March 2013

Analysis in Brief

Hospital Mental Health Services for Concurrent Mental Illness and Substance Use Disorders in Canada

Types of Care

Executive Summary

This Analysis in Brief examines the characteristics of individuals hospitalized for concurrent mental illness and substance use disorders. It also examines the impact of concurrent disorders on the use of inpatient hospital mental health services compared with that for mental illness or substance use disorders alone.

Pan-Canadian data indicates that individuals diagnosed with concurrent mental illness (mood/anxiety disorders or schizophrenia/psychotic disorders) and substance use disorders made up close to one-third (30.8%) of all psychiatric inpatients in the 2010–2011[i] diagnosis groups examined.

When compared with individuals hospitalized for schizophrenia/psychotic disorders only, those with comorbid substance use disorders were 15.2% and 24.6% more likely to be readmitted within 30 days and 1 year of discharge, respectively. In the year after initial discharge, they were expected to stay in hospital 19.0% longer than individuals without comorbid substance use disorders.

Similar results were found among individuals hospitalized for mood/anxiety disorders. Those with comorbid substance use disorders had an increased risk of 30-day and 1-year readmission of 18.2% and 24.8%, respectively. Those with comorbid substance use disorders were also expected to stay in hospital 7.7% longer in the year after initial discharge.

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Better data. Better decisions. Healthier Canadians.

Our Mandate
To lead the development and maintenance of comprehensive and integrated health information that enables sound policy and effective health system management that improve health and health care.

Our Values
Respect, Integrity, Collaboration, Excellence, Innovation

i. Quebec data was based on discharges between April 1, 2009, and March 31, 2010.

Federal Identity Program
Production of this report is made possible by financial contributions from Health Canada and provincial and territorial governments. The views expressed herein do not necessarily represent the views of Health Canada or any provincial or territorial government.

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When compared with persons hospitalized for substance use disorders only, those with the specified comorbid mental illnesses were substantially more likely to be readmitted within 30 days and 1 year of discharge (62.2% and 53.2% more likely, respectively). They were also expected to spend about twice as many days in hospital in the year after initial discharge as individuals diagnosed with substance use disorders alone.

Taken collectively, the results highlight the higher use of hospital services, in terms of both readmissions and days stayed, among individuals who had been diagnosed with mental illness and substance use disorders rather than just one of the two diagnoses. Greater coordination of care that addresses both mental illness and addictions, according to the individual's needs, may help to reduce the use of costly hospitalizations. In particular, for individuals diagnosed with substance use disorders, services that seek to detect, treat and prevent the subsequent development of concurrent mental illness should have the greatest impact in terms of reduced hospitalization.

Introduction

Estimates of the co-occurrence of alcohol- and drug-related disorders among individuals with mental illness range from about one-third to one-half.[1] Similarly, some studies have found that up to 50% of those with substance use disorders (SUDs) also have a co-occurring mental health disorder.[1, 2] These co-occurrence rates vary by client population and setting;[3, 4] however, concurrent disorders (as they are referred to in this analysis) present unique challenges for health care providers and planners. Mental health treatment is affected when the use of alcohol or drugs results in—for instance—a lack of adherence to treatment protocols or compromised efficacy of prescribed medications. There is also an increased risk of negative health and social outcomes such as HIV and hepatitis infections,[5] suicide,[6] violence[7, 8] and involvement with the criminal justice system.[9]

Issues related to help-seeking also appear to involve a complex interplay of challenges in the health and social contexts for individuals with concurrent disorders. Research based on population surveys suggests that a large proportion of individuals with concurrent disorders do not access formal care.[10] In one example, after adjusting for severity of illness, between 35% and 50% of respondents who met criteria for mental illness and SUDs did not seek services.[10] Individuals with concurrent disorders also report high levels of unmet need and low levels of satisfaction with care.[11] Yet concurrent disorders are associated with higher levels of service use when compared with either SUD or mental illness alone. Research in the United States has found that individuals with concurrent disorders are three to four times more likely to be hospitalized than individuals with mental illness only. They are also 10 to 20 times more likely to be admitted to inpatient care than those with SUD only.[12]

Consistent with these findings, other studies suggest that individuals with concurrent disorders are more likely to miss medical appointments, experience relapse and be readmitted to hospital than individuals with mental illness alone.[13, 14] Concurrent disorders tend to be associated with severe mental illness, relatively high care expenses due to greater use of costly hospital services,[15] poor health trajectories and challenges accessing appropriate care along critical points in the recovery pathway. Given all of these factors, it is helpful to have a more informed understanding of individuals with concurrent disorders who are hospitalized in Canada.

The purpose of this analysis is, therefore, to provide a descriptive assessment of individuals hospitalized in Canada with a diagnosis of concurrent disorders, including their socio-demographic and clinical use characteristics. The analysis also examines the impact of concurrent mental illness and SUD on relevant hospital service indicators such as readmission risk and number of days spent in hospital for readmissions.

Findings

Characteristics of Psychiatric Inpatients With Concurrent Disorders

Overall, individuals diagnosed with concurrent mental illness and SUD accounted for 35.6% of all psychiatric inpatients age 15 to 65 in 2010–2011. A subset of this group—those who were diagnosed with mood/anxiety disorders, schizophrenia/psychotic disorders and/or SUDs—was selected for the analysis. Among this analytical sample, 30.8% had been diagnosed with concurrent mental illness and SUD. Detailed descriptive statistics comparing individuals with concurrent disorders and those with mental illness or SUD alone are presented in Table B1. On average, persons with concurrent disorders were younger than those with a diagnosis of mental illness alone. The proportions of males, homeless individuals and those living in the most socially and materially deprived neighbourhoods appear to be greater among those with concurrent disorders than among those with a single diagnosis of mental illness.

