12-13-2017 9:00 AM

Factors Associated with Involuntary Hospitalization among Young People with Early Psychosis

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A thesis submitted in partial fulfillment of the requirements for the Master of Science degree in Epidemiology and Biostatistics

Abstract

Involuntary hospitalization may impact subsequent service engagement in people newly diagnosed with psychosis. We sought to estimate the proportion of young people aged 16-35 years with early psychosis in Ontario hospitalized involuntarily at first admission, and to identify the factors associated. Using health administrative data, we followed-up 17,725 incident cases of non-affective psychosis for 2-years (2009-2016). We used logistic regression with augmented backward elimination to identify associated risk factors. During follow-up, 32% were hospitalized voluntarily or involuntarily, 81% of which were involuntary. Factors associated with higher odds of involuntary status included younger age, immigrants/refugees, psychosis not-otherwise-specified diagnosis, poor insight or adherence, greater severity of mania, aggression, harm to self or others, and recent police involvement. Prior trauma, greater severity of negative symptoms or depression, and contact with community services or primary care were protective. Our findings implicate areas for intervention to improve pathways to care for people with psychosis.

Keywords

Early psychosis, first-episode psychosis, involuntary hospitalization

Acknowledgments

I would like to express my gratitude to my supervisor, Dr. Kelly Anderson for her support and guidance on this project, and other endeavours throughout my Master's. You have been a consistently reassuring and encouraging voice as I have worked through this project, and have been a great mentor these past few years. It has been a rewarding experience for me and I am grateful for the opportunity to work with you on this project.

I would also like to sincerely thank my supervisory committee, Dr. Guangyong Zou, Dr. Arlene MacDougall, and Dr. Paul Kurdyak for providing crucial and insightful feedback on this project. To Dr. Guangyong Zou, your statistical expertise was incredibly helpful in designing this project, and I appreciate your time and responsiveness in helping me work through issues. To Dr. MacDougall and Dr. Kurdyak, your clinical insights were invaluable, and helped me to view this project and our findings from different perspectives.

Thank you to staff at the Institute for Clinical Evaluative Sciences. Specifically, Michael Lebenbaum at ICES Central, I appreciate you taking the time out of your busy PhD schedule to provide valuable input on this project. I would like to sincerely thank Dr. Salimah Shariff, Staff Scientist at ICES Western. Your extensive work in helping to design the cohort and revise the Dataset Creation Plan was crucial for ensuring the cohort creation and data analysis steps went as smoothly as possible. I would also like to thank Dr. Lihua Li, Senior Analyst at ICES Western, for your work in creating the cohort, as well as your expertise and patience in providing feedback on my SAS code, on the project, and answering my questions.

I would also like to thank John Costella from the Allyn & Betty Taylor Library for his advice and assistance in designing the literature review search strategy.

Finally, I would like to thank my husband, Jesse, and my family. It was your support and encouragement that allowed me to return to school to pursue something new, and I will be forever grateful.

I would like to acknowledge the Ontario Mental Health Foundation for funding this project.

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List of Abbreviations

ABE = Augmented backward elimination

ABS = Aggressive Behaviour Scale

AESOP = Aetiology and Ethnicity in Schizophrenia and Other Psychoses

BPRS(-EC) = Brief Psychiatric Rating Scale (-Excited Component)

CI = Confidence interval

CIHI = Canadian Institute for Health Information

DAD = Discharge Abstract Database

DCP = Dataset Creation Plan

DRS = Depression Rating Scale

DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition

DUP = Duration of untreated psychosis

ED = Emergency department

EI = Early intervention

FP = Family physician

FSA = Forward sortation area

GAF = Global Assessment of Functioning

ICD-9/10 = International Classification of Diseases, Ninth Revision/Tenth Revision

ICES = Institute for Clinical Evaluative Sciences

IKN = ICES key number

IQR = Interquartile range

IRCC = Immigration, Refugees and Citizenship Canada

MDS-MH = Minimum Data Set for Mental Health

MHA = *Mental Health Act*

MHCAP = Mental Health Clinical Assessment Protocol

MoHLTC = Ministry of Health and Long-Term Care

NACRS = National Ambulatory Care Reporting System

NOS = Not-otherwise-specified

OHIP = Ontario Health Insurance Plan

OMHRS = Ontario Mental Health Reporting System

OR = Odds ratio

PANSS = Positive and Negative Syndrome Scale

PEPP = Prevention and Early Intervention Program for Psychosis

PSS-Short = Positive Symptom Scale-Short

PTSD = Post-traumatic stress disorder

RAI-MH = Resident Assessment Instrument-Mental Health

RHO = Risk of Harm to Others

RPDB = Registered Persons Database

SCI = Self-Care Index

SD = Standard deviation

SOS = Severity of Self-Harm

VIF = Variance inflation factor

YMRS = Young Mania Rating Scale

Chapter 1

1 Introduction

1.1 Thesis Overview

For people with psychotic disorders, the first two to five years following symptom onset are a crucial period for the establishment of long-term outcomes.[1] It has also been shown that the earlier treatment is initiated, the better the outcomes are in terms of symptoms and functional recovery.[2–4] This early phase of psychotic illness, referred to as the "critical period," offers a window of opportunity for intervention and secondary prevention of the impairments associated with psychosis.[5] Specialized early intervention (EI) services have been developed and implemented around the world with the goal of reducing delays in treatment and providing comprehensive care to young people with psychosis to improve outcomes in this population.[6] In Ontario, the Ministry of Health and Long-Term Care (MoHLTC) has recognized the importance of secondary prevention in psychosis and has invested heavily to implement specialized EI services across the province.[7]

Considering that the effectiveness of EI services relies on early detection of psychosis, understanding the routes and contacts that lead to the initiation of care is important. Initial contacts leading to care may include physicians, social services, school counsellors, and religious agencies.[8] Contacts may also include emergency services, such as police and emergency departments (EDs).[8] These types of emergency contacts are often described as negative relative to other types of contacts, due to the potentially coercive nature of these contacts and given the potential to impact subsequent engagement with services.[9,10]

Involuntary hospitalization has been described as a negative contact with the healthcare system, although it may also be viewed as necessary by patients and caregivers.[11–13] Physicians in Ontario, and similarly in other jurisdictions, have an obligation to detain someone against their will in cases where there is a high likelihood of harm to the patient or others, or deterioration of the patient should they not remain in a psychiatric facility.[14]

Although this may be necessary in some cases for the protection of the patient and others, involuntary admission is a violation of the patient's autonomy and the use of this practice should be minimized wherever possible.[15] Knowledge of the frequency of involuntary hospitalization in early psychosis in Ontario is limited, however evidence to date suggests it occurs frequently, with upwards of 60% of patients having an involuntary admission.[16,17] Furthermore, there is a paucity of evidence regarding the factors associated with an involuntary hospitalization in early psychosis in Ontario.

The purpose of this thesis is to investigate involuntary hospitalization at first admission in a cohort of young people in the first two years of psychotic illness (i.e., early psychosis) identified using health administrative data from outpatient and inpatient records across Ontario. We will examine how frequently involuntary hospitalization occurs at the first hospital admission to gain insight into how often this practice is used in Ontario in early psychosis. We will also broadly explore the sociodemographic, clinical, and service-related factors that are associated with the use of this practice to understand more about the circumstances around which involuntary hospitalization occurs. This chapter provides background information on concepts important to this thesis, including psychotic disorders, pathways to care in young people with psychosis, and involuntary hospitalization. We review the literature specific to research aims presented in the second chapter. The methods used for the study are outlined in Chapter Three. We then present the findings from our analysis in Chapter Four, followed by discussions on the implications of these findings in Chapter Five.

1.2 Psychosis and Psychotic Disorders

The term "psychosis" refers to the presence of specific psychiatric symptoms, including delusions (i.e., fixed false beliefs) and hallucinations (i.e., perceptions occurring in the absence of corresponding external stimuli).[18] These symptoms result in a loss of contact with reality and can lead to impairment in social and occupational functioning.[18] While delusions and hallucinations are the defining symptoms of psychosis, they are among a broader category of psychiatric symptoms often occurring with psychosis known as positive symptoms, which also includes disorganized thinking (speech), and grossly disorganized or abnormal motor behaviour (including catatonia – a marked decrease in

reactivity to the environment).[18] Another symptom cluster associated with psychosis is negative symptoms, which includes diminished emotional expression, avolition (i.e., decrease in motivation), alogia (i.e., diminished speech output), anhedonia (i.e., decreased ability to experience pleasure), and asociality (i.e., lack of interest in social interactions).[18] Affective (i.e., mood) symptoms may also be present, including depression (e.g., feelings of sadness, tearfulness, emptiness or hopelessness), and mania (e.g., elevated mood, inflated self-esteem, racing thoughts, difficulty with attention, decreased need for sleep, excessive involvement in pleasurable activities, and pressured speech).[18]

Psychosis occurs in the context of various mental illness, and is the defining feature of primary psychotic disorders, including schizophrenia, schizoaffective disorder, schizophreniform disorder, schizotypal [personality] disorder, delusional disorder, brief psychotic disorder, other specified schizophrenia and other psychotic disorders, and psychosis not-otherwise-specified (NOS). Psychosis may be present in affective disorders (i.e., mood disorders) such as bipolar disorder and major depressive disorder. Psychosis may also occur due to alcohol and drug use or withdrawal, brain injury, and in certain medical conditions.[18]

The presence of other symptom clusters beyond psychosis in these disorders, such as negative symptoms and mood symptoms, varies across different diagnoses and across individuals. For example, negative symptoms are often most severe in people with schizophrenia, and as a result have been added to the diagnostic criteria for schizophrenia in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).[18] Affective symptoms are most prominent in bipolar disorder with psychotic features and major depression with psychotic features, but are also present to a lesser degree in schizoaffective disorder.[18]

Psychotic disorders that are defined primarily by mood symptoms (e.g., bipolar disorder with psychotic features, and major depression with psychotic features) are typically classified as affective psychotic disorders.[19] Non-affective psychotic disorders include disorders occurring outside the context of a mood disorder (e.g., schizophrenia spectrum

disorders and delusional disorder).[19] In cases where there is diagnostic uncertainty at presentation, a diagnosis of psychosis NOS may be used, which is often intended to be a "place-holder."[20] It has been estimated that 68% of people given this diagnosis early in the course of psychotic illness later receive a more specific diagnosis, the majority of which tend to be non-affective.[20] In this thesis, we primarily focus on non-affective psychotic disorders.

1.2.1 Prevalence and Incidence of Psychotic Disorders

In the general population, the lifetime prevalence of non-affective psychotic disorders has been estimated at approximately 2%.[21] For schizophrenia specifically, a meta-analysis of prevalence across 46 countries estimated a lifetime prevalence of 0.4%.[22]

In Ontario, it has been estimated that approximately 5,000 new cases of schizophrenia or schizoaffective disorder arise each year among people aged 14 to 40 years.[23] Incidence rates of psychotic disorders are heterogeneous across different groups. In terms of age and gender, there is a higher incidence of schizophrenia among younger males.[24] Incidence of psychotic disorders also vary by area of residence (i.e., higher incidence in urban versus rural regions), migrant status, and ethnicity.[23,24] In Ontario, incidence rates of non-affective psychotic disorders among first-generation migrants are similar to the general population, this incidence varies by ethnicity and immigration status.[23] Immigrants from the Caribbean and Bermuda had higher incidence of schizophrenia and schizoaffective disorder, and immigrants from Northern or Southern Europe and East Asia had lower incidence compared to the general population.[23] As well, incidence is higher among those with refugee status.[23] Incidence has been shown to vary by socioeconomic status, with those living in the most materially and socially deprived areas having a higher incidence of schizophrenia spectrum disorders.[25]

1.2.2 The Impact of Psychotic Disorders

Although psychotic disorders are relatively rare among mental illnesses, the impact of these disorders from a societal, economic, and individual perspective is substantial. In 2013, schizophrenia was one of the top 25 leading causes of disability worldwide.[26] In Canada, the direct healthcare and non-healthcare costs of schizophrenia alone have been

estimated at $2.02 billion in 2004.[27] Considering mortality and the high unemployment rate in people with schizophrenia, resulting in additional productivity morbidity and mortality loss, this cost burden increases to $6.85 billion.[27] A more recent study in Ontario estimated the direct net costs of treating people with chronic psychotic disorders to be 3% of the Ontario healthcare budget.[28]

While the societal and economic burdens of psychotic disorders are significant, the personal impact of psychotic illness on individuals and families can be devastating. For those with psychotic disorders, the experience of psychotic symptoms such as hallucinations and delusions can be distressing and terrifying "that both shakes their grip on reality as they previously knew it, and threatens their sense of self."[29,30] This experience may be further exacerbated by personal stigma and feelings of shame.[31] Furthermore, the onset of psychotic illness often occurs during adolescence and young adulthood,[32] which can have detrimental effects on personal, social, and occupational development.[33–35] People with psychotic disorders are also at significantly higher risk of self-harm,[36] suicide,[37] and violence.[38] It has been estimated that people with schizophrenia have a 10 to 25 year reduction in life expectancy compared to the general population.[39] In Ontario, people with schizophrenia have a mortality rate three times higher and on average die eight years younger than those without schizophrenia.[40]

1.3 Early Psychosis

The definition of "early psychosis" varies in the literature, and the term is often synonymous with "first-episode psychosis" and "recent-onset psychosis." There is no consensus operational definition for these terms, and so in the literature, definitions vary. The definitions used may be based on either first treatment contact for psychosis, duration of prior antipsychotic medication use, or duration of psychotic symptoms.[41] However, typically these terms are used to refer to people early in the course of psychotic illness or treatment (e.g., the first two to five years).[41] Although "first-episode psychosis" is often used in the literature, the terms "recent-onset psychosis" or "early psychosis" imply a more accurate representation of this population, since the definitions in the literature do not refer explicitly to people in the midst of a first "episode" of mental illness.[41] These terms may be applied to either affective or non-affective psychotic

disorders, and this varies among individual studies. For the purposes of this thesis, in which we used health administrative data to identify cases, we use the term "early psychosis" and our definition refers to the time from first presentation to services for a psychotic disorder (i.e., diagnosis) and up to two-years thereafter. Furthermore, our definition refers to non-affective psychotic disorders.

1.3.1 Duration of Untreated Psychosis and Early Intervention

The importance of initiating treatment as early as possible following symptom onset was highlighted with the publication of two systematic reviews suggesting that longer delays between symptom onset and initiation of treatment, referred to as the duration of untreated psychosis (DUP), resulted in poorer clinical and functional outcomes.[3,4] Furthermore, the two-year period following initiation of psychotic illness is crucial for establishing long-term outcome trajectories.[1] Therefore the early stages of psychotic illness are considered a critical period for intervention in order to improve long-term outcomes.[5,6]

This shift in thinking – from pessimism around people with psychotic disorders having poor prognoses to optimism that these poor outcomes are preventable – has been fundamental to the establishment of EI services.[42] The goals of EI services are to shorten delays between symptom onset and treatment initiation, and to provide comprehensive treatment that includes the initiation of pharmaceutical and psychosocial treatments, in order to maximize the potential for symptomatic and functional recovery, and prevent relapse.[6] Evidence to date suggests this service delivery model is effective in terms of reducing hospital admissions, relapse rates, symptom severity, and improving treatment access and engagement.[43] Furthermore, EI services have been shown to be cost-effective over the long-term.[44]

Given the impact of psychotic disorders and the evidence of the benefits of EI services, the implementation of these programs around the world has grown.[42] In Ontario, the MoHLTC identified the implementation of EI services as a priority in 1999.[45] Since then, Ontario has continued to invest in EI services and more than 50 hospital- and community-based EI programs have been established across the province.[7]

1.3.2 "Young People" with Early Psychosis

Onset of non-affective psychotic disorders is rare prior to age 14, however between the ages of 15 to 17 years, a substantial increase in the incidence of schizophrenia has been observed.[46] Onset of schizophrenia typically occurs between the ages of 15 to 35 with the median age of onset ranging through late teens to early 20s.[32] Since the 15 to 35 age range is the peak age for risk of psychotic disorders, this age range represents the target population for many EI services in Canada aiming to intervene early in the course of illness and prevent disruption of care or disengagement from services when people enter adulthood.[47] Although the lower age limit for enrollment in EI services often varies in Canada, from 12 to 18 years, the upper age limit is often 35 years.[47] In this thesis, we focus on "young people" with early psychosis, referring to adolescents and young adults up to age 35, with the specific age range of interest for our study being 16 to 35 years.

1.3.3 Pathways to Mental Health Care in Early Psychosis

Achieving the goals of EI relies on the early detection of psychosis in the community. Therefore, the routes by which people with psychotic disorders access services are important to understand. Pathways to care are defined as "the sequence of contacts with individuals and organizations prompted by the distressed person's efforts, and those of his or her significant others, to seek help."[48] Pathways to care are influenced by individual factors such as the help-seeking behaviour of the patient and family members, as well as broader contextual factors such as social, cultural, and health service factors.[48,49]

In early psychosis, pathways to care can be complex and diverse, and can vary by geographic region and ethnicity.[8] Involvement of family physicians (FPs) and psychiatrists is common, however, pathways may also involve contacts with non-physicians, including psychologists, social services, school counselors, or religious agencies.[8] In many cases, people with early psychosis may have contact with emergency services, including EDs, inpatient units, crisis teams, and police.[8,50] In Ontario, evidence suggests emergency services are prominent in pathways to care in early psychosis. It has been estimated that the proportion of people with early psychosis having initial contact

with a physician versus emergency services is similar.[17,51] Furthermore, emergency contacts are the source of referral to mental health services for the highest proportion of patients in Ontario, when compared with physician and other non-physician contacts.[8,17,52–54] Emergency services have been described as "negative" or "adversarial" contacts,[8,9,55] since these interactions may be involuntary or coercive in nature, and may have an impact on subsequent service engagement.[10,56,57] Morgan et al. have suggested a model in which having negative interactions with services during the initial help-seeking process in early psychosis may adversely affect subsequent engagement, which in turn may increase the risk for help-seeking delays in the event of relapse, and that contact with services will again be through negative routes, resulting in "…a vicious cycle of negative experiences, coercion, disengagement, relapse, and so on."[9]

1.4 Involuntary Hospitalization

Involuntary hospitalization represents a potentially negative or less favourable contact with services that those with early psychosis may experience as part of their help-seeking process.[9] Involuntary hospitalization may occur in emergency situations where specific criteria are met, resulting in a person being detained against their will in hospital.[58] While mental health legislation varies among countries, The World Health Organization (WHO) provides some guidance.[59] The WHO also developed a checklist for involuntary admission in which the criteria for detention should include the following: there is serious likelihood of harm to self or others, and/or substantial likelihood of serious deterioration in the patient's condition if treatment is not given, and admission is for a therapeutic purpose.[60] A review of legislation from countries in Europe (UK, Austria, Denmark, France, Germany, Italy, Ireland, and Norway), the Americas (Canada, USA, Brazil), Australasia (Australia and New Zealand), and Asia (China and Japan) found that not all of these criteria are included in all legal frameworks across countries, however these countries include some variant of these criteria.[61] Legislation in Canada varies by province, however the criteria of having a mental disorder plus danger criteria and need for treatment are met.[61]

1.4.1 The *Mental Health Act*

The *Mental Health Act* (*MHA*) is the legislation in Ontario that outlines the criteria by which a "person suffering from a mental disorder" may be admitted to a designated psychiatric facility.[14] A mental disorder is defined in the *MHA* as "any disease or disability of the mind."[14] A patient may be admitted to a psychiatric facility as a voluntary, informal, involuntary, or forensic patient, with the definitions of each as follows[14,58]:

- Voluntary patient - "a person who has agreed to be admitted to the psychiatric facility for care, observation, and treatment."
- Informal patient - "a person who has been admitted pursuant to a substitute decision maker's consent under [the] *Health Care Consent Act*."
- Involuntary patient – "a person who has been assessed by a psychiatrist and found to meet certain criteria set out in section 20 of the *MHA*, following which the person is admitted and detained as an involuntary patient"
- Forensic patient – patients admitted under a court order.

1.4.2 Form 1: Application for Psychiatric Assessment

Often the route towards involuntary hospitalization begins with an Application for Psychiatric Assessment (Form 1). A Form 1 must be applied for by a physician that has personally examined the person within the past seven days prior to submitting the application.[14] These examinations often take place in EDs, but may also take place in a physician's office in the community.[58]

There are two sets of criteria under which a Form 1 can be ordered, known as Box A and Box B criteria, referring to how they are laid out on the form. Both criteria require that the physician has personally examined the patient. The Box A criteria, referred to as the "serious harm test," is where a physician examines a person and has reasonable cause to believe that the person is at risk of causing bodily harm to the person, or to another person, or is not competent in caring for himself or herself, and that the person is apparently suffering from a mental disorder likely to result in serious bodily harm to the person, to another person, or serious physical impairment of the person.[14] The Box B

criteria pertain to people with recurrent mental disorders who have previously responded to treatment. Refer to Table 1.1 for an overview of these criteria.[14]

A Form 1 is effective for seven days once it is signed and provides authority for any person to take the patient to a psychiatric facility where he or she may be detained, restrained, observed, and examined for no more than 72 hours.[14]

1.4.3 Form 2

A Form 2 is similar to a Form 1, the difference being that a Form 2 can be initiated by any person and is not limited to a physician (Table 1.1).[14] To begin the process of ordering a Form 2, any person can provide sworn information to a justice of the peace that there is a person within the jurisdiction of the justice who meets the criteria outlined in a Form 1. The use of a Form 2 as a route to assessment of persons in crisis may be used by concerned family members.[58]

The justice of the peace may consider the information presented and issue an order for the examination by a physician. The order is received by the police in the area where the justice has jurisdiction and provides authority to take the person into custody and bring them to a place where the person may be detained for examination by a physician. Most often, the ED is where people are taken for assessment, however an assessment may also take place in a physician's office or other facility.[58]

1.4.4 Police Apprehension

Under the *MHA*, police officers are provided with authority to take a person to an appropriate place for examination by a physician without a Form or order in circumstances where it would be dangerous to proceed to obtain a Form 2.[14] The police officer must have grounds to believe that a person is acting or has acted in a "disorderly manner" and that the person meets the "serious harm test" criteria for a Form 1.[14] Once a police officer has brought a person to an appropriate place for examination, a Schedule 1 facility is recommended where possible, the police officer must remain at the facility and retain custody of the person until the psychiatric facility takes the person into custody – a

decision which must be made by the facility as soon as is "reasonably possible" under the *MHA*.[14]

1.4.5 Form 3 and 4: Involuntary Admission

The criteria under which a person can be admitted and detained as an involuntary patient is outlined in Form 3, a certificate of involuntary admission. The attending physician must have observed and examined the person who is either the subject of an application for assessment (Form 1) or the subject of an order under a Form 13 (Order to admit a person coming into Ontario) and is required to admit the patient on an involuntary basis if the patient is suffering from a mental disorder that will likely result in serious bodily harm to the patient, to another person, or serious physical impairment of the patient unless the patient remains in the custody of a psychiatric facility.[14] Similar to a Form 1, there is Box A criteria, as well as Box B criteria for a Form 3 aimed at the "revolving door" patient with recurrent mental disorder that has been successfully treated in the past, but who currently has disengaged from treatment or relapsed, and as such, hospitalization could prevent or ameliorate adverse events.[14] As well, each set of criteria also requires that a physician personally examine the patient and must form the opinion that the patient cannot be managed in the facility as an informal or voluntary patient.[14] Refer to Table 1.2 for the complete set of criteria.

A Form 3 is limited to two weeks in duration; however, if the patient still meets the criteria for involuntary admission at the end of the two-week period, the certificate can be renewed or continued.[14] The first certificate of renewal, a Form 4, is limited to one additional month, the second renewal is limited to two additional months, and the third renewal is limited to three additional months. If the patient still meets the criteria for involuntary admission at the expiry of the third renewal, the patient may be subject to a Form 4A, a certificate of continuation, which is valid for an additional three months. The criteria for renewal or continuation do not have to be the same criteria as when the patient was first admitted, and instead rely on the condition of the patient at the time of renewal or continuation. If the patient's condition improves prior to the expiry of a certificate, the patient may be continued as an informal or voluntary patient.[14]

Table 1.1 Overview of Form 1 and Form 2 under the *Mental Health Act* in Ontario

Form	Description	Box A Criteria	Box B Criteria
Form 1	Application by physician for psychiatric assessment	The person has: (a) Threatened or attempted or is threatening and attempting to cause bodily harm to himself or herself; (b) Behaved or is behaving violently towards another person or has caused or is causing another person to fear bodily harm from him or her; or (c) Shown or is showing a lack of competence to care for himself or herself The person is apparently suffering from mental disorder of a nature or quality that likely will result in: (a) Serious bodily harm to the person; (b) Serious bodily harm to another person; or (c) Serious physical impairment of the person	The person: (a) Has previously received treatment for mental disorder of an ongoing or recurring nature that, when not treated, is of a nature or quality that will likely result in: • Serious bodily harm to the person; or • Serious bodily harm to another person; or • Substantial mental or physical deterioration of the person or serious physical impairment of the person; and (b) Has shown clinical improvement as a result of the treatment; And, the physician is of the opinion that the person: (a) Is apparently suffering from the same mental disorder as the one for which he or she previously received treatment or from a mental disorder that is similar to the previous one; (b) Given the person's history of mental disorder and current mental or physical condition, is likely to: • Cause serious bodily harm to himself or herself; or • Cause serious bodily harm to another person; or • Suffer substantial mental or physical deterioration; or • Suffer serious physical impairment; and (c) Is incapable, within the meaning of the *HCCA*, 1996, of consenting to his or her treatment in a psychiatric facility and the consent of his or her substitute decision-maker has been obtained
Form 2	Order for examination issued by a justice of the peace	Same as Form 1	Same as Form 1

Abbreviations: HCCA, Health Care Consent Act

Table 1.2 Overview of Form 3 and Form 4/4A under the *Mental Health Act* in Ontario

Form	Description	Box A Criteria	Box B Criteria
Form 3	Certificate of involuntary admission	(a) The patient is suffering from mental disorder of a nature or quality that likely will result in, • Serious bodily harm to the patient, • Serious bodily harm to another person, or • Serious physical impairment of the patient, unless the patient remains in the custody of a psychiatric facility; and (a) The patient is not suitable for admission or continuation as an informal or voluntary patient	(a) The patient has previously received treatment for mental disorder of an ongoing or recurring nature that, when not treated, is of a nature or quality that likely will result in: • Serious bodily harm to the patient; or • Serious bodily harm to another person; or • Substantial mental or physical deterioration of the patient; or • Serious physical impairment of the patient. (b) The patient has shown clinical improvement as a result of the treatment. (c) The patient is apparently suffering from the same mental disorder as the one for which he or she previously received treatment, or, from a mental disorder that is similar to the previous one. (d) Given the patient's history of mental disorder and current mental or physical condition, the patient is likely to: • Cause serious bodily harm to himself or herself; or • Cause serious bodily harm to another person; or • Suffer substantial mental or physical deterioration; or • Suffer serious physical impairment. (e) The patient has been found incapable, within the meaning of the *HCCA*, 1996, of consenting to his or her treatment in a psychiatric facility and the consent of his or her substitute decision-maker has been obtained; and (f) The patient is not suitable for admission or continuation as an informal or voluntary patient.
Form 4	Certificate of renewal	Same as Form 3	Same as Form 3
Form 4A	Certificate of continuation	Same as Form 3	Same as Form 3

Abbreviations: HCCA, Health Care Consent Act

1.4.6 Psychiatric Admission Following Admission for Medical Reasons

In some cases, a patient may be admitted to an acute care hospital for medical reasons, after which psychiatric issues become apparent. In such a case, a psychiatrist may be brought in for consultation. However, the patient is not considered for admission as a psychiatric patient until the medical problems have been resolved, or where the psychiatric condition becomes a substantial reason for admission. At this point, the physician will consider status for admission (i.e., voluntary, informal, or involuntary).[58]

1.4.7 Involuntary Hospitalization in Early Psychosis

Early psychosis is a period during which there is elevated risk for events that may lead to involuntary hospitalization, including harm to others and self-harm. Evidence suggests that there is elevated risk for committing a homicide or serious violent offense during the early psychosis phase prior to treatment initiation.[62] Furthermore, self-harm is common[36] and there is higher risk for suicide during this period.[63] In people with schizophrenia, suicide risk is three times higher in early psychosis compared to chronic schizophrenia groups.[63] Specifically, the periods shortly before and after hospitalization,[64] as well as the month before and two months after first contact with psychiatric services,[65] have been associated with the highest risk of suicide. However, the risk of suicide decreases after two years in treatment.[66]

1.4.8 The Impact of Involuntary Hospitalization

Involuntary hospitalization is a complex issue, and while it has been described in this chapter as a “negative” interaction with the health care system, the reality is that there are both positive and negative aspects associated with this practice. Furthermore, whether the experience is positive or negative may also be dependent on perspective.

From the patient perspective, a recent qualitative study highlighted the complex interplay of issues surrounding psychosis and the need for hospitalization. Participants reported traumatization by symptoms of psychosis such as distressing auditory hallucinations, bizarre behavior, and persecutory delusions, and yet simultaneously felt traumatized by

coercive interventions, such as involuntary hospitalization, as well as the use of restraints and forced medication, which are intended to address these symptoms.[67] Participants reported that these interventions were humiliating or violations of self.[67] However, findings from other qualitative studies have reported positive reflections on involuntary hospitalization, with some patients eventually recognizing the need for hospitalization, despite not agreeing to it initially.[11] These findings are supported by larger epidemiological studies, finding that between 33% and 81% of patients retrospectively view the involuntary admission as justified and/or the treatment as beneficial.[68,69] Being female, living alone, and having a diagnosis of schizophrenia have been associated with more negative views.[69]

From the perspective of the caregiver, reactions to involuntary hospitalization of a family member may be conflicting and may be tied to experiences of help-seeking. Caregivers of people with early psychosis often report high levels of distress.[70] Initial help-seeking experiences by caregivers on behalf of a loved one with early psychosis may include feelings of "not knowing," which are accompanied by a sense of desperation in trying to meet the needs of their loved one.[12] Subsequently reaching a crisis point may involve feelings of fear and apprehension.[12] As a result, feelings of relief upon involuntary hospitalization of a family member are common, although these feelings may be conflicted, as family members have described the experience as "traumatic yet necessary."[12,13]

Epidemiological studies have provided evidence for both negative and positive patient outcomes associated with involuntary hospitalization. In early psychosis, involuntary hospitalization has been associated with poor treatment engagement,[10] non-adherence,[71] dissatisfaction with health services,[72] and an increased risk of violent behaviour on subsequent admission.[73] Involuntary hospitalization may also exacerbate the distressing nature of psychotic experiences, and in some instances has been associated with symptoms of post-traumatic stress disorder (PTSD).[74,75] However, involuntary hospitalization has also been associated with positive outcomes, such as improvements in psychosocial functioning and treatment motivation at discharge.[76]

Balancing the liberty of people suffering from psychosis with the need for protection of those who may be at risk of harm or impairment, whether it be the self or others, represents a challenging ethical dilemma. Overall, the authority to detain people against their will is an extraordinary power, and importantly, conflicts with the principles of autonomy, shared decision-making, and recovery-focused care.[77,78] While involuntary hospitalization may be a necessary measure in some cases, it is a practice that should be minimized where possible.[15]

1.5 Study Rationale and Objectives

Given the importance of timely and adequate access to care early in the course of psychotic illness for long-term outcomes, knowledge of pathways to care and potentially negative interactions with the health care system in early psychosis is important.[8] Although there are positive aspects associated with involuntary hospitalization, this is one such interaction that is concerning in relation to the potential adverse effects on people with psychosis, such as impacting treatment engagement. However, in the context of the healthcare system in Ontario, we have limited knowledge of how frequently involuntary hospitalization occurs among young people with early psychosis, although evidence to date suggests it occurs in a high proportion of patients.[16,17] Furthermore, we have virtually no knowledge of which factors are associated with the use of involuntary hospitalization in this population, independent of the criteria for involuntary admission (i.e., risk of harm to others, self-harm, and problems with self-care). Therefore, the overall objective of this thesis is to gain insight around the use of involuntary hospitalization for first hospitalization events in a cohort of young people with early psychosis in Ontario using health administrative data. We focus specifically on young people with early psychosis, defined as 16 to 35 years of age, to focus on the population at high risk for development of a psychotic disorder[32] and the target population for secondary prevention with EI services.[47] We also focus on examining involuntary hospitalization at the first hospitalization event within two-years of diagnosis because of the elevated risk of violence[62] and suicide during this time[63] (and specifically at admission[64]), as well as the hypothesis that early contacts with services initiate the trajectory of subsequent service engagement.[9] Specifically, the objectives are to:

1. Estimate the proportion of young people with early psychosis who experience involuntary hospitalization at first admission
2. Identify the sociodemographic, clinical, and service-related factors that are associated with the use of involuntary hospitalization at first admission in young people with early psychosis, independent of the criteria for involuntary admission

Given the importance of the critical early period in psychotic illness in impacting symptomatic and functional outcomes and establishing long-term trajectories, understanding potentially negative experiences such as involuntary hospitalization during this stage of illness is of interest. Identifying risk factors for involuntary hospitalization in Ontario may be important for understanding the circumstances around the use of involuntary hospitalization, and identifying groups that are at high risk of having an involuntary admission. This may allow for the development of strategies to intervene at an earlier stage of illness to improve pathways to care and treatment experiences for young people with early psychosis in Ontario.

Chapter 2

2 Literature Review

In this chapter, the literature surrounding involuntary hospitalization in people with early psychosis is reviewed. Section 2.2 reviews the frequency of involuntary hospitalization in this population in different settings and Section 2.3 reviews the literature on factors associated with involuntary hospitalization in early psychosis, with the goal of identifying potential risk factors for exploration in this study. Knowledge gaps in the literature are discussed in Section 2.4, with a conceptual framework based on findings from the literature review presented in Section 2.5 to guide the analyses in Chapter 4.

2.1 Search Strategy

Medline, EMBASE, CINAHL, and PsycINFO were searched electronically for studies pertaining to involuntary hospitalization in early psychosis. MeSH headings in each database related to psychotic disorders and hospital admission were searched. Keyword searches included terms related to psychotic disorders, early psychosis, hospitalization, and involuntary. No date or language restrictions were imposed. Studies were included if the population was early psychosis (i.e., first presentation for a psychotic illness, or within two to five years of first presentation) and if involuntary hospitalization was investigated. Exclusion criteria included case studies, and forensic populations/admissions.

2.2 Frequency of Involuntary Hospitalization in Early Psychosis

We identified 30 studies that reported proportions of patients that were hospitalized involuntarily. Most studies were from the United Kingdom (UK; N = 8), followed by Canada (N = 2), France (N = 2), Ireland (N = 2), Norway (N = 2), and Spain (N = 2). Single studies were also found from Australia, New Zealand, Denmark, Finland, the Netherlands, Germany, Italy, Greece, Israel, Hong Kong, Japan, and Taiwan. Frequencies and proportions of involuntary hospitalizations were reported in different contexts, including first admissions, on pathways to care, or first contact with services. Frequencies

of involuntary hospitalizations varied widely, ranging from 10% to 84% of admissions occurring on an involuntary basis. Within mixed inpatient and outpatient samples, the proportion of involuntary hospitalizations ranged from 10% to 50%. For a summary of findings from these studies, refer to Appendix A.

Four studies examined involuntary admissions in large samples using data collected from national registries of hospital admissions in Taiwan, Finland, Israel, and Denmark.[79–82] Taiwan reported the lowest proportion of involuntary patients, in which 69,690 first admissions to all psychiatric hospitals in Taiwan over a 12-year period were collected.[79] Involuntary admissions were available from the last three-year period of the study, of which 2,540 patients had involuntary status (10%).[79] Low proportions were also observed in Denmark, with Ohlenschlaeger et al. finding 10% of 2,222 early psychosis patients experiencing an involuntary admission.[82] However, this sample included inpatients and outpatients in the denominator, and the proportion that were hospitalized within the cohort was not reported, which may have impacted the low proportion.[82] Similarly, the study from Israel noted a low proportion, with 15% of 10,591 first hospitalizations over a 14-year period occurring on an involuntary basis.[81] In this group of studies, Finland reported the highest proportion of involuntary patients, with 66% of 3,875 first hospitalizations occurring on an involuntary basis.[80]

Involuntary hospitalization in early psychosis is a topic that has been most extensively explored in the UK compared to other settings, and the largest non-registry studies were from the UK. The Aetiology and Ethnicity in Schizophrenia and Other Psychoses (AESOP) study characterized pathways to care in early psychosis patients presenting to secondary and tertiary services within the defined catchment areas in south-east London and Nottingham over a two-year period.[83] Of 462 patients included, 175 (38%) experienced involuntary admission as a first mode of contact with services.[83] Another large UK study of 674 adult patients referred to and accepted by four EI service teams within London from 2004 to 2009 found that at 12-month follow-up, 426 patients had been admitted to hospital for psychosis (63%), and 288 had been admitted involuntarily, representing 43% of patients in the total sample, and 68% of the patients hospitalized.[84]

In Canada, two small studies reported the frequency of involuntary hospitalizations within their sample. Archie et al.'s study of ethnicity and pathways to care included 200 early psychosis patients recruited from four EI services in Ontario (Toronto, Hamilton, London, and Ottawa) between 2001 and 2003.[17] Of those hospitalized within the 6-month period prior to enrollment in EI services (N = 118), 69% of patients had an involuntary hospitalization. However, this may be an underestimate of involuntary status, as participants who were in hospital and involuntary at the time of enrollment were not invited to participate unless their status was changed to voluntary.[17] Payne et al. reviewed clinical records for all first admissions for non-affective psychosis to hospitals in the catchment area of London, Ontario over a three-year period (1993-1995). Of the 146 patients included in the study, 60% were involuntary at first admission.[16]

Overall, we noted large variations in the frequency and proportion of involuntary admissions within the included studies. This is likely a result of the large variations in setting and study design, as rates of involuntary admissions may be dependent on legislation, as well as clinical experience, resources, traditions, and attitudes.[85] Furthermore, we noted a paucity of data on involuntary hospitalizations in a Canadian setting. Although there are no estimates of involuntary hospitalizations across Ontario, the limited evidence collected to date suggests involuntary hospitalization may occur frequently.[16,17]

2.3 Risk Factors for Involuntary Hospitalization in Early Psychosis

We identified 35 studies in the database searches that investigated factors associated with involuntary hospitalization in early psychosis. Most studies were from the UK (N = 14), and other European countries including Ireland (N = 4), Spain (N = 3), France (N = 2), Norway (N = 2), Denmark (N = 1), Italy (N = 1), and Germany (N = 1). We also found one study each from Australia, New Zealand, Hong Kong, and Taiwan. Two studies were from Ontario, Canada. Many studies that we identified broadly explore risk factors for involuntary hospitalization and discuss factors across three conceptual categories: sociodemographic factors, clinical factors, and service use factors. The following sections will discuss specific factors explored in the literature under these three categories.

2.3.1 Sociodemographic Factors

Sociodemographic factors include a combination of demographic factors such as age, gender, and ethnicity, as well as factors related to socioeconomic status such as income, employment, education, and social support networks.

Age

Eight studies investigated age of the patient for an association with involuntary hospitalization[79,83,86–91] A study from Taiwan of first admissions for psychotic disorders over a nine-year period found that involuntary patients tended to be older, with a higher proportion of patients aged 35-54 years in the involuntary group compared to voluntary.[79] Three studies reported statistically insignificant univariate association between age and involuntary hospitalization..[83,87,91] As well, two other studies reported statistically insignificant associations, after adjusting for other sociodemographic, clinical, and pathway to care factors.[86,89] Overall, findings across studies did not strongly support a role for age in involuntary hospitalization.

Gender

Nine studies assessed the gender of the patient in relation to involuntary hospitalizations, with three studies reporting a statistically significant association.[79,83,84,86–91] A registry study from Taiwan found a significantly higher proportion of involuntary patients were male.[79] A study of 86 early psychosis patients admitted to a hospital in France found males had a higher adjusted likelihood of involuntary admission.[87] A study from Ireland also found male gender was significantly associated with involuntary hospitalization in a univariate model in a sample of 78 first admission patients with schizophrenia, but the effect was no longer significant when adjusted for other factors.[89] Conversely, a study from Norway of 217 patients reported a significantly higher proportion of females in the involuntary group.[90] Overall, the evidence of whether gender is related to involuntary hospitalization remains unclear, and this factor may vary across settings.

