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The Impact of an Early Psychosis Program from a Population Perspective

By

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ABSTRACT

The population health model places an emphasis on health outcomes and indicators as well as on the determinants of health. This study examined the impact of the Early Psychosis Treatment and Prevention Program (EPP) from a population perspective. EPP offers early intervention for residents of Calgary with a newly diagnosed psychotic disorder. Using secondary data sources, this study estimated the referral rate to EPP of eligible hospitalized inpatients, evaluated relevant clinical outcomes for EPP participants, and examined the effectiveness and impact of the EPP from a population perspective. Crude and stratified analysis, incidence densities, survival analysis and rates were calculated in the analysis. The overall referral rate to EPP from hosptial was 26.5%. Males, under 30 years old, living with family, with a schizophrenic disorder were more likely to be referred. The impact of EPP on annual discharge and readmission rates in Calgary was not evident. The study concluded that efforts be made to target certain groups, to evaluate institutional barriers to referral and to continue the assessment of the outcomes and impact of EPP.

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Dedicated to Tony, Sandy, Arden, Virginia and Ford

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CHAPTER ONE: INTRODUCTION

1.1 Overview of the Research Problem

The population health model places an emphasis on health outcomes and indicators as well as on the determinants of health. Information about the impact of health services on the health of populations is critical to the population health perspective. Increasingly, health care services must be accountable. Assessment of any new population based program should consider measures related to referral patterns, clinical variables (i.e. readmission to hospital), and health status (i.e. mortality, morbidity).

Schizophrenia is a debilitating and chronic mental disorder characterized by a wide range of disturbances in thought, communication, and behaviour. Though schizophrenia is usually seen as a disease, according to the Diagnostic and Statistical Manual of Psychiatric Disorders, Fourth Edition (DSM-IV)(1994), it encompasses a group of disorders of uncertain cause with similar clinical patterns referred to as Schizophrenic Disorders. These usually include thought disturbances with characteristic symptoms such as hallucinations, delusions, bizarre behavior, and deterioration in level of social functioning (Appendix A). Schizophrenia affects one in one hundred people worldwide (Häfner & Heiden, 1997; Bland, Newman, & Orn, 1988) which is approximately 306,000 Canadians (Statistics Canada, 1998). Schizophrenia typically begins in late adolescence or early adulthood, usually between the ages of 16 and 25 years (Häfner, Hambrecht, & Loffler, 1998) and the incidence is higher in men than in women (Goldman, 1995). The onset of illness, in some cases, is very gradual, over the

course of months or years while in other cases it can begin suddenly within hours or days (Schizophrenia Programme Development, 1995). The suicide rate among schizophrenics is higher than that of the general population, and life expectancy is lower even when nonsuicidal deaths are considered (Hëla et al., 1997; Mortensen & Juel, 1993). Estimates of the financial burden of the illness to Canadian society are in the billions of dollars. The total direct costs (hospitalization) and indirect costs (lost productivity and impact on family income) of schizophrenia in Canada have been estimated at $5.8 billion (Van den Berg, 1995). According to Health Canada (1993), schizophrenia accounted for 3.6 million hospital days in Canada in 1989 to 1990 or 30.2% of all hospital days for mental disorders. In 1990, schizophrenia was ranked ninth of all causes of disability worldwide based on the years lived with a disability (Murray & Lopez, 1996).

Schizophrenia is treatable through rehabilitation programs and medication. Appropriate treatment is essential to control symptoms and usually focuses on a combined treatment of biological, psychological and sociological methods. The psychiatrist usually works as a member of a treatment team and the family is actively involved in the treatment plan.

The Early Psychosis Treatment and Prevention Program

The Early Psychosis Treatment and Prevention Program (EPP) offers early intervention for residents of Calgary who have a newly diagnosed psychotic disorder. The potential of intervening earlier in the course of illness offers the opportunity for optimal and appropriate treatment and hopefully an improved outcome. This program was first developed in 1996 as a regional service in the Calgary Regional Health Authority and is unique within the Province of Alberta. The goals of the EPP are: 1)

early identification and treatment of primary symptoms of psychotic illness, 2) rapid access to assessment and treatment, 3) reduction of secondary morbidity in the post psychotic phase of the illness, 4) reduction in frequency and severity of relapse, 5) reduced disruption in social and vocational functioning and 6) reduction of burden for care-givers and promotion of well-being among family members. The sources of referral to the program are hospital inpatient units, psychiatrists, family physicians and social service agencies. The services offered by EPP, for up to three years are: 1) assessment and monitoring of psychosis, other symptoms and functioning, 2) optimal pharmacotherapy, 3) outpatient case management, 4) family work, 5) group program, 6) individual cognitive-behavioural therapy, 7) research and evaluation and 8) early detection and monitoring (Addington & Addington, in press).

1.2 Study Purpose

The purpose of this study was to describe from a population-based perspective patterns of referral and changes in specified health status indicators occurring in relation to the initiation of the Early Psychosis Treatment and Prevention Program (EPP) operating at the Foothills Medical Centre.

1.3 Significance of the Study

This study provided information that may assist EPP in determining whether it is successfully reaching its target population, aid other programs in setting goals and

standards by determining benchmark outcomes and determine whether the impact of EPP is discernible at the population level.

The population health model calls for an increased emphasis on health outcomes (Health Canada, 1998). Together with the changing health care system, there are increasing demands for the evaluation of services and programs in the health care sector. Methods and sources of data related to referral patterns, clinical variables such as readmission, the effect of health status (mortality, morbidity) and population emphasis are effective ways of evaluating any clinical program that intends to impact the health of a population.

1.4 Study Objectives

This study has three objectives to allow for an examination of the outcomes of this program from a population viewpoint. They are as follows:

Objective 1: To determine whether EPP is capturing a specific group of eligible hospital inpatients and to determine whether ongoing efforts to increase referral rates to EPP have been successful.

Objective 2: To describe a set of practical clinical outcome measures for program participants referred to the Early Psychosis Treatment and Prevention Program (EPP) from all sources. The clinical outcome measures of interest are: a) admission rates to hospital subsequent to admission to EPP, b) length of stay in hospital for each admission

together with overall days in hospital for all subsequent admissions, c) attempted suicides that presented to emergency departments, and d) completed suicides in hospital.

Objective 3: To examine population based indicators relevant to individuals with psychotic disorders in Calgary in comparison with populations in Edmonton and Lethbridge. The clinical outcome indicators of interest are: a) discharges from a psychiatric unit with a principal diagnosis of a schizophrenic spectrum disorder, b) frequency of readmission with schizophrenia or a psychotic disorder to a psychiatric unit per unit of population, c) suicide attempts resulting in hospitalization with a principal or most responsible diagnosis of schizophrenia or a psychotic disorder and d) completed suicides with an identified contributing cause of death of schizophrenia or a psychotic disorder according to death certificate. While the program focuses on first onset psychotic disorders, the ultimate goal is to contribute to a healthier population of people with psychotic disorders. Hence it is reasonable, over time, to expect to see an impact of such a program on such variables as rates of readmission to hospital, rates of attempted suicide and rates of completed suicide.

A literature review of the predictors and clinical outcomes together with early intervention strategies and programs is given in Chapter 2. The study methods and procedures together with ethical considerations are reviewed in Chapter 3. Study results are presented in Chapter 4, Chapter 5 and Chapter 6. Chapter 7 discusses the key findings, strengths and limitations of this study, and future considerations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a literature review of studies in schizophrenia to examine predictors of course of illness, determinants of clinical outcomes and descriptive information about early psychosis prevention and treatment programs. The literature search utilized Medline (1966 to present) and Psychlit (past 10 years). The following search terms were used: psychotic disorders, schizophrenia, mental disorders, first episode treatment, first-episode studies, intervention studies, early intervention, natural course, gender, age, marital status, mental health studies and follow-up studies. The searches also included relevant citations in the bibliographies of identified papers.

2.2 Predictors

There are a number of predictors that have been reported to influence the course of schizophrenia. The number of predictors suggest that schizophrenic disorders are best described as heterogeneous in nature (Goldman, 1995). These characteristics include: age, gender, marital status, and social functioning.

2.2.1 Age

In general, a younger age at onset of illness is thought to lead to a less favourable course when compared to an older age at onset. Patients with earlier onset of illness have less time to develop social skills and the emotional independence necessary for coping

and for experiencing events which arise during late adolescence (Krausz, Muller-Thomsen & Haasen, 1995). Younger people tend to experience more frequent and longer hospitalizations, demonstrate poorer social adjustment and experience a worsened living situation (Marneros, Deister & Rohde, 1992). The World Health Organization (WHO) (1992) conducted a trans-cultural study that included data from 12 centres located in 10 countries. The study sample (N = 1078) was divided into an older age at onset group (26 – 54 years) and a younger age at onset group (<26 years). During the 2 year follow-up, the older group spent less time in hospital and their social impairment was for shorter periods of time than in the younger age group. Haas and Sweeney (1992) had similar findings in their descriptive study of 71 first hospitalized patients diagnosed with schizophrenia, schizoaffective, or schizophreniform disorder. They reported a positive correlation between age of onset and premorbid functioning and suggested that timing of psychotic symptom onset was related to adequacy of premorbid functioning. Patients with poor premorbid functioning, measured by levels of social and academic competence, became ill 6 to 7 years earlier than those with good premorbid functioning. Häfner et al.(1998) conducted a case register study of all 1169 Danish patients admitted for the first time in 1976 with schizophrenia, paranoid or paranoid reactive psychosis and followed this population for a 10 year period. These investigators found a better 10 year outcome for those over the age of 40 years with a first hospitalization when compared to those under 40 years in terms of number and length of hospital stays. There is, however, literature that suggests that the poorer outcome among the younger age may be a function of insidious onset, that is illness occurring over greater than 4 weeks, as opposed to a function of age (Eggers & Bunk, 1997).

2.2.2 Gender

Studies have consistently reported that women have a more favourable course of illness than do men (Seeman, 1982, 1985). Seeman (1985) reports five dimensions of sexual differentiation including behaviour and genetics that may contribute to the differences between men and women in both the prevalence of the disease as well as the severity. Jablensky et al. (1992) compared women to men who had a first contact with psychiatric services and found that women tended to have a better outcome in relation to the amount of time that they were psychotic, in remission and in hospital. In addition, women experienced a better pattern of course of illness than did men. Salokangas and Stengard (1990) conducted a follow-up study (2 years) of first-episode patients (N = 227) and found that men experienced poorer psychosocial (e.g., relationships with the opposite sex) and employment outcomes as well as more negative symptoms and depression compared to their female counterparts. Similarly, a cohort study conducted by Angermeyer et al. (1989) found gender to be a predictor for course of illness. These investigators studied a representative sample of first-admitted patients with diagnoses of schizophrenia or schizophreniform disorder (N = 278) from the Greater Hanover area of Germany. They reported their findings after periods of three and eight years, respectively. After three years, men with schizophrenia had spent significantly more time in hospital and had significantly higher risk for rehospitalization. After eight years, when confounding factors (e.g., age and marital status) were controlled for in the analysis, women with schizophrenia continued to show a better course of hospital treatment, experienced a shorter length of hospital stay, and remained in the community longer after

their first hospital admission. A longitudinal follow-up study at 5 years and 11 years, of 61 adolescents who showed the first symptoms of schizophrenia between the ages of 14 and 18 years reported a significant gender difference in the rate of completed suicide: 21.5% of men and 6% women; although women made more attempts at suicide. The difference between sexes in terms of frequency of completed suicides were consistent with other research even though the respective numbers were higher than those reported in similar studies (Krausz, Muller-Thomsen & Haasen, 1995).

2.2.3 Marital Status

Patients who are already married at the onset of their illness may be expected to have a more favourable course of illness both in early as well as further on in the illness (McGlashan, 1988). However, it must be kept in mind that "marital status" may be confounded by other variables that also influence course of illness, particularly age and gender. Since single schizophrenic patients are usually young males, it is unclear whether their poorer outcome may be accounted for by their marital status or whether it is due to these patients being mainly early onset males who usually have a less favourable course of outcome. The lower proportion of married men in the studies compared to married women may be accounted for by the influence of age of onset and gender (Reicher-Rössler et al. 1992).

Shepherd et al. (1989) conducted a five-year follow-up study of 49 first-admitted patients with schizophrenia in the Buckinghamshire catchment area. They found that approximately 43% of participants were single and 8% were divorced or separated. Thirteen percent of women (N=3) compared to 69% (N=18) of men were single.

Johnstone et al. (1991) conducted a 10 year follow-up study (Northwick Park Study) of all schizophrenic patients (N=532) discharged from inpatient and day patient psychiatric services in Harrow, Britain. They found that of 291 men, 80.4% (N=226) were single and 14.6% (N=41) were married compared with 39.5% (N=94) of the 241 women who were single and 40.8% (N=97) were married.

2.2.4 Social Functioning

"Social functioning is assessed by whether an individual is able to fulfill various social and work-related roles as adequately as an average person of the same age and gender, social and educational background and culture" (Riecher-Rössler & Rössler, 1998). Age at onset of illness interferes with an individual's social development. Onset during adolescence suggests that many social roles have not yet been achieved (e.g.completion of education, financial independence). If the disorder results in social disability, the level of social development at the beginning of the disorder influences the future social course. It can be expected that the stage of social development at the onset of illness can determine social outcome (Werry & McLellan, 1992). In a five year follow-up study (N=49), Shepherd et al. (1989) examined the individual components of the overall social outcome score including *ability to socialize* and work activities. It was reported that almost 50% (N=22) of the patients experienced either mild or moderate impairment in their ability to socialize. In terms of work activities, 40% (N=20) of patients experienced impairment and more specifically 38% of men and 22% of women were considered to be moderately to severely impaired. Similarly, Häfner et al. (1998)

reported that women tend to have a better medium term (5 year) level of social functioning compared to men.

2.3 Clinical Outcomes

The clinical outcomes of interest to this study were hospital readmissions, length of stay and mortality.

2.3.1 Hospital Readmissions and Length of Stay

In a Danish case register study, Häfner et al. (1998) reported that after 10 years of follow-up that 67% (N=783) of patients had been rehospitalized. Average number of readmissions over the 10 year time period for men and women were 3.7 and 3.4 stays, respectively, including the first admission. Total length of stay in hospital for men was an average of 486 days and for women was 354 days. Shepherd et al. (1989) found during their five year follow-up study in the Buckinghamshire, England catchment area, that of 49 patients, 55% (N=27) were rehospitalized during a 5 year period. The average length of stay in hospital was 8.5 months (including first stay) and two patients stayed in hospital for the full 5 years. In the previously described trans-cultural study, Jablensky et al. (1992) found that no patients (N=1078) required long-term hospitalization and 31% were never hospitalized during the 2 year follow-up. There was however substantial variance between sites with 0% readmission in Prague to 91% in rural regions of India.

It is possible that the variations in length of hospitalization and rehospitalization in the above studies have been due in part to differences between

countries. The diagnosing practices, cultural attitudes towards mental illness and/or other factors such as availability of hospital beds may have affected the results. This further reinforces the need to study these variables in a local context.

2.3.2 Mortality

Mortality is an important measure in assessing the outcome of illness. Increased mortality in schizophrenia has been reported at length (Allebeck,Varla & Wistedt, 1986; Caldwell & Gottesman, 1990; Roy, 1982;). Risk factors for suicide in schizophrenia include being young, male, in the early years of illness and having a history of multiple previous episodes or previous suicide attempts (Caldwell & Gottesman, 1990; Drake, 1986; Rossau & Mortensen, 1997). Mortensen and Juel (1993) conducted a large case register linkage study in Denmark. A national sample (N=9156) of patients first hospitalized with schizophrenia between 1970 and 1987 were studied. When mortality was compared to the general population of the same age group, the relative risk was reported to be higher for men than for women (4.7 vs. 2.3). Additionally, the relative risk decreased with increasing age. Suicide was the most frequent cause of mortality however there was also increased risk of mortality from fatal accident, heart and respiratory illness and homicide. Suicide risk in the first year of follow-up increased by 56% and was responsible for 50% of the deaths among men and 35% in women. Results of a follow-up study at two points, 5 years and 11 years, of 61 adolescents who showed first symptoms of schizophrenia between the ages of 14 to 18 years found the suicide rate of 13.2% (N=8) to be significantly higher than for those who develop the disorder later in life (Krausz, Muller-Thomsen, Haasen, 1995). As mentioned previously, the authors also

reported a significant gender difference in the rate of suicide (21.5% men and 6% women). A retrospective study of mortality by Newman and Bland (1991) used record linkage to the Statistics Canada Mortality Database to examine the outcome of 3,623 patients with schizophrenia who had been followed in Alberta from 1976 to 1985. The risk of mortality (301 deaths) was estimated as double that of the Alberta population and the risk of suicide was increased by a factor of 20. The risk of death due to circulatory, respiratory, digestive and genitourinary diseases was also increased in patients with schizophrenia, confirming other research that estimates a life expectancy for this group that is 20% lower than in the general population.

A large number of individuals with schizophrenia also attempt suicide, with estimates of lifetime occurrence ranging from 18% to 55% (Roy, 1982). Although a history of suicide attempts is common among patients with schizophrenia who die by suicide (estimated at 40 – 61%), it is also estimated that approximately 50% to 80% of suicide attempts do not result in death (Roy, 1982). The risk factors identified for attempted suicide in the general community are a lifetime diagnosis of a psychiatric disorder, female, separated or divorced, caucasian, and of low socioeconomic status (Klerman, 1987).

Radmonsky et al. (1999) evaluated 1 month and lifetime rates of suicidal behavior among 1,048 consecutively admitted patients (15-55 years) diagnosed with a psychotic disorder according to DSM III-R between 1992 and 1994. Across all patients, those who made a recent suicide attempt were younger (mean=29.96 years, SD=8.07) than both those who had no recent attempts or ideation (mean=35.11, SD=9.67) and those who recently thought about suicide (mean=33.41, SD=9.47). This finding was consistent for

all diagnostic groups as well. The prevalence rate for recent suicide attempts (within one month) were highest in the 20 to 29-year-old group (12.7%, N=36 out of 283). Sex and race did not show any significant relationship to recent or lifetime suicide attempts across diagnoses. Patients with a diagnosis of schizoaffective disorder reported a lifetime history of suicide attempts of 42% (N=68) and those with a diagnosis of schizophrenia reported a lifetime history of suicide attempts of 27.3% (N=124). Results from this study indicate that risk factors associated with suicidal behavior in patients with psychosis are different from those in the general population. Harkavey-Friedman et al. (1999) compared the demographic and clinical characteristics of 52 individuals with schizophrenia or schizoaffective disorder who had attempted suicide with 104 individuals with schizophrenia or schizoaffective disorder who had not attempted suicide. The authors found that the two groups did not differ with respect to demographic variables, duration of illness, rate of depression or substance abuse. However, the study did find that 80% (N=43) of first suicide attempts occurred after the onset of psychosis and within the first five years of the illness which is consistent with other findings that the risk for suicidal behaviour is higher after the onset of schizophrenia. In a previously described study, Krausz, Muller-Thomsen, & Haasen, (1995) found that of the 8 adolescent patients (14 – 18 years), who committed suicide, 7 of these patients had attempted suicide one to five times previously.

2.4 Early Intervention Strategies and Programs

The Early Psychosis Prevention and Intervention Centre (EPPIC), located in Melbourne, Australia conducted an initial evaluation of a community-based service

provided to older adolescents and young adults (McGorry et al. 1996). The EPPIC is a program designed "to provide an optimal model for management of first-episode psychosis" (McGorry et al., 1996, p.309). The study was a naturalistic longitudinal study of outcome measures aimed at evaluating the effectiveness of the program at 12 months (1993) in comparison to the pre-EPPIC model of care (1989 – 1992). Fifty-one participants in the EPPIC program were followed together with 51 pre-EPPIC participants. Of the original sample, 37 EPPIC participants and 34 pre-EPPIC participants were reassessed at 12 months follow up. The participants were assessed on a number of variables. The frequency of 1 to 2 hospital admissions was significantly greater in the pre-EPPIC group compared to the EPPIC group (17.6% vs. 7.8%, $p<0.01$). The total length of stay in hospital excluding first admission was also significantly greater in the pre-EPPIC group compared to the EPPIC group (25.4 days vs. 9.6 days, $p<0.01$).

This study had several methodological limitations. For instance, the period of follow-up was only 12 months and the control group was not a concurrent random sample (historical control group). This choice of control group may have impacted the results. The reported differences may have been due to unmeasured changes in the general psychiatric service system. The researchers tried to assess changes by examining duration of mean length of stay in active units but they found these rates to be stable during the time period under consideration. Non-response bias may have also impacted their findings due to the number of dropouts from the study. After 12 months of follow-up, there were 37 participants in the EPPIC study group and 36 participants in the pre-

EPPIC control group. It is possible that the participants that did not continue with the program had a poorer outcome than those that were followed.

A subsequent evaluation of the EPPIC, Power et al. (1998) examined data from the initial three months of treatment of 231 consecutive people with first-episode psychosis admitted to the program in 1995 to 1996. One hundred forty-six participants (63.2%) were hospitalized with an average length of stay of 18.3 days (SD=20.6) during the study period. Of these 146 patients, 104 were males. Additionally, 16% of patients were readmitted a second time, 4% were readmitted a third time and there was one suicide. The researchers compared the three-month findings from this study with the findings of the previously described evaluation. The hospitalization rate decreased from 84% to 63% and the number of inpatient days was reduced from a mean of 50 days to 18 days. The authors concluded that based on an evaluation during this short period of time that the treatment and services offered by EPPIC had been improving and had experienced increased success in the management of first episode psychosis.

Mortality in the EPPIC was measured based on follow-up care of 2 years since the initiation of the program and compared the rates with those of the pre-EPPIC. EPPIC reported a substantial reduction in suicides over pre-EPPIC. Based on an active caseload of approximately 300 individuals, the EPPIC reported 7 suicides during that time. During the pre-EPPIC period, 6 suicides (N=140) were reported within 2 years of entry to treatment.

CHAPTER THREE: METHODS

3.1 Introduction

This project utilized a hybrid study design, incorporating cross-sectional, longitudinal and ecological elements. This chapter describes the methodology of the study in the following sections: sampling, data collection and data analysis.

3.2 Study Population

The target population is defined as "the collection of individuals about which we want to make inferences" (Last, 1995 p.166). The target population for Objective 1, estimating the referral rate and Objective 2, clinical outcomes (see Section 1.4) was individuals experiencing a new onset psychotic disorder as defined by DSM-IV (Appendix A). The target population for Objective 3, description of population based indicators (see Section 1.4) was all individuals with a psychotic disorder in the Province of Alberta.

The study population is "the group selected for investigation" (Last, 1995 p.128). For this study, the populations of the Referral Rate Study (Objective 1) and the Clinical Outcomes Study (Objective 2) were patients with a first discharge diagnosis of a psychotic disorder or schizophrenia from three acute care hospital sites: 1) Foothills Medical Centre (FHH), 2) the Rockyview Hospital (RGH) and 3) Peter Lougheed Hospital (PLC). Two other acute care hospitals were merged. The Bow Valley Centre of the Calgary General Hospital (CGH) was merged with the PLC in 1997 and the Holy Cross Hospital (HCH) was merged with the RGH in 1996. For the purposes of this study,

study population for the Study of Population based Indicators (Objective 3) is all individuals with a diagnoses of psychotic disorder or schizophrenia at three Alberta centres: 1) Edmonton, 2) Calgary and 3) Lethbridge.