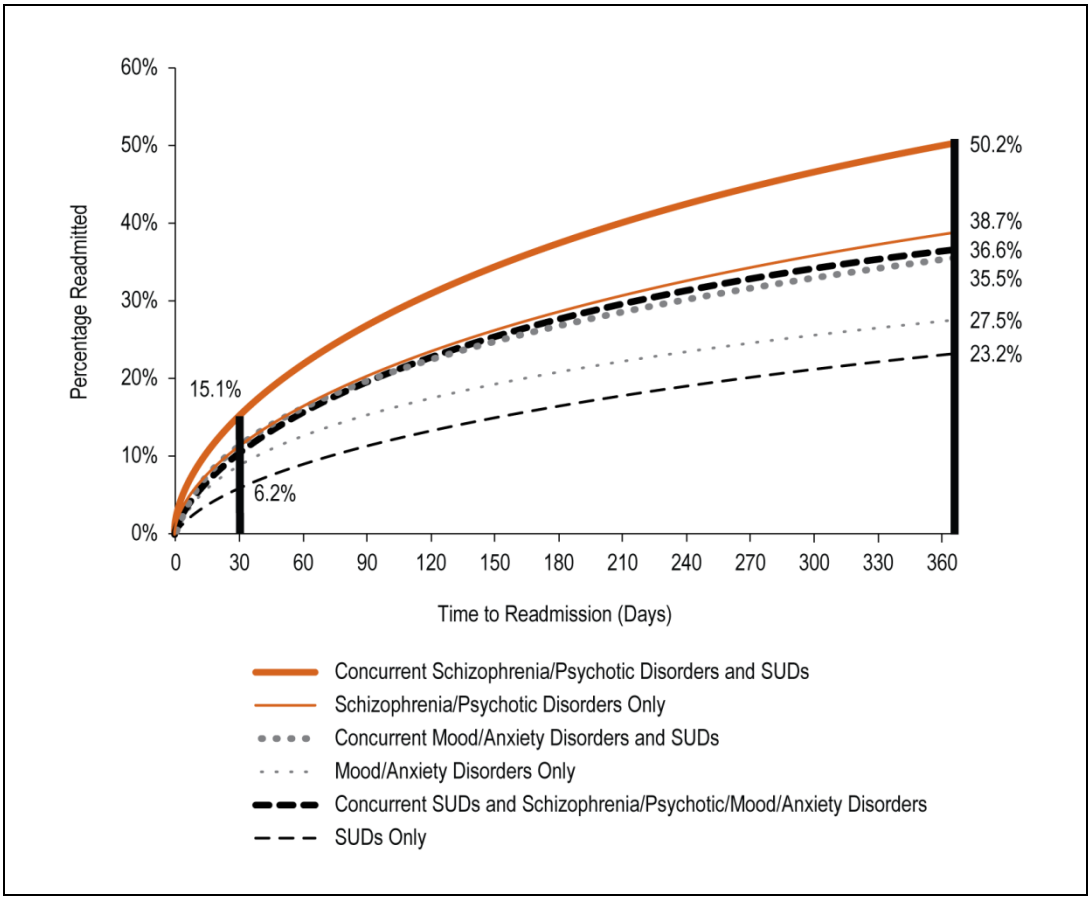
In terms of treatment characteristics, individuals hospitalized with concurrent disorders stayed in hospital for a slightly shorter period for each episode of care, when compared with those diagnosed with the respective mental illness only. However, due to more frequent use of hospital services, they had a greater total length of stay in the four-year time frame prior to the index hospitalization included in the analysis (Table B1).

Of the six groups examined in the analysis, those with concurrent schizophrenia/psychotic disorders and SUD had the highest rates of readmission (15.1% and 50.2% for 30-day and 1-year readmission, respectively) and the highest total number of days stayed in hospital in the previous four years (56.0 days). Those with SUD alone had the lowest numbers on these indices (6.2% and 23.2% for 30-day and 1-year readmission, respectively, and 1.8 days for length of stay) (Figure 1).

First Psychiatric Readmission Following Index Hospitalization

Overall, individuals with concurrent disorders had higher readmission rates over the next year than those with a diagnosis of either mental illness or SUDs alone. People diagnosed with schizophrenia/psychotic disorders and comorbid SUD had the highest readmission rate throughout the one-year follow-up among the groups examined: half (50.2%) were readmitted within one year of discharge (Figure 1).

Figure 1: Rates of First Psychiatric Readmission Following Index Hospitalization



Sources
Hospital Mental Health Database, 2007–2008 to 2010–2011; Discharge Abstract Database, 2007–2008 to 2011–2012; and Hospital Morbidity Database, 2006–2007 to 2010–2011, Canadian Institute for Health Information.

Consistency of Diagnosis Upon First Readmission

The diagnosis for the first psychiatric readmission within 30 days and 1 year of discharge of the index hospitalization was examined to assess consistency in individuals' conditions over time. Overall, readmission diagnoses were consistent with those of the index hospital stay.

Among those readmitted within 30 days of discharge, the majority of individuals who were originally diagnosed with schizophrenia/psychotic disorders, mood/anxiety disorders or the corresponding concurrent disorders had the same mental health or concurrent disorder diagnosis in their readmission hospitalization. However, for those individuals who had an index primary diagnosis of SUD—either as part of a concurrent disorder diagnosis or alone—the subsequent readmission diagnosis was less consistent. In particular, for those diagnosed with SUD only, more than 71.0% had a readmission diagnosis that included a mental illness (Table B2).

Consistency in diagnoses between the index episode and the first psychiatric readmission within one year showed a similar, but slightly lower, pattern of correspondence. Again, however, a large proportion (79.9%) of individuals diagnosed with SUD only in the index episode had a diagnosis that included mental illness upon readmission (Table B3).

