ATHABASCA UNIVERSITY

FACTORS ASSOCIATED WITH READMISSION TO MENTAL HEALTH INPATIENT SERVICES AND THE EMERGENCY DEPARTMENT WITHIN 30 DAYS POST DISCHARGE

BY

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Abstract

This study examined connection to a mental health outpatient program and readmission to the emergency department and an inpatient unit within 30 days post discharge. A retrospective analysis of administrative data in Ontario hospitals was undertaken using a multivariate logistic regression model examining the relationship between connection status and readmission. Five percent were readmitted to a mental health inpatient unit and 14% to the emergency department. Connection status was not a significant predictor of readmission. Substance related disorders (adjusted OR = 2.33; 95% CI = 1.33-4.07) and concurrent chronic illness (adjusted OR = 2.51, 95% CI = 1.06-5.99) were associated with return to the emergency department. Substance related disorders were also more likely to readmitted to an inpatient unit (adjusted OR = 3.36; 95% CI = 1.01-11.2). The findings emphasize the multifaceted issues associated with mental illness related readmissions, most of which could not be controlled for in this study.

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Chapter 1 - INTRODUCTION

Mental illness in Canada is common, with approximately 20% of the population experiencing a mental illness in their lifetime (Canadian Mental Health Association [CMHA], 2011; Health Canada, 2002). Most individuals are first diagnosed with a mental illness in their adolescent and young adult years, with females affected more often than males (Health Canada, 2002; Lim, Jacobs, Ohinmaa, Schopflocher, & Dewa, 2008). The most common mental illnesses include mood disorders, schizophrenia, and anxiety disorders (Canadian Institute of Health Information [CIHI], 2009a; Health Canada, 2002). Mood and anxiety disorders are most prevalent with a one year prevalence of 5.9% and 5.8% respectively, followed by schizophrenia at 1% (Arboleda-Florez, 2005; Health Canada, 2002). Not only are these conditions common, they are also costly with mental illness related hospitalizations costing the Canadian health care system 2.7 billion dollars annually (Institute of Health Economics [IHE], 2010).

Statement of the Problem

Individuals admitted to hospital, with a mental illness as their primary diagnosis, are at higher-risk for readmission both as an inpatient and to the emergency department. This concern has become an issue of national significance, whereby the Mental Health Commission of Canada has noted the need to address readmission in those with mental illnesses and are working on strategies to reduce the instance, particularly shortly after discharge (Mental Health Commission of Canada, 2012). This has also become an area of interest in the research literature for many reasons; unfortunately, there is little agreement on factors contributing to readmission likely due to the fact that the issue is

multifaceted. For instance, a shorter length of inpatient stay may subsequently lead to the inability to connect patients to suitable outpatient services on discharge (Alwan, Johnstone, & Zolese, 2010; Boyer, McAlpine, Pottick, & Olfson, 2000; CIHI, 2008c, 2010a; CMHA, 2009; Niehaus et al., 2008). Also, a lack of adequate housing and poorly coordinated community supports may promote a dependence on hospital based services (CIHI, 2008d; CMHA, 2009; Crisp, Gelder, Rix, Meltzer, & Rowlands, 2000; Government of Ontario, 2009; McCorkle, Rogers, Dunn, Lyass, & Wan, 2008; Sharma, Kuo, Freeman, Zhang, & Goodwin, 2010; Stephens & Joubert, 2001). This dependence may bring individuals back to the hospital setting to receive care as gaps in outpatient service delivery are also well noted in the literature (Catalano, McConnell, Forster, McFarland, & Thornton, 2003; Chaput & Lebel, 2007a; CIHI, 2008d; Downey, Zun, & Gonzales, 2009; Jelinek, Jiwa, Gibson, & Lynch, 2008; LaCalle & Rabin, 2010; Pasic, Russo, & Roy-Byrne, 2005; Snowden, Masland, Wallace, & Evans-Cuellar, 2007).

Finally, though chronic mental illnesses are lifelong conditions with significant burden, an individual's specific diagnosis in itself does not necessarily contribute to readmission; however, when paired with other social and diagnostic factors it can (Health Canada, 2002; Lin, Diaz-Granados, Stewart, & Bierman, 2011; Perlick, Rosenheck, Clarkin, Sirey, & Raue, 1999; Webb, Yaguez, & Langdon, 2007). It is well accepted that identifying risk factors for readmission is important as it allows clinicians to identify individuals that may fall into this category and mitigate risk factors, thereby decreasing the stress to the individuals who use these services, their families, and the healthcare system (Gruber, 1982; Kolbasovsky & Futterman, 2007; Kolbasovsky, Reich, & Futterman, 2007; Mahendran, Mythily, Chong, & Chan, 2005; Mgutshini, 2010).

Though readmission over the course of a chronic mental illness it is not unanticipated, shortly (within 30 days) after discharge is often not expected, especially if the individual is already connected with mental health outpatient services (CIHI, 2011). Thus, it is valuable to understand the differences in patient demographics, mental illness diagnoses, and other factors associated with readmission to compare those individuals who are connected to mental health outpatient services versus those who are not.

Significance of the Study

In order to design services that meet the current and future needs of patients, it is important for healthcare providers to understand how individuals utilize their services. Other studies of similar populations have focused on either inpatient readmission or emergency department utilization (Blank et al., 2005; Bruffaerts, Sabbe, & Demyttenaere, 2005; Chaput & Lebel, 2007b, 2007b; La Calle & Rabin, 2010; Nelson, Maruish, & Axler, 2000; Thompson, Neighbors, Munday, & Trierweiler, 2003). In this study, I further examined the utilization in both of these clinical areas, in order to better understand the relationship between being connected to a mental health outpatient program and subsequent utilization rates for mental illness related inpatient and emergency department services, within 30 days post discharge from a mental health inpatient unit. Since research has shown that being connected to a mental health outpatient program provides a protective effect against readmission to hospital, it is import to understand the specific factors that have been associated with individuals who have returned shortly after discharge despite having this connection (Nelson et al., 2000; Thompson et al, 2003). This study contributes to the understanding of individuals

connected to mental health outpatient programs who return to either a mental health inpatient unit or to the emergency department shortly (within 30 days) after discharge. More importantly, examining hospital readmissions that occur shortly after discharge (within 30 days) assists healthcare providers and hospital administrators in identifying areas that are in need of improvement thus highlighting educational opportunities and targeted interventions for patients, families, and healthcare providers (Bernardo & Forchuk, 2001; Pasic et al., 2005).Not only will this study contribute to the understanding of factors associated with readmission shortly after discharge, but also could be used to identify if any gaps in the current service models contribute to readmission (Cuffel, Held, & Goldman, 2002; LaCalle & Rabin, 2010). Finally, the information garnered from this study can be used to assist healthcare providers and decision makers in planning mental health services as well as identify areas for quality improvement in areas of service delivery, such as discharge planning and outpatient referral processes.

Purpose of the Study

The purpose of this study was to provide a comprehensive description of readmission patterns in adult patients with a study defined mental illness and to identify factors associated with both inpatient and emergency department readmission. Using retrospective hospital based administrative data; this study was specifically designed to examine the incidence of readmission to a mental health inpatient unit and the emergency department within 30 days post discharge, for individuals who had been admitted to a mental health inpatient unit.

Research Questions and Hypotheses

Based on my comprehensive review of the literature and my clinical experience, I expected to find that individuals who had been previously connected to mental health outpatient services on admission to a mental health inpatient unit would have lower rates of readmission to mental health inpatient services and fewer emergency department visits (for mental illness related complaints) within 30 days post discharge. Specific research questions that were addressed included:

1. In patients with a study defined mental illness, who had been admitted to an acute care mental health inpatient program, what were the factors related to mental health related readmission within 30 days post discharge?
2. In patients with a study defined mental illness, who had been admitted to an acute care mental health inpatient program, what were the factors related to mental health related emergency department utilization within 30 days post discharge?

Thesis Outline

This thesis represents the output of a graduate program of education and research (thesis). In this introductory chapter, I provided a brief overview of the topic and a description of the purpose of my research. Chapter 2 provides further background for my study objectives, including a review of the literature pertaining to the epidemiology, healthcare service utilization, and factors that have been found to be related to readmission of individuals with mental illnesses to both inpatient and emergency department services. Chapter 3 describes the research design, including research methods used to undertake the research project and includes operational

definitions, data sources, and ethical issues. Chapter 4 provides a description of the results including the statistics generated from the descriptive and logistic regression analyses. Chapter 5 outlines the related discussion points for consideration based on the findings and interpretation of the data analysis. Finally, consideration for my research, and implications for knowledge development, clinical practice, and future research are outlined in Chapter 6.

Chapter 2 - REVIEW OF THE LITERATURE

Introduction

The following chapter provides an overview of the literature and relevant research related to the study. It begins with a discussion of the changes in healthcare service utilization related to individuals with a mental illness, and the various socio-economic factors that affect current admission trends. The chapter concludes, outlining the importance of continued research to understand how healthcare service providers could improve their practice and the experiences of patients and their families.

Trends in Hospital Utilization for Mental Illness

Since the 1970s and the progressive deinstitutionalization of patients with mental illness in North America, care for individuals with mental illness has shifted from a lifetime of hospitalization towards care based in general hospitals and the community (CIHI, 2008c; Goering, Wasylenki, & Durbin, 2000; Marcus & Olfson, 2010; Sealy & Whitehead, 2004). This shift has affected general hospital based utilization patterns and became an area of interest in the research literature (Lamb & Bachrach, 2001; Sealy & Whitehead, 2004; Zeber, Copeland, & Grazier, 2006). Moreover, the focus on care utilization by individuals with mental illness varies by clinical setting and mental illness (Bruffaerts et al., 2005; Chaput & Lebel, 2007b, 2007b; Jelinek et al., 2008; LaCalle & Rabin, 2010; Madi, Zhao, & Li, 2007; Pasic et al., 2005).

Almost 4% of the total admissions to Canadian hospitals are for a primary mental illness diagnosis and these admissions have contributed to 1.5 million hospital days (Health Canada, 2002). The majority (86%) of these admissions are to general

hospitals; this is a major shift from the more long-term institutional based care provided in specialized psychiatric hospitals of the past (Health Canada, 2002). These model changes in mental health service delivery have affected patient outcomes and the use of specialized program services in various ways. One such change has been the decrease in the total inpatient length of stay. The Canadian Institute for Health Information, who report hospital admission data, noted that between the years 2000 and 2006 the average inpatient length of stay for a mental illness decreased by half, from 36 to 16 days (CIHI, 2008c). This downward trend could be attributed to the shift in providing more care in community based outpatient services rather than in psychiatric hospitals (Olfson et al., 2002). Currently, half of the inpatient stays for mental illness are for one week or less and 85% are for one month or less (Government of Canada, 2006a).

Readmission to Hospital

Although not all individuals with a mental illness require admission to hospital, those who are admitted often experience significant stress and disruption in their lives and the lives of their families (Health Canada, 2002). Moreover, Canadians who are hospitalized with a primary mental illness diagnosis have the potential for greater disruption, as they have been shown to have higher rates of readmission within one month (30 days) to a year after discharge, when compared to others who are hospitalized for non-mental illness related reasons (Health Canada, 2002; Lin et al., 2011). In Canada, one-year readmission rates for a primary mental illness are 22.9%, compared to rates for other common medical conditions such as cardiopulmonary heart disease (18%) and asthma (4.8%) (CIHI, 2008a). Furthermore, 30 day readmission

rates for a primary mental illness are 11.4% Canada wide and 11.5% in the province of Ontario (CIHI, 2008a, 2011). In other words, for every nine discharges from a mental health inpatient unit, one individual patient will be readmitted within 30 days (CIHI, 2011).

