.03; $p = .330$) and rate of admission (1.80 vs. 1.67; $p = .907$), however, were not significantly different.

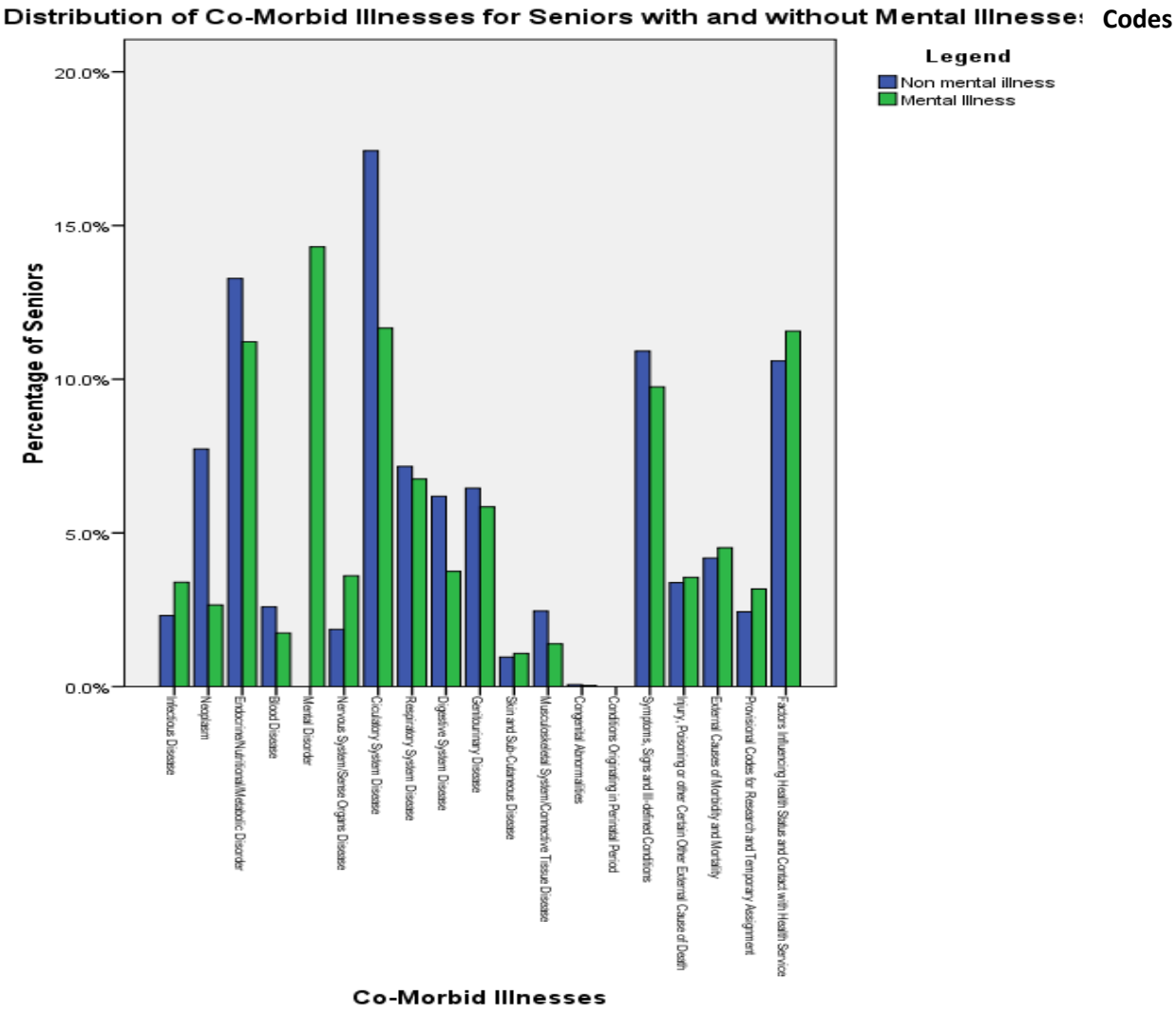
Co-Morbid Illnesses

Variable	Seniors with mental illness diagnostic codes	Seniors without mental illness diagnostic codes	P- value
Mean # Diagnostic codes	9.3	5.63	P < 0.001
AMI	8.8%	9.5%	0.45
CHF	14.5%	12.1%	0.02
PVD	1.7%	2.1%	0.35
CVA	9.1%	7.7%	0.10
Pulmonary	14.8%	10.9%	P < 0.001
Connective	0.6%	0.6%	NS
Peptic Ulcer	1.9%	1.5%	0.26
Liver disease	0.4%	0.5%	0.78
Diabetes	25.3%	25.7%	0.78
Diabetes complications	4.1%	4.2%	0.93
Paraplegia	0.6%	0.9%	0.22
Renal disease	6.6%	5.6%	0.15
Cancer	8.2%	15.4%	P < 0.001
Metastatic cancer	3.4%	16.5%	P < 0.001
Severe liver disease	0.6%	0.2%	0.005
HIV	0%	0%	NS

Table 8: Proportion of medical co-morbidities in seniors with and without mental illness diagnostic codes.

For all 12,502 seniors admitted to acute care facilities in 2008-2009 in the province of Newfoundland and Labrador, a mean of 5.99 diagnoses/person occurred. The number of diagnoses ranged from 1 to 20, with 13.7% having one diagnosis, 15.3% had two diagnoses and 13.4% had at least three different diagnoses. The majority of seniors had greater than three diagnoses (86.3%) (Table 8).

Seniors with and without mental illness diagnostic codes also differed in the extent to which they had additional co-morbid illnesses. Seniors with mental illness diagnostic codes admitted to acute care hospitals had significantly more co-morbid illnesses than did seniors without mental illness diagnostic codes ($p < 0.001$; $t = -21.115$). The mean number of diagnoses for seniors with mental illness diagnostic codes was 9.3 (SD = 7.52), while seniors hospitalized without mental illness diagnostic codes had a mean of 5.63 (SD = 5.59) of diagnoses. Seniors with and without mental illness diagnostic codes had the same common co-morbid illnesses (Graph 15).



Graph 15: Distribution of Co-morbid Illnesses for Seniors with and without Mental Illness Codes

Psychiatric co-morbidities

Upon examining the prevalence of psychiatric co-morbidities, it was found that the mentally-ill seniors in this study most often had just one mental illness code. From the 2,150 re/admissions to hospital for seniors with mental illness diagnostic codes, the majority or 91% (n= 1,974) of mental health admissions involved only one coded mental illness. Further, only 7% (n= 152) involved two psychiatric co-morbidities with just 1% (n= 24) of re/admissions involving three psychiatric co-morbidities. In terms of patients, of the total 1,235 seniors

admitted with mental illness diagnostic codes, the majority or 86% (n= 1,059) had only one mental illness, while 12% (n= 152) had two psychiatric co-morbidities, 2% (n= 24) had three psychiatric co-morbidities and only one senior or 0.085% (n = 1) had five psychiatric co-morbidities.

The most common psychiatric co-morbidities when there were two present, were dementia and depression (20%; n = 25), dementia and delirium (17%; n = 22), anxiety and depression (7%; n= 10) and bipolar illness and delirium (8%; n = 9). When three psychiatric co-morbidities were present, they were most often dementia, depression and anxiety (38%). The only case where a senior had a total of five psychiatric co-morbidities was for the combination of dementia, substance use (ICD-10 192), substance use (ICD-10 194), bipolar and anxiety.

Of all seniors who had one mental illness diagnostic code (n = 1,059), 91% (n= 969) had one hospitalization. Seniors who had one hospitalization and one mental illness actually had a higher mean resource intensity weight (9.39), total hospital stay (60 days), and acute stay (34 days) than that observed for all seniors with mental illness diagnostic codes who had rates of 6.45, 42.68 and 26.96, respectively.

A total of 152 seniors had two psychiatric co-morbidities. Of these seniors with two psychiatric co-morbidities, most of them (84%; n= 127) actually had only one hospitalization and only 10% (n= 16) of them had two hospitalizations. Although these seniors with only one admission to hospital had a slightly higher mean acute stay (31 days) and total length of stay (45 days), their mean resource intensity weight (6.34) was slightly less compared to the means for all mentally-ill seniors at 6.45, 26.96 and 42.68, respectively. Seniors with two psychiatric co-morbidities and two re/admissions to hospital had comparable total hospital stays (40.4 vs. 42.68 days), acute stays (28.45 vs. 26.96 days) or mean resource intensity weights (5.6736 vs. 6.45)

than did mentally-ill seniors in general. Although their total hospital stay and acute stays were slightly longer, their resource intensity weight was actually less.

A total of 24 patients had three psychiatric co-morbidities. Of these 24 patients, the majority (88%; n= 21) had only one admission to hospital, while 12% (n=3) had two hospital admissions. Although these 24 seniors incurred a longer acute stay (37 days) and total hospital stay (55 days), their mean resource intensity weight was actually less (6.29) than those means for all mentally-ill seniors of 26.96 and 42.68 and 6.45, respectively. For the individual who had five psychiatric co-morbid illnesses, service use amounted to a total hospital stay of 32 days, an acute stay of 32 days, resource intensity weight of 3.56 and total hospital cost of $16,148. This person also had a total of 18 diagnoses, five of which were related to mental illness diagnostic codes.

Adjusted outcomes

The outcome variables in this study were further analyzed using general linear modelling. These analyses were performed in order to test whether differences noted between seniors with and without mental illnesses were significant after controlling for other covariates that were present, outside of mental illness, that demonstrated having an impact on how seniors used acute hospital services. In order to control for all co-morbidities, a Charleson co-morbidity index (CCI) was calculated for each patient and the CCI was added to the models (Table 9).

	Crude Mean Values			Adjusted Mean Values		
	Seniors with mental illness codes	**Senior without mental illness codes**	**P- value**	**Seniors with mental illness codes**	**Senior without mental illness codes**	**P- value**
LOS (days)	29.21	11.92	P < 0.001	18.95	13.34	P < 0.001
ALOS (days)	16.10	9.54	P < 0.001	12.30	10.07	P < 0.001
RIW (units)	4.39	2.09	P = 0.008	2.13	2.40	P < 0.001
Readmissions (number)	1.9	1.7	P < 0.001	1.9	1.6	P < 0.001
Costs ($Cdns)	$18,424	$8,476	P = 0.719	$9,664	$9,798	P < 0.001

Table 9: Crude vs. Adjusted means of outcome variables

Total Length of Stay. To determine the full extent of mental illness on seniors' total hospital stay, general linear modeling was used. Using general linear modeling to control for all covariates, the presence of mental illness diagnostic codes continued to be a significant predictor of seniors' total length of hospital stay ($p < 0.001$) (Table 10).

Parameter Estimates

Dependent Variable: Total Length of Stay

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	22.115	2.290	9.656	.000	17.626	26.605.6
Gender_first	.316	.367	.859	.390	-.404	1.0350
Age_first	.008	.025	.327	.743	-.041	.0570
entry_clinic	3.063	1.350	2.269	.023	.417	5.7097
entry_dept	-2.532	1.719	-1.473	.141	-5.902	.8378
Entry_code_ER	.896	.493	1.817	.069	-.071	1.8638
Readmit_planned	-1.393	.688	-2.024	.043	-2.743	-.0440
Acute_seven	7.424	1.689	4.395	.000	4.113	10.7357
Acute_8_28	.698	.695	1.003	.316	-.665	2.0610
Acute_daysurgery	-.550	.560	-.982	.326	-1.649	.5485
DD_LTC	17.910	1.182	15.153	.000	15.593	20.2272
DD_Other	9.451	2.113	4.473	.000	5.309	13.5925
DD_Home_Support	-3.489	1.109	-3.146	.002	-5.663	-1.3153
DD_Home	-6.100	1.034	-5.901	.000	-8.126	-4.0740
DD_AMA	-10.069	3.771	-2.670	.008	-17.460	-2.6786
DD_Died	2.210	1.183	1.869	.062	-.108	4.5285
Rural_urban_residence_first	-.986	.400	-2.467	.014	-1.769	-.2022
Rural_urban_facility_first	3.071	.487	6.309	.000	2.117	4.0250
CCI	1.193	.134	8.916	.000	.931	1.4554
[MIGroup_max=0]	-13.448	.626	-21.496	.000	-14.674	-12.2222
[MIGroup_max=1]	0[a]	.	.	.	.	

Acute_seven-readmitted to acute hospital in less than 7 days of being discharged; Acute_8_28- readmitted to hospital within 8-28 days of being discharged; Acute day surgery- readmitted within 7 days of being discharged from day surgery; DD_LTC- Discharged to long term care setting; DD_Other- Discharged to other facility: DD_Home_Support- Discharged home with supports services in place; DD_AMA- Discharged self against Medical advice; DD_Died- Died in hospital.

Table 10: Total length of stay adjusted outcome output data.

Acute length of stay. General linear modelling was also used with acute length of stay as the outcome variable, to determine the independent predictive effect of mental illness diagnostic codes. While controlling for all other covariates, the presence of mental illness diagnostic codes still independently and significantly predicted acute care hospital stays ($p < 0.001$) (Table 11).

Parameter Estimates

Dependent Variable: Acute Length of Stay

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	19.324	1.500	12.880	.000	16.383	22.265
Gender_first	.274	.241	1.137	.256	-.198	.745
Age_first	-.048	.016	-2.926	.003	-.080	-.016
entry_clinic	2.381	.884	2.692	.007	.648	4.114
entry_dept	-2.363	1.126	-2.099	.036	-4.570	-.156
Entry_code_ER	.025	.323	.077	.939	-.608	.658
Readmit_planned	-1.614	.451	-3.579	.000	-2.498	-.730
Acute_seven	7.604	1.106	6.872	.000	5.435	9.773
Acute_8_28	.404	.456	.887	.375	-.489	1.297
Acute_daysurgery	-.538	.367	-1.465	.143	-1.258	.182
DD_LTC	4.500	.774	5.812	.000	2.982	6.018
DD_Other	-.302	1.384	-.218	.827	-3.015	2.411
DD_Home_Support	-1.445	.726	-1.989	.047	-2.869	-.021
DD_Home	-3.565	.677	-5.265	.000	-4.892	-2.238
DD_AMA	-6.753	2.470	-2.734	.006	-11.595	-1.912
DD_Died	1.921	.775	2.480	.013	.402	3.440
Rural_urban_residence_first	-.868	.262	-3.317	.001	-1.381	-.355
Rural_urban_facility_first	1.623	.319	5.090	.000	.998	2.248
CCI	1.305	.088	14.888	.000	1.133	1.477
[MIGroup_max=0]	-7.536	.410	-18.388	.000	-8.339	-6.732
[MIGroup_max=1]	0[a]	.	.	.	.	.

Entry_clinic- Patient was admitted from an outpatient clinic; Entry_dept- Patient was admitted through another department of the hospital; Entry_code_ER- Patient was admitted through the ER department; Acute_seven- readmitted to acute hospital in less than 7 days of being discharged; Acute_8_28- readmitted to hospital within 8-28 days of being discharged; Acute day surgery- readmitted within 7 days of being discharged from day surgery; DD_LTC- Discharged to long term care setting; DD_Other- Discharged to other facility: DD_Home_Support- Discharged home with supports services in place; DD_AMA- Discharged self against Medical advice; DD_Died- Died in hospital.

Table 11: Acute length of stay adjusted outcome output data

Rate of Re/Admissions. The dependent variable of rate of re/admissions also underwent general linear modeling to determine the independent predictive value that mental illness

diagnostic codes had on the rate of re/admission. After controlling for all covariates present, the presence of mental illness diagnostic codes continued to have a significant influence on seniors' rate of re/admissions (Table 12).

Parameter Estimates

Dependent Variable: Rate of Re/Admission

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	5.199	.191	27.268	.000	4.826	5.573	.089
Age	-.004	.002	-2.606	.009	-.007	.000	.001
Gender	-.052	.024	-2.160	.031	-.099	-.005	.001
Entry Code	-.815	.047	-17.483	.000	-.906	-.723	.039
Readmission Code	-.012	.006	-1.986	.047	-.024	.000	.001
Discharge Disposition	-.132	.009	-15.310	.000	-.149	-.115	.030
Admission Code	.414	.073	5.696	.000	.271	.556	.004
ER Wait time	-.003	.001	-1.881	.060	-.005	.000	.000
Rural/Urban residence	-.119	.025	-4.776	.000	-.167	-.070	.003
Rural/Urban facility	-.117	.036	-3.304	.001	-.187	-.048	.001
Length of stay	-.005	.001	-6.474	.000	-.007	-.004	.006
Resource Intensity Weight	.002	.004	.379	.705	-.006	.009	.000
Charlson Co-morbidity Index	.257	.008	30.940	.000	.241	.273	.112
[MIGroup_max=0]	-.289	.037	-7.756	.000	-.363	-.216	.008
[MIGroup_max=1]	0[a]	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

Table 12: Rate of re/admissions adjusted outcome output data

Resource Intensity Weight. The dependent variable of resource intensity weight was also subjected to general linear modelling to determine the independent predictive value of mental illness diagnostic codes on RIW. After controlling for all other covariates present, the presence of mental illness diagnostic codes continued to have a significant influence on seniors' resource intensity weight ($p = 0.000$) (Table 13).