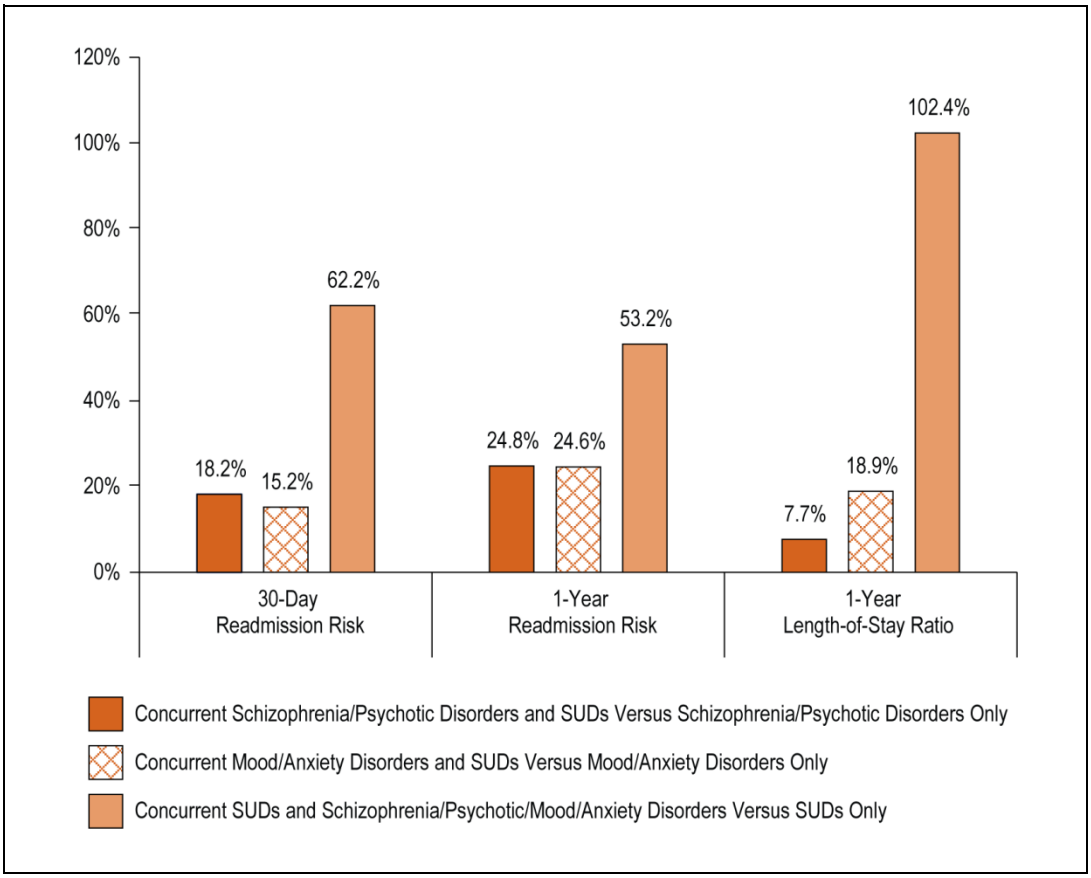
Readmission Risks and Lengths of Stay

Differences between individuals diagnosed with concurrent disorders and those diagnosed with mental illness or SUD alone were examined using models that were fully adjusted for the risk of readmission and days spent in hospital in the year after discharge. The models controlled for age, gender, province of hospitalization, homelessness, geographic isolation, socio-economic status, hospital type, discharge status and number of previous psychiatric hospitalizations.

The results suggest that, when compared with individuals hospitalized for schizophrenia/psychotic disorders alone, those with an additional diagnosis of comorbid SUD were 15.2% and 24.6% more likely to be readmitted within 30 days and 1 year of discharge, respectively. They were also expected to stay in hospital 19.0% longer in the year following discharge. Similar results emerged for individuals hospitalized for mood/anxiety disorders. Those with a comorbid SUD diagnosis had an increased readmission risk of 18.2% and 24.8%, respectively, at 30 days and 1 year, and they were expected to stay in hospital 7.7% longer in the year following discharge (Figure 2).

This pattern was consistent but more pronounced for persons hospitalized with SUD only when compared with those who also had a comorbid diagnosis of the mental illnesses referred to above. Compared with persons hospitalized for SUD only, those with comorbid schizophrenia/psychotic disorders and those with mood/anxiety disorders were substantially more likely (62.2% and 53.2%, respectively) to be readmitted within 30 days and 1 year of discharge. They were also expected to stay about twice as long in the year after discharge (Figure 2). More detailed results are presented in Appendix B (tables B4 and B6).

Figure 2: Adjusted 30-Day and 1-Year Readmission Risk and 1-Year Length-of-Stay Ratio



Sources

Hospital Mental Health Database, 2007–2008 to 2010–2011; Discharge Abstract Database, 2007–2008 to 2011–2012; and Hospital Morbidity Database, 2006–2007 to 2010–2011, Canadian Institute for Health Information.

Discussion and Conclusions

Implications

This analysis presents a pan-Canadian perspective on the issue of concurrent disorders and their impact on hospital service use, with consideration of socio-demographic, clinical and treatment factors. The analytical sample was drawn from pan-Canadian data on inpatients with a range of mental illnesses and types of SUDs and is representative of individuals who access Canada's mental health inpatient services.

Individuals with concurrent disorders accounted for close to one-third (30.8%) of psychiatric discharges in the 2010–2011 analytical sample used here. It is possible that concurrent disorders were underdiagnosed in these patients, as they have been shown to be elsewhere.[4] Indeed, in the case of individuals diagnosed with SUDs only, the analysis revealed that, in the majority of cases, mental illness was diagnosed in a subsequent hospitalization within the year. About one-third of all cases of concurrent disorders used in this analysis were diagnosed with mental illness or SUD only in the index hospitalization and were found to have a corresponding mental illness or SUD diagnosis in the review of hospitalization data from the four years prior. Taken collectively and across multiple episodes of care, these findings further suggest that concurrent disorders are common among Canada's mental health inpatient population and may be underdiagnosed in the hospital setting. Improved screening of concurrent disorders may help to reduce readmissions by enhancing detection and triaging these individuals to more comprehensive, appropriate treatment than they might receive if only one condition is identified and addressed.

Overall, individuals with concurrent schizophrenia/psychotic disorders and SUD demonstrated the highest levels of readmission (Figure 1) and the most days spent in hospital after discharge among the six diagnostic groups in the analysis (Table B1). However, the analyses also indicate that, regardless of primary diagnosis, the co-occurrence of mental illness and SUD increased the risk of readmission for psychiatric hospitalization in both the short (30-day) and longer (1-year) terms. In addition, those with a diagnosis of concurrent disorders spent more time in hospital after an initial discharge than those with a diagnosis of either mental illness or SUD alone.