For patients, this pattern of return to hospital could reinforce frustrations with the healthcare system and bring on a lack of personal control in their lives (George & Howell, 1996). Although return to hospital for some chronic conditions within a year is not uncommon, returning shortly after discharge (either from an inpatient unit or emergency department), is not preferable; thus, readmission is used as a proxy measure for quality related to the continuity of care (CIHI, 2012c; Franklin, Noetscher, Murphy, & Lagoe 1999).

Readmission to an emergency department is also a prevalent issue identified in healthcare service utilization literature. Care in the emergency department, largely designed for urgent and emergent situations, is often used for other non-urgent medical needs (Dawson & Zink, 2009). In a study of individuals accessing mental health emergency department services in Belgium, researchers found that over 50% of individuals who returned rapidly to these services were neither connected to community care nor compliant with their discharge plan (Bruffaerts et al., 2005). Focusing on these issues is worth mentioning in light of the current efficiency standards put forth by many provincial governments, with their focus on decreasing both wait times for care provided in the emergency department and inpatient units (British Columbia Ministry of Health, 2012; Government of Alberta, 2011; Government of Nova Scotia, 2011; Ministry of Health and Long-term Care [MOH-LTC], 2010).

Emergency Department Utilization for Mental Illness Related Issues

The emergency department is a well-resourced source of support for individuals in need of assistance for mental illnesses and is often the first point of contact for patients in crisis (Downey et al., 2009; Health Canada, 2002). Emergency departments often provide quicker access to assessments for mental illness and are seen as the gateway to inpatient care (Downey et al., 2009). In Canada approximately 4% of all emergency department visits are for situations that could be treated in a less acute setting (Ontario Health Quality Council [OHQC], 2009). In a study of individuals with mental illness, who utilized emergency department services in an urban setting, Downey et al. (2009) found that approximately 45% of individuals used these services for the majority of their healthcare needs; of the 45%, only 25% had no primary care provider. Emergency department utilization for mental illnesses can also be linked to how well the system of care is functioning. In their review of emergency department utilization, LaCalle and Rabin (2010) found that individuals used these services appropriately but at times used them to fill gaps in service provision for mental illnesses. These researchers also proposed that the majority of high users of mental health emergency department services accessed this level of care appropriately for acute and chronic issues rather than for other issues that should be treated in a primary care setting (LaCalle & Rabin, 2010). Others espouse that this specific pattern of behaviour is the reason it is difficult to redirect high-volume emergency department utilizers, as they in fact required a higher level of care than could be offered in a primary care setting (Catalano et al., 2003; Chaput & Lebel, 2007a; Jelinek et al., 2008; Pasic et al., 2005). Some patients may also perceive that accessing services in the emergency department

provided them with quicker access to mental health services (Downey et al., 2009). This behaviour may be reinforced by primary care providers who inappropriately refer patients to the emergency department to receive quicker mental health services rather than waiting for a more appropriate level of care in an outpatient setting (Downey et al., 2009).

Interestingly, a segment of high utilizers of emergency department mental health services are often already connected to and are accessing a variety of community supports (Blank et al., 2005; Bruffaerts et al., 2005; Kessler et al., 1999). Similar to the general population with no mental illness, a small segment of individuals have the highest usage of services, accounting for disproportional amount of resource utilization (Chaput & Lebel, 2007b; Pasic et al., 2005). On the other hand, emergency departments are also often used to provide care for individuals who do not have access to a primary care provider (Canadian Health Services Research Foundation [CHSRF], 2009; Field & Lantz, 2006).

Factors Contributing to Hospital Based Utilization

Overall, many factors contribute to hospital based utilization patterns for individuals with mental illnesses. An individual's risk to return to hospital (inpatient unit or emergency department) after discharge can be influenced by societal, systematic, diagnostic, and demographic factors. Age, sex, diagnosis, connection to outpatient support on discharge, length of hospital stay, current housing, and discharge planning are commonly found to be factors associated with return to hospital as an inpatient or to the emergency department after discharge (Boyer et al., 2000; Bruffaerts et al., 2005; CIHI, 2008d; Lin et al., 2011; Lindamer et al., 2012; Madi et al., 2007; Schmutte, Dunn,

& Sledge, 2009; Sharma et al., 2010; van Walraven, Bennett, Jennings, Austin, & Forster, 2011).

Societal factors.

Canadians who are in lower socioeconomic brackets with a chronic illness, including mental illnesses, had higher rates of hospital based healthcare utilization when compared to others in higher income brackets (CIHI, 2008d, 2009c). For example, hospitalization rates for mental illness in the lower socioeconomic groups were two times higher than those in the higher socioeconomic groups (596 per 100,000 people compared to 256 per 100,000) (CIHI, 2008d). The Ontario government, in a report on reforming the delivery of mental health services, emphasized the importance of service providers developing services that are easy to access for the individuals they are mandated to serve (Government of Ontario, 2009). Though ease of access for consumers of mental health services is important, having less time to connect when individuals are hospitalized may decrease the chances of successful transition to mental health outpatient care. Also, the majority of individuals in the lower income brackets do not have the economic resources to secure private and sometimes timelier care; this may confound a successful transition after discharge from hospital or encourage overuse of hospital based services (CIHI, 2012b). Understanding these factors is as this information could aid in the education of patients and their families about an expected course of illness, and inform future models of service delivery to reduce or prevent readmission in healthcare sectors across Canada (Bottle, Aylin, & Majeed, 2006; Lin et al., 2011)

Homelessness and lack of adequate housing for individuals with mental illness is a concern in Canada (Canadian Homelessness Research Network, 2012; CIHI, 2007; Government of Canada, 2006b). In addition, mental illness in itself puts individuals at risk for insecure housing (e.g. boarding homes) and homelessness and thus contributes to an increased risk of hospital and emergency department readmission following discharge (CIHI, 2007; Government of Canada, 2006b). In fact, low quality housing may actually exacerbate an individual's illness which also may contribute to higher readmission rates (Browne & Courtney, 2004; Browne, Courtney, & Meehan, 2004). In the case of patients' living in insecure housing, their tenure is often interrupted on admission to hospital and many times they are required to give up their current housing. This is unfortunate as many have developed relationships and informal supports with landlords and other tenants, and on discharge have to start over in a new housing situation which may not be ideal (Tulloch, Ferron, & David, 2011). This increased residential mobility has been found to be associated with hospital readmission (Tulloch et al., 2011).

Homeless patients with mental illness often use the emergency department for their care rather than outpatient mental health services (McNiel & Binder, 2005). It appears that if individuals do not have access to primary care or community based services, they are more likely to return to the emergency department after discharge (CIHI, 2008d; Crisp et al., 2000; Government of Ontario, 2009; McCorkle et al., 2008; OHQC, 2009; Sharma et al., 2010; Stephens & Joubert, 2001). Also, Lindamar and colleagues, in their study of individuals accessing emergency mental health services,

noted that homeless individuals were 115% more likely to be identified as a high user of mental health services over their lifetime (Lindamar et al., 2012).

Ascertaining primary care is harder for individuals with lower incomes, which may contribute to the increased likelihood of using the emergency department more frequently (Lindamar et al., 2012; OHQC, 2009). In Ontario over 9% of adults (18 years and older) are without a primary care physician and people with low incomes are even less likely to have a family physician (OHQC, 2009).

Demographic factors.

Research into the epidemiology of mental illness indicated that there are gender and age differences related to hospitalization (Government of Canada, 2006a; Health Canada, 2002). Lin, Chan, and Goering (1998), in an analysis of per capita spending in Ontario for mental health care, found that most physician billings were attributed to women aged 22-64 years of age. Similarly, women made up just over half of all the hospitalizations in general hospitals in Canada (54%) when compared to men (47%) (Government of Canada, 2006a). In contrast, Ontario utilization data for mental illnesses have shown that there were minimal differences between sexes in the overall rates of hospitalization (general and psychiatric), as men made up 50.6% of the admissions (CIHI, 2009b). In another study, over 50% of admissions were for individuals between the ages of 25 and 44 years (Health Canada, 2002). Though the average age at admission in Canada is 44.3 years, differences in admission rates existed between age groups; middle aged adults (25-44 years) made up the largest group at 43.2%, 55 to 59 years 27.7%, 15 to 20 years 16.4%, and those 60 years and older accounted for 13.8% of admissions for mental illnesses (Government of Canada, 2006a;

Health Canada, 2002). In the younger adult age group (less than 45 years) rates of hospitalization for mental illness were greater than that of their older counterparts (CIHI, 2009b; Health Canada, 2002).

A similar trend was found when examining patients who were readmitted after discharge. In studies examining demographic factors related to readmissions for mental illnesses after discharge, it was found that younger patients are more often readmitted when compared to older patients (Bernardo & Forchuk, 2001; Haywood, Kravtz, Grossman, Cavanaugh, Davis & Lewis, 1995; Lindamer et al., 2012). Interestingly, the age of an individual at their first hospitalization can influence their risk to be readmitted. Various studies have shown that the younger the age at first admission, the more likely they will be readmitted to hospital (Bernardo & Forchuk, 2001; Chaput & Lebel, 2007a; Webb, et al., 2007). This pattern was also seen in individuals who frequented the emergency department (Chaput & Lebel, 2007b).

Though overall rates of admission to mental health inpatient services don't differ significantly based on sex, differences have been noted when readmissions are examined. Mahedran and colleagues, in a retrospective study of individuals with schizophrenia and their subsequent inpatient service utilization after their first admission, found that the high utilizers of these services were significantly more often male ($p = 0.02$, OR = 2.8) (Mahedran, Chong, & Chan, 2005). As Haywood (1995) noted, men were more likely than women to be re-hospitalized ($p < 0.05$) in their study of with multiple admissions and a diagnoses of schizophrenia and affective disorders.

Systemic factors.

Systemic factors that contribute to readmission include reduced length of hospital stay, not enough discharge planning, and increasing challenges linking individuals to outpatient and community based services. In addition, changes in models of service delivery for mental illnesses have affected patient outcomes and use of program services in various ways. Decreased inpatient length of stay (by as much as 40% over a six-year period) has been shown to be related to an increased burden of care to informal caregivers, and may result in poor transitions from hospital to community support services (CIHI, 2008c). Many postulate that the reduced length of hospital stay allows less time for clinical staff to appropriately plan for discharge and to connect patients to supports (Alwan et al., 2010; Boyer et al., 2000; CIHI, 2010a). This inadequate transition planning may intensify conflict and tension for patients as they move from hospital to the community. Meleis and colleagues propose that various stressors (personal, societal, and community) can exist for patients as they transition in and out of illness states, and this can help or hinder the transitional period (Meleis, Sawyer, Im, Hilfinger Messias, & Schumacher, 2000). Thus, when healthcare professionals have adequate time to address these factors, in collaboration with patients, they can develop appropriate patient centered therapeutic interventions that will minimize stress during these periods of transition (Meleis et al., 2000). This development may be complicated further if a patient lacks informal supports in the community (CIHI, 2007). Multiple readmissions often are as a result of these same factors in addition to an overall lack of community supports for individuals being

discharged from mental illness based care (Hopko, Lachar, Bailley, & Varner, 2001; Madi et al., 2007).

Diagnostic factors.

Overall, hospital utilization related to mental illness is significant. Canadian studies have noted that return to hospital within one year is more likely for individuals with serious mental illness such as schizophrenia and personality and affective disorders (depression and bipolar disorder) (Lin et al., 2011; Madi et al., 2007). Bruffaerts and colleagues, in their study of emergency department users, found that individuals attending the emergency department frequently had substance abuse, personality disorders, and did not follow up consistently with community supports (Bruffaerts et al., 2005). Substance abuse was found to be a mitigating factor, making readmission more likely in those with schizoaffective and mood disorders (Haywood et al., 1995).

In summary, understanding factors that may contribute to hospital readmission and emergency department use, in those patients recently discharged from hospital with a primary mental illness diagnosis, is necessary as these patients continue to have significantly high utilization of hospital services. As this phenomenon is multifaceted and connected to many clinical and societal issues, there is great benefit for further study to better understand the issues and to develop informed interventions to mitigate an individual's potential risk for early readmission.