Parameter Estimates

Dependent Variable: Resource Intensity Weight

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	7.556	.502	15.048	.000	6.572	8.540
Gender_first	-.200	.081	-2.488	.013	-.358	-.043
Age_first	-.029	.005	-5.289	.000	-.040	-.018
entry_clinic	.182	.296	.614	.539	-.398	.762
entry_dept	-.408	.377	-1.081	.280	-1.146	.331
Entry_code_ER	-.495	.108	-4.579	.000	-.707	-.283
Readmit_planned	-.237	.151	-1.568	.117	-.533	.059
Acute_seven	2.518	.370	6.799	.000	1.792	3.244
Acute_8_28	-.114	.152	-.747	.455	-.413	.185
Acute_daysurgery	-.221	.123	-1.796	.073	-.462	.020
DD_LTC	.775	.259	2.990	.003	.267	1.283
DD_Other	-.467	.463	-1.007	.314	-1.374	.441
DD_Home_Support	-1.844	.243	-7.585	.000	-2.320	-1.367
DD_Home	-2.544	.227	-11.224	.000	-2.988	-2.099
DD_AMA	-3.285	.827	-3.974	.000	-4.906	-1.665
DD_Died	.155	.259	.599	.549	-.353	.664
Rural_urban_residence_first	.066	.088	.749	.454	-.106	.237
Rural_urban_facility_first	.748	.107	7.006	.000	.538	.957
CCI	.254	.029	8.653	.000	.196	.311
[MIGroup_max=0]	-1.930	.137	-14.070	.000	-2.199	-1.661
[MIGroup_max=1]	0[a]	.	.	.	.	.

Entry_clinic- Patient was admitted from an outpatient clinic; Entry_dept- Patient was admitted through another department of the hospital; Entry_code_ER- Patient was admitted through the ER department; Acute_seven- readmitted to acute hospital in less than 7 days of being discharged; Acute_8_28- readmitted to hospital within 8-28 days of being discharged; Acute day surgery- readmitted within 7 days of being discharged from day surgery; DD_LTC- Discharged to long term care setting; DD_Other- Discharged to other facility: DD_Home_Support- Discharged home with supports services in place; DD_AMA- Discharged self against Medical advice; DD_Died- Died in hospital.

Table 13: Resource Intensity Weight adjusted outcome output data

Total Hospital Cost. Similar to other outcome variables, mental health coding during a hospital admission significantly predicted total hospital cost. Using general linear modelling to help control for other influential covariates, the presence of mental illness diagnostic codes on their own, exerted significant influence on seniors' total hospital cost ($p = .000$) (Table 14).

Parameter Estimates

Dependent Variable: Mean Cost/Admission (Cdn $)

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	23635.576	2311.772	10.224	.000	19104.147	28167.0
Gender_first	-749.638	370.667	-2.022	.043	-1476.203	-23.0
Age_first	-116.678	25.289	-4.614	.000	-166.247	-67.1
entry_clinic	1588.607	1362.543	1.166	.244	-1082.187	4259.4
entry_dept	-1813.792	1735.085	-1.045	.296	-5214.827	1587.2
Entry_code_ER	-438.817	497.778	-.882	.378	-1414.538	536.9
Readmit_planned	652.184	694.837	.939	.348	-709.803	2014.1
Acute_seven	2850.673	1704.927	1.672	.095	-491.245	6192.5
Acute_8_28	-621.115	701.969	-.885	.376	-1997.082	754.8
Acute_daysurgery	-651.717	565.731	-1.152	.249	-1760.637	457.2
DD_LTC	11976.771	1193.029	10.039	.000	9638.251	14315.2
DD_Other	8155.519	2132.565	3.824	.000	3975.363	12335.6
DD_Home_Support	-569.773	1119.279	-.509	.611	-2763.732	1624.1
DD_Home	-3403.851	1043.386	-3.262	.001	-5449.048	-1358.6
DD_AMA	-6446.047	3805.899	-1.694	.090	-13906.196	1014.1
DD_Died	11655.840	1193.770	9.764	.000	9315.866	13995.8
Rural_urban_residence_first	716.412	403.305	1.776	.076	-74.127	1506.9
Rural_urban_facility_first	2775.269	491.252	5.649	.000	1812.340	3738.1
CCI	181.944	135.067	1.347	.178	-82.808	446.6
[MIGroup_max=0]	-7672.098	631.449	-12.150	.000	-8909.836	-6434.3
[MIGroup_max=1]	0[a]	.	.	.	.	

Entry_clinic- Patient was admitted from an outpatient clinic; Entry_dept- Patient was admitted through another department of the hospital; Entry_code_ER- Patient was admitted through the ER department; Acute_seven- readmitted to acute hospital in less than 7 days of being discharged; Acute_8_28- readmitted to hospital within 8-28 days of being discharged; Acute day surgery- readmitted within 7 days of being discharged from day surgery; DD_LTC- Discharged to long term care setting; DD_Other- Discharged to other facility: DD_Home_Support- Discharged home with supports services in place; DD_AMA- Discharged self against Medical advice; DD_Died- Died in hospital.

Table 14: Total hospital cost adjusted outcome output data

Other Findings

There were other findings from this study worthy of mentioning. These include the primary health care provider, the service under which seniors with and without mental illness diagnostic codes were admitted and the issue of suicide.

Health care provider and service. Generally, seniors admitted to acute care hospitals were done so under the care of either a family practitioner (29.2%) or an internist (25.4%) to the service of general medicine (50.1%). Similarly, seniors with and without mental illness diagnostic codes were most often admitted under the care of a general practitioner (31.7% vs. 28.7%) or an internist (24.7% vs. 25.5%). As for the primary service under which the senior was admitted, seniors with and without mental illness diagnostic codes were again, most often admitted to the patient services of general medicine (52.9% vs. 49.6%). This study found health care provider and service to be very comparable between seniors with and without mental illness codes.

Suicide. When examining the issue of suicide, it was found that of all 12,502 seniors admitted to acute care hospitals, seven were coded for a suicide attempt. These seven patients (four males and three females) had a total of nine re/admissions. The mean age of females (71 years) who attempted suicide was significantly lower than the mean age of males (72 years) ($p = .023$; $t = 0.260$; $F = 7.167$). All patients survived and were discharged home or discharged home with support services in place.

Discussion: Chapter Five

This retrospective descriptive study used an administrative database that included the entire population of the province of Newfoundland and Labrador (NL) to examine differences in acute care hospital use by seniors with and without mental illness codes. Findings from the study showed that while the recorded[2] prevalence of mental illness in seniors was low, there were statistically significant differences in the use of acute hospital in-patient services between seniors with and without mental illness diagnostic codes. Seniors with mental illness codes had a longer total hospital stay, acute stay, emergency room wait, and greater rate of admission, resource intensity weight and cost than did seniors without mental illness codes.

The Epidemiology of Mental Illness in Seniors

This study found that the prevalence of mental illness in hospitalized seniors in the province of NL was relatively low, at only 10%. In spite of NL having one of the most rapidly aging populations (Government of Newfoundland & Labrador, 2002; Statistics Canada, 2009), and therefore, a suggested cumulative increase in significant life events (Carriere, 2006; Nabalamba & Millar, 2007) and a suspected high prevalence of mental illness in seniors (Cole et al., 2008); this prevalence was not found.

The low prevalence of mental illness in seniors found in this study is supported by previous research. Although it was not as low as survey-based research studies have found (Cairney et al., 2008; Corna et al., 2007; Mosier et al., 2010; Préville et al., 2008; Rush et al., 2008; Starkes et al., 2005), it is lower than the Canadian population accepted norm of 20% (Health Canada, 2002). Although the aging person encounters many physical and mental/cognitive changes across the lifespan, some studies identify that these changes are not

[2] Prevalence of mental illness was calculated based on a patient having an ICD-10 code for mental illness coded in the administrative discharge abstract. It has been acknowledged in the literature that mental illnesses are undercoded in administrative databases suggesting that the actual prevalence of mental illness in NF and Labrador is in fact higher.

definitively related to the occurrence of mental illness in seniors (American Psychological Association, 1998; Barnes et al., 2007; Salthouse, 2010). The development of a mental illness in seniors is not a normal change as some previously thought; in fact, the cognitive difficulties that are thought to be correlated with increased age are now understood to be associated with other events, such as physical and/or chronic illness (Han et al., 2010), medication usage (Howland, 2009), elder abuse (Kahan & Paris, 2003), vitamin deficiencies (Wilkins et al., 2006), metabolic disturbances (Hendrickx et al., 2005), and multiple concurrent stressors (Kave et al., 2010), to name a few.

As highlighted earlier, older adulthood is an opportunity for individuals to experience continued growth and to develop unique capacities (Fritsch et al., 2007; Penick & Fallshore, 2005) and contrary to popularly held negative stereotypes, many seniors lead happy and fulfilling lives without significant cognitive changes and/or altered mental status (Barnes et al., 2007; CMHA, 2005; Fritsch et al., 2007). Perhaps having lived through the hardships of war, epidemics and deaths of family and friends (Kimhi et al., 2011), a greater mental endurance, integrity and coping ability (Cloyd & Dyer, 2010; Kimhi et al., 2011) and hence a low rate of mental illness has developed.

One factor unique to the province of NL that may have contributed to the low prevalence of mental illness observed in the seniors in this study is the culture of its people, which is characterized by much kindness, kindred spirit, hospitality and cohesiveness (Moore, 2011). In spite of its rugged terrain (Government of NL Department of Tourism, 2011; Higgins, 2008), harsh climate (Higgins, 2008; Memorial University of Newfoundland, 2007), and prevalent economic hardship that dominates much of its society (Higgins, 2008), Newfoundland has traditionally been known for its close-knit family-focused province with many extended families

(Read & Wuest, 2007). Extended family arrangements that so often occur in Newfoundland and Labrador in response to historic economic hardship may actually have buffered and played a preventative role in deterring mental illness in the elderly (Kremarik, 2000; Pope, 2004). As Kremarik (2000) found, Newfoundlanders and Labradorians are the most sociable people in all of Canada. Particularly, as they age, this sense of friendly contact and socialization with their neighbours increases even more, compared to younger cohorts. As supported by Stephens, Dulberg and Joubert (2000), although the provinces of Newfoundland and Prince Edward Island are always considered isolated and earmarked as "have not" provinces, their populations actually have the best mental health across Canada; with the highest sense of coherence, the most happiness and the least amount of distress and depression. Although much of the younger generation have left the province of NL in search of employment in other provinces (Higgins, 2008), and that NL has one of the lowest birth rates in Canada (Statistics Canada, 2006), there is obviously reason to believe that the seniors of this province were still able to maintain optimal mental health.

A strong presence of familial and social support has been shown to help prevent individuals from developing mental illnesses. The presence of good social support, not only correlates with an enhanced sense of overall well-being (CMHA, 2005; Health Canada, 2004; Smylie, 2003), it also increases one's quality of life, control and self esteem (McInnis & White, 2001). The caring and respect that occurs in social relationships and the resulting sense of satisfaction and well- being buffers against stress and health problems in general (Boydell, Gladstone & Crawford, 2002; DeMarco, 2000; Ducharme, Stevens & Rowat, 1993; Health Canada, 2004; McGee et al., 2004). The National Institute of Aging (2004) noted that a supportive environment results in less than one third of older people reporting feelings of

boredom or loneliness. Furthermore, seniors express more life satisfaction when their social networks include friends as well as relatives. It is cognitive stimulation typically provided by social interaction, that psychologically enhances their sense of identity, value in themselves and their continued personhood, so much so that it is believed to deter cognitive impairments and the development of mental illness (DeMarco, 2000; McInnis & White, 2001).

From a social support perspective, marital status may have also played a role in influencing the findings of this study. Unfortunately, marital status has not been captured in the NLCHI database since 2002 (NLCHI, 2011), hence, it was not a variable that could have been assessed in this study. However, given the characteristic close-knit and supportive culture of the province, accompanied by the fact that the province of Newfoundland has the lowest divorce rate in Canada (Gyapong, 2009; Human Resources and Skills Development Canada, 2011), there is reason to believe that being married positively impacts the promotion of good mental health in seniors, that in turn lowers the prevalence of mental illness.

Being married or having a significant other in one's life is traditionally associated with better overall physical and mental health well-being (Kristjannson et al., 2000), increased longevity (Stephens et al., 1999), decreased mortality (Kessler, Frank, Edlund, Katz, Lin & Leaf, 1997; Stephens et al., 1999), and decreased psychiatric morbidity (Offord et al., 1996; Bland, Orn & Newman, 1988). Gallagher maintained that the covenant of marriage exerts a protective effect against the development of a mental illness, which results in married seniors having a lower suicide rate than single/divorced/widowed seniors (Gallagher, 2000).

Finally, there is reason to suggest that the low prevalence of mental illness in seniors in this study was partly due to seniors with mental illness being under-diagnosed by health care providers. Research has identified that physicians may lack the education, mental health

preparation and expertise needed to do an accurate assessment of mental illness in seniors, hence, mental illnesses in seniors has been overlooked, unrecognized, and not diagnosed (Blixen, 1994; Cherney et al., 2003; Hershkovitz, Kalandariov, Hermush, Weiss, & Brill, 2007; Rogers & Barusch, 2000; Sternberg et al., 2000). Freedberg et al. (2008) add that for older patients with cognitive impairment, diagnostic attempts by practitioners are rare, whereby over 65% of outpatients with cognitive impairment are never evaluated for cognitive status. Further compounding this issue is the fact that some mental illnesses in seniors manifest themselves differently than in other populations. Depression in seniors, for example, often presents with psychosomatic complaints, so depression in seniors can get masked and only discerned through an expert assessment (Rogers & Barusch, 2000; Saravay et al., 2004). Clearly, a missed or overlooked diagnosis translates into a missed coding opportunity (Lahti & Penttila, 2001).

Contrary to what was found in this study, some insist that the prevalence of mental illness in seniors is quite high (Benazzi, 2000; Bourgault-Fagnou & Hadjistavropoulos, 2009; Tranmer et al., 2003; Bryant et al., 2009; Chen et al., 2007; Cullum et al., 2008; Fisher & Copenhaver, 2006; Robison et al., 2009; Martens et al., 2007; Shah, Evans et al., 2000; Shah, Hoxey et al., 2000; Unsar & Sut, 2010; Yohannes et al., 2008; Naughton et al., 1995). However, these studies were not without their limitations which primarily include limited sampling procedures (Benazzi, 2000; Bourgault-Fagnou & Hadjistavropoulos, 2009; Bryant et al., 2009; Chen et al., 2007; Cullum et al., 2008; Fisher & Copenhaver, 2006; Martens et al., 2007; Naughton et al., 1995; Robison et al., 2009; Shah, Evans et al., 2000; Shah, Hoxey, et al., 2000; Tranmer et al., 2003; Unsar & Sut, 2010; Yohannes et al., 2008). Unlike the current study that included all seniors, all ages, all geographical regions and all acute care hospitals, the limitations of these previous studies undermine the confidence with which their results can be generalized.

In summary, the prevalence of mental illness in seniors of the province of NL was found to be quite low. It is acknowledged that issues of a missed and/or under-diagnosis may have contributed to this low prevalence. However, there also exists the reality that the unique people and relationships formed by the seniors of the province of NL, together with the positive growth and development process of aging, may have contributed to the low prevalence of mental illness in seniors seen in this study.

Health Care Economics

The health care economics comparing the use of acute hospital resources of seniors with and without mental illness codes was a core focus of this research study. Using Andersen's model to conceptualize health service utilization by seniors, all measures of service use, including total length of stay, acute length of stay, rate of re/admission, emergency room wait time, resource intensity weight and costs, were explored in depth. This section helps to answer the main research question of "How do seniors with mental illnesses compare to seniors without a mental illness in their length of stay, acute length of stay, emergency waiting time, rate of admission, resource intensity weight and total hospital cost?"

Length of hospital stay and acute length of stay. Results from this study found that seniors with mental illness codes had longer total hospital stays and acute stays than did seniors without mental illness codes. Even after controlling for other co-morbidities, seniors with mental illness codes still had a significantly longer hospital stay than did seniors without mental illness codes.

This study's findings are well supported by previous research. Seniors with mental illness codes typically have longer hospital stays than do seniors without mental illness codes (Bressi et al, 2006; Chen et al., 2007; Gonzalez et al., 2009; Kunik et al., 2003; Lyketsos et al., 2000;

Saravay et al., 2004; Levenson, Hamer, & Rossiter, 1990). As Blank et al. (2005) suggest, despite efforts to decrease hospital stays for mentally-ill seniors, geriatric patients still incur a significantly longer hospital stay compared to younger cohorts. Further, seniors who are war veterans (Chen et al., 2007; Kunik et al., 2003), female (Frise et al., 2002), have specific co-morbidities (Frassure-Smith et al., 2000; Sayers et al., 2007), are from various geographical jurisdictions (Roos et al., 2003) or have only specific mental illnesses (CIHI, 2005; CIHI, 2006; CIHI, 2007a; CIHI, 2008b; Lyketsos et al., 2000) incur a much longer hospital stay than do seniors without mental illness codes. In addition, seniors with other mental illnesses besides organic disorders, such as substance disorders, psychotic disorders, mood disorders, personality disorders and other mental illness not specified, have longer general hospital stays compared to mentally-well seniors (CIHI, 2008c). Even when seniors receive a mental health consult while hospitalized, they still have a length of stay that is 10 days longer than seniors who receive no mental health consult (Verbosky, Franco, & Zrull, 1993). While there has been a noticeable decline in length of stay for mentally-ill seniors (Heeren et al., 2002; Watanabe-Galloway & Zhang, 2007), length of stay still averages about 16.9 days, compared to only 7.2 days for seniors without mental illness codes (CIHI, 2006).

Several others have found that whether hospitalized seniors have mental illnesses alone (Chi et al., 1995; Connor et al., 2010; Freedberg et al., 2007; Fulop et al., 1998), or with physical co-morbidities (Chi et al., 1995; Hershkovitz et al., 2007; Snowden et al., 2004), they incur a longer hospital stay than do seniors without mental illnesses. Hammond et al. (2009) adds that 63% of seniors with mental illnesses are admitted to hospital for an inappropriate duration and 90% of them stay too long. In particular, seniors at increased risk for long hospital stays are those with depression, organic brain, cognitive impairment and substance abuse disorders

(Verbrosky et al., 1993). Fulop et al. (1998) also found that seniors with cognitive impairment, depression or anxiety had a hospital stay that was 2.6 days longer compared to seniors without these mental illnesses. Finally, Blank et al. (2005) found that multiple prior hospitalizations was also a predictor of hospital stay where the more hospitalizations that occurred, the longer one's stay became.