Socioeconomic Status

Socioeconomic status may be assessed through different measures, including income, employment, education, or a combination. Included studies evaluated several factors related to socioeconomic status. No studies measured income specifically, however, Chiang et al. assessed "economic status," characterized by four categories: fully employed, dependent, lowest income, and missing, and found a significantly higher proportion of involuntary patients in the lowest income group.[79] In terms of employment status, four European studies assessed whether unemployment was associated with involuntary hospitalization,[83,86–88] and Morgan et al. reported that unemployment was associated with an increased likelihood of involuntary admission while adjusting for other factors (ethnicity, diagnosis, perceived risk to others, criminal justice referral, help-seeker, site).[83] Considering the young age of people with early psychosis, the occupations of parents may also be an indicator of socioeconomic status. As such, Cougnard et al. measured father's and mother's occupation, categorized as unskilled worker versus employee, and found no adjusted association with involuntary admission.[87] Education level was investigated for an association with involuntary hospitalization in four studies, and none reported a statistically significant association.[83,87,88,90]

Ethnicity/nationality

One of the most commonly investigated factors in the literature was ethnicity, with 12 studies examining the association of various ethnicities with involuntary hospitalization — the majority of which were conducted in the UK. Most studies from the UK have indicated that Black groups, including Black-Caribbean or Black-African, have a higher likelihood of involuntary admission compared to White groups. Specifically, Mann et al. found that among 674 patients recruited from four EI services in London, Black-Africans had the highest adjusted odds of involuntary hospitalization compared to White British at 12-month follow-up.[84] Similarly, the AESOP study of 462 patients who presented to services within the catchment areas of Nottingham and south-east London, reported that both African-Caribbean and Black-African patients were more likely to be admitted involuntarily at first contact versus White-British, after adjusting for employment, diagnosis, perceived risk to others, criminal justice referral, help-seeker, and site.[83] Smaller and less comprehensive studies have largely supported these findings. McKenzie

et al. found that of 77 patients followed-up after four years, African-Caribbean patients had significantly higher adjusted odds of involuntary admission compared to the White group.[92] Two case-control studies of African-Caribbean patients compared to non-Caribbeans found that a significantly higher proportion of African-Caribbeans experienced involuntary admission.[93,94] Cole et al. and McGovern et al. both noted a higher proportion of Black-African and African-Caribbean patients compared to White, were admitted involuntarily, respectively, albeit the difference was not statistically significant.[86,95] Only two studies from the UK did not report significant associations between ethnicity and involuntary admission.[96,97]

In Canada, only one study of 200 patients recruited from four EI sites in Ontario has investigated the role of ethnicity in involuntary hospitalizations in early psychosis.[17] Findings did not indicate that Black ethnic groups have a higher likelihood of compulsory admission, as has been shown in the UK. However, the results do suggest some differences in involuntary hospitalizations among ethnic groups, with the Asian ethnic group having a significantly lower proportion of involuntary admissions compared to White, Black, and other ethnicities.[17]

Studies from other international settings are limited, however, none reported significant relationships between ethnicity and involuntary hospitalization. A study from New Zealand examining differences in involuntary admissions between Maori and non-Maori groups found no significant differences.[98] Similarly, a study from Germany comparing involuntary hospitalizations in people with German nationality to other found no significant differences between groups, although a definition of nationality was not provided so it is unclear whether the authors are referring to ethnic origins in Germany, or migrant status.[88]

Migrant Status

This factor was not widely explored in the literature, and may be closely related to ethnicity. One study from the UK of factors associated with undesirable pathways to care in 93 early psychosis patients examined migrant status directly, as well as in terms of other factors closely related to migrant status.[86] Cole et al. observed no difference in the

likelihood of involuntary admission in those born abroad compared to those born in the UK in a multivariable model adjusting for other sociodemographic and pathway to care-related factors. Migrant status may be related to availability of social support, as well as a person's ability to communicate fluently in English. As such, Cole et al. examined the role of family of origin outside London or abroad, and English not first language, and similar to the above findings, these factors were not significantly related to involuntary hospitalization.[86]

Region

Healthcare utilization and resources can vary by geographic region, and as a result, the specific region where a person lives or where they are treated may impact the likelihood of involuntary hospitalization.[99] However, only one study, a registry study from Taiwan, examined the impact of region of residence on involuntary hospitalization.[79] Chiang et al. noted a significantly higher proportion of involuntary patients in those residing in rural areas compared to urban.[79] As well, a significantly higher proportion of involuntary patients resided in the Eastern region of Taiwan compared to other regions (Northern, Central, and Southern Taiwan). The authors suggested this may be a result of social determinants of health, including disparate income, education, employment, transport, substance use, and aboriginal status, which may have adversely impacted the mental health status of residents in this area, resulting in the observed geographic inequity.[79]

Social Support

Social support, referring to the presence of family members, a spouse/partner, or friends that may act as help-seekers or caregivers during early psychosis, may influence the likelihood of involuntary admission by encouraging help-seeking, avoiding negative pathways to care, as well as helping to influence the patient to voluntarily accept the need for care.[86,100] Evidence from included studies suggests social support factors such as living alone, and the presence of a help-seeker may be associated with involuntary status. Four studies investigated whether living alone was associated with involuntary hospitalization,[86–89] and one study from Germany found this was significantly associated with involuntary status in a multivariable analysis.[88] Although Cole et al. also found that living alone was significantly associated with involuntary admission in unadjusted

analysis, the result was not significant when adjusted for other sociodemographic, clinical and service-related factors.[86] Two UK studies examined whether the presence of a help-seeker was associated with involuntary status, both of which reported significant findings. Cole et al. observed that the absence of a help-seeker was significantly associated with a higher likelihood of involuntary admission,[86] whereas Morgan et al. noted that those who initiated their own help-seeking on their pathway to care (versus other) had a lower likelihood of involuntary status.[83] Other social support factors explored but not found to be associated with involuntary status include marital status (i.e., single)[86,87] and not having children or a friend.[87]

The nature of a person's available social support, such as feelings of burden by a person's social network, may also influence involuntary admission. Boydell et al. conducted an investigation of caregiver burden and involuntary hospitalization in patients and caregivers from the AESOP study, and found that higher scores on the "problems with services" item on the Experience of Caregiving Inventory was significantly associated with involuntary admission.[101] The "problems with services" item assesses difficulties accessing information and dealing with professionals, difficulties with professionals not understanding caregivers or taking them seriously, and knowledge of psychiatric services. These findings suggest that caregivers who found initial help-seeking difficult might have been associated with the family member having an increased likelihood of involuntary admission.[101] However, this analysis was cross-sectional, therefore it is difficult to conclude whether caregiver burden influenced involuntary admission, or vice versa.

Summary of Sociodemographic Factors

Factors explored in the literature included age, gender, socioeconomic status, ethnicity, migrant status, region of residence, and social support. Age, gender, and ethnicity were the most widely examined factors. Most studies including age in their analysis did not find an association with involuntary hospitalization, and findings related to gender varied across studies. Evidence suggests ethnicity may be an important factor in involuntary hospitalization, but may depend on the study setting. Socioeconomic status was assessed in different ways, including income, employment, occupations of parents, and education level. Considering the variation in methodologies, it is difficult to conclude whether

socioeconomic status plays a role in involuntary hospitalization, and the importance of this factor may depend on the specific measure used along with other variables considered. Some evidence suggested unemployment may be associated with involuntary hospitalization, while there were no studies finding that education was related to involuntary hospitalization. Similar to socioeconomic status, different variables were used to evaluate social support across studies, making it difficult to assess the importance of this factor in involuntary hospitalization; however, evidence suggests there may be a relationship. Specific factors related to social support that were explored included the presence of a help-seeker, living alone, marital status, lack of children or friends, and caregiver burden. Factors shown to be associated with involuntary hospitalization included a help-seeker, living alone, and caregiver burden. Evidence for additional factors, such as migrant status, and region of residence, was limited, making it difficult to assess the importance of these factors in relation to involuntary hospitalization.

2.3.2 Clinical Factors

Diagnosis

Diagnosis was one of the most commonly investigated risk factors, and seven studies investigated whether the type of primary psychotic illness was associated with involuntary admission.[79,83,86–88,98,102] The potential mechanism of this factor is unclear, and Cougnard et al. hypothesized that diagnosis may be a proxy measure for other factors related to involuntary hospitalization, such as lack of/inadequate social support or insight level in cases where schizophrenia is associated with a higher likelihood of involuntary admission.[87] Diagnosis was inconsistently associated with involuntary admissions across studies, and furthermore, the specific diagnosis associated with involuntary status varied. Of the seven studies investigating this potential risk factor, only three reported significant associations.[83,87,102] An association between a diagnosis of schizophrenia and involuntary admission was reported in two studies. Cougnard et al. found that those with non-affective psychosis including schizophrenia, acute psychotic disorder, delusional disorder, schizoaffective disorder, and unspecified psychotic disorder, had higher odds of involuntary admission compared to those with psychotic mood disorders.[87] Similarly, Zeppegno et al. were interested in factors associated with a discharge diagnosis of

schizophrenia, and found that an involuntary first admission was associated with this diagnosis.[102] One study from Ireland limited their sample to schizophrenia specifically, due to the association with involuntary admissions noted in the previous studies in their setting.[89] Morgan et al., however, found that those with a diagnosis of mania had higher adjusted odds of involuntary status compared with schizophrenia when accounting for other sociodemographic, clinical, and service-related factors.[83] Overall, whether diagnosis is related to involuntary admissions is unclear and it may depend on the setting, comparison groups considered, other factors adjusted for, and whether diagnosis is a proxy for other factors.

Positive Symptoms

Another clinical factor commonly investigated across studies was severity of positive symptoms, with seven studies investigating this potential risk factor.[89–91,103,104] Five of the seven studies reported some evidence of an association between severity of positive symptoms and involuntary admissions, but associations were found only in unadjusted analyses. Opjordsmoen et al. (N = 217) and Kelly et al. (N = 78) found significantly higher positive symptoms in the involuntary group when compared with the voluntary group (unadjusted).[89,90] However, in Kelly et al.'s analysis, positive symptoms were no longer statistically significant after adjusting for other factors.. A Spanish study involving 61 patients reported that the positive subscale from Positive and Negative Syndrome Scale (PANSS) was significantly associated with involuntary admission.[103] In another unadjusted analysis, Renwick et al. (N = 146) noted that involuntary patients displayed a greater severity of delusions, bizarre behavior, and positive formal thought disorder compared to voluntary patients, as assessed on the Scale for the Assessment of Positive Symptoms.[104] In a Norwegian prospective cohort of 103 early psychosis patients, the PANSS positive component scores at baseline were significantly associated with involuntary hospitalizations during the two-year follow-up in an unadjusted analysis; however, the result was no longer significant when adjusting for other PANSS subscales, GAF symptoms, and substance abuse.[91] While findings indicate that there tends to be greater severity of positive symptoms in involuntary patients, these symptoms may not be independently associated with involuntary admission.

Negative Symptoms

Six studies investigated whether negative symptoms were associated with involuntary admission, with three reporting findings supporting an association.[87–91,104] In a sample of 217 early psychosis patients, Opjordsmoen et al. noted significantly higher negative symptoms as measured by the PANSS negative scale in the involuntary group compared to voluntary at admission,[90] whereas Renwick et al. observed significantly less affective flattening in the involuntary group.[104] However, studies adjusting for other factors often found that negative symptoms were not significantly associated with involuntary status. Opsal et al. found that scores on the PANSS negative scale were significantly higher in the involuntary group, but this result did not remain significant in the adjusted model.[91] Similarly, Kelly et al. noted that the negative symptom of stereotyped thinking was significantly higher in the involuntary group, but overall negative symptom scores on the PANSS were not associated with involuntary status in the adjusted model.[89] Similar to positive symptoms, findings from included studies suggest differences in the severity of negative symptoms between voluntary and involuntary groups, but may not be independently associated with involuntary admission. As well, the direction of effect was inconsistent across studies.

Mania Symptoms

Severity of mania symptoms, including grandiosity, hyperarousal, irritability, increased sociability/hypersexuality, pressure speech/racing thoughts, labile affect, and sleep problems due to hypomania, have not been widely investigated in the context of involuntary hospitalization in early psychosis. We found that only one included study specifically explored this factor. In a study from Spain of 98 first-admitted early psychosis patients, Barbeito et al. observed that involuntary patients had significantly higher scores on the Young Mania Rating Scale (YMRS) at admission compared to voluntary patients.[105] Morgan et al.'s finding that a diagnosis of manic psychosis was associated with a higher likelihood of involuntary hospitalization compared to schizophrenia supports this finding.[83] Of note, some mania symptoms overlap with some items on the PANSS (e.g., excitement, grandiosity), and the YMRS contains items for other factors potentially associated with involuntary hospitalization, such as aggressive behavior, and insight. Therefore, it is unclear whether mania symptoms or other factors

such as positive symptoms, aggression, or insight, are independently associated with involuntary hospitalization. Further evidence is needed to elucidate the role of mania symptoms in involuntary hospitalization in early psychosis.

Depression or Anxiety Symptoms

Symptoms of depression can occur frequently in patients with non-affective early psychosis, and estimates have ranged from 17% to 83% of these patients experiencing depressive symptoms.[106–109] As well, depressive symptoms can occur during the different phases of psychosis, including the prodromal, acute, and post-psychotic phase.[110] Depressive symptoms have been shown to be positively associated with level of insight,[111,112] therefore it has been hypothesized that awareness of psychotic illness may mediate an association between depressive symptoms and involuntary hospitalization.[87] In terms of depressive symptoms, three studies investigated this factor and all noted significantly lower depressive symptoms in the involuntary group.[87,90,104] These findings are further supported by the observation that a diagnosis of depressive psychosis was associated with a lower likelihood of involuntary admission compared with schizophrenia.[83]

None of the included studies investigated symptoms of anxiety specifically, however, one study investigated depression/anxiety symptoms together. Cougnard et al. measured which symptoms (e.g., positive, negative, disorganization, excitement, depression/anxiety symptoms) were the first symptoms of psychosis, and they observed that those manifesting depression/anxiety as the first symptoms were less likely to be involuntarily admitted in an adjusted analysis.[87] Of note, this study included affective and non-affective psychosis, and as a result, may have been more adequately designed to observe the effects of depression/anxiety. Additionally, another study examined the Brief Psychiatric Rating Scale (BPRS) affect domain, which consists of anxiety, guilt, depression, and somatic symptoms, and did not find this symptom group to be associated with involuntary status.[88]

Cognitive Functioning

One study examined cognitive impairment as a potential risk factor for involuntary admission. Huber et al. assessed neuropsychological functioning domains, including processing speed, concentration and attention, executive function, working memory, verbal memory, verbal comprehension, logical reasoning, global cognition, and general intelligence (IQ) in a sample of 152 early psychosis patients. After using a backward elimination selection procedure, the only domain significantly associated with involuntary admission was dysfunction in concentration and attention, while adjusting for living status (i.e., alone), and the BPRS-Excited Component (BPRS-EC).[88] The role for cognitive functioning in involuntary status remains unclear, however, as this factor may be closely related to other important factors such as insight, aggression, and suicidality (described below).[88,113]

Insight

Insight into psychosis has been defined as the patient's awareness that he or she is suffering from a mental illness, and the recognition of its symptoms and its implications.[114,115] Insight has been implicated as a cause of non-adherence to treatment with the rationale that patients are not likely to comply with treatment if they do not believe the illness to be present or to be mental in cause.[115] A similar rationale may link insight to involuntary hospitalization, with a lack of insight causing a lack of understanding of the need for hospitalization, and as such, leading to involuntary hospitalization in some cases. Despite the potential importance of this factor in involuntary hospitalization, only one study assessed lack of insight.[89] Kelly et al. investigated sociodemographic (gender, marital status, age, living alone) and clinical (drug abuse in the past month, DUP, positive symptoms, negative symptoms, and lack of insight as assessed by the PANSS) predictors of admission status in 78 patients admitted to a psychiatric hospital in Ireland with first-episode schizophrenia. When entered into a logistic regression model adjusting for all sociodemographic and clinical factors, lack of insight remained the only significant factor.[89] Although assessed in only one study, these findings suggest insight may be an important factor related to hospitalization status.

Level of Global Functioning

Level of global functioning is measured using the Global Assessment of Functioning (GAF) scale, the purpose of which is to provide an overall summary measure of psychiatric disturbance from a multidimensional approach, including psychological, social, and occupational functioning, with higher scores indicating greater impairment of functioning.[116] Three studies evaluated the effect of GAF score on involuntary hospitalization, two of which observed that GAF scores were significantly higher in involuntary patients at admission,[90,105] including both symptom scores and function scores.[90] However, in the only adjusted analysis in this group of studies, Opsal et al. observed that GAF scores were not significant when adjusting for substance abuse and PANSS subscales for positive, negative, and excitement component.[91]

Behavioural Symptoms

Behavioural symptoms include behaviours that are associated with psychotic illness, including agitation, hostility, aggression, violence, and perceived risk to others. Considering one of the criteria for involuntary admission typically includes risk of harm to others, the presence of these manifestations of psychotic illness may be important in precipitating an involuntary hospitalization.

Aggression was assessed in four studies for an association with involuntary hospitalization.[87,88,105,117] Two studies provided definitions for aggression, both of which were similar. Foley et al. defined aggression as demonstration of "a hostile or destructive mental attitude, which included verbal aggression, physical aggression or both."[117] Huber et al. defined aggression as "intimidating behavior, aggression to property, demeaning or hostile verbal behavior, and aggression to persons" with severe aggression referring to aggression posing an immediate danger to the patient or others.[88] Three of four studies observed a significant relationship between aggression and involuntary status. Two studies observed significantly higher levels of aggression in involuntary patients at admission,[105,117] and another study found all patients presenting with severe aggression had involuntary status.[88] The study that did not report a significant association was more restrictive in their assessment of aggression and specifically investigated whether

aggression/excitement was the first psychotic symptom observed, and in this case, there was no significant association with involuntary status in an unadjusted analysis.[87]

Two studies examined the impact of psychopathology as assessed by the BPRS-EC or PANSS scales on involuntary admission. Higher levels of excitement, hostility and uncooperativeness, as measured by the BPRS-EC, were significantly associated with involuntary admission when adjusting for living alone and cognitive function (concentration and attention).[88] Similarly, Opsal et al. found that the PANSS Excitement Component, which also assesses excitement, hostility, and uncooperativeness, as well as poor impulse control, was significantly associated with a higher likelihood of involuntary hospitalization when adjusting for positive and negative subscales, GAF symptoms, and substance abuse.[91]

Violence was defined by Foley et al. as "the exercise of physical force" to distinguish this factor from aggression, although they are closely related concepts, and those displaying violence will, by definition, display aggression.[117] Violence was examined in two studies, both finding evidence of an association. In 157 early psychosis patients, Foley et al. observed that violence in the week prior to presentation was significantly associated with involuntary status.[117] Morgan et al. found that violence as a reason for admission was not significantly associated with involuntary admission when adjusting for other sociodemographic, clinical, and service use factors, however, perceived risk to others as a reason for admission was independently associated with involuntary admission.[83]

Overall, evidence from included studies highlights higher levels of agitation, aggression, and violence in involuntary patients, and supports a potential role for these factors in impacting the likelihood of involuntary admission.

Self-Harm/Suicidality

Risk of self-harm constitutes a reason for detaining a person against their will in hospital. Huber et al. found a significantly higher proportion of involuntary patients demonstrating suicidality, defined as suicidal ideation, intent, or having attempted suicide, at admission (58% versus 8%, respectively), however, this factor was not retained in the final multivariable model.[88] Morgan et al. observed that self-harm was significantly associated

with a lower likelihood of involuntary admission, however, this factor was excluded from a multivariable model as it was not significant when adjusting for other factors.[83] Morgan et al. also observed that perceived risk to self was not significantly associated with involuntary hospitalization in an unadjusted analysis.[83] Finally, Cougnard et al. observed no difference in a history of parasuicide between voluntary and involuntary groups in a univariate analysis.[87] Overall, findings from included studies have suggested that suicidality may be higher in involuntary groups, however, these studies did not provide substantial evidence that this factor is independently associated with involuntary status.

Substance or Alcohol Use

It has been estimated that more than one in four people with early psychosis have problems with current or lifetime alcohol use, abuse, or current or lifetime cannabis use or abuse.[118] Substance and alcohol use in those with early psychosis can have a negative impact on symptomatic and functional outcomes.[119,120] Early psychosis patients with comorbid substance use disorders have also been shown to have a higher risk for suicidal behavior,[121–123] poor treatment adherence and response,[124,125] and hospital admission.[126] Three studies evaluated differences in the proportion of patients with substance use disorders in voluntary versus involuntary groups at the time of admission, and no significant differences were noted in these studies.[87,88,90] Similar results were observed for alcohol use problems.[88,90] Conversely, findings from a Norwegian prospective cohort study of 103 early psychosis patients suggested substance use may impact the likelihood of involuntary hospitalization over the course of illness.[91] Opsal et al. investigated differences in outcomes in those with substance abuse problems at first presentation compared to those without, and observed that patients abusing either substances or alcohol at baseline had a significantly higher adjusted likelihood of experiencing at least one involuntary hospitalization during the two-year follow-up.[91] Similarly, a retrospective cohort study of 2,026 patients in the UK evaluating the effects of cannabis use found that those with a documented history of cannabis use a presentation to services had a significantly higher adjusted likelihood of involuntary hospitalization at 1-year, 2-year, 3-year, 4-year, and 5-year follow-up.[127]

Medication Adherence

For patients initially diagnosed and managed in the context of outpatient care, adherence to psychotropic medication may play an important role in the management of psychotic symptoms, and therefore may impact a subsequent first hospitalization event. Although estimates in the literature vary, poor adherence can be a problem in a substantial proportion of early psychosis patients, with studies reporting poor adherence in as low as 2% and as high as 59% of patients.[128,129] Adherence may also be connected with other factors potentially related to involuntary hospitalization, including insight, cognitive function, substance use,[130] and less social support in terms of having a family member involved in treatment.[129] Two studies assessed the role of medication adherence in involuntary hospitalization. In 98 early psychosis patients admitted to hospital, Barbeito et al. noted a significantly higher proportion of patients with poor adherence had involuntary status compared with the good adherence group.[131] Findings from Verdoux et al. provide more evidence of the importance of adherence in involuntary admission. Medication adherence was assessed over a two-year follow-up period in 65 early psychosis patients following their first admission. Adherence was classified as poor if medication was completely discontinued "…against medical advice for at least 2 weeks over a 6-month interval." Odds of involuntary readmission in patients with poor medication adherence at baseline were six times that of patients with good medication adherence.[132] No studies, however, assessed medication adherence as a risk factor for involuntary hospitalization at first admission.

Duration of Untreated Psychosis

Similar to adherence, longer DUP may be related to involuntary hospitalization through lack of insight.[133] Longer DUP may also be related to involuntary hospitalization through other mechanisms, such as worse premorbid functioning[134] and social isolation.[133] Five studies examined whether a longer DUP was associated with involuntary admission, and findings suggest a lack of evidence to support this association. Kelly et al. observed that involuntary patients had a longer mean DUP, however, this effect was not significant when adjusting for other sociodemographic and clinical factors.[89] Similarly, Huber et al. observed a higher proportion of patients with a DUP > 12 months in the involuntary group, but this finding was not significant.[88] Morgan et al. found no difference between

involuntary and voluntary groups in terms of long versus short DUP.[83] Opsal et al. observed that DUP was not significantly associated with involuntary status in an unadjusted logistic regression model.[91] Opjordsmoen et al. found no significant difference in mean DUP between voluntary and involuntary groups.[90] Similarly, Cougnard et al. found no significant differences between voluntary and involuntary groups in terms of long delays between the onset of psychotic symptoms and either the first helping contact, first psychotropic treatment, or first hospitalization.[87]

Prior Trauma

Many studies have explored the relationship between psychosis and experiencing trauma, stressful life events, and adversity. Definitions of these concepts, including specific events considered to be traumatic or stressful, may vary across studies, but are related in that these events can affect a person's psychological and emotional wellbeing. Events considered adverse or traumatic in childhood include maltreatment (e.g., sexual abuse, physical abuse, emotional/psychological abuse, neglect, or exploitation), peer victimization, parental loss and separation, war-related trauma, natural disasters, witnessing domestic or non-domestic violence.[135] Exposure to childhood adversity has been associated with an increased risk of developing a psychotic disorder[136] as well as the persistence of psychotic symptoms.[137] Stressful life events in adulthood may include events related to education, work, reproduction, housing, money/possessions, crime/legal issues, health/treatment/accidents, relationships, and death/bereavement.[138] Evidence also indicates that exposure to adult life events may be associated with an increased risk of psychosis, although this area is less well studied than childhood adversity.[138]

Associations between traumatic experiences and psychosis have been observed in forensic populations,[139,140] yet a relationship between prior trauma and involuntary hospitalization in early psychosis has not been widely investigated. We identified only one study on this topic in our literature search.[141] Garabette et al. examined whether childhood adversity was linked with an increased risk of involuntary hospitalization in early psychosis.[141] Early psychosis patients (N = 139) were interviewed for a self-reported history of childhood adversity including parental separation, neglect, psychological abuse, physical abuse, or sexual abuse. No significant differences were observed in rates of involuntary hospitalization among the different childhood adversity

exposures, or in cumulative exposures. However, stratification by gender revealed that males who had been separated from their father prior to 17 years of age (by death or otherwise and for > 6 months), had significantly higher rates of involuntary hospitalization compared to those without paternal separation.[141]

Summary of Clinical Factors

The clinical factors examined across studies included the type of psychotic disorder, severity of symptoms (positive, negative, mania, depression/anxiety), cognitive functioning, insight, global functioning, behavioural symptoms, self-harm or suicidality, substance/alcohol use, adherence, DUP, and childhood adversity. We found evidence supporting a role for behavioural factors such as aggression, violence, and risk of harm to others, as well as substance/alcohol use in increasing the likelihood of involuntary admission. Findings suggest differences in severity of positive, negative, manic, depressive, and anxiety symptoms, as well as global functioning, between voluntary and involuntary groups. However, whether severity of symptoms and functional impairment are independent risk factors for involuntary hospitalization is unclear. Findings regarding diagnosis, self-harm/suicidality varied across studies. Regarding DUP, findings were consistently negative suggesting this factor may not be independently related to involuntary hospitalization. Limited studies investigated factors such as insight, adherence, trauma, and cognitive functioning. However, the available evidence suggests that insight and adherence may be important factors related to involuntary hospitalization.

2.3.3 Service Use Factors

The route by which a patient is referred to services will likely influence the nature of the contact.[83] Therefore, a number of studies have investigated factors pertaining to service use and pathways to care prior to admission for a relationship to involuntary hospitalization. The specific factors identified in the literature review are discussed below.

Family Physician Involvement

Morgan et al. suggested that involvement of a FP prior to hospitalization suggests a willingness of the patient to be involved in psychiatric intervention, and therefore may be a protective factor for involuntary hospitalization.[83] Four studies investigated the role of FP involvement in involuntary hospitalization, three of which reported evidence of an association — all of which were from the UK. Burnett et al. characterized a first contact sample of 100 patients presenting to psychiatric services with a diagnosis of schizophrenia in London, and reported that patients who were admitted following FP referral, or who visited their FP of their own volition (rather than via family), were less likely to be admitted involuntarily than those without such FP involvement.[96] Cole et al. observed that for a group of 93 patients with first onset psychosis, although FP involvement was often the first agency in the pathway to care (40% of patients), having no FP involvement in the pathway to care was independently associated with almost six times the odds of involuntary admission compared to those with FP involvement.[86] Morgan et al. noted that those with a FP referral in the pathway to care had a lower unadjusted likelihood of involuntary hospitalization compared to those without a FP referral, however, this variable was not significant in the context of an adjusted model, and therefore was not selected for inclusion in the final model.[83] Cougnard et al. did not find that FP involvement prior to hospitalization was significantly associated with involuntary admission, however, this study compared whether a FP was the first service contact versus a psychiatrist.[87] Given the different reference groups and definition of FP involvement in Cougnard et al., it is difficult to conclude that FP involvement was not important in relation to involuntary admission in the context of this study. Overall, evidence across studies supports of a potential role for FP involvement in reducing the likelihood of involuntary hospitalization.

Specialized Psychosis-Related Services

Six studies examined the impact of a specialized early psychosis-related service, such as EI services, on subsequent involuntary hospitalization, with most findings supporting a role for these services in reducing involuntary admissions. A Canadian study conducted a pre- and post- comparison following the implementation of the Prevention and Early Intervention Program for Psychosis (PEPP) service in London, Ontario.[142] The mean

number of involuntary admissions over a two-year period was significantly lower among patients from the post-PEPP phase (N = 159) compared to the pre-PEPP patients (N = 146).[142] Two other pre/post studies, one from Hong Kong[143] and one from Melbourne, Australia,[144] comparing outcomes following the implementation of EI services reported similar trends of a significantly lower proportion of involuntary admissions compared to the pre-EI phase. Conversely, a prospective study comparing an EI treatment cohort in London, UK, with a parallel comparison group treated by community mental health teams observed no difference in the proportion of involuntary admissions between the EI versus standard care group over a one-year period.[145] Two studies evaluated outcomes following engagement in services for people at high risk of psychosis (i.e., in the prodromal phase) versus those who did not present for services until the first episode of psychosis.[146,147] Both studies found that patients who presented to specialized services before acute onset of the first episode were less likely to have an involuntary admission at follow-up. Although most studies observed a potential role for EI and specialized services in reducing the likelihood of involuntary admission, no studies evaluated the effect of these types of services while adjusting for other factors related to involuntary admission.

Criminal Justice Agency/Police Involvement

Police involvement may be part of the involuntary process through a Form 2, or in cases where there is imminent danger, police may proceed directly with apprehending an individual and bringing them to an ED. Despite this strong rationale for inclusion of this risk factor in an analysis, only three studies investigated police involvement, all of which were from the UK. The strongest evidence for the importance of police involvement was demonstrated in Morgan et al., in which criminal justice referral (i.e., involvement of police, courts, prisons) in the pathways to care significantly increased the likelihood of involuntary admission by seven times compared to those without criminal justice referral, while adjusting for other sociodemographic, clinical, and service-related factors.[83] Supporting these findings, another study noted frequent police involvement in involuntary admissions.[144] In a smaller study of 100 patients, Burnett et al. found that police involvement was significantly associated with involuntary admission, although this factor was no longer significant after accounting for unemployment and ethnicity.[96]

Other Service Use Factors

Several studies explored whether mental health service use prior to admission, assessed in different ways across studies, was associated with involuntary status. Two studies assessed whether the number of mental health contacts prior to admission was related to involuntary hospitalization. A study from Taiwan investigating first admissions for psychotic disorders over a 10-year period found that for a significantly higher proportion of involuntary patients compared to voluntary, the first hospital admission was the first psychiatric contact (41% vs 24%, respectively).[79] Cougnard et al. investigated whether the number of contacts prior to admission, with categories of 1-2 contacts, or > 2 contacts, compared to no contacts, was associated with involuntary status, and found no association in a univariate logistic regression model.[87]

In terms of having contact with a specialized mental health professional prior to admission, Cougnard et al. compared having a psychiatrist as a first point of contact versus a FP, or other (e.g., emergency practitioner, specialist other than a psychiatrist or psychologist, police, religious, psychic medium, relative, neighbour), and found no significant association.[87] Another study examining the association between religious or non-orthodox agency involvement (i.e., any agency outside statutory provision, including alternative sources of help such as the Citizens' Advice Bureau, psychic mediums, and faith healers) in the pathway to care and involuntary status did not find a significant relationship.[86]

Summary of Service Use Factors

We found that service-related factors were less frequently studied as potential factors associated with involuntary hospitalization. Factors included FP involvement, police involvement/criminal justice referral, involvement in EI services, number of contacts, and the specific type of formal and informal mental health contact prior to admission. Findings across studies suggest FP involvement and EI services may be important factors in reducing the likelihood of an involuntary admission, whereas police involvement, although not widely explored, may increase the likelihood of an involuntary admission.

2.4 Knowledge Gaps in Existing Literature

From our literature review we found there was a dearth of evidence regarding involuntary hospitalization in early psychosis within a Canadian context. Only two Canadian studies reported frequencies and proportions of early psychosis patients experiencing involuntary hospitalization, both of which were smaller studies limited to one to four cities in Ontario. There is virtually no knowledge on the extent of the use of involuntary hospitalization across the province. Overall, we identified few large-scale studies examining the frequency of involuntary hospitalization across many facilities, with only four registry studies examining involuntary hospitalization in early psychosis patients in Taiwan,[79] Denmark,[82] Israel,[81] and Finland.[80] Furthermore, only one of these studies identified an early psychosis population of both inpatients and outpatients, allowing for consideration of how often involuntary hospitalization occurs in the broader context of people with early psychosis, regardless of admission.

Across included studies, we identified factors that are likely associated with involuntary hospitalization, although we did not find such exploratory studies from a Canadian setting. Two studies from Ontario provided some evidence for a possible role for ethnicity and EI services.[17,142] However, these studies were relatively small in sample size and have limitations in their methodologies. The scope of Archie et al.'s study was to examine ethnic variations in pathways to care, and did not broadly consider other sociodemographic, clinical, and service-related factors in their analysis.[17] Goldberg et al. only considered outcomes within one city and similarly did not adjust for other important factors that may influence involuntary hospitalization.[142] While evidence from the literature implicates various sociodemographic, clinical, and service use factors, we have limited knowledge on how these factors play a role in involuntary hospitalization within the context of Ontario. Furthermore, among the exploratory studies of factors associated with involuntary hospitalization that we identified, none consisted of large-scale samples collected across many facilities. The study from Taiwan by Chiang et al. used a large sample collected using registry data; however, their analysis was descriptive and they compared characteristics of voluntary and involuntary groups without adjusting for other factors.[79] The two largest studies to identify factors independently associated with

involuntary hospitalization in an adjusted analysis were Mann et al. and the AESOP study.[83,84] However, the study by Mann et al. consisted of only EI services users at four sites within London and was limited to examining ethnicity. The AESOP was more comprehensive in their recruitment of cases within each community, as well as their consideration of other sociodemographic, clinical and service use-factors in their analysis, however, this study was still limited to two regions (south-east London and Nottingham).[83] Considering the limited scope of these studies, the observations of factors associated with involuntary hospitalization may be limited to those sites, and we may not draw conclusions about the relative importance of the factors identified outside of these specific settings.

2.5 Conceptual Framework

Evidence from the literature suggests that sociodemographic, clinical, and service use factors can independently affect the likelihood of experiencing involuntary hospitalization, although the specific mechanisms through which this occurs has not been characterized. As well, each risk factor category is also related to the others within this framework, and changes in specific factors in each group may affect factors in other groups. For example, a sociodemographic factor such as social support can independently affect both severity of positive symptoms,[148] as well as lack of FP involvement.[86] A clinical factor such as behavioural disturbance can affect caregiver burden,[149] and increase the likelihood of police involvement.[150] Whereas a service use factor, such as involvement in EI services, may affect severity of symptoms,[151] as well as economic status, with those engaged in EI services showing an improvement in employment outcomes.[152] As such, we have developed a broad framework to conceptualize the effects of these risk factor categories on involuntary hospitalization, as well as the effects across risk factor groups (Figure 2.1). Considering the potential effects of each risk factor group on the outcome of involuntary hospitalization, as well as the effects across risk factor categories, this framework highlights the importance of considering variables from each risk factor category in one model. The specific factors within each category vary likely depending on study methodologies and setting, as we have observed from our literature review findings. However, we have identified key variables that warrant further

investigation in relation to involuntary hospitalization for our study. The specific factors to be included in our analysis and the rationale for each will be discussed in Chapter 3 (Methods).

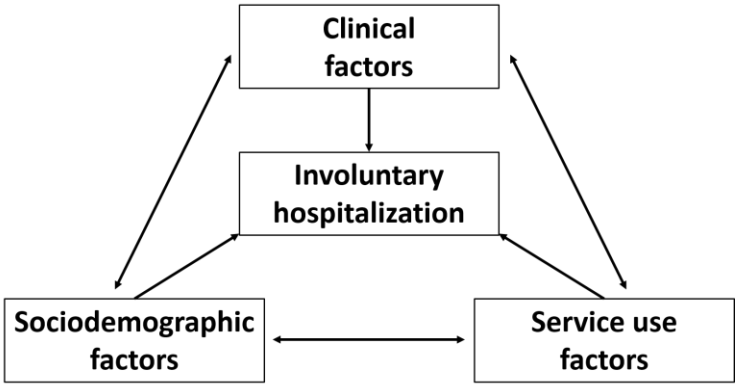


Figure 2.1 Conceptual framework outlining the effects of sociodemographic, clinical, and service use factors on involuntary hospitalization in early psychosis, as well as the potential relationships among risk factor categories

Chapter 3

3 Methods

We used health administrative data housed at the Institute for Clinical Evaluative Sciences (ICES) to construct a retrospective cohort of incident cases of non-affective psychosis over a 5-year period. Incident cases were followed-up to identify the first psychiatric hospitalization event within a two-year period following first presentation to health services for a non-affective psychotic disorder. The policies and procedures of ICES were adhered to for the conduct of this study. For approval of this study, a Privacy Impact Assessment (PIA) and a Project Approval Worksheet (PAW) were reviewed and approved by ICES. We created a Dataset Creation Plan (DCP) outlining the design and execution of this study (refer to Appendix B). The DCP was reviewed and approved by an ICES Scientist.

3.1 Data Sources

Multiple data sources within ICES data holdings were linked for construction of the cohort, including the Ontario Mental Health Reporting System (OMHRS), the Discharge Abstract Database (DAD), the Ontario Health Insurance Plan (OHIP) Claims Database, the National Ambulatory Care Reporting System (NACRS), the Registered Persons Database (RPDB), and the Immigration, Refugees and Citizenship Canada (IRCC)'s Permanent Resident Database. Records across different data sources were linked using unique encoded identifiers, referred to as the ICES key number (IKN), which are generated through a secure ICES algorithm using Ontario health card numbers.

3.1.1 Ontario Mental Health Reporting System

OMHRS includes data on psychiatric admissions to Ontario facilities with designated adult mental health beds. This includes adults (aged 18 years or older), and may also include records for patients younger than 18 years who were admitted to an adult mental health bed. This data collection was mandated by the Ontario MoHLTC and was implemented by the Canadian Institute for Health Information (CIHI) on behalf of the MoHLTC beginning from October 1, 2005. The number of facilities reporting to

OMHRS varies every year, as facilities open, close, merge or split, and has fluctuated from 65 facilities at inception to up to 81 facilities in Ontario as of 2016.[153] The clinical assessment of inpatients for data collection is conducted using the Resident Assessment Instrument–Mental Health (RAI-MH), which was developed by interRAI (www.interrai.org) in collaboration with the MoHLTC, the Ontario Hospital Association, and the Ontario Joint Policy and Planning Committee.[154] The objectives of this assessment include care planning, outcome monitoring, quality improvement, and resource allocation.[155] Data for the RAI-MH in OMHRS is collected via the Minimum Data Set for Mental Health (MDS-MH)© form, which is a standardized, minimum assessment tool for clinical use.[156] Data elements contained in the form include sociodemographic factors, mental state items (history and current indicators), substance use behaviours, cognition, self-care, health conditions, stressors, medications, and prior service utilization. Summary measures generated from these items include Mental Health Clinical Assessment Protocols (MHCAPs), outcome scales, quality improvement indicators, and algorithms for resource allocation. The information collected for the RAI-MH may be obtained through interview with the patient, caregiver(s), observation of the patient, other support staff, and review of medical records.[156] The RAI-MH is completed at admission, discharge, every three months for patients with extended stays, or whenever this is a significant change in a patient's clinical status.[156] For the purposes of our study, we utilized records from the admission assessment to capture symptom profiles and mental state as close as possible to the point when involuntary admission was determined.