These findings are consistent with previous research showing that concurrent disorders are associated with a variety of undesirable outcomes, including higher rates of relapse and hospitalization.[16] This may be attributed to the complex clinical characteristics of individuals with concurrent disorders, their more challenging and integrated treatment requirements and lower rates of treatment compliance.[1]

The analyses demonstrate a consistent effect of the presence of concurrent disorders on hospitalization patterns when compared with mental illness or SUD alone. More detailed assessment suggests that the contrast between those with concurrent diagnoses and those with a single diagnosis was greater when the primary diagnosis was SUD and the comorbid condition was a mental illness, rather than the reverse (tables B4 and B6). This suggests that, among the conditions examined here, the addition or development of a mental illness among individuals who have been diagnosed with SUD may have the largest impact in terms of increased use of hospital services. Additionally, among individuals with an index diagnosis of SUD only who had no hospital diagnosis for mental illness in the previous four years, a majority of those readmitted were subsequently diagnosed with a mental illness. The implications are that timely treatments for individuals with SUDs that are designed to detect and address possible underlying mental disorders could offer an effective means of reducing the development of concurrent disorders and the significant increase in associated hospital service use.

Several other findings derived from control variables should be mentioned, although they are unrelated to the main analysis. First, patients discharged from psychiatric hospitals were less likely to be readmitted in the short or longer term; however, when they were readmitted, they stayed considerably longer than patients discharged from general hospitals. This finding may reflect the existence in psychiatric hospitals of more extensive discharge planning with links to outpatient and community treatment providers, as well as other

supports such as vocational and housing services, when compared with general hospitals. Second, the readmission risk and total days hospitalized after discharge were smaller when the discharge was planned rather than unplanned.[ii] This too may reflect the importance of adequate discharge planning and transitional care. Third, in the one-year readmission analysis, homeless patients stayed in hospital longer and were more likely than other patients to be readmitted after an index episode. A similar pattern was observed for patients in the most socially deprived quintile when they were compared with the most privileged patients.

The findings presented here draw attention to the complex needs of individuals with concurrent disorders within one sector of the health care system. Previous research has indicated that the spectrum of care should include a number of treatment options that correspond to the type and level of individual needs, including collaborative and integrated treatments that address issues of both mental health and addictions.[16] Supportive policies and more comprehensive approaches that reduce the use of costly hospitalizations will require system-level harmonization of services, based on clinically seamless pathways to both integrated and specialized care.[17]

The Complex Question of Service Integration

Recent work by Rush et al.[18] suggests that the issue of integrated care is complex and needs to be considered at multiple levels. In terms of clinical services, the evidence suggests that more integrated care for individuals with concurrent disorders is more effective than care that is not integrated. However, at a system level—where much of the integration effort in Canada has been focused—questions remain about the motivations for the various integration strategies and their appropriateness for certain populations. These are of concern, particularly when structural integration that might affect the health and social services sectors more broadly is considered. It may be essential to maintain a certain balance of integration and specialization among services. However, greater collaboration and communication between the mental health and substance use services systems would enhance the effectiveness of each in meeting the needs of people with concurrent disorders.

Inpatient hospitalization is only one component of the mental health and substance use services system. Future analyses could examine the broader facets of the system, including crisis intervention, outpatient and community care, recovery, laboratory screening and assessment, vocational rehabilitation, and housing and social support. More evidence and context for how these components collectively contribute to the overall outcomes of individuals with concurrent disorders is warranted.

Limitations

Several limitations of this study should be mentioned. First, the analyses were based on inpatient data only, as recent data on service and treatment history in other settings prior to or after inpatient hospitalization was not available at a pan-Canadian level. Second, SUD or mental illness may have been diagnosed only for those with active conditions; although the time frame of the analysis is four years, those diagnosed in the past but currently in remission might not have had their earlier diagnosis recorded, resulting in potential underdiagnosis of concurrent disorders. Finally, lack of available information about treatment programs in hospital settings and their link to community-based services restricted our ability to assess the effect of different treatment approaches on subsequent hospital service use for concurrent disorders.

ii. Unplanned discharge refers to being absent without leave, being on a leave of absence, discharging against medical advice, transferring to other settings and not returning when expected from leave.

Appendix A: Methodological Notes

Index Hospitalization

For individuals with multiple hospitalizations in the year of discharge, the first hospitalization was referred to as the index hospitalization or index episode in this analysis.

Data Source and Inclusion Criteria

The analysis is based primarily on data from the Hospital Mental Health Database at the Canadian Institute for Health Information. The cohort included individuals who were discharged with a primary diagnosis of schizophrenia or other psychotic disorder, mood disorders, anxiety disorders or substance use disorder (SUD) from Quebec hospitals between April 1, 2009, and March 31, 2010, and who were discharged from hospitals in the rest of the country between April 1, 2010, and March 31, 2011.[iii] To be included in the analysis, individuals had to have a valid health card number, be age 15 to 65 (inclusive) at admission, have a hospital stay of 90 days or less, and have been discharged home or to settings other than psychiatric, acute care, rehabilitation or correctional facilities after the index hospitalization.

Based on the primary diagnosis of the index hospitalization, patients were categorized into six mutually exclusive groups:

1. Concurrent schizophrenia or other psychotic disorders (primary) and SUD (secondary)
2. Concurrent mood or anxiety disorders (primary) and SUD (secondary)
3. Concurrent SUD (primary) and any of schizophrenia or other psychotic disorders or mood or anxiety disorders (secondary)
4. Schizophrenia or other psychotic disorders (primary) and no diagnosis of SUD
5. Mood or anxiety disorders (primary) and no diagnosis of SUD
6. SUD (primary) and no diagnosis of schizophrenia or other psychotic disorders or mood or anxiety disorders

If no concurrent disorders were identified for the index hospitalization, hospitalizations from the previous four years were examined to capture diagnoses of concurrent disorders.