3.3 Sampling

All eligible patients and all participants of EPP were sampled to estimate the referral rate and to describe the clinical outcomes of EPP participants.

3.3.1 Inclusion/Exclusion Criteria

The referral criteria of the EPP are individuals: 1) experiencing a first episode of psychosis, 2) hospitalized for a first episode of psychosis and 3) in the first three months of treatment for psychosis. In this study, the inclusion criteria involved individuals with no previous diagnosis of a psychotic disorder between the ages of 15 and 52 years. The specific diagnoses for inclusion were: schizophreniform disorder, schizoaffective disorder, delusional disorders, schizophrenia, and brief psychotic disorders including drug-induced psychoses. Excluded from this study were diagnoses of any psychoses secondary to organic illness such as endocrine disorders and mental retardation. The inclusion criteria for this study was not entirely consistent with the referral criteria of the EPP in that this study did not include any individuals who had received treatment prior to hospital admission.

3.3.2 Determinations of Sample Size

3.3.2a Estimate of Referral Rate

Prior to data collection, pilot data were used to anticipate the precision that could be attained. Results of a pilot study were used to approximate the size of the study sample (referred patients identified in chart review). The chart review component of the pilot study found that of 99 eligible inpatients that 20.2% (n = 20) were referred. In this study 230 inpatients were eligible for referral. Assuming a 20.0% referral rate and 230 eligible patients, the standard error (SE) for the estimated proportion was 0.03 leading to a 95% confidence interval of approximately plus or minus 6%. The following formulas were used:

Approximate 95% Confidence Interval: $\hat{p} \pm 2\,SE(\hat{p})$

$\hat{p}$ = proportion referred (pilot study) = 0.20

$$SE = \text{standard error of } \hat{p} = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{(0.20)(0.80)}{230}} = 0.03$$

n = number of reviewed charts

$$\hat{p} \pm 2\,SE(\hat{p}) = 0.20 \pm 2(0.03) = (0.14, 0.26) = (14\%, 26\%)$$

This extent of precision was considered adequate for the purposes of this study.

3.3.2b Clinical Outcomes

The study population for this component consisted of all participants in EPP referred from all sources rather than from a random sample. The pilot study (n=99) found 28 events (readmissions to hospital) occurred during 90.35 person years of observation. Assuming that EPP participants contributed similar person-years of

observation during year two and three of the program, an adequate degree of precision was obtained. This reasoning was based on the interpretation of confidence intervals (CI) for the incidence density calculated from pilot study data. In order to estimate the CI, the numerator of the incidence density (number of readmissions to hospital) was assumed to be a Poisson variable. This was a reasonable assumption because the incidence density (ID) was low (0.31, see calculations below). These equations are in relation to the standard quadratic form $ax^2 + bx + c = 0$, $x = \sqrt{\lambda_u}$ and $x^2 = \lambda_u$. The following formulas, based on a quadratic equation, were used to first calculate CI for the numerator (Kahn &Sempos, 1989, p.218):

Upper Limit of 95% CI = λ_u = number of events + $1.96\sqrt{\lambda_u}$

Lower Limit of 95% CI = λ_L = number of events – $1.96\sqrt{\lambda_L}$

$$\sqrt{\lambda_u} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{1.96 \pm \sqrt{(1.96)^2 - 4(1)(-28)}}{2(1)} = -4.40 \text{ and } 6.36$$

a = 1
b = -1.96
c= -28

$\sqrt{\lambda_u} = 6.36$

$$\sqrt{\lambda_L} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-1.96 \pm \sqrt{(1.96)^2 - 4(1)(-28)}}{2(1)} = 4.40 \text{ and } -6.36$$

a = 1
b = 1.96
c= -28

$\sqrt{\lambda_L} = 4.40$

Upper Limit of 95% CI = 28 +1.96(6.36) = 40.46

Lower Limit of 95% CI = 28 – 1.96(4.40) = 19.38

To calculate the 95% confidence intervals for the incidence density, each of the above confidence limits was divided by the annual person-years (90.35) (Kahn & Sempos, 1989).

$$\text{Upper limit of 95\% CI} = \frac{40.46}{90.35} = 0.45$$

$$\text{Lower limit of 95\% CI} = \frac{19.38}{90.35} = 0.21$$

$$\text{ID} = \frac{\#\text{events (readmissions to hospital)}}{\text{total person years}} = \frac{28}{90.35} = 0.31$$

These calculations were justified according to criteria put forward by Kahn & Sempos (1989) since the number of events was more than 20. In summary, it was expected that EPP participants would have contributed a greater number of person-years over the course of the study, and therefore an adequate degree of precision would be obtained.

3.3.2c Population Based Indicators

The total population of the three previously described sites will be studied and therefore a sample size estimate was not calculated.

3.4 Data Collection Procedures

Secondary data sources, that is pre-existing data, were used to collect all information. Data were requested from the following sources: (1) Corporate Data of the Calgary Regional Health Authority, (2) Health Records Departments of FHH, PLC and RGH, (3) Early Psychosis Treatment and Prevention Program and (4) Canadian Institute for Health Information.

3.4.1 Estimate of Referral Rate

A chart review was conducted to identify eligible inpatients for referral to the Early Psychosis Treatment Program (EPP) between November 1st, 1997 and October 31st, 1999, year three of the program. Eligible patients for year one of the program had been identified through a completed pilot study (N=99). Referral estimates for eligible patients for years one, two and three were determined and compared.

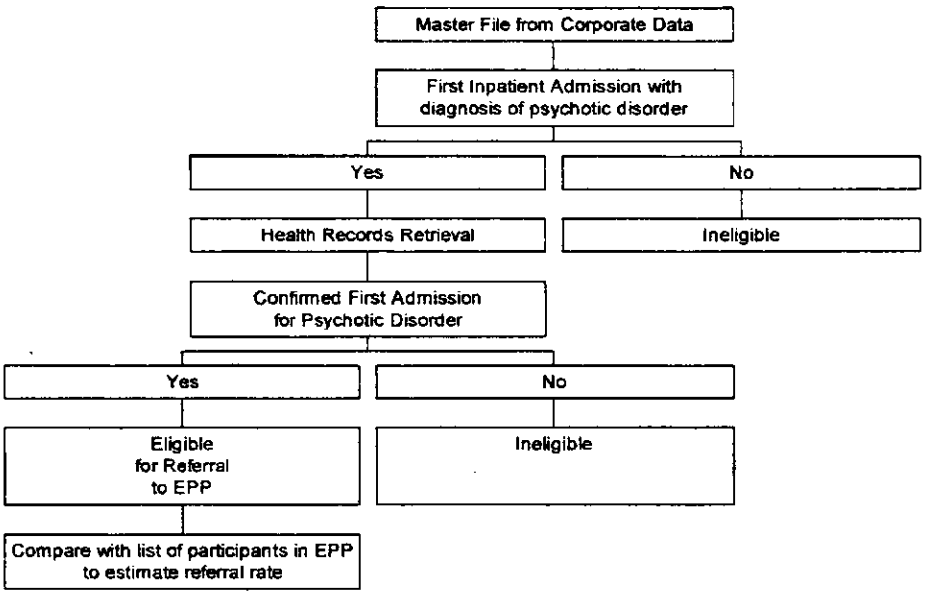
Data from inpatients admissions meeting the inclusion criteria (see Section 3.3.1) were requested of Corporate Data of the Calgary Regional Health Authority in the form of an Excel file. "Corporate data provides information and data analysis in support of health care management within the Calgary Regional Health Authority" (Calgary Regional Health Authority, 1999). For this study, case summary databases of Corporate Data were searched to identify Personal Healthcare Numbers (PHN) of patients with a first discharge diagnosis of a psychotic disorder or schizophrenia from any of three acute care hospital sites (FHH, RGH, PLC). The download contained diagnostic data in the format of International Classification of Diseases (ICD-9) codes (Table 1). The file from Corporate Data, in the form of an Excel file, included PHN, hospital site, hospital chart number, date of admission to hospital, date of discharge from hospital, sex, age, and date of birth. Age and date of birth were requested in order to protect against possible recording or data entry errors. In the case of individuals without a recorded PHN, the hospital site and hospital chart numbers were used and health records departments at the specific hospitals were requested to identify a PHN from their database. If this was not successful, the chart was reviewed to determine whether there had been previous admissions to one of the other hospitals or whether it was a first admission.

Table 3.1: ICD-9 Diagnostic Codes Indicative of Psychotic Disorders

ICD-9 Code	Descriptions of Category
295.xx	Schizophrenia (including 295.1x, 295.2x, 295.3x, 295.9x, 295.6x)
295.4	Schizophreniform Disorder
295.70	Schizoaffective Disorder
298.80	Other and Unspecified Reactive Psychosis
298.90	Psychotic Disorder Not Otherwise Specified

A visual inspection of the Excel file ensured that all admissions were within the specified time period. The file was sorted by date of admission and any records that were outside of the specified dates were deleted. The file was then inspected to ensure that in the event of possible multiple admissions during the time period, to different hospital sites, that only the first admission during the time period was the chart reviewed. The Excel file was sorted by PHN and in the event of repeated numbers, the earliest date of admission for each individual was included for review and subsequent admissions were deleted. This preliminary check of the sorted data also reviewed for possible errors of the same PHN having been assigned to two different individuals. This was detected by examining each duplicate PHN to assure that the individual matched on sex and date of birth. A final list was forwarded to the health records department at each site for retrieval of the charts for data collection. For each chart meeting the inclusion criteria, the data collection form was completed (Appendix B). The data were coded and entered into the software package, Epi-Info (Dean et al. 1994). Figure 1 provides an overview of the method of identifying eligible inpatients.

Figure 3.1: Method of Identifying Eligible Inpatients



A file of all participants of EPP, referred from all sources was obtained. The program director or designate prepared and provided the list including the following information: PHN, age, sex, date of referral to the program and the status of their enrollment, that is whether they were currently in attendance. If a participant had been discharged from the program, the date of discharge was also included. EPP also provided employment status, level of education and living arrangement for each participant for descriptive, comparative information. A database was created in Epi-Info (1994) and all information was entered. The list of eligible patients together with the list of EPP participants were then transferred into the statistical program, Stata (1997) and commands for combining data were used to join and match the two datasets.

3.4.2 Clinical Outcomes for Referred Program Participants

The personal healthcare number of all participants in EPP together with sex, date of birth and date of intake to the program were forwarded to Corporate Data for the Calgary Regional Health Authority. Using this information, they provided an Excel file containing 1) all hospital admissions after intake date to EPP, 2) length of stay in hospital, 3) attempted suicides that presented to emergency departments and 4) completed suicides.

3.4.3 Population Based Indicators

Morbidity and mortality were the primary focus as the population in Calgary was examined and compared to populations in Edmonton and Lethbridge. This phase of the study was ecological because populations, rather than individuals, were compared. Edmonton and Lethbridge, were representative of two other urban centres in the province. Edmonton hospitals serve approximately 775 000 people and have 132 psychiatric beds available in the City. A psychiatric facility, the Alberta Hospital Edmonton, is also located in the area and has 404 beds available and serves a population from northern Alberta, Northwest Territories and Yukon (Capital Health Authority, 2000). Whereas Edmonton and Calgary are comparable centres in terms of population size, Lethbridge represents a smaller urban population. The Lethbridge Regional Hospital provides healthcare to approximately 144,000 residents of southern Alberta and draws from both rural and urban populations (Chinook Regional Health Authority, 2000).

Aggregate data were requested of the Canadian Institute for Health Information (CIHI) for hospitals with psychiatric inpatient units in each of the centres. "CIHI is a

federally chartered but independent, not-for-profit organization" (Canadian Institute for Health Information, 1999). All hospitals in Alberta submit ICD coded data to the CIHI central database. Because of hospital consolidations resulting in possible institutions number changes, all institutions codes were confirmed by CIHI staff for each of the years requested. For the purposes of this study, the source of data was the Discharge Abstract Database. As many as 16 diagnosis codes may be documented for a hospitalization. Aggregate totals within the specified time period (1992 to 1998) were requested by gender and age group for: 1) all discharges from hospital with a diagnosis of schizophrenia or a psychotic disorder, 2) readmissions to hospital with a diagnosis of schizophrenia or a psychotic disorder, 3) attempted suicides and 4) completed suicides. Hospitalizations with the specific diagnosis codes in any of the 16 fields were included in the request. Age groups were determined by CIHI based on feasibility and frequency counts.

Data were requested for the years 1992 through 1998 inclusive. Health regions in Alberta were formally created in 1994, in an effort to improve the governing of health services in the province. Prior to 1994 there were more than 200 existing hospitals, continuing care and public health boards. These were amalgamated into 17 geographic regions. In determining regional boundaries, consideration was given to geography, population size, physical distances as well as health care referral patterns. Local responsibility for health promotion and protection, and the prevention of disease and injury is assumed by the regional health authorities (Casebeer & Hannah, 1996). The rationale for including data for 2 years prior to regionalization was that this factor could affect the secular trends in the outcome relevant data.

Population estimates from 1992 to 1998 were obtained from Statistics Canada. Total population as well as age and sex specific figures were available. Included in the file for Edmonton and Calgary were those persons residing in the respective census metropolitan area (CMA) as defined by Statistics Canada. A census metropolitan area is "a very large urban area (known as the urban core) together with adjacent urban and rural areas (known as urban and rural fringes) that have a high degree of social and economic integration with the urban core. A CMA has an urban core population of at least 100,000, based on the previous census"(Statistics Canada, 1999). Based on the previous census, Lethbridge is considered a census agglomeration (CA) which is defined as "a large urban area (known as the urban core) together with adjacent urban and rural areas (known as urban and rural fringes) that have a high degree of social and economic integration with the urban core. A CA has an urban core population of at least 10,000, based on the previous census" (Statistics Canada, 1999). A request to Statistics Canada was necessary to obtain the population estimates for the Lethbridge CA between 1992 and 1998. The data were derived from income tax returns that were filed in the spring of each year following the reference year. Inter-censual estimates are not calculated for the CA as they are for large urban areas (CMA). The coverage rate is approximately 96.1% of the entire population. The missing population are the non-filing elderly, together with small percentages in each age group (personal communication, Paul Francoeur & Bruce Meyers, Statistics Canada, 2001). The data were maintained in an Excel file.

3.5 Data Management

Prior to analysis, all of the data from EPP and the chart review were checked for any missing information, data entry errors and any outlying or extreme values. First, missing data were identified through visual inspection of the Epi-Info database. An attempt was made to retrieve any missing data by reviewing the particular chart or database. Second, all data (categorical and continuous) were examined for data entry errors and any outlying or extreme values. For categorical data, frequencies were generated to identify any erroneous entries. For example, gender was coded one and two for males and females, respectively, and any other value indicated a coding error. For continuous data, the range of values was examined to detect possible data entry errors and outlying or extreme values. For instance, a possible coding error for age would be detected if an age of 54 appeared in the database, as the upper limit for age in the study was 52 years. After the data was cleaned, it was exported using Stat/Transfer Version 5.0 from the Epi-Info database and Excel spreadsheet into the statistical program, Stata. which together with the other software packages was used for data analysis (StataCorp, 1997).

3.6 Data Analysis

3.6.1 Estimate of Referral Rate

Univariate analysis was conducted to describe the characteristics of the eligible patients. Frequency distributions for all variables identified counts associated with each variable (Table 2). The categorical variables marital status, education, employment status

and living arrangement and the continuous variable age were collapsed into meaningful categories based on frequency counts from the pilot study and the literature review (Table 3). For example, the variable living arrangement had five categories: 1. No fixed address, 2. Supervised, 3. Independent, 4. Family and –9. Unknown. The collapsed categories were: 1. No fixed address or Independent, 2. Supervised or Family and –9. Unknown. Some post-hoc recategorization was also necessary in order to ensure adequate cell sizes in some contingency tables (e.g. employment).

Table 3.2: Variables of Interest: Study to Estimate the Referral Rate

Variable	Type of Variable
Age	Continuous
Sex	Categorical
Marital Status	Categorical
Education	Categorical
Employment Status	Categorical
Living Arrangement	Categorical
Family Doctor	Categorical
Primary Diagnosis	Categorical
Global Assessment Functioning	Continuous
Site	Categorical
Length of Stay	Continuous
Substance Abuse or Dependence	Categorical

Table 3.3: Collapsed Variables of Interest: Study to Estimate the Referral Rate

Variable	Original categories	Collapsed categories (*a priori*)
Marital status	1. never married	1) #1
	2. married	2) #2,3,4,5,6
	3. common-law	-9) #-9
	4. divorced	
	5. separated	
	6. widowed	
	-9. unknown	
Education	1. no formal education	1) #1,2,3,4
	2. some grade school	2) #5,6,7,8,9
	3. grade 9 school	-9) #-9
	4. some high school	
	5. complete high school	
	6. some college	
	7. complete college	
	8. some graduate	
	9. graduate school	
	-9. unknown	
Employment status	1. employed	1) #1
	2. unemployed	2) #2
	3. retired	3) #3,4,5,6
	4. homemaker	-9) #-9
	5. student	
	6. disabled	
	-9. unknown	
Living arrangement	1. no fixed address	1) #1,3
	2. supervised	2) #2,4
	3. independent	-9) #-9
	4. family	
	-9. unknown	
Age	Continuous	1) 15 – 30 yrs.
		2) 31 – 52 yrs.

Similar univariate analysis was conducted to describe the EPP participants. The categorical variables were collapsed into the same categories as those of the eligible patients permitting comparisons of the two groups. Frequency distributions for all variables identified the associated counts.

In order to compare referred eligible patients and those who were not referred with respect to sociodemographic and clinical characteristics, referral was treated as the dependent variable (outcome) and the sociodemographic and clinical variables were treated as independent variables (exposures). To make these comparisons, frequencies and percentages were calculated for each categorical variable in each group. Continuous variables were plotted on histograms to examine the shape of the distribution. The mean and standard deviation of each continuous variable were calculated using Epi-Info (Dean et al., 1994), and the median and interquartile range were calculated and graphed using boxplots.

In order to examine the effect of a third variable (covariate) on the relationship between certain sociodemographic and clinical characteristics, a stratified analysis was conducted. Referral ratios were calculated by dividing the proportion referred in each exposure group by the proportion referred in the non-exposed group. For example, the associations between gender and referral were examined by comparing the proportion of males in the referred group to the proportion of females in the referred group. The stratified analysis was conducted using Epi-Info (Dean et al. 1994) and involved calculating the stratum specific referral ratios together with 95% confidence intervals. In order to be considered a confounder, the covariate must: (a) be a risk factor for the outcome, based on evidence in the literature, (b) be associated with the exposure under

study in the population from which the cases were derived, and (c) not be an intermediate step in the causal path between the exposure and the disease (Weinberg, 1993). If these conditions were met, stratification was used to determine whether this variable acted as a confounder or an effect modifier. If the variable acted as a confounder, an unconfounded single summary Mantel-Haenszel (MH) estimate of the association was presented.

The overall referral rate and annual referral rates to EPP with associated 95% confidence intervals (C.I.) were calculated. The rates were estimated by dividing the number of eligible patients who were referred to EPP by the total number of eligible inpatients.

3.6.2 Clinical Outcomes

Hospitalization rates for EPP participants were calculated from November 1, 1996 to December 31, 1999. The proportion of participants admitted to hospital following intake to the program was calculated together with 95% confidence intervals. These proportions were calculated for males and females who had any admission as well as for participants who had either single or multiple admissions to hospital.

Incidence densities together with 95% confidence intervals were calculated for the clinical outcome of hospital admissions to a psychiatric unit following intake to EPP. Incidence density is the person-time rate at which new events occur in a population. The numerator is the number of new cases in the population and the denominator is "the sum of each individual's time at risk or the sum of the time that each person remained under observation and free from disease" (Hennekens & Buring, 1987, p.58). Incidence

densities for hospital admissions were calculated using the following formula:

$$ID = \frac{a}{\sum_{i=1}^{n} x_i}$$

a = number of new hospital admissions
x_i = time (days)subject i spent at risk

The time at risk was the time that each individual remained under observation and was not admitted to hospital or discharged from the program. For those who were admitted and discharged from hospital during the study period, their time at risk was determined by subtracting the number of days in hospital from the number of days of observation, rejoining the population at risk after discharge. For multiple admissions of some subjects, the associated confidence intervals are narrower than if the non-independence of these events have been accounted for statistically in the calculation of the confidence intervals.

The proportion of days spent in hospital was calculated together with 95% confidence intervals. The total number of days spent in hospital was divided by the total number of days in EPP.

Survival data analysis was used to examine and describe the time to first admission after intake to EPP. The Kaplan-Meier Method provided estimates that represented the probability that hospitalization occurred at a particular time over the observation period. After examining the survival curve for all EPP participants, the data were stratified to compare the survivor functions between groups. The log-rank test was used to compare the curves from two independent samples. It allowed the comparison of the entire survival curve and provided more power than focusing on specific points in

time. The underlying assumption of the log rank is that the odds ratios are homogeneous. In the log rank test for survival curves, the assumption was the equivalent that the survival curves had "no crossover or at most trivial amount of crossover" (Kahn & Sempos, 1989 p.187).

Proportions of completed suicides and attempted suicides among EPP participants were also determined. The proportion of attempted suicides was calculated by dividing the number of attempted suicides reported through presentation to emergency departments or the attempted suicides reported through hospital admission (identified by CRHA Corporate Data), by the number of participants enrolled in EPP. The proportion of completed suicides was calculated by dividing the number of deaths by the total number of participants enrolled in EPP. Confidence intervals (95%) were determined for the proportion of attempted suicides but not for the completed suicides as only one suicide was reported.

3.6.3 Population Based Indicators

Population based rates were calculated for each of the three geographical areas of interest for each year from 1992 to 1998 inclusive with respect to each outcome indicator. The outcome indicators were: a) discharges from a psychiatric unit with a principal diagnosis of schizophrenia or a psychotic disorder, and b) frequency of readmission with schizophrenia to a psychiatric unit per unit of population. The data requested for suicide attempts resulting in hospitalization with a principal diagnosis of schizophrenia or a psychotic disorder, and completed suicides with an identified contributing cause of death of schizophrenia or a psychotic disorder resulted in small numbers or was suppressed by

CIHI. As a result, it was not possible to conduct this part of the planned analysis. Annual rates per 1000 persons were calculated for the above outcomes for each area as well as by sex and age group for each area. Using Excel spreadsheet, proportions were calculated by dividing the annual CIHI data by the total annual population of the specific area and multiplying by 1 000 to achieve the annual rate. Line graphs were then produced to assess the stability of rates and to identify any trends over time.