Chapter 3 - METHOD

Introduction

This chapter provides a description of the methodology used in this research study to investigate the factors associated with readmission of patients to both a mental health inpatient unit and the emergency department, in the initial 30 days after their discharge. Information on the research design, method of data collection, data analysis, ethical clearance, and study limitations are included in this chapter. Data for this study were derived from three distinct databases and required a systematic method to organize and match study cohort records.

Design and Data Sources

A retrospective cohort analysis was conducted to answer the following questions:

1. In patients with a study defined mental illness, who had been admitted to an acute care mental health inpatient program, what were the factors related to mental health related readmission within 30 days post discharge?
2. In patients with a study defined mental illness, who had been admitted to an acute care mental health inpatient program, what were the factors related to mental health related emergency department utilization within 30 days post discharge?

To answer these questions, I utilized administrative healthcare data derived from hospital separation records and selected extracts of the Resident Assessment Inventory-Mental Health (RAI-MH), the National Ambulatory Care Reporting System (NACRS), and the hospital registration database (STAR). These three databases used a unique patient identifier making it possible to link the

administrative records anonymously at the individual level by the use of a unique personal health number (PHN).

Description of the Databases

Resident Assessment Inventory-Mental Health (RAI-MH).

The RAI-MH is a standardized data collection system used by Ontario hospitals with designated adult inpatient mental health beds as well as by specialty and provincial psychiatric hospitals. Some of the data collected by the RAI-MH are used for submission to the Ontario Mental Health Reporting System (OMHRS) (CIHI, 2010b). These included data on inpatient utilization, care planning, outcome measurement, and quality improvement and case mix–based funding applications. The RAI-MH also included demographic, administrative, and clinical information collected on patients admitted to Ontario hospitals. See **Appendix A** for a detailed list of items from the RAI-MH that were extracted for this study.

National Ambulatory Care Reporting System (NACRS).

NACRS contains data for all hospital-based and community-based ambulatory care, including day surgery, outpatient clinics (not mental health), and the emergency department (CIHI, 2010b). This database provided information on emergency department utilization; specifically, data extracted for the purpose of this study included: discharge date, unique patient identifier, postal code, residence code, sex, age, discharge disposition, and the International Statistical Classification of Diseases and Related Health Problems, 10th Revision Canada (ICD-10-CA) diagnosis codes in relation to the Diagnostic and Statistical Manual

of Mental Disorders IV Text Revision (DSM IV) diagnosis (Andrews, Slade, & Peters, 1999; CIHI, 2010b). See **Appendix A** for details on the NACRS variables that were extracted for this study.

Hospital registration database (STAR).

Hospital registration databases (STAR) are utilized when patients are registered for a hospital based service in the study based institution (McKesson, 2011). This database contained information on service utilization for the mental health outpatient programs, including historical and current patient visit activity and information for financial analysis related to hospital based services. See **Appendix A** for a detailed list of items from the STAR database that were extracted for this study.

Study Population

This retrospective cohort study included all adult patients between the ages of 18 and 64 years of age who resided in Hamilton, Ontario and were admitted to St. Joseph's Healthcare Hamilton hospital with a study defined mental illness during the study time period. St. Joseph's Healthcare Hamilton is a 650 bed academic healthcare centre providing acute and tertiary level care. This organization has 95 inpatient acute mental health beds and approximately 1,200 discharges annually (M. Fonseca, personal communication, January 12, 2011). This was a population-based study including all residents of Hamilton who meet the study inclusion criteria; therefore, a sample size calculation was not warranted.

Inclusion criteria.

Individuals were included in this study if they were between 18 and 64 years old at the time of index admission. Patients had to have been admitted to hospital with a study defined mental illness, as the primary diagnosis, during the study period of September 1, 2009 to January 31, 2012.

Exclusion criteria.

Individuals with any one of the following criteria were excluded:

1. Individuals who lived outside the city of Hamilton, the area that the organization is mandated to provide care. This helped to decrease the chances of individuals accessing mental health care in other hospital settings after they were discharged from the mental health inpatient program.
2. A DSM-IV diagnosis of dementia or cognitive disorder (290.40-290.43, 294.10, 294.11, 294.8, 294.9, 294.10, 780.9); substance intoxication, withdrawal related and induced disorders (291.0-291.3, 291.5, 291.81, 291.89, 291.9, 292.0, 292.11, 292.12, 292.81-292.84, 292.89, 292.9); amnesic disorders (294.0, 294.8, 300.12); mental disorders due to a general medical condition (293.0, 293.81-293.84, 293.89, 293.9, 294.0, 294.10); conversion disorder (300.11); and factious disorders (300.16, 300.19) (American Psychiatric Association [APA], 2000).
3. DSM-IV code of no axis 1 diagnosis (V71.09) (APA, 2000).
4. Individuals with a mental health inpatient admission within six months of the index admission from the same mental health program, for the same primary diagnosis (study wash out period).

5. Individuals with a RAI-MH identified other medical diagnosis at time of index admission and within the 30 day post discharge period.
6. Individuals with an admission that was less than 24 hours.
7. Individuals who died while in hospital.

Definition of Study Variables

The following terms are used throughout the thesis.

Mental illness.

Cases of mental illness were ascertained by searching for the first notation of a coded, mental illness diagnoses, from the DSM IV-TR, in the primary discharge diagnosis field of the RAI-MH (APA, 2000; CIHI, 2010b). For the purposes of this research, a case definition of mental illness included a DSM-IV diagnosis of any one of the following: schizophrenia, mood disorders, delusional and psychotic disorders, anxiety disorders, personality disorders, substance related disorders, and adjustment disorders. See **Appendix B** for the specific diagnostic codes used.

Index admission date and study period.

The admission index date was defined as the first documented study defined mental illness related admission during the study period of September 1, 2009 to January 31, 2012). To ensure the identification of only new admissions (incident cases), subjects with an inpatient admission within six months prior to the index admission date were excluded.

Connected to a mental health outpatient program.

Connection to a mental health outpatient program were defined as: when an individual, upon discharge, had an open case file in any of the mental health outpatient

programs, as indicated in the hospital registration database (STAR), and at least 60 days prior to the index admission and at discharge from a mental health inpatient unit.

Mental illness inpatient admission.

A mental illness inpatient admission was defined as: when an individual was admitted to a mental health inpatient unit at the St. Joseph's Healthcare Hamilton hospital with a study defined mental illness during the index study period, and for at least 24 hours or more.

Chronic illness.

RAI-MH defined chronic illness as any medical disease or infection that has a relationship to the current self-care status, cognitive status, mood or behaviour disorder status, or medical treatments or risk of death that are documented on the index admission (WHO, 2012). Chronic illnesses that were documented in the RAI-MH included: diabetes types 1 and 2, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), chronic renal failure with dialysis, HIV positive, and hepatitis C. Conditions that had resolved or that no longer affected the patient's functioning were excluded (CIHI, 2009b). Chronic illness information for the study cohort was collected from the RAI-MH database at the time of index admission.

Patient Selection and Outcome Measures

To identify the study cohort, all consecutive adult patients (between 18 and 64 years of age) with a study defined mental illness who had been discharged from the St. Joseph's Healthcare Hamilton hospital during the study index period were identified for study inclusion using the RAI-MH. After the initial exclusion criteria were applied, the

mental illness cohort data were linked to STAR data to identify those patients connected to a mental health outpatient program on hospital discharge.

To identify those patients with a study defined mental illness (the mental illness cohort) who were readmitted to a mental health inpatient unit within 30 days post discharge (research question one) data were then linked back to the RAI-MH database. **Figure 1** illustrates the patient selection process for research question 1. To identify those patients within the mental illness cohort, who had utilized the emergency department within 30 days post discharge from a mental health inpatient unit, data were linked to the NACRS database. See **Figure 2** for the study subject (cohort) selection procedures for research question 2.

Analytical Approach

All analyses were stratified by connection status to mental health outpatient programs and descriptive statistics were used to characterize the study population. The determination of statistical differences between groups (individuals who were connected to an outpatient mental health program on discharge and those who were not) were made using chi square (χ^2) statistics for categorical variables (age group, length of stay category, sex, diagnosis, discharge location, connection status to an outpatient mental health program, and chronic illness status). Alpha (p) was considered significant at 0.05 and 95% confidence intervals (CI) of the estimates were conducted.

To examine the relationship between connection to an outpatient mental health program and readmission rates, I initially used univariate logistic regression techniques to assess the unadjusted odds ratios (OR) and 95% CIs. Logistic

regression was utilized as the dependent variable was binary in nature (Tranmer & Elliot, 2008).

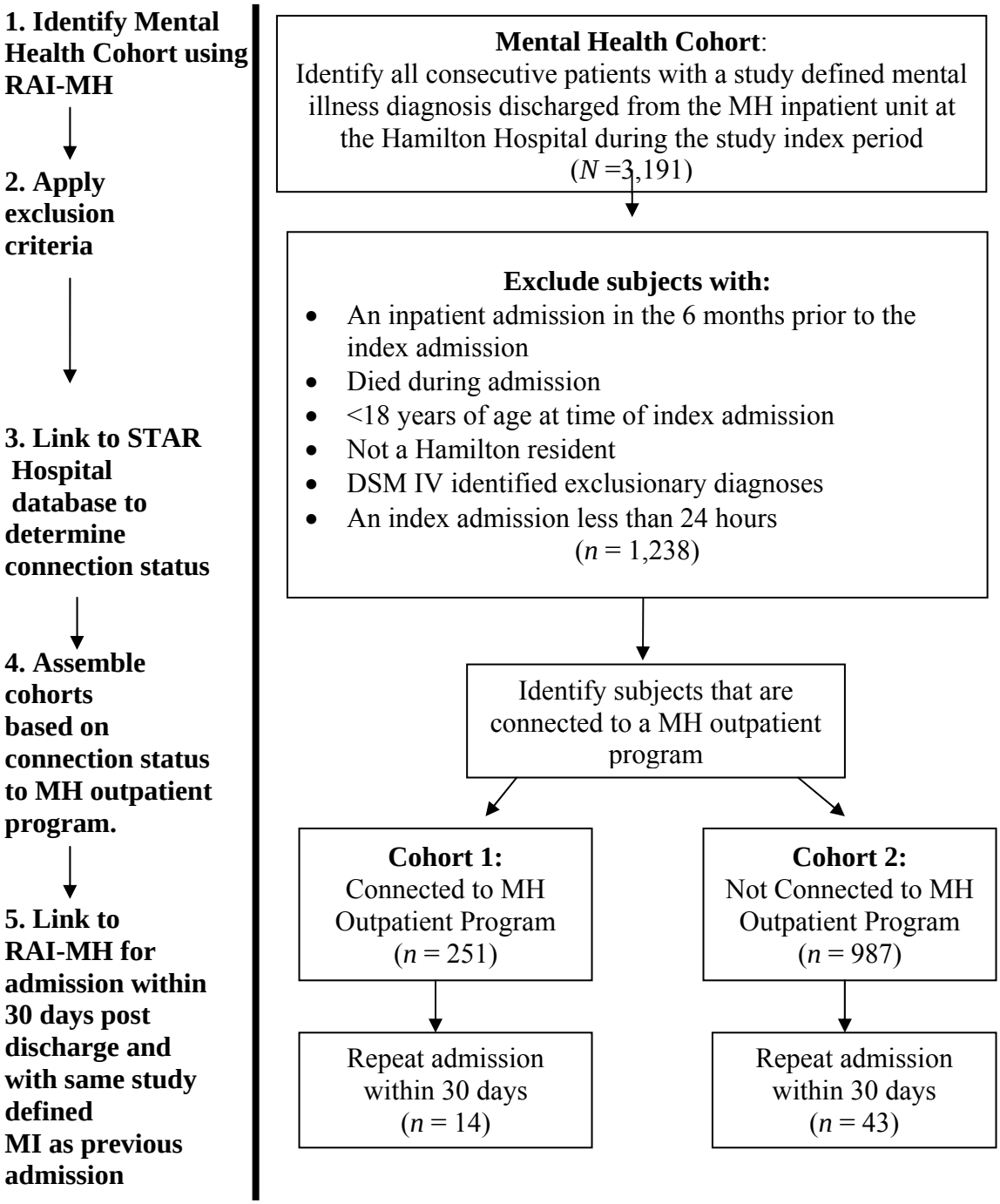

***Figure 1*: Selection of study cohort for question 1**

Note: NACRS = National Ambulatory Care Reporting System; RAI-MH = Resident Assessment Inventory- Mental Health, MH = Mental health; STAR = Hospital registration database