Socio-Economic Status

The 2006 Institut national de santé publique du Québec Deprivation Index includes both material and social components that are shown to be related to health; the index also allows data to be presented at the level of Statistics Canada's dissemination areas. It was used to operationalize area-level socio-economic status in this analysis as a proxy for individual socio-economic status. For further information on how the index is defined and calculated, please see Pampalon et al., 2009.[19]

Geographic Isolation

The Statistical Area Classification (SAC) groups census subdivisions according to whether they are a component of a census metropolitan area (CMA), a census agglomeration (CA), a CMA/CA–influenced zone (strong, moderate, weak or no influence) or the territories (Yukon, Northwest Territories and Nunavut). The SAC type based on 2006 Census data was used in this analysis as a proxy for identifying geographic isolation. For further information about the SAC, please visit Statistics Canada's website.

iii. Data from four psychiatric hospitals that report to the Ontario Mental Health Reporting System was excluded due to a data quality issue.

Cox Proportional Hazard Regression

Cox proportional hazard regression was used to examine the relationship between hospital readmission risk and patient diagnosis. Both models (30-day and 1-year readmission) included first readmission only and controlled for age, gender, province of hospitalization, homelessness, geographic isolation, socio-economic status, hospital type, discharge status and number of previous psychiatric hospitalizations. Cox regression results are presented in tables B4 and B5.

Poisson Regression

Poisson regression was used to examine how diagnosis may affect the total length of hospital stay in the year following an index discharge. The same set of independent variables as used in the Cox regression analysis was included in the model that examined total length of stay after discharge. Poisson regression results are presented in tables B6 and B7.

Appendix B: Data Tables

Table B1: Descriptive Statistics by Diagnosis Group

Domain	Variable/Categories	Concurrent Schizophrenia/ Psychotic Disorders and SUD (N = 6,538)	Schizophrenia/ Psychotic Disorders Only (N = 14,339)	Concurrent Mood/Anxiety Disorders and SUD (N = 9,499)	Mood/Anxiety Disorders Only (N = 26,969)	Concurrent SUD and Schizophrenia/ Psychotic/Mood/ Anxiety Disorders (N = 7,989)	SUD Only (N = 12,556)	Total (N = 77,890)
		Percentage	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage
Treatment	**Hospital Type**							
	General	83.3	88.3	87.4	90.5	82.0	87.2	87.7
	Psychiatric	16.7	11.7	12.6	9.5	18.0	12.8	12.3
	Number of Psychiatric Hospitalizations in Previous Four Years							
	Mean (N)	2.8	1.3	2.0	0.8	2.5	0.8	1.3
	0	25.9	50.4	38.8	64.7	29.9	67.2	52.5
	1	19.9	20.3	21.2	17.5	22.7	16.8	19.1
	2–3	25.9	18.3	21.3	11.7	23.6	10.3	16.3
	4+	28.4	11.0	18.7	6.1	23.8	5.7	12.2
	Average Total LOS in Previous Four Years (Days)							
	Average	56.0	29.7	19.2	10.0	17.3	1.8	18.1
	Average LOS for Index Hospitalization (Days)							
	Average	20.1	20.3	13.5	14.0	9.1	6.8	14.0
	Average Total LOS Within One Year of Index Discharge (Days)							
	Average	48.8	47.0	28.1	31.8	22.2	15.1	33.8
	Discharge Status							
	Unplanned	8.2	5.9	7.7	5.7	11.6	12.3	7.9
	Planned	91.8	94.1	92.3	94.3	88.4	87.7	92.1

Table B1: Descriptive Statistics by Diagnosis Group (cont'd)

Domain	Variable/Categories	Concurrent Schizophrenia/ Psychotic Disorders and SUD (N = 6,538)	Schizophrenia/ Psychotic Disorders Only (N = 14,339)	Concurrent Mood/Anxiety Disorders and SUD (N = 9,499)	Mood/Anxiety Disorders Only (N = 26,969)	Concurrent SUD and Schizophrenia/ Psychotic/Mood/ Anxiety Disorders (N = 7,989)	SUD Only (N = 12,556)	Total (N = 77,890)
		Percentage	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage
Socio-Demographic	**Sex**							
	Female	24.4	45.1	46.2	61.6	39.0	29.7	46.1
	Male	75.6	54.9	53.8	38.4	61.0	70.3	53.9
	Homeless (Upon Admission)							
	No	95.7	97.7	98.2	99.3	96.8	97.5	98.0
	Yes	4.3	2.3	1.8	0.7	3.2	2.5	2.0
	Age at Admission (Years)							
	Mean (Years)	34.4	40.4	38.3	39.7	40.1	40.0	39.3
	15–24	25.3	14.7	19.9	21.1	14.3	17.8	18.9
	25–34	31.8	21.6	21.0	16.3	21.7	19.2	20.2
	35–44	19.2	21.8	22.5	19.4	23.0	20.2	20.7
	45–54	16.7	24.7	24.0	24.4	27.0	25.9	24.3
	55–65	6.9	17.1	12.6	18.8	14.1	16.8	15.9
	Patient Neighbourhood Social Deprivation Quintile							
	1 (Most Privileged)	9.2	12.5	11.4	15.3	11.7	13.0	13.1
	2	12.8	14.0	15.2	17.8	14.2	16.4	15.8
	3	16.3	17.3	18.7	19.5	18.4	19.9	18.7
	4	21.5	21.0	22.2	21.9	21.9	20.8	21.6
	5 (Most Deprived)	40.2	35.1	32.5	25.5	33.9	29.9	30.9

Table B1: Descriptive Statistics by Diagnosis Group (cont'd)

Domain	Variable/Categories	Concurrent Schizophrenia/ Psychotic Disorders and SUD (N = 6,538)	Schizophrenia/ Psychotic Disorders Only (N = 14,339)	Concurrent Mood/Anxiety Disorders and SUD (N = 9,499)	Mood/Anxiety Disorders Only (N = 26,969)	Concurrent SUD and Schizophrenia/ Psychotic/Mood/ Anxiety Disorders (N = 7,989)	SUD Only (N = 12,556)	Total (N = 77,890)
		Percentage	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage
Socio-Demographic (cont'd)	**Patient Neighbourhood Material Deprivation Quintile**							
	1 (Most Privileged)	13.9	14.6	15.2	16.4	15.7	14.9	15.4
	2	15.7	17.6	17.7	18.9	17.7	16.8	17.8
	3	18.0	19.2	20.8	21.2	19.7	19.5	20.1
	4	20.9	21.4	21.0	21.1	20.2	20.2	20.9
	5 (Most Deprived)	31.5	27.2	25.2	22.5	26.6	28.7	25.9
	Patient Statistical Area Classification (SAC) Type							
	1	65.4	71.9	56.2	60.9	57.0	55.5	61.4
	2	6.2	5.3	8.4	6.0	7.5	6.2	6.4
	3	11.9	9.9	14.9	12.7	14.5	12.3	12.5
	4	2.9	2.7	3.7	3.8	3.2	3.6	3.4
	Others	13.6	10.3	16.9	16.6	17.8	22.5	16.3