In-hospital events also play a role in affecting mentally-ill seniors' hospital stay. Decades ago, Wallen, Pincus, Goldman, & Marcus (1987) found that seniors receiving psychiatric consultations had an average length of stay that was nine days longer than those not requiring psychiatric consults. Test delays have also been found to prolong mentally-ill seniors hospital stay (Butler et al., 1996; Hammond et al., 2009). Butler et al. (1996) reported that inappropriate hospital days were often due to diagnostic imaging procedure delays and Hammond et al. (2009) noted that inappropriate hospital stays were due to delayed undertaking of, or receipt of investigations and delayed specialty and therapeutic services. Similarly, lack of and inappropriate referrals are a well-recognized system issue that often causes seniors with mental illnesses to stay longer in hospital than is necessary (Blank et al., 2005; Collins et al., 1997; Coyne & Katz, 2001; Crabb & Hunsley, 2006; Fernando et al., 2010; Flint, 1997; Hammond et al., 2009; Klap et al., 2003; Wen et al., 2007).

Inefficient discharge processes and practices contribute to seniors with mental illness codes staying longer in hospital than they need to. Efficient and effective discharge processes need to be in place in order for mentally-ill seniors to be appropriately discharged from acute in-patient hospitals, and in a timely fashion (Butler et al., 1996). Discharge processes should be integrated into comprehensive care plans (Popejoy, 2010), but for seniors with mental illnesses

who are placed off service (as frequently occurs), inadequate care plans and discharge processes are, in all likelihood, the norm.

Draper and Luscombe (1998) maintained that hospital stays for acute psychiatric admissions tend to be longer among older patients because of concomitant physical illness and placement problems, where 40% of bed days are used for mentally unwell seniors whose discharge is delayed. Blank et al. (2005) adds that delays in court proceedings also increase the financial burden on health care organizations by increasing hospital stays. Specific mental illnesses known to influence discharge delays resulting in lengthy hospital stays are depression, behaviour problems, confusion, psychosis and their diagnostic assessment (Draper & Luscombe, 1998).

Brownwell and Roos (1995) maintained that the longer hospital stay of mentally-ill seniors is strongly influenced by "hospital of admission", in particular, doctors' preferences and administrative inefficiencies. Butler et al. (1996) cited inefficient medical management as a chief cause of inappropriate hospital days in mentally-ill seniors. Similarly, Hammond et al. (2009) found that inappropriate hospital stays are due to delays in discharge planning and compounded by delayed and/or inappropriate medical management decisions.

Finally, the issue of bed availability also perhaps influenced the findings of this study. Given that bed occupancy is a prevalent issue in most hospitals in our current health care climate of bed shortages and unit closures, it is not uncommon for mentally-ill seniors to be placed in off-service units (Rae, Busby, & Millard, 2007). Typically, the care and expertise needed by mentally-ill seniors is unavailable among the attending staff on medical-surgical units and must be obtained via consultations, thus jeopardizing the optimal plan of care (Kowal, Swenson, Aubry, Marchand, & MacPhee, 2011).

Contrary to this study's findings, previous studies have reported that seniors with mental illnesses do not incur longer hospital stays than do seniors without mental illnesses (Chaput & Lebel, 2007; Chi et al., 1995; Freedberg et al., 2007; Silverstein et al., 2008; Snowden et al., 2004). Snowden et al. (2004) found that although older adults with mental illness have longer hospitals stays compared to younger adults the longer stay is actually due to physical illness severity, not mental illness. However, the study by Snowden et al. (2004) as well as the studies by both Chaput and Lebel (2007) and Silverstein et al. (2008) included only one hospital sample. Further, Freedberg et al. (2007) who found the difference in hospital stays between seniors with and without mental illnesses to be non-significant, included only seniors 85 years and older in their study, and Chi et al. (1995) used only seniors 75 years and older in their study sample. Finally, Health Canada (2002) suggests that seniors with mental illness have one of the shortest hospital stays compared to other age cohorts. However, they only studied individuals who have mental illness listed as their primary admitting diagnosis. Due to limited samples used, the results of all of these studies cannot be generalized to other older adult populations and settings.

In summary, this study found that seniors with mental illness codes experienced longer hospital stays and acute stays than did seniors without mental illnesses, even when other medical co-morbidities were controlled for. This study is well supported by previous studies and contradicted only minimally by others, therefore because of its rigor, its findings can be instructive and used as evidence by policy and decision makers to better help address the long hospital stays being experienced by mentally-ill seniors. This study was rigorous in its approach because it included all seniors 65 years and older, all geographical regions, all mental illness diagnostic codes, and all acute hospitals/facilities in the province of NL. Studies presented that did not support the findings of this study were often limited in their generalizability, because

they included select seniors' age groups, samples and/or seniors whose mental illness was the primary diagnosis only.

Rate of admission and readmission. This study found that seniors with mental illness diagnostic codes had a significantly higher re/admission rate to acute hospital than did seniors without mental illness diagnostic codes. Even after controlling for the influence of other co-morbidities, seniors with mental illness codes still had significantly more re/admissions than did seniors without mental illness codes. Further, seniors who had only one admission were mostly seniors without mental illness codes while seniors experiencing multiple re/admissions were primarily seniors with mental illness codes.

This study supports much of what the literature suggests thus far; that seniors with mental illnesses have more re/admissions to acute care hospitals than do seniors without mental illnesses (Chen et al., 2007; CIHI, 2005; CIHI, 2006; CIHI, 2007a; CIHI, 2008b CIHI, 2008; Kunik et al., 2003; Naughton et al., 1995; Tranmer et al., 2003; Walter-Ginzburg et al., 2001). For example, whether studies include war veterans (Chen et al., 2007; Kunik et al., 2003), mental illness as the primary admitting diagnosis (CIHI, 2006; CIHI, 2008), females only (Frise et al., 2002), specific co-morbid illnesses such as heart failure (Frassure-Smith et al., 2000; Sayers et al.; 2007) or specific mental illnesses such as depression (McCusker et al., 2000), these studies have shown that seniors with mental illnesses have a higher rate of re/admission to hospital compared to seniors without mental illnesses.

Draper and Luscombe (1998) found that psychological factors, depression in particular, was the main reason for admission to hospital and significantly predicts duration of hospital stay. Other studies reveal that organic disorders represent almost half of all hospital discharges of seniors in both general and psychiatric hospitals (CIHI, 2005; CIHI, 2006; CIHI, 2007a; CIHI,

2008b). In addition, Walter-Ginzburg et al. (2001) and Tranmer et al. (2003) both found that seniors with mental illnesses more often seek admission to hospital and have overnight hospitalizations than do seniors without mental illnesses. In addition, mentally-ill seniors have been found to most often seek readmission through emergency departments (McCusker et al., 1997; McCusker et al., 2000; McCusker et al., 2007). In particular, when comparing readmission rates, seniors with depression have more visits in a six-month period and have more 30-day returns then do seniors without depression (McCusker et al., 2000). CIHI (2006) suggests that the longer the initial general hospital stay, the greater the chance that readmission will occur within one year.

Lack of home care and/or community-based supports also contribute to hospital re/admissions for mentally-ill seniors. The need for increased home care and community-based services for seniors with mental illnesses is repeatedly echoed in the literature (Kozyrskyj et al., 2004; MacCourt, 2004; Menec et al., 2004). These resources fulfill a much needed function that can help keep seniors with mental illnesses optimally functioning in their own homes and out of hospitals. On the one hand, the receipt of home care is a key predictor of institutionalization (Kozyrskyj et al., 2004; Silverstein et al., 2008), but when available and accessible in adequate quantities, it promotes more independent and community living, disease management and achievement of health tasks without requiring the mentally-ill seniors to be hospitalized and/or institutionalized (Kozyrskyj et al., 2004).

Some previous research contradicts the findings of the current completed study. Some suggest that seniors with mental illnesses do not necessarily have more re/admissions to hospital than do seniors without mental illnesses, or if they did, it was not significant (Freedberg et al., 2007; Madi et al., 2007). For example, while Health Canada (2002) find seniors with mental

illness have one of the lowest rates of hospitalization and the lowest proportion of all hospitalizations compared to all other age cohorts, they only used data where mental illness was the primary admitting diagnosis. Further, admission rates (Silverstein et al., 2008; Snowden et al., 2004) and emergency visits (Chaput & Lebel, 2007) for seniors with mental illnesses are no different than they are for seniors without mental illnesses. However, each of Snowden et al. (2004), Silverstein et al. (2008) and Chaput and Lebel (2007) used very limited study samples. Chi et al. (1995) who reported no significant difference between cognitively impaired seniors and physically frail and physically healthy seniors in admission rates, used only seniors 75 years of age and older. As well, while Freedberg et al. (2007) studied only seniors 85 years and older and focused on only cognitive impairment, Madi et al. (2007) included only seniors whose mental illness was the primary admitting diagnosis. Finally, Cornette et al. (2005) suggests that the recurrence of a severe medical problem is probably the main reason for readmission within three months of discharge and that factors related to early readmissions are mainly medical, not mental, in nature. Cornette et al. (2005) however, included only seniors 70 years and older and only included cognitive impairment as a risk factor for admission.

In summary, the findings from this study showing that seniors with mental illness codes experienced a greater number of re/admissions than did seniors without mental illnesses is supported by previous research. Further, seniors without mental illness codes often only had one hospital admission, while those with mental illness codes had two or more hospital re/admissions. The findings of this study can be utilized to better address the frequency of re/admissions of seniors with mental illnesses to hospitals.

Emergency room wait time. Emergency room wait time is another hospital use indicator analyzed in this study. The results showed that seniors with mental illness diagnostic

codes had a significantly longer mean emergency room wait time than did seniors without mental illness codes, even after controlling for other medical co-morbidities.

Overall, the limited research on emergency room wait times for seniors supports the findings of this study that seniors with mental illnesses wait longer in emergency room departments of acute hospitals than seniors without mental illnesses (Elkum, Fahim, Shoukri, & Al-Madouj, 2009). As Elkum et al. (2009) found, older adults have the longest wait in emergency rooms, particularly if they have a mental illness (Nielson & Klein, 2009). No research found to date suggests that seniors with mental illnesses have a shorter wait time in the emergency department than do seniors without mental illnesses.

In summary, this study found that seniors with mental illness codes experienced longer emergency wait times than did seniors without mental illnesses. While a dearth of research exists on the topic of seniors' wait times in emergency rooms, what was found supports the current study. Given that no studies could be found to suggest that seniors with mental illnesses have a shorter emergency room wait time, lends further support to the findings of the current study whose approach was rigorous with enhanced generalizability and representativeness that is needed to make solid well informed clinical and program decisions.

Resource intensity weight and hospital costs. Given that seniors with mental illnesses in this study have already been shown to have longer hospital stays, acute hospital stays and rates of re/admission to hospital, it seemed only logical that they would also incur a greater resource intensity weight and hospital cost. Indeed, this study did find that seniors with mental illness codes were more resource intensive and costly to acute hospitals than were seniors without mental illness codes. Even after controlling for other medical co-morbidities, the presence of mental illness in seniors still significantly predicted greater resource intensity weight.

Although the literature on resource intensity weight is scarce when trying to find comparisons between seniors with and without mental illnesses, the literature on cost is more abundant. The majority of research found supports this study's findings; that seniors with mental illnesses are costlier to the hospital system then are seniors without mental illnesses (Frassure-Smith et al., 2000; Lyketsos et al., 2000; Saravay et al., 2004; Sayers et al., 2007; Tranmer et al., 2003; Walter-Ginzburg et al., 2001). Even in the presence of other co-morbid illnesses common to seniors, such as heart failure, seniors with mental illness continue to incur greater costs than do seniors with heart failure and no mental illness (Frassure-Smith et al., 2000; Sayers et al., 2007). Harman et al. (2004) found that mood disorders, particularly, depression and bipolar disorder, are two of the most expensive conditions associated with inpatient psychiatric treatment. Further, although seniors' multiple admissions has been found to decrease overall (Heeren et al., 2002), it is short term hospitalizations, that so often occur, that are the most expensive type of medical care and constitute the largest proportion of health care expenditures (Koenig & Kuchibhatla, 1998).

Overall, this study's findings, accompanied by recent trend costs, are consistent with what was found in the literature. Even dating back to 1985 in Canada, the mean cost for seniors using psychiatric in-patient services was a lot more than for seniors not using psychiatric services (Richman, 1985). No research conducted to date has been found to suggest that seniors with mental illnesses are less resource intensive or less costly to hospitalize than are seniors without mental illnesses.

This concludes the discussion of findings related to acute hospital use for seniors with and without mental illness codes. Following is a description of the remaining findings, which

focus on how the predisposing, enabling and need variables can facilitate or impede acute hospital service utilization for seniors with and without mental illness codes.

Variables Impacting Service Use

In this study, differences between seniors with and without mental illness diagnostic codes were found for each hospital use measure of hospital stay, acute length of stay, rate of re/admission, emergency room wait time, resource intensity weight and costs. However, a number of variables outlined by Andersen's health service utilization model for how they impacted this hospital use were also explored. These variables include individual, as well as system characteristics, of predisposing, enabling and need variables. This section discusses the outcomes that answer the second main research question of "What is the influence of age, gender, geography of residence, a mental illness diagnosis, co-morbidities, referring institution, discharge destination, discharge disposition, admission variables, on total hospital length of stay, acute length of stay, emergency room waiting time, rate of re/admission, resource intensity weight and costs for seniors with and without mental illness?"

Predisposing variables. Two key predisposing variables of age and gender were explored in this study. These variables were found to influence seniors' hospital use to varying degrees, but not always were they as significant or influential as previously thought.

Age. This study found that age was associated, although only minimally, with increased service use. For each outcome variable of total hospital stay, acute hospital stay, rate of re/admission, emergency wait time, resource intensity weight and hospital cost, although minimal in strength, correlations with age were positive. After controlling for other co-morbidities, age still significantly predicted service use for both seniors with and without mental illness diagnostic codes.

The results of this study are supported by various other studies. Blixen (1994) suggested the use of emergency rooms for mental health reasons increased with advancing age, with those > 85 yrs making more emergency room visits than the young "old" and middle "old" groups. Others have also found that seniors exhibit an increased use of services with advancing age (Demers, 1995; Nabalamba & Millar, 2007; Watson et al., 2005). This high use relates to their increased vulnerability to disease and injury, and the multiple co-morbidities they often exhibit (Carriere, 2006; CIHI, 2008b; Crabb & Hunsley, 2006; Dalziel, 1996; Frise et al., 2002; McCusker et al., 2000; Nabalamba & Millar, 2007; Reid et al., 2003; Rotermann, 2006; Starkes et al., 2005). Some propose that increased illness and mental illness is an expected norm, as the body becomes increasingly susceptible to the development of much co-morbidity (Carriere, 2006; Dalziel, 1996; McCusker et al., 2000; Nabalamba & Millar, 2007; Reid et al., 2003; Rotermann, 2006).

For both out-patient community and in-patient hospital services, other researchers found that seniors exhibit high rates of use for physician offices (Dalziel, 1996; Demers, 1995; Nabalamba & Millar, 2007; Reid et al., 2003; Watson et al., 2005) and in-patient hospital services (Bay et al., 1997; Roos et al., 2003; Rosenberg & Moore, 1997). For readmission rates in particular, the risk of readmission to an acute care hospital typically increases with the age of the patient, and often results from a disruption in outpatient treatment (CIHI, 2006). For overall costs, seniors were shown to incur the highest average per capita spending in 2006 (CIHI, 2008).

While the findings of this study suggested age is positively correlated with hospital use and costs, others found contradictory results. Some found that seniors do not use a lot of health care services as many think (Hunt et al., 2006; Lix, Newburn-Cook, Roos, & Derksen, 2002; Stockdale et al., 2007). Although Hunt et al. (2006) suggests younger age groups are more likely

to use emergency room departments; their study used data based on self- reports, which involves recall bias and admittedly, as the authors state, "seniors' representation was significantly low, with insufficient data occurring for most users aged 65 and older". As well, Bland, Newman and Orn (1997), who found that the younger, not older adults are the highest help-seekers for mental health issues looked at urban populations only, relied on self-reported data, and used old data from 1984-1989. Stockdale et al. (2007) also used only data that was obtained from a self-reported survey that had much potential for bias. Chaput and Lebel (2007) who looked at all adults seeking admission through a psychiatric emergency room found that elderly patients are not high users; in fact, the younger patients were found to be the highest seekers for mental health issues in particular. However, the sample in that study was obtained from a single hospital. Finally, Watanabe-Galloway and Zhang (2007) suggest from discharge trends, that seniors' hospital use is actually on the decline; however, their study was limited by using one general hospital only and included only those with a primary diagnosis of mental illness.

In summary, the population of seniors in the province of NL has increased exponentially compared to other Canadian provinces. As such, age remains a key predisposing variable as suggested in Andersen's model of service use. Age exhibited a positive correlation with each of the variables of total and acute hospital stays, rate of re/admission, emergency room wait time, resource intensity weight and hospital cost. This finding was supported by research conducted in this field to date. Although some studies suggested that increased age does not translate into a higher use of hospital services, these studies were found to have limited generalizability because of self-reported data, geographical location, single hospital departments, and use of seniors whose mental illness was a primary diagnosis only. The current study that included all seniors 65 years and older, all geographical locations, all mental illness diagnostic codes whether they were

the primary, secondary, or tertiary, all geographical locations, and all hospitals/facilities in the province of NL was felt to exhibit stronger generalizability and representativeness, because of its enhanced methodological rigor. The additional objectivity obtained by using data from an administrative database was also felt to increase the generalizability of findings from this study.