3.1.2 Discharge Abstract Database

The DAD was developed and maintained by CIHI, and contains data for hospital inpatient acute discharges from 1988 onwards. CIHI receives the data directly from participating hospitals, which includes about 75% of hospital inpatient discharges in Canada.[157] A standardized form is used to abstract data from patient charts after a patient is separated from hospital, which includes discharges, transfers, or death. A medical records coder at each hospital creates an abstract from patient charts and records are forward from hospitals to CIHI. The main data elements collected include clinical data such as diagnoses and procedures performed, patient demographic data, and

administrative data such as institution number, admission category, and length of stay. Additional data collected for psychiatric admissions in DAD include source of referral, method of admission (i.e., voluntary versus involuntary), change in legal status, absence without leave, suicide, previous psychiatric admissions, disposition after discharge, education, employment, and financial support. Data for mental health inpatients was collected in DAD from 1998/99 onwards, until October 1, 2005, when information for designated adult inpatient mental health beds began collection through OMHRS. However, information for mental health inpatients continues to be collected in DAD for paediatric mental health beds (ages 0 to 17 years), as well as for psychiatric admissions to non-mental health beds (e.g., intensive care unit, general medical bed).[158] There is no overlap between the DAD and OMHRS; however, patients' hospital stays may include transfers between beds that report to each database.

3.1.3 Ontario Health Insurance Plan Claims Database

The OHIP database contains most claims paid for by the OHIP. This includes services from all health care providers who receive income from a fee-for-service model, and from non-fee-for-service physicians who submit shadow billings for their services. The only physicians not required to submit billing claims are those family physicians who work in Community Health Centres in which physicians are salaried employees. The information collected includes patient and physician identifiers (e.g., physician number and specialty), fee code for the service provided, date of service, and associated diagnoses. OHIP claims are prepared by the service provider and submitted to the MoHLTC office. ICES receives OHIP claims data directly from the MoHLTC.

3.1.4 National Ambulatory Care Reporting System

Information on patient visits to hospital and community-based ambulatory care, including day surgery, outpatient clinics, and EDs is captured in NACRS starting from July 2000 for ED visits, and 2003 onwards for other services. Data for the NACRS database is received by CIHI directly from participating facilities, regional health authorities, or ministries of health. Information collected includes demographic, clinical, administrative, financial, and service-specific data elements (for day surgery and emergency). The

NACRS abstract is completed for each patient visit using information from admission/discharge/transfer systems, ED information systems, patient records, physician notes, and laboratory and diagnostic imaging results.[159,160] A re-abstraction study found all data elements collected for ED visits to have good inter-rated reliability with high agreement between re-abstractors.[161]

3.1.5 Registered Persons Database

The RPDB contains the demographic information of people who hold, or have held, an Ontario health card from April 1990 onwards. Demographic information in the RPDB includes date of birth, gender, and postal code. The data in the RPDB is received by ICES directly from the MoHLTC.

3.1.6 Immigration, Refugees and Citizenship Canada's Permanent Resident Database

The IRCC database at ICES contains records for immigrants who landed in Ontario between January 1985 and December 2012. The IRCC database contains demographic information on permanent residents, including country of citizenship, mother tongue, education, and immigrant class, including economic immigrants, family class, and refugee or asylum seekers. This database does not include immigrants currently residing in Ontario who originally landed in another province. The IRCC database at ICES has been linked with RPDB records using probabilistic data linkage based on a combination of last and given name variants, date of birth, and gender, in order to obtain IKNs to enable linkage to other data sources at ICES. The overall linkage rate was 86.4%, indicating the percentage of records in the IRCC database for which an IKN was obtained.[162]

3.2 Study Design

A retrospective cohort study design was utilized. A cohort of incident cases of non-affective psychosis, including schizophrenia, schizoaffective disorder, and psychosis NOS, presenting to health services in Ontario between January 1, 2009 and December 31, 2013 was constructed. Incident cases were followed-up to identify the first hospitalization

event for any mental health reason within a two-year period after first presentation to health services for a non-affective psychotic disorder. The cohort was constructed by an ICES Analyst using the methods specified in the DCP.

3.2.1 Case Definition

We defined "early psychosis" as the time from first presentation to services for a non-affective psychotic disorder and up to two-years thereafter. We identified incident cases of non-affective psychosis based on the methods of Kurdyak et al.[163] and are described in detail in the following sections, as well as in the DCP (Appendix B). This algorithm was developed for the identification of chronic cases of non-affective psychosis within ICES data holdings, therefore, we used a more conservative definition since we were interested in identifying first onset cases. This adapted method for identification of incident cases was used by Anderson et al.[23] The algorithm for the detection of chronic psychotic illness in ICES data holdings was validated through the comparison of cases identified within the data holdings to diagnostic information abstracted from clinical records, and was found to have a sensitivity of 94%, a specificity of 50%, a positive predictive value of 62%, and a negative predictive value of 90%.[163]

We identified cases of non-affective psychosis during the 5-year accrual period of January 1, 2009 to December 31, 2013 using three data sources: OMHRS, DAD, and ambulatory care (NACRS and OHIP claims). We created database-specific cohorts from each data source before merging records from all data sources together for analysis. The inclusion/exclusion criteria for each database-specific cohort are described below.

3.2.1.1 OMHRS Cohort Inclusion Criteria

All discharges in OMHRS during the accrual period with a DSM-IV Axis 1 primary discharge diagnosis of schizophrenia (295.x), schizoaffective disorder (295.7), or psychosis NOS (298.x) and a valid IKN were included. The OMHRS sample was restricted to one record per patient and the first hospitalization event by taking the first discharge date per patient identified during the accrual period. The discharge date was used as the index date.

3.2.1.2 DAD Cohort Inclusion Criteria

All hospital discharges in DAD during the accrual period with an International Classification of Diseases, Tenth Revision (ICD-10) primary discharge diagnosis of schizophrenia (F20), schizoaffective disorder (F25), or psychosis NOS (F29) and a valid IKN were included. The DAD sample was restricted to one record per patient and the first hospitalization event by taking the first discharge date per patient identified during the accrual period. The discharge date was used as the index date.

3.2.1.3 Ambulatory Cohort Inclusion/Exclusion Criteria

The ambulatory cohort includes records identified through OHIP billing claims or NACRS. OHIP billings with a diagnostic code for schizophrenia (295), schizoaffective disorder (295), or psychosis NOS (298) and a valid IKN were identified and combined with all ED visits in NACRS with an ICD-10 diagnostic code for schizophrenia (F20), schizoaffective disorder (F25), or psychosis NOS (F29) and a valid IKN. Identification of cases required that the two physician or ED visits occurred within a 12-month period, therefore, cases were excluded if there was no evidence of at least two OHIP billing claims or ED visits with a diagnostic code for schizophrenia, schizoaffective disorder, or psychosis NOS occurring in any 12-month period. Of the multiple events, the first date per patient was used as the index date. Where events in OHIP claims and NACRS occurred on the same day, the NACRS observation was preferentially selected as the index event.

3.2.1.4 Definition of the Index Event/Date across Cohorts

The records identified across the three cohorts were merged, and where multiple events were present for the same person, the first event was used as the index event and the date of that first event was considered the index date. If the first date was the same in more than one cohort, the observations were preferentially selected based on the order of the pathway to care, followed by validity of diagnosis, meaning that ambulatory cases were preferentially selected over OMHRS, followed by DAD.

3.2.1.5 Exclusion Criteria

Exclusion criteria (in order) for all three cohorts included: (1) invalid or missing data in age and gender variables, (2) less than 16 or greater than 35 years of age, and (3) prevalent cases identified by the presence of a diagnostic code for schizophrenia, schizoaffective disorder, or psychosis NOS at any point prior to 2009. The look-back window for identification of prevalent cases varied within each cohort depending on the availability of data and included a 20-year look-back period where possible. By using date restrictions and cohort hierarchies, each of the three cohorts were mutually exclusive with only unique cases present in each of the final samples derived.

3.2.2 Follow-up of Cohort

We followed the cohort for a period of up to two-years following the index date to identify the first psychiatric hospitalization event. For people who entered the cohort via an inpatient admission (i.e., cases identified through DAD or OMHRS), we used the index hospitalization as the outcome event. For those identified through the ambulatory cohort and followed-up, we looked for any psychiatric hospitalization, not restricted to non-affective psychosis. Refer to the DCP in Appendix B for a complete list of diagnostic codes used to define the hospitalization event.

Where hospitalization records occurred in both DAD and OMHRS on the same day, we preferentially selected the OMHRS record. As a *post-hoc* exclusion, we removed people whose diagnosis at hospitalization changed from non-affective psychotic disorder to organic psychosis or affective psychosis.

The cohort time-frame was based on the availability of data in OMHRS related to admission status. Involuntary versus voluntary admission status was collected in OMHRS beginning in 2009, therefore, the five-year case accrual window began January 1, 2009 and ended on December 31, 2013 to allow for a two-year follow-up observation window in which to look for the outcome event (i.e., first hospitalization). The observation window terminated at either of the following events: (1) a discharge date following a first hospitalization to a psychiatric hospital bed for a mental health reason in DAD or

OMHRS, or (2) a two-year period following the index date for case definition. The maximum follow-up date was January 1, 2016.

3.3 Variables

3.3.1 Explanatory Variables

Potential risk factors for inclusion as explanatory variables in the regression analysis were identified through the literature review (Chapter 2) and through review of the variables available in OMHRS. All identified variables were compiled in a table and grouped into relevant categories, including sociodemographic, clinical, or service use factors. We reviewed each variable and a decision was made whether to include or exclude, with rationale provided. Refer to Appendix C for the table and rationale for inclusion/exclusion of each variable.

3.3.1.1 Sociodemographic Variables

Age

The potential role of age in involuntary hospitalization was unclear from the literature review findings. However, we included this variable as it was commonly adjusted for. Age in years as of the index date was calculated using date of birth from RPDB. Age was categorized as follows: 16 to 20, 21 to 25, 26 to 30, and 31 to 35 years.

Gender

Findings from the literature review suggest there may be gender differences in involuntary hospitalizations. Gender for each person was obtained from the RPDB, coded as male (M) or female (F).

Rurality

We included urban versus rural place of residence, as one study noted a potential relationship to involuntary hospitalization.[79] Urban versus rural place of residence was identified by census data. Rurality was obtained by identifying the person's best known forward sortation area (FSA; first three digits of postal code) as of July 1st in the same year as the index date in the RPDB. A person was defined as living in a rural region if the FSA was associated with a community size of 10,000 or less.

Neighbourhood-Level Income Quintile

We included neighbourhood-level income quintile as a proxy for socioeconomic status. Although unemployment was more commonly used as a measure of socioeconomic status in studies from the literature review,[83,86–88] we included income quintile as a more relevant measure of socioeconomic status, considering the young age range of our cohort. Income quintile is a neighbourhood-level variable in which median income within a FSA is determined using census data. FSA in the RPDB as of July 1st in the same year as the index date was obtained for each person in the cohort, and people were categorized into quintiles of average neighbourhood income level based on the provincial distribution.

Migrant Status

Migrant status is likely related to ethnicity, social support, and socioeconomic status – factors demonstrated to be associated with involuntary hospitalization.[17,83,84,86,88,92,94] We included only migrant status and not ethnicity in our analysis. Ethnicity has been more commonly investigated in the literature, and has been demonstrated to impact the likelihood of involuntary hospitalization.[17,83,84,92,94] However, this particular factor warrants more in-depth investigation beyond the scope of this exploratory analysis. In addition, the effect of migrant status in the context of involuntary hospitalization in early psychosis has not been explored, and recent evidence suggests that differences observed in pathways to care among different ethnic groups may be partially attributed to migrant status.[164]

We defined migrant status based on three categories: non-immigrant, immigrant, or refugee. We included the refugee group as separate from the immigrant group, as previous work has shown that refugee status was independently associated with increased risk for psychotic disorders in Ontario,[23] and refugees are more likely to differ from other immigrants in sociodemographic characteristics and exposure to adversity or traumatic events.[165] We identified first-generation immigrants and refugees through linkage with records in the IRCC database, as previously described.

Living Alone

This variable was included as a measure of social support. Given the age group of the cohort (16 to 35 years), this variable was selected as a more relevant measure of social support rather than marital status. This variable was defined using the "Who Lived With at Admission" item in the RAI-MH.[156] Cases where the option selected was either "Lived with spouse only," "Lived with spouse and other(s)," "Lived with child/children (but not spouse/partner)," "Lived with others (not spouse or child/children)," or "Lived in a group setting with non-relative(s)" were coded as 0 (not living alone). Cases where the option "Lived alone" was selected were coded as 1 (living alone).

Residential Stability

Residential stability was included in the analysis as a measure of living situation, which may also relate to socioeconomic status and social support. Residential stability is determined as part of the RAI-MH in OMHRS. "Stability" refers to the permanence of the person's current living arrangements, meaning temporary versus long-term.[166] A temporary residence is defined as "…one in which the person has lived for less than 30 days and from which he or she plans to move within 30 days (e.g., a shelter, a hostel)."[156] The variable was coded as 0 where the person's last residence was not considered temporary, versus 1 where the person's last residence was considered temporary.

Family or Close Friend Overwhelmed by Person's Illness

A potential role for caregiver burden in involuntary hospitalization was implicated in findings from the literature review.[101] As well, this variable may be related to the use of a Form 2 (Order for Examination), in which families/caregiver(s) may apply for a Justice of the Peace Order requiring apprehension and transport of the ill person to a physician. The physician can then determine if the person requires an involuntary psychiatric assessment (Form 1).[167] The definition provided for this variable in the OMHRS Resource Manual indicates that "At least 1 member of the person's social network is reported to be feeling overwhelmed and/or greatly stressed by the person's behaviours and actions attributed to his or her mental illness, or a family or close friend feels overwhelmed with concern and worry over the person's well-being."[156] This information is collected based on the clinicians' observations and discussions with other staff, and

may also include consultation with other staff familiar with the person.[156] The variable is coded 0 where this observation is not present, and 1 where the observation is present.

3.3.1.2 Clinical Variables

Index Diagnosis of Psychotic Illness

The specific diagnosis of psychotic illness was widely investigated in the literature, and findings from some studies suggest this may be related to involuntary hospitalization.[83,87,102] This variable includes the initial diagnosis of psychotic illness assigned at cohort entry (i.e., index diagnosis), and was dichotomized as schizophrenia spectrum disorder (includes schizophrenia and schizoaffective disorder) and psychosis NOS.

Main Diagnosis Associated with Hospitalization

Since we identified any psychiatric hospitalization, this variable was included to account for those who were hospitalized due to their psychotic illness, versus those who were hospitalized for another mental health reason. We grouped the main diagnosis associated with the hospital stay into the following categories: (1) schizophrenia, (2) schizoaffective disorder, (3) psychosis NOS, (4) other psychotic disorders (e.g., delusional disorder, acute and transient psychotic disorders), (5) mood/affective disorders, (6) anxiety and adjustment disorders, (7) substance use disorders, and (8) other (e.g., personality disorders, sleep disorders, social problems, eating disorders). In the multivariable logistic regression analysis, this variable was dichotomized to group those hospitalized due to a psychotic disorder (categories 1 to 4) versus those hospitalized for a mental health reason other than their psychotic disorder (categories 5 to 8).

Time Between Index Diagnosis and Hospitalization

This variable was included to adjust for potential differences in people who were hospitalized at cohort entry (i.e., the index date) versus those who were hospitalized during the follow-up period. Those hospitalized during the follow-up period may have been more likely to have more contacts with the mental health care system and engage in treatment related to their psychotic illness, which may affect the likelihood of involuntary hospitalization. This variable was calculated as a continuous measure of the number of

days between index diagnosis and hospital admission, by subtracting the index date (diagnosis of psychosis) from the admission date in OMHRS. This variable was then categorized for interpretation purposes to separate those hospitalized within the same episode of care as the index date (i.e., hospitalized at diagnosis). The same episode of care as the time of diagnosis was defined as hospitalization within one day of the index date. The other categories included hospitalization within one month, one to six months, six months to one year, and one year to two years after the index diagnosis.

Insight into Mental Health Problem

We included insight into mental health in our analysis given the importance of this factor in the study by Kelly et al.,[89] and the lack of investigation of this factor in other studies in the literature review. This variable assesses the person's level of awareness of his or her mental health problems. Insight in the RAI-MH is defined as the "person's level of awareness of his or her mental health problems and the contributing factors…the person is assessed as having insight if there is recognition of a problem and that he or she needs some help."[156] Insight was assessed by interview with the person regarding his or her view of their situation with the intention of determining whether there is recognition that a problem exists and whether the person recognizes the causes and the need for help.[156] Insight is an ordinal variable with the following three categories: full insight (i.e., the person recognizes that a problem exists and appears to understand the problem or that he or she needs treatment), limited insight (i.e., acknowledgement of a problem but may not be able to identify the cause), and no insight (i.e., no awareness of difficulties or a mental health problem).

Substance/Alcohol Use

Substance or alcohol use was not widely found as an important factor in the literature with the exception of Opsal et al.'s prospective study, which suggested that substance abuse increased the likelihood of involuntary hospitalization over a two-year period,[91] the time-frame of our study. Substance/alcohol use is captured in the RAI-MH assessment, and includes the type of substance(s) the person may be taking or has taken in the past, including alcohol, inhalants, hallucinogens, cocaine and crack, stimulants, opiates, or cannabis. We coded this variable as current problems with substance use versus no

current problems (which may include a history of problems). A person was coded as having current problems if they used any of the above substances in the past month, consumed five or more alcoholic drinks at any given sitting in the last 14 days, or if the person has misused any medication (either prescription or over-the-counter) in the last three months.[168] The substance use assessment in RAI-MH was found to have a sensitivity of 97% and a specificity of 68%.[154]

Medication Adherence

Findings from the literature review suggest that medication adherence may be related to involuntary hospitalization. This factor may be particularly important for people who had outpatient status at the index diagnosis and had the opportunity to engage in treatment prior to hospitalization. History of adherence to psychotropic medication is assessed in the RAI-MH. Adherence was defined in the RAI-MH as "actually taking the medication as prescribed."[156] Information on adherence was estimated for the 30-day period prior to admission and was collected through interview with the person and caregiver, and may be cross-referenced with medication orders.[156] We recoded this variable to include the following categories: no problems with medication adherence (i.e., the person was always adherent or the person was adherent 80% of the time or more), problems with medication adherence (i.e., taking medication as prescribed less than 80% of the time, or stopped taking medication due to side effects), not on medication, or unknown/missing. We grouped missing data in this variable with the "unknown" category included in the RAI-MH to prevent elimination of observations in the logistic regression analysis.

Prior Trauma

Prior trauma was investigated in only one study in the literature review which did not indicate this was a risk factor for involuntary hospitalization.[141] However, considering the observation that those with psychosis and PTSD tend to have worse clinical and functional outcomes[137,169] and difficulties with treatment engagement, adherence, and response,[170–172] prior trauma may be an under-studied but important factor impacting involuntary hospitalizations. We included prior trauma in our analysis to address this knowledge gap.

Stressful life events that may be influence a person's well-being are assessed in the RAI-MH. We categorized a person as having experienced prior trauma if they experienced a stressful event in their lifetime that may warrant screening for PTSD based on the Life Events Checklist screening questionnaire.[173] This includes experiencing any of the following: serious accident or physical impairment, lived in war zone or area of violent conflict (combatant or civilian), witnessed (first-hand) severe accident, disaster, terrorism, violence or abuse, victim of crime, victim of sexual assault or abuse, or victim of physical assault or abuse. This information was collected via interview with the person regarding any events that have had an important impact on his or her life.[156]

Symptom Severity

Severity of symptoms associated with psychotic illness was assessed using outcome scales that are embedded within the RAI-MH. This includes positive, negative, mania, and depressive symptoms, all of which were identified in the literature review as factors associated with involuntary hospitalization.[83,87,89–91,103–105] Each scale assesses relevant symptom indicators, and each indicator was coded based on the frequency with which it was present in the past three days: not exhibited in the last three days; not exhibited in the last three days but is reported to be present; exhibited on one to two of the last three days; or exhibited daily in the last three days. Each item is then converted to a score, and the scores are summed to generate an overall score, with higher scores indicating greater severity of symptoms.[174,175] Each scale selected for inclusion in our analysis is outlined in Table 3.1.

Behaviour Severity

Severity of behaviours associated with psychotic disorders – including aggressive behaviour, risk of harm to self, risk of harm to others, and inability to care for self due to psychiatric symptoms – constitute potential reasons for involuntary hospitalization, and were identified as important factors in the literature review. These factors were assessed using outcome scales embedded within the RAI-MH. The Severity of Self-Harm (SOS) Scale, Risk of Harm to Others (RHO) Scale, and the Self-Care Index (SCI) are predictive algorithms designed to provide a measure of risk that the person will pose a risk of harm to self, to others, or will be unable to care for self due to psychiatric symptoms,

respectively.[174] Calculation of these scales is complex and is based on a decision-tree, with several potential steps within each branch.[174] The descriptions of these scales in Table 2.2 provides an overview of the items incorporated into each decision-tree branch for each scale. We also included the Aggressive Behaviour Scale (ABS), which is a summary scale providing a measure of aggressive behaviour.[174] Refer to Table 3.2 for an overview of the behaviour scales included in our analysis.

Table 3.1 Symptom severity scales

Scale	Symptom Indicators Assessed	Scale Range[1]
Positive Symptom Scale-Short	1. Hallucinations 2. Command hallucinations 3. Delusions 4. Abnormal thought process/form	0 to 12
Negative Symptom Scale	1. Anhedonia 2. Withdrawal from activities of interest 3. Lack of motivation 4. Reduction in social interactions	0 to 12
Mania Scale	1. Inflated self-worth 2. Hyperarousal 3. Irritability 4. Increased sociability/hypersexuality 5. Pressured speech/racing thoughts 6. Labile affect 7. Sleep problems due to hypomania	0 to 20
Depression Rating Scale	1. Made negative statements 2. Persistent anger with self or others 3. Expressions (including non-verbal) of what appear to be unrealistic fears 4. Repetitive health complaints 5. Repetitive anxious complaints/concerns (non-health related) 6. Sad, pained, worried facial expression 7. Crying, tearfulness	0 to 14

[1]For all scales, higher scores indicate greater severity of symptoms

Table 3.2 Behaviour severity scales

Scale	Symptom Indicators Assessed	Calculation	Scale Range[1]
ABS	1. Verbally abusive 2. Physically abusive 3. Socially inappropriate/disruptive behavior 4. Resistance to care	• Each item coded based on the frequency with which it occurred in the past 3 days • Score calculated by adding together the values coded for each symptom	0 to 12
SOS	1. Intent of any self-injurious act was to kill himself/herself 2. Considered performing self-injurious act 3. Family, caregiver, friend, or staff express concern that the person is at risk for self-injury 4. Development of a suicide plan the last 30 days in which the person formulated a scheme to end his or her life In some cases: 5. Abbreviated PSS-Short[2] 6. Cognitive Performance Scale[3] 7. Abbreviated Depressive Severity Index[4]	Decision-tree depending on when the person considered performing a self-injurious act (item 2): • More than 31 days ago or never – score may consider items 1, 3, 5, 6, 7. Score in this group ranges from 0 to 4. • 4-30 days ago – score may consider item 1. Score ranges from 3 to 4. • Last 3 days – score may consider item 1, 3, 4, 7. Score ranges from 2 to 6.	0 to 6

Abbreviations: ABS, Aggressive Behaviour Scale; SOS, Severity of Self-Harm; PSS-Short, Positive Symptom Scale-Short; RHO, Risk of Harm to Others; PSS-Long, Positive Symptom Scale-Long; SCI, Self-Care Index

[1]For all scales, higher scores indicate greater severity of symptoms

[2]Score includes frequency of indicators for hallucinations, command hallucinations, and delusions

[3]Measure of impairment of a person's cognitive status in terms of short-term memory, cognitive skills for daily decision-making, eating self-performance, making self understood

[4]Score includes frequency of indicators of mood disturbance, including sad/pained/worried facial expression, negative statements, and self-deprecation; [5]Score includes frequency of indicators of psychosis, including the PSS-Short score, plus inflated self-worth, hyperarousal, and pressured speech; [6]Score includes frequency of indicators for inflated self-worth, hyperarousal, irritability, increased sociability/hypersexuality, pressured speech, and labile affect

Table 3.2 Behaviour severity scales, *continued*

Scale	Symptom Indicators Assessed	Calculation	Scale Range[1]
RHO	1. Violent to others 2. Intimidation of others or threatened violence 3. Violent ideation 4. Extreme behaviour disturbance 5. Police intervention for violent behavior 6. Delusions 7. Difficulty falling asleep 8. Insight into mental health In some cases: 9. ABS 10. Abbreviated PSS-Long[5]	Decision-tree depending on history of violence or extreme behaviour (items 1-5): • No history – score may consider items 7, 9, and 10. Score ranges from 0 to 3. • Last 7 days – score may consider items 1-8. Score ranges from 2 to 6. • More than 7 days ago - consider item 10. Score ranges from 2 to 4.	0 to 6
SCI	1. Cognitive skills for daily decision-making 2. Insight into mental health 3. Abnormal thought process/form 4. Making self understood 5. Hygiene 6. Anhedonia 7. Decreased energy In some cases: 8. Abbreviated PSS-Short 9. Abbreviated Mania Scale[6]	Decision-tree depending on cognitive skills for decision-making (item 1): • Person is independent – score may consider items 2, 3, 4, 5, 6, 8, 9. Score ranges from 0 to 4. • Person is not independent – score may consider items 2, 7, 8. Score ranges from 2 to 6.	0 to 6

Abbreviations: ABS, Aggressive Behaviour Scale; SOS, Severity of Self-Harm; PSS-Short, Positive Symptom Scale-Short; RHO, Risk of Harm to Others; PSS-Long, Positive Symptom Scale-Long; SCI, Self-Care Index

[1]For all scales, higher scores indicate greater severity of symptoms

[2]Score includes frequency of indicators for hallucinations, command hallucinations, and delusions

[3]Measure of impairment of a person's cognitive status in terms of short-term memory, cognitive skills for daily decision-making, eating self-performance, making self understood

[4]Score includes frequency of indicators of mood disturbance, including sad/pained/worried facial expression, negative statements, and self-deprecation; [5]Score includes frequency of indicators of psychosis, including the PSS-Short score, plus inflated self-worth, hyperarousal, and pressured speech; [6]Score includes frequency of indicators for inflated self-worth, hyperarousal, irritability, increased sociability/hypersexuality, pressured speech, and labile affect

3.3.1.3 Service Use Variables

Police Involvement

We included police involvement in our analysis given that evidence from the literature review suggesting that police involvement in pathways to care increases the likelihood of involuntary hospitalization.[83,96,144] Information regarding police involvement is collected in the RAI-MH and includes police intervention for either violent or non-violent behavior. Police intervention in the RAI-MH is defined as "any history of police contact/intervention (e.g., arrests, police escort to hospital for psychiatric examination, or intervention to de-escalate a situation with no resulting charges)." [156] Contact in which the person was a victim, or that resulted in civil litigation were excluded.[166] Time-frames for police involvement include more than 1 year ago, 31 days to 1 year ago, 8 to 30 days ago, 4 to 7 days ago, and the last 3 days. We recoded this variable to group those with police involvement in the past 7 days versus those with police involvement more than 7 days ago or never, in order identify those with recent police involvement, which may be more likely to be related to the involuntary admission.

Prior Contact with Community Mental Health Services

Although evidence from the literature review regarding an association between prior contact with mental health services and involuntary hospitalization was unclear, we included this factor to account for service use prior to admission outside of primary care. This variable is collected in the RAI-MH in order to assess whether a person had involvement with a community-based mental health service in the year prior to admission, other than contact with a FP, including any mental health service provided through a community agency or outpatient clinic.[156] The options available in the RAI-MH assessment include: no involvement in the past year, 31 days or more since last involvement, or the person was involved with a community mental health service in the last 30 days. This variable was recoded to a binary variable indicating involvement in the last 30 days, or 31 days or more or no involvement to capture recent contact prior to admission.

Family Physician Involvement

FP involvement was identified in the literature review as a potential factor impacting the likelihood of an involuntary admission.[83,86,96] We defined FP involvement as the number of visits to a FP for a mental health reason in the six-month period prior to the admission date. FP visits for a mental health reason were identified using the method of Steele et al.[176] A primary care visit for a mental health reason was defined as any mental health service code, pediatric service code, or general service code with an associated mental health diagnostic code in OHIP billing claims. Refer to the DCP for the complete list of service and diagnostic codes (Appendix B). All service types were included given that primary care physicians may provide mental health services in the context of shorter general medical visits, which may not get assigned as a mental health service when billed.[176,177] Validation of this method against data abstracted from charts was found to have a sensitivity of 81%, specificity of 97%, positive predictive value of 85%, and negative predictive value of 96%.[176]

Prior Psychiatric Admissions (Past Two Years)

Similar to prior contact with community-based mental health, this variable serves as an indicator for ongoing mental health problems prior to the onset of psychotic illness. The number of previous admissions to a mental health facility or mental health inpatient unit within the last two years is captured in the RAI-MH through consulting with the person, family members, and/or medical records.[156] This variable was coded as binary: no admissions in the last two years versus one or more admission(s) in the last two years.

3.3.2 The Outcome Variable

The outcome variable was hospitalization on an involuntary versus voluntary basis. We used the "Admission method – psych" variable in DAD to determine status, which includes the following options: informal, voluntary, involuntary, Form 1, Form 3 or 4, Form 8-judge's order for admission, detention under the Criminal Code of Canada, and other.[158] For OMHRS records, the outcome variable was derived from the variable "Inpatient Status at Time of Admission" which includes the following options: application for psychiatric assessment or order for psychiatric examination (e.g., Form 1 or Form 2 of the *MHA* as completed by a physician or justice of the peace), voluntary,

informal, involuntary (Form 3 or Form 4 of the *MHA*), or forensic.[156] Records were categorized as voluntary if the "voluntary" option was selected in either DAD or OMHRS. Records were categorized as involuntary if the Form 1 or Form 3 or 4 options were selected in DAD, or if the "Application for psychiatric assessment or order for psychiatric examination" or "Involuntary" options were selected in OMHRS. We excluded cases that were hospitalized with status other than voluntary or involuntary (i.e., informal or forensic status). For people with records in both DAD and OMHRS (i.e., people who were admitted in DAD and subsequently transferred to OMHRS), we examined whether there was a discrepancy in status between the two records. Cases were excluded where status was anything other than voluntary or involuntary at any point during the episode of care. Records were categorized as involuntary if the person was recorded as involuntary at any point (e.g., a record that was voluntary in DAD and involuntary in OMHRS was categorized as involuntary).

3.4 Statistical Analysis

Datasets were linked using unique encoded identifiers and analyzed on-site at ICES Western (London Health Sciences Centre, London, Ontario). We used SAS Enterprise Guide (Version 6.1) for conducting our statistical analyses and we used Stata (Version 13.1) for testing model assumptions.

3.4.1 Objective 1

For the first objective, which was to estimate the proportion of people with early psychosis who have involuntary status at their first admission, descriptive summary statistics characterizing the hospitalization event were calculated. This included the overall proportion in the cohort that was hospitalized, the mean time to hospitalization following diagnosis (and standard deviation [SD]), and proportions for the main diagnosis present at hospitalization. Finally, frequencies and proportions of people that were voluntary versus involuntary were tabulated and 95% confidence intervals (CIs) calculated using the Wald method in the form of point estimate ± 1.96 multiples of the standard error. Admissions were further described by calculating proportions for those on

Form 1 versus Form 3, and the reasons for admission in voluntary versus involuntary patients.

3.4.2 Objective 2

The second objective was to identify the sociodemographic, clinical, and service-related factors associated with the use of involuntary hospitalization at first admission, independent of the criteria for involuntary admission (risk of harm to others, self-harm, and self-care). The analysis steps for this objective consisted of an exploration of correlation among the continuous/ordinal clinical variables, a descriptive analysis comparing the explanatory variables by voluntary versus involuntary status, unadjusted logistic regression, and adjusted logistic regression with a variable selection procedure[178] to define the important variables associated with involuntary hospitalization in our cohort.

3.4.2.1 Associations among Explanatory Variables

We investigated correlations and associations among covariates where we hypothesized there may be a relationship. We examined correlations among clinical variables that were continuous and ordinal variables that could be treated as continuous (e.g., insight) using Pearson's correlation coefficient, or Spearman's rank correlation coefficient where data were not normally distributed. Correlation coefficient values of 0.70 to 1 (-0.70 to -1) were considered to indicate a high correlation, 0.50 to 0.69 (-0.50 to -0.69) as moderate, 0.30 to 0.49 (-0.30 to -0.49) as weak, and 0 to 0.29 (0 to -0.29) as negligible.[179] As well, we cross-tabulated the index diagnosis against substance use, hypothesizing a relationship between a diagnosis of psychosis NOS and substance use. Frequencies and proportions were calculated for each group, and standardized differences were used to compare groups.[180] In cases where variables were highly associated with each other, we investigated whether one of the correlated variables should be excluded from the multivariable logistic regression model.

3.4.2.2 Descriptive Analysis of Voluntary and Involuntary Patients

The distributions of each explanatory variable were compared between voluntary and involuntary groups. The proportions of people with voluntary versus involuntary status were calculated for binary/categorical explanatory variables, while means and SDs and/or medians and interquartile ranges (IQRs) were calculated for continuous variables. We used standardized differences to compare differences in explanatory variables between voluntary and involuntary groups. Standardized differences were used rather than hypothesis tests because standardized differences provide a method of quantifying the magnitude of the difference between groups independent of sample size.[181] Standardized differences for means and proportions were calculated using the method of Austin (2009).[180] Where data were not normally distributed we compared medians.[181] We considered a standardized difference of 0.1 to reflect significant between-group differences.[180]

3.4.2.3 Unadjusted Models and Final Adjusted Regression Model

The unadjusted associations between each explanatory variable and the outcome was calculated using univariate logistic regression models. Odds ratios (ORs) and associated 95% CIs were calculated for each variable. Variables with CIs excluding unity/one were considered statistically significant at the 5% level.

To explore adjusted associations and identify factors independently associated with involuntary hospitalization, we conducted multivariable logistic regression. We included variables associated with the criteria for involuntary admission, including the RHO scale, SOS scale, and the SCI, in the adjusted analysis in order to identify explanatory variables associated with involuntary hospitalization independent of these factors. To achieve a more parsimonious model, we used a variable selection procedure called augmented backward elimination (ABE) as described by Dunkler et al.[178]

3.4.2.3.1 Augmented Backward Elimination

Using a model selection procedure is useful in cases such as our study, in which important covariates are not known and we have a large number of potential explanatory variables.[178,182] Model selection procedures allow for an efficient method of screening a large number of variables.[182] Most variable selection procedures commonly used, such as forward selection, stepwise selection, and backward elimination, rely only on significance of p-values. These methods ignore the possibility of variables acting as confounding factors, in which their presence in the model changes the estimates of other variables in the model.[178,182] Unlike forward, stepwise, and backward selection, ABE uses both p-value cut-offs as well as a change-in-estimate criterion for variable selection. The change-in-estimate criterion is evaluated when a variable is eliminated from the model, and if any of the remaining parameter estimates change by a significant pre-specified threshold compared to the full model, this suggests the variable removed may be an important confounding factor. The resulting model includes variables that are strongly associated with the outcome, or may act as potential confounding factors, allowing for a richer model compared to other methods.[178,183]

The ABE algorithm incorporates the change-in-estimate criterion in a procedure similar to backward elimination. A mild significance level for p-value cut-offs is used (e.g., $\alpha = 0.20$), rather than the traditional $\alpha = 0.05$, in order to ensure potentially important factors are not eliminated.[184] The change-in-estimate criterion is then used to evaluate the variables not meeting the p-value cut-off. The change-in-estimate criterion in ABE is approximated using the parameter estimates of two variables (one passive, one active), their covariance, and the variance of the active variable. The significance of the change-in-estimate, where the null hypothesis is that the change-in-estimate is equal to zero, is then tested.

The role of explanatory variables in the model selection process can be specified as follows:

- “Passive or active” refers to variables that are used as passive as well as active when evaluating the change-in-estimate criterion.

- "Only passive" refers to an exposure variable of interest or a known confounder that is forced into the model regardless of significance or the change-in-estimate criterion.

- "Only active" refers to variables that, if the p-value cut-off is not met, should only be included if the change-in-estimate criterion is significant.

Below is a summary of how the ABE algorithm flows:

1. An initial working set of candidate variables is defined using appropriate clinical reasoning.

2. The significance threshold (α), change-in-estimate threshold (τ), and the roles of each variable in the initial working set (i.e., "passive or active," "only passive," or "only active") are defined.

3. An initial model is fit with the all variables from the working set.

4. The significance of all effects in the model is evaluated and a temporary "blacklist" is created including the set of variables that are either "passive or active" or "only active" and have p-values large than α, sorted in order of descending p-values.

5. The change-in-estimate criterion is evaluated, starting with the first variable on the "blacklist." The change-in-estimate criterion of the first variable is evaluated as active, and all other variables in the model as passive. If the variable does not meet the change-in-estimate criterion threshold (τ), the variable is deleted. The algorithm then goes back to step 3 with the updated working variable set. If there are no variables on the blacklist, the algorithm stops selecting the current working model as the preliminary final model.

In running the ABE algorithm, we set cut-offs based on the defaults recommended within the macro: $\alpha = 0.20$ for the significance level for retention of variables in the multivariable model, and $\tau = 0.05$ for the significance threshold for the change-in-

estimate criterion.[178] The initial working set of variables described in the Explanatory Variables section were entered into the SAS ABE macro written by Dunkler and Heinze.[185] Without prior knowledge of the relative degree of importance of each explanatory variable in the context of Ontario, all variables were entered into the algorithm as "active."

Results of a simulation study have demonstrated that ABE tends to select more variables and approximates the full unselected model with negligible differences in point estimates.[178] The authors of the ABE algorithm note that using ABE with the proposed default values for α and τ, this procedure is "at least as safe as application of [backward elimination], and is at least as good as, but often better than, including all available variables from the initial set for adjustment."[185]

3.4.2.3.2 Final Model

We used ABE to identify important potential risk factors for involuntary hospitalization. Following identification of these variables through ABE, the final model was run with categorizations for some variables for interpretation purposes, as these variables were treated as continuous in the selection procedure due to restrictions on variable type that can be entered in the SAS macro. These variables included age, migrant status, and level of insight.

3.4.2.3.3 Model Fit and Diagnostics

The model was explored using several strategies. Linearity of continuous variables against the logit of the outcome was evaluated using a component plus residuals plot to evaluate linearity of each variable in the context of all the variables in the final model. As an assessment of how well the final model fits the data, we used the Hosmer-Lemeshow goodness of fit test. This method involves dividing the sample into deciles according to predicted probabilities and calculating the observed and expected frequencies for each group. Differences between the observed and expected frequencies are evaluated using a chi-square test and the calculated p-value. A small p-value (< 0.05) suggests there are significant differences between the observed and expected frequencies, suggesting a poor model fit.

We assessed multicollinearity among explanatory variables by calculating variance inflation factor (VIF). A VIF greater than 10 suggests high collinearity among covariates. Variables with high VIF were investigated for possible removal from the model.

We examined the influence of potential outliers in the FP visits variable. Observations with extreme values were omitted from the final model and estimates recalculated to determine whether these observations influenced the estimates in the final model.

Chapter 4

4 Results

Our algorithm identified 18,645 incident cases of non-affective psychosis over the five-year case accrual period. Of those, we excluded 919 cases *post-hoc* due to a diagnosis change to affective or organic psychosis at the first hospitalization. Over the two-year follow-up, 5,635 cases experienced a first hospital admission after diagnosis to a psychiatric or medical bed on a voluntary or involuntary basis — this is the sample that was included in the descriptive analysis for our first objective. Within this sample, 5,184 cases were hospitalized to a psychiatric bed and were included in the analysis for our second objective. The inclusion/exclusion numbers are presented in Figure 4.1.