Notes

SUD: substance use disorder.
LOS: length of stay.
SAC: Statistical Area Classification.
SAC type 1: census metropolitan area.
SAC type 2: census agglomeration.
SAC type 3: strong metropolitan-influenced zone.
SAC type 4: moderate metropolitan-influenced zone.
SAC type Others: weak metropolitan-influenced zone, no metropolitan-influenced zone and the territories.
The figures for homelessness were under-represented in this analysis due to coding differences in the Quebec data. After investigation, it was found that this underestimate did not affect the risk-adjusted models presented here.

Sources

Hospital Mental Health Database, 2007–2008 to 2010–2011; Discharge Abstract Database, 2007–2008 to 2011–2012; and Hospital Morbidity Database, 2006–2007 to 2010–2011, Canadian Institute for Health Information.

Table B2: Patient's First Readmission Diagnosis Within 30 Days of Index Discharge

	Diagnosis in Index Hospitalization					
	Concurrent Schizophrenia/ Psychotic Disorders and SUD (N = 6,538)	Schizophrenia/ Psychotic Disorders Only (N = 14,339)	Concurrent Mood/Anxiety Disorders and SUD (N = 9,499)	Mood/Anxiety Disorders Only (N = 26,969)	Concurrent SUD and Schizophrenia/ Psychotic/Mood/ Anxiety Disorders (N = 7,989)	SUD Only (N = 12,556)
Diagnosis at First Readmission	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage
Number of Individuals Rehospitalized Within 30 Days	987	1,635	1,082	2,384	866	779
Concurrent Schizophrenia/Psychotic Disorders and SUD	20.5	3.4	1.1	0.4	5.5	2.7
Schizophrenia/Psychotic Disorders Only	60.9	79.2	4.2	6.3	7.3	5.8
Concurrent Mood/Anxiety Disorders and SUD	1.4	0.2	18.9	3.1	16.2	6.9
Mood/Anxiety Disorders Only	5.4	9.1	49.4	74.4	11.4	6.7
Concurrent SUD and Schizophrenia/Psychotic/ Mood/Anxiety Disorders	0.5	0.1	2.3	0.3	2.5	2.6
SUD Only	4.1	0.4	6.7	0.5	22.9	28.9
Concurrent Others	2.7	1.0	5.8	1.1	27.5	38.6
Mental Health Others	4.6	6.7	11.6	13.8	6.7	7.8

Notes

SUD: substance use disorder.

Concurrent Others: primary diagnosis of SUD along with a secondary diagnosis of mental illness other than schizophrenia, other psychotic, mood or anxiety disorders; or primary diagnosis of mental illness other than schizophrenia, other psychotic, mood or anxiety disorders and secondary diagnosis of SUD.

Mental Health Others: primary diagnosis of mental illness other than schizophrenia, other psychotic, mood or anxiety disorders and secondary diagnosis of any mental health disorder.

Sources

Hospital Mental Health Database, 2007–2008 to 2010–2011; Discharge Abstract Database, 2007–2008 to 2011–2012; and Hospital Morbidity Database, 2006–2007 to 2010–2011, Canadian Institute for Health Information.

Table B3: Patient's First Readmission Diagnosis Within One Year of Index Discharge

	Diagnosis in Index Hospitalization					
	Concurrent Schizophrenia/ Psychotic Disorders and SUD (N = 6,538)	Schizophrenia/ Psychotic Disorders Only (N = 14,339)	Concurrent Mood/Anxiety Disorders and SUD (N = 9,499)	Mood/Anxiety Disorders Only (N = 26,969)	Concurrent SUD and Schizophrenia/ Psychotic/Mood/ Anxiety Disorders (N = 7,989)	SUD Only (N = 12,556)
Diagnosis at First Readmission	Percentage	Percentage	Percentage	Percentage	Percentage	Percentage
Number of Individuals Rehospitalized Within One Year	3,280	5,549	3,375	7,418	2,923	2,911
Concurrent Schizophrenia/Psychotic Disorders and SUD	16.0	2.4	1.1	0.3	3.6	1.5
Schizophrenia/Psychotic Disorders Only	60.0	71.0	5.5	6.7	8.2	4.5
Concurrent Mood/Anxiety Disorders and SUD	1.1	0.2	14.5	2.4	12.3	5.4
Mood/Anxiety Disorders Only	4.4	8.0	45.4	66.2	10.9	6.4
Concurrent SUD and Schizophrenia/Psychotic/ Mood/Anxiety Disorders	0.3	0.1	1.6	0.3	1.8	1.3
SUD Only	3.3	0.2	5.1	0.4	19.2	20.1
Concurrent Others	4.3	0.9	8.8	1.4	31.9	48.4
Mental Health Others	10.7	17.1	17.8	22.3	12.1	12.3

Notes

SUD: substance use disorders.

Concurrent Others: primary diagnosis of SUD along with a secondary diagnosis of mental illness other than schizophrenia, other psychotic, mood or anxiety disorders; or primary diagnosis of mental illness other than schizophrenia, other psychotic, mood or anxiety disorders and secondary diagnosis of SUD.

Mental Health Others: primary diagnosis of mental illness other than schizophrenia, other psychotic, mood or anxiety disorders and secondary diagnosis of any mental health disorder.

Sources

Hospital Mental Health Database, 2007–2008 to 2010–2011; Discharge Abstract Database, 2007–2008 to 2011–2012; and Hospital Morbidity Database, 2006–2007 to 2010–2011, Canadian Institute for Health Information.