Gender. In this study, females with mental illness diagnostic codes were no more significantly likely than males with mental illness codes to be found in acute hospitals in NL. However, in looking at the specific hospital services used, significant differences were found. For example, females with mental illness diagnostic codes experienced a significantly higher mean length of stay, acute length of stay, and greater emergency room wait time, than did males with mental illness diagnostic codes. Further, although females with mental illness codes had higher usage of acute hospital services, mentally-ill male seniors actually incurred a higher resource intensity weight and cost/hospitalization than did the females.

The findings of this study related to gender are supported by much of what has been found in previous research studies. Others have shown that females are more frequently the greater users of acute hospital services than are males (Carriere, 2006; Crabb & Hunsley, 2006; Fernandez-Olano et al., 2006; Finkelstein, 2001; Humphries & Doorslaer, 2000; Mackenzie et al., 2006; McCusker et al., 2000; Nabalamba & Millar, 2007; Redondo-Sendino et al., 2006; Reid et al., 2003; Sajatovic et al., 2004; Starkes et al., 2005; Streiner et al., 2006; Walter-Ginzburg et al., 2001; Weiss et al., 2002). In particular, female seniors with mental illnesses experience longer hospital stays and more hospital admissions than do male seniors with mental illnesses (Jimenez, Lam, Marot & Delgado, 2004; Koenig & Kuchibhatla, 1998; Roos et al., 2003; Sajatovic et al., 2004; Sayers et al., 2007; Watanabe-Galloway & Zhang, 2007).

To the contrary, some researchers find male seniors with mental illnesses are the greater hospital users (CIHI, 2006; Lai & Chau, 2007; McCusker et al., 1997; Silverstein et al., 2008). McCusker et al. (1997) found that while female seniors use emergency services more often than males, it is the males who get more frequently admitted and had higher repeat visits back to the emergency department. However, this study used only one emergency room department of one hospital. Both CIHI (2006) and Tranmer et al. (2003) found that male seniors with mental illnesses are higher users of health care services than are female seniors with mental illnesses. However, Tranmer et al. focused only on the diagnosis of dementia and CIHI (2006) only included patients whose mental illness was the primary admitting diagnosis. Further, Silverstein et al. (2008) suggest that mentally-ill males are at a higher risk of admission and readmission than are females; however, this study too, used a sample from one hospital only.

While there was a dearth of literature found to support the finding from this study that males with mental illness codes are the most costly in terms of hospital use, there is much research on general gender differences in cost. One study by Burns, Cain and Husaini (2001) found that although mood disorders, outpatient costs and total mental health costs are higher for females, males actually have the highest overall total health care costs. In general, males are more costly to maintain in hospitals than are females. In a study by Knight (2009) it was found that males had higher total acute care hospital costs for 11 of the 15 most expensive health conditions including myocardial infarction, angina pectoris and colorectal cancer. This finding that males have a tendency to be more likely hospitalized for these more serious health conditions was supported by many others as well (Ariste, Panait, & Lalonde, 2009; Morettin et al., 2000).

Research to the contrary suggests that mentally-ill females are the greatest users of acute hospital services (Jimenez et al., 2004; Koenig & Kuchibhatla, 1998; Roos et al., 2003; Sajatovic et al., 2004; Sayers et al., 2007; Watanabe-Galloway & Zhang, 2007), hence, because increased service use often positively correlates with resources used and cost incurred, they are also suspected then to be the most costly as well. However, these studies are not without their limitations. For example, Watanabe-Galloway & Zhang (2007) found that mentally-ill females have significantly more discharges than do mentally-ill males, however, their study used general hospitals only, those with a primary diagnosis of mental illness only and just four mental illnesses were included. Sajatovic et al. (2004) as well, found that mentally-ill females have longer hospital stays than do males, however their study included only one gero-psychiatric hospital unit. Roos et al. (2003) also found that females, those with mental illness and seniors are the greatest hospital users, however, there was no statistical interactive effect completed to confirm the finding that it was indeed female seniors with mental illnesses who were the greatest hospital users. Jimenez et al. (2004) who found that mentally-ill females have significantly longer hospital stays than do mentally-ill males, included in their study everyone aged 55 and up, select mental illnesses only and used only one unit in one hospital. Koenig and Kuchibhatla (1998) and Sayers et al. (2007) also found mentally-ill senior females were the higher users of acute hospital services. While Koenig and Kuchibhatla (1998) used only seniors admitted to a general medicine, cardiology and neurology unit of one hospital, those 60 years of age and older and omitted seniors admitted from nursing homes, Sayers et al. (2007) used only mentally-ill seniors who had heart failure, and excluded all seniors with dementia or other cognitive impairment.

In summary, although this study found females with mental illness codes to be higher users of acute hospitals services, it also found males seniors with mental illness codes were actually the most costly on the health care system. Both results of this study are supported and contradicted by previous researchers, notwithstanding their methodological challenges, such as limitations of sampling, age, setting and medical and mental illness diagnoses included. The methodology used in this study has taken into consideration all of these challenges, and attempted to enhance the rigor to clarify the relationship between gender in seniors with mental illnesses and hospital use.

Enabling variables. The key enabling variables included in this study were geography both of one's residence and of the health care hospital/facility, co-morbid illnesses, and the accessibility and availability of care, services and facilities. With respect to access and availability of care, services and facilities, the indicators of discharge disposition, referring institution, discharge destination, entry code, admission code and readmission code were also assessed and analyzed. All of these hold much potential to influence one's access to health services and/or to represent barriers encountered by patients when trying to do so (Andersen, 1995; Bergeron et al., 2005).

Geography of residence. The results of this study indicated that seniors admitted to acute care hospitals were significantly more likely to be seniors with mental illness codes from urban, not rural areas. However, seniors with no diagnosed mental illness who were admitted were more frequently from rural, not urban areas. Seniors from urban areas with mental illness codes had a significantly greater total hospital stay, acute stay, resource intensity weight and hospital costs compared to seniors with mental illness codes from rural areas. Even when seniors had no mental illnesses, those from rural areas were less costly to hospitalize than were seniors from urban

areas. There were no significant differences found between these two groups for their waiting time in emergency and their rate of hospital admission.

The findings that urban mentally-ill seniors were the higher users of acute hospital services than were rural mentally-ill seniors is supported by other studies (Bowling, Farguhar, & Browne, 1991; Health Canada, 2006; Palinkas et al., 2007; Pepin et al., 2009; Shah et al., 2007; Solway et al., 2010). In general, Canadian urban seniors exhibit higher per capita utilization rates (Bay et al., 1997), physician visits (Dunlop et al., 2000; Tataryn et al., 1995), and hospital services (Finkelstein, 2001) than do those living in rural areas. If they are suffering from a mental illness, the general use of acute hospital services, rate of admission and higher total hospital days, and use by urban seniors exceeds that of rural seniors (Allan & Cloutier-Fisher, 2006; Cloutier-Fisher, Penning, Zheng, & Druyts, 2006; Jimenez et al., 2004; McCusker et al., 2007; Shea, Russo, & Smyer, 2000; Silverstein et al., 2008; Starkes et al., 2005). Further, the finding that rural seniors who are not diagnosed with a mental illness also get frequently admitted to hospital was also supported. Because the proportion of people aged 65 and over is higher and growing faster in rural areas as opposed to urban areas (Statistics Canada, 2006); it makes much sense that rural seniors without mental illness are most often getting admitted to hospital.

On the other hand, the findings of this study are not consistent with research that shows rural living, in and of itself, increases one's chance of developing mental illness (Hebert et al, 2000; Sambrook et al., 2004; Tryssenaar & Tremblay, 2002). Further, others have found that rural living seniors with mental illness are the greatest users of hospital services primarily because of the lack of needed resources and mental health expertise in those often isolated areas (Hebert et al., 2000; Sambrook et al., 2004; Tryssenaar & Tremblay, 2002). However, results of

these studies should be interpreted with caution due to some limitations in methods. For example, the study by Hebert et al. (2000) used data obtained from a survey that was not necessarily completed by patients but by proxies. Similarly, Sambrook et al. (2004) state that because they used convenience sampling, there was the potential for sampling bias, and data obtained was based on subjective recall of the participants which may or may not have included the seniors themselves. Finally, Tryssenaar and Tremblay (2002) used purposeful sampling with a very small sample of 19.

In summary, this research showed that seniors with mental illness codes from urban areas and seniors without mental illness codes from rural areas of NL were the greatest users of acute hospital services. This is supported by other related research. Studies that showed contradictory results had methodological challenges of sampling bias and use of proxies, not patients, in the data collection process, and hence, lack the rigor of the current study and its capacity to provide strong evidence upon which decisions can be made.

Co-morbid illnesses. Another key enabling variable suggested by Andersen's model of service use is that of co-morbid illnesses. In this study, seniors had a mean of six diagnoses, with the majority of seniors having between one and six diagnoses. Further, seniors with mental illness codes admitted to acute care hospitals had significantly more co-morbid illnesses than did seniors without mental illness codes. For each of total hospital stay, acute hospital stay, rate of re/admissions, emergency room waiting time, resource intensity weight and hospital costs, positive correlations increased as the number of co-morbid illnesses increased.

The findings of this study are supported by the literature which indicates that seniors often have increased rates of co-morbidities and/or complex medical illnesses (Carriere, 2006). In addition, studies have shown that seniors who have a lot of co-morbidities have a greater use

of acute hospital services (Blank et al., 2005; Braden et al., 2008; Carriere, 2006; Fernandez-Olano et al., 2006; Hansagi et al., 2001; McCusker et al., 2000; Nabalamba & Millar, 2007; Redondo-Sendino et al., 2006; Reid et al., 2003; Rotermann, 2006; Walter-Ginzburg et al., 2001). It has also been substantiated that when one of those co-morbidities is a mental illness, hospital use increases even more (Barush, Rogers & AbuBader, 1999; Braden et al., 2008; Choi et al., 2006; CIHI, 2008b; CMHA, 2005; Cole et al., 2008; Conn, 2002; Crabb & Hunsley, 2006; Dunlop et al., 2000; Frise et al., 2002; Fulop et al., 1998; Health Canada, 2006; Kunik et al., 2003; Nabalamba & Millar, 2007; Rogers & Barush, 2000; Sayers et al., 2007; Starkes et al., 2005). Specifically, mentally-ill seniors not only have more co-morbidities (Chen et al., 2007; Guijarro et al. 2010; Sayers et al., 2007), they have prolonged hospital stays (Carriere et al., 2004; Draper & Luscombe, 1998; Jimenez et al., 2004; Kozyrskyj et al., 2004; Patrick et al., 2001; Rogers & Barush, 2000), increased rates of re/admission to hospital (Gao et al., 2005; McCusker et al., 1997; McCusker et al., 2000; McCusker et al., 2007; Wilber et al., 2006), and increased costs as well (CIHI, 2008; Lyketsos et al., 2000; Saravay et al., 2004). In comparison, cognitively intact seniors have better levels of functioning on discharge, increased rates of improvement, increased potential for rehabilitation, and shorter lengths of stay (Guijarro et al., 2010). But for others, for example, seniors admitted with hip fractures, while depression is the most important factor associated with hospital stay; cognitive function, affective status & co-morbidities affect the rehabilitation outcomes (Mossey, Knott, & Craik, 1990). Blank et al (2005) noted that 66% of psycho-geriatric in-patients have at least two or more medical illnesses. Further, Jimenez et al. (2004) suggest that the more co-morbidities experienced by mentally-ill seniors, the greater their hospital stay.

The diagnosis of mental illness not only increases use of services in general, but it often negatively influences the rate at which mentally-ill seniors receive medically necessary procedures, particularly cardiovascular testing (Kisely et al, 2007). Even though ischemic heart disease persists as the major cause of death in people with mental illness (Harris & Barraclough, 1998; Lawrence, Holman, Jablensky, & Hobbs, 2003), the diagnostic procedures needed for the detection of this disease in mentally-ill seniors is not considered a priority (Kisely et al., 2007). A number of studies have demonstrated that seniors with co-morbid medical and psychiatric illnesses are heavy users of health care services are (Fulop et al., 1998; Koenig & Kuchibhatla, 1998). Hansagi et al. (2001) found that frequent emergency room users who are seniors, show high rates of multiple chronic medical conditions accompanied by psychiatric diagnoses. When admitted, the confusion and poor cognitive processing that occurs with organic disorders, often leads to other conditions that prolong hospital stay, such as agitation causing fractured hips from falling, wound separations, urinary tract infections, urinary incontinence and bedsores (Francis, Martin, & Kapoor, 1990; Gustafson et al., 1991). The presence and culmination of medical co-morbidity in seniors often precipitates feelings of anxiety, depression, and even paranoia, to the extent that a mental illness insidiously occurs or becomes exacerbated. The result is a greater usage of acute care hospital in-patient services.

As was also found in this study, seniors with and without mental illness codes most often had commonly occurring co-morbidities such as circulatory system diseases, endocrine/ metabolic disorders and ill-defined conditions. These findings are supported by other researchers who found that seniors with delirium, depression or dementia are often admitted to hospital with infectious diseases (Freedberg et al., 2007; Gonzalez et al., 2009; Guijarro et al., 2010), metabolic disorders (Gonzalez et al., 2009; Guijarro et al., 2010; Kunik et al., 2003), and

respiratory diseases (Cornette et al., 2005; Freedberg et al., 2007; Gonzalez et al., 2009; Guijarro et al., 2010). Further, in seniors with mental illnesses, cardiac (Gonzalez et al., 2009; Guijarro et al., 2010; Kunik et al., 2003), cardiovascular (Gonzalez et al., 2009; Guijarro et al., 2010), gastrointestinal (Guijarro et al., 2010), musculoskeletal (Guijarro et al., 2010; Hershkovitz et al., 2007), neurological disease (Guijarro et al., 2010; Kunik et al., 2003) and genitourinary (Cornette et al., 2005) also occur frequently.

In summary, seniors with mental illness codes had more medical co-morbidities than did seniors without mental illness codes, and they also had a greater use of acute hospital services. The outcomes of this study provide strong evidence that suggests that seniors with mental illnesses require comprehensive assessment and treatment to address and/or prevent medical conditions that may mask, exacerbate or result from their other diagnoses.

Accessibility and Availability of Care and Facilities. Within Andersen's conceptual framework the accessibility and availability of care and facilities are enabling variables. In the context of this study, each of the measures of referring institution (institution to), discharge destination (institution from), admit code, readmit code, and discharge disposition were relevant to how seniors with and without mental illness diagnostic codes used acute hospital services. This study revealed that all of these variables impacted hospital service use for seniors with and without mental illness codes. Seniors' discharge disposition, discharge destination, re/admission variables, and referring institution each provided valuable information on the accessibility and availability of hospital services used. They help explain why seniors with mental illness codes have a significantly longer total hospital stay, acute stay, rate of admission, emergency room wait time, resource intensity weight and overall cost than do seniors without mental illness codes.

Discharge disposition and destination. In the context of Andersen's service utilization model, discharge disposition and destination are enabling variables that indicate why seniors stay in hospital as long or as short as they do, their impact on re/admission rates, and hence, their overall cost and resource intensity weight. For the purposes of this discussion, both discharge disposition and discharge destination are discussed together, as there is much overlap between the two and the influence they exert. While the discharge destination variable provides specific information to where seniors are being discharged, discharge disposition provides additional information inclusive of mortality rates. For example, if the discharge disposition indicates that the senior was discharged from hospital to a long term care facility, the discharge destination is able to further identify which facility and/or service the patient was transferred to, in terms of nursing home, personal care home, chronic care facility, general rehabilitation, community care services, and unclassified type of other facility. Also within the services of acute care, discharge destination identifies if the senior is discharged to another acute care facility, the emergency room, outpatient services, or day surgery.

This study found that seniors with mental illness codes were more likely to be discharged to continuing care/long term care, such as nursing homes, personal care homes and chronic care facilities, another acute care facility, and community care services; to leave against medical advice, or to die in hospital than were seniors without mental illness codes. In contrast, seniors without mental illness codes were more likely to be discharged home or discharged home with supportive services compared to seniors with mental illnesses.

The findings of this study support previous research which indicated that seniors with cognitive impairment or organic brain disorders were less likely to be discharged back to their own home (Fulop et al., 1998), while seniors without cognitive impairments being discharged

from acute hospital settings were primarily discharged home alone or home with a spouse or support person (Shah, Evans et al., 2000). Others have found that older adults with alterations in mental status, particularly alterations in consciousness and delirium, are at high risk for being admitted to an inpatient unit and institutionalization after discharge (Naughton et al., 1995). More recently, Kozyrskyj et al. (2004) noted that the presence of other co-morbid illnesses plays a role in discharge destination or disposition, as seniors with less co-morbidity on discharge are more likely to be discharged home. Furthermore, Silverstein et al. (2008) found that those being discharged to long term care have an increased relative risk of being readmitted back to hospital compared to those who are discharged home and to home care. Additionally, Hammond et al. (2009) showed that mentally-ill seniors waiting for discharge to long term care facilities have an increased likelihood of remaining in hospital longer than necessary, as a result of seniors being admitted to hospitals inappropriately and the wider problems of limited availability of respite care facilities and/or long term care institutions. Indeed, if seniors' hospital stay is longer than four months, it increases their risk of being admitted to a nursing home or other long term care facility (Kozyrskyj et al., 2004). Further, factors associated with admissions to a nursing home are depression symptoms, having dementia and other cognitive impairments (Martens et al, 2007; Kozyrskyj et al., 2004). Earlier studies showed that seniors with major depression spend significantly more days in nursing homes than do those with either minor depression or no depression (Koenig & Kuchibhatla, 1998). Hershkovitz et al. (2007) maintain that because of the less functional gain depressed seniors experience, even after rehabilitative efforts, they have lower odds of being discharged back home.