3.7 Ethical Considerations

The data collected for this study were gathered from all subjects indirectly. Privacy in research refers to limited access to a person (Beauchamp, 1996). The use of indirect methods such as the use of inpatient records, program participant lists and existing databases did not result in substantial risk of harm to subjects. The respect of participants' privacy was protected through ensuring their anonymity. All identifiable information was removed.

The requested download from Corporate Data (objective 1) included PHN numbers and chart numbers but did not include any identifiable information. The data collected from the inpatient records during the chart review did not contain any personal identifiers (refer to data collection form in Appendix B). A study identification number was assigned to each record as the inpatient chart was reviewed. No information pertaining to physicians was collected from the chart. In the event that the principal researcher personally identified a patient from their hospital chart, the researcher's supervisor would review the record and complete the data collection form, although this was not necessary.

In order to protect the privacy and anonymity of program participants, the program director or designate was requested to prepare and provide a list of program participants. A link between inpatient records, Corporate Data and the list of referrals from the clinic was established through PHN numbers (objective 2). Signed consent for patient information to be used for program evaluation had been requested of all program participants since 1998 (Appendix C). Any patients, after 1998, who did not complete a consent form were not included in the list of referrals. Prior to that time, no consent process was in place for the program participants. In order to conduct this research it was necessary to balance the infringement of privacy resulting from linking to other databases without consent against the advantages of this research, that is the assessment of program outcomes. This was a critical information need, and the data collection resulted in productive insights that will ultimately improve the health of individuals with schizophrenia. By making a concerted effort to protect the privacy of subjects, the protocol minimized the infringement of privacy, which must be balanced against a potentially large benefit.

In order to measure the population outcomes of interest (objective 3), only anonymous, aggregate were collected. In the case of the Lethbridge area, there is only one hospital which submits data to CIHI. Consent was received for CIHI to release information from Lethbridge Regional Hospital. There was no need for nonaggregate identification of individuals and therefore there was no substantial infringement of privacy or confidentiality.

Confidentiality refers to the management of private information and the strategy for maintaining the data. All records including computer discs of prepared databases

were maintained under lock and key and access to confidential information was restricted. Once the program information files, inpatient data collection forms and the Corporate Data files had been merged successfully, the PHN numbers were removed from the data files.

Ethics approval for this project was received from the Conjoint Ethics Committee of the Calgary Regional Health Authority.

CHAPTER FOUR: ESTIMATE OF REFERRAL RATE

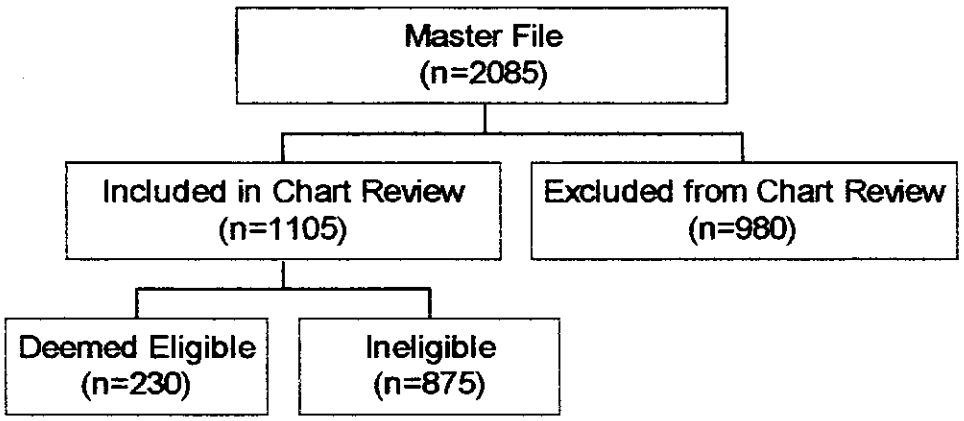
4.1 Introduction

In this chapter, data will be presented to describe sociodemographic and clinical characteristics of participants in EPP and to compare eligible psychiatric inpatients who were referred to EPP with those who were not referred.

4.1.1 Description of Study Sample

The sample consisted of 422 subjects, 192 EPP participants and 230 inpatients considered eligible for the EPP program, by the chart review. Hereafter these 230 inpatients will be referred to as eligible patients. These categories were not mutually exclusive. The study included all EPP participants that met the inclusion and exclusion criteria as described in Section 3.3.1. The identification of the eligible patients is described in Figure 4.1.

Figure 4.1: Identification of Eligible Patients from the Chart Review



The next three subsections present the following results: 1) description of EPP and eligible patients on sociodemographic variables, 2) estimation of referral rates to EPP from identified eligible inpatients and 3) comparison of referred and not referred eligible patients on sociodemographic and clinical variables.

4.2 Description of EPP Participants and Eligible Patients: Sociodemographic Characteristics

This section describes the sociodemographic characteristics of all participants in EPP and the eligible inpatients from the chart review. EPP participants and eligible patients were described by gender, age, marital status, level of education, employment status and living arrangement.

The age range in both groups was 15 to 52 years. The mean age of the EPP participants was 23.4 years (SD=7.2) and the mean age of the eligible patients was 28.7 years (SD=9.4). The standard deviations suggested that the EPP participants were more alike in age. Histograms (Figure 4.2) revealed that the distribution of age was positively skewed in both groups. Therefore, medians and interquartile ranges (25% - 75%) were presented as the summary statistics (Table 4.1). The median age was lower than the mean age in both groups. The median age in the EPP group was lower (21years) than in the eligible patients group (27 years). As this variable was categorized for the analysis, a transformation of the data was not necessary.

Figure 4.2: Histogram of Age for EPP Participants and Eligible Patients

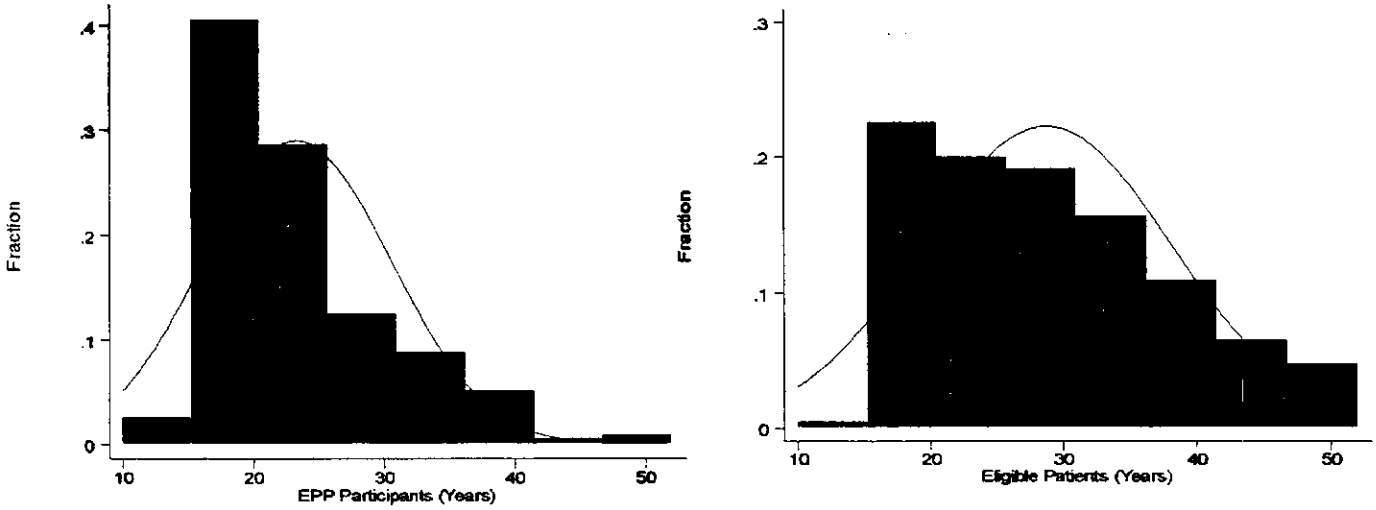


Table 4.1: Data Summary of Age for EPP Participants and Eligible Patients:

Group	**Mean** (years)	**SD**	**Min.** (years)	**1st Qu.** (years)	**Median** (years)	**3rd Qu.** (years)	**Max.** (years)
EPP	23.4	7.21	15	18	21	26.5	52
Eligible Pts.	28.7	9.40	15	21	27	35	52

As described in Section 3.6.1, the variables marital status, level of education, employment status and living arrangements were also categorized for the analysis. The description of the study sample and these four variables are presented in Table 4.2.

Table 4.2: Description of Study Sample for EPP Participants and Eligible Patients

STUDY VARIABLE	EPP PARTICIPANTS (N=192)		ELIGIBLE PATIENTS (N=230)	
	N	%	N	%
Gender				
Males	126	65.6	**126**	54.8
Females	66	34.4	**104**	45.2
Age Group (years)				
15 – 30	158	82.3	**139**	72.1
31 – 52	34	17.7	**91**	27.9
Marital Status				
Never Married	169	88.0	**148**	64.3
Currently/Previously Married	23	12.0	**80**	34.8
Unknown	0	0.0	**2**	0.9
Education				
<High School Diploma	81	42.2	**70**	30.4
>High School Diploma	111	57.8	**114**	49.6
Unknown	0	0.0	**46**	20.0
Employment				
Employed	52	27.1	**76**	33.0
Unemployed/Student/ Homemaker/Disabled	140	72.9	**151**	65.7
Unknown	0	0.0	**3**	1.3
Living Arrangement				
Family/Supervised	168	87.5	136	59.1
Alone/No Fixed Address	24	12.5	**92**	40.0
Unknown	0	0.0	**2**	0.9

4.3 Estimation of Referral Rates to EPP from Eligible Patients

The referral rates to the EPP of eligible inpatients were calculated from data obtained in the chart review according to methods described in Section 3.6.1. An overall rate and annual rates of referral for year 1, year 2, and year 3 of the program are presented in Figures 4.3 to 4.6 together with associated confidence intervals.

Figure 4.3: Overall Referral Rate (November 1, 1996 – October 31, 1999)

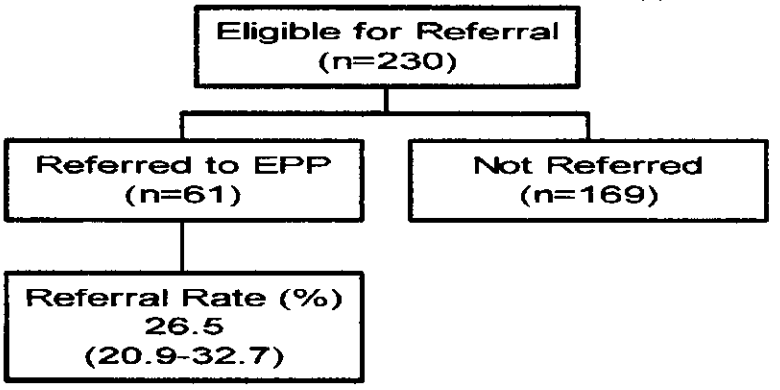


Figure 4.4: Referral Rate for Year 1 (November 1, 1996 – October 31, 1997)

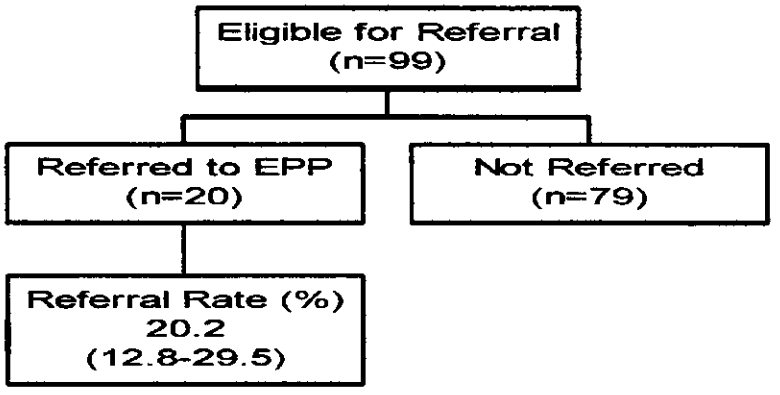


Figure 4.5: Referral Rate for Year 2 (November 1, 1997 – October 31, 1998)

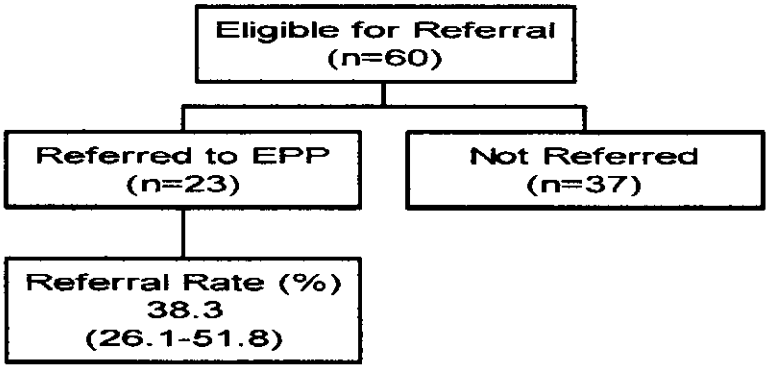
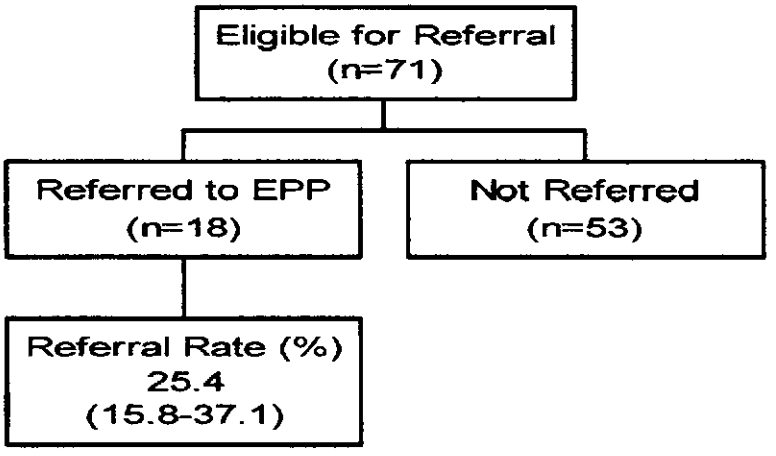


Figure 4.6: Referral Rate Year 3 (November 1, 1998 – October 31, 1999)



The overall referral rate for all three years of the program was 26.5% (20.9-32.7). The referral rates showed an increase in referrals from eligible patients between year 1 and year 2 from 20.2% to 38.3% and a decrease of referrals to 25.4% for year 3.

Tables 4.3 and 4.4 summarize the sociodemographic and clinical variables for participants in each year of EPP.

Table 4.3: Data Summary of Sociodemographic Categorical Variables for Years 1, 2, and 3 of Referred Patients

STUDY VARIABLE	YEAR 1 (N=20)		YEAR 2 (N=23)		YEAR3 (N=18)	
	N	%	N	%	N	%
Gender						
Males	12	60.0	15	65.2	13	72.2
Females	8	40.0	8	34.8	5	27.8
Age Group (years)						
15 – 30	14	70.0	23	100.0	13	72.2
31 – 52	6	30.0	0	-	5	27.8
Marital Status						
Never Married	18	90.0	22	95.7	14	77.8
Currently/Previously Married	2	10.0	1	4.3	4	22.2
Unknown	0	-	0	-	0	-
Education						
<High School Diploma	8	40.0	11	47.8	9	50.0
>High School Diploma	12	60.0	12	52.2	7	38.9
Unknown	0	-	0	-	2	11.1
Employment						
Employed	9	45	3	13.0	6	33.3
Unemployed/Student/ Homemaker/Disabled	11	55	20	87.0	12	66.7
Unknown	0	-	0	-	0	-
Living Arrangement						
Family/Supervised	15	75.0	20	87.0	10	55.6
Alone/No Fixed Address	5	25.0	3	13.0	8	44.4
Unknown	0	-	0	-	0	-

Table 4.4: Data Summary of Clinical Categorical Variables for Years 1, 2, and 3 of Referred Patients

STUDY VARIABLE	YEAR 1 (N=20)		YEAR 2 (N=23)		YEAR 3 (N=18)	
	N	%	N	%	N	%
AxisI Diagnosis						
Schizophrenia	10	50.0	3	13.0	5	28.8
Schizophreniform D/O	6	30.0	7	30.4	5	27.8
Schizoaffective D/O	0	-	3	13.0	0	-
Other/Unspecified Reactive Psychosis	2	10.0	2	8.7	1	5.6
Psychotic Disorder NOS	2	10.0	8	34.8	7	38.9
Substance Abuse						
Yes	6	30.0	13	56.5	6	33.3
No	14	70.0	10	43.5	12	66.7
Family History of Schizophrenia						
Yes	2	10.0	3	13.0	1	5.6
No	14	70.0	15	65.2	12	66.7
Unknown	4	20.0	5	21.7	5	27.8
Family Doctor						
Yes	5	25.0	15	65.2	10	55.6
No	13	65.0	2	8.7	4	22.2
Unknown	2	10.0	6	26.1	4	22.2
Site						
Foothills Hospital	15	75.0	15	65.2	11	61.1
Peter Lougheed Hospital	1	5.0	7	30.4	3	16.7
Rockyview Hospital	4	20.0	1	4.3	4	22.2

4.4 Comparison of Referred and Not Referred Eligible Patients

4.4.1 Comparison of Referred and Not Referred Eligible Patients

Sociodemographic Characteristics

The eligible patients were divided into two groups: those referred to EPP (N=61) and those not referred to EPP (N=169). The mean age for the referred patients was lower than that of the not referred patients, 23.16 years and 30.75 years respectively. The standard deviation for referred patients was 7.32 and was 9.27 for not referred patients suggesting that the referred patients were more similar in age. The range of ages among those referred was 16 to 52 years while the age range for not referred patients was 15 to 52 years. The median age for those referred (21 years) was lower than the mean age, whereas the median age for those not referred (30 years) was very similar to the mean age. Figure 4.2 shows the interquartile range and median age for the referred patients and not referred patients. Age was categorized into two categories: 1) 15 – 30 years and 2) 31-52 years. Of those inpatients referred, 82% were between the ages of 15-30 years (Table 4.4).

Figure 4.7: Boxplots of Age by Group

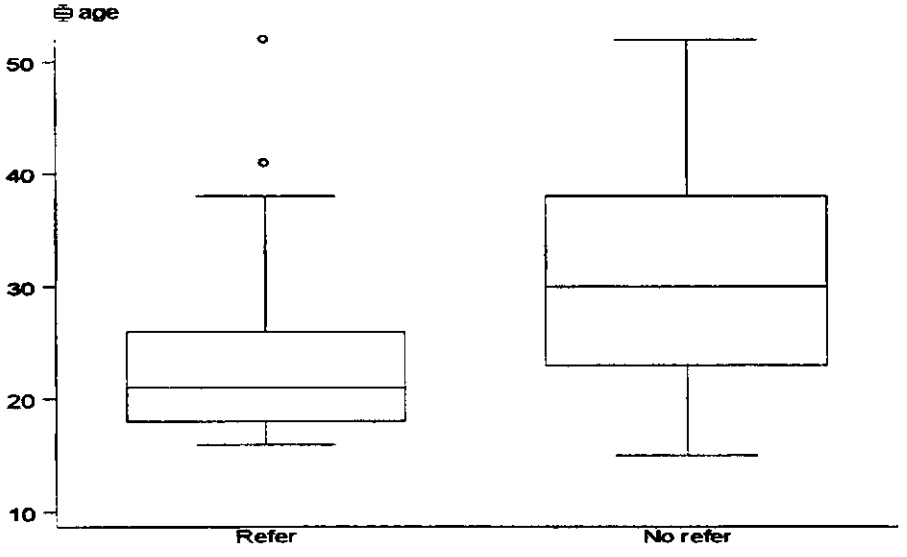


Table 4.5 summarizes the sociodemographic data for eligible patients referred and eligible patients not referred to EPP.

Inpatients referred to EPP were more likely to be male (65.6%) than female (34.4%) whereas those not referred were evenly distributed with 50.9% being male and 49.1% being female.

Eighty-eight percent of referred inpatients were never married in comparison with 55.6% of not referred inpatients. There were 31% fewer patients who were currently or previously married among the referred group compared to not referred.

Data on education was available for 184 of 230 patients (80.0%). There was information available on 23% more referred patients than not referred patients. When considering available information on education, more referred patients had less than high school diploma compared to not referred patients.

Information on employment status was available for all but two of those not referred. Seventy percent of referred patients were unemployed/student/homemaker compared to 63.9% of not referred patients.

Patients referred to EPP compared to patients not referred were more likely to live with family or in a supervised arrangement. Ten percent more of those not referred lived alone or had no fixed address.

Table 4.5: Sociodemographic Characteristics of Referred Eligible Patients and Not Referred Eligible Patients

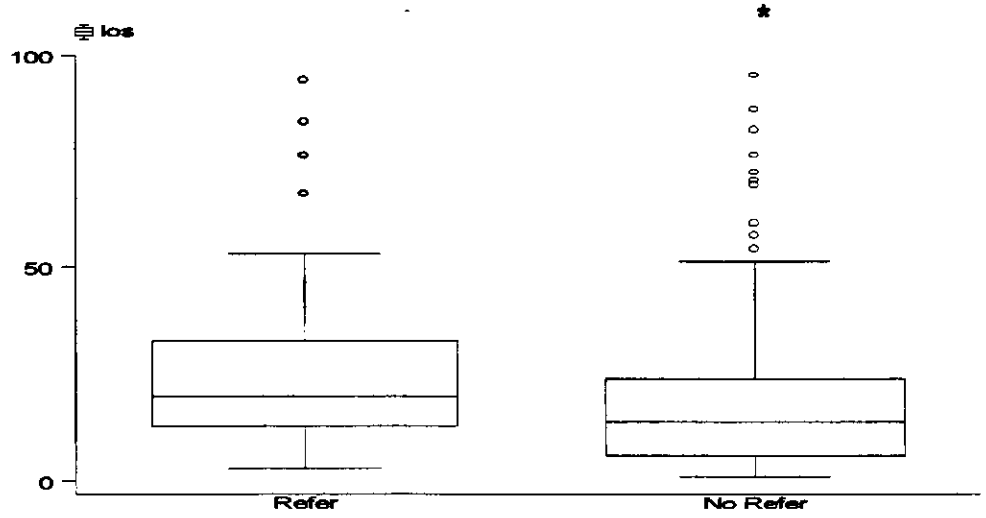
STUDY VARIABLE	REFERRED (N=61)		NOT REFERRED (N=169)	
	N	%	N	%
Gender				
Males	**40**	65.6	86	50.9
Females	**21**	34.4	83	49.1
Age Group (years)				
15 – 30	**50**	82.0	89	52.7
31 – 52	**11**	18.0	80	47.3
Marital Status				
Never Married	54	88.5	94	55.6
Currently/Previously Married	7	11.5	73	43.2
Unknown	**0**	0.0	**2**	**1.2**
Education				
<High School Diploma	28	45.9	42	24.9
>High School Diploma	31	50.8	83	49.1
Unknown	**2**	3.3	44	26.0
Employment				
Employed	**18**	29.5	58	34.3
Unemployed/Student/ Homemaker/Disabled	43	70.3	108	63.9
Unknown	0	0.0	**3**	**1.8**
Living Arrangement				
Family/Supervised	45	71.7	91	60.0
Alone/No Fixed Address	16	28.3	76	38.8
Unknown	0	0.0	3	1.2

4.4.2 Comparison of Referred and Not Referred Eligible Patients: Clinical Characteristics

The mean length of stay in hospital for all eligible patients was 24.5 days (SD=35.2). The mean length of stay for eligible patients referred to EPP was similar to that for those not referred to EPP, 25.5 and 24.1 days, respectively. The standard deviation was higher for those not referred (SD=39.3) compared to those referred

(SD=19.2) which may suggest that in terms of length of stay, those not referred were less alike than those who were referred to EPP. The length of stay among referred patients ranged from 3 days to 95 days whereas for those not referred, the length of stay ranged from 1 day to 365 days. The median length of stay for both groups was lower than the respective mean length of stay. The median length of stay for the referred group (20 days) was higher than that of the not referred group (15 days). Figure 4.3 shows the interquartile range and median length of stay for each group.