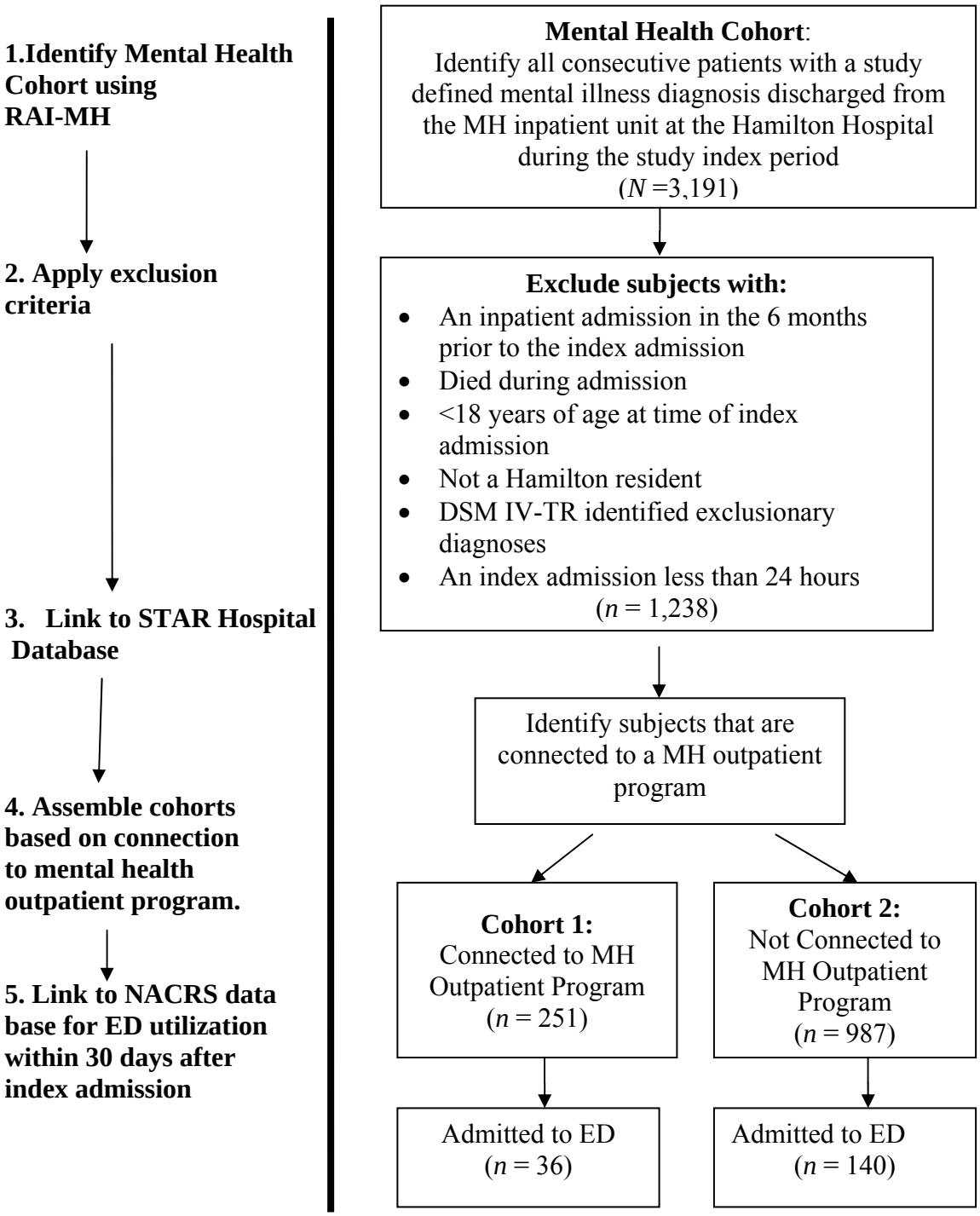

***Figure 2*: Patient selection flowchart for question 2**

Note: NACRS = National Ambulatory Care Reporting System; RAI-MH = Resident Assessment Inventory- Mental Health, MH = Mental health; STAR = Hospital registration database

The outcome of interest (the dependent variable), was whether the patient was readmitted to a (1) mental health inpatient unit or to the (2) emergency department within 30 days post discharge and the main independent variable of interest (predictor variable) was connection status to an outpatient mental health program on discharge. Other independent variables or covariates included: age, sex, specific mental illness diagnosis, length of inpatient hospital stay, discharge placement (location), and chronic illness status. *A priori*, using the techniques described by Hosmer and Lemeshow, I planned to include only those variables that were statistically significant at $p < .20$ or which were deemed clinically important in the multivariate (adjusted) analysis (Hosmer & Lemeshow, 2000). For the multivariate analysis, all independent variables were retained, as they were deemed to be of clinical significance. The *Enter* procedure was used in which all independent variables were entered in a single step. The adjusted ORs were considered statistically significant if the range of the 95% CI did not include 1.0. All statistical analyses were done using SPSS version 20.0 (IBM SPSS Statistics).

Ethical Considerations

This study linked patient data from existing administrative databases, that included de-identified patient information, and was eligible for expedited ethics approval. Ethics approval was provided by the Centre for Nursing and Health Studies (CNHS) Research Ethics Review Committee, acting under the authority of the Athabasca University Research Ethics Board and the St. Joseph's Healthcare Hamilton Research Ethics Board. All data were analyzed and stored

on a secure computer in a locked officethat was within the mental health clinical utitlization offices at St. Joseph's Healthcare Hamilton hospital. The policies and mandate of the Tri-Council Policy- Ethical Conduct for Research Involving Humans were upheld.

Conflict of interest.

This research study took place within the organization that I am employed. As per terms of my employment, I am responsible for reporting utilization information for the program in which this study took place. Considering these points, I did not use patient specific data for utilization tasks undertaken under the auspicious of my current role.

CHAPTER 4 - RESULTS

Introduction

The main objectives of this study were to describe readmission patterns of those patients admitted with a mental illness to a hospital in Ontario and to identify factors associated with readmission comparing those patients who were connected to a mental health outpatient program on discharge and those who were not. In this chapter I describe the study cohort based on connection to an outpatient service at the time of discharge. This chapter also includes results from the multivariate logistic regression analysis where I have identified various factors related to hospital and emergency department readmission within 30 days after initial discharge.

Description of the Study Cohort

Of the 3,191 hospital discharges identified during the study index period, there were 1,238 individual index visits identified that met the inclusion criteria for the study. The mean age of the sample was 40.6 years (SD 13.0; range 18 – 64 years), and 52% of the subjects were male. Diagnostically, mood disorders and schizophrenia were the most frequent diagnoses, making up 72% of the sample. The next most frequent diagnoses were delusional and psychotic disorders (9%), adjustment disorders (7%), substance-related disorders (7%), anxiety disorders (3%), and personality disorders (2%). The hospital admission length of stay for index admissions ranged from 2 to 209 days, with a mean length of stay of 21 days (*SD* 16.2). Significant portions (87%) of the study sample were discharged from hospital to a private home. The next most common discharge destinations were psychiatric hospitals (8%), homeless (2%), boarding homes (1%), mental health residences (0.9%), and a variety of other settings

(2%) including, assisted living, other acute care hospitals, correctional facilities, and group homes for the physically disabled. Patients with a chronic illness (type 1 diabetes, type 2 diabetes, COPD, CHF, or renal failure) made up 3% of the cases in the study. Of this group, the majority (61%) of patients had type 2 diabetes. Characteristics of the sample, by outpatient connection status, are presented in **Table 1**.

Connection to an Outpatient Mental Health Program

Almost 80% of the subjects were not connected to a mental health outpatient program on hospital discharge. The 25-34 years and 45-54 year age categories were most often connected to an outpatient program in comparison to the other age groups (23% for each group). Those in the 18-24 year age group, were least likely to be connected (14%), $\chi^2(4, N = 1{,}238) = 10.5$, $p = 0.03$. Female subjects were significantly more likely to be connected to outpatient programs (56%) than males (44%), $\chi^2(1, N = 1{,}238) = 6.7$, $p = 0.01$.

When looking at connectivity to an outpatient service by diagnostic category, those who were connected to an outpatient program had been diagnosed with a mood disorder (48% of individuals), followed by schizophrenia (33%), delusional and psychotic disorders (6%), anxiety disorders and adjustment disorders (4% in each category), substance related disorders (3%), and personality disorders 2%). Although, based on the size of the diagnostic group, those with a personality disorder (33%), schizophrenia (30%), and an anxiety disorder (28%) were the most likely to be connected to a mental health outpatient program, $\chi^2(6, N = 1{,}238) = 36.6$, $p = 0.00$.

The majority (79%) of subjects that were connected to an outpatient program had a length of stay between 1 and 28 days, and the least connected (2%) were subjects

who had a length of stay of 70 or more days. Individuals that were connected to an outpatient program had a longer mean length of stay, approximately 23 days compared to 20 days for individuals that were not connected. There was no statistical relationship between a patients' length of stay and connection status to outpatient services, $\chi^2(5, N = 1{,}238) = 7.2$, $p = 0.20$.

The chi square test to analyze relationships between connection to an outpatient program and discharge environment revealed a strong relationship which was statistically significant, $\chi^2(5, N = 1{,}238) = 13.9$, $p = 0.02$. Furthermore, the majority of subjects who were connected to an outpatient program were discharged to a private home setting (93%). There was no statistical relationship between having a chronic illness and connection to an outpatient program, $\chi^2(1, N = 1{,}238) = .49$, $p = 0.49$. Characteristics of the sample, stratified by connection status, are presented in **Table 1**.

Table 1

Description of the sample by outpatient connection status[†]

	Total *N* = 1,238	***Connected* to Outpatient Program** *N* = 251 (20.3)	***Not Connected* to Outpatient Program** *N* = 987 (79.7)
Age			
Mean age (years)	40.6 (*SD* 13.0)	41.3 (*SD* 13.0)	40.5 (*SD* 13.0)
Median age (years)	40.6	40.0	43.0
Age Category (years) [a]			
18-24	222 (17.9)	34 (13.6)	188 (19.1)
25-34	235 (19.0)	58 (23.1)	177 (17.9)
35-44	245 (19.8)	48 (19.1)	197 (20.0)
45-54	325 (26.3)	58 (23.1)	267 (27.1)
55-64	211 (17.0)	53 (21.1)	158 (16.0)
Sex [a]			
Male	638 (51.5)	111 (44.2)	527 (53.4)
Female	600 (48.5)	140 (55.8)	460 (46.6)
Diagnosis [a]			
Mood disorders	622 (50.2)	120 (47.8)	502 (50.9)
Anxiety disorders	40 (3.2)	11 (4.4)	29 (2.9)
Schizophrenia	274 (22.1)	83 (33.1)	191 (19.4)
Delusional & psychotic disorders	116 (9.4)	15(6.0)	101 (10.2)
Substance-related disorders	82 (6.6)	7 (2.8)	75 (7.6)
Personality disorders	18 (1.5)	6 (2.4)	12 (1.2)
Adjustment disorders	86 (6.9)	9 (3.6)	77 (7.8)
Length of Stay (LOS) – Inpatient (days)			
Mean LOS (days)	20.8 (*SD* 16.2)	22.8 (*SD* 17.0)	20.3 (*SD* 16.0)
Median LOS (days)	17	16.0	18.0
1-14	526 (42.5)	94 (37.5)	432 (43.8)
15-28	448 (36.2)	92 (36.7)	356 (36.1)
29-42	160 (12.9)	39 (15.5)	121 (12.3)
43-56	59 (4.8)	12 (4.8)	47 (4.8)
57-70	23 (1.9)	8 (3.2)	15 (1.5)
>70	22 (1.8)	6 (2.4)	16 (1.6)
Discharge Placement [a]			
Private home	1,075 (86.8)	234 (93.2)	841 (85.2)

Psychiatric hospital	97 (7.8)	10 (4.0)	87 (8.8)
Homeless	19 (1.5)	4 (1.6)	15 (1.5)
Boarding home	14 (1.1)	2 (0.8)	12 (1.2)
Mental health residence	11 (0.9)	0	11 (1.1)
Other	22 (1.8)	1 (0.4)	21 (2.1)
Chronic Illness			
Chronic illness noted [b]	38 (3.1)	6 (2.4)	32 (3.2)

Note. [†] All data are shown as number (percentage)
[a] Chi square $p < 0.05$

[b] Chronic Illnesses: type 1 diabetes, type 2 diabetes, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), hepatitis, renal failure

Mental Illness Related Readmissions

Regardless of connection status, overall there were low readmission rates to both a mental health inpatient unit (5%) and to the emergency department (14%) within 30 days post discharge.