Other factors that relate to a mentally-ill senior being discharged to a nursing home are receipt of home care services (Kozyrskyj et al., 2004) and low income housing (Kozyrskyj et al.,

2004). Overall, seniors' admission to hospital often results in a two-fold increase in the probability of placement in a long term care or nursing home facility (Glazebrook, Rockwood, Stolee, Fisk & Gray, 1994; Tomiak, Berthelot, Guimond & Mustard, 2000). Further, they are also more likely to be institutionalized after discharge (Naughton et al., 1995) or unable to return to previous living arrangements (Blank et al., 2005) if they have a mental illness. In an earlier study, Draper & Luscombe (1998) found that long term care settings was one of the most common destinations mentally-ill seniors are discharged to from hospital.

In this study, organizational bureaucracies were also found to be perhaps influencing factors on the discharge disposition and destination. Among the key organizational bureaucracies thought to impact mentally-ill seniors' use of hospital services are the policies and practices of the involved institutions. Issues of politics and poorly structured policies become evident in the physicians' lack of acknowledgement of the policies (Silverstein et al., 2008), the long term care policies that have strict admission criteria and guidelines that enable selective picking of seniors (Lane et al., 2010; Rogers & Barush, 2000), and the lack of administrative responsibility and action to provide effective care for seniors (Lane et al., 2010).

Finally, insufficient resources involving home care and community supports also influence seniors' discharge disposition or destination (Kozyrskyj et al., 2004; MacCourt, 2004; Menec et al., 2004). Improvements in home care, currently often insufficient in volume and coverage, would facilitate the clinically efficient and timely discharge of individuals to their own homes with supports in place. Home-based mental health services for the elderly serve to promote seniors' autonomy, dignity and control and the opportunity for health care professionals to conduct an accurate mental health assessment of seniors and their environment (Kohn et al., 2004). Although the receipt of home care is often cited as a predictor of institutionalization

(Kozyrskyj et al., 2004; Silverstein et al., 2008), if readily available and resourced, it does promote independent and community living, disease management and achievement of health tasks, without the need for hospitalization and/or institutionalization (Kozyrskyj et al., 2004). For all Canadian provinces, Romanow (2002) previously recommended that home care services be covered under medical care plans for Canada; however, to date, almost 10 years later, this has not yet to be implemented.

Geriatric psychiatry day hospitals are another important service that helps fulfill the goal of keeping seniors with mental illnesses out of hospital (Chiu et al., 2009). However, they too, are often limited in number and in the services they provide; or they are simply not available at all (Mackenzie et al., 2006).

Finally, the availability of supportive community programs also impacts the discharge disposition and destination of mentally-ill seniors from hospital. Assertive community treatment (ACT) teams, for example, promote and support patients with mental illness living in the community (Assertive Community Treatment Association, 2010). These ACT teams focus on mental health, supportive housing, psycho-geriatric assessment services and case management; these help keep seniors with mental illnesses functioning optimally in the community, avoid stigma and prevent hospitalization. Unfortunately, ACT teams are often insufficient in number and resources to meet the needs of this growing population (Hugo et al., 2002; Malone et al., 2007; Mausbach et al., 2008; Puamau, 2006; Robbins et al., 2000).

In earlier research, Draper and Luscombe (1998) found that seniors with mental illnesses being discharged from hospital most often go to live with their spouse, to live alone or to another acute care setting. However, this study used only one hospital unit to obtain their sample and they made no comparison to the discharge destinations of mentally-well seniors. In a study by

Bressi et al. (2006), seniors with mental illnesses waiting for long term care placement were actually discharged in a timely fashion. These authors maintain that being discharged to a long term care setting results in a shorter hospital stay and if a patient has a co-morbid mental illness; it triggers a quicker referral or acceptance into a nursing home and a discharge of three days earlier than expected. This study however, made no comparison to seniors without mental illnesses in their wait time for placement.

In the current study, death occurred in less than ten percent of all seniors while they were in hospital, with mortality rates for seniors with mental illness diagnostic codes being higher than for seniors without mental illness diagnostic codes. The findings from this study are supported by previous research, but the numbers are slightly lower compared to what other studies have found. Shoko, Shiraishi, Kaji and Otomo (2010) found that hospital mortality for those aged 75 and older with dementia or mental retardation is higher compared to seniors without these diagnoses. Similarly, Marengoni et al. (2011) and Guijarro et al. (2010) found that older in-patients with dementia had a high hospital mortality rate which was double that of seniors without dementia. This finding persists even after adjusting for confounding variables in each of these studies. As well, Eeles et al. (2010) also found that, even after adjusting for multiple confounders, seniors with delirium have a significantly shorter median time to death compared to seniors without delirium. Some even suggest that the presence of a mental illness is a significant predictor of mortality rates (McCusker et al., 2006).

In summary, the discharge disposition and destination are variables that influence seniors' accessibility and availability of services used. This study found that seniors with mental illnesses were often discharged to long term care facilities and other supportive settings, and a greater proportion of them die before leaving hospital compared to seniors without mental illness

codes. The findings of this study are supported by other research on discharge disposition and destination. This new well substantiated evidence can provide direction for future health care changes and decisions that can help improve services for seniors with mental illnesses.

Admission variables. In addition to the re/admission rates for seniors with and without mental illnesses, admission codes and readmission codes were also obtained and analyzed in this study. The admission code or the degree of urgency with which seniors were admitted to acute hospitals was also a valuable indicator assessed in this study. The decision to admit seniors to hospital on either an emergency (urgent), or elective basis, obviously played a significant role in how hospital resources were used.

This study found that seniors hospitalized with mental illnesses were significantly more likely to be admitted on an urgent basis; whereas, seniors without mental illnesses were significantly more likely to be admitted on an elective basis. More specifically, the majority of admissions for seniors with mental illness diagnostic codes for organic, mood, substance use, anxiety/stress, and schizophrenia were done primarily on an urgent, not elective basis. Further, all admissions of seniors with personality disorders, mental retardation and behavioural/ emotional disorders were done only on an urgent basis.

The findings of this study are supported by Blank et al. (2005) who found that the majority of mentally-ill seniors are admitted involuntarily on an urgent basis- with most of them coming directly from the emergency department. Campbell et al. (2005) focused on non-elective admissions for seniors, because only a very small proportion of older medical admissions are elective. Furthermore, they note that the outcome of such admissions tend to be pre-determined not by individual case-mix, but by the type of procedure or investigation being performed.

In the current study, the readmission code, or the manner in which an individual was

admitted to hospital, was of value and reflected how seniors used acute care hospital in-patient services. This study found that seniors hospitalized with mental illness codes more often had an unplanned readmission, readmission in less than seven days of being discharged, re/admission between eight and 28 days of being discharged, and re/admission after 28 days of being discharged. However, seniors hospitalized without mental illness codes were significantly more likely to have planned readmissions from other acute care units, and were more likely to be a new patient to an acute care unit.

Other studies found that seniors with mental illnesses most often experience unplanned readmissions and hence, most often are admitted through the emergency department on an urgent basis. Walter-Ginzburg et al. (2001) and Tranmer et al. (2003) found that seniors with mental illnesses more often seek admission to hospital and have overnight hospitalizations than do seniors without mental illnesses. Similarly, others reported that mentally-ill elderly most often seek readmission through emergency departments (McCusker et al., 1997; McCusker et al., 2000; McCusker et al., 2007), which further suggests the urgency and unplanned nature of their admission to hospital. In particular, when comparing readmission rates, seniors with depression have more visits in a six-month period and have more 30-day returns then do seniors without depression (McCusker et al., 2000).

To the contrary, Cornette et al. (2005) in a sample of seniors 70 years and older with cognitive impairment, found that the recurrence of a severe medical problem was probably the main reason for readmission within three months of discharge, and factors related to early readmissions were mainly medical (genitourinary & respiratory); not psychiatric in nature.. Others suggest that the discharge destination is influential. For example, in a sample of seniors with chronic obstructive pulmonary disease, stroke or dementia admitted to one war veterans'

hospital, seniors with dementia discharged to long term care nursing homes were less likely to be readmitted in 30 days compared to those discharged home (Camberg et al., 1997).

In summary, seniors with mental illness codes were more likely to be admitted to hospital on an urgent, not elective basis, and were also more likely to have unplanned, not planned re/admissions compared to seniors without mental illness codes.

Institution From (Referring Institution). The institution from which seniors get admitted to hospital also plays an integral role for how acute hospitals are used by seniors. Although Canada's universal health care system should provide for multiple points of entry to access a variety of care providers, services and treatments, this don't always occur. In this study, two variables of referring institution and entry code helped to capture information that can help describe any influences on hospital service use by seniors. While the referring institution provides broader outside facility information, entry code provides in-house specific information that has taken place once the senior reaches the hospital.

This study found that overall, seniors with mental illness codes were significantly more likely to be admitted to acute care hospitals from emergency rooms primarily, and secondarily from other acute care units, general rehabilitation, chronic care facilities, nursing home facilities, community care, emergency rooms or personal care homes than were seniors admitted without mental illness codes. Unequivocally, seniors without mental illness codes were more likely than seniors with mental illness codes to be admitted from day surgery, outpatient clinics, and admitting departments.

These findings are supported by previous research indicating that seniors with mental illness diagnostic codes most often enter hospitals through the emergency department (McCusker et al., 1997; McCusker et al., 2000; McCusker et al., 2007). Blixen (1994), maintained that

generally, seniors have increased concern about their health compared to other age groups; hence they become frightened about perceived physical or mental illnesses, so rather than wait for a visit with a general practitioner they go to the nearest emergency room department.

Blixen (1994) and Brokaw and Zaraa (1991) indicated that the most prevalent reason for seniors visiting emergency room departments is a psychiatric diagnosis. Blixen (1994) suggests this increased use of emergency room departments is due in part to the initial misdiagnoses that seniors received there on previous visits.

Hansagi et al. (2001) pointed out that seniors' frequent use of the hospital emergency department is indicative of high use of other health care services as well. They found that seniors 65 and over are one of the highest and most frequent users of emergency room departments, with mental illness being the third most common diagnosis during these visits. It has long been recognized that older adults with alterations in mental status, particularly alterations in consciousness and delirium, are at high risk for admission to an inpatient unit and institutionalization after discharge (Naughton et al., 1995) and that seniors admitted to acute hospitals are significantly more likely admitted from a facility, not home (Fulop et al.,1998).

Further, from this study, it is clear that many seniors with mental illness diagnostic codes come from long term care settings such as nursing homes, personal care homes and chronic care facilities. This finding is not uncommon as was previously supported. However, in long term care facilities, as already found, there exists very little if any, mental health expertise available to the mentally-unwell seniors residing there (Snowden, 2010). In long term care facilities, the presence of professionals with appropriate training could help with counselling, coping mechanisms and other mental health interventions that could help to prevent a seniors' hospitalization to acute care settings (Gibson, Carter, Helms, & Edberg, 2010; Snowden, 2007).

Other studies have found that seniors are frequently admitted from a variety of settings, besides long-term care. For example, in a study of hospitalized seniors, 85 years and older with cognitive impairment Freedberg et al. (2008), found that they most often came from nursing homes or assisted living facilities or other/unknown locations, but they also frequently came from their own private homes. Their study however, included only seniors 85 years and older and focused on only cognitive impairment. Similarly, in a study of seniors with cognitive impairment (70 years of age and older) Cornette et al. (2005) noted that seniors with mental illnesses living in nursing homes are less often than seniors without mental illnesses to be readmitted to hospital. Earlier researchers suggested that if mentally-ill seniors are admitted from home, the stress from care-giver burden is most likely the cause of seniors' admission because caregivers frequently find it difficult to cope (Draper & Luscombe, 1998).

In summary, this study found that seniors with mental illness diagnostic codes were more likely admitted from emergency rooms, long term care, acute care, community care, and rehabilitation settings, while seniors without mental illness codes more often got admitted from day surgery, outpatient clinics or admitting departments.

Need variables. Mental illness was not only one of the main focal points in this study, it too acted as a need variable or deterrent to service use for seniors as outlined in Andersen's model of health service use (Andersen, 1995; Bergeron et al., 2005; Vasiliadis et al., 2005). Although much of how mental illness impacted hospital use for seniors has been covered throughout this chapter, this section is intended to highlight the issue of psychiatric co-morbidities and the impact of specific mental illnesses on seniors' hospital use.

***Psychiatric co-morbid illnesses*.** This study found that most seniors had one mental illness, with only a very small proportion of them having two or more psychiatric co-morbidities.

In addition, although most seniors admitted to hospital had only one mental illness and only one hospitalization, their use of and cost to acute care hospitals was significant. Not surprisingly, seniors who had more than one mental illness and repeated hospital admissions, incurred a slightly greater use of and cost for acute hospitals than did seniors who had only one mental illness.

The finding of proportionally low number of seniors with more than one mental illness in this study is different from that found in previous research. Most research to date has found that mentally-ill seniors most often have greater than one mental illness (Bressi et al., 2006; Furlenetto, Da Dilva, & Bueno et al., 2003; Guijarro et al., 2010; Shah, Evans et al., 2000). However, Shah, Evans et al. (2000) sampled seniors on only one rehabilitation unit, Bressi et al. (2006) used only seniors in general hospitals and excluded all seniors who had a mental illness as their primary admitting diagnosis and Guijarro et al. (2010) included seniors with dementia only. The number of psychiatric co-morbidities found in this study was also much less than that found in Blank et al.'s (2005) study, where nearly half of all seniors were found to have greater than one psychiatric diagnosis and one fifth had greater than two psychiatric diagnoses, however, Blank et al.'s study used only one psycho-geriatric in-patient unit.

In terms of two or more mental illness codes, Potter, Hartman and Ward (2009) suggest memory complaints among older adults are often influenced by depression and anxiety. Even after controlling for the influence of depression and anxiety, higher levels of perceived stress are associated with higher levels of memory complaints, and have less to do with one's activity level and ongoing life events. Shah, Evans et al. (2000) noted that depression and dementia are often seen together, as are depression and anxiety disorders. Because depression can present with poor concentration and memory problems, it is often misdiagnosed as dementia. Furthermore, patients

with dementia often become depressed particularly if they still have some insight into their condition, hence their mood problem adversely affects their memory deficit.

From a service use perspective, the results of this study generally supported what many researchers have found; that seniors with many mental illnesses have an increasingly higher use of hospital services than did those with just one mental illness (Fulop et al., 1998; Guijarro et al., 2010; Kisely et al, 2007). Bressi et al. (2006) found also, that seniors with psychological co-morbidity, depression, anxiety and organicity, have significantly longer hospital stays. Marcantonio, Flacker, Wright, and Resnick (2001) assert that many mental illness diagnoses overlap in their signs and symptoms, making an accurate diagnosis difficult to achieve. For example, both delirium and dementia have overlapping signs and symptoms, such as agitation, aggression, hallucinations, delusions and other behavioural disturbances. This makes it increasingly difficult to not only diagnose but also to treat, which increases one's length of stay and rate of re/admission. In the past, this occurred especially in elderly medical-surgical patients in general hospital settings (Fulop et al., 1998) and Guijarro et al. (2010) recently found that patients with dementia are frequently admitted with other neurological and psychiatric concerns.

In general, the co-existence of mental illnesses amplifies the use of services even more where both psychiatric and medical lengths of stay significantly increase (Bressi et al., 2006; Kales et al., 1999). Psychiatric co-morbidity among senior general medical in-patients has been reported to occur at rates of 15-50% (Fulop et al., 1998; Mayou, Hawton, Feldman, & Ardern, 1991). Furlanetto et al., (2003) contend that psychiatric co-morbidity is common among "all" general medical in-patients who are seniors, which results in much longer hospital stays for these seniors, than those without psychiatric co-morbid illnesses. Likewise, seniors with dementia and other psychiatric co-morbidities in particular, have increased hospital stays, compared to seniors

with dementia and no other psychiatric co-morbidities (Kunik et al., 2003). In summary, most seniors in this study had only one mental illness code. However, seniors who had two or more mental illness codes had a higher use of hospital service compared to seniors with only mental illness code. This is well supported by other research in this area.

The impact of specific mental illnesses and/or diagnostic categories of mental illness.

The second component of the need variable of mental illness is the differential service use that specific mental illnesses and/or diagnostic categories of mental illnesses create. This section will focus on service use across each diagnostic category of mental illness and their impact on hospital stay, rate of admission, emergency wait time, resource intensity weight and cost.

Substance use. Like any other population, seniors may resort to maladaptive type of coping mechanisms through the use of alcohol and drugs, which potentially influence their hospital stay, re/admission rates and cost. In this study, psychoactive substance use in seniors was linked to the third highest hospital stay, the fourth highest acute care hospital stay and was the third most costly mental illness to result in seniors' hospitalization. Actually, the single diagnosis that had the highest total hospital stay was a mental or behavioural disorder due to psychoactive substance use that precipitated a residual or late onset psychotic disorder. Further, when seniors were re/admitted to hospital multiple times, alcoholism was one of the primary causes. Interestingly, seniors with substance use issues did not have to wait long in emergency rooms and actually had the second lowest wait time of all seniors with mental illnesses. Regardless, substance use, and specifically, alcoholism, emerged as an area of concern in this population of seniors.