Figure 4.8: Boxplots – Length of Stay by Group



* 4 patients in no refer group had length of stay greater than 100 days; 137, 163, 258 and 365 days respectively

Table 4.6 summarizes the clinical characteristics of those referred to EPP and those not referred to EPP from eligible inpatients.

In considering primary Axis I diagnosis, eligible patients were recategorized as being diagnosed with schizophrenic disorders or with psychotic disorders. The category of schizophrenic disorders included all eligible patients coded with a 295.XX rubric according to ICD-9 diagnostic codes (see Table 3.1) Referred patients were more likely

to be diagnosed with schizophrenia (63.6%) and those not referred were more likely to have a diagnosis of Other Psychotic Disorders (62.7%). The diagnosis of substance abuse was equal between the two groups (41%).

Information on family history of schizophrenia or of a psychotic disorder was not available for 61 (26.5%) of all patients; 14 (23%) referred patients and 47 (27.8%) not referred patients. Fewer of those patients with a recorded family history (9.8%) were referred compared to those not referred (16.8%).

Similarly, 26.1% of data with respect to Global Assessment of Functioning were missing for all patients, 17 (28.3%) among those referred and 43 (25.3%) among those not referred.

Sixty-seven percent (67%) of referred patients were discharged from Foothills Hospital compared to 27.8% not referred. In contrast, 22.8% of eligible patients from the Peter Lougheed and Rockyview Hospitals were referred and 72.2% were not referred.

Table 4.6 summarizes the clinical characteristics of those referred to EPP and those not referred to EPP.

Table 4.6: Clinical Characteristic of Referred Eligible Patients and Not Referred Eligible Patients

STUDY VARIABLE	REFERRED (N=61)		NOT REFERRED (N=169)	
	N	%	N	%
AxisI Diagnosis				
Schizophrenic Disorders	39	63.9	63	37.3
Other Psychotic Disorders	22	36.1	106	62.7
Substance Abuse				
Yes	25	41.0	70	41.4
No	36	59.0	99	58.6
Family History of Schizophrenia				
Yes	6	9.8	28	16.6
No	41	67.2	94	55.6
Unknown	14	23.0	47	27.8
Family Doctor				
Yes	38	62.3	108	63.9
No	8	13.1	35	20.7
Unknown	15	24.6	26	15.4
Global Assessment of Functioning	44	71.7	126	74.7
Unknown	17	28.3	43	25.3
Site				
Foothills Hospital	41	67.2	47	27.8
Peter Lougheed and Rockyview Hospitals	20	22.8	122	72.2

4.4.3 The Relationship Between Referral to EPP and Sociodemographic and Clinical Characteristics

A number of sociodemographic and clinical variables were potentially related to referral to EPP. Stratified analyses were conducted to examine whether relationships in the data were a result of the distribution of other variables among referred patients and not referred patients. For example, a possible relationship between not being married and being referred to EPP may have been affected by the higher proportion of patients less

than 30 years old who were referred compared to not referred patients. Stratified analysis was not conducted for family history of schizophrenia, family doctor and Global Assessment of Functioning because of the amount of missing data.

The stratified tables for these variables are displayed in Tables 4.7 to 4.13. The goal of this analysis was to compare the proportion of patients referred to EPP in one of the above exposure groups with the proportion of patients referred to EPP who were not exposed to one of the groups and to calculate a referral ratio. In order to detect possible effect modification and confounding the data were stratified against the other variables.

The variables that were examined for associations with referral and as potential effect modifiers and/or confounders included gender, age, marital status, living arrangement, employment, diagnosis, and site. Each of these variables may act as a potential confounder in that it may "cause or prevent the outcome of interest, is not an intermediate variable, and is associated with the factor under investigation" (Last, 1995 p. 35).

4.4.3a Relationship between Gender and Referral to EPP:

Among the 126 male patients, 40 (31.75%) were referred to EPP. In comparison, twenty-one (20.19%) of the 104 female patients were referred to EPP. The crude referral ratio for males was 1.57 with a 95% confidence interval of 0.99 to 2.49, suggesting an association between gender and referral. Table 4.7 shows the proportion of males and the proportion of females who were referred to EPP in each stratum, together with stratum specific referral ratios.

Table 4.7: Stratified Referral Ratios for Gender

	Proportion of Male Subjects Referred	Proportion of Female Subjects Referred	Referral Ratio (95% C.I.)
Age 15-30 yrs	36/91	14/48	1.36 (0.82-2.26)
Age 31-52 yrs	4/35	7/56	0.91 (0.29-2.90)
Never Married	38/95	16/53	1.32 (0.82-2.14)
Currently/Previously Married	2/30	5/50	0.67 (0.14-3.22)
Family/Supervised	31/78	14/58	1.65 (0.97-2.80)
Alone/No Fixed Address	9/47	7/45	1.23 (0.50-3.03)
Employed	13/42	5/34	2.10 (0.83-5.32)
Not employed	27/84	16/67	1.35 (0.79-2.28)
Schizophrenic Disorders	26/63	13/39	1.24 (0.73-2.11)
Other Psychotic Disorders	14/63	8/65	1.81 (0.81-4.00)

Referral ratio calculated using males as referent category

The individual stratifications on age, marital status, living arrangement, employment and diagnosis each yielded point estimates of the stratum specific referral ratios which differed from each other as well as from the crude estimate. The referral ratio for those living with family is larger than the referral ratio for those living alone. The stratum specific referral ratio for those employed is higher than the referral ratio for those not employed as is the referral ratio for patients with a diagnosis of other psychotic disorders in comparison with those patients with a diagnosis of schizophrenic disorders. The estimate of the crude association lies between the stratum specific estimates. These differing point estimates suggest possible effect modification. However, the confidence intervals were in each case wide and overlap, and therefore there is no strong evidence of effect modification.

The stratum specific referral ratios for age and marital status were similar and do not approximate the crude estimate. Stratification on age group and marital status resulted in a decrease in the stratum specific referral ratios indicating that in this analysis, age and marital status may each act as confounders in the association between gender and referral. A single summary estimate of the association between gender and referral that is unconfounded by age was 1.26 (0.79-2.00)(MH), suggesting a weakened association. A single summary estimate of the association between gender and referral that is unconfounded by marital status was 1.22 (0.77-1.93)(MH), which also suggests a weakened association from the crude. The confidence intervals in each case suggest that the referral estimates may be from 0.77, indicating no association to 1.93 or almost a doubling of effect.

4.4.3b Relationship between Age and Referral to EPP:

Among the 139 patients aged between 15 and 30 years old, 50 (36.0%) were referred to EPP. In comparison, eleven (12.1%) of the 91 patients between the ages of 31 and 52 years were referred to EPP. The crude referral ratio for those between 15 and 30 years old was 2.98 with 95% a confidence interval of 1.64 to 5.41. This estimate suggests a strong association between age and referral to EPP although the association may be influenced by effect modification or confounding due to extraneous variables. Table 4.8 shows the proportion of those between the ages of 15 and 30 years and the proportion of those between the ages of 31 and 52 years who were referred to EPP in each stratum, together with stratum specific referral ratios.

Table 4.8: Stratified Referral Ratios for Age:

	Proportion of 15-30 Year Old Subjects Referred	**Proportion of 31-52 Year old Subjects Referred**	**Referral Ratio (95% C.I.)**
Males	36/91	4/35	3.46 (1.33-9.01)
Females	14/48	7/56	2.33 (1.03-5.30)
Never Married	47/114	7/34	2.00 (1.00-4.01)
Currently/Previously Married	3/25	4/55	1.65 (0.40-6.83)
Family/Supervised	40/91	5/45	3.96 (1.68-9.33)
Alone/No Fixed Address	10/47	6/45	1.60 (0.63-4.03)
Employed	14/43	4/33	2.69 (0.97-7.41)
Not Employed	36/96	7/55	2.95 (1.41-6.17)
Schizophrenic Disorders	32/67	7/35	2.39 (1.18-4.85)
Other Psychotic Disorders	18/72	4/56	3.50 (1.26-9.76)
Foothills Hospital	31/55	10/33	1.86 (1.05-3.28)
Peter Lougheed/Rockyview Hospitals	19/84	1/58	* *

Referral ratio calculated using 15-30 years old as referent category
* not sufficiently precise for meaningful interpretation

The stratified estimates of referral ratios for gender and diagnosis each approximate the crude referral ratio and did not differ greatly from one another. These stratifications do not suggest confounding or effect modification.

The individual stratifications on living arrangement yielded stratum specific referral ratios that differed. Patients living with family have an estimated referral ratio that is higher than the estimated referral ratio of those living alone and the crude estimate lies between the stratum specific estimates. Due to the small numbers within strata, the confidence intervals were wide and overlap. The data therefore, do not provide strong evidence of effect modification even though the point estimates differed.

The stratum specific referral ratios for marital status were similar between strata and do not approximate the crude estimate. Stratification on marital status resulted in a decrease in the stratum specific referral ratios indicating that marital status may act as a confounder in the association between age and referral. A single summary estimate of the association between age and referral that is unconfounded by marital status was 1.94 (1.04-3.62)(MH), a weaker association than the observed crude estimate. The lower limit of the confidence interval of the MH estimate provides no evidence of an association whereas the upper limit of the confidence interval provides evidence of strong effect between age and referral.

4.4.3c Relationship between Marital Status and Referral to EPP:

Among the 148 never married patients, 54 (36.5%) were referred to EPP. In comparison, seven (8.8%) of the 80 currently/previously married patients were referred to EPP. The crude referral ratio for those never being married was 4.17 with a 95% confidence interval of 1.99 to 8.73 suggesting a strong association between being never married and referral to EPP. In order to assess for the influence of effect modification or confounding, Table 4.9 shows the proportion of those never married and the proportion

of those currently/previously married who were referred to EPP in each stratum, together with stratum specific referral ratios.

Table 4.9: Stratified Referral Ratios for Referral to EPP for Marital Status:

	Proportion of Never Married Patients Referred	Proportion of Currently/ Previously Married Patients Referred	Referral Ratio (95% C.I.)
Males	38/95	2/30	6.00 (1.54-23.41)
Females	16/53	5/50	3.02 (1.19-7.63)
Age 15-30 yrs	47/114	3/25	3.44 (1.16-10.16)
Age 31-52 yrs	7/34	4/55	2.83 (0.89-8.96)
Family/Supervised	41/88	4/48	5.59 (2.13-14.67)
Alone/No Fixed Address	13/59	3/31	2.28 (0.70-7.39)
Employed	15/42	3/34	4.05 (1.28-12.84)
Not employed	39/106	4/44	4.05 (1.54-10.65)
Schizophrenic Disorders	34/70	5/31	3.01 (1.30-6.96)
Other Psychotic Disorders	20/78	2/49	6.28 (1.54-25.70)

Referral ratio calculated using never married group as referent category
Missing values: 2

The individual stratifications on gender, living arrangement, and diagnosis each yielded stratum specific referral ratios that differed from one another. The referral ratio for males is larger than the referral ratio for females. Similarly, those patients that live

with family or in supervised arrangements have an estimated referral ratio that is higher in comparison with those patients that live alone as is the referral ratio for patients with a diagnosis of other psychotic disorders in with to that of patients with a diagnosis of schizophrenic disorders. These differing point estimates suggest possible effect modification. However, in each instance the associated confidence intervals were wide and overlap. Also, there were a small number of subjects in a number of the strata which results in imprecise estimates. Therefore, there is no strong evidence of effect modification.

To determine that a variable is a confounder requires homogeneity within the strata, that is, the stratum specific referral ratios should be similar and should not approximate the crude. Stratification on age group resulted in similar stratum specific referral ratios, lower than the crude estimate, indicating that age may be a confounder in the association between marital status and referral. A single summary estimate of the association between marital status and referral that is unconfounded by age was 3.20 (1.43-7.18)(MH). This is a weaker association than observed in the crude estimate however the unconfounded estimate continues to suggest a strong association between marital status and referral. The confidence interval also infers an association that may range from 1.43 times to 7.18 times.

4.4.3d Relationship between Living Arrangement and Referral to EPP:

Among the 136 patients living in a family or in a supervised arrangement, 45 (33.1%) were referred to EPP. In comparison, sixteen (17.4%) of the 92 patients living alone or without fixed address were referred to EPP. The crude referral ratio for those

living in a family arrangement was 1.90 with a 95 % confidence interval of 1.15 to 3.15 indicating that there was an association between living arrangement and referral. Table 4.10 shows the proportion living in a family arrangement and the proportion living alone who were referred to EPP in each stratum, together with stratum specific referral ratios.

Table 4.10: Stratified Referral Ratios for Living Arrangement

	Proportion of Subjects Living with Family Referred	**Proportion of Subjects Living Alone Referred**	**Referral Ratio (95% C.I.)**
Males	31/78	9/47	2.08 (1.09-3.97)
Females	14/58	7/45	1.55 (0.68-3.52)
Age 15-30 yrs	40/91	10/47	2.07 (1.14-3.75)
Age 31-52 yrs	5/45	6/45	0.83 (0.27-2.54)
Never Married	41/88	13/59	2.11 (1.25-3.59)
Currently/Previously Married	4/48	3/31	0.86 (0.21-3.59)
Employed	11/46	7/30	1.02 (0.45-2.35)
Not employed	34/89	9/60	2.55 (1.32-4.92)
Schizophrenic Disorders	29/62	10/38	1.78 (0.98-3.22)
Other Psychotic Disorders	16/74	6/54	1.95 (0.82-4.65)

Referral ratio calculated using living with family or supervised as referent category
Missing values: 2

Stratifications on gender, age, marital status, and employment resulted in stratum specific referral ratios that differed between strata and also differed from the crude estimate. The estimated referral ratio for males was higher than the estimated referral ratio for females. Also, among those 15-30 years, the estimated referral ratio was higher than in the older age group and the estimated referral ratios for never married patients was higher than that of the currently/previously married patients. Among employed patients the estimated referral ratio was lower than the referral ratio for unemployed patients. However, once again, the confidence intervals were wide and overlap, therefore there is no strong evidence of effect modification. The number of subjects in some of the strata were small which may lead to imprecision in the estimates. There is no evidence of confounding.

4.4.3e Relationship between Employment and Referral to EPP:

Among the 76 currently employed patients, 18 (23.7%) were referred to EPP. In comparison, fifty-eight (38.4%) of the 151 patients not employed were referred to EPP. The crude referral ratio for those employed was 0.83 with a 95% confidence interval of 0.52 to 1.34. There was no effected between being employed and referral to EPP. This crude estimate may be misleading if the association is influenced by effect modification or influenced by confounding due to extraneous variables. The proportion of employed patients and the proportion of not employed patients who were referred to EPP in each stratum, together with stratum specific referral ratios are presented in Table 4.11.

Table 4.11: Stratified Referral Ratios for Employment:

	Proportion of Employed Subjects Referred	Proportion of Not Employed Subjects Referred	Referral Ratio (95% C.I.)
Males	13/42	27/84	0.96 (0.56-1.67)
Females	5/34	16/67	0.62 (0.25-1.54)
Age 15-30 yrs	14/43	36/96	0.87 (0.53-1.43)
Age 31-52 yrs	4/33	7/55	0.95 (0.30-3.01)
Never Married	15/42	39/106	0.97 (0.60-1.56)
Currently/Previously Married	3/34	4/44	0.97 (0.23-4.05)
Family/Supervised	11/46	34/89	0.63 (0.35-1.12)
Alone/No Fixed Address	7/30	9/51	1.56 (0.64-3.77)
Schizophrenic Disorders	12/28	27/73	1.16 (0.69-1.95)
Other Psychotic Disorders	6/48	16/78	0.61 (0.26-1.45)
Foothills Hospital	12/28	29/59	0.87 (0.53-1.44)
Peter Lougheed/Rockyview Hospitals	6/48	14/92	0.82 (0.34-2.00)

Referral ratio calculated using employed as referent category
Missing values: 3

The individual stratifications indicated that the variables did not impact the association between employment and referral. The stratum specific referral ratios were similar to

each other and to the crude ratio. There is no strong evidence of effect modification or confounding.

4.4.3f Relationship between Axis I Diagnosis and Referral to EPP:

Among the 102 patients with an Axis I diagnosis of schizophrenic disorder, 39 (38.2%) were referred to EPP. In comparison, 22 of the 128 patients (17.2%) with an Axis I diagnosis of psychotic disorder were referred to EPP. The crude referral ratio for patients with a diagnosis of schizophrenic disorders was 2.22 with a 95% confidence interval of 1.41 to 3.50 indicating a strong association between diagnosis and referral. The association may be influenced by effect modification or influenced by confounding due to extraneous variables. Table 4.12 shows the proportion of patients diagnosed with schizophrenic disorders and the proportion of patients diagnosed with psychotic disorders who were referred to EPP in each stratum, together with stratum specific referral ratios.

Table 4.12: Stratified Referral Ratios for Axis I Diagnosis

	Proportion of Subjects with diagnosis of Schizophrenic Disorders (295.0) Referred	**Proportion of Subjects with diagnosis of Other Psychotic Disorders (298.0) Referred**	**Referral Ratio (95% C.I.)**
Males	26/63	14/63	1.86 (1.07-3.21)
Females	13/39	8/65	3.56 (1.23-5.94)
Age 15-30 yrs	32/67	18/72	1.91 (1.19-3.06)
Age 31-52 yrs	7/35	4/56	2.80 (0.88-8.88)
Never Married	34/70	20/78	1.89 (1.21-2.97)
Currently/Previously Married	5/31	2/49	3.95 (0.82-19.13)
Family/Supervised	29/62	16/74	2.16 (1.30-3.60)
Alone/No Fixed Address	10/38	6/54	2.37 (0.94-5.96)
Employed	12/28	6/48	3.43 (1.45-8.12)
Not employed	27/73	16/78	1.80 (1.06-3.06)
Foothills Hospital	28/52	13/36	1.49 (0.90-2.46)
Peter Lougheed/Rockyview Hospitals	11/50	9/92	2.25 (1.00-5.06)

Referral ratio calculated using diagnosis of schizophrenic disorders as referent category

The individual stratifications on gender, age, marital status, employment and site yielded stratum specific referral ratios that differed. The referral ratio for males was lower than the referral ratio for females. The estimated referral ratio for those aged 31-52 years exceeded the estimated referral ratio for those in the younger age group as did the estimated referral ratios for patients employed exceed that of those unemployed. The estimated referral ratio for never married patients was lower than that of the currently/previously married patients. Patients discharged from Foothills Hospital had a lower estimated referral ratio than those discharged from Rockyview/Peter Lougheed Hospitals. The estimate of the crude association lies between the stratum specific estimates suggesting possible effect modifications. The small number of subjects in some of the strata (<5) lead to imprecise estimates. There was no evidence of confounding in the association between Axis I diagnosis and referral.

4.4.3g Relationship between Site and Referral to EPP:

Among the 88 patients discharged from Foothills Hospital, 41 (46.6%) were referred to EPP. In comparison, twenty (14.1%) of the 142 patients discharged from the Peter Lougheed and Rockyview Hospitals were referred to EPP. The crude referral ratio for those discharged from Foothills Hospital was 3.31 with a 95% confidence interval of 2.0 to 5.36 indicating a strong association between being discharged from Foothills Hospital and being referred to EPP. However, this crude estimate may be misleading if the association is influenced by effect modification or possible confounding due to other variables. Table 4.13 shows the proportion of patients discharged from Foothills Hospital

and the proportion of patients discharged from Peter Lougheed/Rockyview Hospitals who were referred to EPP in each stratum, together with stratum specific referral ratios.

Table 4.13: Stratified Referral Ratios for Hospital Site

	Proportion of Subject from Foothills Hospital Referred	**Proportion of Subjects from Peter Lougheed/ Rockyview Hospitals Referred**	**Referral Ratio (95% C.I.)**
Age 15-30 yrs	31/55	19/84	2.49 (1.57-3.94)
Age 31-52 yrs	10/33	1/58	17.58 (2.35-131.27)
Schizophrenic Disorders	28/52	11/50	2.45 (1.37-4.37)
Other Psychotic Disorders	13/36	9/92	3.69 (1.73-7.87)

Referral ratio calculated using Foothills Hospital as referent category

When the data were stratified on age, the stratum specific estimates differed from each other as well as from the crude estimates, suggesting effect modification. However, the small number of subjects in the 31-52 year old strata lead to imprecise estimates and the confidence intervals are wide and overlap. Therefore, there is no strong evidence of effect modification. The stratified estimates of referral ratio for diagnosis approximated each other, and the crude estimate. This variable, therefore did not act either as a confounder or as an effect modifier of the association between hospital site and referral.

CHAPTER FIVE: CLINICAL OUTCOMES OF EPP PARTICIPANTS

5.1 Introduction

In this chapter, data will be presented to describe the clinical outcomes of participants in the EPP subsequent to the their admission to the program. This chapter is divided into three sections: 1) first psychiatric inpatient admission following referral to EPP, 2) attempted suicides and 3) mortality.

5.2 Inpatient Admission Subsequent to Referral to EPP

The objective of this section is to describe psychiatric inpatient admissions subsequent to EPP intake. Descriptive data are presented, followed by an examination of survival experience among EPP participants. The survival experience refers to the participants' time between referral to EPP and first admission to an inpatient unit.

As described in Section 3.6.2, survival curves were produced using the Kaplan-Meier (KM) Method. The data was stratified to compare survivor functions between groups and the log-rank test was conducted.

5.2.1 Inpatient Admission Subsequent to Referral to EPP: Descriptive Data

Fifty of 192 (26.0%) EPP participants were admitted to hospital following their admission to the program. The highest number of admissions for any individual subject to an inpatient unit following intake to EPP was 4. As described in Section 3.6.2 an incidence rate (incidence density) was calculated with person-year of participation in EPP rather than count data. The incidence density for all participants admitted to hospital was

192/10^3 person years. Among any admissions to hospital, 1.55% of total EPP days were inpatient days. Table 5.1 presents the number and percentage of participants admitted to hospital, the incidence densities and the proportion of days spent in hospital.