Readmission to a mental health inpatient unit.

A total of 57 patients (5% of the sample) were readmitted to a mental health inpatient unit within 30 days post discharge. Those patients who had been readmitted did so between 1 and 5 separate times; specifically, 72% were readmitted once within 30 days, 16% were readmitted twice, and 12% were readmitted an additional 3 to 5 times. There were no statistical differences in age category, sex, mental illness diagnosis, length of stay, discharge placement, or chronic illness status of those readmitted to a mental health inpatient unit compared to those who were not (p values for $\chi 2$ differences between groups were all > 0.05).

When stratified by connection status, the 251 patients who were connected to a mental health outpatient program were no more likely to be readmitted to a mental health inpatient unit than those who were not connected to an outpatient program, (6% vs. 4%) $\chi^2(1, N = 1{,}238) = 0.68$, $p = 0.41$. When 30 day readmission and connection status were further stratified by age, sex, length of stay, discharge placement, and chronic disease status, there were no statistical differences between those readmitted and those who had not been readmitted to an inpatient unit (p values for χ^2 differences between groups were all > 0.05). These results note that I was not able to reject the null hypothesis that patients connected to outpatient program on admission will have no difference in rate of return to a mental health inpatient unit in the 30 days after

discharge (Foltz, 2012). See **Table 2** for characteristics of patients, by connection status, readmitted to a mental health inpatient unit within 30 days post discharge.

Table 2

Characteristics of patients, by connection status, readmitted to a mental health inpatient unit within 30 days post discharge[†]

	Total ***N* = 1,238**	***Connected* to Outpatient Program** ***N* = 251 (20.3)**	***Not Connected* to Outpatient Program** ***N* = 987 (79.7)**
Total readmitted to mental health inpatient unit within 30 days post discharge	57 (4.6)	14 (5.6)	43 (4.4)
Age Category (years)			
18-24	11 (5.0)	1 (2.9)	10 (5.3)
25-34	8 (3.4)	3 (5.2)	5 (2.8)
35-44	10 (4.1)	3 (6.3)	7 (6.6)
45-54	17 (5.2)	4 (6.9)	13 (4.9)
55-64	11 (5.2)	3 (5.7)	8 (5.1)
Sex			
Male	26 (4.1)	8 (7.2)	18 (3.4)
Female	31 (5.2)	6 (4.3)	25 (5.4)
Diagnosis			
Mood disorders	33 (5.3)	5 (4.2)	28 (5.6)
Anxiety disorders	0 (0)	0 (0)	0 (0)
Schizophrenia	13 (4.7)	6 (7.2)	7 (3.7)
Delusional & psychotic disorders	3 (2.6)	1 (6.7)	2 (1.9)
Substance-related disorders	4 (4.9)	1 (7.1)	3 (4.0)
Personality disorders	0 (0)	0 (0)	0 (0)
Adjustment disorders	4 (4.7)	1 (11)	3 (3.9)
Length of Stay (LOS) – Inpatient (days)			
1-14	22 (4.2)	5 (5.3)	17 (3.9)
15-28	23 (4.7)	6 (6.5)	17 (4.8)
29-42	4 (2.5)	2 (5.1)	2 (1.7)
43-56	5 (8.5)	1 (8.3)	4 (8.5)
57-70	2 (8.7)	0 (0)	2 (13.3)
>70	1 (4.6)	0 (0)	1 (6.3)
Discharge Placement			
Private home	51 (5.3)	13 (5.6)	38 (4.5)
Psychiatric hospital	4 (4.1)	0 (0)	4 (4.6)

Homeless	0 (0)	0 (0)	0 (0)
Boarding home	1 (7.1)	1 (7.1)	0 (0)
Mental health residence	1 (9.1)	0 (0)	1 (9.1)
Other	0 (0)	0 (0)	0 (0)
Chronic Illness			
Chronic illness noted [a]	4 (10.5)	1 (16.7)	3 (9.4)

Note. [†] All data are shown as number (percentage)

[a] Chronic illnesses: type 1 diabetes, type 2 diabetes, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), hepatitis, renal failure

Mental illness related emergency department admission

More subjects were admitted to the emergency department (14%) after discharge than were readmitted to a mental health inpatient unit (5%). Of those who were admitted to the emergency department in the 30 day period after discharge, 68% did so only once, 18% twice, 12% between 3 and 5 times, and 3% had 6 to10 visits. There were statistically significant differences in emergency department admissions based on diagnosis. Those with a substance-related disorder (27%) or an anxiety disorder (20%) were the most likely to be admitted to the emergency department, $\chi^2(6, N = 1{,}238) = 14.84$, $p = 0.02$. There were no statistical differences in age category, sex, length of stay, discharge placement, or chronic illness status of those admitted to the emergency department compared to those who were not (p values for χ^2 differences between groups were all > 0.05).

When stratified by connection status, patients who were connected to an outpatient mental health program were no more likely to be admitted to the emergency department than those who had not been connected to an outpatient program, $\chi^2(1, N = 1{,}238) = 0.00$, $p = 0.95$. These results note that I was not able to reject the null hypothesis that patients connected to outpatient program on admission will have no difference in rate of return to an emergency department in the 30 days after discharge (Foltz, 2012).

When connection status was further stratified by mental illness diagnosis, there continued to be statistical differences between the diagnoses of those connected to a mental health outpatient program and those who were not connected, $\chi^2(6, N = 1{,}238) =$

20.62, $p = 0.00$. See **Table 3** for characteristics of patients, by connection status, admitted to the emergency department within 30 days post discharge.

Table 3

Characteristics of patients, by connection status, admitted to the emergency department (for a mental illness complaint) within 30 days post discharge[†]

	Total ***N*** **= 1,238**	***Connected*** **to Outpatient Program** ***N*** **= 251 (20.3)**	***Not Connected*** **to Outpatient Program** ***N*** **= 987 (79.7)**
Total readmitted to the emergency department (for a mental illness complaint) within 30 days post discharge	176 (14.2)	36 (14.3)	140 (14.2)
Age Category (years)			
18-24	41 (18.5)	6 (17.6)	35 (18.6)
25-34	41 (17.5)	10 (17.2)	31 (17.5)
35-44	28 (11.4)	3 (6.3)	25 (12.7)
45-54	39 (12.0)	9 (15.5)	30 (11.2)
55-64	27 (12.8)	8 (15.1)	19 (12.0)
Sex			
Male	86 (13.5)	12 (10.8)	74 (14.0)
Female	90 (15.0)	24 (17.1)	66 (14.4)
Diagnosis [a]			
Mood disorders	89 (14.3)	17 (14.2)	72 (14.3)
Anxiety disorders	8 (20.0)	2 (18.2)	6 (20.7)
Schizophrenia	31 (11.3)	9 (10.8)	22 (11.5)
Delusional & psychotic disorders	13 (11.2)	2 (13.3)	11 (10.9)
Substance-related disorders	22 (26.8)	5 (7.1)	17 (22.7)
Personality disorders	2 (11.1)	0 (0)	2 (16.7)
Adjustment disorders	11 (12.8)	1 (11.1)	10 (13.0)
Length of Stay (LOS) – Inpatient (days)			
1-14	78 (14.8)	18 (19.2)	60 (13.9)
15-28	69 (15.4)	10 (10.9)	59 (16.6)
29-42	13 (8.1)	4 (10.3)	9 (7.4)
43-56	8 (13.6)	1 (8.3)	7 (14.9)
57-70	5 (21.7)	2 (25.0)	3 (20.0)
>70	3 (13.6)	1 (16.7)	2 (12.5)
Discharge Placement			
Private home	159 (14.8)	33 (14.1)	126 (15.0)

Psychiatric hospital	12 (12.4)	1 (10.0)	11 (12.6)
Homeless	1 (5.3)	0 (0)	1 (6.7)
Boarding home	1 (7.1)	1 (50.0)	0 (0)
Mental health residence	2 (18.2)	0 (0)	2 (18.2)
Other	1 (36.4)	1 (100.0)	0 (0)
Chronic Illness			
Chronic illness noted [b]	8 (21.1)	2 (33.3)	6 (18.8)

Note. [†] All data are shown as number (percentage)

[a] Chi square $p < 0.05$

[b] Chronic illnesses: type 1 diabetes, type 2 diabetes, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), hepatitis, renal failure

Factors Associated with Mental Health Inpatient Readmission: Logistic Regression Analysis

Using univariate logistic regression techniques, I initially assessed the unadjusted ORs and 95% CIs between the dependent variable (readmission to a mental health inpatient unit within 30 days post discharge), connection status (the main independent variable), and all covariates. The chronic illness variable reached statistical significance ($p < 0.20$) while all remaining variables did not. As all covariates were deemed to be of clinical importance, all were retained in the final model. All cases (1,238) were included in the model for both regression analysis for readmission to mental health inpatient unit and emergency department.

The final logistic regression model for the dependent outcome (readmission to a mental health inpatient unit within 30 days post discharge) included the variables: connection to outpatient program on discharge, age, sex, mental illness diagnosis, length of index hospital stay, discharge placement, and presence of a chronic illness. There was evidence of possible multicollinearity as both diagnosis of anxiety disorder and personality disorder as their standard errors were larger than 2. A test of the model fit, using the Hosmer and Lemeshow test of goodness of fit produced a non-significant result ($\chi^2 = 3.31$, $p = 0.91$) suggesting that the model was a good fit for the data (Peng, Lee, & Ingersoll, 2002). Nagelkerke's $R^2 = 0.047$ indicating a weak relationship of 4.7% between predictors and return emergency department (Burns & Burns, 2008; Peng et al., 2002).

A concurrent history of chronic illness was the strongest predictor of readmission to a mental health inpatient unit within 30 days post discharge, with the

presence of this factor increasing the risk of readmission by 3.6 times than if no chronic illness was present (adjusted OR = 3.36; 95% CI = 1.01-11.20). There were no other statistically significant predictors identified in the adjusted analysis. See **Table 4** for the unadjusted and adjusted logistic regression results.