The literature on seniors and substance use, and specifically alcohol use, is growing. Although this study included only one year of data, trends from the literature suggest substance use is on the rise in seniors in Canada, to the extent that it interferes with normal daily functioning (St. John, Montgomery & Tyas, 2008). Two decades ago, McEwan, Donnelly, Robertson and Hertzman (1991) found that alcohol was estimated to affect between 5% and 11% of seniors. A decade later, although often hidden, denied, or unrecognized, alcohol was considered to be the most common substance misused by one-third of older adults (Elderly Mental Health Care Working Group, 2002). Other substance use among seniors involves prescription or non-prescription over-the-counter drugs (CMHA-Ontario, 2008).

Although seniors may believe that alcohol helps them cope with life's challenges, alcohol is a central nervous system depressant, therefore, it has potential to increase and/or exacerbate one's chance of developing a psychiatric co-morbidity such as depression (Graham & Schmidt, 1999). The development or exacerbation of a depression as a result of using alcohol regularly may reciprocally increase the need of hospitalization. In addition, seniors' common usage of multiple medications and practices of poly-pharmacy precipitates and/or increases their predisposition to the development of a psychoactive substance use disorder (Simoni-Wastila & Yang, 2006). In terms of service use, seniors with substance use problems have significantly longer general hospital stays compared to seniors without substance use disorders (CIHI, 2008b; Saravay et al., 1991).

Organic disorders. In this study, almost two thirds of all seniors admitted to acute care hospitals in Newfoundland and Labrador had an organic disorder coded for their stay. In fact, the top three single most common occurring mental illness diagnoses in seniors were unspecified

dementia, unspecified delirium and dementia in Alzheimer's disease. Dementia was the most common organic brain disorder, followed by deliriums.

In terms of hospital use, there were some variations noted under the category of organic disorders. Seniors with organic disorders admitted to hospital were the most expensive to care for, had the longest acute care hospital stay and longest waiting time in emergency, and the second longest overall hospital stay, with the second highest cumulative resource intensity weight. From the perspective of re/admissions, dementia was the most common occurring diagnoses when a senior experienced at least two or three re/admissions and the second most common occurring diagnosis when there were four re/admissions. Deliriums were also the more prevalent form of organic brain disorders found in seniors' re/admissions.

The findings of this study support those found by others. For Sambrook et al. (2004) the prevalence of dementia amongst elderly Canadians ranged from 2.5% to 84%, with earlier research attributing the upper limits of this range primarily to those elderly living in Canada's long term care facilities (Graham & Rockwood, 1997). Dementia is perhaps one of the most common distressing and burdensome illness affecting the elderly (Rockwood & Stadnyk, 1994; CMHA, 2005) and has become known as one the greatest challenges of the 21st century (Sturcke, 2010).

The findings of this study for how organic disorders impacted seniors' hospital usage, is consistent with findings from an earlier study by (Saravay et al., 1991) and by Lyketsos et al. (2000) who found that seniors with dementia have a significantly longer length of stay than do seniors without dementia. Similarly, the CIHI found that seniors with organic disorders represent almost half of all hospital discharges and have the longest hospital stay in both general and psychiatric hospitals (CIHI, 2005; CIHI, 2006; CIHI, 2007a; CIHI, 2008b). Since the 1990s,

research has shown that patients with organic disorders, such as dementia in particular, incur one of the highest hospital costs compared to seniors without dementia (Guijarro et al., 2010; Fulop et al., 1998; Lyketsos et al., 2000; Rockwood & Stadnyk, 1994). As well, Levkoff et al., (1992) found that seniors with sub-syndromal delirium had double the hospital stay as did seniors without delirium. Even after controlling for the severity of cognitive impairment, co-existing anxiety and depression, cognitive impairment was still found to significantly predict longer stays for seniors in hospital (Fulop et al., 1998; Francis et al., 1990; Levkoff et al., 1992; Schor et al., 1992). Similarly, seniors with dementia and other psychiatric co-morbidities have been shown to have increased medical in-patient days but also have increased psychiatric in-patient days compared to seniors with dementia and without other psychiatric co-morbidity (Kunik et al., 2003). This can be partly explained by the finding highlighted by Hammond et al. (2009) that seniors with dementia are not only admitted inappropriately, but they also have an inappropriate length of stay in hospital. Compared to seniors without dementia, seniors with dementia not only have a longer hospital stay; they also require more intensive nursing care (Guijarro et al., 2010; Lyketsos et al., 2000). The confusion and poor cognitive processing that accompanies organic brain disorders, give rise to time consuming informed consent issues and results in poor compliance with rehabilitation efforts and therefore prolongs hospital stays for seniors (Marcantonio et al., 1994). The presence of cognitive impairments in seniors also disrupts rehabilitation efforts for seniors trying to recover from physical illnesses (Hershkovitz et al., 2007). Furthermore, Durazzo, Meyerhoff, and Nixon (2010) note that chronic smoking in seniors with mental illnesses, contributes to structural and biochemical brain abnormalities and overall brain atrophy. This further alters neuro-cognitive processes such as memory processing speed, working memory and cognitive flexibility.

To compound the issue, from a medication compliance perspective, organic brain disorders result in an element of paranoia (Mental Health America, 2011). Therefore, if seniors with these disorders believe their treatments, diagnostic test procedures and/or visits to health care providers are poisonous, dangerous and/or life threatening, they will not comply with recommended treatment regimes for fear that they may be harmed or killed; this may impact their overall hospital stay (Farrell & Ganzini, 1995).

Literature on acute care hospital use by seniors with delirium is abundant. Research has long shown that seniors with delirium have longer hospital stays than do seniors without delirium (Francis, et al., 1990; Gonzalez et al., 2009). For those 70 and older, delirium has been associated not only with increased length of stay, but increased mortality rate as well (Francis et al., 1990). Farrell & Ganzini, (1995) noted that seniors with delirium, in particular, have an impaired motivation and problems with treatment compliance that prompts them to avoid the necessary health care they need to be well. This same low motivation and poor compliance in seniors with delirium has been linked to agitation, subsequently causing other medical conditions such as fractured hips from falling, wound separations, urinary tract infections and urinary incontinence (bedsores) that prolong hospital stays (Francis et al., 1990; Gustafson et al., 1991). Further, dehydration, aspiration, congestive heart failure, surgery post-op response and myocardial infarction are all consequences of delirium and dementia and causes of delirium in seniors (Cole & Primeau, 1993; Lyketsos et al., 2000), that cause them to stay longer and/or become more frequently admitted. Finally, confinement of seniors to bed and use of restraints, urinary catheters and sedative medications, as often occurs to seniors in acute care settings, both cause and are consequences of delirium (Inouye & Charpentier, 1996; Milisen et al. 2001).

Arora et al. (2010) concludes that older hospitalized patients are at greater risk for the "hazards of hospitalization" which include geriatric-specific conditions such as delirium that increases their stay in hospital. In addition, the confusion that so often occurs as a result of urinary tract infections, metabolic disturbances (Hendrickx et al., 2005), septicaemia, vitamin deficiencies (Wilkins et al., 2006), dehydration, medication side effects/interactions and anaesthetics, post-operatively precipitate delirium in the older patient (Potter & George, 2006). Greater use of inpatient and outpatient medical services can itself trigger or exacerbate mental illness.

Further evidence of the hazards that acute care hospitalization can present to seniors is illustrated in a study by Lindquist et al (2011). These researchers found that at the time of hospital discharge, greater than one third of seniors have unrecognized low cognition; however, one month later, greater than half of these seniors no longer had low cognition. While cognitive orientation improves when seniors return to their long standing homes, hospitalized seniors are increasingly susceptible to many other co-morbid illnesses and/or medical events while hospitalized (Cole & Primeau, 1993; Lyketsos et al., 2000).

The environmental impact of acute care hospitals on seniors with dementia and delirium is profound. As discussed earlier, the acute care hospital environment is characterized by a busy, fast-paced, confusing atmosphere and usually inadequate structures to deal with seniors in general and especially seniors with mental health concerns. For dementia patients in particular, the busy, fast-paced acute setting is not ideal as they require a calm, non-stimulating environment for optimal therapeutic effectiveness. Although seniors' mental health has been shown to improve and become stabilized somewhat in an acute care environment, patients continue to require significant care and attention, even if they no longer need the services of an

acute care unit (Paton et al., 2004). Without this care, their health and well-being can rapidly deteriorate.

To make matters worse, the busy nature of the acute care setting prompts the use and sometimes overuse, of physical and even chemical restraints. Davies et al. (2005) and others (Hickey, Clinch & Groarke, 1997; Miles & Meyers, 1994; Thomas & Brennan, 2000) suggest that admission of older adults to acute care units increases their risk for behavioural problems; as a result, they are often placed in physical restraints (Minnick, Mion, Leipzig, Lamb & Palmer, 1998). The placement of a mentally-ill senior in restraints causes further agitation, behavioural outbursts and confusion (Scherder, Bogen, Eggermont, Hamers, & Swaab, 2010), which contributes to a longer hospital stay than necessary (Kotter, 2005; Scherder et al., 2010), especially when needed physical activity is forcibly decreased because of a restraint (Scherder et al., 2010). Cotter (2005) maintained that the use of restraints increases periods of aggression, and is a significant contributing factor to death as a result of asphyxiation, strangulation and cardiac arrest for patients with dementia in particular because seniors existing state of confusion and agitation is amplified.

Lindquist et al. (2011) agree that hospitalization of seniors raises other issues that compromise their mental health and extend their length of stay. For example, after remaining bed bound for long periods of time, seniors' orientation becomes so challenged that it ultimately affects their cognition. Further, the sense of decreased safety awareness and 'uncooperative' nature of dementia puts seniors at risk for further illness and/or injury (Saravay et al., 2004).

Normal routine hospital events and expectations can be detrimental to the mental health of seniors. Vulnerable hospitalized seniors are further weakened by sleep deprivation, sedating medications, ongoing diagnostic tests, with-holding of meals, and the acute medical illness that

perhaps cause the hospitalization initially (Erkinjuntti, Autio, & Wikstrom, 1988). Other related variables unique to the acute care hospital setting include iatrogenic complications, functional decline, nosocomial infections, malnutrition, poly-pharmacy, adverse drug reactions, and catheterizations. Lindquist et al. (2011) adds that not only is an acute care hospital a new and different physical environment, but while in hospital the sedating medications diminishes peoples' memories and often creates a lack of sleep and reversal of day-night. Further, tests throughout the night, snoring patients, intermittent vital signs and alarm/call bells sounding all night, result in seniors being weak, tired, confused and cognitively impaired by the time they are discharged from acute care hospital (Lindquist et al., 2011).

Affective/mood disorders. Findings from this study showed that mood disorders among seniors continue to be an area of concern. A mood disorder accounted for almost one fifth of all mental illness diagnoses coded for hospitalized seniors and was the second most frequent mental illness diagnosis among seniors. The most prevalent mood disorder was depression, representing almost three quarters of all mood disorders.

From a hospital service use perspective, mood disorders were responsible for the highest acute care hospital stays. In addition, they had the second highest total hospital stay and wait time in emergency. Of all mentally-ill seniors who experienced multiple re/admissions to hospital, the most common diagnostic category was mood disorders. Depression was again one of the most common diagnoses in these re/admissions. Bipolar was the second most common mood disorder for those who had multiple re/admissions. Unspecified mood disorders also minimally existed for those with two or more re/admissions, as did mania for seniors who had four re/admissions. Further, mood disorders had the highest cumulative mean resource intensity

weight and incurred cost. Depression, in particular, had one of the most resource intensive stays, and next to dementia, was the second most costly to hospitalize.

Findings from this study were consistent with the notion put forth by previous researchers, that depression is the most common occurring mood disorder in seniors (Blank et al., 2005; Cole et al., 2006; Cornette et al., 2005; Ostbye et al., 2005; St. John, Blandford & Strain, 2006). Likewise other studies have indicated that bipolar disorders are increasingly noticed in seniors in Canada (Blank et al., 2005; Schaffer, Mamdani, Levitt, & Herrmann, 2006). In spite of research that suggests depression is greatest amongst the younger population (Beaudet, 1996; Bland et al., 1988; Offord, Boyle, Campbell, Goering, Kin, Wong et al., 1996; Stephens et al., 1999), it is identified as one of the most frequently occurring mental illnesses in the elderly population (Reker, 1997; Wittchen, Knauper & Kessler, 1994). In Canada, 15-50% of seniors experience depressions (Canadian Study of Health and Aging Working Group, 1994; Sambrook et al., 2004), with the upper range of depression having been found to occur mostly in long term care institutions (National Advisory Council on Aging, 1999). Finally, again consistent with the current study, Harman et al., (2004) found that mood disorders, particularly, depression and bipolar disorder are two of the most common mental illnesses found in seniors in acute care hospitals.

The finding from this study, that seniors with mood disorders used a large proportion of hospital services, supports similar findings from previous research. For example, Bland et al., (1997) noted that depressed seniors seek help from a health care professional more frequently than do seniors without depression. Previous studies also found that seniors with depression have an increased hospital stay (Bressi et al., 2006; CIHI, 2008b; Draper & Luscombe, 1998; Frassure-Smith et al, 2000; Hershkovitz et al., 2007; Koenig & Kuchibhatla, 1998; Mills et al.,

2002; Saravay et al., 2004; Walter-Ginzburg et al., 2001), higher rates of re/admission to hospital (Chen et al., 2007; Draper & Luscombe, 1998; Fogel, Hyman, Rock, & Wolf-Klein, 2000; Frassure-Smith et al, 2000; Walter-Ginzburg et al., 2001) and greater use of emergency departments (Walter-Ginzburg et al., 2001), compared to seniors without depression.

Others have also reported that depression is not only associated with extended hospital stays, it also prolongs recovery from other medical illnesses (Mossey et al., 1990; Parikh et al., 1990). Further, Gustafson et al. (1991) and Franco, Litaker, Locala, & Bronson (2001) found that hospitalized seniors face increased rates of depression, adverse drug events and decreasing function, all of which impact their hospital stay and rate of admission.

Koenig and Kuchibhatla (1998) differentiated types of depression to find that regardless of the type of depression, seniors with minor or major depression have longer hospital stays than do seniors without depression, but major depressed seniors have an expected longer stay. Seniors with major, but not minor depression, used more hospital days in the past year than did patients without depression. Further total in-patient days were greater for patients with major or minor depression, than for those without depression, and seniors with either major or minor depression had more short-stay hospital days over a three months period than did seniors without depression (Koenig & Kuchibhatla, 1998).

There are conflicting results from research on depression and other psychiatric co-morbidities together. For example, Fulop et al., (1998) found that seniors with anxiety and depressive disorders had no difference in hospital stay than those 65 and older without cognitive impairment. However, Draper & Luscombe (1998) suggested that depression is one of the main reasons for seniors being admitted to hospital and that depression results in the longest hospital stay compared to other mental illnesses, including dementia. The signs and symptoms of

depression are often confounded with those of physical illness (Balsis & Cully, 2008; Shahpesandy, 2005) where instead of reports of social withdrawal, indecisiveness and feelings of hopelessness and helplessness that typify depression in the general population (Souery et al., 2011), older adults present with anxiety, agitation, somatic complaints and complaints of physical and memory disorders (Shah, Evans et al., 2000), increased hospital stays, difficulty sleeping and eating, and experienced constipation and/or loneliness (American Psychiatric Association, 2003). Unfortunately, these complaints are often interpreted as attention-seeking behaviours that mask mental health complaints and symptoms, and make the assessment and diagnostic process more difficult than it is already (Shah, Evans et al., 2000; Shahpesandy, 2005). In addition, somatic symptoms that typify depression such as poor appetite, poor sleep, reduced energy and poor concentration can all be caused by physical illness. Given that some seniors do not show any subjective symptoms of sadness (Cornette et al., 2005; Gallo, Rabins, Lyketsos, Tien, & Anthony, 1997), the task of doing an adequate assessment is challenged even more so. Further, the National Institute of Health consensus Statement (Reynolds, Lebowitz, & Schneider, 1993) on the diagnosis and treatment of depression in later life state that it frequently occurs in patients with numerous physical and social problems which obscures the diagnosis and complicates the decision for treatment measures. In addition, frontline clinicians are often so pre-occupied with seniors' primary presenting complaint that their mental illness is often overlooked when admitted, and is hence not diagnosed and not treated (Podrazik & Whelan, 2008).

For readmissions in particular, Cornette et al. (2005) found that while older adults with depression have higher rates, these are not early readmissions, but much later readmissions, two-three months after discharge. In addition, for seniors trying to recover from physical illness,

rehabilitation efforts are somewhat stalled and prolonged as a result of depression (Hershkovitz et al., 2007; Koenig & Kuchibhatla, 1998; Mills et al., 2002).

From a medication compliance perspective, as mentioned previously seniors with mood disorders may manifest paranoia toward medication and treatment and therefore jeopardize their compliance with any diagnostic tests, prescribed medication or treatment regime (Mental Health America, 2011). Physiologically, as well, anti-depressants typically take 6-8 weeks to reach therapeutic effectiveness (Kuruvilla, Fenwick, Haque, & Vassilas, 2006), which prolongs seniors' hospital stay. Further, anti-depressants have an adverse effect of weight gain (Baptista et al., 2004; Henderson et al., 2000; Teff & Kim, 2011), which can precipitate other medical illnesses that require the frequent use of acute care hospitals. Finally, depression can cause apathy and unwillingness to care for oneself (Holzapfel et al., 2009), leaving seniors uninterested and unmotivated in doing what is best for their optimal well-being, thus jeopardizing their overall health.

From a cost perspective, depressed seniors incur greater costs when hospitalized than do non-depressed seniors. Elderly medical in-patients have high rates of depression and high use of one of the most costly forms of medical care- short term hospitalizations (Koenig & Kuchibhatla, 1998). Koenig, George, and Meador (1997), found that over 70% of seniors with depression are either untreated or treated inadequately because clinicians do not have the expertise or knowledge to complete accurate assessments, which prolongs their hospital stays. Koenig and Kuchibhatla (1998) adds that even small increases in service use due to untreated depression substantially increase the cost of general medical care.