Table 5.1: Description of Hospital Admissions by EPP Participants

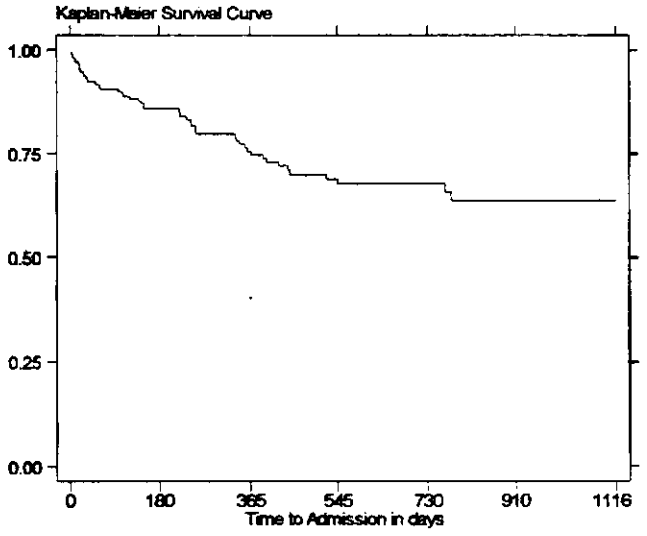
Admission	N	Participants Admitted to Hospital (%) (95%CI)	Incidence Density (person-years) (per 10^3) (95%CI)	Proportion of days spent in hospital (%) (95%CI)
Any	50	26.0 20.0-32.9	192 148-244	1.55 1.47-1.63
Males	28	20.6 13.9-28.8	166 115-230	1.40 1.31-1.50
Females	22	33.3 22.2-46.0	240 160-334	1.82 1.68-1.97
Single admit	33	17.2 12.1-23.3	126 89-170	0.77 0.72-0.84
Multiple admits	17	8.9 5.2-13.8	65 38-101	0.78 0.73-0.84

5.2.2 Inpatient Admission Subsequent to Referral to EPP: Examination of Survival Time

The length of time between referral to EPP and first admission to a psychiatric unit was evaluated using survival analysis. A total of 26.0% of participants were admitted to hospital between their index date of admission to EPP and December 31st, 1999. Twelve patients were admitted within 30 days of referral, a further 14 patients were admitted between two and six months and an additional 14 patients were admitted between six months and one year following admission to EPP. Overall, 40 of 192

(20.8%) EPP participants were admitted to hospital within one year of their intake to EPP. Figure 5.1 shows the survival curve, in days, for EPP participants.

Figure 5.1: Kaplan-Meier Curve for Time to Hospital Admission, EPP Participants



The cumulative probability of remaining hospital free for each year of follow-up (the survivor function) for EPP participants is presented in Table 5.2. This table also presents the 95% confidence interval for the survival probability, the number of participants at risk at the beginning of the time interval, and the number of participants admitted to hospital at each interval. The first year after index referral was the highest risk period. Among the 50 participants admitted to hospital, 40 (80.0%) were admitted within the first year. The probability of remaining free of inpatient admission for at least one year was estimated to be 75.6% with a confidence interval of 68.0% and 81.6%. The survivor functions for the following two years are conditional probabilities. For example, the probability of remaining free of inpatient admission for at least two years was

conditional on having been without an admission during the first year. As shown in Table 5.2, this was estimated to be 67.8% (CI 59.0% to 75.0%).

Table 5.2: Kaplan-Meier Estimates of Survival Probability by Year of Participation

	Number at Risk	Number Participants Admitted to Hospital	Survivor Function	95% Confidence Interval
Year 1	88	40	0.756	0.680 – 0.816
Year 2	40	8	0.678	0.590 – 0.750
Year 3	4	2	0.637	0.536 – 0.721

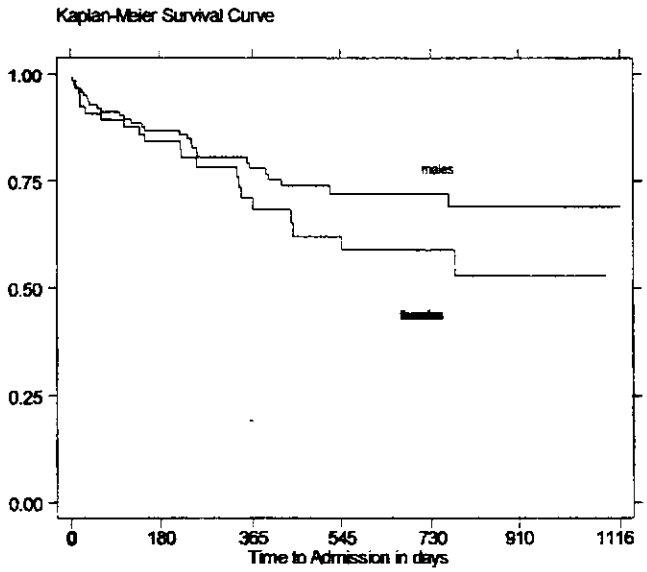
5.2.3 Examination of the Sociodemographic Characteristics and Hospital Admission

The following sections present an examination of the impact of sociodemographic characteristics on hospital admission following admission to EPP. The sociodemographic characteristics examined were: (a) gender (b) age (c) marital status (d) living arrangement (e) employment status and (f) level of education.

5.2.3a Impact of Gender on Hospital Admission:

Figure 5.2 shows the KM survival curves for males and females . The survival curve for females consistently lies below that for males. The difference between the two survivor functions increases after approximately one year. The log rank test was used to test the null hypothesis of no overall difference between the two survival curves. The log rank statistic indicated that there was no evidence that the KM survivor curves were different; $\chi^2_{(Logrank)} = 1.93$, df = 1, P = 0.17).

Figure 5.2: Kaplan-Meier Curve for Time to Hospital Admission by Gender



The cumulative probability of remaining hospital free by six-month intervals of follow-up for males and females is presented in Table 5.3. The table also presents 95% confidence intervals for the survival probability, the number at risk at the beginning of the time period and the number of participants admitted to hospital for each interval. The first 12 months were the period of highest risk for both males and females. Among 29 males and 21 females admitted to hospital, 24 (82.7%) males and 16 (76.2%) females were admitted within the first twelve months. The cumulative probability of not being hospitalized for 18 months was 72.2% for males and 62.1% for females with confidence intervals of 61.7% to 80.2% and 46.1% to 74.6% respectively. The confidence intervals at all time periods were wide and overlapping emphasizing the imprecision of the survival estimates.

Table 5.3: Kaplan-Meier Estimates of Survival Probability for 6-Month Periods of Follow-up by Gender

	Males				Females			
Mo	N at Risk	N Failed	Survivor Function	95% CI	N at Risk	N Failed	Survivor Function	95% CI
6	91	16	0.868	0.793-0.920	48	10	0.843	0.727-0.912
12	62	8	0.780	0.687-0.848	27	6	0.711	0.567-0.815
18	41	4	0.722	0.617-0.802	20	3	0.621	0.461-0.746
24	29	0	0.722	0.617-0.802	12	1	0.589	0.425-0.721
30	15	1	0.692	0.572-0.784	9	1	0.530	0.345-0.685
36	1	0	0.692	0.572-0.784	1	0	-	-

Note: Number Failed = Number of participants admitted to hospital

5.2.3b Impact of Age on Hospital Admission:

Figure 5.3 shows the KM curve of time to admission for age group and Table 5.4 presents the cumulative probability of remaining free from inpatient admissions. The survival curve for those aged 15-30 years lies above that for those aged 31-52 years. The survivor functions crossed at approximately 120 days and then again at approximately 220 days. The curves also had areas of plateauing and deep steps. The confidence intervals at these times were wide, and overlapping suggesting imprecision of the survival probabilities (see Table 5.4). Also, in the 31-52 year old group, after the 12-month period, there were a small number of participants at risk (<15), resulting in very little information and imprecisionof the KM estimate. The log rank test was not used as the survival curves of the two groups crossed.

Figure 5.3: Kaplan-Meier Curve for Time to Hospital Admission by Age Group

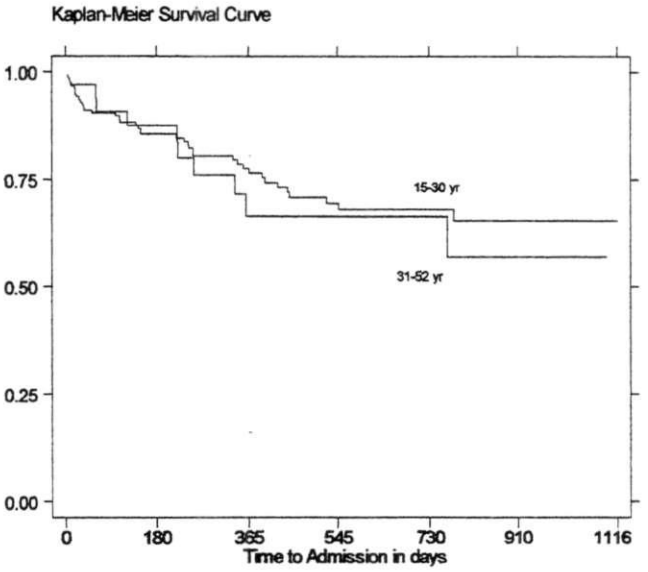


Table 5.4: Kaplan-Meier Estimates of Survival Probability for 6-Month Periods of Follow-up by Age Group

	15-30 Years				31-52 Years			
Mo.	N at Risk	N Failed	Survivor Function	95% CI	N at Risk	N Failed	Survivor Function	95% CI
6	113	22	0.860	0.791-0.903	26	4	0.881	0.701-0.951
12	75	9	0.774	0.693-0.840	14	5	0.664	0.444-0.813
18	50	7	0.694	0.600-0.771	11	0	0.664	0.444-0.813
24	33	1	0.680	0.583-0.761	8	0	0.664	0.444-0.813
30	19	1	0.654	0.546-0.743	5	1	0.571	0.310-0.762
36	1	0	0.654	0.546-0.743	1	0	-	-

Note: Number Failed = Number of participants admitted to hospital

5.2.3c Impact of Marital Status on Hospital Admission

Figure 5.4 shows the KM curve for time to admission for marital status by group. In the single category, there was a total of 44 admissions and during the first 12 months of follow-up, 33 of these participants (76.7%) were admitted. Among the 7 admissions in the married category, 5 participants (71.4%) were admitted in the first 6 months and all

admissions had taken place during the first 12 months of follow-up. Up until 24 months, the survival curve for those in the married group was below that of the single group. Table 5.5 confirms that the number of participants at risk among those married was less than 15 after 6 months, indicating the imprecision of the KM estimate of survival time. The confidence intervals for the two groups overlapped and were wide indicating decreased precision of the estimates. The survival curves of the two groups crossed and therefore no log rank test was conducted.

Figure 5.4: Kaplan-Meier Curve for Time to Hospital Admission by Marital Status

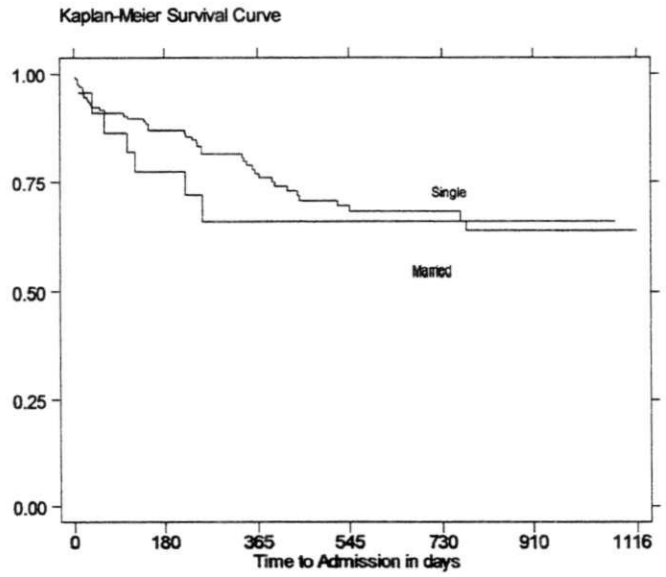


Table 5.5: Kaplan-Meier Estimates of Survival Probability for 6-Month Periods of Follow-up by Marital Status

	Never Married				Currently/Previously Married			
Mo	N at Risk	N Failed	Survivor Function	95% CI	N at Risk	N Failed	Survivor Function	95% CI
6	123	21	0.871	0.809-0.914	16	5	0.774	0.540-0.899
12	80	12	0.769	0.689-0.831	9	2	0.659	0.409-0.823
18	54	7	0.694	0.602-0.769	7	0	0.659	0.409-0.823
24	37	1	0.681	0.587-0.758	4	0	0.659	0.409-0.823
30	21	2	0.636	0.528-0.727	3	0	0.659	0.409-0.823
36	1	0	0.636	0.528-0.727	1	0	-	-

Note: Number Failed = Number of participants admitted to hospital

5.2.3d Impact of Living Arrangement on Hospital Admission

Figure 5.5 shows the KM curve for time to admission by living arrangement groups and Table 5.6 presents the survival probability by group. For those participants in the alone category, all admissions (9) occurred during the first 12 months of follow-up. Among those living with family, 31 of 41 admissions (78.6%) occurred during that same period. The survival curve for those living alone or with no fixed address was consistently below the curve for those living in a family or supervised arrangement. There were sections when the steps were deeper than in other sections of the curves, particularly among those living alone. Prior to six months, the number of participants in the alone category fell below 15. Therefore, after this time, the survival curve and the survival probability provided little information. The wide confidence interval for that period (0.51 to 0.88) further emphasized the imprecision. There was also plateauing in the group of participants living with family particularly after18 months, as the time between events increased. The log rank test was used to test the null hypothesis that the

that the survival curves were the same. The log rank statistic failed to find evidence that that the KM survivor curves for living arrangement were different; $\chi^2_{(Logrank)} = 2.98$, df = 1, P = 0.08.

Figure 5.5: Kaplan-Meier Curve for Time to Hospital Admission by Living Arrangement

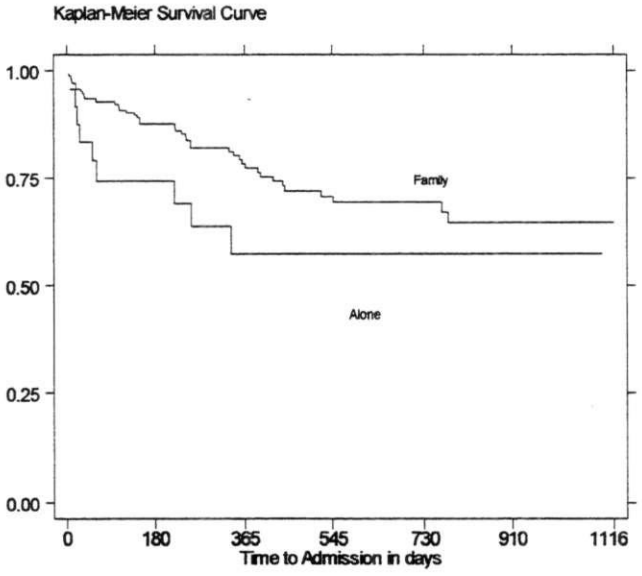


Table 5.6: Kaplan-Meier Estimates of Survival Probability for 6-Month Periods of Follow-up by Living Arrangement

	Family/Supervisor				Alone/No Fixed Address			
Mo	N at Risk	N Failed	Survivor Function	95% CI	N at Risk	N Failed	Survivor Function	95% CI
6	124	20	0.876	0.814-0.918	15	6	0.743	0.514-0.876
12	81	11	0.783	0.703-0.843	8	3	0.573	0.331-0.756
18	54	7	0.707	0.616-0.781	7	0	0.573	0.331-0.756
24	35	1	0.694	0.600-0.770	6	0	0.573	0.331-0.756
30	19	2	0.645	0.533-0.737	5	0	0.573	0.331-0.756
36	1	0	0.645	0.533-0.737	1	0	0.573	0.331-0.756

Note: Number Failed = Number of participants admitted to hospital

5.2.3e Impact of Employment Status on Hospital Admission

Figure 5.6 shows the KM curve for time to admission by employment status. The first 12 months are a time of highest risk of admission to hospital for both groups. Among those employed, 11 of 14 (78.6%) admissions were within the first 12 months and among the unemployed, 29 of 36 admissions (80.6%) were in the same time period. The wide and overlapping confidence intervals for the survival functions indicated a lack of precision of the estimates. As the number of participants not admitted to hospital decreases, the KM curves become less reliable. The survival curves for the two groups crossed and therefore a log rank test for difference in the survival curves was not conducted.

Figure 5.6: Kaplan-Meier Curve for Time to Hospital Admission by Employment Status

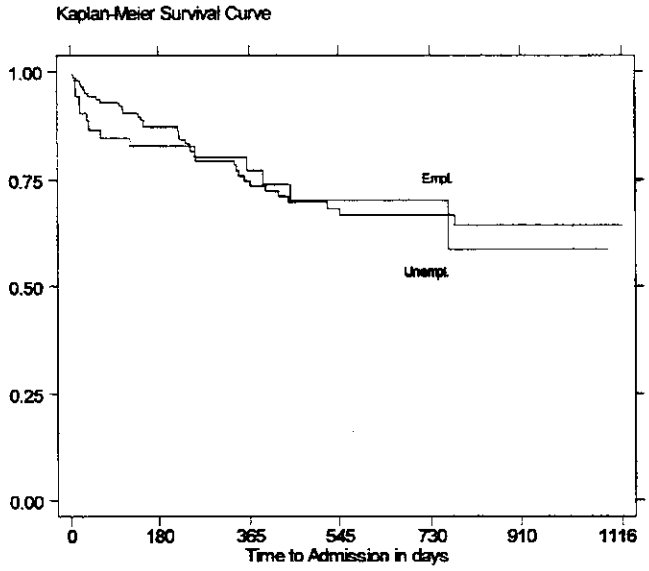


Table 5.7: Kaplan-Meier Estimates of Survival Probability for 6-Month Periods of Follow-up by Employment

	Employed				Unemployed			
Mo.	N at Risk	N Failed	Survivor Function	95% CI	N at Risk	N Failed	Survivor Function	95% CI
6	39	9	0.830	0.691-0.910	100	17	0.871	0.800-0.921
12	26	2	0.770	0.621-0.871	63	12	0.751	0.654-0.818
18	15	2	0.701	0.531-0.821	46	5	0.682	0.579-0.764
24	9	0	0.701	0.531-0.821	31	1	0.670	0.561-0.752
30	4	1	0.584	0.314-0.781	20	1	0.642	0.528-0.735
36	1	0	-	-	1	0	0.642	0.528-0.735

Note: Number Failed = Number of participants admitted to hospital

5.2.3f Impact of Education on Hospital Admission

Figure 5.7 shows the KM survival curve by level of education and Table 5.8 presents the cumulative probabilities of survival in the community in 6-month time intervals. For those with less than high school education, 17 of the 21 admissions (70.8%) occurred during the first 12 months. In those with greater than high school education, 23 of the 26 admissions (88.5%) occurred in the first 12 months. The survival curves for the two groups crossed at different points therefore a log rank test for difference in the survival curves was not conducted. At 6 months, the probability of survival was 86.9% for those with less than high school and 85.2% for those with greater than high school. At 12 months the survival probabilities were 74.3% and 76.5%, respectively. At 12 months, those with more education had a better probability of not being admitted to hospital than those with less than high school. However, these estimates should be interpreted with caution as the confidence intervals were wide and overlapped emphasizing the imprecision of the estimates.

Figure 5.7: Kaplan-Meier Curve for Time to Hospital Admission by Level of Education

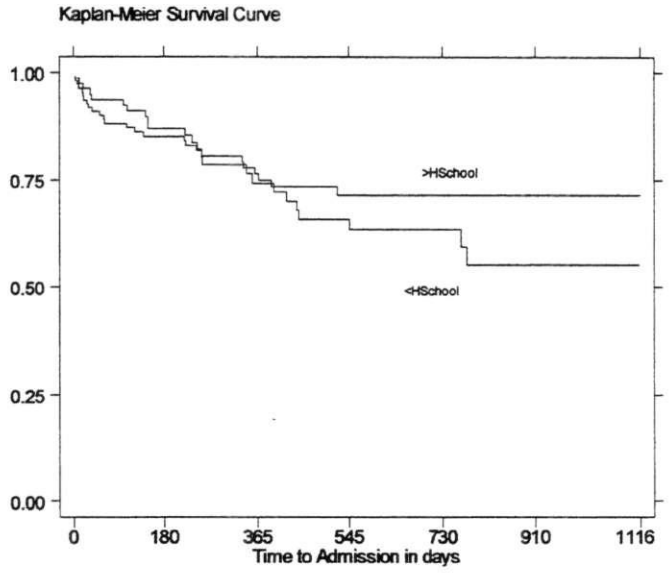


Table 5.8: Kaplan-Meier Estimates of Survival Probability for 6-Month Periods of Follow-up by Group – Education

	Less than High School Education				Greater than High School Education			
Mo	N at Risk	N Failed	Survivor Function	95% CI	N at Risk	N Failed	Survivor Function	95% CI
6	59	10	0.869	0.770-0.928	80	16	0.852	0.769-0.907
12	36	7	0.743	0.620-0.834	53	7	0.764	0.665-0.838
18	28	4	0.658	0.519-0.766	33	3	0.713	0.601-0.799
24	18	1	0.634	0.490-0.747	23	0	0.713	0.601-0.799
30	10	2	0.552	0.386-0.690	14	0	0.713	0.601-0.799
36	1	0	-	-	1	0	0.713	0.601-0.799

Note: Number Failed = Number of participants admitted to hospital

5.3 Attempted Suicide and Suicide

As described in Section 3.4.2, the information for attempted suicides and completed suicides were obtained from Corporate Data of the CRHA.

Among participants in EPP, 4 of 192 (2.1%) were admitted to hospital with a diagnosis of attempted suicide. An incidence rate (incidence density) was calculated with person-year of participation in EPP rather than count data. The incidence density for all participants admitted to hospital with a confirmed diagnosis of attempted suicide was $151/10^3$ person years.

In this study, one completed suicide was identified during the period of November 1st, 1996 to December 31st, 1999.

CHAPTER SIX: ECOLOGICAL DESCRIPTION OF POPULATION BASED INDICATORS

6.1 Introduction

In this chapter, data will be presented to describe population based indicators relevant to individuals with a diagnosis of psychotic disorders in Calgary in comparison over time to populations in Edmonton and Lethbridge between 1992 and 1998. This chapter will be divided in the following sections: a) discharges from a psychiatric unit, and b) frequency of readmissions to a psychiatric unit. Although data was requested for attempted suicides as well as completed suicides, the frequency of these events were either rare or in a number of instances, the data was suppressed by CIHI. Therefore it was not possible to perform the planned analysis.