Table B4: Selected Results From Cox Proportional Hazard Regression With Different Diagnosis Reference Groups for 30-Day and 1-Year Readmission Analyses

Diagnosis Group	Reference Group	30-Day Readmission			1-Year Readmission		
		Chi-Square	Hazard Ratio	p-Value	Chi-Square	Hazard Ratio	p-Value
Concurrent Mood/Anxiety Disorders and SUD	Mood/Anxiety Disorders Only	19.0	1.182	<0.0001	91.4	1.248	<0.0001
Concurrent Schizophrenia/ Psychotic Disorders and SUD	Schizophrenia/ Psychotic Disorders Only	10.8	1.152	0.0010	76.5	1.246	<0.0001
Concurrent SUD and Schizophrenia/Psychotic/ Mood/Anxiety Disorders	SUD Only	88.3	1.622	<0.0001	205.9	1.532	<0.0001

Notes

SUD: substance use disorder.

For 30-day and 1-year readmission analyses, an independent Cox regression was conducted for each pair of diagnosis groups.

Sources

Hospital Mental Health Database, 2007–2008 to 2010–2011; Discharge Abstract Database, 2007–2008 to 2011–2012; and Hospital Morbidity Database, 2006–2007 to 2010–2011, Canadian Institute for Health Information.

Table B5: Complete Results From Cox Proportional Hazard Regression for 30-Day and 1-Year Readmission Analyses

Domain	Independent Variables	30-Day Readmission			1-Year Readmission		
		Chi-Square	Hazard Ratio	p-Value	Chi-Square	Hazard Ratio	p-Value
Diagnosis	**Primary Diagnosis Group**						
	SUD Only		1			1	
	Concurrent Mood/Anxiety Disorders and SUD	143.6	1.781	<0.01	272.6	1.553	<0.01
	Concurrent SUD and Schizophrenia/ Psychotic/Mood/Anxiety Disorders	88.3	1.622	<0.01	205.9	1.532	<0.01
	Concurrent Schizophrenia/Psychotic Disorders and SUD	240.5	2.226	<0.01	751.0	2.261	<0.01
	Mood/Anxiety Disorders Only	92.9	1.507	<0.01	95.1	1.245	<0.01
	Schizophrenia/Psychotic Disorders Only	219.0	1.933	<0.01	629.9	1.815	<0.01
Treatment	**Hospital Type**						
	General Hospital		1			1	
	Psychiatric Hospital	14.3	0.862	<0.01	5.9	0.949	0.02
	Number of Previous Psychiatric Hospitalizations						
	Number of Previous Psychiatric Hospitalizations	132.4	1.057	<0.01	157.2	1.068	<0.01
	Discharge Status						
	Planned Discharge		1			1	
	Unplanned Discharge	292.6	1.838	<0.01	128.3	1.297	<0.01
Socio-Demographic	**Sex**						
	Female		1			1	
	Male	0.0	1.002	0.92	0.3	0.993	0.6
	Homeless (Upon Admission)						
	No		1			1	
	Yes	2.3	1.118	0.13	10.7	1.147	<0.01
	Age at Admission (Years)						
	15–24		1			1	
	25–34	0.3	0.981	0.59	7.9	1.063	<0.01
	35–44	15.8	0.865	<0.01	0.5	0.985	0.49
	45–54	37.0	0.804	<0.01	0.2	0.991	0.66
	55–65	37.1	0.780	<0.01	6.0	0.944	0.01

Table B5: Complete Results From Cox Proportional Hazard Regression for 30-Day and 1-Year Readmission Analyses (cont'd)

Domain	Independent Variables	30-Day Readmission			1-Year Readmission		
		Chi-Square	Hazard Ratio	p-Value	Chi-Square	Hazard Ratio	p-Value
Socio-Demographic (cont'd)	**Hospital Province**						
	Ont.		1			1	
	B.C.	7.3	1.099	<0.01	11.3	1.071	<0.01
	Alta.	14.5	0.850	<0.01	1.8	0.970	0.17
	Sask.	2.5	0.901	0.11	1.1	0.963	0.29
	Man.	14.0	0.767	<0.01	1.1	0.963	0.29
	Que.	1.8	0.957	0.18	0.4	0.989	0.54
	N.B.	0.0	0.994	0.93	2.3	1.064	0.13
	N.S.	0.1	1.025	0.76	0.0	1.005	0.91
	P.E.I.	0.0	1.019	0.89	11.1	1.255	<0.01
	N.L.	0.2	0.961	0.67	11.6	1.177	<0.01
	Y.T./N.W.T./Nun.	3.0	0.768	0.08	0.2	0.962	0.62
	Patient Neighbourhood Social Deprivation Quintile						
	1 (Most Privileged)		1			1	
	2	0.0	0.993	0.88	0.1	0.994	0.81
	3	0.1	1.013	0.77	1.9	1.033	0.17
	4	0.3	1.022	0.60	11.3	1.080	<0.01
	5 (Most Deprived)	6.1	1.102	0.01	20.2	1.103	<0.01
	Patient Neighbourhood Material Deprivation Quintile						
	1 (Most Privileged)		1			1	
	2	0.0	1.000	0.99	0.7	1.020	0.39
	3	0.3	1.024	0.57	0.0	0.998	0.94
	4	0.3	0.977	0.58	0.0	1.004	0.85
	5 (Most Deprived)	2.3	1.063	0.13	1.8	1.031	0.18

Table B5: Complete Results From Cox Proportional Hazard Regression for 30-Day and 1-Year Readmission Analyses (cont'd)

Domain	Independent Variables	30-Day Readmission			1-Year Readmission		
		Chi-Square	Hazard Ratio	p-Value	Chi-Square	Hazard Ratio	p-Value
Socio-Demographic (cont'd)	**Patient Statistical Area Classification (SAC) Type**						
	1		1			1	
	2	0.3	1.025	0.61	3.4	1.049	0.06
	3	6.8	1.098	<0.01	8.6	1.060	<0.01
	4	0.0	1.012	0.86	2.0	0.949	0.16
	Others	13.8	1.140	<0.01	0.6	1.016	0.43

Notes

SUD: substance use disorder.

SAC: Statistical Area Classification.