4.1 Sample Characteristics

Sample characteristics for the cohort at baseline are presented in Table 4.1. The majority of the sample were under the age of 25 (61%), with a mean age of 24.3 years (SD 5.5), and were male (65%). There were 32% of people residing in the two lowest income quintiles. Most of the people lived in an urban setting (91%) and were non-immigrants (82%). The index diagnoses present in the cohort were primarily split between schizophrenia (48%) and psychosis NOS (51%).

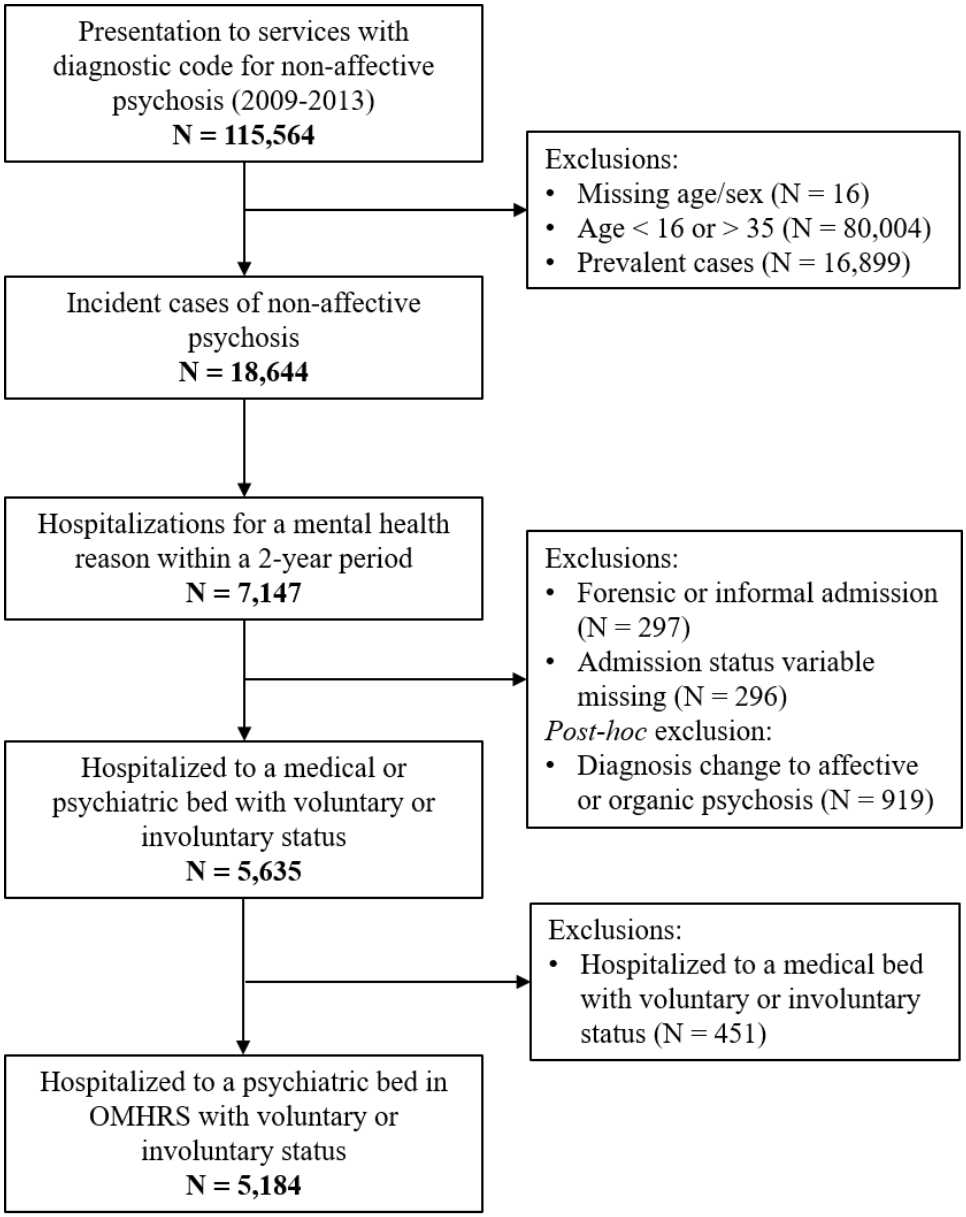


Figure 4.1 Flow diagram of cohort inclusion and exclusion numbers. Hospitalizations refer to the first hospitalization event following presentation to services for a non-affective psychotic disorder.

Table 4.1 Sample characteristics at baseline (N = 17,725)

	N	%
Age (years), mean (SD)	24.3 (5.5)	
16–20	5,662	32
21–25	5,079	29
26–30	3,752	21
31–35	3,232	18
Gender		
Male	11,448	65
Female	6,277	35
Income quintile[1]		
5 (highest)	4,845	28
4	3,692	21
3	3,197	19
2	2,981	17
1 (lowest)	2,591	15
Residence[2]		
Urban	15,908	91
Rural	1,508	9
Migrant status		
Non-immigrant	14,578	82
Immigrant	2,392	14
Refugee	755	4
Index diagnosis		
Schizophrenia	8,572	48
Schizoaffective disorder	110	0.6
Psychosis NOS	9,043	51

Abbreviations: SD, standard deviation, NOS, not otherwise specified

[1]15 missing observations

[2]51 missing observations

4.2 Objective 1

Our first objective was to estimate the proportion of young people with early psychosis in Ontario that were involuntarily hospitalized at first admission during the two-year period after first diagnosis.

4.2.1 First Hospitalizations Following Diagnosis

The hospitalizations for the study cohort are described in Table 4.2. More than one third (35%) of people were hospitalized within 2-years of the first diagnosis of non-affective psychosis, and 32% of the cohort was hospitalized on a voluntary or involuntary basis. The majority of hospitalizations occurred in psychiatric beds captured in OMHRS (29% of total cohort and 92% of hospitalizations). A small proportion of the cohort were initially hospitalized to medical beds (N = 451; 3%), however most were subsequently transferred to psychiatric beds in OMHRS (N= 330; 73%). Most of the hospitalizations occurred within the first six-months following diagnosis, and 25% occurred at the time of diagnosis. The mean time to hospitalization was approximately 5 months (SD 6.6), with a median of approximately 1.5 months (IQR 0–9). Two thirds (66%) of people were hospitalized due to their psychotic disorder, whereas 34% were hospitalized for other mental health reasons, the primary reason being a mood episode.

Table 4.2 Descriptive statistics of first hospitalizations following diagnosis on a voluntary or involuntary basis in the cohort over the 2-year follow-up

	N	%
Hospitalizations		
Total in cohort (N = 17,725)	5,635	32
Medical bed (DAD)	451	3
Psychiatric bed (OMHRS)	5,184	29
Time from diagnosis to first hospitalization (N = 5,635)		
Mean (SD), months	5.1 (6.5)	
At diagnosis	1,434	25
> 1 day to 1 month	1,061	19
> 1 month to 6 months	1,289	23
> 6 months to 1 year	876	16
> 1 year to 2 years	975	17
Main diagnosis at first hospitalization (N = 5,635)		
Schizophrenia	1,425	25
Schizoaffective disorder	319	6
Psychosis NOS	1,649	29
Other psychotic disorder	322	6
Mood disorder	1,108	20
Anxiety/adjustment disorder	290	5
Substance use disorder	400	7
Other[1]	122	2

Abbreviations: DAD, Discharge Abstract Database; OMHRS, Ontario Mental Health Reporting System; SD, standard deviation; NOS, not otherwise specified

[1]Includes personality disorders, social problems, sleeping disorders, eating disorders, conduct disorders

4.2.2 Involuntary Status at First Admission

Within the early psychosis cohort, 26% of patients (N = 4,546, 95% CI 25% to 26%) experienced an involuntary hospitalization at first admission within two years of diagnosis. Among voluntary or involuntary inpatients (N = 5,635), the majority were hospitalized involuntarily (N = 4,546; 81%; 95% CI 80%, 82%), which includes those admitted under a Form 1 or a Form 3 (Table 4.3). Of the 330 cases that were initially admitted to a medical bed and subsequently transferred to a psychiatric bed, only 23 cases (0.4% of the hospitalized sample) had discordant inpatient status between DAD and OMHRS (i.e., involuntary in DAD and voluntary in OMHRS, or vice versa). The most common type of involuntary admission was under an application for psychiatric assessment (Form 1) in 70% of involuntary cases (Table 4.3).

4.2.3 Reasons for Admission

The reason(s) for admission are captured in OMHRS as part of the RAI-MH. We observed some differences in the reasons for admission in those with involuntary status compared to those who were voluntary (Table 4.4). Involuntary patients, compared to voluntary patients, had a higher proportion of admissions as a threat or danger to self (50% versus 36%, respectively), as a threat or danger to others (34% versus 8%, respectively), or for an inability to care for self due to mental illness (50% versus 31%, respectively). These categories are not mutually exclusive, so patients may have more than one reason for admission documented.

Table 4.3 Inpatient status at the time of first admission among young people with early psychosis in Ontario over a 7-year period

	N	% in cohort (95% CI)	% among inpatients (95% CI)
First admission status			
Voluntary	1,089	6 (6, 7)	19 (18, 20)
Involuntary	4,546	26 (25, 26)	81 (80, 82)
	N	**% (95% CI)**	
Form for admission under the *MHA* among involuntary inpatients (N = 4,546)			
Form 1 (application for psychiatric assessment)	3,162	70 (68, 71)	
Form 3 (Certificate of Involuntary Admission)	1,384	30 (29, 32)	

Abbreviations: CI, confidence interval; *MHA*, *Mental Health Act*

Table 4.4 Reasons for admission indicated in the early psychosis sample hospitalized in psychiatric beds, by voluntary versus involuntary admission status (N = 5,184)

	Voluntary N = 983	Involuntary N = 4,208
Reason(s) for admission	**N (%)**	**N (%)**
Threat or danger to self	352 (36)	2,080 (50)
Threat or danger to others	83 (8)	1,406 (34)
Inability to care for self due to mental illness	302 (31)	2,084 (50)
Problem with addiction/dependency	259 (26)	1,130 (27)
Specific psychiatric symptoms	795 (81)	3,250 (77)
Involvement with criminal justice system, forensic admission	27 (3)	252 (6)
Other	48 (5)	120 (3)

4.3 Objective 2

Our second objective was to identify the sociodemographic, clinical, and service-related factors that are associated with involuntary hospitalization at first admission in early psychosis, independent of risk of harm to others, self-harm, and self-care.

4.3.1 Associations Among Explanatory Variables

Due to potential overlap and similarity in the continuous and ordinal clinical measures in the analysis, we considered the linear relationships among these variables by examining correlations (Table 4.5). We observed that self-care, as measured by the SCI, was moderately and positively correlated with the PSS-Short (ρ = 0.56), as well as insight (ρ = 0.59). The ABS was moderately and positively correlated with the RHO scale (ρ = 0.54), and close to moderately correlated with the mania scale (ρ = 0.45). No correlations, or weak correlations, were observed among the remaining clinical scale measures.

We also explored whether an index diagnosis of psychosis NOS, which is indicative of diagnostic instability, was potentially related to substance/alcohol use problems. There was a significantly higher proportion of people diagnosed with psychosis NOS that had current problems with substance/alcohol use compared to people diagnosed with schizophrenia spectrum disorders, however, the difference between groups was not large (55% versus 49%, respectively; Table 4.6).

Table 4.5 Correlation matrix of the continuous/ordinal clinical measures using Spearman's rank correlation coefficient (ρ; N = 5,184)

	PSS-Short	NSS	Mania Scale	DRS	RHO	SOS	SCI	ABS	Insight
PSS-Short	1	0.14	0.30	0.20	0.28	0.25	0.56	0.23	0.31
NSS		1	-0.08	0.25	0.00	0.19	0.20	-0.01	0.07
Mania Scale			1	0.36	0.40	0.04	0.33	0.45	0.28
DRS				1	0.18	0.22	0.22	0.23	0.11
RHO					1	0.10	0.36	0.54	0.33
SOS						1	0.16	0.04	0.02
SCI							1	0.35	0.59
ABS								1	0.32
Insight									1

Abbreviations: PSS-Short, Positive Symptom Scale-Short; NSS, Negative Symptom Scale; DRS, Depression Rating Scale; RHO, Risk of Harm to Others; SOS, Severity of Self-Harm; SCI, Self-Care Index; ABS, Aggressive Behaviour Scale

Table 4.6 Patterns of substance/alcohol use in those diagnosed with schizophrenia spectrum disorders versus psychosis NOS

	Schizophrenia spectrum N = 2,056	Psychosis NOS N = 3,110	Standardized difference[1]
Substance/alcohol use	**N (%)**	**N (%)**	
No indicators of problems with substance/alcohol use	921 (45)	1,244 (40)	0.10
Prior history of problematic substance/alcohol use	127 (6)	168 (5)	0.05
Current history of problematic substance/alcohol use	1,008 (49)	1,698 (55)	0.11

Abbreviations: NOS, not otherwise specified

[1]Standardized difference = difference in proportions ÷ pooled estimate of standard deviation. Standardized difference > 0.1 indicates a significant difference between groups.

4.3.2 Descriptive Analysis of Voluntary and Involuntary Patients

We analyzed each potential risk factor by voluntary versus involuntary status. The distribution of sociodemographic factors between voluntary and involuntary groups are described in Table 4.7. Compared to voluntary patients, there was a higher proportion of involuntary patients that were younger, male, and in the immigrant or refugee groups. We also observed a higher proportion of involuntary patients who had a social network that felt overwhelmed by the patient's illness.

The distributions of clinical variables across voluntary and involuntary groups are described in Table 4.8. We observed that a higher proportion of involuntary patients had an index diagnosis of psychosis NOS, were hospitalized due to their psychotic disorder as opposed to other mental health reasons, and were hospitalized within at the time of the initial diagnosis. We also observed that there was a higher proportion of involuntary patients with no insight into their mental illness and current problems with substance/alcohol use. There was a higher proportion of voluntary patients that did not have medication adherence issues reported. We observed higher levels of positive and mania symptoms in involuntary patients compared to voluntary, as well as greater severity of problems with self-care, risk of harm to others, and aggression.

The distributions of service use variables between voluntary and involuntary groups are described in Table 4.9. There was a large difference in the proportion of patients with police involvement in the involuntary versus voluntary groups, with a higher proportion of involuntary patients having recent police involvement. We also observed a lower proportion of involuntary patients having recent contact with a community-based mental health service. Involuntary patients tended to have fewer FP visits for a mental health reason compared to voluntary patients.

Table 4.7 Descriptive analysis of sociodemographic variables by voluntary and involuntary status at first admission (N = 5,184)

Sociodemographic variables	Voluntary N = 983 N (%)	Involuntary N = 4,208 N (%)	Standardized difference[1]
Age (years)			
16–20	287 (29)	1,441 (34)	0.10
21–25	260 (27)	1,368 (33)	0.13
26–30	224 (23)	807 (19)	0.09
31–35	205 (21)	592 (14)	0.18
Gender			
Male	572 (59)	2,795 (66)	0.16
Female	404 (41)	1,413 (34)	0.16
Residence[2]			
Urban	883 (91)	3,833 (91)	0.02
Rural	91 (9)	362 (9)	0.02
Income quintile[3]			
5 (highest)	163 (17)	600 (14)	0.07
4	169 (18)	693 (17)	0.02
3	179 (19)	788 (19)	0.01
2	204 (21)	853 (21)	0.01
1 (lowest)	253 (26)	1,231 (30)	0.08
Migrant status			
Non-immigrant	834 (86)	3,297 (78)	0.19
Immigrant	110 (11)	666 (16)	0.13
Refugee	32 (3)	245 (6)	0.12
Living alone[4]			
No	773 (80)	3,421 (82)	
Yes	198 (20)	774 (19)	0.05
Patient's last residence considered temporary[4]			
No	678 (70)	3,037 (72)	
Yes	293 (30)	1,158 (28)	0.06
Patient's social network feels overwhelmed by illness[4]			
No	631 (65)	2,268 (54)	
Yes	340 (35)	1,927 (46)	0.22

[1]Standardized difference = difference in proportions ÷ pooled estimate of standard deviation. Standardized difference > 0.1 indicates a significant difference between groups.[180]
[2]15 missing observations
[3]51 missing observations
[4]18 missing observations

Table 4.8 Descriptive analysis of clinical variables by voluntary and involuntary status at first admission (N = 5,184)

Clinical variables	Voluntary N = 983 N (%)	Involuntary N = 4,208 N (%)	Standardized difference[1]
Index diagnosis			
Schizophrenia spectrum	478 (49)	1,582 (38)	0.23
Psychosis NOS	498 (51)	2,626 (62)	0.23
Hospitalized due to psychotic disorder			
No	456 (47)	1,233 (29)	
Yes	520 (53)	2,975 (71)	0.36
Time from diagnosis to hospitalization			
At diagnosis	181 (19)	1,131 (27)	0.20
> 1 day to 1 month	174 (18)	776 (18)	0.02
> 1 month to 6 months	296 (30)	861 (21)	0.23
> 6 months to 1 year	167 (17)	651 (16)	0.04
> 1 year to 2 years	158 (16)	789 (19)	0.07
Insight			
Full	227 (23)	347 (8)	0.42
Limited	623 (64)	2,404 (57)	0.14
None	121 (13)	1,444 (34)	0.54
Current problems with substance/alcohol use[2]			
No	526 (54)	1,934 (46)	
Yes	445 (46)	2,261 (54)	0.16
Medication adherence			
No problems with adherence	570 (58)	1,487 (35)	0.48
Problems with adherence	249 (26)	1,605 (38)	0.27
Not on medication	88 (9)	689 (16)	0.22
Missing/unknown	69 (7)	427 (10)	0.11
Prior trauma[3]			
No	602 (62)	2,903 (69)	
Yes	368 (38)	1,288 (31)	0.15
	Median (IQR)	**Median (IQR)**	**Standardized difference[1]**
Positive Symptoms Scale-Short (0–12)[2]	2 (0-5)	4 (1-6)	0.40
Negative symptom scale (0–12)[2]	2 (0-6)	2 (0-6)	0.08
Depression Rating Scale (0–14)[2]	3 (1-4)	3 (1-5)	0.04
Mania Scale (0–20)[2]	0 (0-3)	2 (0-6)	0.50
Self-Care Index (0–6)[2]	1 (1-2)	2 (1-4)	0.49
Severity of Self-Harm (0–6)[2]	2 (0-3)	2 (1-3)	0.11
Risk of Harm to Others (0–6)[2]	1 (0-2)	2 (1-5)	0.67
Aggressive Behaviour Scale (0–12)[2]	0 (0-0)	0 (0-3)	0.65

Abbreviations: NOS, not otherwise specified; IQR, interquartile range

[1]Standardized difference = difference in medians or proportions ÷ pooled estimate of standard deviation.[180,181] Standardized difference > 0.1 indicates a significant difference between groups.[180]

[2]18 missing observations, [3]23 missing observations

Table 4.9 Descriptive analysis of service use variables by voluntary and involuntary status at first admission (N = 5,184)

Service use variables	Voluntary N = 983 N (%)	Involuntary N = 4,208 N (%)	Standardized difference[1]
Police involvement (past 7 days)[2]			
No	915 (94)	2,738 (65)	
Yes	55 (6)	1,453 (35)	0.78
Contact with a community-based mental health service or outpatient clinic (past 30 days)[2]			
No	547 (56)	2,860 (68)	
Yes	424 (44)	1,335 (32)	0.25
One or more psychiatric hospital admissions (past 2 years)[3]			
No	427 (44)	1,996 (48)	
Yes	544 (56)	2,199 (52)	0.07
	Median (IQR)	**Median (IQR)**	**Standardized difference[1]**
Number of FP visits for a mental health reason (past 6 months)	1 (0-4)	1 (0-3)	0.15

Abbreviations: IQR, interquartile range; FP, family physician

[1]Standardized difference = difference in medians or proportions ÷ pooled estimate of standard deviation.[180,181] Standardized difference > 0.1 indicates a significant difference between groups.[180]

[2]23 missing observations

[3]18 missing observations

4.3.3 Unadjusted Models and Final Adjusted Regression Model

We included all sociodemographic, clinical, and service use variables in an ABE selection procedure, including the variables representing the criteria for involuntary admission (i.e., the RHO scale, SOS scale, and the SCI). The variables in the final model met the pre-specified p-value cut-off of 0.2. Removing variables that did not meet the p-value cut-off did not significantly change the model estimates.

Unadjusted and adjusted findings among sociodemographic variables are presented in Table 4.10. Among sociodemographic factors, age and migrant status remained significant in the final adjusted model. Those in the oldest age group of 31 to 35 years had 30% lower odds (95% CI 0.56, 0.89) of an involuntary first admission compared to the youngest reference age group of 16 to 20 years. The odds of involuntary first admission for immigrants and refugees was 1.45 (95% CI 1.14, 1.84) and 1.82 (95% CI 1.21, 2.72) times higher than non-immigrants, respectively. Factors that were significantly associated with involuntary first admission in an unadjusted model, but not in the context of the adjusted model, included gender, residing in the lowest income quintile, and having a social network that feels overwhelmed by the patient's illness.

Table 4.11 shows the associations of clinical factors with involuntary hospitalization. These results suggest that an index diagnosis of psychosis NOS (versus schizophrenia spectrum) was associated with a higher likelihood of involuntary first admission (OR 1.40, 95% CI 1.20, 1.64). Those hospitalized due to their psychotic disorder had higher odds of an involuntary first admission compared to those hospitalized for other mental health reasons (OR 1.55, 95% CI 1.31, 1.83). Poor insight remained associated with a higher likelihood of involuntary status in the adjusted model, although the effects were attenuated. Those with no insight had almost three times the odds of an involuntary first admission compared to those with full insight (OR 2.80, 95% CI 2.11, 3.11). While the association between medication adherence and involuntary hospitalization remained in the context of the adjusted model, we observed a decrease in the effects. Those with adherence problems had 1.4 times (95% CI 1.17, 1.71), and those not on medication had 1.5 times (95% CI 1.17, 2.01) the odds of an involuntary first admission compared to those who were on medication and adherent. Similar to the unadjusted association,

experiencing prior trauma was associated with a 26% decrease in the odds of involuntary admission (OR 0.74, 95% CI 0.63, 0.88).

Among the symptom scales, the decrease in the odds of involuntary hospitalization associated with negative symptoms remained significant in the adjusted model (OR 0.98, 95% CI 0.96, 1.00). While depression was not associated with an involuntary first hospitalization in an unadjusted model, we observed that greater severity of depressive symptoms was associated with a decreased likelihood of involuntary hospitalization in the adjusted model (OR 0.96, 95% CI 0.93, 1.00). Greater severity of mania symptoms remained significantly associated with increased odds of involuntary first admission (OR 1.05, 95% 1.02, 1.08). Current problems with substance/alcohol use was significantly associated with involuntary hospitalization in an unadjusted model, and although this variable met the p-value cutoff for inclusion in the final model, it was not significant in the context of the multivariable model. Although being hospitalized after diagnosis was generally associated with an unadjusted decreased likelihood of involuntary first admission, this factor was not significant in the adjusted model. Among the behaviour scales, greater severity of self-harm (OR 1.16, 95% CI 1.10, 1.08), risk of harm to others (OR 1.12, 95% CI 1.06, 1.18), and aggressive behaviour (OR 1.16, 95% CI 1.08, 1.23) were all associated with an increased likelihood of involuntary admission, while adjusting for other factors. Greater severity of positive symptoms and problems with self-care were significantly associated with involuntary hospitalization in unadjusted models, however, these effects were not significant in the adjusted model and were not selected for inclusion in the final model.

Associations between service use factors and an involuntary first hospitalization are described in Table 4.12. Police involvement was strongly associated with involuntary hospitalization. Although there was a decrease in effects compared to the unadjusted association, police involvement remained strongly associated with a higher likelihood of an involuntary first hospitalization while adjusting for other factors (OR 5.10, 95% CI 3.80, 6.85). Prior contact with a community-based mental health service (OR 0.73, 95% CI 0.62, 0.86), and FP visits for a mental health reason (OR 0.98, 95% CI 0.96, 1.00) had significant protective effects in the final adjusted model. Prior psychiatric admissions in

the past two-years was associated with significantly lower odds of involuntary first admission in an unadjusted model, and although this variable met the p-value cutoff for inclusion in the final multivariable model, it was not significant when adjusting for other factors.

Table 4.10 Unadjusted logistic regression models and adjusted findings following ABE selection of sociodemographic factors associated with an involuntary first hospitalization in young people with early psychosis (N = 5,184)

Sociodemographic variables	Unadjusted OR	95% CI	Adjusted OR[1]	95% CI
Age (years)				
16–20	Reference		Reference	
21–25	1.05	0.87, 1.26	1.09	0.89, 1.33
26–30	0.72	0.59, 0.87	0.84	0.67, 1.04
31–35	0.58	0.47, 0.71	0.70	0.56, 0.89
Gender				
Male	Reference			
Female	0.72	0.62, 0.83		
Residence[2]				
Urban	Reference			
Rural	0.92	0.72, 1.17		
Income quintile[3]				
5 (highest)	Reference			
4	1.11	0.88, 1.42		
3	1.20	0.94, 1.52		
2	1.14	0.90, 1.43		
1 (lowest)	1.32	1.06, 1.65		
Migrant status				
Non-immigrant	Reference		Reference	
Immigrant	1.53	1.24, 1.90	1.45	1.14, 1.84
Refugee	1.94	1.33, 2.82	1.82	1.21, 2.72
Living alone[4]				
No	Reference			
Yes	0.88	0.74, 1.05		
Patient's last residence considered temporary[4]				
No	Reference			
Yes	0.88	0.76, 1.03		
Patient's social network feels overwhelmed by illness[4]				
No	Reference			
Yes	1.58	1.36, 1.82		

Abbreviations: ABE, augmented backward elimination; OR, odds ratio; CI, confidence interval
[1]Adjusted for other sociodemographic, clinical (Table 4.11), and service use factors (Table 4.12) selected for inclusion in the multivariable model using ABE
[2]15 missing observations
[3]51 missing observations
[4]18 missing observations

Table 4.11 Unadjusted logistic regression models and adjusted findings following ABE selection of clinical factors associated with an involuntary first hospitalization in young people with early psychosis (N = 5,184)

Clinical variables	Unadjusted OR	95% CI	Adjusted OR[1]	95% CI
Index diagnosis				
Schizophrenia spectrum	Reference		Reference	
Psychosis NOS	1.59	1.39, 1.83	1.40	1.20, 1.64
Hospitalized due to psychotic disorder				
No	Reference		Reference	
Yes	2.12	1.84, 2.44	1.55	1.31, 1.83
Time from diagnosis to hospitalization				
At diagnosis	Reference			
> 1 day to 1 month	0.71	0.57, 0.90		
> 1 month to 6 months	0.47	0.38, 0.57		
> 6 months to 1 year	0.62	0.50, 0.79		
> 1 year to 2 years	0.80	0.63, 1.01		
Insight				
Full	Reference	2.10, 3.05	Reference	
Limited	2.52	6.08,	1.69	1.37, 2.08
None	7.80	10.02	2.80	2.11, 3.71
Current history of problematic substance use[2]				
No	Reference		Reference	
Yes	1.38	1.20, 1.59	1.11	0.95, 1.31
Medication adherence				
No problems with adherence	Reference		Reference	
Problems with adherence	2.47	2.10, 2.91	1.42	1.17, 1.71
Not on medication	3.00	2.36, 3.82	1.53	1.17, 2.01
Missing/unknown	2.37	1.81, 3.11	1.44	1.06, 1.95
Prior trauma[3]				
No	Reference		Reference	
Yes	0.73	0.63, 0.84	0.74	0.63, 0.88
Positive Symptoms Scale-Short (0–12)[2]	1.14	1.11, 1.16		
Negative symptom scale (0–12)[2]	0.98	0.96, 1.00	0.97	0.95, 0.99
Depression Rating Scale (0–14)[2]	1.02	0.99, 1.05	0.96	0.93, 1.00
Mania Scale (0–20)[2]	1.15	1.12, 1.18	1.05	1.02, 1.08
Self-Care Index (0–6)[2]	1.31	1.26, 1.37		
Severity of Self-Harm (0–6)[2]	1.07	1.02, 1.12	1.16	1.10, 1.22
Risk of Harm to Others (0–6)[2]	1.44	1.38, 1.50	1.12	1.06, 1.18
Aggressive Behaviour Scale (0–12)[2]	1.46	1.38, 1.55	1.16	1.08, 1.23

Abbreviations: ABE, augmented backward elimination; OR, odds ratio; CI, confidence interval, NOS, not otherwise specified

[1]Adjusted for other sociodemographic (Table 4.10), clinical, and service use factors (Table 4.12) selected for inclusion in the multivariable model using ABE

[2]18 missing observations

[3]23 missing observations

Table 4.12 Unadjusted logistic regression associations and adjusted findings following ABE selection of service use factors associated with an involuntary first hospitalization in young people with early psychosis (N = 5,184)

Service use variables	Unadjusted OR	95% CI	Adjusted OR[1]	95% CI
Police involvement (past 7 days)[2]				
No	Reference	6.68,	Reference	
Yes	8.83	11.67	5.10	3.80, 6.85
Contact with a community-based mental health service or outpatient clinic (past 30 days)[3]				
No	Reference		Reference	
Yes	0.60	0.52, 0.69	0.73	0.62, 0.86
One or more psychiatric hospital admissions (past 2 years)[3]				
No	Reference		Reference	
Yes	0.87	0.75, 1.00	0.88	0.75, 1.04
Number of FP visits for a mental health reason (past 6 months)	0.96	0.94, 0.97	0.98	0.96, 1.00

Abbreviations: ABE, augmented backward elimination; OR, odds ratio; CI, confidence interval; FP, family physician

[1]Adjusted for other sociodemographic (Table 4.10), clinical, and service use factors (Table 4.12) selected for inclusion in the multivariable model using ABE

[2]23 missing observations

[3]18 missing observations

4.3.4 Model Fit and Diagnostics

We examined the assumption of a linear association between continuous variables in the final model (Negative Symptom Scale, DRS, Mania Scale, SOS, RHO, ABS, and number of FP visits) with the logit of the outcome using component plus residuals plots. We did not observe any substantial deviations from linearity for any variables in the context of the final model (data not shown). The Hosmer-Lemeshow goodness-of-fit test indicated no evidence of poor model fit ($p = 0.16$).

We examined variance inflation factor (VIF) for problems with multicollinearity in the final model. The highest VIF was 4.3, with a mean of 2.2 across all variables, suggesting that multicollinearity was not problematic in the final model. We further investigated the possibility of multicollinearity by removal of clinical variables in the final model that we observed to be strongly correlated. Specifically, we removed the ABS, since it was strongly correlated with the Mania Scale and the RHO scale, and recalculated estimates. We observed no difference in estimates when the ABS was removed compared to when it was included in the model.

We observed some potential outliers in the FP visits variable, with some observations having more than 30 visits in the six-months prior to hospitalization ($N = 11$). However, removal of these observations and recalculation of adjusted estimates in the final model did not change our findings.

Chapter 5

5 Discussion

To our knowledge, this is the first Canadian study on involuntary hospitalization among young people with early psychosis from a large sample collected across many facilities using health administrative data. We identified 17,725 incident cases of non-affective psychosis after *post-hoc* exclusions. There were 5,635 cases hospitalized during follow-up on a voluntary or involuntary basis. We observed that approximately one in four early psychosis patients experienced an involuntary hospitalization at first admission within two years of diagnosis over a seven-year period. Among those who had a first admission within two years of diagnosis, the majority of hospitalizations were involuntary (81%). Guided by the existing literature, we also explored factors associated with an involuntary first hospitalization and identified sociodemographic, clinical, and service-related risk factors associated with involuntary hospitalization in early psychosis, independent of the criteria for an involuntary admission (risk of harm to others, self-harm, and self-care). We found that people who were younger at first diagnosis or in immigrant or refugee groups were more likely to be hospitalized involuntarily at first admission. In terms of clinical variables, we observed that people diagnosed with psychosis NOS, those hospitalized due to their psychotic disorder (as opposed to other mental health reasons at follow-up), poor insight, having problems with medication adherence or not on medication, and people with more severe mania or behavioural symptoms (self-harm, risk of harm to others, aggression) had a higher likelihood of involuntary first admission. We also found that those with prior trauma, more severe negative symptoms, or depression were less likely to have involuntary status. We observed that service use factors were important — people with recent police involvement had the highest likelihood of involuntary admission, while those having recent contact with a community-based mental health service were less likely to have an involuntary first admission. As well, having prior mental health-related FP visits provided some protective effects. This chapter discusses and interprets our findings in the context of the literature, and addresses the strengths and limitations of our study, the implications of our findings, and future directions.

5.1 Objective 1

For our first objective, there were 5,635 total voluntary or involuntary hospitalizations within two years following incident diagnosis. Among this early psychosis inpatient group, 4,546 (81%) were hospitalized involuntarily at first admission. Our findings are similar to the estimated prevalence of 74% of all psychiatric admissions through EDs in Ontario as involuntary over a 5-year period.[186] Based on estimates of involuntary hospitalization in other settings from large-scale registry studies,[79–81,187] our findings indicate that Ontario has a higher proportion of involuntary hospitalizations. The proportion of early psychosis patients in Ontario who experienced an involuntary hospitalization was approximately 1.2 to 8.1 times higher than in other settings described in the literature review, including Taiwan,[79] Denmark,[82] Israel,[81] and Finland.[80] Differences across countries are expected, and are partially due to legislative differences. Finland has relatively high rates of involuntary hospitalization among European countries[188] and had the highest proportion of involuntary patients from our literature review, at 66%.[80] Finland's high rates have partially been attributed to legislation regarding involuntary hospitalization due to the need for treatment. In many other European countries (e.g., Germany), this criterion is also dependent on the patient's inability to give informed consent to treatment.[189] However, in Finland, patients can be detained for their own health regardless of their capacity to consent to treatment, which is similar to legislation in Ontario.[189] At 10%, Taiwan had the lowest proportion of involuntary early psychosis patients.[79] A low proportion of involuntary patients in Taiwan has been noted across all psychiatric emergency services and has been attributed to narrower criteria for detainment compared to Canada and other European settings, including: psychotic state, non-compliance with treatment, and dangerous behaviour.[190] Furthermore, involuntary hospitalization rates have also been shown to be influenced by differences in legal procedures, psychiatric services, patient demographics and characteristics, ethics and attitudes of professionals, and the public's perception about risk arising from mental illness.[189]

The proportion of early psychosis patients in Ontario with involuntary status at first admission is substantial. Rates of involuntary admissions have been linked to the

availability of psychiatric hospital beds.[191,192] As a result of deinstitutionalization and the shift towards community-based care, provisions for psychiatric hospital beds have been decreasing over time.[193] In Canada, the process of deinstitutionalization starting in the late 1960s has been associated with a decline in the number of psychiatric beds per capita, such that bed capacity has decreased by 71% from 1965 to 1981, and this has been associated with a 42% decrease in days of care from 1985 to 1999.[194] In Ontario, the target of 35 beds per 100,000[45] is less than recommendations from the Canadian Psychiatric Association of 50 per 100,000,[195] suggesting that the target bed number may be insufficient to adequately meet the needs of patients in a crisis who require hospitalization as part of the treatment continuum.[196] Accompanying the decrease in hospital beds has been an increase in community-based services and spending on community-based services during this time,[194] however it may be that these services have contributed to reducing voluntary rather than involuntary admissions.[191,197] It has been suggested that the reduction in psychiatric hospital beds in Ontario in response to a shift to community care has created a crisis-driven system, in which there are only enough beds available for people admitted involuntarily.[198] A lack of sufficient resources provided at the community level, coupled with the reduction in psychiatric hospital beds, leads to an over-reliance on crisis-oriented care and emergency services.[198] Our findings, showing a high proportion of involuntary patients in our cohort, along with a low proportion of admitted patients accessing community-based mental health services prior to admission (34%), supports this.

In addition to these system-level factors, other ecological factors likely play a role in the high proportion of involuntary admissions observed in Ontario, such as socioeconomic deprivation and size of ethnic minority populations.[199] However, the specific role of these factors in involuntary hospitalization in early psychosis in Ontario has not been investigated.

5.2 Objective 2

Results from multivariable logistic regression analyses suggest a number of sociodemographic, clinical, and service-related factors are associated with involuntary hospitalization among young people with early psychosis in Ontario.

Sociodemographic Factors

This is the first study to report a significant relationship between age and involuntary status. Those in the older age group of 31 to 35 had 30% lower odds of an involuntary admission compared to the 16 to 20 age group. Prior studies adjusting for other factors have not observed a relationship between age and involuntary status.[83,86–89,91] However, none of these studies limited their sample to young adults in their inclusion criteria (i.e., < 35) and had samples that were on average older than in our study. As a result, the effect of age of onset may not be as apparent. Our finding that people in their 30s had a lower likelihood of involuntary first hospitalization were similar to another large register study from Denmark, observing that the age group 31 to 30 had lower odds of experiencing any type of involuntary treatment compared to those 18 to 30 years.[200] A register study from the UK observed that age was associated with involuntary hospitalization, particularly young adulthood (18 to 35 years).[199] It is unclear, however, what the mechanisms are behind this finding. Keown et al. observed an association between age and urban environments, with rural areas having low proportions of young adults.[199] Although we observed that living in a rural setting was not associated with involuntary hospitalization, we did not investigate the possibility of interaction effects, therefore we cannot rule out this hypothesis. This observation may also be influenced by differences in symptom course and severity for those with adult onset of psychosis versus adolescent onset (before age 18). Longer DUP in adolescent-onset psychosis compared to adult-onset may contribute to the necessity for treatment, and adolescents may be more likely to reach a crisis state, necessitating involuntary admission.[201,202] However, findings from our literature review suggest the relationship between DUP and involuntary hospitalization is unclear. Adolescents are also more likely to have more severe expression of illness, lower premorbid social/emotional adjustment, cognitive impairments, bizarre behaviour, and negative symptoms compared to adults, which may affect the differences in likelihood of involuntary admission between these groups.[201,203]

Immigrant and refugee groups had 45% and 82% higher odds of an involuntary first hospitalization, respectively, compared to non-immigrants. Only one study from our literature review investigated migrant status directly and did not find a significant association.[86] Our finding that refugee status was associated with a higher likelihood of

involuntary hospitalization is novel in the context of early psychosis, as our study is the first to investigate this factor in this population. However, a higher likelihood of involuntary admission among migrant groups has been observed in the broader literature of involuntary hospitalization in European countries.[204–207] One study reported that the effect of migrant status was no longer significant after controlling for symptoms and behavioural factors, suggesting that differences in involuntary hospitalization among migrants are due to differences in clinical presentation.[207] We did not find such evidence, after adjusting for symptom and behavioural severity. It has also been observed that there is an underutilization of mental health services among migrant groups.[205] While some differences in service utilization have been observed among migrants in Ontario, including lower intensity of primary care use, and lower use of psychiatric services among Caribbean migrants,[164] our adjustment for service use factors suggest service utilization differences in terms of primary care and community mental health contact do not fully explain the differential risk by migrant status. Other possible explanations for our findings that migrant status is a risk factor for involuntary hospitalization independent of sociodemographic characteristics, symptom and behaviour severity, and service utilization include language and communication barriers, higher levels of social disadvantage, or more pronounced stigma leading to social isolation and delay in help-seeking.[204] Future studies are needed to understand the mechanisms underlying this finding.

Clinical Factors

We observed that those who were hospitalized due to their psychotic disorder increased the odds of an involuntary first admission by 55% compared to those hospitalized for other mental health reasons. This association has been consistently observed in studies of involuntary hospitalization among all psychiatric inpatients.[186,188,208,209] In particular, it has been documented that people with schizophrenia represent the majority of involuntary hospitalizations.[188,209] However, we observed that those initially diagnosed with psychosis NOS had a 40% increased odds of an involuntary first hospitalization compared to people diagnosed with schizophrenia spectrum disorders. Our findings are not comparable to findings from studies in our literature review, as no studies included psychosis NOS as a separate diagnostic category. Previous studies finding schizophrenia

was associated with a higher likelihood of involuntary hospitalization compared to other psychoses have speculated that this may be due to a lack of insight or inadequate social support.[87] Our adjustment for these factors in our analysis may have contributed to reducing the effect of a diagnosis of schizophrenia. It is difficult to interpret our finding that psychosis NOS was associated with higher odds of involuntary hospitalization due to the diagnostic instability of this category and the use of this diagnosis as a "catch-all" in practice.[20] Evidence at 10-year follow-up following a first-episode of psychosis cohort suggests that a diagnosis of psychosis NOS "reveal[s] no immediately obvious patterns or utility in terms of describing a course of symptoms."[210] In that case, it is difficult to discern what the differences are between these two groups that may impact involuntary hospitalization without understanding diagnostic stability in practice in Ontario. Of note, the diagnosis of psychosis NOS was used frequently in our cohort — 51% (N = 9,043) of patients at the index date and in 29% (N = 1,649) of patients at hospitalization — suggesting further investigation into the use of this diagnostic category in Ontario is warranted to better understand the characteristics of this group and ongoing mental health service needs.