6.2 Discharge Rates from a Psychiatric Unit with a Diagnosis of Psychotic Disorder

6.2.1 Annual Discharge Rates for Psychotic Disorders from All Centres

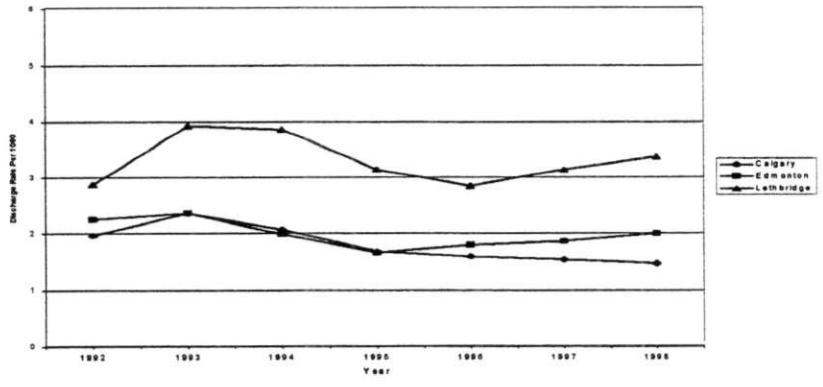
The overall number of discharges for each year by centre together with discharge rates calculated per 1 000 people are presented in Table 6.1.

Table 6.1 Annual Discharge Rates for Psychotic Disorders by Centre

	Calgary		Edmonton		Lethbridge	
	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)
1992	1534	1.96	1944	2.24	191	2.87
1993	1867	2.35	2058	2.35	266	3.93
1994	1667	2.06	1737	1.98	265	3.86
1995	1375	1.67	1452	1.65	219	3.14
1996	1310	1.59	1609	1.79	199	2.84
1997	1377	1.53	1692	1.85	223	3.13
1998	1356	1.46	1844	1.99	243	3.36

In each centre, the number of discharges was highest in 1993. The discharge rates for the three centres, during the study period, are shown graphically in Figure 6.1. The rates in Edmonton and Calgary were very similar until 1995. At that time, the rates in Calgary decreased whereas those in Edmonton increased. Lethbridge rates were lowest in 1996 and over the study period ranged from 2.84 discharges per 1 000 to 3.93 discharges per 1 000.

Figure 6.1: Annual Discharge Rates for Psychotic Disorders by Centre



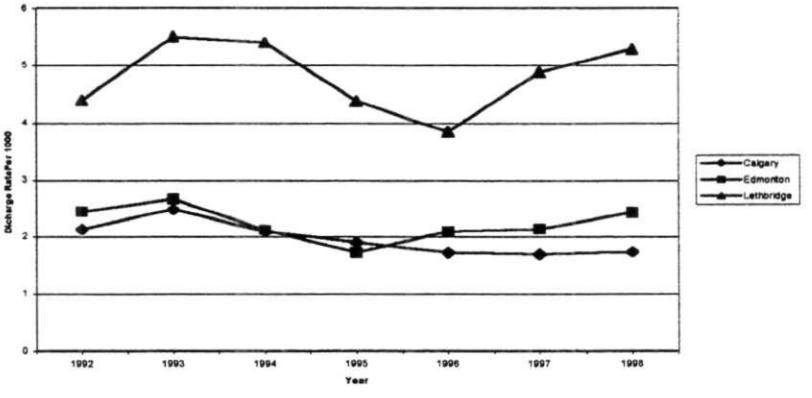
6.2.2 Discharge Rates for Psychotic Disorders: Gender

Annual discharge rates for males, by centre, are presented in Table 6.2 and displayed graphically in Figure 6.2. Over the study period the rates varied annually within centres and between centres although all three centres had a similar pattern of discharges. In Calgary, the discharge rate per 1 000 was highest in 1993. In Edmonton, the discharge rate per 1 000 was highest in 1993 and reached its lowest rate in 1995. Discharge rates in Lethbridge were higher than in the other two centres ranging from 3.85 per 1 000 in 1996 to 5.51 in 1993.

Table 6.2: Annual Discharge Rates for Psychotic Disorders by Centre, Males

	Calgary		**Edmonton**		**Lethbridge**	
	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)
1992	837	2.14	1062	2.45	103	4.40
1993	986	2.49	1167	2.67	131	5.51
1994	845	2.09	929	2.12	132	5.41
1995	748	1.81	824	1.88	109	4.38
1996	732	1.72	926	2.10	97	3.85
1997	744	1.70	957	2.14	116	4.49
1998	792	1.74	1111	2.43	140	5.29

Figure 6.2: Annual Discharge Rates for Psychotic Disorders by Centre, Males

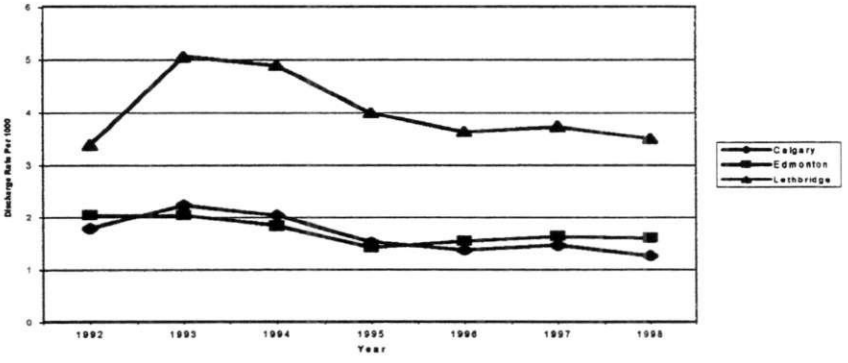


Annual discharge rates for females, by centre, are presented in Table 6.3 and displayed in Figure 6.3. Once again the rates varied within centres and between centres. In all three centres, the discharge rates per 1 000 were highest in 1993. Lethbridge had more discharges than in the other two centres ranging from 3.39 per 1 000 in 1992 to 5.06 in 1993.

Table 6.3: Annual Discharge Rates for Psychotic Disorders by Centre, Females

	Calgary		**Edmonton**		**Lethbridge**	
	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)
1992	697	1.79	882	2.04	88	3.39
1993	881	2.23	891	2.04	135	5.06
1994	822	2.04	808	1.84	133	4.90
1995	627	1.52	628	1.42	110	3.99
1996	578	1.37	683	1.54	102	3.64
1997	633	1.46	735	1.64	107	3.74
1998	564	1.26	733	1.60	103	3.51

Figure 6.3: Annual Discharge Rates for Psychotic Disorders by Centre, Females



6.2.3 Discharge Rates for Psychotic Disorders: Gender by Age

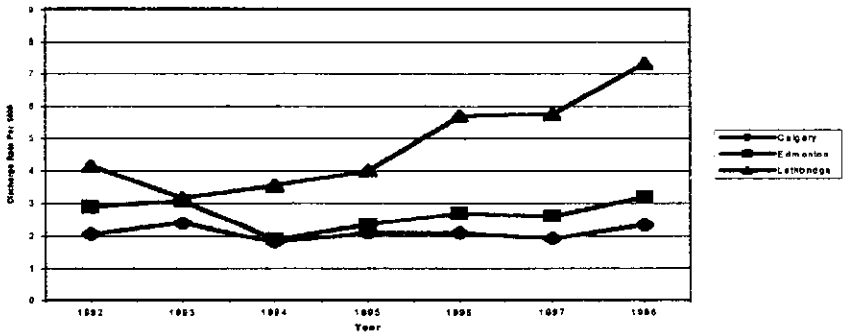
6.2.3.a Discharge Rates for Psychotic Disorders, Males by Age Group

Tables 6.4, 6.5 and 6.6 presents the annual discharge rates for males for each centre by age grouping. Age is grouped in three categories: 1) less than 30 years, 2) 30 to 54 years and 3) greater than 54 years. Figures 6.4, 6.5 and 6.6 graphically display these rates. In Calgary and Edmonton, the discharge rate per 1 000 males, less than 30 years of age, was highest in 1993 and lowest in 1994. After 1994, the rates again increased until 1998 when they returned to the 1993 levels. Discharge rates per 1 000 males in Lethbridge were higher than in the other two centres and rose sharply after 1994 from 4.02 per 1 000 to 7.34 per 1 000 in 1998.

Table 6.4: Annual Discharge Rates for Psychotic Disorders by Centre, <30 Years, Males

	Calgary		**Edmonton**		**Lethbridge**	
	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)
1992	196	2.06	306	2.89	25	4.15
1993	223	2.39	319	3.08	19	3.17
1994	168	1.81	192	1.90	20	3.55
1995	196	2.09	233	2.35	23	4.02
1996	201	2.10	268	2.71	32	5.70
1997	190	1.92	260	2.59	33	5.75
1998	243	2.35	334	3.21	43	7.34

Figure 6.4: Annual Discharge Rates for Psychotic Disorders by Centre: <30 Years, Males

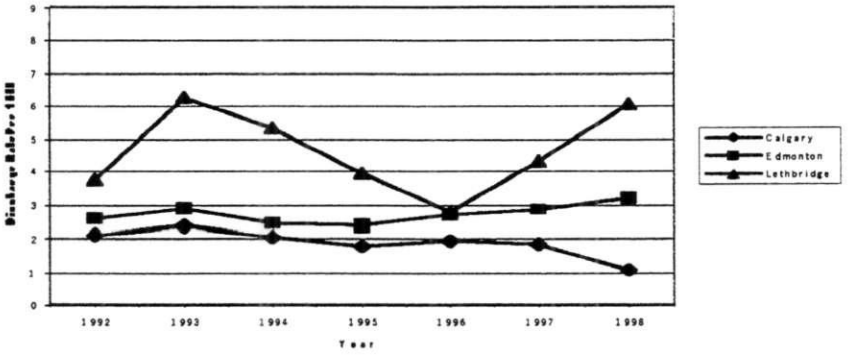


Among 30 to 54 year old males, the discharge rates per 1 000 for Calgary were at their highest in 1994. The rates increased once again in 1996 from the previous year and declined after that point. In Edmonton, the rates followed a similar pattern as Calgary until 1995 when they began to increase annually and reached their highest level of 3.19 discharges per 1 000 in 1998. In Lethbridge the rate of discharges for males varied over the years. The rate increased from 3.76 per 1 000 in 1992 to 6.26 per 1 000 in 1993. The rates decreased after 1993 to a low rate of 2.76 per 1 000 in 1996, a rate that was equal to that of Edmonton during the same year. Between 1996 and 1998 the discharge rates rose once again to the level of 1992 (6.09/1 000).

Table 6.5: Annual Discharge Rates for Psychotic Disorders by Centre, 30-54 Years, Males

	Calgary		Edmonton		Lethbridge	
	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)
1992	330	2.13	416	2.55	41	3.76
1993	380	2.37	482	2.88	70	6.26
1994	338	2.04	407	2.40	61	5.37
1995	304	1.78	405	2.36	46	3.97
1996	341	1.93	461	2.65	32	2.76
1997	337	1.83	505	2.85	51	4.31
1998	318	1.66	576	3.19	73	6.09

Figure 6.5: Annual Discharge Rates for Psychotic Disorders by Centre: 30-54 Years, Males

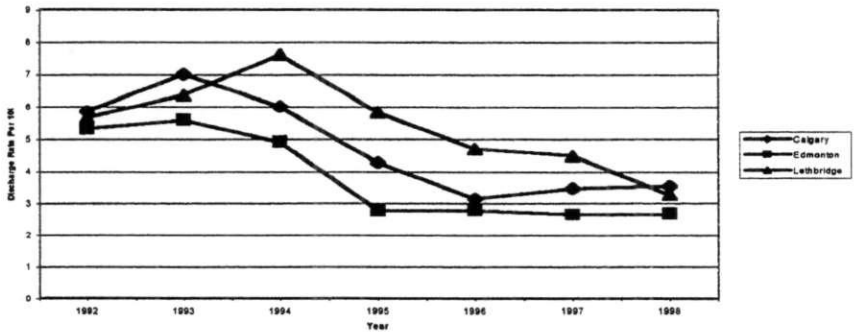


The annual discharge rates per 1 000 for males over the age of 54 years follow a similar pattern. Annual rates for Edmonton and Calgary increased from 1992 to 1993 and then decreased after that time until 1996 when rates in Calgary began to increase slightly whereas those in Edmonton remained relatively constant. Lethbridge rates were highest in 1994 and declined steadily after that time and in 1998 the discharge rates were consistent with those in Calgary.

Table 6.6: Annual Discharge Rates for Psychotic Disorders by Centre: >54 Years, Males

	Calgary		**Edmonton**		**Lethbridge**	
	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)
1992	311	5.86	340	5.32	37	5.67
1993	383	7.01	366	5.59	42	6.36
1994	339	6.02	330	4.91	51	7.62
1995	248	4.27	186	2.77	40	5.84
1996	190	3.15	197	2.79	33	4.70
1997	217	3.47	192	2.65	32	4.48
1998	231	3.54	201	2.68	24	3.27

Figure 6.6: Annual Discharge Rates for Psychotic Disorders, Age >54 Years, Males



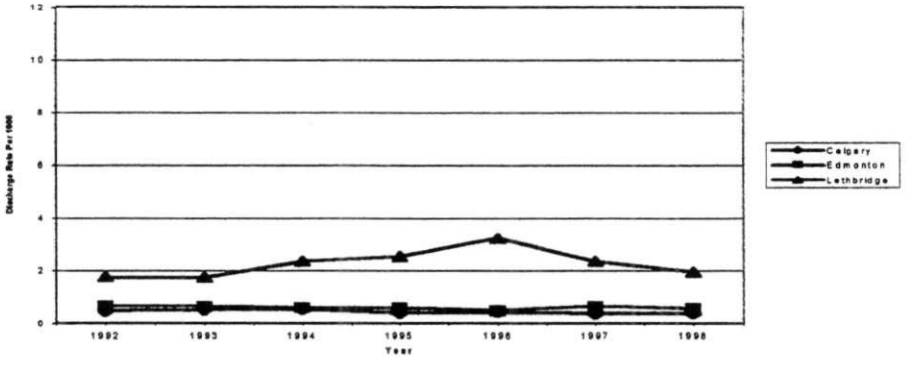
6.2.3.b Annual Discharge Rates for Psychotic Disorders, Females by Age Group

Tables 6.7, 6.8 and 6.9 present the annual discharge rates for females for each centre by age grouping. Figures 6.7, 6.8 and 6.9 are graphical displays of these rates. The annual discharge rates per 1 000 females less than 30 years of age, followed a similar pattern in Calgary and Edmonton from 1992 to 1996. In 1997, discharges increased in Edmonton while decreasing in Calgary. Discharge rates per 1 000 females in Lethbridge were considerably higher than in the other two centres and rose sharply from 1993 through to 1996 and then began to decline.

Table 6.7: Annual Discharge Rates for Psychotic Disorders by Centre: <30 Years, Females

	Calgary		Edmonton		Lethbridge	
	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)
1992	83	0.47	133	0.67	11	1.77
1993	90	0.52	126	0.64	11	1.76
1994	92	0.53	114	0.59	14	2.36
1995	73	0.41	110	0.58	15	2.54
1996	78	0.44	92	0.48	19	3.23
1997	70	0.38	122	0.64	14	2.35
1998	76	0.40	110	0.57	12	1.96

Figure 6.7: Annual Discharge Rates for Psychotic Disorders by Centre: Age <30 Years, Females

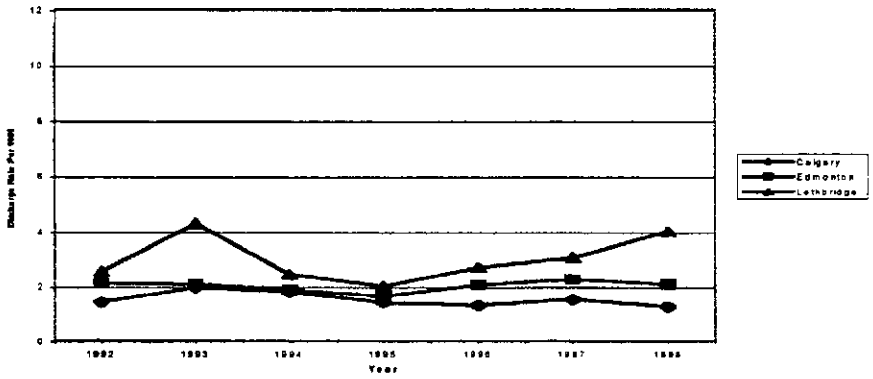


Among 30 to 54 year old females, the patterns of discharge and the discharge rates per 1 000 were similar in Calgary and Edmonton. Throughout the 6 years, the discharge rates in Calgary and Edmonton ranged from 1.29 to 2.30. In all three centres the rates were lowest in 1995 and then increased until 1997. In Lethbridge, this increase continued and in 1998, the discharge rate had increased from 2.73 (1996) to 4.05.

Table 6.8: Annual Discharge Rates for Psychotic Disorders by Centre: 30-54 Years, Females

	Calgary		Edmonton		Lethbridge	
	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)
1992	218	1.46	339	2.14	30	2.59
1993	306	1.98	344	2.11	52	4.33
1994	293	1.83	314	1.89	30	2.47
1995	239	1.44	280	1.66	25	2.03
1996	229	1.34	357	2.09	34	2.73
1997	273	1.54	400	2.30	39	3.09
1998	237	1.29	375	2.12	52	4.05

Figure 6.8: Annual Discharge Rates for Psychotic Disorders by Centre: 30-54 Years, Females

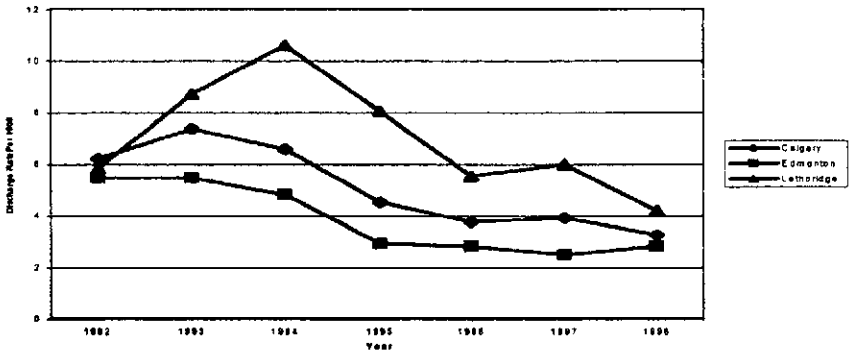


The annual discharge rates per 1 000 for females over the age of 54 years appears to follow a similar pattern in all three centres. The discharges rates per 100 were lower in Edmonton than in the other two centres throughout the time period and the rates were highest in Lethbridge. The rates in Lethbridge more than doubled between 1992 and 1994. In all centres, annual discharge rates declined after 1994 with small increases in Calgary and Lethbridge in 1997.

Table 6.9: Annual Discharge Rates for Psychotic Disorders by Centre: >54 Years, Females

	Calgary		Edmonton		Lethbridge	
	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)	Discharges (N)	Discharge Rate (per 1000)
1992	396	6.19	410	5.45	47	5.84
1993	485	7.37	421	5.45	72	8.73
1994	447	6.58	380	4.80	89	10.61
1995	315	4.51	238	2.93	70	8.06
1996	271	3.76	234	2.82	49	5.52
1997	290	3.90	213	2.50	54	5.97
1998	251	3.25	248	2.82	39	4.19

Figure 6.9: Annual Discharge Rates for Psychotic Disorders by Centre, >54 Years, Females



6.3 Readmission Rate to a Psychiatric Unit with a Diagnosis of Psychotic Disorder

6.3.1 Annual Readmission Rates with Psychotic Disorder from All Centres

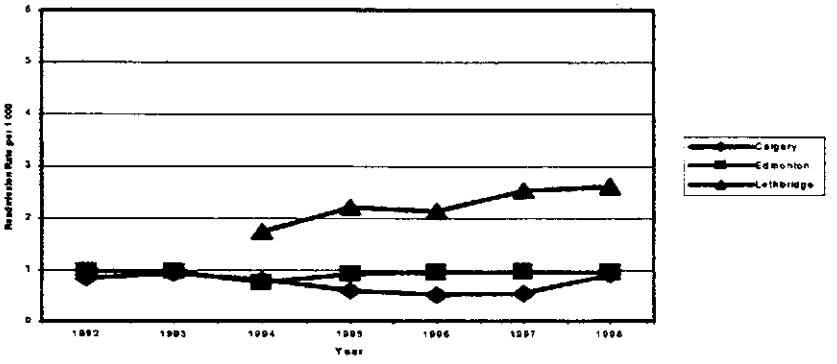
The overall number of readmissions for each year, by centre, together with discharge rates calculated per 1 000 people are presented in Table 6.10.

Table 6.10: Annual Readmission Rate for Psychotic Disorders by Centre

	Calgary		Edmonton		Lethbridge	
	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)
1992	659	0.84	839	0.97	-	-
1993	741	0.94	846	0.97	-	-
1994	654	0.81	662	0.76	120	1.75
1995	489	0.59	806	0.92	154	2.21
1996	423	0.51	864	0.96	150	2.14
1997	501	0.55	897	0.98	181	2.54
1998	838	0.91	891	0.96	189	2.62

The readmission rates for Calgary and Edmonton were similar from 1992 until 1994. After that time, the rates in Edmonton increased during 1995 and then remained consistent until 1998. In Calgary, the rates declined until 1997 when they increased to a rate similar to Edmonton. Readmission data for Lethbridge was not available before 1994. The rates in 1994 were more than double the rates of the other two centres and continued to increase throughout the years to a readmission rate of 2.62 per 1 000 in 1998. The readmission rates for the three centres throughout the study period are shown graphically in Figure 6.10.

Figure 6.10: Annual Readmission Rates for Psychotic Disorders by Centre



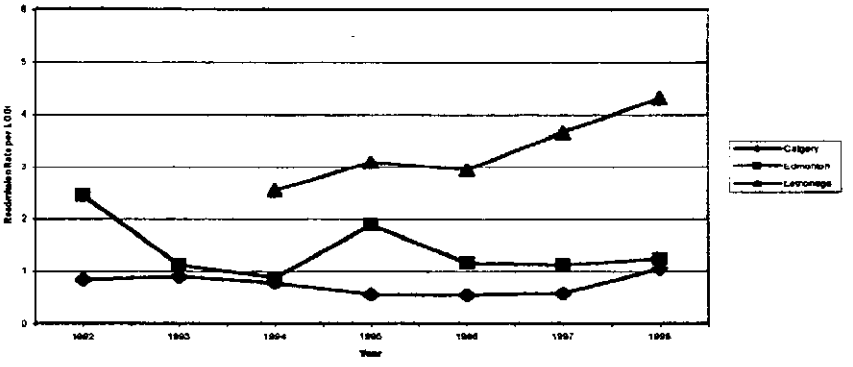
6.3.2 Readmission Rates for Psychotic Disorders: Gender

Annual readmission rates for males of all ages, by centre, are presented in Table 6.11 and displayed graphically in Figure 6.11. The rates varied both within centres and between centres. In Calgary, the readmission rates per 1 000 were relatively constant until 1997, with a slight decrease in 1995. Between 1997 and 1998, readmission rates per 1 000 had a sharp increase from 0.58 to 1.04. In Edmonton, the readmission rate per 1 000 was highest in 1992 and lowest in 1994. After 1994, the rates increased slightly and remained relatively constant throughout the study period. Between 1994 and 1996, the readmission rates in Lethbridge fluctuated from year to year. Following that period, there was a steady increase of the rates to 4.31 readmissions per 1 000 in 1998. In 1994, the readmission rates in Lethbridge were similar to those in Edmonton in 1992.