Seniors with depression are one population whose illness is difficult to stabilize (Oslin, Datto, & Kalan, 2002). Physiologically, depression reduces tolerance for an established physical

problem, especially a painful one, which leads to a decreased ability to cope with activities of daily living. Depression, also delays rehabilitation efforts, further increasing seniors' hospital stays (Mills et al, 2002). Shah, Evans et al. (2000) propose that altered mental states in seniors is related to poor outcomes in mobility, discharge, prognosis, all of which prolong rehabilitation progress and desired outcome goals. Jimenez et al. (2004) contend that one's individual response to treatment and use of interventions such as ECT therapy for depression also delay timely discharges.

Personality disorders. This study found that personality disorders were not prevalent in older adults who were hospitalized. Of all mental illness diagnoses coded for seniors' admissions to acute care hospitals personality disorders represented only a very small portion.

As would be expected given their low prevalence seen in this study, seniors with personality disorders did not contribute as greatly to the high use of hospital services as was observed for other mental illness codes. Seniors with personality disorders contributed only minimally as the fifth leading cause of total hospital stays and acute hospital stays amongst all seniors admitted with mental illnesses. The proportion of total hospital days was much below that experienced by seniors with mood, organic and substance use disorders. From a cost perspective, personality disorders in seniors had one of the lowest cumulative mean resource intensity weights and were therefore, one of the least costly mental illnesses for which seniors were hospitalized. Further, seniors with personality disorders had the least number of re/admissions to hospital and the second lowest overall wait time in the emergency room setting.

The older adult's personality is not increasingly susceptible to change as age increases (American Psychological Association, 1998). While gender identity disorders are rarely diagnosed in the elderly, enduring personality changes and habits, and impulse disorders in the

form of gambling do prevail (Cousins & Witcher, 2007) While gambling disorders in particular currently remain at low levels (Wiebe & Cox, 2005) personality disorders, including gambling disorders, correlate with an increased risk of suicide in seniors (Heisel, Links, Conn, van Reekum, & Flett, 2007).

Mental retardation. In this study, the prevalence of mental retardation in seniors admitted to hospital was one of the lowest of all mental illness codes found. In terms of service use, seniors with mental retardation disorders did not contribute as greatly to the high use of hospital services as those with other mental illnesses. Seniors with mental retardation disorders had the second lowest proportion of overall hospital stays and acute hospital stays, which was much below that experienced by seniors with mood, organic and substance use disorders. For seniors with mental illnesses who were re/admitted at least twice to hospital, mental retardation was not prevalent. Their resource intensity weight was one the lowest and consequently they incurred the second lowest costs, but they actually had the third highest proportion of wait time in the emergency department.

The literature on the prevalence and how seniors with mental retardation use acute hospital in-patient services was minimal but was supported by the results of this study. The prevalence of developmental delay disorders in Canada for older adults occurs at a rate of only 9% (National Advisory Council on Aging, 2004), and often co-occurs with other mental illnesses, hence the term "dual diagnosis" is often applied (Griswold & Zucker-Goldstein, 1999; Lakin, Anderson, Hill, Bruininks & Wright, 1991). The life expectancy of individuals with mental retardation is younger than the average population (Durvasula, Beange, & Baker, 2002), but has been increasing in recent years (Lin, Wu, Lin, Lin, & Chu, 2011). At 66.1 years, life expectancy of persons with developmental disabilities still remains much lower than that of the

general population (Janicki, Dalton, Henderson, & Davidson, 1999). The population of NL is known for and frequently used for research on developmental delay because of its historical high prevalence of inbreeding in specific geographical regions (Atkinson, 2000; Quinlan, 2007; Parfrey, Davidson, & Green, 2002; Rahman et al., 2003). Despite this, the presence of mental retardation in seniors was not believed to significantly impact hospital use in this study. However, others suggest that seniors with mental retardation have a high use of hospital services. For example, Lakin, Prouty, Coucouvanis and Byun (2005) whose study was limited to long term care settings, maintain that the population of seniors with developmental disabilities is increasing at a rate similar to that of the senior population in general. Clearly, seniors with developmental disabilities is a population in which more research is required, including a wider range of care settings.

Anxiety and stress related disorders. This study found a low percentage of anxiety and/stress-related disorders in hospitalized seniors. However, seniors with anxiety or stress-related mental illnesses contributed significantly to overall in-patient hospital service use, with the fourth longest hospital stay, acute hospital stay and emergency wait time. Although mentally-ill seniors with anxiety and stress related disorders had few readmissions to hospital, these seniors accounted for the fourth highest resource intensity weight and the fifth most expensive mental illness for which to maintain seniors in hospital.

Findings from this study support other research which found that seniors with anxiety have a higher use of hospital services compared to seniors without anxiety disorders (CMHA, 2008b). Anxiety disorders can turn seniors' lives into a continuous journey of unease and fear, and interfere with their relationships with family, friends and colleagues (CMHA, 2008b). Hence, it influences how health care services are utilized. As Jimenez et al. (2004) found,

adjustment disorders, a type for anxiety disorder, in seniors account for the fourth longest hospital stay which is slightly less than that of mood disorders, psychotic disorders, and personality disorders. Further, phobias also often occur in Canadian seniors (Cairney et al., 2008; Flint, 1998), although they rarely occur on their own, but instead co-occur with other psychiatric diagnoses (Cairney et al., 2008). So severe do phobias manifest themselves, that they impact significantly the extent to which seniors utilize hospital services (Cairney et al., 2008; Flint, 1998). Health Canada (2002) reports that anxiety disorders constitute the highest rates of hospitalization in general hospitals for those 65 and older.

The low prevalence rate of anxiety disorders in seniors seen in this study is not consistent with what others have found. This could be partly due to the way in which these illness were classified and what was included in the diagnostic categories. For example, some maintain that the most common anxiety disorders in seniors are anxiety disorders, adjustment disorders and phobias; even though younger age cohorts experience them much more (Cairney, Corna, Veldhuizen, Kurkyak et al., 2008; Cairney, Corna, Veldhuizen, Hermann et al., 2008).

Likewise, in the 1990s it was reported that the most common anxiety/stress related disorders in seniors were anxiety disorders, adjustment disorders and phobias (Cross National Collaborative Group, 1992; Flint, 1994; Wittchen et al., 1994). Gagnon, Habel, Hervouet, & Moore, (2002) also noted that adjustment disorders were prevalent in seniors. It is not known how anxiety and stress related disorders are reflected in these studies and there are other limitations related to sampling, ages included, settings used that make it difficult to generalize their findings or draw comparisons with the current study. Gagnon et al. (2002) for example, used only a sample of seniors who were referred to a cancer treatment center.

Schizophrenia and other psychotic disorders. This study found that schizophrenia and other psychotic disorders represented only three percent of all mental illness diagnoses in hospitalized seniors. Although the prevalence of schizophrenia and other psychotic disorders was low, they contributed their fair share to the use of in-patient hospital services, with the fourth highest overall length of hospital stay and the third highest acute hospital stay. They also had the fourth highest resource intensity weight and were the fourth most costly mental disorder for which seniors were hospitalized. Finally, they had the fifth highest wait time in emergency room settings. However, only minimally were schizophrenia and psychotic types of disorders attributed to seniors admitted two, three and four times to hospital.

Consistent with the findings in this study, early reports indicate that psychotic disorders such as schizophrenia and others were considered to be a rarity in older adults, and when they were been present, signs and symptoms typically decreased with increasing age (American Psychological Association, 1998). Hence, psychotic disorders are often only referred to as associated conditions, not the primary diagnosis that impacts hospital stays (Health Canada, 2002). Conversely, Jimenez et al. (2004) also found that psychotic disorders in seniors are highly prevalent. Similarly, though their study was limited to select acute care hospitals of one geographical region, Harman et al. (2004) also found that schizophrenia was one of the most common mental illnesses in hospitalized seniors; however, they too used a limited sample.

The literature on schizophrenia in seniors is minimal and indicates that seniors with schizophrenia have a high hospital use, as was found in this study. For example, the CIHI (2008b) report that outside of organic disorders, seniors with schizophrenia and other psychotic disorders have one of the longest hospital stays in general hospitals compared to seniors without schizophrenia and Jimenez et al. (2004) found that when admitted to hospital they have a long

hospital stay. In addition, Bressi et al, (2006) noted that seniors on Medicare who have schizophrenia or mood disorders also have an increased hospital stay. Oslin et al. (2002) suggested that seniors with psychoses are difficult to stabilize. From a medication compliance perspective, seniors with schizophrenia or psychoses-type disorders often have symptomatic paranoia (Mental Health America, 2011), which has been shown to jeopardize their overall treatment compliance and hospital usage (Farrell & Ganzini, 1995). Further, anti-psychotic medications have a well-known adverse effect of weight gain (Baptista et al., 2004; Henderson et al., 2000; Teff & Kim, 2011), that can precipitate a wide array of medical illnesses that require hospitalization.

In contrast, Harman et al. (2004) found that schizophrenia is one of the most common mental illnesses in hospitalized seniors. However, Harman et al. (2004) used only select acute care hospitals in a single geographical region.

Other mental illnesses not specified. This study found that seniors with mental illness unspecified were not at all prevalent as was found for all other mental illness diagnostic categories, therefore, it did not present itself as a concern amongst seniors or how they used acute hospital services. In this study, seniors with mental illness unspecified codes actually had the lowest hospital stay, acute hospital stay, emergency room wait time, resource intensity weight and cost. In terms of re/admissions, it was not a prevalent diagnosis for seniors.

There is a noticeable dearth of literature on "other mental illness not specified". However, as is found by CIHI (2008b), even when mental illnesses are not specified, seniors with them have one of the longest lengths of stay in general hospitals compared to seniors without mental illnesses not specified. However, the CIHI only included mental illness not

specified when it was the primary admitting diagnosis, which was unlike the current study that ensured its inclusiveness of all seniors and all mental illnesses.

In summary, as was highlighted before, although the overall prevalence of mental illness codes in seniors of this study was quite low, their use of acute hospitals was generally quite high. With the exception of mental illness categories of mental retardation, personality disorders and unspecified mental illnesses, seniors with mental illness codes most often had a longer total hospital stay, acute stay, greater rate of re/admission, emergency room wait time, resource intensity weight and cost than did seniors without mental illness codes.

Suicide. When discussing mental illness in any capacity, the issue of suicide must not be overlooked. In this study population, from all seniors admitted to acute care hospitals, seven of them were coded for a suicide attempt and required hospitalization as a result of that attempt. These seven seniors (four males and three females) had a total of nine re/admissions. Six of the seven made a single known suicide attempt. All patients survived their ordeal and were discharged home or discharged home with support services in place.

This study's findings are consistent with those of Alaghehbandan, Gates, and MacDonald (2005) who previously found that for the province of Newfoundland and Labrador, attempted suicides that resulted in hospitalization for the elderly was less than the national average of 4.2%.With the exception of its native peoples, Newfoundland overall, has one of the lowest suicide rates in Canada. Suicide has also been found to be three times less likely for those who are married (Bell, 2008). The literature indicates that males, more so than females, often resort to more violent means (Dombrovski et al., 2008). Of the seven seniors who attempted suicide in this study, six did so by ingesting poisonous substances.

In contrast to the relatively low prevalence of suicide in seniors found in this study, society has witnessed an exponential increase in suicide among the elderly population. Adults aged 65 and over have the highest suicide rates of all age groups, with older Caucasian men (over the age of 80 years), in particular, having the highest rate of success (Health Canada, 2002; Heisel, 2006). Most studies suggesting a high incidence of attempted suicide amongst seniors, although providing valuable information, are fraught with limitations. For example, the study by Clark et al. (2006) used only seniors who were survivors of the Holocaust, which would be a significant extenuating circumstance that could be expected to precipitate the onset of mental illnesses and consequently, suicide attempts. Further, Health Canada (2002) only included seniors whose mental illness was the primary admitting diagnosis. Other studies were conducted post-mortem. Finally, Heisel (2006), Waern, Bestow, Runeson, and Skoog (1999) and Waern et al. (2002) all relied solely upon the subjective recall by proxy informants such as the physician/friend/relative/acquaintance of the senior who had completed suicide.

Although this study found a low prevalence of suicide attempts among seniors, it is recognized that this study obviously would have only included seniors who were not successful in their attempts. Those who were not brought into hospital but instead, sought recovery or died at home would not have been included in this study. Seniors who completed their suicides would not have been admitted to hospital.

In summary, although the overall prevalence of mental illness codes in seniors of this study was relatively low, the use of acute care hospitals by seniors with mental illnesses was quite high overall. With the exception of mental illness categories of mental retardation, personality disorders and unspecified mental illnesses, seniors with mental illness codes most often had a longer total hospital stay, acute stay and a greater rate of re/admission, emergency

room wait time, resource intensity weight and cost than did seniors without mental illness codes. These findings are consistent with what has been found in other studies, although there are studies suggesting mentally-ill seniors are not high users of hospital services. Many studies on seniors with mental illnesses are fraught with limitations because they are based on unrepresentative samples drawn from specific facilities or diagnostic codes and most did not include mentally well seniors as a comparison group. The present study used a large, more representative database, and compared both seniors with, and without mental illnesses. It is hoped that with the inclusive approach and methods used in this study, the findings are reliable and generalizable to the extent to which they provide sound evidence for decisions making to better meet the needs of seniors with mental illness.

Chapter 6- Conclusions

This descriptive-comparative study was a retrospective quantitative investigation of seniors admitted to acute care hospitals/facilities in the province of Newfoundland and Labrador. This research study helped to answer two main research questions. First, "How do seniors with mental illness codes compare to seniors without mental illness codes in their total hospital stay, acute stay, emergency waiting time, rate of re/admission, resource intensity weight and total hospital cost?" And second, "What is the influence of age, gender, geography of residence and facility, mental illness, medical co-morbidities, re/admission variables, referring institution, discharge destination, and discharge disposition on total hospital stay, acute stay, rate of admission, resource intensity weight and total hospital cost for both seniors with and without mental illness?"

A rigorous methodological approach was taken in this study. The sample included all seniors 65 and older, all mental illness codes, all geographical regions, both genders and all acute care hospitals/facilities in the province of Newfoundland and Labrador. Further, the well-known, extensive and established objective database, the *Discharge Abstract Database*, was the source of data for this study.

In answer to the first research question, this study found significant differences between seniors with and without mental illness codes in how they used acute hospital services. Seniors with mental illness codes had a total hospital stay, acute hospital stay, emergency room wait time, rate of admission to hospital, resource intensity weight and hospital costs that was significantly higher than that experienced by seniors without mental illness codes. Even when other medical co-morbidities were controlled for, the presence of a mental illness diagnosis still significantly predicted an increased hospital use of services. This higher hospital usage and cost

was found even though seniors with mental illness codes constituted just 10% of the total seniors' population studied.

In answer to the second main research question of the variables impacting seniors' hospital use, although findings were varied, there were clear differences for seniors with and without mental illness codes. Compared to seniors without mental illness codes, seniors with mental illness codes were more often discharged to long term care facilities, had mostly unplanned admissions that were urgent in nature, and they came primarily through the emergency room setting from their home, a long term care facility or another acute hospital unit. These seniors were primarily from urban areas, had more medical co-morbidities, had a higher average age than did seniors without mental illness codes, and were most often admitted into the service of medicine under the care of either a general practitioner or internist. In addition, although female seniors with mental illness codes were more often admitted, male seniors with mental illness codes were the more costly for hospitals to maintain.

In terms of mental illness categories, seniors with organic, mood, substance use and anxiety disorders were, overall, the highest and most costly users of hospital services compared to seniors with personality, mental retardation and unspecified mental illness. In particular, seniors with dementias, depression and alcoholism were the greater and most costly users. Clearly, from this study, even after controlling for other medical co-morbidities, the discharge disposition, discharge destination, referring institution, re/admission variables, age, gender, and geography all influenced the extent to which seniors with mental illness codes used acute hospital services.

Contextualizing the Findings

The Canada Health Act mandates that there be equitable and universal rights of access for all Canadians to publicly funded medically necessary health care that is free of any discrimination and barriers (Madore, 2005). The Government of Canada has an important role to play in helping Canadians maintain and improve their mental health and cope with mental illness and addiction. Health Canada supports the delivery of primary and supplementary mental health services and addiction treatment to approximately one million Canadians. It has made efforts to strengthen public health capacity in relation to mental health and mental illness, public health infrastructure to support mental health issues, knowledge generation and development, stronger capacity of primary health care, home care and acute care sectors to provide leadership and governance, and to develop health-oriented marketing campaigns for seniors (Health Canada, 2006). Although, the recently formed Mental Health Commission of Canada in response to the Romanow and Kirby reports, further symbolize efforts towards meeting the needs of Canada's mental health patients (Mental Health Commission of Canada, 2008), there remain many unfulfilled recommendations and gaps in services for seniors with mental illnesses.

To fully appreciate the findings of this study, the Canadian and NL context needs to be understood. Unlike other provinces in Canada, NL was historically a poorly resourced province, often characterized as being an economically compromised "have not" province, hence resources were even less plentiful than they are currently, where at present the province has a vibrant economy. Its geographical vastness also challenges the delivery of all services in rural areas where many seniors reside. Seniors of the province of NL have endured much economic and personal financial hardship, with the rugged terrain and obstacles inherent in the province's often isolated landscape and today seniors are the fastest growing population in Canada. Hence, the

struggles to obtain the basic essentials in life would be expected to inadvertently tax seniors' emotional, social, psychological, physical and mental health to a point that low income seniors should have an increased prevalence of mental illness codes and use of acute hospital services (Fernandez-Olano et al., 2006; Rice & Matsuoka, 2004). The characteristics of NL further challenge the accessibility and availability of services for mentally-ill seniors, which may have impacted the overall hospital usage. However, in spite of the many environmental and personal struggles that have come to define the people of this province, their social habits and close-knit family structures may help explain why they continue to exhibit relatively good mental health.