We found poor insight to be significantly associated with an involuntary first hospitalization, consistent with findings from our literature review.[89] Similar to Kelly et al.,[89] we observed that lack of insight was associated with involuntary hospitalization independent of positive and negative symptom severity, which have been shown to be negatively associated with poor insight.[115,211] Kelly et al. hypothesized that the importance of insight in increasing the likelihood of involuntary hospitalization may be related to reduced adherence observed in those with lack of insight,[89,115] however, our study has provided evidence that poor insight is associated with involuntary hospitalization, independent of adherence. Our findings also suggest that insight is associated with involuntary hospitalization independent of depressive symptoms, which have been shown to be associated with insight.[115,211,212] In addition to independent associations, we did not observe a correlation between the DRS and insight in our study. Methodological factors such as instrument used to assess depression and the phase of illness can significantly influence this association,[212] therefore it may be that measures within the RAI-MH were not sufficient to capture this correlation. Our findings support

the possibility that the association between lack of insight and involuntary hospitalization may be more of a direct relationship. It may be that those assessed as having limited or no insight in our study are impaired in the domain of insight related to understanding the need for treatment, in which case they may be less likely to consent to hospitalization.

We also found that having poor adherence, or not being on medication, was associated with an increased likelihood of an involuntary first hospitalization, independent of insight and symptom severity, which is consistent with findings from our literature review.[131,132] The association between poor adherence and involuntary hospitalization may be related to relapse risk. Discontinuation of medication is associated with relapse over a 1-year period.[213] Even partial adherence has been associated with breakthrough of symptoms, loss of functioning, and ultimately leading to relapse.[214] The impact of adherence on involuntary hospitalization may also be related to levels of functioning in those with poor adherence,[131] which we did not directly account for in our analysis.

Prior trauma is not a widely explored risk factor for involuntary hospitalization. Our finding that prior trauma has a protective effect is inconsistent with the limited evidence available showing no or limited effects of prior trauma in specific groups.[141] However, in a study on the use of control interventions (e.g., seclusion or restraints) among all psychiatric admissions in Ontario using OMHRS records, prior trauma was similarly found to be a protective factor.[215] It is possible that this finding may be related to problems in accurate data collection. For newly admitted patients who are in the midst of a psychiatric crisis or an acutely psychotic state, clinicians may not accurately capture a detailed trauma history. However, considering the possibility that these data accurately reflect trauma histories of people in our cohort, potential mechanisms underlying these findings are unclear. An explanation may be that the psychotic disorder is a misdiagnosis of PTSD, major depression, or an adjustment disorder, which has been shown to occur among ethnic minority and immigrant populations,[216] and subsequently differences in presentation of misdiagnosed psychotic disorder contribute protective effects on the risk of subsequent involuntary hospitalization. The protective effects may also be related to prior service use. Trauma exposure has been independently associated with greater mental healthcare utilization.[217,218] It may be that those with prior trauma in our cohort

have different patterns of service utilization other than what we accounted for in our analysis, which contributed to a protective effect of involuntary hospitalization. In Ontario, it has been observed that adults 15 to 40 years of age reporting childhood abuse have significantly higher health care utilization compared to those who did not report childhood abuse. Specifically, this group showed higher use of the ED and other professionals (including nurses, dentists, chiropractors, physiotherapists and medical specialists), and were more likely to report physical health problems, suggesting more contacts with healthcare professionals for medical reasons, compared to those without.[219]

In terms of specific symptomatology associated with involuntary admission, we found that severity of mania symptoms, but not positive symptoms, were independently associated with involuntary status at first admission. Findings from our literature review suggest that despite higher levels of positive symptoms in involuntary groups, positive symptoms were not an independent risk factor for involuntary hospitalization,[89,91] which is consistent with our results. In terms of mania symptoms, our study was the first to examine severity mania symptoms directly while adjusting for other factors. However, our findings are consistent with the few studies that investigated this factor in the literature review — mania symptoms were significantly more severe in the involuntary group, similar to Barbeito et al.'s results.[105] Our observation that mania symptoms, but not positive symptoms, were associated with involuntary hospitalization are supported by Morgan et al.'s observation that a diagnosis of manic psychosis was associated with a higher likelihood of involuntary hospitalization compared to schizophrenia.[83] It is unclear, however, why presentation with more severe mania symptoms were associated with an increased likelihood of involuntary hospitalization. Symptoms of mania have been associated with violence,[38] however, our adjustment for violence within the RHO scale suggests violence may not explain this association. It may be that the increased agitation and irritability associated with mania symptoms contribute to an unwillingness to be hospitalized.

Increasing severity of negative symptoms and depression were associated with decreases in the likelihood of an involuntary first admission. It is unclear why negative symptoms were shown to have protective effects, since negative symptoms are more difficult to treat

than positive symptoms and associated with worse functional outcomes.[220,221] For those with severe negative symptoms, it may be that these symptoms act as an emotional buffer to the prospect of a stressful hospitalization event, contributing to a decreased likelihood of an involuntary hospitalization, as has been hypothesized as a mechanism behind the development of PTSD following traumatic exposure in schizophrenia.[222] Negative symptoms may also confer protection in terms of other factors related to involuntary hospitalization, such as suicidality. For example, negative symptoms have been associated with a significantly decreased risk for death by suicide.[223] Stronger negative symptoms, such as avolition and amotivation, may prevent people from actively engaging in making deliberate suicide plans.[223] Cougnard et al. similarly observed depressive symptoms to be associated with a decreased likelihood of involuntary admission when controlling for other sociodemographic, clinical, and service-related factors.[87] The authors hypothesized this may be the result of the positive association between anxiety/depressive symptoms and good insight.[87] Our findings suggest the association may be independent of insight. However, it is possible there may be residual confounding with the single-item measurement of insight within the RAI-MH, as measures consisting of multiple items are generally more stable and reliable than single-item measures.[115]

Specific behavioural symptoms that were associated with involuntary status at first admission included having increased risk of self-harm, harm to others, and aggression, but not problems with self-care. Considering risk of harm to others and self-harm are part of both the Box A and Box B criteria for a Form 1 and Form 3, it not surprising that these factors independently predicted involuntary hospitalization. Problems with self care may be related to a Form 1, as the person has to have shown a lack of competence to care for himself or herself, as well as the impairment criteria in both Box A and Box criteria in a Form 1 and Form 3, which may explain why we observed significantly higher mean scores on the SCI in the involuntary group. However, our findings indicate that self-care problems were not a significant risk factor when accounting for other sociodemographic, clinical, and service-related factors. It is interesting that both risk of harm to others and aggression were independently associated with involuntary hospitalization, suggesting that aggressive behaviour that does not pose a risk of harm to others may still be sufficient to precipitate an involuntary admission. Similarly, people who are not

outwardly aggressive, but maybe displaying homicidal or violent ideation may have an increased likelihood of involuntary hospitalization.

Service Use Factors

Among all the risk factors examined in our study, having police involvement in the seven-days prior to first admission was the strongest factor associated with involuntary status. Specifically, 35% of involuntary patients had police involvement in the past seven days, compared to only 6% of voluntary patients, and those with police involvement had more than 5-times the odds of an involuntary admission compared to those without. Our findings are consistent with Morgan et al.'s study in which police involvement was the strongest predictor of involuntary admission, with more than 7-times the likelihood of an involuntary admission in those with criminal justice referral, while adjusting for other sociodemographic, clinical, and service use factors.[83] Findings from studies in Ontario of psychiatric involuntary admissions in EDs have similarly observed that police involvement leads to the highest likelihood of involuntary admission, suggesting this trend is not specific to people with early psychosis.[186,224] This is likely due to the involvement of police as part of the involuntary hospitalization process. In cases where a Form 2 is issued, the usual next step is for police to be contacted to apprehend the person and bring him/her to an ED for assessment.[58] Police also have the authority to apprehend a person and bring him/her to a psychiatric facility in emergency situations where it would be dangerous to proceed with a Form 2. Therefore, police involvement is an important step along the causal pathway toward an involuntary hospitalization for the subset of our sample with these circumstances. In other words, the upstream factors that led to police involvement are likely the same factors that led to an involuntary hospitalization. Evidence from Ontario has shown an increase in the frequency of police involvement over time.[225] An increase in the frequency of police involvement with people with severe mental illness has been has been associated with deinstitutionalization and the increase of people with severe mental illness in the community, as well as legislative changes.[226] An understanding of how people with early psychosis can be better served in the community to avoid reaching a crisis state necessitating police involvement and subsequent involuntary hospitalization is warranted.

In contrast to police involvement, active engagement with mental health services prior to first hospitalization indicates a willingness of the patient to accept intervention.[83] Therefore, it is not surprising that both recent contact with community mental health services, or having FP visits for a mental health reason, were associated with a decreased likelihood of an involuntary first admission. Prior contact with a community mental health service provided the largest protective effects in terms of service use factors, with a 27% decrease in the odds of an involuntary admission. This finding is consistent with studies from our literature review showing specialized community services decrease the likelihood of involuntary admission.[142–144] However, it is unclear whether such specialized EI services would be accounted for in this variable in the RAI-MH. More research is needed to understand the role of community-based mental health in reducing the likelihood of involuntary admission in Ontario, and the specific services associated with these protective effects.

Our finding that having FP visits prior to first hospitalization were associated with a decreased likelihood of involuntary admission is consistent with findings from studies in our literature review.[86,96] However, the effect was smaller in comparison to having prior contact with community mental health services. This is consistent with another study of all psychiatric hospitalizations in Ontario, in which it was observed that outpatient FP visits over the past year had a small protective effect in relation to involuntary hospitalizations (10% decrease in likelihood), whereas the effect of a psychiatrist visit were slightly greater (22% decrease in likelihood).[186] Although the independent effect of FP visits was small, the additive protective effect of 3% across visits may still be important in impacting the likelihood of involuntary hospitalization. FP involvement has been shown to reduce the likelihood of police involvement and other emergency services in pathways to care.[55,224] FPs may also act as an important referral point to other services. Therefore, increasing uptake of primary care services may be useful in relation to decreasing negative contacts associated with involuntary hospitalization.

5.3 Strengths and Limitations

To our knowledge, our study is the largest and most comprehensive Canadian study to date on the subject of involuntary hospitalization in early psychosis using a large sample

collected across many facilities. The use of a large health administrative dataset provided high power to detect statistically significant risk factors, and high external validity for generalizability to the target population of Ontario. We have also investigated risk factors not well explored in the literature, including migrant status (and specifically, refugees), insight, mania symptoms, and prior trauma. As well, the use of administrative data allowed us to avoid the selection bias present in prospective studies because of the requirement for informed consent, which is problematic to obtain from involuntary patients.[227] We included outpatient data to identify incident cases of psychosis, which is important for complete case ascertainment rather than relying only on inpatient data.[228,229]

This study also has some limitations. First, the algorithm used for case definition has high sensitivity, which may have generated some false positives in the data. Thus, this cohort is highly inclusive of incident cases of non-affective psychosis in Ontario, but may include misclassified individuals. Furthermore, the algorithm was validated for chronic cases of non-affective psychosis, so we do not know how or whether its performance varies for first episode cases. The diagnosis of psychosis NOS is associated with diagnostic instability, and it has been estimated that 7% of people with this diagnosis initially are subsequently diagnosed with affective psychosis.[20] Therefore, despite our efforts to limit the cohort to non-affective psychosis, our cohort likely contains some cases of affective psychosis. The OMHRS database contains information for adult psychiatric beds only, therefore the results from our risk factor analysis are not be generalizable to youth admitted to pediatric psychiatry beds or to people admitted to medical beds. We attempted to identify the first hospitalization event in the context of a psychotic disorder, however, we acknowledge that we may not have captured the first hospitalization event for people hospitalized outside of Ontario. Due to the use of pre-existing administrative data, we are limited to the variables present in the database. Therefore, we were unable to explore variables that we identified in our literature search that may be important, including DUP, enrollment in EI services, and the specific help-seeker involved on the pathway to care. However, evidence from the literature suggests DUP may not be an important factor related to involuntary hospitalization, as none of the five studies examining DUP found a significant association. Enrollment in EI services may potentially be captured within the contact with a community-based mental health

service item in the RAI-MH. Finally, our data on immigrant and refugee status is limited to migrants who landed in Ontario, therefore we may have misclassified some individuals in the non-immigrant reference group. Some variables collected in the RAI-MH may be subject to recall bias, such as adherence and substance use.

5.4 Implications of Findings

The high proportion of involuntary early psychosis patients at first admission in Ontario suggests interventions are needed to reduce the frequency of these negative interactions with the health care system. The results of this study may allow for the identification of early psychosis patients who are at high risk for involuntary hospitalization in Ontario. The observation that those of a younger age (16 to 20), immigrants and refugee groups, as well as those with a diagnosis of psychosis NOS, poor insight, and poor adherence have a higher likelihood of involuntary hospitalization suggests special attention to these groups is warranted for preventative measures. In particular, for refugee groups who are at increased risk for development of a psychotic disorder.[23]

From a policy perspective, the findings that contact with community-based mental health and FPs decreases the likelihood of an involuntary first admission, are significant. Further investment in community-based mental health, along with increasing uptake of primary care and community mental health services, may be effective strategies in mitigating involuntary hospitalization, by helping people with early psychosis avoid reaching a crisis state in which negative contacts, such as police involvement and involuntary hospitalization, become necessary. Furthermore, the finding that those adherent to medication have a lower likelihood of involuntary admission supports the importance of early outpatient care. Contact with specialized mental health service that facilitate medication management and promote adherence may be helpful in further contributing to a decrease in involuntary hospitalizations in Ontario.

Importantly, comparison of our findings to those observed across all involuntary admissions through EDs in Ontario[186] suggest that risk factors for involuntary hospitalization are not specific to people with early psychosis. Findings from both studies highlight the importance of service use variables in involuntary hospitalization, in which

those with prior contact with services have a lower likelihood of involuntary hospitalization, whereas those with police contact have a higher likelihood. Overall these findings suggest that underlying system-level variables in Ontario are contributing to high rates of involuntary hospitalization in across all psychiatric admissions.

5.5 Future Directions

The high proportion of involuntary early psychosis patients identified across Ontario suggest that interventions to reduce involuntary admissions are needed. A recent meta-analysis of randomized clinical trials designed to reduce involuntary admission in adult psychiatric patients in outpatient settings found that advance statements, which included patient-provided statements on future preferences for treatment,[230] and joint crisis plans developed by patients, a caregiver/friend/advocate, and/or professionals,[231–233] showed the most promise, with a 23% risk reduction in involuntary hospitalization.[15] Community treatment orders, compliance enhancement, and integrated treatment did not show a significant reduction in risk.[15] However, advance directives require planning with the patient during a time in which the patient is capable of assessing the need for coercion in a number of circumstances.[234] For many young people experiencing psychosis for the first time, in which they may have cognitive deficits and lack insight, drafting advance directives may not feasible.[234] We need evidence around which interventions would be feasible and effective in the context of early psychosis intervention services in Ontario.

We identified adolescent patients, immigrant and refugee groups, and those with a diagnosis of psychosis NOS as having a higher likelihood of an involuntary first admission. Further studies aimed at elucidating mechanisms behind these findings are needed to understand why these populations are particularly vulnerable, and how we can potentially intervene to reduce the likelihood of involuntary hospitalization in these groups.

We also identified early psychosis patients with poor insight as having a higher likelihood of an involuntary first admission. Patients who lack of insight represent another vulnerable group that present challenges to treat. In many cases, coercive measures may be the only hope that people lacking insight will get treatment.[235,236] In

such cases, community treatment orders may be a useful alternative in ensuring treatment of these patients in a less restrictive setting.[234] However, legislation in Ontario for community treatment orders requires at least two hospitalizations, which precludes the use of this measure in a first episode case.[237] Revisiting current mental health laws in Ontario to permit compulsory community treatment as a first option may be effective in reducing involuntary hospitalization and providing a less coercive treatment option where appropriate.[237]

Further studies are needed to understand more about the service-related factors associated with involuntary hospitalization. Our study provided evidence that contact with a community-based health service within 30 days prior to first admission has protective effects in reducing the likelihood of involuntary hospitalization. Future studies should be aimed at elucidating specific community services within Ontario that are related to this decreased likelihood of involuntary hospitalization. As well, future studies aimed at understanding how we can better engage young people in primary care and community mental health services prior to reaching a crisis point necessitating police involvement and hospitalization would be useful in providing strategies to increase uptake of these services and therefore mitigate involuntary hospitalizations where possible.

5.6 Conclusions

Involuntary hospitalization is a significant infringement on patient autonomy, and may be viewed as a negative interaction with the health care system, that may have lasting effects in young people with early psychosis newly engaging with the mental health care system. However, involuntary hospitalization also remains an important option in dangerous situations where there is risk of harm to self or others, or further deterioration, including early psychosis patients lacking insight who may not get treatment otherwise. Our findings have contributed important Canadian data on involuntary hospitalizations in early psychosis, as well as evidence for risk factors for involuntary hospitalization at first admission in a large early psychosis sample. We observed that among young people with early psychosis hospitalized within two years of diagnosis, the majority of first hospitalizations during this crucial period of illness occurs on an involuntary basis. We identified a number of sociodemographic, clinical, and service-related factors that

independently affect the likelihood of an involuntary first hospitalization in Ontario, independent of the criteria for involuntary admission. Service use factors, including police involvement and contact with community mental health services, demonstrated some of the largest effects in terms of increasing or decreasing the likelihood of involuntary admission, respectively, and implicate potential areas for further studies and policy initiatives that may serve to reduce the proportion of involuntary admissions, where possible. Comparison of our findings to those of all psychiatric admissions in Ontario similarly identify prior contact with services and police involvement as factors associated with involuntary hospitalization, suggesting broader system-level factors may be driving involuntary admission rates in Ontario, regardless of psychiatric diagnosis. Our findings support an important role for community-based services in providing mental health care in Ontario, which may be crucial for prevention of negative service contacts, such as involuntary hospitalization. We need a better understanding of how community services can be improved for groups at high risk of involuntary hospitalization, and how we can improve uptake of these services, in order to help improve pathways to care for young people with early psychosis in Ontario. In addition, revisiting mental health legislation in Ontario to permit compulsory community treatment in early psychosis patients could be useful for providing less restrictive alternatives to inpatient settings in cases where involuntary treatment is needed.

References

1. Harrison, G. *et al.* Recovery from psychotic illness: a 15- and 25-year international follow-up study. *Br. J. Psychiatry* **178,** 506–517 (2001).
2. Crumlish, N. *et al.* Beyond the critical period: Longitudinal study of 8-year outcome in first-episode non-affective psychosis. *Br. J. Psychiatry* **194,** 18–24 (2009).
3. Marshall, M. *et al.* Association between duration of untreated psychosis and outcome in cohorts of first-episode patients: a systematic review. *Arch. Gen. Psychiatry* **62,** 975–983 (2005).
4. Perkins, D. O., Gu, H., Boteva, K. & Lieberman, J. A. Relationship between duration of untreated psychosis and outcome in first-episode schizophrenia: a critical review and meta-analysis. *Am. J. Psychiatry* **162,** 1785–1804 (2005).
5. Birchwood, M., Todd, P. & Jackson, C. Early intervention in psychosis. The critical period hypothesis. *Br. J. Psychiatry. Suppl.* **172,** 53–59 (1998).
6. McGorry, P. D., Killackey, E. & Yung, A. R. Early intervention in psychotic disorders: detection and treatment of the first episode and the critical early stages. *Med. J. Aust.* **187,** S8-10 (2007).
7. Ontario Ministry of Health and Long Term Care. *Program Policy Framework for Early Intervention in Psychosis*. (2004).
8. Anderson, K. K., Fuhrer, R. & Malla, A. K. The pathways to mental health care of first-episode psychosis patients: a systematic review. *Psychol. Med.* **40,** 1585–1597 (2010).
9. Morgan, C., Mallett, R., Hutchinson, G. & Leff, J. Negative pathways to psychiatric care and ethnicity: The bridge between social science and psychiatry. *Soc. Sci. Med.* **58,** 739–752 (2004).
10. Compton, M. T. Barriers to initial outpatient treatment engagement following first hospitalization for a first episode of nonaffective psychosis: a descriptive case series. *J. Psychiatr. Pract.* **11,** 62–69 (2005).
11. O'Donoghue, B. *et al.* Involuntary admission from the patients' perspective. *Soc. Psychiatry Psychiatr. Epidemiol.* **45,** 631–8 (2010).
12. Cairns, V. A., Reid, G. S. & Murray, C. Family members' experience of seeking help for first-episode psychosis on behalf of a loved one: a meta-synthesis of qualitative research. *Early Interv. Psychiatry* **9,** 185–199 (2015).
13. Gerson, R. *et al.* Families' experience with seeking treatment for recent-onset psychosis. *Psychiatr. Serv.* **60,** 812–816 (2009).
14. *Mental Health Act, R.S.O., c. M.7*. (Government of Ontario, 1990).
15. de Jong, M. H. *et al.* Interventions to Reduce Compulsory Psychiatric Admissions. *JAMA Psychiatry* **73,** 657 (2016).

16. Payne, J., Malla, A., Norman, R., Windell, D. & Brown, N. Status of first-episode psychosis patients presenting for routine care in a defined catchment area. *Can. J. Psychiatry* **51,** 42–47 (2006).

17. Archie, S. *et al.* Ethnic diversity and pathways to care for a first episode of psychosis in Ontario. *Schizophr. Bull.* **36,** 688–701 (2010).

18. American Psychiatrc Association. *Diagnostic and Statistical Manual of Mental Disorders*. (American Psychiatric Association, 2013).

19. Salvatore, P. *et al.* Psychopathology factors in first-episode affective and non-affective psychotic disorders. *J. Psychiatr. Res.* **41,** 724–736 (2007).

20. Fusar-Poli, P. *et al.* Diagnostic Stability of ICD/DSM First Episode Psychosis Diagnoses: Meta-analysis. *Schizophr. Bull.* (2016). doi:10.1093/schbul/sbw020

21. Perälä, J. *et al.* Lifetime prevalence of psychotic and bipolar I disorders in a general population. *Arch. Gen. Psychiatry* **64,** 19–28 (2007).

22. Saha, S., Chant, D., Welham, J. & McGrath, J. A systematic review of the prevalence of schizophrenia. *PLoS Med.* **2,** 414–433 (2005).

23. Anderson, K. K., Cheng, J., Susser, E., McKenzie, K. J. & Kurdyak, P. Incidence of psychotic disorders among first-generation immigrants and refugees in Ontario. *CMAJ* **187,** E279-86 (2015).

24. Kirkbride, J. B. *et al.* Heterogeneity in incidence rates of schizophrenia and other psychotic syndromes. *Arch. Gen. Psychiatry* **63,** 250–258 (2006).

25. Anderson, K. K., Fuhrer, R., Abrahamowicz, M. & Malla, A. K. The incidence of first-episode schizophrenia-spectrum psychosis in adolescents and young adults in Montreal: An estimate from an administrative claims database. *Can. J. Psychiatry* **57,** 626–633 (2012).

26. Global Burden of Disease 2013 Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* **386,** 743–800 (2015).

27. Goeree, R. *et al.* The economic burden of schizophrenia in Canada in 2004. *Curr. Med. Res. Opin.* **21,** 2017–28 (2005).

28. de Oliveira, C., Cheng, J., Rehm, J. & Kurdyak, P. The Economic Burden of Chronic Psychotic Disorders in Ontario. *J. Ment. Health Policy Econ.* **19,** 181–192 (2016).

29. Strauss, J. S. Subjective experiences of schizophrenia: toward a new dynamic psychiatry--II. *Schizophr. Bull.* **15,** 179–87 (1989).

30. Mueser, K. T., Lu, W., Rosenberg, S. D. & Wolfe, R. The trauma of psychosis: posttraumatic stress disorder and recent onset psychosis. *Schizophr. Res.* **116,** 217–227 (2010).

31. Gerlinger, G. *et al.* Personal stigma in schizophrenia spectrum disorders: a systematic review of prevalence rates, correlates, impact and interventions. *World*

Psychiatry **12,** 155–64 (2013).

32. Kessler, R. C. *et al.* Age of onset of mental disorders: a review of recent literature. *Curr. Opin. Psychiatry* **20,** 359–364 (2007).

33. Couture, S., Lecomte, T. & Leclerc, C. Personality Characteristics and Attachment in First Episode Psychosis. *J. Nerv. Ment. Dis.* **195,** 631–639 (2007).

34. Harris, A. *et al.* Clinical profiles, scope and general findings of the Western Sydney First Episode Psychosis Project. *Aust. N. Z. J. Psychiatry* **39,** 36–43 (2005).

35. Rinaldi, M. *et al.* First episode psychosis and employment: A review. *Int. Rev. Psychiatry* **22,** 148–162 (2010).

36. Harvey, S. B. *et al.* Self-harm in first-episode psychosis. *Br. J. Psychiatry* **192,** 178–184 (2008).

37. Pompili, M. *et al.* Suicide risk in first episode psychosis: a selective review of the current literature. *Schizophr. Res.* **129,** 1–11 (2011).

38. Large, M. M. & Nielssen, O. Violence in first-episode psychosis: A systematic review and meta-analysis. *Schizophr. Res.* **125,** 209–220 (2011).

39. Laursen, T. M., Munk-Olsen, T. & Vestergaard, M. Life expectancy and cardiovascular mortality in persons with schizophrenia. *Curr. Opin. Psychiatry* 83–88 (2012).

40. Gatov, E., Rosella, L., Chiu, M. & Kurdyak, P. A. Trends in standardized mortality among individuals with schizophrenia, 1993–2012: a population-based, repeated cross-sectional study. *Can. Med. Assoc. J.* **189,** E1177–E1187 (2017).

41. Breitborde, N. J. K., Srihari, V. H. & Woods, S. W. Review of the operational definition for first-episode psychosis. *Early Interv. Psychiatry* **3,** 259–265 (2009).

42. McGorry, P. D., Killackey, E. & Yung, A. Early intervention in psychosis: concepts, evidence and future directions. *World Psychiatry* **7,** 148–56 (2008).

43. Bird, V. *et al.* Early intervention services, cognitive-behavioural therapy and family intervention in early psychosis: Systematic review. *Br. J. Psychiatry* **197,** 350–356 (2010).

44. Mihalopoulos, C., Harris, M., Henry, L., Harrigan, S. & McGorry, P. Is early intervention in psychosis cost-effective over the long term? *Schizophr. Bull.* **35,** 909–918 (2009).

45. Ontario Ministry of Health and Long Term Care. *Making it Happen: Implementation Plan for Mental Health Reform*. (1999).

46. Thomsen, P. Schizophrenia with childhood and adolescent onset--a nationwide register-based study. *Acta Psychiatr. Scand.* **94,** 187–93 (1996).

47. Nolin, M., Malla, A., Tibbo, P., Norman, R. & Abdel-Baki, A. Early intervention for psychosis in Canada: What is the State of Affairs? *Can. J. Psychiatry* **61,** 186–194 (2016).

48. Rogler, L. H. & Cortes, D. E. Help-seeking pathways: a unifying concept in mental health care. *Am. J. Psychiatry* **150,** 554–561 (1993).

49. Singh, S. P. & Grange, T. Measuring pathways to care in first-episode psychosis: A systematic review. *Schizophr. Res.* **81,** 75–82 (2006).

50. Anderson, K. K. *et al.* Patterns of health services use prior to a first diagnosis of psychosis: The importance of primary care. *Soc. Psychiatry Psychiatr. Epidemiol.* **48,** 1389–1398 (2013).

51. Norman, R., Malla, A., Verdi, M., Hassall, L. & Fazekas, C. Understanding delay in treatment for first-episode psychosis. *Psychol. Med.* **34,** 255–266 (2004).

52. Addington, J., Van Mastrigt, S., Hutchinson, J. & Addington, D. Pathways to care: help seeking behaviour in first episode psychosis. *Acta Psychiatr. Scand.* **106,** 358–364 (2002).

53. Scholten, D. J. *et al.* Removing barriers to treatment of first-episode psychotic disorders. *Can. J. Psychiatry* **48,** 561–565 (2003).

54. Addington, J. & Addington, D. Early intervention for psychosis: who refers? *Schizophr. Res.* **84,** 176–177 (2006).

55. Anderson, K. K., Fuhrer, R., Schmitz, N. & Malla, A. K. Determinants of negative pathways to care and their impact on service disengagement in first-episode psychosis. *Soc. Psychiatry Psychiatr. Epidemiol.* **48,** 125–136 (2012).

56. Bhugra, D., Harding, C. & Lippett, R. Pathways into care and satisfaction with primary care for black patients in South London. *J. Ment. Heal.* **13,** 171–183 (2004).

57. Monteiro, V. B. M., Dos Santos, J. Q. & Martin, D. Patients' relatives delayed help seeking after a first psychotic episode. *Rev. Bras. Psiquiatr.* **28,** 104–110 (2006).

58. Ontario Hospital Association. A Practical Guide to Mental Health and the Law in Ontario. (2016).

59. World Health Organization. Mental Health Care Law: Ten Basic Principles. *Ment. Health Care* 1–8 (1996).

60. World Health Organization. *WHO Resource Book on Mental Health, Human Rights and Legislation*. (2005).

61. Zhang, S., Mellsop, G., Brink, J. & Wang, X. Involuntary admission and treatment of patients with mental disorder. *Neurosci. Bull.* **31,** 99–112 (2015).

62. Nielssen, O. B., Yee, N. L., Millard, M. M. & Large, M. M. Comparison of first-episode and previously treated persons with psychosis found NGMI for a violent offense. *Psychiatr. Serv.* **62,** 759–764 (2011).

63. Palmer, B. A., Pankratz, V. S. & Bostwick, J. M. The Lifetime Risk of Suicide in Schizophrenia. *Arch. Gen. Psychiatry* **62,** 247 (2005).

64. Melle, I. *et al.* Early detection of the first episode of schizophrenia and suicidal behavior. *Am. J. Psychiatry* **163,** 800–4 (2006).

65. Ayesa-Arriola, R. *et al.* Suicidal behaviour in first-episode non-affective psychosis: Specific risk periods and stage-related factors. *Eur. Neuropsychopharmacol.* **25,** 2278–2288 (2015).

66. Melle, I. *et al.* Course and predictors of suicidality over the first two years of treatment in first-episode schizophrenia spectrum psychosis. *Arch. Suicide Res.* **14,** 158–170 (2010).

67. Lu, W., Mueser, K. T., Rosenberg, S. D., Yanos, P. T. & Mahmoud, N. Posttraumatic reactions to psychosis: A qualitative analysis. *Front. Psychiatry* **8,** 129 (2017).

68. Katsakou, C. & Priebe, S. Outcomes of involuntary hospital admission--a review. *Acta Psychiatr. Scand.* **114,** 232–41 (2006).

69. Priebe, S. *et al.* Patients' views of involuntary hospital admission after 1 and 3 months: Prospective study in 11 European countries. *Br. J. Psychiatry* **196,** 179–185 (2010).

70. Addington, J. *et al.* The first episode of psychosis: The experience of relatives. *Acta Psychiatr. Scand.* **108,** 285–9 (2003).

71. de Haan, L., van Amelsvoort, T., Dingemans, P. & Linszen, D. Risk factors for medication non-adherence with first episode schizophrenia and related disorders: a prospective five year follow-up. *Pharmacopsychiatry* **40,** 264–268 (2007).

72. Leavey, G., King, M., Cole, E., Hoar, A. & Johnson-Sabine, E. First-onset psychotic illness: Patients' and relatives' satisfaction with services. *Br. J. Psychiatry* **170,** 53–57 (1997).

73. Foley, S. R. *et al.* Is violence at presentation by patients with first-episode psychosis associated with duration of untreated psychosis? *Soc. Psychiatry Psychiatr. Epidemiol.* **42,** 606–610 (2007).

74. Tarrier, N., Khan, S., Cater, J. & Picken, A. The subjective consequences of suffering a first episode psychosis: Trauma and suicide behaviour. *Soc. Psychiatry Psychiatr. Epidemiol.* **42,** 29–35 (2007).

75. Rodrigues, R. & Anderson, K. K. The traumatic experience of first-episode psychosis: A systematic review and meta-analysis. *Schizophr. Res.* (2017). doi:10.1016/j.schres.2017.01.045

76. Kortrijk, H. E., Staring, A. B. P., van Baars, A. W. B. & Mulder, C. L. Involuntary admission may support treatment outcome and motivation in patients receiving assertive community treatment. *Soc. Psychiatry Psychiatr. Epidemiol.* **45,** 245–252 (2010).

77. Courtney, M. & Moulding, N. T. Beyond balancing competing needs: Embedding involuntary treatment within a recovery approach to mental health social work. *Aust. Soc. Work* **67,** 214–226 (2014).

78. Jaeger, M. & Hoff, P. Recovery: conceptual and ethical aspects. *Curr. Opin. Psychiatry* **25,** 497–502 (2012).

79. Chiang, C.-L. *et al.* Time trends in first admission rates for schizophrenia and other psychotic disorders in Taiwan, 1998–2007: a 10-year population-based cohort study. *Soc. Psychiatry Psychiatr. Epidemiol.* **52,** 163–173 (2017).

80. Kiviniemi, M. *et al.* Five-year follow-up study of disability pension rates in first-onset schizophrenia with special focus on regional differences and mortality. *Gen. Hosp. Psychiatry* **33,** 509–517 (2011).

81. Levine, S. Z. Population-based examination of the relationship between type of first admission for schizophrenia and outcomes. *Psychiatr. Serv.* **59,** 1470–1473 (2008).

82. Øhlenschlaeger, J., Nordentoft, M., ØHlenschlæger, J. & Nordentoft, M. Coercion in patients who at their first contact with the psychiatric services system were diagnosed within the schizophrenia-spectrum in Denmark. A register study. *Nord. J. Psychiatry* **62,** 77–81 (2008).

83. Morgan, C. *et al.* Pathways to care and ethnicity. I: Sample characteristics and compulsory admission: Report from the ÆSOP study. *Br. J. Psychiatry* **186,** 281–289 (2005).

84. Mann, F. *et al.* Ethnic variations in compulsory detention and hospital admission for psychosis across four UK Early Intervention Services. *BMC Psychiatry* **14,** 256 (2014).

85. Iversen, K. I., Høyer, G. & Sexton, H. C. Rates for civil commitment to psychiatric hospitals in Norway. Are registry data accurate? *Nord. J. Psychiatry* **63,** 301–307 (2009).

86. Cole, E. *et al.* Pathways to care for patients with a first episode of psychosis. A comparison of ethnic groups. *Br. J. Psychiatry* **167,** 770–776 (1995).

87. Cougnard, A. *et al.* Factors influencing compulsory admission in first-admitted subjects with psychosis. *Soc. Psychiatry Psychiatr. Epidemiol.* **39,** 804–809 (2004).

88. Huber, C. G. *et al.* Brief Psychiatric Rating Scale - Excited Component (BPRS-EC) and neuropsychological dysfunction predict aggression, suicidality, and involuntary treatment in first-episode psychosis. *Schizophr. Res.* **134,** 273–278 (2012).

89. Kelly, B. *et al.* Clinical predictors of admission status in first episode schizophrenia. *Eur. Psychiatry* **19,** 67–71 (2004).

90. Opjordsmoen, S. *et al.* A 2-year follow-up of involuntary admission's influence upon adherence and outcome in first-episode psychosis. *Acta Psychiatr. Scand.* **121,** 371–376 (2010).

91. Opsal, A. *et al.* Involuntary hospitalization of first-episode psychosis with substance abuse during a 2-year follow-up. *Acta Psychiatr. Scand.* **124,** 198–204 (2011).

92. Mckenzie, K. *et al.* Psychosis with good prognosis in Afro-Caribbean people now living in the United Kingdom. *Br. Med. J.* **311,** 1325–1328 (1995).

93. Chen, E. Y., Harrison, G. & Standen, P. J. Management of first episode psychotic illness in Afro-Caribbean patients. *Br. J. Psychiatry* **158,** 517–522 (1991).

94. Harrison, G. *et al.* Severe mental disorder in Afro-Caribbean patients: some social, demographic and service factors. *Psychol. Med.* **19,** 683–696 (1989).

95. McGovern, D. & Cope, R. Second generation Afro-Caribbeans and young whites with a first admission diagnosis of schizophrenia. *Soc. Psychiatry Psychiatr. Epidemiol.* **26,** 95–99 (1991).

96. Burnett, R. *et al.* The first contact of patients with schizophrenia with psychiatric services: social factors and pathways to care in a multi-ethnic population. *Psychol. Med.* **29,** 475–483 (1999).

97. Goater, N. *et al.* Ethnicity and outcome of psychosis. *The British Journal of Psychiatry* **175,** 34–42 (1999).

98. Turner, M., Smith-Hamel, C. & Mulder, R. Pathways to care in a New Zealand first-episode of psychosis cohort. *Aust. New Zeal. J. Psychiatry* **40,** 421–428 (2006).

99. Lin, E., Goering, P., Offord, D. R., Campbell, D. & Boyle, M. H. The use of mental health services in Ontario: Epidemiologic findings. *Can. J. Psychiatry* **41,** 572–577 (1996).

100. Szmukler, G. I. Compulsory admissions in a London borough: II. Circumstances surrounding admission: service implications. *Psychol. Med.* **11,** 825–38 (1981).

101. Boydell, J. *et al.* Caregiving in first-episode psychosis: Social characteristics associated with perceived 'burden' and associations with compulsory treatment. *Early Interv. Psychiatry* **8,** 122–129 (2014).

102. Zeppegno, P. *et al.* First admissions for psychoses in Eastern Piedmont-Italy. *Eur. J. Psychiatry* **23,** 153–165 (2009).

103. Figuerido, J., Gutierrez, M., Mosquera, F. & Lalaguna, B. Involuntary hospitalization in the first psychotic episodes: associated factors. *Actas espanolas de psiquiatria* **28,** 275–278 (2000).

104. Renwick, L. *et al.* Depression and quality of life in first-episode psychosis. *Compr. Psychiatry* **53,** 451–455 (2012).

105. Barbeito, S. *et al.* Involuntary admission of first-episode psychotic patients and evolution up to 8 years of follow up. *European Neuropsychopharmacology* **22,** S351–S352 (2012).

106. Sim, K., Mahendran, R., Siris, S. G., Heckers, S. & Chong, S. A. Subjective quality of life in first episode schizophrenia spectrum disorders with comorbid depression. *Psychiatry Res.* **129,** 141–147 (2004).

107. Addington, D., Addington, J. & Patten, S. Depression in people with first-episode schizophrenia. *Br. J. Psychiatry. Suppl.* **172,** 90–2 (1998).

108. Bottlender, R., Strauss, A. & Möller, H. J. Prevalence and background factors of depression in first admitted schizophrenic patients. *Acta Psychiatr. Scand.* **101,**

153–160 (2000).

109. Romm, K. L. *et al.* Depression and depressive symptoms in first episode psychosis. *J. Nerv. Ment. Dis.* **198,** 67–71 (2010).

110. Sönmez, N., Romm, K. L., Andreasssen, O. A., Melle, I. & Røssberg, J. I. Depressive symptoms in first episode psychosis: a one-year follow-up study. *BMC Psychiatry* **13,** 106 (2013).

111. Sanz, M., Constable, G., Lopez-Ibor, I., Kemp, R. & David, A. S. A comparative study of insight scales and their relationship to psychopathological and clinical variables. *Psychol. Med.* **28,** 437–46 (1998).