Table 6.11: Annual Readmission Rates for Psychotic Disorders by Centre: Males

	Calgary		Edmonton		Lethbridge	
	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)
1992	328	0.84	1062	2.45	-	-
1993	352	0.89	491	1.12	-	-
1994	311	0.77	382	0.87	62	2.54
1995	230	0.56	460	1.05	77	3.09
1996	231	0.54	509	1.15	74	2.94
1997	255	0.58	501	1.12	95	3.67
1998	471	1.04	568	1.24	114	4.31

Figure 6.11: Annual Readmission Rates for Psychotic Disorders, All Centres, Males



Annual readmission rates for females, by centre, are presented in Table 6.12 and shown in Figure 6.12. Once again the rates varied within centres and varied between Edmonton and Calgary and Lethbridge. In Calgary the readmission rates per 1 000 increased from 1992 to 1993 and then declined to the lowest rate (0.5) in 1996 and then increased annually to 1998. In Edmonton, the readmission rates decreased from 1992 to 1994 and then increased and remained fairly constant until 1997 when they decreased once again. The Lethbridge rates were highest in 1997 (3.0/1 000) and then decreased to 2.56 readmissions per 1 000.

Table 6.12: Annual Readmission Rates for Psychotic Disorders by Centre: Females

	Calgary		Edmonton		Lethbridge	
	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)
1992	331	0.85	372	0.86	-	-
1993	389	0.98	355	0.81	-	-
1994	343	0.85	280	0.64	58	2.13
1995	259	0.63	346	0.79	77	2.79
1996	210	0.50	355	0.80	76	2.71
1997	246	0.57	396	0.88	86	3.00
1998	367	0.82	323	0.71	75	2.56

Figure 6.12: Annual Readmission Rates for Psychotic Disorders, All Centres, Females

6.3.3 Readmission Rates for Psychotic Disorders: Gender by Age

6.3.3.a Readmission Rates for Psychotic Disorders: Males by Age Group

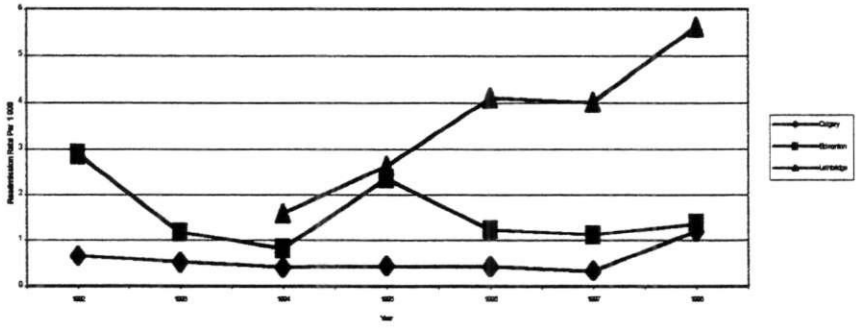
Tables 6.13, 6.14 and 6.15 present the annual readmission rates for males for each centre by age grouping. Age is grouped in three categories: 1) less than 30 years, 2) 30 to 54 years and 3) greater than 54 years. Figures 6.13, 6.14 and 6.15 graphically display these rates. In Calgary, the readmission rates per 1 000 males under the age of 30 years, was lower than those reported by the other two centres throughout the study period. The rates were relatively stable from 1992 to 1997 when the rates decreased to 0.35 per 1 000. The rates increased by 3.4 fold between 1997 and 1998 to 1.20 readmissions per 1 000.

The readmission rates in Edmonton in 1992 were at the highest of the study period and decreased to the lowest rate in 1994. The next year the rate had a 2.9 fold increase and then decreased. Once again, the readmission rates in Lethbridge increased steadily from 1994 to 1998, from 2.62 readmissions per 1 000 to 5.64 readmissions per 1 000 in 1998.

Table 6.13: Annual Readmission Rates for Psychotic Disorders by Centre: Age <30 Years, Males

	Calgary		Edmonton		Lethbridge	
	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)
1992	64	0.67	306	2.89	-	-
1993	50	0.54	121	1.17	-	-
1994	38	0.41	82	0.81	9	1.60
1995	43	0.46	233	2.35	15	2.62
1996	41	0.43	123	1.24	23	4.10
1997	35	0.35	113	1.12	23	4.01
1998	124	1.20	141	1.36	33	5.64

Figure 6.13: Annual Readmission Rates for Psychotic Disorders by Centre: <30 Years, Males

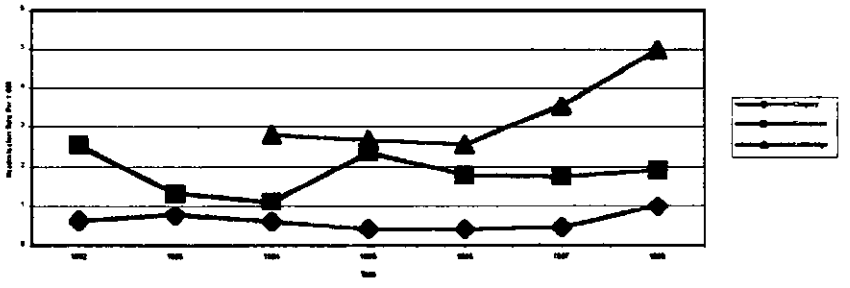


Among 30 to 54 year old males, the discharge rates per 1 000 for Calgary followed a similar pattern to those in the younger age group. The readmission rates ranged from 0.42 in 1996 to 0.99 in 1998. As in the younger age group, there was a large increase in readmission rates from 1997 to 1998. The rates in Edmonton decreased from 1992 to 1994 and then returned to the approximate level of 1992 before decreasing during 1996 and 1997. Lethbridge readmission rates for this age group increased annually from 2.82 per 1 000 (1994) to 5.01 per 1 000 (1998).

Table 6.14: Annual Readmission Rates for Psychotic Disorders by Centre: 30-54 Years, Males

	Calgary		Edmonton		Lethbridge	
	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)
1992	100	0.64	416	2.55	-	-
1993	123	0.77	223	1.33	-	-
1994	102	0.62	189	1.11	32	2.82
1995	73	0.43	405	2.36	31	2.68
1996	75	0.42	313	1.80	30	2.58
1997	86	0.47	311	1.76	42	3.55
1998	189	0.99	345	1.91	60	5.01

Figure 6.14: Annual Readmission Rates for Psychotic Disorders by Centre: 30-54 Years, Males

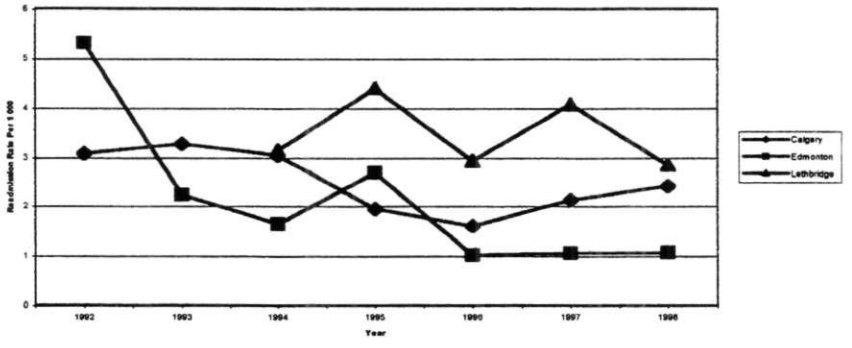


The annual readmission rates per 1 000 for males over the age of 54 years for all centres were more similar between centres than in the younger age groups (Table 6.15 and Figure 6.15). All centres had relatively large changes in rates from year to year. In Calgary, the rates decreased, particularly from 1994 to 1995 and increased after 1996. The rates in Edmonton ranged form 5.32 per 1 000 in 1992 to 1.03 per 1 000 in 1996. Lethbridge rates were highest in 1995 and declined to 2.86 readmissions per 1 000 in 1998.

Table 6.15: Annual Readmission Rates for Psychotic Disorders by Centre: >54 Years, Males

	Calgary		Edmonton		Lethbridge	
	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)
1992	164	3.09	340	5.32	-	-
1993	179	3.28	147	2.24	-	-
1994	171	3.04	111	1.65	21	3.14
1995	114	1.96	186	2.70	31	4.41
1996	97	1.61	73	1.03	21	2.94
1997	134	2.14	77	1.06	30	4.08
1998	158	2.42	82	1.09	21	2.86

Figure 6.15: Annual Readmission Rates for Psychotic Disorders by Centre: >54 Years, Males



6.3.3.b Readmission Rates for Psychotic Disorders: Females by Age Group

Tables 6.16, 6.17 and 6.18 present the annual readmission rates for females for each centre by age grouping. Figures 6.16, 6.17 and 6.18 are graphical displays of these rates. There were fewer readmissions for females than for males in each age group. The annual readmission rates per 1 000 females less than 30 years of age, followed a similar pattern in Calgary and Edmonton from 1992 to 1997. However, in 1996, readmission rates increased in Calgary and decreased in Edmonton. Readmission rates per 1 000 females in Lethbridge were considerably higher than in the other two centres and rose sharply from 1994 to 1996, from 0.84 readmissions per 1 000 to 2.20 readmissions per 1 000 and then declined. These rates should be interpreted with caution due to the small number of readmissions.

Table 6.16: Annual Readmission Rates for Psychotic Disorders by Centre: <30 Years Females

	Calgary		Edmonton		Lethbridge	
	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)
1992	31	0.18	48	0.24	-	-
1993	26	0.15	45	0.23	-	-
1994	28	0.16	41	0.21	5	0.84
1995	15	0.09	51	0.27	13	2.20
1996	24	0.13	50	0.26	15	2.55
1997	22	0.12	49	0.26	10	1.68
1998	42	0.22	46	0.24	8	1.31

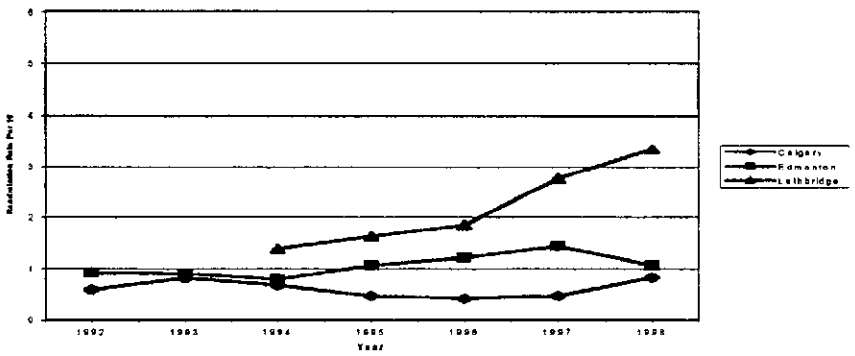
Figure 6.16: Annual Readmission Rates for Psychotic Disorders by Centre: <30 Year, Females

Among 30 to 54 year old females, the readmission rates per 1 000 were similar in Calgary and Edmonton between 1993 and 1994. After that time, the rates in Edmonton increased until 1997 whereas the rates in Calgary decreased. In the 1998, the rates in Edmonton declined whereas the rates in Calgary increased. In Lethbridge, the rates increased throughout the study period and ranged from 1.4 readmissions per 1 000 in 1994 to 3.35 readmissions per 1 000 in 1998.

Table 6.17: Annual Readmission Rates by Centre: 30-54 Years, Females

	Calgary		**Edmonton**		**Lethbridge**	
	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)
1992	90	0.60	148	0.93	-	-
1993	126	0.82	148	0.91	-	-
1994	110	0.69	131	0.79	17	1.40
1995	78	0.47	180	1.07	20	1.63
1996	71	0.42	209	1.22	23	1.85
1997	84	0.47	250	1.44	35	2.77
1998	155	0.84	189	1.07	43	3.35

Figure 6.17: Annual Readmission Rates for Psychotic Disorders by Centre: 30-54 Years, Females

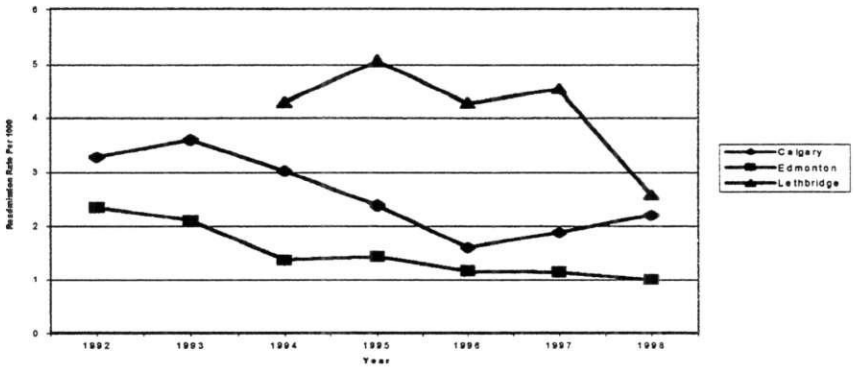


The annual readmission rates per 1 000 for females over the age of 54 years appears to follow a similar pattern in Calgary and Edmonton between 1992 and 1996. The rates in Edmonton continued to decline whereas the rates in Calgary increased in 1997 and 1998. The annual rates in Lethbridge ranged from 5.06 readmissions per 1 000 in 1995 to 2.58 readmissions per 1 000 in 1998. The rates in 1998 were similar to those reported in Calgary during the same year.

Table 6.18: Annual Discharge Rates by Centre: >54 Years, Females

	Calgary		**Edmonton**		**Lethbridge**	
	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)	Readmits (N)	Readmit Rate (per 1000)
1992	210	3.28	176	2.34	-	-
1993	237	3.60	163	2.11	-	-
1994	205	3.02	108	1.36	36	4.29
1995	166	2.38	115	1.42	44	5.06
1996	115	1.60	96	1.16	38	4.28
1997	140	1.88	97	1.14	41	4.54
1998	170	2.20	88	1.0	24	2.58

Figure 6.18: Annual Readmission Rates for Psychotic Disorders by Centre: >54 Years, Females



CHAPTER SEVEN: DISCUSSION

7.1 Introduction

The purposes of this study were to determine whether a particular subset of eligible psychiatric inpatients were being referred to EPP, to describe practical clinical outcome measures for participants in EPP and to examine population based clinical outcome indicators. The objective of this chapter is to discuss the following areas: (a) summary of key findings and their relation to other studies, (b) the impact of bias on the results, (c) the strengths and limitations of the study, and (d) areas of future study.

7.2 Summary of Major Study Findings and Their Relation to Other Studies

7.2.1 Estimate of referral rate to EPP

The principle objective of this component of the study was to determine whether a specific group of eligible inpatients were being referred to EPP and whether ongoing efforts to increase referral rates to EPP had been successful. The following discussion focuses on the referral rates to EPP and a comparison of eligible psychiatric inpatients referred to EPP to those who were not referred.

Overall, 61 of 230 subjects were referred to EPP between November 1, 1996 and October 31, 1999, representing an estimated referral rate of 26.5% from all hospitals. Although this rate may seem to be quite low, there were a number of possible contributing factors that may have influenced this rate. These contributing factors included: the inclusion criteria of the study, the population focus of EPP, attitudes of institutions and the availability of hospital beds. These four factors are discussed in the

following paragraphs.

First, a possible explanation for this referral rate may be the narrow inclusion criteria in this study in that only those patients with a first admission of a first episode of psychotic disorder were included for chart review. This did not include anyone who may have received treatment in the past although according to the eligibility criteria of EPP, they may have been referred from hospital.

Third, referral rates may be affected by attitudes of practitioners at different institutions. Calgary hospitals have differing models of care, which may influence referral rates to EPP. The psychiatrists at the PLC and FHH hospitals operate within a program-based model whereas the psychiatrists of the RGH use a practitioner-based model (private practice model). At the RGH, patients admitted to inpatient units are not transferred to an inpatient psychiatrist but tend to be followed by the admitting psychiatrist. Since care is by a private psychiatrist, a proportion of patients admitted may be known to the psychiatrists either through previous admission or through their private practice. Rapports are established with patients and families and on discharge treatment is often continued through the private practice or the patient may be discharged to the care of their family physician. Therefore, although the patients may have been admitted with a new onset psychosis and have been eligible for referral to EPP, these patients are not referred directly from hospital to EPP. Additionally, referrals may also be affected by the presence of other outpatient programs in the city. Health care providers may have loyalties to regional programs that had previously been associated with particular institutions and refer patients for follow-up treatment. For instance, following discharge, inpatients of the PLC may be referred to the Psychiatric Day Hospital located at the PLC.

This is an outpatient program providing schizophrenia treatment and an alternative to inpatient care (Health Canada, 1999). Another regional program, the Social Rehabilitation Program, provides long-term psychiatric support and rehabilitation for individuals with severe and persistent mental illness and accepts referrals from general practitioners and psychiatrists who follow their patients while they attend the program (personal communication, Social Rehabilitation Program, 2001). Prior to regionalization, this program was associated with the RGH.

Finally, the size of the inpatient units at the specific hospitals may also affect referral rates. The RGH has fewer acute care beds (30 beds) available and therefore may transfer psychotic patients to the FHH. Foothills Hospital may be perceived to be the best centre for treatment of psychoses thereby enabling the RGH to admit patients that may be candidates for programs offered at their facility. As a result, a number of the referrals to EPP may be patients that had been transferred from other hospitals. This would contribute to the higher estimated rate of referral from FHH to EPP.

The higher referral rate from FHH to EPP may also be the result of the extensive transfers that took place as a result of bed shortages during the time of data collection. The FHH has more acute care beds and during that time may have admitted increased numbers of patients by transfer from other facilities. If a proportion of transferred patients were referred to EPP, the FHH referral rates would be inflated in comparison to other facilities during the same period and also in comparison to times when the number of transfers are low.

When compared with inpatients not referred to EPP, those referred were more likely to be male, aged 15 to 30 years, never married, living with family or in supervised

arrangement, with a diagnosis of a schizophrenic disorder. The sociodemographic and clinical characteristics of those referred to EPP replicate previous findings by McGorry et al. in the outcome evaluation of the Early Psychosis Prevention and Intervention Centre (EPPIC), in Australia (1996). The inclusion criteria for the study of the Australia program are the same as in this study. The EPPIC reported that 64.7% of the participants were male; 88% of the sample had not yet married; and 66.7% had a diagnosis of schizophrenic disorder. This lends more confidence to the results of this study in providing benchmark indicators. As these two programs are alike in their model of care, it is encouraging to have replicated the EPPIC findings. Those referred to EPP did not differ from those not referred to EPP in their employment level, their length of stay in hospital or whether they had a diagnosis of substance abuse.

To examine the relationship between sociodemographic and clinical variables and referral to EPP, a stratified analysis was conducted. Referral ratios were calculated although small sample sizes resulted in imprecise stratum specific estimates. This decreased the ability to simultaneously evaluate the impact of various variables. In the stratified analysis, strong associations were noted between referral and all variables except employment level. The crude associations between gender and referral, age and referral and marital status and referral may have been influenced by the effects of other variables by the process of confounding.

7.2.2 Clinical Outcomes

The principle objective of this component of the study was to describe clinical outcome measures of EPP participants. The discussion that follows focuses on the

admission of participants to hospital following their intake to EPP, their length of stay in hospital, suicide attempts and completed suicides.

Fifty of 192 (26.0%) EPP participants were admitted to hospital following intake to EPP and 40 of 192 admissions (20.8%) were during the first year of follow-up. This outcome is similar to the readmission rate of 20% per annum reported by the Scottish Schizophrenia Research Group (1992) in their 3-year follow-up of first episode patients. Of the total number of days that participants were followed in EPP, 1.6% of this time was spent in hospital. Malla, Norman and Scholten reported similar findings in a naturalistic study of 92 patients diagnosed with schizophrenia or schizoaffective disorder who were treated and followed in a comprehensive treatment program with inpatient and community treatment components, over a period of 3 years. The authors calculated mean "service use" of 1.4% of the total time in the treatment program. Service use was defined as "the number of days spent in hospital as a proportion of total time in the program"(Malla, Norman & Scholten, 2000, p.271).

Survival analysis was used to examine the time to hospital admission for EPP participants. Following intake to EPP, 40 of 50 admissions occurred within the first 12 months and the probability of remaining free from hospitalization was 76%. These findings are consistent with those of Rabiner et al. (1986), who reported between 71%

and 77% of hospitalized first episode patients remained free from admission at one year follow-up. The sociodemographic characteristics that were examined in relation to hospitalization were (a) gender, (b) age, (c) marital status, (d) living arrangement, (e) employment status and (f) education. There were no statistically significant differences found in comparisons between these variables and hospitalization.

It was unexpected that readmission rates were similar to those reported for first hospitalized patients who were not participants in an early intervention program. A possible explanation may be that with closer monitoring of EPP participants through the case management system, that early detection of relapses resulted in admission to hospital with less severe symptoms than for patients outside of a program. Together with hospitalization, severity of relapse and reason for admission may be a meaningful indicator of outcome.

Four of 192 (2.1%) EPP participants were admitted to hospital with a diagnosis of attempted suicide. This proportion does not apply to all participants in EPP attempting suicide, but only to those whose suicide attempt was serious enough to warrant hospitalization. It is difficult to determine whether this rate suggests an increase or decrease in the rate of attempted suicides in comparison to other lifetime rates reported for schizophrenia. However, this estimate may be useful as a benchmark for similar programs.

There was one reported suicide among 192 participants in EPP. According to the literature, the rate of suicides among those with schizophrenia is estimated to be more than 10 times higher than in the general population (Allebeck, 1989). While it is not possible to interpret a single suicide as evidence of an elevated rate, a single suicide

would not have been expected if rates of suicide in the general population applied.

7.2.3 Ecological Description of Population Based Indicators Relevant to Schizophrenia

The principle objective of this component of the study was to describe population based indicators relevant to psychotic disorders in Calgary and to compare those over time to populations in Edmonton and Lethbridge. The following discussion focuses on discharges from psychiatric units and readmissions to psychiatric units.

Between 1992 and 1998, the patterns of discharges were similar between all centres. The highest annual discharge rate per 1000 occurred in 1993 for all centres. When examined by gender, discharge rates per 1000 for females were lower than for males. The discharge rates were greater in 1993 for males and females and discharge patterns closely resembled each other in Edmonton and Calgary compared to Lethbridge. There did not appear to be any large differences between annual discharge rates for males divided into three age categories. The rates in Lethbridge indicated different patterns than in the other two centres. It was unexpected to see that the discharge rates of males <30 years old were similar to those in the 30-54 year old age group given that the age of onset for schizophrenia among males typically begins in late adolescence or early adulthood (Hafner et al., 1998). However, there may be a comparable number of people with schizophrenia in each age group, which could explain the similar rate of discharge. The discharge rates among females, in each age group, in Edmonton and Calgary were of a similar pattern whereas for Lethbridge the rates were higher. Consistent with the literature that women tend to experience an older age of onset for schizophrenia, the discharge rates for females were greater in the 30-54 year old age group than in the under

30 age group (Häfner et al., 1998).