Many of the needed community resources are still very new concepts in the province of NL. For example, the use of Assertive Community Treatment (ACT) teams in NL only began in 2009. The province has one ACT team to date, and because the team works out of the capital city of St. John's, the location makes access geographically difficult for seniors in rural and smaller urban areas of the province. The same applies to geriatric-psychiatry day hospitals in NL. The only two in existence are both located in the capital city of St. John's, thereby, once again making access difficult for rural seniors (Government of NL, 2011a). Other supportive community mental health programs such as the Stella Burry Project (Stella Burry Community Services, 2011) are also new, but again, this project is based only in St. John's. The one province-wide service that can possibly help seniors with mental illnesses is provided by public health nurses (who may or may not have geriatric-psychiatry knowledge and training). In addition, voluntary seniors' groups, such as the elder abuse support line, and peer advocate groups monitored by the provincial Seniors' Resource Center (2011), are provincially represented and dispersed geographically. However, these groups are voluntary and therefore services, resources and expertise are limited.

Home care for the province of NL continues to remain on the government's agenda as a priority to address and as a result is still not covered by the provincial medical care plan (Government of Newfoundland & Labrador, 2011). To date, in the province of Newfoundland and Labrador, the only home support provided is by non-professionals or non-regulated care providers, such as personal care attendants and home support workers. These individuals who are restricted in scope, skill, and knowledge are limited to providing personal and/or behavioural supports, household management and respite care at a minimal level, to help seniors maintain some sense of independence. Hence, there remains little assistance, support and expertise for mentally-ill seniors living at home.

Nursing Implications

This study highlights several gaps in services for seniors with mental illnesses in the province of NL. Nurses are indeed in an excellent position to provide the needed care and services to seniors with and without mental illnesses. The population-based approach taken in this study provided a system wide perspective of how long stay hospitalizations and repeat admissions contribute to overall hospital usage by seniors with and without mental illness codes. The findings from this study indirectly point to opportunities for improving education, admission and discharge procedures, the therapeutic environment, basic competence and standardized nursing practice. First, all nurses should be receiving basic and ongoing education on how to care for seniors with mental illnesses. As has been suggested, knowledge and education for many front-line clinicians is lacking, but is very much needed to provide direction in assessment, diagnosis, and treatments to best meet the needs of seniors with mental illnesses.

In preparing seniors for discharge, nurses are integral to help ease the transition from hospital to community. Nurses need to inform and advocate for mentally-ill seniors as to the

availability of local programs that can provide support for them in the community (Roos et al., 2003). As well, from a community health nursing perspective, identifying what resources are needed to support mentally-ill seniors in the community, advocating for them and taking a leadership position in developing and establishing these resources, are key strategies that should be encouraged. Having the required community supports in place would ultimately help achieve more timely and appropriate discharges. Nurses with an understanding of factors that best predict the transition from independent living to institutional care in seniors is paramount to improving the continuum of health care in this population (Kozyrskyj et al., 2004).

The necessity of expanding home care services is also recognized as being a valued resource when discharging mentally-ill seniors to the community (Kozyrskyj et al., 2004; MacCourt, 2004; Menec et al., 2004). Primarily, the home setting provides an opportunity for community health nurses or geriatric psychiatry assessment nurses to conduct an accurate mental health assessment of seniors in their own environment and to initiate prompt interventions when indicated (Kohn et al., 2004). Further, home care services focused on management of treatment and medication regimes, and activities of daily living can help prevent institutionalization (Kozyrskyj et al., 2004).

At the bedside, there are many interventions nurses can engage in to help promote quality patient care and services for seniors with mental illnesses. Nurses can become involved in developing and implementing programs that can help to reduce anxiety and confusion in seniors with cognitive impairment (Inouye et al., 1999). Similarly, nurses can be instrumental in facilitating in-patient mental health programming, the usage of mental health liaison consultants for referrals, and in creating an environment that is not perceived as too busy and over-stimulating for seniors with mental illnesses. The placement of seniors with mental illnesses in

private hospital rooms or rooms away from main thoroughfares, for example, is one measure that can be implemented.

As counsellors, nurses can ensure appropriate communication and demonstration of authenticity, presence and non-judgemental interest in the care of seniors with mental illnesses. Taking the time to sit and speak with the senior who has a mental illness can be very beneficial for how the senior then cooperates and works with the nurse. The development of respectful rapport and mutually interactive relationship is vital to help promote understanding for the mentally-ill senior (Cowdell, 2010). As seniors may have stigma, fear and embarrassment associated with having mental illnesses, not to mention an element of paranoia that accompanies many mental illnesses, this genuine presence and non-judgemental approach is necessary (American Psychiatric Association, 2011; Berzins et al., 2003; Cochrane et al., 2000; Hamid, 2002; Rogers & Barush, 2000; Sadovoy et al., 2004; Whalen, 2007; Wrigley et al., 2005). Nurses need to develop the knowledge and skills to communicate effectively with seniors in general, and with seniors with mental illnesses in particular, whether in long term care (Mayers, 1995) or in the emergency room (Kihlgreen et al., 2005).

Finally, nurses have a pivotal role to play in helping to decrease inappropriate and/or frequent hospital re/admissions and long hospital stays of mentally-ill seniors. For example, nurses can help to ensure that units/departments are equipped, designed and resourced to allow detailed assessments, prompt access to specialists, and increased social care services needed. In addition, they can help to ensure more immediate access to secondary care services as well, should that senior be discharged to a community or long term care facility (Hammond et al., 2009). In the emergency room setting particularly, triage nurses have an important role to play in their assessment of seniors with mental illnesses (Cloyd & Dyer, 2010). Similarly, on hospital

in-patient units, the nurses' astute observation of changes in a seniors' mental health status could help to ensure the senior gets the needed treatments that may further prevent long hospital stays or unnecessary re-admissions post discharge.

Recommendations

The topic of mental illness in seniors and how they use acute hospital in-patient services remains a growing topic of interest, perhaps now even more so in a social climate where the population of seniors is increasing rapidly and health care costs are rising. This study used aggregate level population data to reveal that seniors with mental illnesses have an increased use of hospital services compared to seniors without mental illnesses. Findings from this study provides direction for health care policy analysts, administrators and governments on how they can best meet the needs of seniors with mental illnesses, and how they can better implement alternatives to services and care to address their high usage of acute care hospitals.

Recommendations stemming from this study are many: First, early and complete discharge planning is needed, regardless of the setting from which the senior is being discharged. Second, a transparency of policies and funding mechanism, particularly long term care policies and practices is required, as practitioners often are reluctant to admit mentally-ill seniors and/or subjectively choose who they prefer to admit. To help avoid this, a single entry system is encouraged for all long term care facilities. Third, an accurate assessment, preferably in the emergency room setting is paramount. The emergency room is the gateway to the hospital for many seniors with and without mental illness, and a thorough assessment completed here can begin early treatment interventions such that hospital stay is not prolonged and re/admissions are avoided. Fourth, basic and ongoing education for health professionals, but physicians and nurses, in particular, on the care of seniors for mental illnesses is vital; as they are the frontline

clinician's most frequently interacting with, assessing and treating this population. This would also hopefully help address the prevalent stigma, ageist attitudes and deficient clinician knowledge/education in the area of seniors with mental illnesses.

Fifth, the coding process used for in-patients is also suspected of needing improvement. An audit schedule for hospital ICD coders should be established to increase the validity with which mental illnesses are being coded. Finally, it is time that both federal and provincial governments follow through with their commitments regarding home care, attending to the needs of the rapidly aging population and to promote the quality of life of those with mental illnesses living in the community. The work and recommendations of the Royal Commission on Mental Health should be visible, proactive and expedited. If both provincial and federal governments plan to be more fiscally responsible in a manner that best meets the needs of our rapidly growing population of seniors, immediate attention must be given to the population of seniors who are hospitalized with mental illnesses.

Limitations

There were three main limitations identified in this study. These limitations primarily involved the database being used, other external efforts unknown to the researcher, and the sample.

The discharge abstract database used in this study has several inherent limitations. As mentioned previously, the administrative database, the *Discharge Abstract Database* used, only included a select few independent and dependent variables possible for inclusion and analyses. As well, administrative data based on codes from medical record review are known to be less accurate than prospectively collected clinical data, and tend to under-report chronic conditions. Only the most severe forms of dementia or other mental illness get coded, therefore the cohort

used in this study probably represented the more severe end of the disease spectrum for mental illnesses. Further, coding for the cause of death, in particular, is a suspected issue, as a low prevalence of mortality due to mental illnesses may not be accurate, because the mental illness diagnosis often takes on less importance compared to the most immediate and proximate cause of death (Desjarlais, Eisenbert, Good & Kleinman, 1995; Hannerz, Borga, & Borritz, 2001).

This study was not able to describe or identify active, internal efforts made for treatment of concomitant physical or mental illnesses, early exploration of placement options that may have been ongoing in the hospitals/facilities involved, and therefore offered few clues to aspects of inpatient treatment that were targeted to improve efficiency. Further, individual help-seeking behaviours of seniors with mental illnesses would not have been known to the researcher.

Some sampling limitations from this study also need highlighting. As the focus of this study was on seniors only, this may be perceived as a limitation by some, as comparisons across other age cohorts either with or without mental illness diagnostic codes could not be completed. Coding issues have also been found to occur, particularly when coding admitted patients for ICD mental illness diagnostic codes (Goldacre, Roberts, & Griffith, 2004). As well, the population studied in this research would have only included those seniors who went to hospital and were actually admitted; it would not have included seniors who entered an emergency department and were sent back home without being admitted to hospital. It is recognized that a substantial number of seniors suffering from mental illnesses do exist in community settings as well. Therefore, hospital use by seniors with and without mental illnesses only captured a proportion of seniors in total, as many seniors often rely upon general practitioners, community services, caregivers, etc.

Future Research Directions

The findings of this study have identified potential areas of research on the topic of how seniors with mental illness codes use hospital services. From both a community care and in-patient acute care hospital setting, and quantitative and qualitative research perspective, there are many issues yet to be further explored for how certain factors can help or positively impact the care needed and/or provided to seniors with mental illnesses.

Quantitatively, from within the confines of an acute care hospital, research in the areas of discharge planning, knowledge level of clinicians, clinical efficiency, policies and potential coding errors need to be undertaken. In terms of discharging seniors with mental illnesses, the processes used, timeliness, and existing policies need to be further explored for the extent to which they are followed, implemented and whether they are adequate to meet the needs for seniors with mental illnesses. Further, the barriers or bureaucracies need to be considered and explored for how they can inhibit the admission and discharge processes for seniors with mental illness codes.

A reanalysis of data from a sub-sample of seniors admitted for physical illnesses is warranted. In this proposed study, comparing seniors who have a concomitant diagnosis of a mental illness with those who do not would help to identify difficulties they experience when admitted for medical illnesses. It is believed that seniors who have a mental illness are likely to have longer hospital stays simply because their mental illnesses challenge the skills and knowledge of the health care providers, but research is required to explore this matter.

For nursing and other clinicians, exploration in their level of education and/or knowledge in assessing and treating seniors with mental illnesses is needed. This should include a large sample size that is representative of and includes all hospitals, all care settings and all

geographical regions. As well, the reporting of ‘problem behaviours’ in hospitalized seniors was previously identified as a barrier to how clinicians can best deal with and intervene to help mentally-ill seniors. If the identification and assessment of these problem behaviours are not optimally documented or recognized, than they could have a significant impact on how long mentally-ill seniors stay in hospital and/or the rate at which they get readmitted to hospital.

For organizations, a more in-depth study of bed utilization is needed using an aggregate population dataset that includes all ages, both with and without mental illness, for comparison. This more in-depth bed utilization study would help identify potential areas needing improvement to better meet the needs of our seniors, to better achieve a sense of fiscal stewardship, and uncover potential cost saving initiatives that can be undertaken to help the organization meet their fiscal obligations, while at the same time, not jeopardize patient care. Further, trend studies would be valuable. This study used only one fiscal year. However, to truly appreciate and discover underlying trends, an aggregate level study needs to be conducted over a period of several years that will help demonstrate hospital usage trends, any changes found therein, and provide direction for how the hospital systems can be better prepared for these trends depending on the rate at which they were occurring. Further, the determinant of health of social support is thought to play an integral role in this study. Therefore, an investigative study on the supports the mentally-ill of NL received from families and friends would help provide a better picture of the total realm of care provided to this group.

From an emergency room perspective, it would be interesting to find out exactly how many seniors with mental illnesses come to emergency and get either turned away, and/or sent home without any assessment, mental health assessment and/or intervention. Further, the standards of practice, protocols and tools used by front line clinicians and how they conduct their

assessment, particularly in the emergency room setting, of mentally-ill seniors need further exploration.

Qualitatively, the experience of mentally-ill seniors and frontline clinicians is a rich area to explore. For mentally-ill seniors undergoing and waiting on admission and discharge processes, we need to hear their voices as to how they are feeling through this experience and what ways in which their needs could be better met. For seniors visiting emergency rooms, in particular, it would be valuable to gain their perspective on how they are treated by personnel they encounter. Interviews with frontline clinicians in all areas/programs of health care systems can help identify their practices the assessment tools used and their perception of the quality of care they are providing to seniors with mental illnesses.

In the community setting, explorations of the policies and procedures followed by long term care facilities are needed. Both administration practices and policies in long term care settings have been previously identified as barriers to the discharge of mentally-ill seniors from hospitals (Cochrane et al., 2000; Lane et al., 2010; Rogers & Barush, 2000).

An environmental scan of community services and supports used by an aggregate level of mentally-ill senior population would serve to identify barriers to a successful discharge. Further, an investigation for acute hospital personnel communicate with community agencies and support services when trying to discharge and prepare the mentally-ill senior for community living would help to identify any difficulties in communication and processes. For the province of NL which has a large population of indigenous peoples, such as the Inuit, Innu and Mi'kmaq, a qualitative, focused ethnography of how their elders perceive mental illness and their beliefs around seeking help for that mental illness would also be valuable to explore so that health care authorities can best meet their culturally defined needs. As well, the role of community health nurses in how

they provide care, consultation, advocacy and supportive counselling to seniors with mental illnesses needs to be further explored.

Finally, the recovery model is an approach that addresses both the individual and population needs. The Recovery Model's philosophy is based on peoples' journey and transformation that enables them to live with mental health problems in their community, meanwhile striving to achieve their full potential. The recommendations made by the Commission include: planning comprehensive integrate mental health system that understands diversity among seniors; developing policies that reflect guiding principle and values (respect, dignity, self-determination, independence, equality, etc.); providing public awareness, training, and community based support services; and being recovery oriented (choice, empowerment and hope) (Mental Health Commission of Canada, 2011). The recovery model has been adopted by the Mental Health Commission of Canada as a national guideline to enhance services provided to older adults. It would prove a valuable investigative study to determine the extent to which it is being used across Canada and in individual provinces in settings where mentally-ill seniors are admitted, or even the extent to which it is known.

Conclusion

Neither cost, nor hospital use were perceived as a significant negative outcome of caring for seniors with and without mental illnesses in hospitals. However, it is evident appropriate services for seniors, should they have been present, may have been able to help curtail some of unnecessarily high costs, particularly in an economic environment of cost constraint and fiscal stewardship. It is a government priority to understand hospital use and length of stay because of the costs associated with inpatient care. The use of the Andersen Model of Health Services Utilization proved to be a valuable guiding framework to help keep all variables and outcomes in

focus as to the role they played and the relationships they exhibited throughout this study, and the presentation of the findings. The continued use of this model would seem prudent when assessing health services utilization regardless of disease process.

In summary, although the overall prevalence of mental illnesses in seniors of this study was relatively low, the use of acute hospitals and associated costs with mentally-ill seniors was high and even excessive at times, compared to seniors without mental illness codes. Further, although acute care hospitals are the main focal point for trying to stabilize seniors with mental illnesses, there are many downfalls of this acute care environment that not only jeopardize seniors' mental health treatment, but their mental and physical health as well. However, if adequate resources were present such as knowledgeable clinicians, long term care beds, supportive community resources, home care and timely discharge processes, it is believed that seniors with mental illnesses would not have to use acute hospitals to the degree with which we observed in this study. The social and personal costs, in terms of the well-being of seniors when they are institutionalized, cannot be overstated and must not be overlooked.

This is the first study of its kind to include all seniors, all geographical regions, all mental illnesses, all ages 65 and above, and both genders, using a province-wide sample from the Discharge Abstract Database. This study has shown that seniors suffering with mental illness diagnoses are still very much an underserviced population. Although Canada in general, and Newfoundland in particular, are trying to make progress in the areas of community supports, home care, long term care living and the quality of life for seniors with and without mental illness codes, much bureaucratic bias, uneducated clinicians and stigma still persists. For the seniors of Newfoundland and Labrador, it is suspected that their traditions, culture and

supportive extended family arrangements, even in the most isolated regions of the province, have continued to support and promote their good mental health.

In spite of its noted limitations, the population-based approach used in this study is believed to add significantly to the evidence and capacity of health care administrators to make evidence-based decisions regarding the needs of seniors with mental illnesses. Further, the results of this study provide evidence upon which administrators and decision makers can work to improve appropriate assessment, diagnosis, and treatment of seniors with mental illnesses in order to meet their operational objectives, fiscal budget expectations and most importantly, the quality care for seniors with and without mental illnesses. Acute care hospitals should not be the "go to" location when seniors are seeking assistance for their mental health needs.

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