Table 4

Logistic regression: Factors associated with readmission to a mental health inpatient unit within 30 days post mental illness related hospital discharge

Variable	Unadjusted Odds ratio (95%)	*P* - value	Adjusted Odds ratio (95% CI)	*P* - value
Constant			0.05	0.0
Connection status				
Not connected to an outpatient program	1 (reference)		1 (reference)	
Connected to an outpatient program	1.30 (0.70, 2.41)	0.41	1.41 (0.74, 2.70)	0.30
Age Category (years)				
18-25	1 (reference)	0.84	1 (reference)	0.87
26-34	0.68 (0.27, 1.71)	0.41	0.61 (0.24, 1.58)	0.31
35-44	0.82 (0.34, 1.96)	0.65	0.77 (0.31, 1.90)	0.57
45-54	1.06 (0.49, 2.31)	0.89	.92 (0.42, 2.04)	0.84
56-64	1.06 (0.45, 2.49)	0.90	0.83 (0.34, 2.03)	0.68
Sex [a]				
Male	1 (reference)		1 (reference)	
Female	1.28 (0.75, 2.19)	0.36	1.31 (0.75, 2.29)	0.34
Diagnosis				
Mood disorders	1 (reference)	0.96	1 (reference)	0.86
Anxiety disorders	N/A [a]		N/A [a]	
Schizophrenia	0.89 (0.46, 1.72)	0.73	0.72 (0.34, 1.50)	0.37
Delusional & psychotic disorders	0.47 (0.14, 1.57)	0.22	0.40 (0.12, 1.40)	0.15
Substance-related disorders	0.92 (0.32, 2.65)	0.87	1.10 (0.37, 3.29)	0.86
Personality disorders	N/A [a]		N/A [a]	
Adjustment disorders	0.87 (0.30, 2.52)	0.80	0.98 (0.33, 2.95)	0.97
Length of Stay (days)				

1-14	1 (reference)	0.45	1 (reference)	0.51
15-28	1.24 (0.68, 2.26)	0.48	1.13 (0.61, 2.11)	0.70
29-42	0.59 (0.20, 1.74)	0.33	0.53 (0.17, 1.58)	0.25
43-56	2.12 (0.77, 5.83)	0.15	2.02 (0.71, 5.79)	0.19
57-70	2.18 (0.48, 9.90)	0.31	1.73 (0.37, 8.09)	0.49
>70	1.09 (0.14, 8.48)	0.93	0.95 (0.12, 7.55)	0.96
Discharge Placement				
Private home	1 (reference)	0.98	1 (reference)	0.95
Psychiatric hospital	1.54 (0.20, 12.04)	0.68	1.68 (0.21, 13.63)	0.63
Homeless	2.01 (0.25, 15.98)	0.51	2.84 (0.34, 23.89)	0.34
Boarding home	0.86 (0.31, 2.44)	0.78	0.97 (0.34, 2.78)	0.95
Mental health residence	N/A [a]		N/A [a]	
Other	N/A [a]		N/A [a]	
Chronic Illness				
No chronic illness	1 (reference)		1 (reference)	
≥ 1 chronic illness	2.55 (0.87, 7.44)	0.09	3.36 (1.01, 11.20)	0.05

Note. CI = confidence interval

[a] N/A: no occurrence, unable to measure

Factors Associated with Mental Illness Related Emergency Department Utilization: Logistic Regression Analysis

Using univariate logistic regression techniques, I initially assessed the unadjusted ORs and 95% CIs between the dependent variable (admission to the emergency department for a mental illness related complaint within 30 days post discharge), connection status (the main independent variable), and all covariates. The age, mental illness diagnosis, and length of stay variables all reached statistical significance ($p < 0.20$) while the connection status, sex, discharge placement, and chronic illness variables did not. As all covariates were deemed to be of clinical importance, all were retained in the final model. There were no numerical errors detected as none of the independent variables in the analysis had a standard error larger than 2 (Schwab, 2012). A test of the model fit, using the Hosmer and Lemeshow test of goodness of fit produced a non-significant result ($\chi^2 = 3.79$, $p = 0.88$) suggesting that the model was a good fit to the data (Peng et al., 2002). Nagelkerke's $R^2 = 0.049$ indicating a weak relationship of 4.9% between predictors and return to inpatient unit (Burns & Burns, 2008; Peng et al., 2002).

A diagnosis of a substance related disorder was the strongest predictor of emergency department admission 30 days post mental health inpatient admission (adjusted OR = 2.33; 95% CI = 1.33-4.07). The next strongest association of emergency department admission was the presence of a chronic illness (adjusted OR = 2.51, 95% CI = 1.06-5.99). Those patients aged 35 to 44 years (adjusted OR = 0.57, 95% CI = 0.33-0.97) and 45 to 54 years (adjusted OR = 0.59, 95% CI = 0.36-0.96) were significantly less likely to be admitted to the emergency department, in comparison to those patients 25 years of age and younger. See **Table 5** for factors (the adjusted ORs)

associated with return to the emergency department for a mental health issue within 30 days of discharge from an inpatient unit.

Table 5

Logistic regression: Factors associated with admission to the emergency department (for a mental illness complaint) within 30 days post mental illness related hospital discharge

Variable	Unadjusted Odds ratio (95% CI)	*P* - value	Adjusted Odds ratio (95% CI)	*P* - value
Constant			0.22	0.00
Connection status				
Not connected to an outpatient program	1 (reference)		1 (reference)	
Connected to an outpatient program	1.01 (0.68, 1.51)	0.95	1.01 (0.68, 1.51)	0.71
Age Category (years)				
18-24	1 (reference)		1 (reference)	
25-34	0.93 (0.58, 1.51)	0.78	0.93 (0.57, 1.52)	0.77
35-44	0.57 (0.34, 0.96)	0.03	0.57 (0.33, 0.97)	0.04
45-54	0.60 (0.37, 0.97)	0.04	0.59 (0.36, 0.96)	0.03
55-64	0.65 (0.38, 1.10)	0.11	0.60 (0.35, 1.04)	0.07
Sex				
Male	1 (reference)		1 (reference)	
Female	0.88 (0.64, 1.22)	0.44	1.18 (0.84, 1.64)	0.34
Diagnosis				
Mood disorders	1 (reference)		1 (reference)	
Anxiety disorders	1.50 (1.50, 0.67)	0.33	1.59 (0.69, 3.66)	0.27
Schizophrenia	0.76 (0.49, 1.18)	0.23	0.68 (0.43, 1.10)	0.12
Delusional & psychotic disorders	0.76 (0.41, 1.40)	0.38	0.67 (0.35, 1.27)	0.22
Substance-related disorders	2.20 (1.28, 0.76)	0.00	2.33 (1.33, 4.07)	0.00
Personality disorders	0.75 (0.17, 3.31)	0.70	0.62 (0.14, 2.81)	0.54
Adjustment Disorders	0.88	0.71	.88	0.71

	(0.45, 1.72)		(0.44, 1.76)	
Length of Stay (days)				
1-14	1 (reference)		1 (reference)	
15-28	1.1 (0.74, 1.49)	0.80	1.14 (0.79, 1.65)	0.50
29-42	0.51 (0.27, 0.94)	0.03	0.54 (0.28, 1.01)	0.05
43-56	.90 (0.41, 1.97)	0.79	1.06 (0.47, 2.38)	0.89
57-70	1.6 (0.58, 4.42)	0.37	1.82 (0.64, 5.19)	0.26
>70	0.91 (0.26, 3.14)	0.88	1.08 (0.31, 3.82)	0.91
Discharge Placement				
Private home	1 (reference)		1 (reference)	
Psychiatric hospital	0.44 (0.06, 3.41)	0.43	0.46 (0.06, 3.56)	0.46
Homeless	1.28 (0.27, 5.98)	0.75	1.72 (0.35, 8.34)	0.50
Boarding home	0.81 (0.43, 1.52)	0.52	0.82 (0.43, 1.55)	0.54
Mental health residence	0.32 (0.42, 2.41)	0.27	0.32 (0.04, 2.45)	0.27
Other	0.27 (0.04, 2.05)	0.21	0.28 (0.04, 2.10)	0.21
Chronic Illness				
No chronic illness	1 (reference)		1 (reference)	
≥ 1 chronic illness	1.64 (0.74, 3.63)	0.26	2.51 (1.06, 5.99)	0.04

Note. CI = confidence interval

In summary, the logistic regression analysis noted that a few variables were associated with return to an inpatient unit or to the emergency department in the 30 days after discharge. To answer the first research question posed, chronic illness was the only factor to increase the chance of return to a mental health inpatient unit in the 30 days after discharge. In the instance of readmission to the emergency department, presence of a substance related disorder, a chronic illness, and being 25 years of age or

younger were the factors identified to predict readmission to this setting 30 days after discharge from a mental health inpatient unit.

CHAPTER 5 - DISCUSSION

Introduction

A summary of the study objectives and key findings are followed by a discussion in the context of current research are presented in this chapter. Study limitations and strengths are then reviewed, followed by a summary of the study contributions and a discussion of future research directions.

Summary of Study Objectives and Key Findings

This study looked to describe patient readmission patterns to both a mental health inpatient unit and to the emergency department in the 30 days after discharge from a mental health inpatient program, based on connection to an outpatient program. Also, through the use of logistic regression model and factor analysis I was also able to identify the factors that may contribute to return to an inpatient mental health unit and/or an emergency department. Approximately 20% of subjects were connected to a mental health outpatient program on discharge, with older age, female sex, diagnosis, and placement on discharge all significantly related to connection status.

Overall, readmission rates to a mental health inpatient unit were low at 5%, with a slightly higher rate of readmission for individuals connected to an outpatient program (6%) than were not (4%). There were no statistical differences in age category, sex, mental illness diagnosis, length of stay, discharge placement, or chronic illness status of those readmitted to a mental health inpatient unit compared to those who were not. Logistic regression analysis found that the presence of a concurrent chronic illness was the strongest, and only, predictor of readmission to a mental health inpatient unit within 30 days post discharge.

The emergency department readmission rate for the study cohort was higher at 14% with no statistical differences found between connection status to an outpatient program in relation to readmission to the emergency department. Subjects who were younger, had a diagnosis of a substance related disorder, or concurrent chronic illness were more likely to be readmitted to the emergency department.

The overall findings suggest that there are likely other demographic and clinical factors, which could not be measured, that are associated with readmission to both mental health inpatient and mental health emergency department visits in the 30 days after discharge.

Discussion of Key Findings

Mental illness related hospital admissions.

Individuals in the study sample were on average younger (41 years) than individuals receiving care in the same settings across Canada (47 years) (CIHI, 2012c). The study had showed a minimal difference between sexes in the overall rates of hospitalization (general and psychiatric) for mental illnesses of the sample and national and provincial data. CIHI analysis of mental health inpatient service utilization in Canada, noted 49% of individuals were male and 51% in Ontario (CIHI, 2012c; CIHI, 2009b).

The study sample results however did differ in the overall ranking and distribution of various mental illness diagnoses making up discharges from Canadian general hospitals. For instance, mood disorders made up 29% of discharges from Canadian general hospitals, schizophrenia and other psychotic disorders 22%, substance

related disorders 17%, anxiety disorders 4% and personality disorders 3% (CIHI, 2012c). Statistics for the province of Ontario differ from national data, as a larger proportion of discharges are attributed to mood disorders (35%) and substance related disorders (15%) and fewer for schizophrenia and psychotic disorders (22%), personality disorders (2%), and no real difference with anxiety disorders (4%) (CIHI, 2012c). Though similar to the national and provincial proportions of general hospital utilization for mood disorders, the study sample in contrast, had a significant proportion of patients with a mood disorder (50%); almost 20% more than reported Canadian discharges from general hospitals and 15% more than the provincial rate (CIHI, 2012c).

A small portion of study patients had a personality disorder (2%); this is less than both the national and provincial rates in both psychiatric (4.4%) and general hospitals (3.4%) (CIHI, 2012c). The difference in the proportion of subjects who had personality disorders may be due to the delivery of a specific therapy, dialectical behavioural therapy (DBT), which focuses on delivering care for this diagnostic group in an outpatient setting (St. Joseph's Healthcare Hamilton [SJHH], n. d.). This therapeutic approach has been shown to reduce hospitalization and emergency department use for suicide ideation and attempts at self-harm. This in turn may have contributed to the lower percentage of patients with this diagnosis and consequently lower readmission rates (Linehan et al., 2006).