SAC type 1: census metropolitan area.

SAC type 2: census agglomeration.

SAC type 3: strong metropolitan-influenced zone.

SAC type 4: moderate metropolitan-influenced zone.

SAC type Others: weak metropolitan-influenced zone, no metropolitan-influenced zone and the territories.

Two independent Cox regressions were conducted to examine 30-day and 1-year readmission after the index discharge.

The figures for homelessness were under-represented in this analysis due to coding differences in the Quebec data. After investigation, it was found that this underestimate did not affect the risk-adjusted models presented here.

Sources

Hospital Mental Health Database, 2007–2008 to 2010–2011; Discharge Abstract Database, 2007–2008 to 2011–2012; and Hospital Morbidity Database, 2006–2007 to 2010–2011, Canadian Institute for Health Information.

Table B6: Selected Results From Poisson Regression With Different Diagnosis Reference Groups for Total Length of Stay Within One Year of Discharge Analysis

Diagnosis Group	Reference Group	One-Year Total Length of Stay		
		Chi-Square	Risk Ratio	p-Value
Concurrent Mood/Anxiety Disorders and SUD	Mood/Anxiety Disorders Only	370.8	1.077	<0.01
Concurrent Schizophrenia/Psychotic Disorders and SUD	Schizophrenia/Psychotic Disorders Only	2,910.6	1.189	<0.01
Concurrent SUD and Schizophrenia/Psychotic/Mood/Anxiety Disorders	SUD Only	13,377.9	2.024	<0.01

Notes

SUD: substance use disorder.

An independent Poisson regression was conducted for each pair of diagnosis groups.

Sources

Hospital Mental Health Database, 2007–2008 to 2010–2011; Discharge Abstract Database, 2007–2008 to 2011–2012; and Hospital Morbidity Database, 2006–2007 to 2010–2011, Canadian Institute for Health Information.

Table B7: Complete Results From Poisson Regression for Total Length of Stay Within One Year of Discharge Analysis

Domain	Independent Variables	One-Year Total Length of Stay		
		Chi-Square	Risk Ratio	p-Value
Diagnosis	**Primary Diagnosis Group**			
	SUD Only		1	
	Concurrent Mood/Anxiety Disorders and SUD	29,722.4	2.673	<0.01
	Concurrent SUD and Schizophrenia/ Psychotic/Mood/Anxiety Disorders	13,377.9	2.024	<0.01
	Concurrent Schizophrenia/Psychotic Disorders and SUD	112,098.0	6.010	<0.01
	Mood/Anxiety Disorders Only	30,640.5	2.483	<0.01
	Schizophrenia/Psychotic Disorders Only	100,508.0	5.051	<0.01
Treatment	**Hospital Type**			
	General Hospital		1	
	Psychiatric Hospital	10,138.1	1.344	<0.01
	Number of Previous Psychiatric Hospitalizations			
	Number of Previous Psychiatric Hospitalizations	189,947.0	1.047	<0.01
	Discharge Status			
	Planned Discharge		1	
	Unplanned Discharge	6,003.9	1.332	<0.01
Socio-Demographic	**Sex**			
	Female		1	
	Male	131.9	1.026	<0.01
	Homeless (Upon Admission)			
	No		1	
	Yes	658.4	1.187	<0.01
	Age at Admission (Years)			
	15–24		1	
	25–34	174.4	1.046	<0.01
	35–44	687.2	0.911	<0.01
	45–54	20.5	1.015	<0.01
	55–65	2,940.8	1.217	<0.01

Table B7: Complete Results From Poisson Regression for Total Length of Stay Within One Year of Discharge Analysis (cont'd)

Domain	Independent Variables	One-Year Total Length of Stay		
		Chi-Square	Risk Ratio	p-Value
Socio-Demographic (cont'd)	**Hospital Province**			
	Ont.		1	
	B.C.	721.9	0.908	<0.01
	Alta.	884.8	1.119	<0.01
	Sask.	453.8	0.862	<0.01
	Man.	17.5	1.027	<0.01
	Que.	4,195.7	1.201	<0.01
	N.B.	193.1	1.105	<0.01
	N.S.	728.3	1.220	<0.01
	P.E.I.	162.1	1.181	<0.01
	N.L.	235.6	1.137	<0.01
	Y.T./N.W.T./Nun.	472.5	0.655	<0.01
	Patient Neighbourhood Social Deprivation Quintile			
	1 (Most Privileged)		1	
	2	228.7	1.068	<0.01
	3	320.4	1.078	<0.01
	4	1,031.4	1.138	<0.01
	5 (Most Deprived)	2,410.5	1.206	<0.01
	Patient Neighbourhood Material Deprivation Quintile			
	1 (Most Privileged)		1	
	2	3.6	1.007	0.06
	3	24.2	1.018	<0.01
	4	21.5	0.983	<0.01
	5 (Most Deprived)	43.6	0.976	<0.01

Table B7: Complete Results From Poisson Regression for Total Length of Stay Within One Year of Discharge Analysis (cont'd)

Domain	Independent Variables	One-Year Total Length of Stay		
		Chi-Square	Risk Ratio	p-Value
Socio-Demographic (cont'd)	**Patient Statistical Area Classification (SAC) Type**			
	1		1	
	2	118.3	0.952	<0.01
	3	426.9	0.929	<0.01
	4	393.2	0.879	<0.01
	Others	1,120.0	0.888	<0.01

Notes

SUD: substance use disorder.

SAC: Statistical Area Classification.

SAC type 1: census metropolitan area.

SAC type 2: census agglomeration.

SAC type 3: strong metropolitan-influenced zone.

SAC type 4: moderate metropolitan-influenced zone.

SAC type Others: weak metropolitan-influenced zone, no metropolitan-influenced zone and the territories.

The figures for homelessness were under-represented in this analysis due to coding differences in the Quebec data. After investigation, it was found that this underestimate did not affect the risk-adjusted models presented here.

Sources

Hospital Mental Health Database, 2007–2008 to 2010–2011; Discharge Abstract Database, 2007–2008 to 2011–2012; and Hospital Morbidity Database, 2006–2007 to 2010–2011, Canadian Institute for Health Information.

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