112. Iqbal, Z., Birchwood, M., Chadwick, P. & Trower, P. Cognitive approach to depression and suicidal thinking in psychosis. 2. Testing the validity of a social ranking model. *Br. J. Psychiatry* **177,** 522–8 (2000).

113. Harris, A. W. F. *et al.* Clinical and cognitive associations with aggression in the first episode of psychosis. *Aust. New Zeal. J. Psychiatry* **44,** 85–93 (2010).

114. David, A. S. Insight and psychosis. *Br. J. Psychiatry* **156,** 798–808 (1990).

115. Lincoln, T. M., Lüllmann, E. & Rief, W. Correlates and long-term consequences of poor insight in patients with schizophrenia. A systematic review. *Schizophr. Bull.* **33,** 1324–1342 (2007).

116. Endicott, J., Spitzer, R. L., Fleiss, J. L. & Cohen, J. The Global Assessment Scale A Procedure for Measuring Overall Severity of Psychiatric Disturbance. *Arch. Gen. Psychiatry* **33,** 766–771 (1976).

117. Foley, S. R. *et al.* Incidence and clinical correlates of aggression and violence at presentation in patients with first episode psychosis. *Schizophr. Res.* **72,** 161–168 (2005).

118. Wisdom, Jennifer; Manuel, Jennifer; Drake, R. Substance Use Disorder With First-Episode Psychosis : A Systematic Review of Course and Treatment. *Psychiatr. Serv.* **62,** (2011).

119. Menezes, N. *et al.* A multi-site Canadian perspective: examining the functional outcome from first-episode psychosis. *Acta Psychiatr. Scand.* **120,** 138–146 (2009).

120. Turkington, A. *et al.* Impact of persistent substance misuse on 1-year outcome in first-episode psychosis. *Br. J. Psychiatry* **195,** (2009).

121. Barrett, E. A. *et al.* Suicidality before and in the early phases of first episode psychosis. *Schizophr. Res.* **119,** 11–17 (2010).

122. Verdoux, H. *et al.* Predictors and outcome characteristics associated with suicidal behaviour in early psychosis: a two-year follow-up of first-admitted subjects. *Acta Psychiatr. Scand.* **103,** 347–54 (2001).

123. Verdoux, H. *et al.* Suicidality and substance misuse in first-admitted subjects with psychotic disorder. *Acta Psychiatr. Scand.* **100,** 389–95 (1999).

124. Bühler, B., Hambrecht, M., Löffler, W., an der Heiden, W. & Häfner, H.

Precipitation and determination of the onset and course of schizophrenia by substance abuse--a retrospective and prospective study of 232 population-based first illness episodes. *Schizophr. Res.* **54,** 243–51 (2002).

125. Green, A. I. *et al.* First episode schizophrenia-related psychosis and substance use disorders: acute response to olanzapine and haloperidol. *Schizophr. Res.* **66,** 125–35 (2004).

126. Wade, D. *et al.* Substance misuse in first-episode psychosis: 15-month prospective follow-up study. *Br. J. Psychiatry* **189,** 229–234 (2006).

127. Patel, R. *et al.* Association of cannabis use with hospital admission and antipsychotic treatment failure in first episode psychosis: an observational study. *BMJ Open* **6,** e009888 (2016).

128. Kane, J. M., Kishimoto, T. & Correll, C. U. Non-adherence to medication in patients with psychotic disorders: epidemiology, contributing factors and management strategies. *World Psychiatry* **12,** 216–26 (2013).

129. Coldham, E., Addington, J. & Addington, D. Medication adherence of individuals with a first episode of psychosis. *Act1. Coldham, E. L., Addington, J. Addington, D. Medicat. adherence Individ. with a first Epis. psychosis. Acta Psychiatr. Scand. 106, 286–290 (2002).a Psychiatr. Scand.* **106,** 286–290 (2002).

130. Leclerc, E. *et al.* Determinants of adherence to treatment in first-episode psychosis: a comprehensive review. *Rev. Bras. Psiquiatr.* **37,** 168–176 (2015).

131. Barbeito, S. *et al.* Cannabis use and involuntary admission may mediate long-term adherence in first-episode psychosis patients: a prospective longitudinal study. *BMC Psychiatry* **13,** 326 (2013).

132. Verdoux, H. *et al.* Medication adherence in psychosis: predictors and impact on outcome. A 2-year follow-up of first-admitted subjects. *Acta Psychiatr. Scand.* **102,** 203–210 (2000).

133. Drake, R. J., Haley, C. J., Akhtar, S. & Lewis, S. W. Causes and consequences of duration of untreated psychosis in schizophrenia. *Br. J. Psychiatry* **177,** 511–515 (2000).

134. Schimmelmann, B. G. *et al.* Impact of duration of untreated psychosis on pre-treatment, baseline, and outcome characteristics in an epidemiological first-episode psychosis cohort. *J. Psychiatr. Res.* **42,** 982–990 (2008).

135. Butchart, A., Putney, H., Furniss, T. & Kahane, T. *Preventing child maltreatment: a guide to taking action and generating evidence*. (2006).

136. Varese, F. *et al.* Childhood adversities increase the risk of psychosis: A meta-analysis of patient-control, prospective-and cross-sectional cohort studies. *Schizophr. Bull.* **38,** 661–671 (2012).

137. Trotta, A., Murray, R. M. & Fisher, H. L. The impact of childhood adversity on the persistence of psychotic symptoms: a systematic review and meta-analysis. *Psychol. Med.* 1–18 (2015). doi:10.1017/S0033291715000574

138. Beards, S. *et al.* Life events and psychosis: A review and meta-analysis. *Schizophr. Bull.* **39,** 740–747 (2013).

139. Saavedra, J. & Álvarez, M. L. Association between traumatic experiences and psychosis among incarcerated men. *J. Nerv. Ment. Dis.* **201,** 773–779 (2013).

140. Kennedy, S. C., Tripodi, S. J. & Pettus-Davis, C. The relationship between childhood abuse and psychosis for women prisoners: Assessing the importance of frequency and type of victimization. *Psychiatr. Q.* **84,** 439–453 (2013).

141. Garabette, J. *et al.* Childhood adversity and compulsory admission during presentation of first episode psychosis. *Schizophrenia Research* **136,** S216 (2012).

142. Goldberg, K. *et al.* Impact of a specialized early intervention service for psychotic disorders on patient characteristics, service use, and hospital costs in a defined catchment area. *Can. J. Psychiatry* **51,** 895–903 (2006).

143. Chen, E. Y. H. *et al.* Three-year outcome of phase-specific early intervention for first-episode psychosis: A cohort study in Hong Kong. *Early Interv. Psychiatry* **5,** 315–323 (2011).

144. Petrakis, M. *et al.* Early psychosis treatment in an integrated model within an adult mental health service. *Eur. Psychiatry* **27,** 483–488 (2012).

145. Singh, S. P. *et al.* One-year outcome of an early intervention in psychosis service: A naturalistic evaluation. *Early Interv. Psychiatry* **1,** 282–287 (2007).

146. Fusar-Poli, P. *et al.* Services for people at high risk improve outcomes in patients with first episode psychosis. *Acta Psychiatr. Scand.* **133,** 76–85 (2016).

147. Valmaggia, L. R. *et al.* Duration of untreated psychosis and need for admission in patients who engage with mental health services in the prodromal phase. *Br. J. Psychiatry* **207,** 130–134 (2015).

148. Norman, R. M. G. *et al.* Social support and three-year symptom and admission outcomes for first episode psychosis. *Schizophr. Res.* **80,** 227–234 (2005).

149. Birchwood, M. & Cochrane, R. Families coping with schizophrenia: coping styles, their origins and correlates. *Psychol. Med.* **20,** 857 (1990).

150. Bhui, K., Ullrich, S., Kallis, C. & Coid, J. W. . Criminal justice pathways to psychiatric care for psychosis. *Br. J. Psychiatry* **207,** 523–529 (2015).

151. Malla, A. K., Norman, R. M. & Joober, R. First-episode psychosis, early intervention, and outcome: What have we learned? *Can. J. Psychiatry* **50,** 881–891 (2005).

152. Bond, G. R., Drake, R. E. & Luciano, A. Employment and educational outcomes in early intervention programmes for early psychosis: a systematic review. *Epidemiol. Psychiatr. Sci.* **24,** 446–457 (2015).

153. Canadian Institute for Health Information. *Ontario Mental Health Reporting System, Data Quality Documentation*. (2016).

154. Martin, L. *et al.* Validating the Mental Health Assessment Protocols (MHAPs) in the Resident Assessment Instrument Mental Health (RAI-MH). *J. Psychiatr. Ment.*

Health Nurs. **16,** 646–653 (2009).

155. Hirdes, J. P. *et al.* Development of the Resident Assessment Instrument – Mental Health (RAI- MH). *Hosp Q* **4,** (2000).

156. Canadian Institute for Health Information. Ontario Mental Health Reporting System Resource Manual, 2016-2017. (2016).

157. Canadian Institute for Health Information. *Data Quality Documentation, Discharge Abstract Database—Current-Year Information, 2015–2016*. (2016).

158. Canadian Institute for Health Information. DAD Abstracting Manual, 2014-2015 Edition. (2014).

159. Canadian Institute for Health Information. *Standards and Data Submission Data Quality Documentation, National Ambulatory Care Reporting System—Multi-Year Information*. (2012).

160. Canadian Institute for Health Information. *Standards and Data Submission Data Quality Documentation, Discharge Abstract Database—Multi-Year Information*. (2012).

161. Canadian Institute for Health Information. *Discharge Abstract Database (DAD)/ CMG/Plx Data Quality Re-abstraction Study*. (2003).

162. Chiu, M. *et al.* Describing the linkages of the immigration, refugees and citizenship Canada permanent resident data and vital statistics death registry to Ontario's administrative health database. *BMC Med. Inform. Decis. Mak.* **16,** 1–11 (2016).

163. Kurdyak, P., Lin, E., Green, D. & Vigod, S. Validation of a Population-Based Algorithm to Detect Chronic Psychotic Illness. *Can. J. Psychiatry* **60,** 362–368 (2015).

164. Anderson, K. K., Mckenzie, K. J. & Kurdyak, P. Examining the impact of migrant status on ethnic differences in mental health service use preceding a first diagnosis of schizophrenia. *Soc. Psychiatry Psychiatr. Epidemiol.* (2017). doi:10.1007/s00127-017-1403-z

165. MacPherson, D. W. & Gushulak, B. D. in *Mental Disorder in Canada: An Epidemiological Perspective* (eds. Cairney, J. & Streiner, D. L.) 286–303 (University of Toronto Press, 2010).

166. CIHI. Ontario Mental Health Reporting System Resource Manual, 2013–2014: Module 1 - Clinical Coding. (2013).

167. Centre for Addiction and Mental Health. Challenges & Choices: Finding Mental Health Services in Ontario. (2003).

168. Canadian Institute for Health Information. Mental Health Clinical Assessment Protocols (CAPs) Specifications 2017-18. 1–52 (2017).

169. Seow, L. *et al.* A systematic review on comorbid post-traumatic stress disorder in schizophrenia. *Schizophr. Res.* **176,** 441–451 (2016).

170. Lecomte, T. *et al.* Predictors and profiles of treatment non-adherence and

engagement in services problems in early psychosis. *Schizophr. Res.* (2008). doi:10.1016/j.schres.2008.01.024

171. Hassan, A. N. & De Luca, V. The effect of lifetime adversities on resistance to antipsychotic treatment in schizophrenia patients. *Schizophr. Res.* **161,** 496–500 (2015).

172. Mondelli, V. *et al.* Cortisol and inflammatory biomarkers predict poor treatment response in first episode psychosis. *Schizophr. Bull.* **41,** 1162–1170 (2015).

173. Gray, M. J., Litz, B. T., Hsu, J. L. & Lombardo, T. W. Psychometric properties of the life events checklist. *Assessment* **11,** 330–41 (2004).

174. Canadian Institute for Health Information. Resident Assessment Instrument – Mental Health (RAI-MH) Outcome Scales Reference Guide. (2015).

175. interRAI. Scales: Status and Outcome Measures. Available at: http://www.interrai.org/scales.html. (Accessed: 11th August 2017)

176. Steele, L. S., Glazier, R. H., Lin, E. & Evans, M. Using administrative data to measure ambulatory mental health service provision in primary care. *Med. Care* **42,** 960–965 (2004).

177. Craven, M., Cohen, M., Campbell, D., Williams, J. & Kates, N. Mental health practices of Ontario family physicians: A study using qualitative methodology. *Can. J. Psychiatry* **42,** 943–949 (1997).

178. Dunkler, D., Plischke, M., Leffondré, K. & Heinze, G. Augmented backward elimination: A pragmatic and purposeful way to develop statistical models. *PLoS One* **9,** 1–19 (2014).

179. Hinkle, D., Wiersma, W. & Jurs, S. *Applied Statistics for the Behavioral Sciences*. (Houghton Mifflin, 2003).

180. Austin, P. C. Using the Standardized Difference to Compare the Prevalence of a Binary Variable Between Two Groups in Observational Research. *Commun. Stat. - Simul. Comput.* **38,** 1228–1234 (2009).

181. Yang, D. & Dalton, J. A unified approach to measuring the effect size between two groups using SAS®. *SAS Glob. Forum* 6 (2012).

182. Hosmer, D. W., Lemeshow, S. & Sturdivant, R. X. *Applied Logistic Regression*. (John Wiley & Sons, Inc., 2013).

183. Bursac, Z., Gauss, C. H., Williams, D. K. & Hosmer, D. W. Purposeful selection of variables in logistic regression. *Source Code Biol. Med.* **3,** 17 (2008).

184. Maldonado, G. & Greenland, S. Simulation Study of Confounder-Selection Strategies. *Am. J. Epidemiol.* **138,** 923–936 (1993).

185. Dunkler, D. & Heinze, G. *A SAS Macro for Augmented Backward Elimination*. (2014).

186. Lebenbaum, M., Chiu, M., Vigod, S. & Kurdyak, P. Trends, risk factors, and variation in use of involuntary admissions across Ontario. in *Canadian Academy of Psychiatric Epidemiology* (2016).

187. Ohlenschlaeger, J. *et al.* Intensive treatment models and coercion. *Nord. J. Psychiatry* **61,** 369–378 (2007).

188. Dressing, H. & Salize, H. J. Compulsory admission of mentally ill patients in European Union Member States. *Soc. Psychiatry Psychiatr. Epidemiol.* **39,** 797–803 (2004).

189. Zinkler, M. & Priebe, S. Detention of the mentally ill in Europe--a review. *Acta Psychiatr. Scand.* **106,** 3–8 (2002).

190. Wang, J. P. *et al.* The low proportion and associated factors of involuntary admission in the psychiatric emergency service in Taiwan. *PLoS One* **10,** 1–13 (2015).

191. Keown, P., Weich, S., Bhui, K. S. & Scott, J. Association between provision of mental illness beds and rate of involuntary admissions in the NHS in England 1988-2008: ecological study. *BMJ* **343,** d3736–d3736 (2011).

192. Myklebust, L. H., Sørgaard, K. & Wynn, R. Local psychiatric beds appear to decrease the use of involuntary admission: a case-registry study. *BMC Health Serv. Res.* **14,** 64 (2014).

193. Tyrer, P., Sharfstein, S., O'Reilly, R., Allison, S. & Bastiampillai, T. Psychiatric hospital beds: an Orwellian crisis. *Lancet* **389,** 363 (2017).

194. Sealy, P. & Whitehead, P. C. Forty Years of Deinstitutionalization of Psychiatric Services in Canada: An Empirical Assessment. *Can. J. Psychiatry* **49,** 249–257 (2004).

195. Gordon, A. Psychiatric Beds Levels. (1997).

196. Shum, J., O'Reilly, R. & Gray, J. E. How many psychiatric beds per capita do we need? in *Academic Research Day, Department of Psychiatry, Western University* (2016).

197. Johnson, S. *et al.* Randomised controlled trial of acute mental health care by a crisis resolution team: the north Islington crisis study. *BMJ* **331,** 599 (2005).

198. Schizophrenia Society of Ontario. *It doesn't work: Unpacking mental health policy and legislation*. (2013).

199. Keown, P. *et al.* Rates of voluntary and compulsory psychiatric in-patient treatment in England: an ecological study investigating associations with deprivation and demographics. *Br. J. Psychiatry* **209,** bjp.bp.115.171009 (2016).

200. Thomsen, C. *et al.* Risk factors of coercion among psychiatric inpatients: a nationwide register-based cohort study. *Soc. Psychiatry Psychiatr. Epidemiol.* **52,** 979–987 (2017).

201. Ballageer, T., Malla, A., Manchanda, R., Takhar, J. & Haricharan, R. Is adolescent-onset first-episode psychosis different from adult onset? *J. Am. Acad. Child Adolesc. Psychiatry* **44,** 782–789 (2005).

202. Joa, I. *et al.* Baseline profiles of adolescent vs. adult-onset first-episode psychosis in an early detection program. *Acta Psychiatr. Scand.* **119,** 494–500 (2009).

203. Abidi, S. *et al.* CPA Guidelines for the Pharmacological Treatment of Schizophrenia Spectrum and Other Psychotic Disorders in Children and Youth. *Can. J. Psychiatry* 70674371772019 (2017). doi:10.1177/0706743717720197

204. Norredam, M., Garcia-Lopez, A., Keiding, N. & Krasnik, A. Excess use of coercive measures in psychiatry among migrants compared with native Danes. *Acta Psychiatr. Scand.* **121,** 143–151 (2010).

205. Lay, B., Lauber, C., Nordt, C. & Rössler, W. Patterns of inpatient care for immigrants in Switzerland. *Soc. Psychiatry Psychiatr. Epidemiol.* **41,** 199–207 (2006).

206. Lay, B., Lauber, C. & Rossler, W. Are immigrants at a disadvantage in psychiatric in-patient care? *Acta Psychiatr. Scand.* **111,** 358–366 (2005).

207. Mulder, C. L., Koopmans, G. T. & Selten, J.-P. Emergency psychiatry, compulsory admissions and clinical presentation among immigrants to The Netherlands. *Br. J. Psychiatry* **188,** 386–391 (2006).

208. Riecher, A., Rössler, W., Löffler, W. & Fätkenheuer, B. Factors influencing compulsory admission of psychiatric patients. *Psychol. Med.* **21,** 197–208 (1991).

209. Ng, X. T. & Kelly, B. D. Voluntary and involuntary care: Three-year study of demographic and diagnostic admission statistics at an inner-city adult psychiatry unit. *Int. J. Law Psychiatry* **35,** 317–326 (2012).

210. Heslin, M. *et al.* Diagnostic change 10 years after a first episode of psychosis. *Psychol. Med.* **45,** 2757–2769 (2015).

211. Mintz, A. R., Dobson, K. S. & Romney, D. M. Insight in schizophrenia: a meta-analysis. *Schizophr. Res.* **61,** 75–88 (2003).

212. Belvederi Murri, M. *et al.* Is good insight associated with depression among patients with schizophrenia? Systematic review and meta-analysis. *Schizophr. Res.* **162,** 234–247 (2015).

213. Zipursky, R. B., Menezes, N. M. & Streiner, D. L. Risk of symptom recurrence with medication discontinuation in first-episode psychosis: A systematic review. *Schizophr. Res.* **152,** 408–414 (2014).

214. Masand, P. S., Roca, M., Turner, M. S. & Kane, J. M. Partial Adherence to Antipsychotic Medication Impacts the Course of Illness in Patients With Schizophrenia. *Prim. Care Companion J. Clin. Psychiatry* **11,** 147–154 (2009).

215. CIHI. *Restraint Use and Other Control Interventions for Mental Health Inpatients in Ontario*. (2011).

216. Adeponle, A. B., Thombs, B. D., Groleau, D., Jarvis, E. & Kirmayer, L. J. Using the Cultural Formulation to Resolve Uncertainty in Diagnoses of Psychosis Among Ethnoculturally Diverse Patients. *Psychiatr. Serv.* **63,** 147–153 (2012).

217. Kartha, Anand; Brower, Victoria; Saitz, Richard; Samet, Jeffrey H.; Keane, Terence M.; Leibschutz, J. The impact of trauma exposure and post-traumatic stress disorder on healthcare utilization among primary care patients. *Med. Care*

46, 388–393 (2009).

218. Elhai, J. D., North, T. C. & Frueh, B. C. Health service use predictors among trauma survivors: A critical review. *Psychol. Serv.* **2,** 3–19 (2005).

219. Chartier, M. J., Walker, J. R. & Naimark, B. Childhood abuse, adult health, and health care utilization: Results from a representative community sample. *Am. J. Epidemiol.* **165,** 1031–1038 (2007).

220. Sarkar, S., Hillner, K. & Velligan, D. I. Conceptualization and treatment of negative symptoms in schizophrenia. *World J. Psychiatry* **5,** 352–61 (2015).

221. Chang, W. C. *et al.* Persistent negative symptoms in first-episode schizophrenia: A prospective three-year follow-up study. *Schizophr. Res.* **133,** 22–28 (2011).

222. Strauss, G. P., Duke, L. A., Ross, S. A. & Allen, D. N. Posttraumatic stress disorder and negative symptoms of schizophrenia. *Schizophr. Bull.* **37,** 603–610 (2011).

223. Huang, X., Fox, K. R., Ribeiro, J. D. & Franklin, J. C. Psychosis as a risk factor for suicidal thoughts and behaviors: a meta-analysis of longitudinal studies. *Psychol. Med.* 1–12 (2017). doi:10.1017/S0033291717002136

224. Rotenberg, M., Tuck, A., Ptashny, R. & McKenzie, K. The role of ethnicity in pathways to emergency psychiatric services for clients with psychosis. *BMC Psychiatry* **17,** 137 (2017).

225. Durbin, J., Lin, E. & Zaslavska, N. Police-Citizen Encounters That Involve Mental Health Concerns: Results of an Ontario Police Services Survey. *Can. J. Community Ment. Heal.* **29,** 53–71 (2010).

226. Cotton, D. & Coleman, T. G. Canadian police agencies and their interactions with persons with a mental illness: A systems approach. *Police Pract. Res.* **11,** 301–314 (2010).

227. Fulford, K. W. & Howse, K. Ethics of research with psychiatric patients: principles, problems and the primary responsibilities of researchers. *J. Med. Ethics* **19,** 85–91 (1993).

228. Jörgensen, L., Ahlbom, A., Allebeck, P. & Dalman, C. The Stockholm non-affective psychoses study (snaps): The importance of including out-patient data in incidence studies. *Acta Psychiatr. Scand.* **121,** 389–392 (2010).

229. Simon, G. E. *et al.* First presentation with psychotic symptoms in a population-based sample. *Psychiatr. Serv.* **68,** 456–461 (2017).

230. Papageorgiou, A. *et al.* Advance directives for patients compulsorily admitted to hospital with serious mental illness : Randomised controlled trial. *Br. J. Psychiatry* **181,** 513–519 (2002).

231. Henderson, C. *et al.* Effect of joint crisis plans on use of compulsory treatment in psychiatry: single blind randomised controlled trial. *BMJ* **329,** 1–5 (2004).

232. Ruchlewska, A. *et al.* Effect of crisis plans on admissions and emergency visits: a randomized controlled trial. *PLoS One* **9,** 1–7 (2014).

233. Thornicroft, G. *et al.* Clinical outcomes of Joint Crisis Plans to reduce compulsory treatment for people with psychosis: a randomised controlled trial. *Lancet* **381,** 1634–1641 (2013).

234. O'Reilly, R. Why are community treatment orders controversial? *Can. J. Psychiatry* **49,** 579–584 (2004).

235. Munetz, M., Grande, T., Kleist, J. & Peterson, G. The effectiveness of outpatient civil commitment. *Psychiatr. Serv.* **47,** 1251–1253 (1996).

236. McEvoy, J. P., Applebaum, P. S., Apperson, L. J., Geller, J. L. & Freter, S. Why must some schizophrenic patients be involuntarily committed? The role of insight. *Compr. Psychiatry* **30,** 13–17 (1989).

237. Gray, J. E. & O'Reilly, R. L. Canadian compulsory community treatment laws: Recent reforms. *Int. J. Law Psychiatry* **28,** 13–22 (2005).

Appendices

Appendix A Summary of included studies reporting frequencies of involuntary hospitalizations

Study	Country	Study design	Source of sample	% non-affective	N	Context / timeframe of hospitalizations	Hospitalized, n (%)	Involuntary		
								n	% in full sample[a]	% in hospitalized sample
Archie 2010	Canada	Cross-sectional	Consecutive patients referred to four EI sites	100	200	Pathway to care	118 (59)	81	41	69
Barbeito 2012 & 2013	Spain	Prospective cohort	Consecutive admissions to one hospital	66	98	First hospitalization	98 (100)	56	-	57
Burnett 1999	UK	Cross-sectional	South London psychiatric services	100	100	Pathway to care	100 (100)	28	-	28
Chen 2011	Hong Kong	Retrospective cohort (pre/post)	Consecutive cases who received EI services (2001 to 2003) and historical controls who received standard care (1998 to 2001)	88	EI cohort: 700 Historical controls: 700	First hospitalization over a 3-year follow-up period following presentation to services	EI cohort: 435 (62) Historical controls: 680 (97)	EI cohort: 91 Historical controls: 264	EI cohort: 13 Historical controls: 38	EI cohort: 21 Historical controls: 39
Chiang 2017	Taiwan	Retrospective cohort	National database of admissions to all psychiatric hospitals over a 12-year period	93	69,690	First hospitalization	69,690 (100)	2,540 for 2004 to 2007[b]	-	10

Abbreviations: EI, early intervention; UK, United Kingdom; NR, not reported; FEP, first-episode psychosis; ARMS, at-risk mental state
[a]For studies with both outpatients and inpatients included; [b]Records not available prior to June 2003; [c]Denominator was total admissions, this includes multiple per patient (1-3 per patient)

Appendix A Summary of included studies reporting frequencies of involuntary hospitalizations, *continued*

Study	Country	Study design	Source of sample	% non-affective	N	Context / timeframe of hospitalizations	Hospitalized, n (%)	Involuntary		
								n	% in full sample[a]	% in hospitalized sample
Cole 1995	UK	Cross-sectional	All new patients presenting to services within the catchment area of one psychiatric hospital in Haringey	38	93	Pathway to care	Not described	29	31	-
Cougnard 2004	France	Cross-sectional	Patients consecutively hospitalized in two psychiatric hospitals in Bordeaux city over a 1-year period	56	86	First hospitalization	86 (100)	53	-	62
de Haan 2007	Netherl-ands	Prospective cohort	Consecutive first admitted patients to clinical and day-care facilities at a specialized unit for treatment of young persons with schizophrenia in Amsterdam over a 3-year period	100	119	First hospitalization	119 (100)	12	-	10
Figuerido 2000	Spain	Cross-sectional	NR	NR	61	First hospitalization	61 (100)	41	-	67

Abbreviations: EI, early intervention; UK, United Kingdom; NR, not reported; FEP, first-episode psychosis; ARMS, at-risk mental state

[a]For studies with both outpatients and inpatients included; [b]Records not available prior to June 2003; [c]Denominator was total admissions, this includes multiple per patient (1-3 per patient)

Appendix A Summary of included studies reporting frequencies of involuntary hospitalizations, *continued*

Study	Country	Study design	Source of sample	% non-affective	N	Context / timeframe of hospitalizations	Hospitalized, n (%)	Involuntary		
								n	% in full sample[a]	% in hospitalized sample
Foley 2005 & Kelly 2004	Ireland	Cross-sectional	Patients presenting within catchment area of two sites	72	157	Hospitalization at first presentation	157 (100)	37	-	24
Garabette 2012	UK	Cross-sectional	NR	NR	139	During the FEP treatment period	139 (100)	79	-	57
Gould 2006	UK	Cross-sectional	Patients presenting within two London boroughs	NR	111	At first presentation or within 3-months of first presentation	80 (72)	54	49	68
Huber 2012	Germany	Cross-sectional	Inpatients in one hospital	74	152	First hospitalization	152 (100)	31	-	20
Kiviniemi 2011	Finland	Retrospective cohort	National hospital registry	100	3,875	First hospitalization	3,875 (100)	2571	-	66
Levine 2008	Israel	Retrospective cohort	National registry of psychiatric admissions over a 14-year period	100	10,591	First hospitalization	10,591 (100)	1508	-	15
Mann 2014	UK	Prospective cohort	Adult patients accepted by four EI service teams over a 5-year period	74	674	1-year follow-up after EI referral	426 (63)	288	43	68

Abbreviations: EI, early intervention; UK, United Kingdom; NR, not reported; FEP, first-episode psychosis; ARMS, at-risk mental state
[a]For studies with both outpatients and inpatients included; [b]Records not available prior to June 2003; [c]Denominator was total admissions, this includes multiple per patient (1-3 per patient)

Appendix A Summary of included studies reporting frequencies of involuntary hospitalizations, *continued*

Study	Country	Study design	Source of sample	% non-affective	N	Context / timeframe of hospitalizations	Hospitalized, n (%)	Involuntary		
								n	% in full sample[a]	% in hospitalized sample
Mantas 2012	Greece	Prospective cohort	Referrals to one EI service over a 2-year period	73	45	After referral to EI services	37 (82)	14	31	38
Morgan 2005	UK	Prospective cohort	Patients presenting to services within the catchment areas of the south-east London and Nottingham over a 2-year period	74	462	Hospitalization at first presentation	462 (100)	175	-	38
Ohlensch laeger 2008	Denmark	Retrospective cohort	Registry of all patients having contact with psychiatric services (outpatient or inpatient) in a 2-year period	100	2,222	1-year follow-up after first contact with services	Not described	220	10	-
Opjordsm oen 2010	Norway	Prospective cohort	Consecutive patients from three EI sites in a 4-year period	NR	217	First hospitalization	217 (100)	126	-	58
Opsal 2011	Norway	Prospective cohort	Consecutive patients referred to an EI service, acute inpatient ward, or outpatient clinics in the catchment area in a 3.5-year period	NR	103	At referral and 2-year follow-up	87 (84)	Referral: 26 2-year follow-up: 42	Referral: 25 2-year follow-up: 41	Referral: 30 2-year follow-up: 48

Abbreviations: EI, early intervention; UK, United Kingdom; NR, not reported; FEP, first-episode psychosis; ARMS, at-risk mental state

[a]For studies with both outpatients and inpatients included; [b]Records not available prior to June 2003; [c]Denominator was total admissions, this includes multiple per patient (1-3 per patient)

Appendix A Summary of included studies reporting frequencies of involuntary hospitalizations, *continued*

Study	Country	Study design	Source of sample	% non-affective	N	Context / timeframe of hospitalizations	Hospitalized, n (%)	Involuntary		
								n	% in full sample[a]	% in hospitalized sample
Payne 2006	Canada	Retrospective record audit	Clinical records for all first admissions to all hospitals in the catchment area of London, Ontario	100	146	First hospitalization	146 (100)	88	-	60
Petrakis 2012	Australia	Pre/post cohorts	Clinical records for a standard care historical cohort (2001) was compared with a cohort of patients recruited to the new EI service (2008) in Melbourne	Historic cohort: 73 EI cohort: 72	Historic cohort: 62 EI cohort: 60	Within the first 2 years of treatment for early psychosis	Historic cohort: 50 (81) EI cohort: 34 (60) patients with admission, 47 admissions (1-3 per patient)	Historic cohort: 42 EI cohort: 30[c]	Historic cohort: 68 EI cohort: 50[c]	Historic cohort: 84 EI cohort: 64[c]
Proctor 2004	UK	Prospective cohort	All patients presenting across a Mental Health Trust	56	227	At referral to the Mental Health Trust	108 (48)	41	18	38
Renwick 2012	Ireland	Cross-sectional	Consecutive patients referred to an EI service in Dublin over a 6-year period	100	146	At referral to EI services	87 (60)	28	19	32
Turner 2006	New Zealand	Cross-sectional (baseline characteristics of a cohort study)	All patients accepted into one EI service	41	184	Pathway to care (within 6-months prior to EI referral)	115 (63)	66	36	57

Abbreviations: EI, early intervention; UK, United Kingdom; NR, not reported; FEP, first-episode psychosis; ARMS, at-risk mental state
[a]For studies with both outpatients and inpatients included; [b]Records not available prior to June 2003; [c]Denominator was total admissions, this includes multiple per patient (1-3 per patient)

Appendix A Summary of included studies reporting frequencies of involuntary hospitalizations, *continued*

Study	Country	Study design	Source of sample	% non-affective	N	Context / timeframe of hospitalizations	Hospitalized, n (%)	Involuntary		
								n	% in full sample[a]	% in hospitalized sample
Valmaggia 2015	UK	Prospective cohort	First-episode patients who accessed a service for people with an ARMS for psychosis in south London compared to patients presenting to an EI service	NR	ARMS transition: 43 FEP: 147	Within 1-year from presentation for first-episode psychosis	ARMS transition: 20 (47) FEP: 100 (68)	ARMS transition: 6 FEP: 74	ARMS transition: 14 FEP: 50	ARMS transition: 30 FEP: 74
Verdoux 2000	France	Prospective cohort	Consecutive inpatients from one psychiatric hospital	NR	65	First hospitalization	65 (100)	32	-	49
Yamazawa 2004	Japan	Cross-sectional	Consecutive outpatients who visited psychiatric services at two hospitals in Tokyo over a 3-year period	100	83 (29 at mental hospital)	Pathway to care	26/29 who visited the mental hospital admitted at first consultation	9	-	31
Zeppegno 2009	Italy	Retrospective cohort	First admitted patients to a psychiatric hospital over a 7-year period	58	245	First hospitalization	245 (100)	41	-	17

Abbreviations: EI, early intervention; UK, United Kingdom; NR, not reported; FEP, first-episode psychosis; ARMS, at-risk mental state
[a]For studies with both outpatients and inpatients included; [b]Records not available prior to June 2003; [c]Denominator was total admissions, this includes multiple per patient (1-3 per patient)

Appendix B Dataset Creation Plan

Project Initiation This Section must be Completed Prior to Project Dataset(s) Creation		
Project Title:	Factors Associated with Involuntary Hospitalization Among People with First-Episode Psychosis	
Project TRIM number:	2017 0906 223 000	
Research Program:	MHA	
Site:	ICES Western	
Project Objectives:	*Insert Project Objectives as listed in the approved ICES Project PIA* • Estimate the proportion of people with first-episode psychosis who have an involuntary hospitalization to a psychiatric bed within two years of index diagnosis in Ontario from 2009 to 2016 • Compare the reasons for admission in FEP patients who are involuntarily admitted to those who are voluntarily admitted to a psychiatric bed within two years of diagnosis • Identify the sociodemographic, clinical, and service-level factors associated with involuntary hospitalization to a psychiatric bed in FEP	
ICES Project PIA Initial Approval Date:	*The ICES Employee or agent who is responsible for creating the Project Dataset(s) is responsible for ensuring there is an approved ICES Project PIA and verifying the date of approval prior to creating the Project Dataset(s)* 2016-09-30	
Principal Investigator (PI):	Rebecca Rodrigues	
Check the applicable box if the PI is an ICES Student/Trainee	☒ ICES Student ☐ ICES Fellow ☐ ICES Post-Doctoral Trainee ☐ Visiting Scholar	
Responsible ICES Scientist:	*Name the Responsible ICES Scientist if the PI is not a Full Status ICES Scientist* Dr. Paul Kurdyak, Dr. Kelly K. Anderson (co-supervision)	
Project Team Member(s) Responsible for Project Dataset Creation and/or Statistical Analysis and date joined (list all):	*All person(s) (ICES Analyst, Appointed Analyst, Analytic Epidemiologist, PI, and/or Student) responsible for creating the Project Dataset(s) and/or statistical analysis on the Research Analytics Environment (RAE) and the date they joined the project must be recorded* Rebecca Rodrigues	2016-04
	Lihua Li	2017-03-13
Other ICES Project Team Members and date joined (list all):	*All other Research Project Team Members (e.g., Research Administrative Assistants, Research Assistants, Project Managers, Epidemiologists) and the date they joined the project must be recorded* Salimah Shariff	2017-01
Confirmation that DCP is consistent with Project Objectives:	*The following individuals must confirm that the ICES Data provided for in this DCP is relevant (e.g., with respect to cohort, timeframe, and variables) and required to achieve the Project Objectives stated in the ICES Project PIA prior to initial Project Dataset creation: 1) PI; 2) Responsible ICES Scientist if the PI is not a Full Status ICES Scientist, or a second ICES Scientist or the Scientific Program Lead if the PI is creating both the DCP and the Project Dataset[s]; 3) ICES Research and Analysis Staff creating the DCP; and 4) ICES Analytic Staff (ICES Employee or agent responsible for creating the Project Dataset[s]). This may be delegated either verbally or via e-mail.* ***Principal Investigator*** ☒	2016-Jan-

Project Initiation This Section must be Completed Prior to Project Dataset(s) Creation			
			05
	Responsible ICES Scientist or Second ICES Scientist/Lead	☒	2016-Jan-05
	ICES Research and Analysis Staff Creating the DCP	☐	yyyy-mon-dd
	ICES Analytic Staff	☒	2017-Mar-27
Designated ICES Research and Analysis Staff accountable for Project Documentation:	*The person named (ICES staff) is accountable for ensuring that the approved ICES Project PIA, ICES Project PIA Amendments, and DCP are saved on the T Drive, ensuring ICES Project PIA Amendments are submitted as required, ensuring DCP Amendments are documented, and sharing the final DCP with the PI/Responsible ICES Scientist at project completion*		
DCP Creation Date and Author:	*Date DCP was finalized prior to Project Dataset(s) creation*	*Name of person who created the DCP*	
	Date	***Name***	
	2017-Mar-27	Rebecca Rodrigues	

ICES Data This Section must be Completed Prior to Project Dataset(s) Creation	
The ICES Employee or agent who is responsible for creating the Project Dataset(s) must ensure that this list includes only data listed in the ICES Project PIA *Changes to this list after initial ICES Project PIA approval require an ICES Project PIA Amendment*	*Mandatory for all datasets that are available by individual year*
General Use Datasets – Health Services	***Years (where applicable)***
CIHI DAD	1989 – 2016
NACRS	2000 – 2013
OHIP	1993 - 2013
OMHRS	2005 – 2016
General Use Datasets – Care Providers	
See list	
See list	
General Use Datasets – Population	
RPDB	1990 - 2016
See list	
General Use Datasets – Coding/Geography	
See list	
See list	
General Use Datasets - Facilities	
See list	
General Use Datasets - Other	

ICES Data This Section must be Completed Prior to Project Dataset(s) Creation	
See list	
See list	
Controlled Use Datasets	
CIC	1985 - 2012
See list	
Other Datasets	

Project Amendments and Reconciliation			
ICES Project PIA Amendment History (add additional rows as needed):	*Privacy approval date*	*Person who submitted amendment*	*Note that any changes to the list of ICES Data or Project Objectives require an ICES Project PIA Amendment*
	Date	***Name***	***Amendment***
	yyyy-mon-dd		
DCP Amendment History (add additional rows as needed):	*Date DCP amended*	*Person who made the DCP amendment*	*Note that any DCP amendments involving changes to the list of ICES Data or Project Objectives require an ICES Project PIA Amendment*
	Date	***Name***	***Amendment***
	2016-11-29	Rebecca Rodrigues	First draft
	2016-12-12	Rebecca Rodrigues	Updated based on feedback from Kelly Anderson and Michael Lebenbaum: • Clarified inclusion criteria – changed starting year for case accrual from 2005 to 2009, specified calendar years, specified discharge diagnosis, specified NACRS ED visits with a first position diagnosis, and specified that where cases meeting > 1 criteria the first event should be used to define the case • Changed index event from diagnosis of psychosis to first hospitalization • For max follow-up date, removed flag for patients with loss of follow-up over a 2-year period – not necessary for our analysis • Clarified lookback window for specific variables/databases • Added unique identifier to merge NACRS records to OMHRS records