The patterns of readmission to hospital for Calgary and Edmonton between 1992 and 1998 were similar whereas in Lethbridge the readmission rates per 1000 were higher and the pattern differed from the other two centres. Within each city, the readmission rates for males and females were comparable to each other. In Edmonton, the rates were higher throughout the time period for males compared to females. The patterns of readmission for males in each age group differed between centres. In Edmonton, for males in all age groups, there were steep increases in rates between 1994 and 1995. The rates in Lethbridge increased steadily over the years in each group. In Calgary, the readmission rates were relatively consistent in the less than 30 age group and in the 30 to 54 year age group with increased rates from 1997 to 1998. The patterns of readmission for females by age group were similar between Calgary and Edmonton and higher in Lethbridge. The readmission rates increased with each age category for all three centres.

The ecological study design may not be an optimum way to evaluate the impact of the EPP on outcome. It might have been expected that differences would emerge over time in the ecological data if the EPP was an important determinant of discharge/re-admission, however since EPP participants' hospitalization rates were similar to those reported in the literature for hospitalized first onset patients it is clear in retrospect that the ecological comparisons would not show an impact of the EPP on these variables. Nor would such differences be expected to emerge over time.

7.3 The Impact of Major Biases on the Findings

In order to interpret the findings of the study, it is necessary to consider the role of

bias in potentially impacting the findings, that is whether bias potentially provided alternative explanations for the findings. Last (1995) defines bias as resulting from "any trend in the collection, analysis, interpretation, publication, or review of data that can lead to conclusions that are systematically different from the truth" (p. 15). In the epidemiological literature, many terms have been used to describe various types of bias (Sackett, 1979). However, in general bias relates to issues of sampling (selection bias), measurement/misclassification (information bias), and confounding.

7.3.1 Selection Bias

Selection bias results "from procedures used to select subjects that lead to an effect estimate among subjects included in the study different from the estimate obtainable from the entire population theoretically targeted for study" (Rothman, 1986, p.83).

7.3.1a Estimate of Referral Rate

In this study, all of the patients hospitalized in acute-care hospitals during the study period, who satisfied the inclusion criteria were selected for investigation. Since sample selection was not required, the subjects in this group were, to a certain extent, the target population, and the risk of selection bias was minimized. Where population refers to a clinical population, these results may be considered to reflect population proportions. At the same time, if patients were omitted from the sample because of inaccuracy of Corporate Data, and if these patients differed from those included in the study, then there may be the potential for selection bias. However, it seems unlikely that these errors

would occur to a great degree and therefore would not substantially impact the results. Rawson and Malcolm (1995) found, in a comparison of hospital discharge data with that of medical charts for patients with a diagnosis of myocardial infarction and chronic obstructive pulmonary disease that the diagnostic agreement was 97% and 95% respectively.

7.3.1b Population Outcomes

In the description of the population outcomes, the total population was sampled and therefore selection bias was not an issue.

7.3.2 Misclassification/Information/Measurement Bias

Last (1995) defines misclassification bias as "systematic error arising from inaccurate measurements (or classification) of subjects on study variable(s)" (p.106). The results of this study were more vulnerable to misclassification bias than to selection bias, in particular with respect to misclassifying the clinical outcome of attempted suicides (see Section 7.3.2).

7.3.2a Estimating Referral Rate

Measurement error may have impacted the findings of the study. A proportion of patients may have been recorded as having a first admission for a psychotic disorder when in fact they had been previously hospitalized (false positives). Similarly, some patients who were not recorded as having a first admission for a psychotic disorder, in fact did not have this outcome (false negatives). In order to minimize the measurement

error, steps were taken during the chart review to confirm that each of the inclusion criteria was met. However, to the degree that the classification of eligibility was non-specific, the result would have been an inflation of the denominator and resulted in a bias of the estimate of the referral rate downwards.

Misclassification of the outcome variable (i.e. referral) may have occurred in matching the EPP referral list with the list of inpatients eligible for referral to EPP. Different spelling of names, missing PHN numbers and incomplete chart numbers may have resulted in patients not being identified as referred. This would have led to an underestimate of the referral rate. Strategies were used to verify the possible differing spellings for names, and to track missing PHN information in order to successfully minimize the effect of misclassification.

The reliance on secondary data sources may have led to misclassification bias in that some data may be inaccurate or incomplete. Misclassification may occur with the same frequencies between groups (nondifferential misclassification bias) or with different frequencies between groups (differential misclassification). Nondifferential misclassification bias causes a dilution of the observed effect and a bias towards the null, whereas differential misclassification bias may cause a distortion of the observed effects either towards or away from the null. If inaccuracies arose in the coding of Axis I diagnosis, the error rate should not have differed between the referred and not referred subjects (nondifferential misclassification), and the resulting bias would have been towards the null. It is accepted that there may be errors in coding however the advantages of using secondary data sources outweigh these limitations. Further, care was taken when reviewing the charts to confirm that each patient met the inclusion criteria

The clinical diagnosis may be inaccurate or affected by diagnosing practices. For example, a proportion of patients may be diagnosed with a schizophrenic disorder rather than psychotic disorder. If the frequency of this occurrence differed among those referred and those not referred to EPP, the misclassification would have been differential and result in an underestimate or an overestimate of the association. However, it is more likely that the inaccuracy was independent of referral, that it occurred with the same frequencies among those referred and those not referred, and resulted in a dilution of the association towards the null. Although this may have occurred, the effect would have been minimal.

7.3.2b Clinical Outcomes

Patients may have been misclassified on the clinical outcome variable of attempted suicide. Because of the stigma associated with suicide attempts, underreporting would have occurred if patient records were not coded with suicide attempts. Case summary data was requested for all participants of EPP who were admitted to hospital or who presented to the emergency department of an acute care hospital following referral to EPP. Corporate data was asked to also highlight attempted suicides that presented to hospital. Perusal of the diagnoses of each individual identified three additional patients with suicide attempts although they were not identified by Corporate Data as such. These patients were treated in the emergency department and the recorded diagnosis was: 1) poisoning by benzodiazepine tranquillizer, 2) poisoning by aromatic analgesics and 3) poisoning by psychodysleptics. Two patients were discharged while one was admitted to an inpatient unit. Undercoding resulted in the underestimate

of the proportion of attempted suicides by participants in EPP (2.1% vs. 3.6%).

7.3.2c Population Outcomes

Ecological study designs are vulnerable to "ecological fallacy". This is an issue of interpretation that may occur when associations observed between the aggregated factors do not necessarily represent the association that exists at the individual level (Last, 1995). Therefore it is not possible to make causal inference about individual phenomenon or process on the basis ecological data. The problem occurs because the composition of each group is not homogeneous with respect to the study factor (Kleinbaum, 1982). The rates included all individuals discharged from hospital and readmitted to hospital with a diagnosis of psychotic disorder or schizophrenic disorder. A large proportion of patients would not fit the criteria for EPP referral. The participants of EPP would represent only a small number of discharges and readmissions in Calgary. Further, it is not possible to determine whether individuals discharged or readmitted in the other centres had been exposed to EPP.

As discussed previously, the use of large electronic administrative databases such as CIHI raised the issue of accuracy of reporting and the possibility of errors although the impact of error on the rates would have been minimal (see Section 7.3.1). Population denominators, obtained from national census data required for the calculation of rates may also be problematic. During inter-censusal years, the populations are estimated and may not accurately reflect the movement of the population. This has been noted as a potential problem when studying groups, similar to this study population, that are thought to be highly mobile or transient (Holley, 1998).

7.3.3 Confounding

Hennekens and Buring (1987) describe confounding as "a mixing of the effect of the exposure under study on the disease with that of a third factor" (Hennekens & Buring 1987, p.287). For the third factor to be a confounder it must be associated with the exposure and be an independent risk factor for the disease under investigation. There are a number of strategies to control for confounding in the design and analysis stage. In this study, stratification was used in the analysis stage.

7.3.3a Impact of Potential Determinants on Referral Rate

Stratification was used to assess whether any of the variables confounded the association between the sociodemographic or clinical characteristics and referral to EPP. The variables examined as potential confounders were (a) gender, (b) age, (c) marital status, (d) living arrangement, (e) employment status, (f) education level, (g) diagnosis and (h) site. The results of the stratified analysis indicated that in the relationship between gender and referral, that age and marital status may act as confounders. Similarly, in the relationship between marital status and referral, age may act as a confounder. Additionally, in the relationship between age and referral, marital status may act as a confounder. As this is cross-sectional data and although it appears that the interrelationship between these variables may be the result of two independent causal effects (confounding), it may also be suggestive of a causal influence (causal chain). The study design does not permit the establishment of a temporal relationship between the exposure and disease. Nonetheless, after stratification, the associations between these

variables remained strong.

Other measured variables may have acted as confounders however, because of limitations in the data, it was not possible for them to be assessed. For instance, a family history of schizophrenia may have been related to diagnosis as well as referral to EPP. However, greater than 25% of subjects were missing information on this variable therefore this variable was excluded from the stratified analysis.

The control of confounding is based on the accurate measurement of the confounder. Therefore, the ability to control for confounding is hampered if subjects are misclassified on the confounding variable (Rothman, 1986 p.132). It is probable that subjects were misclassified on some of the confounding variables for example, marital status. As a result, it was difficult to assess whether the impact of potential confounders was completely controlled although to the extent that it was possible, control was achieved.

7.4 Potential Role of Chance

Together with the impact of bias on the validity of the study findings the role of chance must also be considered. Hennekens and Buring (1987) note that the possibility always exists that due to the role of chance or due to sampling variability that the inference will be either inaccurate or imprecise. Estimates that are based on a large sample size have less variability in the estimates and are therefore less vulnerable to random error. As the sample size increases, the likelihood that the sample will correctly reflect the characteristics of the population to which the inference is intended increases.

Random error may have impacted the study findings. Through multiple comparisons in the analysis, some of the observed associations may have arisen due to chance (Type I error). Type I error can be defined as "the error of rejecting a true null hypothesis" (Last, 1995, p.57). A Type I error would have led to the conclusion that an association between a specific variable and referral existed when in fact it did not. This issue was minimized by having an analysis plan without any unnecessary comparisons. Also, there are circumstances when this study may have been vulnerable to Type II error. For example, in the survival analysis in this study, the power of the logrank test depended only on the number of events observed and not on the number of participants. The relatively small number of hospitalized patients (50) and the resulting small numbers in strata may have resulted in a lack of ability to detect an association if one existed (Type II error). During the study period, the rates of referral appeared to change from year to year. These estimates lack precision as evidenced by the wide, overlapping confidence intervals. This imprecision in rates is a reflection of small sample size.

7.5 Strengths and Limitations of the Study

7.5.1 Strengths

The cross-sectional design is useful to describe characteristics of a target population (Kleinbaum, 1982,). This study design allowed for the description of sociodemographic and clinical characteristics and the assessment of relationships of eligible patients and EPP participants. It provided baseline information that enabled the estimate of referral rates and the establishment of benchmark indicators for other programs.

The chart review was conducted at all acute care hospitals. As a result, institutional differences were not an issue and the sample may be seen as a representative sample of all first onset psychiatric patients admitted to hospital in Calgary. The use of secondary data sources minimized the potential for recall bias or response bias as data was obtained from records (hospital charts and EPP) and administrative databases.

A population-based program in Calgary was examined in this study. As demands for the study of programs and services increases, these methods and sources of data will provide effective means for assessing clinical programs. The results of this study suggest the feasibility of implementing this model in other settings and with other mental health populations.

7.5.2 Limitations

In addition to the previously discussed possible limitations arising from the impact of bias, the cross-sectional study design also has inherent limitations. As discussed previously, this may be a limitation when considering potentially confounding variables such as marital status. The presence or absence of exposure and disease are determined at the same time in each subject and a temporal relationship between exposure and disease cannot be established. The relatively short period of time that was studied presented limitations in terms of sample size.

7.6 Future Considerations

The barriers to referral at the institution level warrant further investigation. A qualitative approach may contribute to understanding what prevents health care providers

from referring patients to EPP and help to obtain their suggestions for facilitating change. The results of this study have highlighted the need to target groups that are not being referred from hospital to EPP by improving access for females in all age groups, patients with a diagnosis of a psychotic disorder other than schizophrenia, patients that are single and those who live alone. A qualitative study would enable recommendations for change in these areas.

The benchmarks established in this study should be reassessed over time in order to follow the outcomes of EPP as it develops. The benchmarks established in this program may be useful for similar programs as a way to generate hypotheses for improving programs.

A future area of research to examine the impact of these programs may be the randomized control design. "Randomization can provide a degree of assurance about the comparability of the study groups that is simply not possible in any observation design" (Hennekens & Buring, 1987, p.188). The initiation of a new treatment program would provide the opportunity to randomize patients to program participation. This study design would be less vulnerable than the non-experimental designs to the effects of confounding as it allows both known and unknown confounders be equally distributed between comparison groups.

The availability of hospital discharge data for communities with and without EPP programs suggests the possible utility of ecological methods to depict the impact of EPPs on population health. However, since EPP programs may not change admission or re-admission rates, this approach is unlikely to be useful.

7.7 Conclusions

The population health model places an emphasis on health outcomes and indicators together with the determinants of health. This study assessed the impact of the Early Psychosis Treatment and Prevention Program from a population perspective. The study estimated the referral rate to EPP for individuals hospitalized for a first episode of psychosis, together with an examination of relevant clinical outcomes of EPP participants. The third component assessed the impact of EPP from a population perspective. Further research is suggested to evaluate institutional barriers to referral, to target those groups not referred, to continue the assessment of outcomes of EPP and to consider a randomized control study to investigate a newly initiated treatment program.

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APPENDIX A: DSM-IV DIAGNOSTIC CRITERIA FOR SCHIZOPHRENIA

A: *Characteristic symptoms:* Two (or more) of the following, each present for a significant portion of time during a 1-month period (or less if successfully treated):

1) delusions (2) hallucinations (3) disorganized speech (e.g. frequent derailment or incoherence) (4) grossly disorganized or catatonic behavior (5) negative symptoms, i.e. affective flattening, alogia, or avolition.
2) **Note:** Only one criterion A symptom is required if delusions are bizarre or hallucinations consist of a voice keeping up a running commentary on the person's behaviour or thoughts, or two or more voices conversing with each other.

B. *Social/occupational dysfunction:* For a significant portion of the time since the onset of the disturbance, one or more major areas of functioning such as work, interpersonal relations, or self-care are markedly below the level achieved prior to the onset (or when the onset is in childhood or adolescence, failure to achieve expected level of interpersonal, academic, or occupational achievement).

C. *Duration:* Continuous signs of the disturbance persist for at least 6 months. This 6-month period must include at least 1 month of symptoms (or less if successfully treated) that meet criterion A (i.e. active-phase symptoms) and may include periods of prodromal or residual symptoms. During these prodromal or residual periods, the signs of the disturbance may be manifested by only negative symptoms or two or more symptoms listed in criterion A present in an attenuated form (e.g. odd beliefs, unusual perceptual experiences).

D. *Schizoaffective and Mood Disorder exclusion:* Schizoaffective disorder and mood disorder with psychotic features have been ruled out because either (1) no major depressive, manic, or mixed episodes have occurred concurrently with the active phase symptoms, or (2) if mood episodes have occurred during active phase symptoms, their total duration has been brief relative to the duration of the active and residual periods.

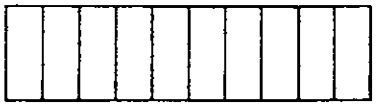
E. *Substance/general medical condition exclusion:* The disturbance is not due to the direct physiological effects of a substance (e.g. a drug of abuse, a medication) or a general medical condition.

F. *Relationship to a Pervasive Developmental Disorder.* If there is a history of autistic disorder or another pervasive developmental disorder, the additional diagnosis of schizophrenia is made only if prominent delusions or hallucinations are also present for at least a month (or less if successfully treated).

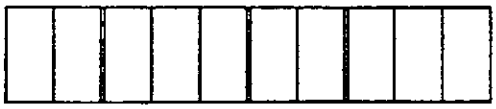
*Classification of longitudinal course (*can be applied only after at least 1 year has elapsed since the initial onset of active-phase symptoms):
Episodic With Interepisode Residual Symptoms (episodes are defined by the reemergence of prominent psychotic symptoms); *also specify if:* **With Prominent Negative Symptoms**
Episodic With No Interepisode Residual Symptoms
Continuous (prominent psychotic symptoms are present throughout the period of observation); also specify if: **With Prominent Negative Symptoms**
Single Episode in Partial Remission; also specify if: **With Prominent Negative Symptoms**
Single Episode in Full Remission
Other or Unspecified Pattern

APPENDIX B: DATA COLLECTION FORM FOR IDENTIFICATION OF ELIGIBLE INPATIENTS

1. Record the hospital identification number, from the *case list.*



2. Assign a *study identification number*:



3. Record the Subject's *Unique Lifetime Identifier:*

Determine (from the hospital chart - obtaining previous volumes if necessary) whether this subject has been previously admitted with a psychotic disorder (those listed in Appendix II) to the hospital from which the chart derives (circle correct response).

Previous Admissions (mark excluded) None (continue)

Indeterminate (explain/continue): _____

Determine whether the subject is listed in the *Early Psychosis Program Patient List.*

On Patient List (mark excluded) Not on List (continue)

4. Record the subject's age from the admission *face sheet:* _____

5. Record the subject's date of birth from the admission *face sheet* (DD/MM/YY):

6. Record the subject's sex (circle): M F

7. Record the subject's marital status (circle):

Never Married	1
Married	2
Common law	3
Divorced	4
Separated	5
Widowed	6

8. Record the subject's education level (circle):

No formal education	1
Some grade school	2
Completed grade school(gr.9)	3
Some high school	4
Completed high school	5
Some college	6
Completed college	7
Some graduate work	8
Completed graduate degree	9
Not available	-9

9. Record the subject's employment status (circle):

Employed	1
Unemployed	2
Retired	3
Homemaker	4
Student	5
Disabled	6
Not available	-9

10. Record the subject's living arrangements (circle):

No fixed address	1
Supervised	2
Independent	3
Family	4
Unknown	-9

11. Record whether the subject has a family doctor (circle):

1	Yes
2	No
-9	Unknown

12. Record the ICD-9 code for the *PrimaryDiagnosis* from the *discharge summary* both on Axis I and Axis II. *(Use text format).*

Axis I: _____ ICD code:_____

_____ ICD code:_____

Axis II: _____ ICD code:_____

Axis III: _____ ICD code:_____

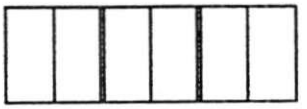
13. Record the GAF (Global Assessment Functioning) on admission and discharge.

GAF: Adm: _____ Disch: _____

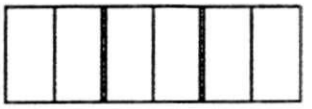
14. What was the hospital/psychiatric unit from which this subject was discharged?

Site:_____ Unit:_____

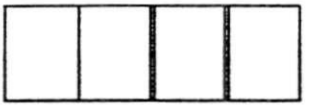
15. What was the date of admission to this unit?



16. What was the date of discharge from hospital?

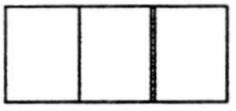


17. Enter the *Specification Code* for *Substance Dependence or Abuse* from Appendix I. If none, code as zero.



18. If the first two digits in 17 are '12' (polysubstance) or '13 (other): specify, in writing, each substance mentioned in the admitting history/physical examination section of the chart.

19. Enter the *Specification Code* for any *Other Substance-Related Disorder* from Appendix I. If none, code as zero.



20. If the first two digits in 19 are '12' (polysubstance) or '13 (other): specify, in writing, each substance mentioned in the admitting history/physical examination section of the chart.

APPENDIX C: CONSENT FORM FOR EARLY PSYCHOSIS TREATMENT AND PREVENTION PROGRAM

CRHA
Calgary Regional Health Authority

CRHA, Early Psychosis Treatment & Prevention Program

Informed Consent to Allow Patient Information to be used for Program Evaluation

Investigators: Dr. D. Addington, Dr. J. Addington, Dr. S. Patten

Sponsors: Provincial Mental Health Advisory Board, Eli Lilly Ltd.

This consent form, a copy of which has been given to you, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The purpose of this research is to evaluate the Early Psychosis Treatment and Prevention Program

The Early Psychosis Treatment and Prevention Program is a treatment program funded by the Provincial Mental Health Advisory Board and operated through the Calgary Regional Health Authority. The program only uses established treatments as part of its program. If you are invited to participate in an experimental research project this will be in addition to your participation in this treatment program. You would be informed about the project and invited to sign an informed consent form relevant to that project.

The goals of the Early Psychosis Treatment and Prevention Program are to:

- prevent relapse or recurrence of psychosis
- improve quality of life
- reduce family burden.

In order to ensure that the program meets its goals the program is being evaluated based upon the outcome of individual patients and family members. Information to be collected from individuals includes symptoms and side effects, medications used, quality of life, family burden and stress. In addition some key individual items will be collected such as your age, sex and employment status.

Once compiled this information can be analyzed to assess how effectively the program is meeting its goals. For purposes of evaluation your name will not be identified. The information from all of the participants will be compiled in order to make a report which would be available to the CRHA, PMHAB or Eli Lilly Ltd. It is also hoped that this information will be useful for setting standards for care at a National Level.

The usual rules of medical confidentiality will apply to your medical record. No information will be provided to third parties other than that normally required by law. Your name will not appear in any summary report, nor will it be made available to persons other than those involved in your health care and those involved in evaluating the program. Your patient confidentiality will be maintained .You enter this program willingly and may withdraw from the program at any time, without prejudice to future health care.

In the event that you suffer injury as a result of participating in this research, no compensation or treatment will be provided to you by Eli Lilly, the University of Calgary, the Calgary Regional Health Authority or the researchers. You still have all your legal rights. Nothing said here about treatment or compensation in any way alters your right to recover damages.

I have read the above information and understand the purpose of allowing my file data to be used for evaluation. I understand that I may withdraw from the program at any time without prejudice to further health care. I allow my name to be placed on a list for the purpose of contacting me if my health condition and information may be appropriate for a research study at some future date.

Your signature on this form indicates that you have understood to your satisfaction the information regarding your participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the program at any time without jeopardizing your health care. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. If you have further questions, please contact

DR. D. ADDINGTON TELEPHONE: (403) 670 1296

If you have any questions about your rights as a possible participant in this research, please contact the office of Medical Bioethics, Faculty of Medicine, The University of Calgary, at 220-7990.

Participants Signature	Date
Participant Name	Date
Investigator and / or Delegate's Signature	Date
Witness' Signature	Date

A copy of this consent form has been given to y to keep for your records and reference.