This study noted significant differences in length of hospital stay when compared to national, provincial and regional data. The study mean length of stay was 3 days more and median 9 days more when compared to Canadian data (CIHI, 2012c). Wider differences were also noted between this study and provincial and regional

average lengths of stay; 20 days vs.18 days and 15 days (CIHI, 2012c). It is important to consider these differences as hospital functions related to length of stay have been shown to have an effect on the probability of readmission (Heggestad, 2001). For example, bed turnover rates are a measure (based on a specific time period) of the number of discharges in relation to the number of available beds and are directly related to the length of stay; therefore the longer the length of stay, the fewer times a bed turns over (American Health Information Management Association [AHIMA], 2008. In view of the fact that length of stay is related to hospital bed turnover rates, Heggestad (2001) established that there was a relationship ($p < 0.001$) between higher rates of bed turnover with an increased risk (1 to 4 times) of early readmission, .). Other studies have supported the relationship between a short length of stay and higher readmission rates, noting that those patients with longer-term admissions were readmitted less often (CIHI, 2008b; CIHI, 2012a). Considering these points, the significant differences in patient mean length of stay for this study, when compared to other national, provincial, and regional data, were notable. This study's 30-day readmission rate of 5% was noticeably less than the reported rates for Canada (9%), Ontario (10%), and the region (10%) in which this organization is situated (CIHI, 2012c). With a longer mean length of stay and thus lower rate of bed turnovers would not be as frequent and thus may have contributed to the lower rates of readmission to the inpatient unit.

In this study connection status to a mental health outpatient program was not related to an increased risk for readmission. CIHI (2011) noted that other patient and system related factors are more closely associated with readmission, rather than just connection to outpatient program. Also, connection to an outpatient program per say,

was not noted to influence rates of readmission, rather it was the attendance at an appointment after discharge that had an effect on readmission (CIHI, 2011; Nelson et al., 2000). Studies looking at not only connection to outpatient services but actual attendance at the service for an appointment and connection with a health professional after discharge have shown to decrease readmission rates, sometimes for up to one year (Nelson, et al., 2000; Reynolds, Lauder, Sharkey, MacIver, Veitch, & Cameron).

Mental illness related readmissions and emergency department use.

A diagnosis of a substance related disorder had the strongest association with return to the emergency department after discharge. This finding is similar to that of Chan and Ovens (2002), who also noted in their study of frequent users of emergency departments, that individuals with substance dependence or addiction made up almost one third of the individuals who return frequently to the emergency department.

Connection to an outpatient program at the time of acute care discharge is thought to be advantageous as it has been shown to provide support for individuals as they transition home (Bruffaerts et al., 2005; Hopko et al., 2001; Madi et al., 2007; Niehaus et al., 2008; Woz et al., 2012). Furthermore, other authors have noted that return to the emergency department after discharge can increase the risk of readmission to an inpatient mental health unit (Zhang, Harvey, & Andrew, 2011). Zhang and colleagues (2011) also noted that those patients with certain social and diagnostic issues were significantly more likely to return to an inpatient unit after discharge.

Factors associated with mental health inpatient and emergency department readmission.

There are differences with the findings of this study with the readmission of subjects to the emergency department than other Canadian analyses. Patients who were not connected to a mental health outpatient program were no more likely to be readmitted to a mental health inpatient unit than those who were connected to an outpatient program. Of the subjects readmitted to a mental health inpatient unit, individuals with a diagnosis of schizophrenia, a delusional and psychotic disorder, substance related disorder, or an adjustment disorder had the highest rates of readmission to a mental health inpatient unit. Currently, in Canada individuals with a diagnosis of schizophrenia have the highest rates of readmission within 30 days of their discharge from hospital at 13% (CIHI, 2011). One possible reason for this large difference in readmission rates for the study subjects with schizophrenia could be the longer than average length of stay, thus allowing time to stabilize patients at least for the short period of examination of readmission (CIHI, 2011).

The presence of a chronic illness in patients discharged from a mental health inpatient unit was found to be associated with both readmission to a mental health inpatient unit and the emergency department for mental illness related issues. This is not unexpected, as the presence of chronic illness has been shown to increase the rate of readmission to both medical and surgical units for other primary conditions (CIHI, 2012a; Kirby, Dennis, Jayasinghe, & Harris, 2010). In Canada, readmission rates to non-mental health units within the 30 days after discharge are higher for individuals with chronic illness (CIHI, 2012a). Mental illnesses such as depression are common in individuals with chronic illness, but often it is their medical complexity (not their

mental health issues) that is attributed to their hospital readmission (Ng et al., 2007). In a study of patients who were hospitalized for an exacerbation of COPD, there were no differences in readmission rates between patients with depression and ones without (Ng et al., 2007).

Both COPD and CHF were also found to have a strong association of emergency department utilization after discharge (Kirby et al., 2010). Krumholz (2013) talks about the stress patients experience when trying to cope and recover after a discharge from hospital, which he calls, post-hospital syndrome and feels that it may need to be addressed, especially in patients with a chronic illness, as they often return to hospital for a reason not related to their index event (CIHI, 2012a; Kirby, 2010; Krumholz, 2013). Thus, it is not uncommon for individuals with a chronic illness to return to the emergency department in a period of medical instability; unfortunately, these patients may be stigmatized by hospital staff who assumes they have a mental illness related issue, due to their recent discharge from a mental health inpatient unit (Sinding et al., 2013).

In Canada 8% of hospitalizations and 10% of days related to hospitalization are due to the heavy use of drugs and alcohol subsequently leading to other medical and psychiatric issues (Government of Canada, 2006a). In this study, a diagnosis of substance related disorder was strongly associated with emergency department use for a mental illness related issue, within 30 days after discharge. Current literature notes that approximately 25% of individuals who have been identified as frequent users of the emergency department (15 or more visits in 12 months) have substance abuse issues which are thought to contribute significantly to the volume of visits (Brubacher, et al.,

2008; Geurts, Palatnick, Strome, & Weldon, 2012). Often these visits are related to either psychiatric issues or medical related issues secondary to substance misuse such as intravenous drug use (Geurts et al., 2012; Kerr et al., 2005). Furthermore, in Ontario, 30% of discharges from general hospitals for individuals with a primary substance abuse disorder have a co-occurring mental illness, which may put them at more risk for return to the hospital, albeit to the emergency department (CIHI, 2012c; Druss, Rosenheck, Desai, & Perlin, 2002).

Furthermore, the 30-day readmission rate is often referenced as a continuity of care indicator (CIHI, 2011; Nelson et al., 2000). Consequently, the low rate of readmission found in this study could bode well for this organization. Again, Nelson and colleagues (2011) speak to readmission rates as an indication of system functioning. This was difficult to determine in this study as connection to an outpatient program was noted to have no association between readmission to either locations and the cohort had an overall low rate of connection (20%) in the patients who returned to the inpatient unit. Also, CIHI (2011) cautions against the comparison of readmission rates at the jurisdiction level, as programs could have variations in how inpatient services are organized.

CIHI (2011), in their study of health indicators related to mental illnesses, noted that as age increased, the risk for readmission in the 30 days after discharge decreased. Consistent to the CIHI findings, in this study, older patients were readmitted less often compared to those patients aged 18 to 24 years. Also, the CIHI report noted that risk adjusted rates for readmission were statistically lower for substance related disorders at 10%, when compared to schizophrenia (13%) and personality disorders (13%) (CIHI,

2011). Though this study found a strong statistical relationship ($p < 0.05$) between diagnosis and connection to an outpatient program at discharge, it was only the presence of a substance related disorder that was associated with both readmission to hospital and to the emergency department. Zhang et al. (2011) also noted that certain social and diagnostic issues, such as alcohol intoxication showed a significant relationship to return to an inpatient unit after discharge. Furthermore, they espouse that emergency department use after hospital discharges can significantly increase the risk of readmission to a mental health unit (Zhang et al., 2011).

Similar trends were found in the diagnostic category of mood disorders and the rates of return to hospital services after discharge. Lin and colleagues (2011) found that 25% of patients discharged with a mood disorder returned within 30 days to the emergency department. Readmission rates as high as 36% in Alberta and Ontario were noted following a first admission for the same diagnosis (CIHI, 2011). Canada wide, mood disorders account for 34% of all readmissions. A CIHI report had similar portions of returning patients with mood disorders at 39% (CIHI, 2011). This finding was in line with other studies of readmission which have shown that the presence of a mood disorder, like depression or other affective disorders had a higher risk of readmission, especially with relapse and each subsequent admission (Jones, Yates, & Zhou, 2002; Kessing, Hansen, & Andersen, 2004). Also, this study looked only at discharges from a general hospital and did not include data from psychiatric hospitals, which may have had an effect on the portion of readmitted patients. The type of hospital where patients receive care (general hospital) can have an effect on the portion of readmitted patients with mood disorders, as the literature notes that patients discharged

from general hospitals with mood disorders, such as depression, are more likely to be readmitted within 30 days compared to patients treated in a psychiatric hospital (CIHI, 2012c).

Since my study was limited to discharges from mental health inpatient units at a general hospital, it could be likely that the study cohort did not include as many individuals with co-morbid medical issues, thus producing a lower rate of readmission at 30 days than seen in the CIHI data (CIHI, 2012c). Thus the findings of this study, indicating that the presence of a substance related diagnosis increased the odds of returning to the emergency department, was congruent with the current utilization literature in this area.

Homeless individuals most often use the emergency department and outpatient clinic related services for their healthcare needs (Government of Ontario, 2012). In fact, a review of mental health data from Ontario hospitals (OMHRS), noted that only 3% of admissions to inpatient units (both general and psychiatric hospitals) for mental illness related diagnoses were by homeless patients (Joiner, 2007). Similar findings were found in the current study whereby only 2% of individuals were identified as homeless on discharge. The overall low rates are thought to be due to the fact that homeless individuals often receive support in connecting them to housing prior to discharge from hospital, thus identified as homeless on admission, but at the time of actual discharge have somewhere to live (Hulchanski, Campsie, Chau, Hwang, & Paradis, 2009). Further study into the types of supports individuals engaged with on discharge or had a previous

relationship prior to admission, rather than just the discharge environment, may help us understand their role in community tenure after discharge. Concentrated efforts to follow up with patients after discharge to encourage and ensure that they attend their outpatient appointments has shown to decrease "no-shows" to mental health outpatient programs (Orlosky, Caiati, Hadad, Arnold, & Camarro, 2007). In the present study, patients were either discharged with or without connection to an outpatient program. Unfortunately, I had no way of knowing the nature of other supports, if any, they had access to during the immediate 30 days after their discharge. Current literature suggests that mental health patients benefited from having a transitional period with supports (professional and peer), to transfer therapeutic alliance and ensure connection to services in the community after discharge (Forchuk, Reynolds, Sharkey, Martin, & Jensen, 2007; Orlosky, et al., 2007).

Study Limitations and Strengths

This study had a number of strengths and limitations, most of which were associated with the exclusive use of administrative data. Other researchers have noted the strength of using administrative data and secondary data analysis which provides a satisfactory method to illustrate factors which contribute to or help predict readmissions as data are often more accessible and less time consuming to collect than clinical chart reviews (Eaton et al., 1992; Heggestad, 2001; Hermann et al., 2000; Kolbasovsky et al., 2007; Sayers et al., 2007; Zeber et al., 2006). An additional strength of this study includes the source of data for analyses and location of the study. This study included

discharge data that were sourced from a validated clinical data collection tool (RAI-MH), which is used to collect data on patients receiving care for mental illnesses in Ontario hospitals (general and psychiatric) and submitted to the [OMHRS (CIHI, 2010b; Hirdes, Smith, Rabinowitz, & Yamauchi, 2002). As the RAI-MH is a validated data collection tool with moderate reliability (kappa of 0.7), the possibility of missing data is less likely and therefore not a significant concern (Hirdes et al., 2002). The fact that subjects were only included if they resided in Hamilton, and that the organization of study is the sole provider of inpatient mental health services, also decreased the likelihood an inpatient readmission would be overlooked.