Project Amendments and Reconciliation			
			• Added merging of DAD/OMHRS records to capture those transferred from DAD to OMHRS • Removed criteria for mental health diagnostic codes associated with ED visit and DAD transfer • Removed variable for involuntary ED visit (OHIP billing) • Added specialist diagnostic code for a psychiatrist (confirmed_dx variable)
	2017-01-05	Kelly Anderson	• Removed third objective (redundant with the last objective) • Deleted "confirmed_dx" variable since we are focusing on hospitalizations this is unnecessary • Added a variable for length of stay of index hospitalization (los) • Added a variable for readmission within 3 days of discharge (readmit_30)
	2017-01-05	Rebecca Rodrigues	Update based on feedback from KKA: • Added a diagnosis variable to capture diagnoses of those in the cohort who entered through OHIP billings • Added index_event variable to categorize the database(s) from which the index event occurred Update based on feedback from Paul Kurdyak: • Revised age minimum for cohort from 14 to 16. • Refocus objectives to look specifically at those who are involuntarily hospitalized to a psychiatric hospital/beds (ie, we will not analyze those within DAD) • Added OMHRS-DAD-NACRS merge since we may be missing people who don't get transferred directly from OMHRS to capture the patient journey

Project Amendments and Reconciliation			
	2017-01-28	Rebecca Rodrigues	Updated based on feedback from Salimah. See tracked changes & comments from Salimah  FEP Involuntary Hospitalization - DCP Revisions made saved as DCP v4  FEP Involuntary Hospitalization - DCP
	2017-02-17	Rebecca Rodrigues	Updated based on feedback from Salimah at meeting on February 14th. • Specified DXCODE1/DX10CODE1 for the variables to keep in Cohort A, Cohort C and in the data dictionary • Specified sets of variables to keep in OMHRS rather than the whole data set (refer to Cohort B inclusion criteria and data dictionary) • Specified accrual start/end dates as Jan 1, 2009 to Dec 31, 2012, rather than Jan 2009 to Jan 2013. Then revised end date to Dec 31, 2013 to include updated data in OMHRS. • Specified max follow-up date as Jan 31, 2015 rather than Jan 2015, and then revised to Jan 31, 2016 to include updated data in OMHRS. • In the data dictionary, deleted redundant age, sex, income, rural, immigrant variables from CohortCDAD and CohortCOMHRS. Also added the readmit variables to CohortCDAD. • Moved NACRS transfer and DAD transfer merging info to the emerg and DADtransfer variables, respectively • Removed DADtransfer from CohortCOMHRS since this is captured in the OMHRS data set • Deleted extra ICD-9 codes in

Project Amendments and Reconciliation			
			Appendix A that are not used in DAD • Corrected the error in the diagnostic codes in Appendix B – changed the DAD ICD-9 code 294.x-3 and 19.x to 294.x-319.x. Specified that we're excluding the listed diagnoses in OMHRS only if they're the main diagnosis.
	2017-02-27	Salimah Shariff	See tracked changes  FEP Involuntary Hospitalization - DCP
	2017-03-10	Rebecca Rodrigues & Kelly Anderson	See tracked changes  FEP Involuntary Hospitalization - DCP
	2017-03-27	Lihua Li, Rebecca Rodrigues	DCP reviewed by Lihua and RR updated based on her questions. See tracked changes  FEP Involuntary Hospitalization - DCP
	2017-04-03	Rebecca Rodrigues	DCP updated based on feedback from Lihua. DCP also updated to include FP involvement as an additional risk factor and after completion of lit review and discussion with KKA.  FEP Involuntary Hospitalization - DCP
	2017-04-04	Rebecca	Added variable "TransferFromDAD"
	2017-04-12	Rebecca	Clarified with KKA the criteria for hospitalization during the follow-up period in Cohort C - changed the criteria from admission for nonaffective psychosis to admission for any mental health reason (using same criteria from readmit_30dmh variable) to ensure we do not underestimate hospitalizations. Also deleted spec=physician from Cohort C %getohip macro as per Lihua's suggestion (not necessary to include, too

Project Amendments and Reconciliation			
			broad). Re-worded gp_dx variable to clarify the OHIP billing codes and time point of interest (ie, the point of diagnosis).
	2017-04-17	Rebecca	Changed dxtype=main to dxtype=all for removal of prevalent cases to make cohort size more conservative, as per Lihua's suggestion.
	2017-04-24	Rebecca	Added the following to the list of variables to keep from OMHRS: CIHI_ANHEDONIA, CIHI_SCIPP_CATEGORY, FACILITY_HEALTH_REGION, SUBUSE_MHC
	2017-05-03	Rebecca	Updated DCP with analysis plan (see tracked changes in DCP v13)
	2017-05-04	Rebecca	Updated based on feedback from KKA – clarified that we will determine whether to exclude affective psychosis and how to categorize hosp_dx once we have frequency counts. Specified that we will run univariate logistic regression models. (see tracked changes in DCP v14)
	2017-05-15	Rebecca	Updated variable names to be consistent with variables in codebooks. Changed coding of source variable from 0, 1, etc to a, b, c etc.
	2017-05-23	Rebecca	Changed OMHRS diagnostic codes for cohort b inclusion to include any 295 or 298 code. Added ADMMETH from DAD to data dictionary for inclusion in final data cut for cohort b and cohortcomhrs.
	2017-09-26	Rebecca	Updated DCP to reflect changes made during analysis. See tracked changes  FEP Involuntary Hospitalization - DCP
	2017-11-06	Rebecca	Added GAF score (Q4) as a variable to include from the admission assessment in OMHRS for CohortB and CohortCOMHRS.
Date Programs/DCP reconciled	*The person(s) creating the dataset and/or analyzing the data are responsible for ensuring that the final DCP reflects the final program(s) when the project is completed*		
	yyyy-mon-dd		

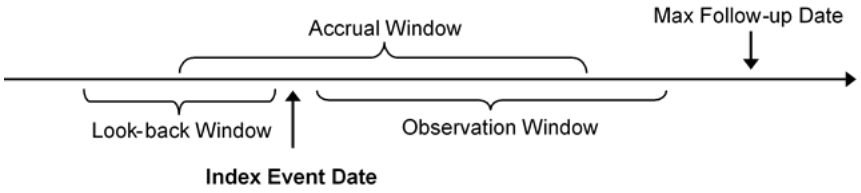
Project Cohort

Project Cohort	
Study Design	☒ Cohort study ☐ Matched cohort study ☐ Case-control study ☐ Cross-sectional study ☐ Other (specify):
Cohort Creation Plan	This study cohort is created based on three different data sources (DAD, OMHRS, ambulatory (OHIP/ED). The cohort creation plan will be as follows: 1. Apply the cohort specific inclusion/exclusion criteria for each of the 3 cohorts 2. Restrict to the first episode using the criteria defined 3. Apply the remainder of the exclusion criteria to each of the 3 cohorts.
Cohort A (DAD): Inclusion Criteria	All hospital discharges during the accrual period with a primary discharge diagnosis (dxtype=M; see macro criteria below) of schizophrenia, schizoaffective disorder, or psychosis not-otherwise-specific (NOS) from an acute care hospital bed in the Discharge Abstract Database (DAD) and valid IKN. Include the following criteria from the %getdadsds macro: - source=inpatient - start=20090101 - end=20131231 - dx10code=(see Appendix A for codes) - dxtype=M - keep=(see NOTE 1 below) Use the discharge date in DAD as the **index date**. Restrict to the first date per patient. NOTE 1: Keep the following variables from DAD: - IKN - KEY - ADMDATE - DDATE - ADMMETH - ADMCAT - INSTTYPE - DX10CODE1 NOTE 2: Diagnostic codes listed in Appendix A.
Cohort B (OMHRS): Inclusion Criteria	1. All OMHRS discharges during the accrual period with a DSM-4 Axis 1 primary discharge diagnosis (AXIS1_DSM4CODE_DISCH1) of schizophrenia, schizoaffective disorder, or psychosis NOS from a psychiatric hospital bed in OMHRS with a valid IKN 2. Restrict to the first date per patient. Use the discharge date in OMHRS (DDATE) as the **index date.** NOTE 1: Keep the following variables from the ICES stand-alone data set: IKN, AXIS1_DSM4CODE_DISCH1, DDATE, INST

Project Cohort	
	NOTE2: Link the records from the ICES stand-alone admission dataset to the full OMHRS dataset using ADMISSION_ID. Keep the following variables from the admission assessment (A2=1) in the full OMHRS dataset: - Identifiers (section AA): AA4, AA5 - Personal items (section BB): BB3, BB4, BB5, BB6A-G - Referral items (section CC): CC1, CC2, CC3, CC4, X65, CC5 - Mental health service history (section DD): DD1, DD2, DD3, DD4, DD5 - Assessment information (section A): A3A, A3B, A4A-D, A5A-B - Mental state indicators (section B): B1A-B1Z, B1AA-GG, B2 - Substance use and excessive behaviours (section C): C1, C2A-C2F, C3, C4A-D, C5, C6 - Harm to self and others (section D): D1A-D1C, D1Da-D1b, D2A-C, D3 - Behaviour disturbance (section E): E1A-G, E2 - Life events and history (section J): J1A-P, J2, J3A-B - Medications (section K): K1, K2, K3, K4, K5 - Service utilization (section L): L1A-H, L2A-D - Control procedures/observation (section M): M1A-F, M3 - Role functioning and social relations (section O): O1, O2A-G, O3, O4, O5, O6A-C - CIHI scales: CIHI_ABS, CIHI_ANHEDONIA, CIHI_DRS, CIHI_DSI, CIHI_MANIA, CIHI_PSS_LONG, CIHI_PSS_SHORT, CIHI_RHO, CIHI_SOS, CIHI_SCI, CIHI_SCIPP_CATEGORY - FACILITY_HEALTH_REGION - From the OMHRS_MHCAPS dataset: SUBUSE_MHC NOTE 2: Diagnostic codes listed in Appendix A.
Cohort C (ambulatory): Inclusion Criteria	- All OHIP billings during the accrual period with a diagnostic code (DXCODE) for schizophrenia, schizoaffective disorder, or psychosis NOS with a valid IKN Include the following criteria from the %getohip macro: - start=20090101 - end=20131231 - source=NONLAB - keep=(see NOTE 1 below) COMBINED WITH: - All emergency department (ED) visits in NACRS (on REGDATE) with a diagnostic code (DX10CODE) for schizophrenia, schizoaffective disorder, or psychosis NOS Include the following criteria from the %getnacrs macro: - source=ed - start=20090101 - end=20131231 - keep= (see NOTE 1 below) - admitcohort=T - dx10code=(see Appendix A for codes) - dxtype=MAIN NOTE 1: Keep the following variables from OHIP or NACRS:

Project Cohort	
	OHIP: - IKN - SERVDATE - DXCODE NACRS: - IKN - TO_ID - REGDATE - DX10CODE1 - ADMAMBUL NOTE 2: Diagnostic codes listed in Appendix A.
Cohort C (ambulatory): Exclusion Criteria	1 Exclude if there is no evidence of two OHIP physician billing claims or emergency department (ED) visits with a diagnostic code for schizophrenia, schizoaffective disorder, or psychosis NOS occurring in ANY 12 month period (365 days) Then: • Restrict to the first date per patient. o Use the servdate in OHIP or regdate in NACRS from the first ever claim as the **index date**. o If the OHIP servdate and NACRS regdate fall on the same date, preferentially select the NACRS observation
Criteria for restricting to the first episode	1. In cases where a IKN appears in more than one cohort, use the date of the first event as the **index date**. 2. If the first date is the same for more than one cohort, preferentially select Cohort C > Cohort B > Cohort A
Estimated Size of Cohort (if known)	Approximately 15,000
All Cohorts - Exclusions (in order)	*Step* Description
	1 Invalid/missing data in age and sex variables
	2 Age < 16 or > 35
	3 Presence of a diagnostic code for schizophrenia, schizoaffective disorder, or psychosis NOS at any point prior to 2009 (to remove prevalent cases) • OMHRS: AXIS1_DSM4CODE_DISCH1-3 code for schizophrenia, schizoaffective disorder, or psychosis NOS (lookback from database inception (2005) up to December 31, 2008, inclusive) • DAD: DXCODE or DX10CODE (dxtype=alldxtype) for schizophrenia, schizoaffective disorder, or psychosis NOS (lookback from 1989-December 31, 2008, inclusive) • OHIP: DXCODE for schizophrenia, schizoaffective disorder, or psychosis NOS (lookback from database inception (1993)-December 31, 2008, inclusive) • NACRS: DXCODE or DX10CODE (dxtype=alldxtype) for schizophrenia, schizoaffective disorder, or psychosis NOS (lookback from database inception (2000)-December 31, 2008, inclusive)

Project Cohort	
	NOTE 1: Diagnostic codes listed in Appendix A.
	NOTE: At completion of Cohort build, Cohorts A, B & C will be mutually exclusive (no IKN appears in more than one Cohort)

Project Time Frame Definitions	
	
Index event	Incident non affective psychotic disorder.
Accrual Start/End Dates	January 1, 2009 to December 31, 2013
Max Follow-up Date	January 31, 2016
When does observation window terminate?	• Discharge date following index hospitalization to a psychiatric or general hospital bed for schizophrenia, schizoaffective disorder, or psychosis NOS (OMHRS/DAD). OR • Index date for case definition (ie, first OHIP billing claim or ED visit with a first position diagnostic code for schizophrenia, schizoaffective disorder, or psychosis NOS) + 730 days (i.e., 2 years)
Lookback Window(s)	To identify and exclude prevalent cases, look back for presence of a diagnostic code for schizophrenia, schizoaffective disorder, or psychosis NOS for up to 20 years prior to 2009: • OMHRS: 2005-December 31, 2008 • DAD: 1989-December 31, 2008 • OHIP: 1993-December 31, 2008 • NACRS: 2000-December 31, 2008 To identify immigrants/refugees (immigrant variable below) and country of birth (country variable below): • CIC: 1985 up to index date

Data Dictionary of Datasets to be Provided to Student (see variable definitions below) NOTE: Bolded variables are variables that the analyst will derive, non-bolded variables come directly from the source datasets	
CohortA	IKN ADMDATE_index (DAD admission date) indexdate (DAD discharge date) ADMMETH Age Sex incquint Rural

Data Dictionary of Datasets to be Provided to Student (see variable definitions below) NOTE: Bolded variables are variables that the analyst will derive, non-bolded variables come directly from the source datasets	
	Immigrant **Country** **readmit_30dmh** **readmit_30dmh_dx1** **readmit_30dmh_dx2** **readmit_date** **readmit_30dany** **readmit_date_30dany** **emerg** ADMAMBUL (from NACRS, only if emerg=1) **DADtransfer** fsa **gp_visits** ADMCAT INSTTYPE DX10CODE1 *If DADtransfer=1, include the following variables from OMHRS:* *Variables to include from the ICES stand-alone data set:* DDATE (OMHRS discharge date) ADMDATE (OMHRS admission) AXIS1_DSM4CODE_DISCH1 INST *Variables to include from admission assessment (A2=1) in full OMHRS dataset (with same ADMISSION_ID as the ICES stand-alone data set):* Identifiers (section AA): AA4, AA5 Personal items (section BB): BB3, BB4, BB5, BB6A-G Referral items (section CC): CC1, CC2A-G, CC3, CC4, X65, CC5 Mental health service history (section DD): DD1, DD2, DD3, DD4, DD5 Assessment information (section A): A2, A3A, A3B, A4A-D, A5A-B Mental state indicators (section B): B1A-B1Z, B1AA-GG, B2 Substance use and excessive behaviours (section C): C1, C2A-C2F, C3, C4A-D, C5, C6 Harm to self and others (section D): D1A-D1C, D1Da-D1b, D2A-C, D3 Behaviour disturbance (section E): E1A-G, E2 Life events and history (section J): J1A-P, J2, J3A-B Medications (section K): K1, K2, K3, K4, K5 Service utilization (section L): L1A-H, L2A-D Control procedures/observation (section M): M1A-F, M2A-D, M3 Role functioning and social relations (section O): O1, O2A-G, O3, O4A-D, O5, O6A-C CIHI scales: CIHI_ABS, CIHI_ANHEDONIA, CIHI_DRS, CIHI_DSI, CIHI_MANIA, CIHI_PSS_LONG, CIHI_PSS_SHORT, CIHI_RHO, CIHI_SOS, CIHI_SCI, CIHI_SCIPP_CATEGORY FACILITY_HEALTH_REGION From the OMHRS_MHCAPS dataset: SUBUSE_MHC
CohortB	IKN Admission_ID Omhrskey_adm indexdate

Data Dictionary of Datasets to be Provided to Student (see variable definitions below) NOTE: Bolded variables are variables that the analyst will derive, non-bolded variables come directly from the source datasets	
	AXIS1_DSM4CODE_DISCH1 INST Age Sex incquint Rural **Immigrant** **Country** **readmit_30dmh** **readmit_30dany** **readmit_30dmh_dx1** **readmit_30dmh_dx2** **emerg** fsa **gp_visits** **TransferFromDAD** ADMMETH (from DAD, only if transferfromdad=1) ADMAMBUL (from NACRS, only if emerg=1) Identifiers (section AA): AA4, AA5 Personal items (section BB): BB3, BB4, BB5, BB6A-G Referral items (section CC): CC1, CC2, CC3, CC4, X65, CC5 Mental health service history (section DD): DD1, DD2, DD3, DD4, DD5 Assessment information (section A): A2, A3A, A3B, A4A-D, A5A-B Mental state indicators (section B): B1A-B1Z, B1AA-GG, B2 Substance use and excessive behaviours (section C): C1, C2A-C2F, C3, C4A-D, C5, C6 Harm to self and others (section D): D1A-D1C, D1Da-D1b, D2A-C, D3 Behaviour disturbance (section E): E1A-G, E2 Life events and history (section J): J1A-P, J2, J3A-B Medications (section K): K1, K2, K3, K4, K5 Service utilization (section L): L1A-H, L2A-D Control procedures/observation (section M): M1A-F, M2A-D, M3 Role functioning and social relations (section O): O1, O2A-G, O3, O4A-D, O5, O6A-C CIHI scales: CIHI_ABS, CIHI_ANHEDONIA, CIHI_DRS, CIHI_DSI, CIHI_MANIA, CIHI_PSS_LONG, CIHI_PSS_SHORT, CIHI_RHO, CIHI_SOS, CIHI_SCI, CIHI_SCIPP_CATEGORY FACILITY_HEALTH_REGION From the OMHRS_MHCAPS dataset: SUBUSE_MHC Q4 (from full OMHRS dataset – admission assessment (ie, where A2=1))
CohortC	IKN indexdate dxcode_index Age Sex incquint Rural **Immigrant** **Country**

Data Dictionary of Datasets to be Provided to Student (see variable definitions below)

NOTE: Bolded variables are variables that the analyst will derive, non-bolded variables come directly from the source datasets

	gp_dx
CohortCDAD	IKN KEY ADMDATE DDATE ADMMETH **emerg** ADMAMBUL (from NACRS, only if emerg=1) **DADtransfer** DX10CODE1 **readmit_30dmh** **readmit_date** **readmit_30dany** **readmit_date_30dany** **readmit_30dmh_dx1** **readmit_30dmh_dx2** fsa **gp_visits** *If DADtransfer=1, include the following variables from OMHRS:* *Variables to include from the ICES stand-alone data set:* DDATE_OMHRS ADMDATE_OMHRS AXIS1_DSM4CODE_DISCH1 INST *Variables to include from admission assessment (A2=1) in full OMHRS dataset (with same ADMISSION_ID as the ICES stand-alone data set):* Identifiers (section AA): AA4, AA5 Personal items (section BB): BB3, BB4, BB5, BB6A-G Referral items (section CC): CC1, CC2, CC3, CC4, X65, CC5 Mental health service history (section DD): DD1, DD2, DD3, DD4, DD5 Assessment information (section A): A2, A3A, A3B, A4A-D, A5A-B Mental state indicators (section B): B1A-B1Z, B1AA-GG, B2 Substance use and excessive behaviours (section C): C1, C2A-C2F, C3, C4A-D, C5, C6 Harm to self and others (section D): D1A-D1C, D1Da-D1b, D2A-C, D3 Behaviour disturbance (section E): E1A-G, E2 Life events and history (section J): J1A-P, J2, J3A-B Medications (section K): K1, K2, K3, K4, K5 Service utilization (section L): L1A-H, L2A-D Control procedures/observation (section M): M1A-F, M2A-D, M3 Role functioning and social relations (section O): O1, O2A-G, O3, O4A-D, O5, O6A-C CIHI scales: CIHI_ABS, CIHI_ANHEDONIA, CIHI_DRS, CIHI_DSI, CIHI_MANIA, CIHI_PSS_LONG, CIHI_PSS_SHORT, CIHI_RHO, CIHI_SOS, CIHI_SCI, CIHI_SCIPP_CATEGORY FACILITY_HEALTH_REGION From the OMHRS_MHCAPS dataset: SUBUSE_MHC

Data Dictionary of Datasets to be Provided to Student (see variable definitions below) NOTE: Bolded variables are variables that the analyst will derive, non-bolded variables come directly from the source datasets	
CohortCOMHRS	IKN Admission_ID Omhrskey_adm DDATE ADMDATE AXIS1_DSM4CODE_DISCH1 INST **readmit_30dmh** **readmit_date** **readmit_30dany** **readmit_date_30dany** **readmit_30dmh_dx1** **readmit_30dmh_dx2** **emerg** fsa **gp_visits** **TransferFromDAD** ADMMETH (from DAD, only if transferfromdad=1) ADMAMBUL (from NACRS, only if emerg=1) Identifiers (section AA): AA4, AA5 Personal items (section BB): BB3, BB4, BB5, BB6A-G Referral items (section CC): CC1, CC2, CC3, CC4, X65, CC5 Mental health service history (section DD): DD1, DD2, DD3, DD4, DD5 Assessment information (section A): A2, A3A, A3B, A4A-D, A5A-B Mental state indicators (section B): B1A-B1Z, B1AA-GG, B2 Substance use and excessive behaviours (section C): C1, C2A-C2F, C3, C4A-D, C5, C6 Harm to self and others (section D): D1A-D1C, D1Da-D1b, D2A-C, D3 Behaviour disturbance (section E): E1A-G, E2 Life events and history (section J): J1A-P, J2, J3A-B Medications (section K): K1, K2, K3, K4, K5 Service utilization (section L): L1A-H, L2A-D Control procedures/observation (section M): M1A-F, M2A-D, M3 Role functioning and social relations (section O): O1, O2A-G, O3, O4A-D, O5, O6A-C CIHI scales: CIHI_ABS, CIHI_ANHEDONIA, CIHI_DRS, CIHI_DSI, CIHI_MANIA, CIHI_PSS_LONG, CIHI_PSS_SHORT, CIHI_RHO, CIHI_SOS, CIHI_SCI, CIHI_SCIPP_CATEGORY FACILITY_HEALTH_REGION From the OMHRS_MHCAPS dataset: SUBUSE_MHC Q4 (from full OMHRS dataset – the admission assessment (ie, where A2=1))

Analysis Plan	
Cohort A	1. Complete baseline characteristics 2. Define readmit_30dmh 3. Define readmit_30dany 4. Define readmit_30dmh_dx1 5. Define readmit_30dmh_dx2

Analysis Plan	
	6. Define emerg Define DADTransfer 7. Define Immigrant & Country 8. Define pstlcode 9. Define gp_visits 10. If DADTransfer=1, pull OMHRS records, keeping variables indicated in the Data Dictionary (variables from the ICES stand-alone dataset and the full OMHRS admission records (A2=1) with the same ADMISSION_ID) 11. Define index_dx and source
Cohort B	1. Complete baseline characteristics 2. Define readmit_30dmh 3. Define readmit_30dany 4. Define readmit_30dmh_dx1 5. Define readmit_30dmh_dx2 6. Define emerg 7. Define Immigrant & Country 8. Define pstlcode 9. Define gp_visits 10. Define TransferFromDAD 11. Define index_dx and source
Cohort C	1. Complete baseline characteristics 2. Define Immigrant & Country 3. Define gp_dx 4. Look forward a maximum of 730 days for a DAD or OMHRS hospitalization for any mental health reason using one of the following criteria: • Use %GETDADSDS and limit to non-elective admissions (ADMCAT U or E) for all hospitalizations at acute care institution (INSTTYPE AT or AP) with a DX10CODE1 related to mental health. • For psychiatric hospitalizations in OMHRS, use only first diagnosis from Axis 1 or Axis 2, first position at discharge (AXIS1_DSM4CODE_DISCH1 or AXIS2_DSM4CODE_DISCH1). Exclude discharges with no Axis 1 diagnosis (Axis 1 diagnosis variable [AXIS1_DSM4CODE_DISCH1] is missing) NOTE 1: Diagnostic codes listed in Appendix B. 5. Restrict to the first hospitalization in the follow-up period and save into respective dataset (CohortCDAD or CohortCOMHRS). If there are hospitalization records occurring in both DAD and OMHRS on the same day, preferentially select the OMHRS record. 6. Define readmit_30dmh for each CohortCDAD and CohortCOMHRS 7. Define readmit_30dany for each CohortCDAD and CohortCOMHRS 8. Define readmit_30dmh_dx1 for each CohortCDAD and CohortCOMHRS 9. Define readmit_30dmh_dx2 for each CohortCDAD and CohortCOMHRS 10. Define emerg for each CohortCDAD and CohortCOMHRS 11. Define pstlcode for CohortCDAD and CohortCOMHRS 12. Define gp_visits for CohortCDAD and CohortCOMHRS 13. Define TransferFromDAD for CohortCOMHRS

Analysis Plan	
	14. Define DADTransfer for CohortCDAD 15. If DADTransfer=1 for CohortCDAD, pull OMHRS records, keeping variables indicated in the Data Dictionary (variables from the ICES stand-alone dataset and the full OMHRS admission records (A2=1) with the same ADMISSION_ID) 16. Define index_dx and source
Cohort D (overall baseline sample)	1. Concatenate CohortCDAD and CohortCOMHRS 2. Concatenate Cohort A, Cohort B, and CohortCDADOMHRS and save into new dataset (CohortAll) 3. Define new variables: age_cat, hosp_dx, index_dx_binary, hosp_dx_binary, immigrant_binary, livedalone, subuse_binary, adherence, insight, trauma1, pss_cat, mania_cat, anhedonia_cat, abs_cat, rho_cat, sos_cat, sci_cat, drs_cat, police_7d, days_hosp, days_hosp_cat, gp_visits_binary, gp_visits2, gp_involvement, ch_contact_recent, admits_recent, trans_ovrll, status, hosp, admdate, ddate, involuntary, form 4. Subset CohortAll where those with a diagnosis of affective or organic psychosis at hospitalization are excluded (ie, hosp_dx in (0,1,2,3,6,7,8,9.)) and save into new dataset (Cohort D) 5. Complete analysis plan for baseline sample (see Analysis Plan section below, Part I, and III)
Cohort E (sample with primary outcome of voluntary/involuntary hospitalization)	1. Subset Cohort D to select those who were hospitalized on a voluntary or involuntary basis (ie, subset D where a3a in (1,2,4) or admmeth in (b,c,d,e)) 2. Exclude those where status is anything other than voluntary or involuntary (ie, in cases where status in (0,1,2,3,8,9.)) 3. Subset Cohort E to select only those who were hospitalized in OMHRS and save into new dataset (CohortEOMHRS): Source = 2 or 5 OR DADtransfer = 1 4. Subset cohort E to select only those who were hospitalized in DAD and save into new dataset (CohortEDAD) Source = 1 or 4 AND TransferFromDAD ne 1 5. Complete analysis plan for Part II, IV, V, VI.

Variable Definitions (add additional rows as needed)	
Primary Outcome Definition	
readmit_30dmh	Psychiatric hospital admissions within 30 days of discharge date of index event using one of the following criteria: 1. Use %GETDADSDS and limit to non-elective admissions (ADMCAT U or E) for all hospitalizations at acute care institution (INSTTYPE AT or AP) with a DX10CODE1 related to mental health. 2. For psychiatric hospitalizations in OMHRS, use only first diagnosis from Axis 1 or Axis 2, first position at discharge (AXIS1_DSM4CODE_DISCH1 or AXIS2_DSM4CODE_DISCH1). Exclude discharges with no Axis 1 diagnosis (Axis 1 diagnosis variable [AXIS1_DSM4CODE_DISCH1] is missing) NOTE 1: Diagnostic codes listed in Appendix B.

Variable Definitions (add additional rows as needed)	
	Categorize as follows: 0 = no psychiatric hospitalization within 30 days 1 = psychiatric hospitalization within 30 days
readmit_30dmh_dx1	Main diagnosis code associated with hospital admission in readmit_30dmh variable: 1. If admitted in DAD, include DX10CODE1 2. If admitted in OMHRS, include AXIS1_DSM4CODE_DISCH1
readmit_30dmh_dx2	Axis 2 diagnosis code associated with hospital admission in OMHRS in readmit_30dmh variable.
readmit_30dany	Any other hospital admission (DAD or OMHRS) within 30 days of discharge date of index event not included in variable above. Categorize as follows: 0 = no readmission 1 = readmission
involuntary	Classify index hospitalization as voluntary, involuntary, etc as follows: 1 = involuntary defined as follows: • admitted in OMHRS only and involuntary, or transferred from DAD but DAD status missing (status = . or 8 and a3a = 1 or 4) OR • for those with records in DAD & OMHRS, select those who were involuntary at any point as involuntary (status = 1 or 2 or 3) OR • transferred from DAD but OMHRS status missing, and involuntary in DAD (status = 9 and admmeth = c or d or e) OR • admitted in DAD only and involuntary (status=. And admmeth = c or d or e) 0 = voluntary defined as follows: • admitted in OMHRS only and voluntary or transferred from DAD and DAD status missing (status = . or 8 and a3a =2) OR • for those with records in DAD & OMHRS and voluntary in both (status = 0) • transferred from DAD but OMHRS status missing and voluntary in DAD (status = 9 and admmeth = b) • admitted in DAD only and voluntary (status = . and admmeth = b)
Baseline Characteristics/Exposures	
age	Age on the index date, calculated based on date of birth from RPDB
age_cat	Categorize age as follows: 0 = 16-20 1 = 21-25 2 = 26-30 3 = 31-35
sex	Sex from RPDB at index date
incquint	INCQUINT from %GETDEMO (1 = lowest income quintile, 5 = highest income quintile) at index date
rural	RURAL from %GETDEMO (1 = rural, 0 = non-rural) at index date
immigrant	CATEG variable from CIC, categorized as follows: 0 = non-immigrant (ie, not included in CIC database) 1 = immigrant (CATEG = all values not listed below) 2 = refugee (CATEG = 020-029,031-034,037,047-049,052-055,080,086-089,094-095,120-142,153)
immigrant_binary	Dichotomize immigrant variable as follows:

Variable Definitions (add additional rows as needed)	
	0 = non-immigrant (immigrant = 0) 1 = immigrant or refugee (immigrant = 1 or 2)
country	FCOB from CIC, classified according to Appendix C
index_dx	Classify main diagnosis (DX10CODE1 for Cohort A, AXIS1_DSM4CODE_DISCH1 for Cohort B, and DXCODE (OHIP) or DX10CODE1 (NACRS) for Cohort C) at inclusion in cohort as follows: 0 = schizophrenia (OMHRS = 295.0 – 295.6x or 295.90, DAD/NACRS (ICD-10) = F20, OHIP = 295) 1 = schizoaffective disorder (OMHRS = 295.70, DAD/NACRS (ICD-10) = F25) 2 = psychosis NOS (OMHRS = 298.90, DAD/NACRS (ICD-10) = F29, OHIP = 298)
index_dx_binary	Dichotomize index diagnosis as schizophrenia spectrum versus psychosis NOS as follows: 0 = schizophrenia or schizoaffective disorder (index_dx = 0 or 1) 1 = psychosis NOS (index_dx = 2)
hosp_dx	NOTE1: I will determine frequencies of codes present for discharge diagnoses at first hospitalization and depending on diagnoses present, I will categorize into groups. A tentative grouping is outlined here below. Classify main diagnosis at hospitalization (DX10CODE1 for Cohort A and CohortCDAD, AXIS1_DSM4CODE_DISCH1 for Cohort B and CohortCOMHRS) as follows: 0 = schizophrenia 1 = schizoaffective disorder 2 = psychosis NOS 3 = other psychotic disorders (nonaffective) 4 = affective psychotic disorders 5 = organic psychoses 6 = mood disorders 7 = anxiety/adjustment disorders 8 = substance use disorders 9 = other NOTE2: See Appendix F for diagnostic codes
hosp_dx_binary	Dichotomize main diagnosis at hospitalization as follows: 0 = psychotic disorder (hosp_dx in 0,1,2,3) 1 = non-psychotic disorder (hosp_dx in 6,7,8,9)
livedalone	Categorize the variable “Who Lived With at Admission” from OMHRS (CC3) as follows: 0 = no (CC3 = 2, 3, 4, 5, or 6) 1 = yes (CC3 = 1)
subuse_binary	Dichotomize substance use to current versus none/history as follows: 0 = none/history (subuse_mhc = 0 or 1) 1 = current problems with substance use (subuse_mhc = 2)
adherence	Problems with medication adherence, classified as follows: 0 = no indicators of problems with adherence (K1 = 0 or 1 and k3 = 0 or .) 1 = at least one indicator of problems with adherence (K1 = 2 or k3 = 1) 2 = not on mediation (K1 = 3) 3 = unknown or missing
trauma	Experienced or witnessed a traumatic event (lifetime), classified as follows: 0 = no (j1a and J1j and J1m and J1n and J1k = 0) 1 = yes (j1a OR J1j OR J1m OR J1n OR J1k = 1, 2, 3, 4 or 5)

Variable Definitions (add additional rows as needed)	
pss_cat	Categorize cihi_pss_short as follows: 0 = cihi_pss_short = 0 or 1 or 2 1= cihi_pss_short = 3 or 4 or 5 2 = cihi_pss_short >= 6
mania_cat	Categorize cihi_mania as follows: 0 = cihi_mania = 0 or 1 or 2 1= cihi_mania = 3 or 4 or 5 2 = cihi_mania >= 6
anhedonia_cat	Categorize cihi_anhedonia as follows: 0 = cihi_anhedonia = 0 or 1 or 2 1= cihi_anhedonia = 3 or 4 or 5 2 = cihi_anhedonia >=6
abs_cat	Categorize abs_cat as follows: 0 = cihi_abs = 0 1= cihi_abs = 1 or 2 2 = cihi_abs = 3 or 4 or 5 3 = cihi_abs >=6
rho_cat	Categorize rho_cat as follows: 0 = cihi_rho = 0 or 1 or 2 1= cihi_rho = 3 or 4 2 = cihi_rho >=5
sos_cat	Categorize sos_cat as follows: 0 = cihi_sos = 0 or 1 or 2 1= cihi_sos = 3 or 4 2 = cihi_sos >= 5
sci_cat	Categorize sci_cat as follows: 0 = cihi_sci = 0 or 1 or 2 1= cihi_sci = 3 or 4 2 = cihi_sci >= 5
drs_cat	Categorize drs_cat as follows: 0 = cihi_drs = 0 or 1 or 2 1= cihi_drs >= 3
days_hosp	The number of days from index diagnosis (ADMDATE for Cohort A, CC1 for Cohort B, SERVDATE or REGDATE for Cohort C) and first hospitalization (ADMDATE for Cohort A & CohortCDAD, CC1 for Cohort B & CohortCOMHRS).
days_hosp_cat	Categorize the number of days from index diagnosis to hospitalization as follows: 0 = Hospitalized at diagnosis (within a day; days_hosp = 0-1) 1 = Hospitalized within a month (days_hosp = 2-30) 2 = Hospitalized more than a month and within 6 months (days_hosp = 31-180) 3 = Hospitalized more than 6 months but within 1 year (days_hosp = 181-360) 4 = Hospitalized more than 1 year (days_hosp > 360)
police_7d	Police intervention for violent or non-violent behavior in the past 7 days, classified as follows: 0 = more than a week ago or never (A5A and A5B = 0 or 1 or 2 or 3) 3 = past week (A5A or A5B = 4 or 5)
gp_visits	Number of visits to a general practitioner for a mental health reason within

Variable Definitions (add additional rows as needed)	
	6 months prior to first hospitalization admission date (ADMDATE for Cohort A and CohortCDAD, CC1 for Cohort B and CohortCOMHRS). A mental health reason includes all mental health service codes, paediatric service codes, and general service codes with a mental health diagnostic code (codes listed in Appendix D).
gp_visits_binary	Dichotomize gp_visits to no gp visits in the 6 months prior to hospitalization versus any number of visits: 0 = no gp visits (gp_visits = 0) 1 = at least 1 gp visit (gp_visits > 0)
gp_visits2	Exclude outliers in gp_vists variable (ie, those with 30 or more visits) (ie, if gp_visits < 30 then gp_visits2=gp_visits)
gp_involvement	Any gp involvement (ie, visits or diagnosed by a gp) versus no gp involvement: 0 = no gp involvement (gp_visits = 0 and gp_dx = 0 or .) 1 = any gp involvement (gp_visits > 0 or gp_dx = 1)
ch_contact_recent	Dichotomize contact with community health (DD5) to indicate recent contact (ie, past 30 days) versus no recent contact (30 days or more or none) 0 = no contact within the past 30 days (DD5 = 0 or 1) 1 = contact within the past 30 days (DD5 = 2)
admits_recent	Dichotomize recent psychiatric admissions in the past 2 years (DD1) to none versus any: 0 = no recent psychiatric admissions (DD1 = 0) 1 = at least 1 recent psychiatric admission (DD1 = 1 [1 or 2 admissions] or 2 [3 or more admissions])
Other Variables	
emerg	Admitted through the ED for any reason from NACRS at first hospitalization Use %GETNACRS to get ED visit associated with first hospitalization Merge: • OMHRS-NACRS: TO_ID = OMHRSKEY_ADM • DAD-NACRS: TO_ID = KEY Categorize as follows: 0 = not admitted through the ED 1 = admitted through the ED
DADtransfer	Flag those who were admitted in DAD and transferred to OMHRS by identifying an OMHRS admission (admdate) +/- 1 day after a DAD discharge (ddate) Merge: OMHRS-DAD: DAD record +/- 1 day
TransferFromDAD	Flag those in OMHRS who were admitted in DAD and transferred to OMHRS by identifying an OMHRS admission (admdate) +/- 1 day after a DAD discharge (ddate). Merge: OMHRS-DAD: OMHRS record +/- 1 day
trans_ovrll	Flag all of those who were admitted in DAD and transferred to OMHRS (ie, combine DADtransfer and TransferFromDAD) 0 = not transferred 1 = transferred (dadtransfer = 1 or transferfromdad = 1)
fsa	Use %GETDEMO and PSTLYEAR to obtain first three digits of postal code (forward sortation area) for the year the patient was first admitted (ADMDATE for Cohort A and CohortCDAD, CC1 for Cohort B and CohortCOMHRS).

Variable Definitions (add additional rows as needed)	
gp_dx	For Cohort C, for those included in the cohort with one or more OHIP billing claims present, flag the records where at least one of those billing claims was submitted by a general practitioner. Categorize as follows: 0 = no GP involvement 1 = GP involvement
source	Flag each cohort used to construct overall cohort to indicate source of each record according to inclusion criteria: 1 = Cohort A 2 = Cohort B 3 = Cohort C 4 = CohortCDAD 5 = CohortCOMHRS
status	Define status in DAD and OMHRS as follows: 0 = voluntary in DAD and voluntary in OMHRS (admmeth = b and a3a = 2) 1 = involuntary in DAD and involuntary in OMHRS (admmeth = c or d or e and a3a = 1 or 4) 2 = voluntary in DAD and involuntary in OMHRS (admmeth = b and a3a = 1 or 4) 3 = involuntary in DAD and voluntary in OMHRS (admmeth = c or d or e and a3a = 2) 4 = informal or other in DAD and voluntary in OMHRS (admmeth = a or I and a3a = 2) 5 = informal or other in DAD and involuntary in OMHRS (admmeth = a or I and a3a = 1 or 4) 6 = voluntary in DAD and informal or forensic in OMHRS (admmeth = b and a3a = 3 or 5) 7 = involuntary in DAD and informal or forensic in OMHRS (admmeth = c or d or e and a3a = 3 or 5) 8 = transferred from DAD but DAD status missing (dadtransfer or transferfromdad = 1 and admmeth = .) 9 = transferred from DAD but OMHRS status missing (dadtransfer=1 and a3a=.)
hosp	Categorize those who were hospitalized, regardless of status: 1 = hospitalized (source = 1,2,4 or 5) 0 = not hospitalized
admdate	Recode admission dates from each cohort so all within one variable: if source = 1 then admdate=indexdate (in cohort A, adm date is labelled admdate_index) else if source = 2 then admdate = cc1 (in cohort b, adm date is cc1) else if source in (4,5) then admdate = admdate
ddate	Recode discharge dates from each cohort so all within one variable: if source in (1,2) then ddate=indexdate else if source in (4,5) then ddate = ddate
form	Categorize whether involuntary status was a form 1 or form 3: 1 = form 1 (admmeth = d or a3a = 1) 3 = form 3 (admmeth = c or e or a3a = 4)

Analysis Plan and Dummy Tables (expand/modify as needed)

Analysis Plan and Dummy Tables (expand/modify as needed)

List of tables in appendix:

Table 0a. Overall cohort inclusion/exclusion numbers
Table 0b. Inclusion/exclusion numbers for primary outcome sample
Table 1. Descriptive statistics of baseline and explanatory study variables
Table 2. Baseline characteristics according to primary outcome
Table 3. Description of hospitalizations and involuntary/voluntary admissions
Table 4: Reasons for admission in patients with voluntary versus involuntary status at admission
Table 5: Correlations among continuous covariates
Table 6: Associations among categorical covariates
Table 7: Associations among continuous and categorical covariates
Table 8: Explanatory variables according to primary outcome
Table 9: Logistic regression results using the augmented backward elimination method for factors associated with involuntary hospitalization

Statistical Model(s)	
Type of model	Logistic regression
Dependent variable	Involuntary
Explanatory variables	age, sex, income, immigrant, livingalone, CC5, O2b, index_dx, CIHI_PSS_SHORT, CIHI_ANHEDONIA, CIHI_DRS, CIHI_MANIA, CIHI_SOS, CIHI RHO, CIHI_SCI, Q4, CIHI_ABS, SUBUSE_MHC, B2, adherence, trauma, days_hosp, gp_dx, gp_visit, emerg, DD5, DD1
Sensitivity Analyses	TBD
Type of model	
Primary independent variable	
Dependent variable	
Covariates	

Analysis Plan and Dummy Tables (expand/modify as needed)

Part I. Data exploration of baseline variables

Sample:

- Cohort D (full baseline cohort)
- Cohort E (primary outcome sample)
- CohortEOMHRS (primary outcome sample in OMHRS)

Variables:

- age
- sex
- incquint
- rural
- immigrant
- index_dx

Analyses:

- Calculate summary statistics (frequencies, proportions, means, standard deviation, median, range, IQR) for each variable
- Calculate frequency and percent missingness for each variable.
- Assess if outliers with histograms or box plots

Output tables: Table 1: Descriptive statistics of baseline and explanatory study variables

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Part II. Data exploration of explanatory variables in sample with primary outcome

Sample:

- Cohort E
- CohortEOMHRS

Variables:

- AXIS1_DSM4_DISCH1
- age
- sex
- incquint
- rural
- immigrant
- index_dx
- hosp_dx
- CC3 (Who lived with at admission)
- livedalone
- CC5 (Residential stability)
- O2b (Family or close friend overwhelmed by patient's illness)
- CIHI_PSS_SHORT (Positive symptoms)
- CIHI_PSS_LONG (Positive symptoms)
- CIHI_ANHEDONIA (Negative symptoms)
- CIHI_DSI (Depressive Severity Index)
- CIHI_DRS (Depression Rating Scale)
- CIHI_MANIA (Mania symptoms)
- CIHI_SOS (Severity of Self-Harm)

Analysis Plan and Dummy Tables (expand/modify as needed)

- CIHI_RHO (Risk of Harm to Others)
- CIHI_SCI (Self-Care Index)
- Q4 (GAF score)
- CIHI_ABS (Aggressive Behaviour Scale)
- SUBUSE_MHC (Addictive behaviours)
- B2 (Insight)
- CC2 (Reasons for admission)
- adherence
- trauma
- days_hosp
- gp_dx
- gp_visits
- police
- emerg
- ADMAMBUL
- DADTransfer
- TransferFromDAD
- DD5 (Contact with community health)
- DD1 (Number of psychiatric admissions – past 2 years)
- DD2 (Number of psychiatric admissions – lifetime)

Analyses:

- Calculate frequencies for diagnostic codes present at discharge (AXIS1_DSM4_DISCH1)
- Decide whether to exclude affective psychosis from Cohort E, CohortEDAD and CohortEOMHRS
- Define hosp_dx variable
- Calculate summary statistics (frequencies, proportions, means, median, standard deviation, range) for each variable
- Calculate frequency and percent missingness for each variable.
- Assess skewness/normality with histogram
- Look for outliers with histograms or box plots

Output tables:

- Table 1: Summary statistics of baseline and explanatory study variables

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Part III. Baseline characteristics

Sample:

- Cohort E
- CohortEOMHRS

Variables:

- age
- sex
- incquint
- rural
- immigrant
- index_dx

Analyses:

- Calculate summary statistics for each baseline variable according to primary outcome in Cohort E

and CohortEOMHRS
- Calculate the standardized difference between voluntary and involuntary groups for each baseline variable in Cohort E and CohortEOMHRS

Output tables: Table 2: Baseline characteristics according to primary outcome

---

Part IV. Descriptive analyses of involuntary hospitalizations

Objective 1: Estimate proportion of those hospitalized at first admission with involuntary status

Samples:
- Cohort E
- CohortEDAD
- CohortEOMHRS

Variables:
- days_hosp
- DADtransfer
- TransferFromDAD
- Involuntary
- A3A (status at admission in OMHRS)
- A3B (status at assessment in OMHRS)
- ADMMETH (status at admission in DAD)
- hosp_dx
- status

Analyses:
- Calculate means and proportions for each variable in each sample

Output tables: Table 3: Description of hospitalizations and involuntary/voluntary admission

---

Part V. Descriptive analysis of reasons for admission in voluntary versus involuntary patients

Objective 2: Compare the reasons for admission in FEP patients who are involuntarily admitted to those who are voluntarily admitted to a psychiatric bed

Sample:
- CohortEOMHRS

Outcome variable:
- Involuntary

Explanatory variables:
- Reasons for admission (CC2a-g)

Analysis:
- Calculate frequencies and proportions for each reason for admission in CohortEOMHRS and by outcome status (voluntary versus involuntary)
- Calculate standardized difference between voluntary and involuntary groups for each reason for admission

---

Analysis Plan and Dummy Tables (expand/modify as needed)

Output tables: Table 4: Reasons for admission in patients with voluntary versus involuntary status at admission

---

Part VI. Factors associated with involuntary hospitalization

Objective: Identify the sociodemographic, clinical, and service-level factors associated with involuntary hospitalization to a psychiatric bed in FEP

Sample:

- CohortEOMHRS

Outcome variable: involuntary

Explanatory variables:

- Sociodemographics
  - Age
  - Sex
  - Rural
  - incquint
  - immigrant
  - livingalone
  - CC5 (Residential stability)
  - O2b (Family or close friend overwhelmed by patient's illness)
- Clinical factors
  - CIHI_PSS_SHORT (Positive symptoms)
  - CIHI_ANHEDONIA (Negative symptoms)
  - CIHI_DRS (Depression Rating Scale)
  - CIHI_MANIA (Mania symptoms)
  - CIHI_SOS (Severity of Self-Harm)
  - CIHI_RHO (Risk of Harm to Others)
  - CIHI_SCI (Self-Care Index)
  - CIHI_ABS (Aggressive Behaviour Scale)
  - SUBUSE_MHC (Addictive behaviours)
  - B2 (Insight)
  - adherence
  - trauma
- Service use
  - days_hosp
  - gp_dx
  - gp_visits
  - police
  - emerg
  - DD5 (Contact with community health)
  - DD1 (Number of psychiatric admissions – past 2 years)

Analyses:

- Describe associations among covariates:
  - Calculate Perason's r or Spearman's rho to determine correlations among continuous covariates

Analysis Plan and Dummy Tables (expand/modify as needed)

- Bivariate analysis of means and proportions for each covariate according to outcome with standardized differences
- Calculate unadjusted ORs for each explanatory variable with a series of univariate logistic regression models
- Conduct logistic regression using augmented backward elimination (ABE) method
- Assess model fit diagnostics:
    - Assess linearity
    - Goodness of fit test
    - Multicollinearity (VIF)
- Re-run model using robust standard error to assess if clustering is present
- Re-run model excluding correlated covariates and outliers to see if this impacts results

Output tables:

- Table 5: Correlations among continuous covariates
- Table 6: Associations among categorical covariates
- Table 7: Associations among continuous and categorical covariates
- Table 8: Explanatory variables according to primary outcome
- Table 9: Logistic regression results using the ABE selection method for factors associated with involuntary hospitalization

Quality Assurance Activities

RAE Directory of SAS Programs		
RAE Directory of Final Dataset(s)	*The final analytic dataset for each cohort includes all the data required to create the baseline tables and run all the models. It should include all covariates for all models such as patient risk factors, hospital characteristics, physician characteristics, exposure measures (continuous, categorical) and outcomes. It should include covariates that were considered but didn't make the final cut. This would permit an analyst to easily re-run the models in the future.*	
RAE README file available:	☐Yes ☐No	
Date results of quality assurance tools for final dataset shared with project team (where applicable):		
	%assign	yyyy-mon-dd
	%evolution	yyyy-mon-dd
	%dinexplore	yyyy-mon-dd
	%track / %exclude	yyyy-mon-dd
	%codebook	yyyy-

Quality Assurance Activities	
	mon -dd
Additional comments:	

APPENDIX A – List of Diagnostic Codes to Include for Cohort Definition

OMHRS:

Schizophrenia & schizoaffective disorder:
295 (295, 295.X, or 295.XX)

Psychosis NOS:
298 (298, 298.X, or 298.XX)

DAD (ICD-10):
F20 = SCHIZOPHRENIA
F200 = PARANOID SCHIZOPHRENIA
F201 = HEBEPHRENIC SCHIZOPHRENIA
F202 = CATATONIC SCHIZOPHRENIA
F203 = UNDIFFERENTIATED SCHIZOPHRENIA
F204 = POST-SCHIZOPHRENIC DEPRESSION
F205 = RESIDUAL SCHIZOPHRENIA
F206 = SIMPLE SCHIZOPHRENIA
F208 = OTHER SCHIZOPHRENIA
F209 = SCHIZOPHRENIA, UNSPECIFIED

F25 = SCHIZOAFFECTIVE DISORDERS
F250 = SCHIZOAFFECTIVE DISORDER, MANIC TYPE
F251 = SCHIZOAFFECTIVE DISORDER, DEPRESSIVE TYPE
F252 = SCHIZOAFFECTIVE DISORDER, MIXED TYPE
F258 = OTHER SCHIZOAFFECTIVE DISORDERS
F259 = SCHIZOAFFECTIVE DISORDER, UNSPECIFIED

F29 = UNSPECIFIED NONORGANIC PSYCHOSIS

DAD (ICD-9):
295 = SCHIZOPHRENIAS
29500 = SIMPL SCHIZOPHREN-UNSPEC
29501 = SIMPL SCHIZOPHREN-SUBCHR
29502 = SIMPLE SCHIZOPHREN-CHR
29503 = SIMP SCHIZ-SUBCHR/EXACER
29504 = SIMPL SCHIZO-CHR/EXACERB
29505 = SIMPL SCHIZOPHREN-REMISS
2951 = HEBEPHRENIA-UNSPEC
2952 = CATATONIA-UNSPEC
2953 = PARANOID SCHIZO-UNSPEC
2954 = AC SCHIZOPHRENIA-UNSPEC
2955 = LATENT SCHIZOPHREN-UNSP
2956 = RESID SCHIZOPHREN-UNSP

2957 = SCHIZOAFFECTIVE-UNSPEC
2958 = SCHIZOPHRENIA NEC-UNSPEC
2959 = SCHIZOPHRENIA NOS-UNSPEC

298 = OTHER PSYCHOSES
2980 = REACT DEPRESS PSYCHOSIS
2981 = EXCITATIV TYPE PSYCHOSIS
2982 = REACTIVE CONFUSION
2983 = ACUTE PARANOID REACTION
2984 = PSYCHOGEN PARANOID PSYCH
2988 = REACT PSYCHOSIS NEC/NOS
2989 = PSYCHOSIS NOS

OHIP DXCODE
295 = SCHIZOPHRENIA
298 = OTHER PSYCHOSES

APPENDIX B – List of Diagnostic Codes to Include for first hospitalization during the follow-up period for Cohort C and for the readmit_30dmh variable

DAD

ICD-10 codes
F10 to F51
F53
F55
F59
F60 to F69
F91 to F99

OMHRS
Include all codes EXCEPT the following if they are the main diagnosis (AXIS1_DSM4CODE_DISCH1 or AXIS2_DSM4CODE_DISCH1):
290, 293, 294, 299, 302, 314-319, 607-787, and codes that start with V

APPENDIX C – Country of Birth Classification (Statistics Canada)

0 = Country Not Available (FCOB = 0, 979)
1 = North America (FCOB = 461, 511, 512, 531)
2 = Central America (FCOB = 501, 541-549)
3 = Caribbean and Bermuda (FCOB = 601, 602, 605, 610, 620-622, 624-633, 650, 651, 653-658, 699)
4 = South America (FCOB = 703, 709, 711, 721-725, 751-755, 799)
5 = Western Europe (FCOB = 11-13, 22, 24, 31, 41, 46, 87, 652, 821)
6 = Eastern Europe (FCOB = 14-16, 18-20, 26, 33, 42, 51, 55, 56, 59, 83, 88)
7 = Northern Europe (FCOB = 1-10, 17, 21, 27, 32, 40, 85)
8 = Southern Europe (FCOB = 25, 28, 30, 34-37, 39, 43, 44, 47, 48, 61-64, 70, 81, 82, 84, 86, 89, 90)
9 = Western Africa (FCOB = 160, 164-167, 169, 170, 173, 174, 176, 177, 180, 181, 187, 188, 911)
10 = Eastern Africa (FCOB = 111-113, 130, 132, 136, 154, 161, 162, 172, 175, 179, 182, 183, 902-905)
11 = Northern Africa (FCOB = 101, 131, 133, 135, 171, 185)
12 = Central Africa (FCOB = 151, 155-159, 163, 178)
13 = Southern Africa (FCOB = 121, 122, 152, 153, 186)
14 = West Central Asia and Middle East (FCOB = 45, 49, 50, 52-54, 57, 58, 60, 206, 208, 210, 213, 221, 223-226, 231, 252,
253, 263, 265, 273, 274, 280)
15 = Eastern Asia (FCOB = 198, 200, 202-204, 207, 257, 258, 261, 262, 268)
16 = Southeast Asia (FCOB = 222, 227, 241, 242, 246, 255, 256, 260, 267, 270, 271)
17 = Southern Asia (FCOB = 201, 205, 209, 212, 254, 264)
18 = Oceania (FCOB = 305, 339, 341-343, 399, 801, 822-826, 830-836, 840-846, 899)
19 = Europe Other (FCOB = 99)
20 = Africa Other (FCOB = 184, 199, 906, 914, 915)
21 = Asia Other (FCOB = 266, 299, 901, 916)
22 = Americas Other (FCOB = 521, 912)

APPENDIX D – Visit and diagnostic codes used to define a primary care visit for a mental health reason

Comprehensive Primary Care Codes
A001 – Minor Assessment
A003 – General Assessment
A007 – Intermediate Assessment
A903 – Pre-operative Assessment
E075 – Geriatric General Assessment Premium
G212 – Allergy injection alone
G271 – Anticoagulant supervision
G372 – Injection with visit
G373 – Injection sole reason
G365 – Pap Test
G538 – Immunization with visit
G539 – Immunization - sole reason
G590 – Influenza immunization - with visit
G591 – Influenza immunization - sole reason
K005 – Primary Mental Health Care
K013 – Counseling – Individual Care
K017 – Annual Health Exam – Child after second birthday
P004 – Minor prenatal assessment

Pediatric Service Codes
A260 Paediatrics – 75 minute consultation
A265 Consultation – Paediatric
A662 Paediatrics – 90 minute consultation
K122 Paediatric psychotherapy individual, per unit
K123 Paediatric psychotherapy family, per unit

Mental Health Service Codes
K005 Primary mental health care
K007 Psychotherapy
K623 Assessment for involuntary admission

Mental Health Diagnostic Codes
295 Schizophrenia
296 Manic-depressive psychoses
297 Other paranoid states
298 Other psychoses
300 Anxiety neurosis, hysteria, neurasthenia, obsessive-compulsive neurosis, reactive
301 Personality disorders
302 Sexual deviations
306 Psychosomatic illness
309 Adjustment reaction
311 Depressive disorder
303 Alcoholism
304 Drug dependence
897 Economic problems
898 Marital difficulties
899 Parent-child problems
900 Problems with aged parents or in-laws
901 Family disruption/divorce

902 Education problems
904 Social maladjustment
905 Occupational problems
906 Legal problems
909 Other problems of social adjustment

APPENDIX E – Diagnostic codes to exclude for hospitalization (for CohortCDAD and CohortCOMHRS)

OMHRS
296 Manic depressive psychoses

DAD (ICD-10)
F30.2 Mania with psychotic symptoms
F31.2 Bipolar affective disorder, current episode manic with psychotic symptoms
F31.5 Bipolar affective disorder, current episode depression with psychotic symptoms
F32.3 Severe depressive episode with psychotic symptoms
F33.3 Recurrent depressive disorder, current episode severe with psychotic symptoms

APPENDIX F – Diagnostic codes for hosp_dx diagnosis

OMHRS

Schizophrenia
29510 = SCHIZOPHRENIA, DISORGANIZED TYPE
29520 = SCHIZOPHRENIA, CATATONIC TYPE
29530 = SCHIZOPHRENIA, PARANOID TYPE
29540 = SCHIZOPHRENIFORM DISORDER
29560 = SCHIZOPHRENIA, RESIDUAL TYPE
29590 = SCHIZOPHRENIA, UNDIFFERENTIATED TYPE

Schizoaffective disorder
29570 = SCHIZOAFFECTIVE DISORDER

Psychosis NOS
29890 = PSYCHOTIC DISORDER NOS

Other psychotic disorders
2971 Delusional disorder
2973 Shared psychotic disorder
2988 Brief psychotic disorder

Affective psychotic disorders
29604 Bipolar I disorder, single manic episode, severe with psychotic features
29624 Major depressive disorder, single episode, severe with psychotic features
29634 Major depressive disorder, recurrent, severe with psychotic features
29644 Bipolar I disorder, most recent episode manic, severe with psychotic features
29654 Bipolar I disorder, most recent episode depressed, severe with psychotic features
29664 Bipolar I disorder, most recent episode mixed, severe with psychotic features

Organic disorders (psychotic or dementia)
2913 Alcohol-induced psychotic disorder, with hallucinations
2915 Alcohol-induced psychotic disorder, with delusions
29211 Alcohol-induced persisting amnestic disorder
29212 Alcohol-induced persisting dementia
29382 Alcohol-induced sleep disorder

Mood disorders
296/2960/29600 Bipolar I disorder, single manic episode, unspecified
29601 Bipolar I disorder, single manic episode, mild
29602 Bipolar I disorder, single manic episode, moderate
29603 Bipolar I disorder, single manic episode, severe without psychotic features
29605 Bipolar I disorder, single manic episode, in partial remission
29606 Bipolar I disorder, single manic episode, in full remission
2962/29620 Major depressive disorder, single episode, unspecified
29621 Major depressive disorder, single episode, mild
29622 Major depressive disorder, single episode, moderate
29623 Major depressive disorder, single episode, severe without psychotic features
29625 Major depressive disorder, single episode, in partial remission
2963/29630 Major depressive disorder, recurrent, unspecified

29631 Major depressive disorder, recurrent, mild
29632 Major depressive disorder, recurrent, moderate
29633 Major depressive disorder, recurrent, severe without psychotic features
29635 Major depressive disorder, recurrent, in partial remission
29636 Major depressive disorder, recurrent, in full remission
2964/29640 Bipolar I disorder, most recent episode manic, unspecified
29641 Bipolar I disorder, most recent episode manic, mild
29642 Bipolar I Disorder, Most Recent Episode Manic, Moderate
29643 Bipolar I Disorder, Most Recent Episode Manic, Severe Without Psychotic Features
29645 Bipolar I Disorder, Most Recent Episode Manic, In Partial Remission
29646 Bipolar I Disorder, Most Recent Episode Manic, In Full Remission
2965/29650 Bipolar I Disorder, Most Recent Episode Depressed, Unspecified
29651 Bipolar I Disorder, Most Recent Episode Depressed, Mild
29652 Bipolar I Disorder, Most Recent Episode Depressed, Moderate
29653 Bipolar I Disorder, Most Recent Episode Depressed, Severe Without Psychotic Features
29656 Bipolar I Disorder, Most Recent Episode Depressed, In Full Remission
2966/29660 Bipolar I Disorder, Most Recent Episode Mixed, Unspecified
29661 Bipolar I Disorder, Most Recent Episode Mixed, Mild
29662 Bipolar I Disorder, Most Recent Episode Mixed, Moderate
29663 Bipolar I Disorder, Most Recent Episode Mixed, Severe Without Psychotic Features
29665 Bipolar I Disorder, Most Recent Episode Mixed, In Partial Remission
2967/29670 Bipolar I Disorder, Most Recent Episode Unspecified
2968/29680 Bipolar Disorder NOS
29689 Bipolar II Disorder
2969/29690 Mood Disorder NOS
311 Depressive Disorder NOS
3004 Dysthymic Disorder

Anxiety/adjustment disorders
300/30000 Anxiety Disorder NOS
30001 Panic Disorder Without Agoraphobia
30002 Generalized Anxiety Disorder
30011 Conversion Disorder
30014 Dissociative Identity Disorder
30015 Dissociative Disorder NOS
30016 Factitious Disorder With Predominantly Psychological Signs and Symptoms
30019 Factitious Disorder NOS
30021 Panic Disorder With Agoraphobia
30023 Social Phobia
3003 Obsessive-Compulsive Disorder
3007 Body Dysmorphic Disorder
30081 Somatization Disorder
30082 Somatoform Disorder NOS
3009 Unspecified Mental Disorder (nonpsychotic)
3083 Acute Stress Disorder
309/3090 Adjustment Disorder With Depressed Mood
30921 Separation Anxiety Disorder
30924 Adjustment Disorder With Anxiety
30928 Adjustment Disorder With Mixed Anxiety and Depressed Mood
3093 Adjustment Disorder With Disturbance of Conduct
3094 Adjustment Disorder With Mixed Disturbance of Emotions and Conduct
30981 Posttraumatic Stress Disorder
3099 Adjustment Disorder Unspecified

Alcohol/Substance use disorders
2910 Alcohol Intoxication Delirium
2911 Alcohol-Induced Persisting Amnestic Disorder
2918/29181 Alcohol withdrawal
29189 Alcohol-Induced Anxiety Disorder
2919 Alcohol-Related Disorder NOS
292/2920 Substance withdrawal
29281 Substance intoxication delirium
29284 Drug-induced mood disorder
29289 Hallucinogen persisting perception disorder
2929 Substance-related disorder NOS
3039/30390 Alcohol dependence
304/30400 Opioid dependence
30410 Sedative, hypnotic, anxiolytic dependence
3042/30420 Cocaine dependence
3043/30430 Cannabis dependence
3044/30440 Amphetamine dependence
30450 Hallucinogen dependence
3048/30480 Polysubstance dependence
30490 Other/unknown substance dependence
305/30500 Alcohol abuse
30510 Nicotine dependence
3052/30520 Cannabis abuse
3056/30560 Cocaine abuse
30570 Amphetamine abuse
3059/30590 Caffeine intoxication

Other
3014 Obsessive-Compulsive Personality Disorder
3017 Antisocial Personality Disorder
30183 Borderline Personality Disorder
3019 Personality Disorder NOS
2899
29980 Rett's disorder/Asperger's disorder/PDD-NOS
3071 Anorexia nervosa
30723 Tourette's Disorder
30747 Dyssomnia NOS
3075/30750 Eating disorder not otherwise specified (EDNOS)
30751 Bulimia nervosa
3101 Personality change due to... [indicate the general medical condition]
(Subtypes: Labile, Disinhibited, Aggressive, Apathetic, Paranoid, Other, Combined, Unspecified)
3123/31230 Impulse-Control Disorder NOS
31234 Intermittent Explosive Disorder
3128 Conduct disorder
31281 Conduct disorder childhood onset
31282 Conduct disorder adolescent onset
31289 Conduct disorder unspecified onset
3129 Disruptive Behavior Disorder NOS
31381 Oppositional Defiant Disorder
3139 Disorder of infancy, childhood, or adolescence NOS
3337 Neuroleptic-Induced Acute Dystonia
7999 Diagnosis or condition deferred on Axis I

DAD (ICD-10)

Schizophrenia
F20 = SCHIZOPHRENIA
F200 = PARANOID SCHIZOPHRENIA
F201 = HEBEPHRENIC SCHIZOPHRENIA
F202 = CATATONIC SCHIZOPHRENIA
F203 = UNDIFFERENTIATED SCHIZOPHRENIA
F204 = POST-SCHIZOPHRENIC DEPRESSION
F205 = RESIDUAL SCHIZOPHRENIA
F206 = SIMPLE SCHIZOPHRENIA
F208 = OTHER SCHIZOPHRENIA
F209 = SCHIZOPHRENIA, UNSPECIFIED

Schizoaffective disorders
F25 = SCHIZOAFFECTIVE DISORDERS
F250 = SCHIZOAFFECTIVE DISORDER, MANIC TYPE
F251 = SCHIZOAFFECTIVE DISORDER, DEPRESSIVE TYPE
F252 = SCHIZOAFFECTIVE DISORDER, MIXED TYPE
F258 = OTHER SCHIZOAFFECTIVE DISORDERS
F259 = SCHIZOAFFECTIVE DISORDER, UNSPECIFIED

Psychosis NOS
F29 = UNSPECIFIED NONORGANIC PSYCHOSIS

Other psychotic disorders
F21 Schizotypal disorder
F22 Persistent delusional disorders
F220 Delusional disorder
F23 Acute and transient psychotic disorders
F232 Acute schizophrenia-like psychotic disorder
F233 Other acute predominantly delusional psychotic disorders
F238 Other acute and transient psychotic disorders
F239 Acute and transient psychotic disorder, unspecified
F28 Other nonorganic psychotic disorders

Affective psychotic disorders
F302 Mania with psychotic symptoms
F312 Bipolar affective disorder, current episode manic with psychotic symptoms
F315 Bipolar affective disorder, current episode severe depression with psychotic symptoms
F323 Severe depressive episode with psychotic symptoms
F333 Recurrent depressive disorder, current episode severe with psychotic symptoms

Organic disorders
F115 Mental and behavioural disorders due to use of opioids : psychotic disorder
F125 Mental and behavioural disorders due to use of cannabinoids : psychotic disorder
F147 Mental and behavioural disorders due to use of cocaine : residual and late-onset psychotic disorder

F155 Mental and behavioural disorders due to use of other stimulants, including caffeine : psychotic disorder
F165 Mental and behavioural disorders due to use of hallucinogens : psychotic disorder
F195 Mental and behavioural disorders due to multiple drug use and use of other psychoactive substances : psychotic disorder

Mood disorders
F300 Hypomania
F309 Manic episode, unspecified
F310 Bipolar affective disorder, current episode hypomanic
F311 Bipolar affective disorder, current episode manic without psychotic symptoms
F313 Bipolar affective disorder, current episode mild or moderate depression
F314 Bipolar affective disorder, current episode severe depression without psychotic symptoms
F316 Bipolar affective disorder, current episode mixed
F318 Other bipolar affective disorders
F319 Bipolar affective disorder, unspecified
F322 Severe depressive episode without psychotic symptoms
F329 Depressive episode, unspecified
F331 Recurrent depressive disorder, current episode moderate
F332 Recurrent depressive disorder, current episode severe without psychotic symptoms
F340 Cyclothymia
F341 Dysthymia
F38 Other mood (affective) disorders
F39 Unspecified mood (affective) disorder

Anxiety/adjustment disorders
F411 Generalized anxiety disorder
F412 Mixed anxiety and depressive disorder
F418 Other specified anxiety disorders
F419 Anxiety disorder, unspecified
F429 Obsessive-compulsive disorder, unspecified
F430 Acute stress reaction
F431 Post-traumatic stress disorder
F432 Adjustment disorders
F445 Dissociative convulsions
F448 Other dissociative [conversion] disorders

Alcohol/Substance use disorders
F55 Abuse of non-dependence-producing substances
F100 Mental and behavioural disorders due to use of alcohol : acute intoxication
F101 Mental and behavioural disorders due to use of alcohol : harmful use
F103 Mental and behavioural disorders due to use of alcohol withdrawal state
F108 Mental and behavioural disorders due to use of alcohol : other mental and behavioural disorders
F111 Mental and behavioural disorders due to use of opioids : harmful use
F112 Mental and behavioural disorders due to use of opioids : dependence syndrome
F113 Mental and behavioural disorders due to use of opioids withdrawal state
F120 Mental and behavioural disorders due to use of cannabinoids : acute intoxication
F121 Mental and behavioural disorders due to use of cannabinoids : harmful use
F122 Mental and behavioural disorders due to use of cannabinoids : dependence syndrome
F123 Mental and behavioural disorders due to use of cannabinoids withdrawal state
F128 Mental and behavioural disorders due to use of cannabinoids : other mental and behavioural disorders
F141 Mental and behavioural disorders due to use of cocaine : harmful use

F150 Mental and behavioural disorders due to use of other stimulants, including caffeine : acute intoxication
F190 Mental and behavioural disorders due to multiple drug use and use of other psychoactive substances : acute intoxication
F191 Mental and behavioural disorders due to multiple drug use and use of other psychoactive substances : harmful use
F192 Mental and behavioural disorders due to multiple drug use and use of other psychoactive substances : dependence syndrome
F193 Mental and behavioural disorders due to multiple drug use and use of other psychoactive substances withdrawal state
F199 Mental and behavioural disorders due to multiple drug use and use of other psychoactive substances : unspecified mental and behavioural disorder

Other

F602 Dissocial personality disorder
F603 Emotionally unstable personality disorder
F639 Habit and impulse disorder, unspecified
F659 Disorder of sexual preference, unspecified
F502 Bulimia nervosa
F900 Disturbance of activity and attention
F901 Hyperkinetic conduct disorder
F911 Unsocialized conduct disorder
F913 Oppositional defiant disorder
F919 Conduct disorder, unspecified
F920 Depressive conduct disorder
F928 Other mixed disorders of conduct and emotions

Appendix C Variables considered for inclusion/exclusion in risk factor analysis

Variable considered	Include/ exclude	Rationale
Sociodemographic Variables		
Age	Include	Standard practice in included studies
Gender	Include	Standard practice in included studies
Rural vs urban	Include	Standard for ICES studies; one study in lit review found significantly more involuntary hospitalizations in rural settings
Income quintile	Include	Standard for ICES studies; one study in lit review found economic status significant associated with involuntary hospitalizations
Migrant status	Include	Proxy for ethnicity and may also be related to social support, if family is living abroad. This was explored in three studies in some capacity - one study from Norway/Denmark looked at whether being Scandinavian was related to involuntary hospitalization (no difference between groups). One UK study looked at being born abroad vs in the UK and found no significant association with involuntary hospitalization. This same study also included the variable "Family of origin outside London or abroad" and found a significant adjusted association.
Living alone	Include	2/4 studies in lit review found a significant association with involuntary status. This may broadly describe social support available.
Usual residence (private dwelling, homeless, board and care, group home, long-term care facility, etc.)	Exclude	1/1 study from lit review found a significant association between public vs owner-occupied housing and involuntary status, however, we have other measures of social support and economic status that might correlate with this variable.
Residential stability (patient's last residence considered temporary or not)	Include	Include instead of usual residence, may be a more relevant indicator of living situation than usual residence.
Education level	Exclude	0/4 studies in lit review found a significant association with this factor. Also 10% in OMHRS are "unknown." This may also be less relevant for our cohort of young people. Income quintile may be the more appropriate measure of SES in our cohort.

Appendix C Variables considered for inclusion/exclusion in risk factor analysis, *continued*

Variable considered	Include/ exclude	Rationale
Sociodemographic Variables, *continued*		
Marital status	Exclude	0/2 studies in lit review found a significant association. This would be related to "living alone" which we are including, and would likely be more relevant for a younger population.
English not first language	Exclude	Likely related to ethnicity, which will be accounted for in migrant status. Will examine this further in a future study of ethnicity.
Patient's social network feels overwhelmed by illness	Include	Although one study looked at caregiver burden and provided some evidence of an association. This may also be related to the use of a Form 2 in terms of family members unable to cope with illness
Relationship conflict	Exclude	Not identified in lit search, and may be related to the above factor.
Ethnicity	Exclude	Exploration of this factor warrants a separate, more in-depth analysis; beyond the scope of this study.
Clinical Variables		
Variable	**Include/ exclude**	**Rationale**
Index diagnosis	Include	7 studies in lit review examined this, 3 found a significant association.
Main diagnosis associated with hospitalization	Include	Included to account for those in the cohort who were hospitalized after diagnosis and potentially for other mental health reasons
Positive symptom scale	Include	4/7 studies in lit review found greater severity of positive symptoms associated with involuntary status
Negative symptom scale	Include	3/6 studies in lit review noted a relationship between negative symptoms and involuntary status
Depression rating scale	Include	2/2 studies noted a relationship: one found less depressive symptoms in the involuntary group, one found those with depressive/anxiety symptoms had lower risk of involuntary hospitalization.
Anxiety symptoms	Exclude	Some anxiety symptoms accounted for in the Depression Rating Scale that will be included. Difficult to separate anxiety/depression. No validated measure for anxiety included in OMHRS as for the other symptoms.
Mania symptoms	Include	1/1 study found significantly higher mania symptoms in the involuntary group, and another study found a diagnosis of mania vs schizophrenia associated with increased odds of involuntary status.

Appendix C Variables considered for inclusion/exclusion in risk factor analysis, *continued*

Variable considered	Include/ exclude	Rationale
Clinical Variables, *continued*		
Severity of self-harm	Include	A potential reason or justification for involuntary admission
Risk of harm to others	Include	A potential reason or justification for involuntary admission
Self-care index	Include	A potential reason or justification for involuntary admission
Global functioning	Exclude	Potential overlap with above symptom scales and functional measures
Insight	Include	1/1 study found this to be the only significant variable after adjustment in a multivariable logistic regression model.
Reason(s) for admission	Exclude	One study found self-harm, violence and perceived risk to others as reasons for admission were associated with higher odds of involuntary status. This would be accounted for in variables selected above.
Suicidality	Exclude	The severity of self-harm scale accounts for this.
Aggressive behavior scale	Include	3/4 studies found aggression was associated with involuntary status.
Violence	Exclude	2/2 studies found violence associated with involuntary admission, however all items in OMHRS related to violence are included as part of the Risk of Harm to Others Scale.
Substance/alcohol use	Include	1/4 studies found a significant association. May contribute to a patient not wanting to stay in hospital, which may increase likelihood of involuntary hospitalization.
Medication adherence	Include	2/2 studies found involuntary patients had significantly worse adherence.
Prior trauma	Include	One study examined and did not find an association, however, will include considering the potentially different presentation and issues for those with prior trauma and the knowledge gap related to this factor.
Time between index diagnosis and hospitalization	Include	Adjust for those hospitalized at cohort entry versus during follow-up.

Appendix C Variables considered for inclusion/exclusion in risk factor analysis, *continued*

Variable considered	Include/ exclude	Rationale
Service Use Variables		
Variable	**Include/ exclude**	**Rationale**
Family physician (FP) involvement	Include	2/3 studies found FP involvement in pathway to care to be protective
Police involvement	Include	1/1 study noted frequent police involvement with involuntary admissions. Prior ICES study noted significantly higher odds of involuntary hospitalization with police involvement.
First psychiatric contact first admission	Exclude	One study found this was significant. May be accounted for in time between diagnosis and hospitalization.
Facility type (general vs psychiatric)	Exclude	Whether or not come through emergency department more important. Missing facilities in OMHRS, difficult to assess this.
Prior contact with community mental health agency or outpatient clinic	Include	A potentially important measure of mental health service use prior to hospitalization other than FPs.
Number of contacts before admission	Exclude	One study examined this – we already capture measures of health care utilization.
First mental health contact (FP, psychiatrist, other)	Exclude	One study examined this – we already capture measures of health care utilization.
Number of psychiatric admissions (past 2 years)	Include	Prior hospitalizations an indicator of prior history of mental health issues.

Curriculum Vitae

Name	Rebecca Rodrigues
Post-secondary Education and Degrees	University of Guelph Guelph, Ontario, Canada 2001-2006 B.Sc., Honours, Biochemistry major McMaster University Hamilton, Ontario, Canada 2006-2008 M.Sc., Biochemistry The University of Western Ontario London, Ontario, Canada 2015-2017 M.Sc., Epidemiology & Biostatistics
Honours and Awards	Ontario Graduate Scholarship 2006-2007, 2007-2008 Western Graduate Research Scholarship 2015-2016, 2016-2017
Related Work Experience	Teaching Assistant McMaster University 2007, 2008 Research Assistant McMaster University, McMaster Immunology Research Centre 2008-2011 Teaching Assistant The University of Western Ontario 2016 Research Assistant The Centre for Addiction and Mental Health 2016-2017

Publications

Rodrigues, R., Anderson, K.K. (2017). The traumatic experience of first-episode psychosis: A systematic review and meta-analysis. Schizophrenia Research, 189, 27-36

El-Aloul, B., Altamirano-Diaz, L., Zapata-Aldana, E., **Rodrigues, R.**, Malvankar, M., Nguyen, C., Campbell, C. (2017). Pharmacological therapy for the prevention and management of cardiomyopathy in Duchenne muscular dystrophy: A systematic review. Neuromuscular Disorders, 27, 4-14

Kwofie, K., Scott, M., **Rodrigues, R.**, Guerette, J., Radford, K., Nair, P., Richards, C.D. (2015). Regulation of IL-17A responses in human airway smooth muscle cells by oncostatin M. Respiratory Research, 16, 1-14

Wong, S., Botelho, F., **Rodrigues, R.M.**, Richards, C.D. (2014). Oncostatin M overexpression induces matrix deposition, STAT3 activation, and SMAD1 dysregulation in lungs of fibrosis-resistant BALB/c mice. Laboratory Investigation, 94, 1003-1016

Rodrigues, R., Cuddington, B., Mossman, K. (2010). Bovine herpesvirus type 1 as a novel oncolytic virus. Cancer Gene Therapy, 17, 344-355

Sobol, P.T., Hummel, J.L., **Rodrigues, R.M.**, Mossman K.L. (2009). PML has a predictive role in tumor cell permissiveness to interferon-sensitive oncolytic viruses. Gene Therapy, 16, 1077-1087

Conference Presentations

Rodrigues, R., El-Aloul, B., Anderson, K.K. The traumatic experience of first-episode psychosis: A systematic review and meta-analysis.

1. Poster presentation at London Health Research Day, London, Ontario, Canada. (2016, March).
2. Oral presentation at the Department of Psychiatry Academic Research Day, Schulich School of Medicine & Dentistry, Western University, London, Ontario, Canada. (2016, June).
3. Poster presentation at the Canadian Academy of Psychiatric Epidemiology, Toronto, Ontario, Canada. (2016, September)

Rodrigues, R., MacDougall, A., Zou, G.Y., Lebenbaum, M., Kurdyak, P., Anderson, K.K. Factors associated with involuntary hospitalization among young people with early psychosis.

1. Poster presentation at London Health Research Day, London, Ontario, Canada. (2017, March).
2. Oral presentation at the Department of Psychiatry Academic Research Day, Schulich School of Medicine & Dentistry, Western University, London, Ontario, Canada. (2017, June).
3. Oral presentation at the Canadian Academy of Psychiatric Epidemiology, Ottawa, Ontario, Canada. (2017, September)