> Using administrative data, to answer research questions, is a common approach; nevertheless, there remain unique challenges that may compromise the internal and external validity of the results. Concerns with using administrative data are related to data quality, effecting the internal validity of the results. Some of the more common data quality concerns include: errors in coding, missing variables, and computing errors as a result of transcribing data, all of which produce challenges when preparing data for statistical analysis (Austin, Daly, & Tu, 2002; CIHI, 2010b; Hendryx et al., 2003; Roos, Gupta, Soodeen, & Jebamani, 2009; Seko, 2001). Errors such as these may have contributed to the small percentage of individuals that were identified as homeless in the study sample. Coded data often use geographic level information as is in the case of the OMHERS, and may in fact have used different definitions of homelessness than community service providers (Canadian Homelessness Research Network, 2012; Government of Ontario, 2012). Also, other definitions of homelessness are

recognized in social service provision in Canada. Canadian Homelessness Research network suggests that the definition of homeless encompasses a continuation of shelter options including residing in a shelter to precarious housing arrangements (Canadian Homelessness Research Network, 2012). This is vastly different from what is considered homeless in hospital databases, like OMHERS, where homelessness is indicated as having no postal code recorded (Government of Ontario, 2012). It is also possible that validation of the individual's address or housing status were not completed on admission to hospital, thus not accurately noting which patients were actually homeless (Government of Ontario, 2012). Considering this information, many individuals that may have been homeless may have not been included in this study, as they would have not had a postal code available to determine their residency in Hamilton (Government of Ontario, 2012).

Perhaps the most significant of the limitations of this study are related to the lack of information available in the administrative data sources utilized for this study. These other pertinent variables known to contribute to re admissions and emergency department utilization include: medication compliance, attachment to a family doctor, employment status, socioeconomic factors, social supports, individual choice in healthcare utilization, and outcome findings risk assessment on admission (Chan & Ovens, 2002, Downey et al., 2009, Pasic et al., 2005; Segal, Akutsu, & Watson, 1998; Webb et al., 2007). Chan and Ovens (2002), in their study of emergency department utilization found that socioeconomic and economic characteristics were significantly related to the frequency of emergency

department use. Unlike my study, they found that the population under 25 years had the lowest (19%) portion of individuals that returned to the department frequently over a year (12 or more times/year). The individual's socioeconomic conditions have also been shown to have an effect on hospital utilization for mental illness, with lower socioeconomic groups having two times higher rates of utilization than those in the higher socioeconomic groups (596 per 100,000 people compared to 256 per 100,000) (CIHI, 2008d). Patients with no regular access to a family doctor have also been found to have higher utilization of emergency department services for mental illness related issues (Downey et al., 2009).

Also, the definition of connection to outpatient program was limited to an open account on the administrative database. This did not provide any information on patients' utilization or visit patterns to the outpatient program, thus I cannot be certain if they had any actual contact with the service after discharge. , including if they had any contact with the outpatient program this study did not include emergency department utilization data from three other local emergency departments as they are run by a different organization; therefore, I have likely underestimated emergency department use by study participants, and limits the external validity. For that reason, it is difficult to make generalizations related to emergency department use (for the same issue) after discharge.

Generalizability of the Results

Generalizability of these results to populations other than the study cohort may not be possible as there are likely geo-political differences in how individuals interact

with the health care system. While this study may not be generalizable to the wider population, the findings could be used to inform local organizations or other organizations of a similar size and composition (i.e. academic health teaching centres). This should be done with caution as the purpose of this study was to explore relationships between the variables, not to infer causality (LoBiondo-Wood & Haber, 2005; Stat Soft, Inc. 2010).

Chapter 6 - CONCLUSION

Contributions, Conclusions, and Future Directions

The findings in this study contribute to a better understanding of the factors associated with early readmission post hospital discharge. This knowledge can be used to add to the practice of discharge planning for patients, with particular attention in the consideration of not only a patient's mental health condition but also other medical conditions that may be present. Since further analyses did not support my initial hypothesis that a connection to an outpatient program on discharge had a noticeable effect on readmission to either a mental health inpatient unit or to the emergency department, this may alert clinical staff to consider other additional informal and formal supports when planning for discharge. This is especially important for patients who have other chronic illnesses or substance use issues, as both were associated with mental health inpatient readmission and emergency department use in the 30 days following discharge. Taking this into consideration, staff and patients with chronic illnesses should consider paying particular attention to these factors when planning for discharge and ensure that both mental health and other health related issues are supported to promote tenure in the community. This may include inviting other services (outpatient services, specialists, and family doctors) to collaborate in discharge planning with the patient.

Furthermore, these results could be used to encourage further research of the patient population who return to hospital after discharge. This could include the exploration of the reasons that the patients actually return to hospital after discharge.

This qualitative data could be used to compliment quantitative reports of utilization in this patient population.

Finally, since this study cohort had a significantly lower readmission rate to mental health inpatient units, it may be interesting to better understand what other internal and external factors to the hospital setting may be playing a role. Since the presence of a substance related disorder was found to increase the odds of emergency department admission in the 30 days after discharge, mental health programs should pay particular attention to this specific population and consider further study.

Future research in this area may also consider examining outpatient service delivery models and their effectiveness on emergency department readmission. This may help understand and identify patients who may be at risk of return to hospital after discharge, and focus on providing appropriate supports for these patients in the community to prevent readmission to both the emergency department and to inpatient units.

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Appendix A – Study Variables from Hospital Administrative Databases

Study Variables from Hospital Administrative Databases

Variable	NACRS	RAI-MH	Hospital Registration Database (STAR)
Admission date	•	•	•
Age	•	•	•
Birth date	•	•	•
Death during intervention	•		
Discharge date	•	•	•
Discharge diagnosis	•[a]	•	
Discharge location	•	•[b]	
Sex	•	•	
Institution-unique patient identifier	•	•	•
Length of stay		•	
Main problem	•		
Mental health outpatient service code (on service, discharged)			•
Mental health outpatient visits			
Other problems (chronic illnesses)	•	•	
Postal code	•	•	
Residence code	•	•	
Submission period	•	•	

Note. NACRS = ; RAI-MH = .

[a] Diagnosis identified by ICD-10 V diagnoses mapped onto DSM- IV-TR diagnostic codes

[b] Includes individuals who died during inpatient stay

• Indicates the variable that will be extrapolated from the database

Appendix B – Diagnostic and Statistical Manual of Mental Disorders Codes

DSM-IV Classifications with ICD-10 Codes

DSM IV Category	DSM IV Classification (APA, 2000)[a]	ICD-10 Code (CIHI, 2012d)[b]
Mood disorders	296.00-296.06 296.20-296.26 296.30-293.36 296.40-293.46 296.50-293.56 296.60-293.66 296.70, 296.80 296.89, 296.9 300.04, 301.13 311	F30.x-F39.x (0-mild; 1-moderate, 2 severe without psychotic features; 3 severe with psychotic features; 4 in partial remission and full remission; 8 in full or partial remission; 9 unspecified) F32.9
Anxiety disorders	293.89, 300-300.02, 300.21-300.23, 300.29, 300.3, 308.3, 309.81	F40.0-F40.2, F40.8, F40.9 F41.0-F41.3, F41.8, F41.9 F42.0-F42.2, F42.8, F42.9 43.0, 43.1,
Adjustment disorders	309.0, 309.24, 309.28, 309.3, 309.4, 309.81, 309.9	F43.2, F43.8, F43.9
Schizophrenia	295.10 - 295.90	F20x-F20.6, F20.8-F20.9 .0x paranoid Type .1x Disorganized type .2x Catatonic type .3xUndifferentiated type .5xresidual type F21.1, F23.0, F23.1, F23.2, F23.3, F23.8, F23.9 F25x .0 bipolar type .1 depressive type .2 mixed type F25.8, F25.9
Delusional & psychotic disorders	297.1, 297.3, 298.8, 298.9, 293.81, 293.82	F22.8, F22.9, F23.1, F23.2, F23.3, F23.8, F23.9, F24, F28, F29
Personality Disorders	301.0, 301.20, 301.22, 301.4, 301.5, 301.6, 301.7, 301.81-301.83, 301.9	F21 F60.0-60.9, F62.0, F62.1, F62.8, F62.9
Substance dependence related disorders	303.90, 304.00-304.60, 304.80, 304.90, 305.00-305.90	F10.2, F11.2, F12.2, F13.2, F14.2, F15.2, F16.2, F17.2, F18.2, F19.2

Note. APA = American Psychiatric Association (2000); DSM IV-TR = Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition, Text Revision; ICD-10-CA = International Statistical Classification of Diseases and Related Health Problems, Tenth Revision.

Appendix C –Athabasca University Research Ethics Approval

Ethics Approval
MEMORANDUM

DATE: March 13, 2012
TO: Claire Kislinksy
COPY: Jennifer Knopp-Sihota (Supervisor), Assistant Professor, Centre for Nursing and Health Studies
Dr**.** Simon Nuttgens, Chair, Athabasca University Research Ethics Board
Janice Green, Secretary, Athabasca University Research Ethics Board
Dr. Sherri Melrose, Chair, CNHS Research Ethics Review Committee
FROM: Dr. Sharon Moore, Chair, CNHS Research Ethics Review Committee
SUBJECT: **Ethics Proposal #CNHS-11-03, Kislinsky, C.*:*** *"Readmission to Mental Health Emergency and Inpatient Services 30 Days to Post Discharge"*

Thank you for providing the additional information requested by the Centre for Nursing & Health Studies (CNHS) Research Ethics Review Committee.
I am pleased to advise that the above-noted project has now been awarded interim **APPROVAL TO PROCEED**. **You may begin your research immediately.**
This approval of your application will be reported to the Athabasca University Research Ethics Board (REB) at their next monthly meeting. The REB retains the right to request further information, or to revoke the interim approval, at any time.
As implementation of the proposal progresses, if you need to make any significant changes or modifications prior to receipt of a final approval memo from the AU Research Ethics Board, please forward this information immediately to the CNHS Research Ethics Review Committee via Dr. Sharon Moore sharon.moore@athabascau.ca for further review.
If you have any questions, please do not hesitate to contact sharon.moore@athabascau.ca .

Appendix D- Organizational Research Ethics Approval

St. Joseph's Healthcare Hamilton

RESEARCH ETHICS BOARD

McMaster University

50 CHARLTON AVENUE EAST, HAMILTON, ONTARIO, CANADA L8N 4A6
Tel. (905) 522-4941 ext. 33537 Fax: (905) 521-6092

March 5, 2012

Ms. Claire Kislinsky
St. Joseph's Healthcare Hamilton
Geriatric Psychiatry Program
Juravinski Tower - T10168

RE: R.P. #12-3642
Project Title: Readmission to mental health emergency and inpatient services 30 days post discharge – Retrospective Chart Review

Dear Ms. Kislinsky:

A member of the Research Ethics Board's Subcommittee reviewed R.P. #12-3642 "*Readmission to mental health emergency and inpatient services 30 days post discharge*" and approved it with some conditions. Those conditions have now been met. You have final approval to commence your research.

This approval will be for a one-year period **ending 05 March, 2013.** We will request a progress report at that time.

If your project is terminated, it is your responsibility to notify the REB.

Please ensure that all study personnel are familiar with the REB requirements on the appended page.

Please reference R.P. #12-3642 in any future correspondence.

We wish you well in the completion of this research.

Sincerely yours,

Raelene Rathbone

Raelene Rathbone, MB, BS, MD, PhD
Chairperson, Research Ethics Board
RR:lmm

cc: Marnie Fletcher - Rose Iannone, Health Information Services
Append.