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Predictors of Medical/surgical and Psychiatric Hospitalizations among a Population-based Cohort of Homeless Adults

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Abstract

Objectives—To identify factors associated with inpatient hospitalizations among a population-based cohort of homeless adults in Toronto, Canada.

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Contributor Statement

C. Chambers, S. W. Hwang, A. Kiss, D. A. Redelmeier, and W. Levinson contributed to the study concept and design. S. W. Hwang originated and supervised the overall study. S. Chiu oversaw all aspects of the data collection. C. Chambers, S. W. Hwang, and M. Katic analyzed and interpreted the data. C. Chambers and S. W. Hwang drafted and edited the manuscript. S. Chiu, D. A. Redelmeier, and W. Levinson critically revised the manuscript for important intellectual content. All authors approved the final version of the manuscript to be published.

Human Participant Protection

This study was approved by the Research Ethics Board at St. Michael's Hospital in Toronto, Canada. All participants provided written informed consent.

Methods—Participants were linked to administrative databases to capture hospital admissions during the study period (2005–2009). Logistic regression was used to identify predictors of medical/surgical and psychiatric hospitalizations.

Results—Among 1,165 homeless adults, 20% had a medical/surgical hospitalization and 12% had a psychiatric hospitalization during the study period. These individuals contributed a total of 921 hospitalizations, of which 548 were medical/surgical and 373 were psychiatric. Independent predictors of medical/surgical hospitalization included birth in Canada, having a primary care provider, higher perceived external health locus of control, and lower health status. Independent predictors of psychiatric hospitalization included being a current smoker, having a recent mental health problem, and having a lower perceived internal health locus of control. Being accompanied by a partner or dependent children was protective for hospitalization.

Conclusions—Health care need was a strong predictor of medical/surgical and psychiatric hospitalizations. Some hospitalizations among homeless adults are potentially avoidable, while others represent an unavoidable use of health services.

Keywords

Hospitalization; Homeless persons; Health care utilization

Homeless adults are frequent users of inpatient hospital services. In a nationally representative sample of homeless persons in the United States, almost one in four respondents reported being hospitalized in the past year, a rate four times higher than U.S. norms.¹ The frequent use of inpatient hospital services partially reflects the high prevalence of acute and chronic disease, injuries and assaults, and substance use and mental illness among this population.^{1–3} However, the high rates of hospitalization have also been attributed to a lack of access to primary and preventative care, particularly in the United States where 50% of homeless people have no health insurance.^{1, 4–7} In a nationally representative sample of persons who used homeless services in the United States, Kushel et al. show that lack of health insurance and African American race/ethnicity, as compared to non-Latino white race/ethnicity, were the only factors significantly associated with a lower odds of self-reported hospitalization.¹ In a subsequent study, Kushel et al. show that being uninsured significantly decreased the likelihood of self-reporting a non-maternal hospitalization in the past year, while food instability and housing instability significantly increased the odds.⁴ Similarly, Lim et al. in their population-based study of homeless women in Los Angeles show that having health insurance was significantly associated with an increased likelihood of hospitalization.⁵

These studies point to the enabling influence of health insurance on access to inpatient hospital services in the United States; however, these findings are likely not applicable in a Canadian setting where individuals have access to universal health insurance coverage. Furthermore, most prior studies of health care utilization in the United States have relied on self-reported data^{1, 8–10} or restricted their analysis to a single health care institution.^{11, 12} The purpose of this study was to identify factors associated with inpatient hospitalizations among a population-based cohort of homeless adults in Toronto, Canada, using comprehensive administrative data. Analyses were stratified by type of inpatient service to

examine the influence of predictors separately for medical/surgical and psychiatric hospitalizations.

METHODS

Study Participants

Recruitment and sampling methods for this study have been described previously.^{13–15} Briefly, a random sample of homeless adults was selected from shelters and meal programs in Toronto, Canada, over 12 consecutive months in 2004–2005. Recruitment was stratified to obtain a 2:1:1 ratio of single adult men (i.e., men without dependent children), single adult women (i.e., women without dependent children), and family adults (i.e., men or women accompanied by a partner and/or dependent children) to ensure adequate sample size for comparison and to approximate the demographic profile of Toronto's homeless population.³ Findings from a pilot study show that about 90% of homeless people in Toronto sleep at shelters, while 10% do not use shelters but use meal programs.¹⁶ Therefore, 90% of the sample was recruited at shelters and the remaining 10% at meal programs.

Homelessness was defined as living within the last seven days at a shelter, public place, vehicle, abandoned building, or someone else's home, and not having a home of one's own.¹⁷ Participants were excluded if they did not meet the definition of homelessness, were unable to communicate in English, were unable to provide informed consent, or were meal program users who had not used a shelter in the past seven days. Participants were also excluded if they did not have a valid provincial health insurance number, as this information was required for linkage to administrative data. All participants provided written informed consent and received \$15 for their participation. The Research Ethics Board at St. Michael's Hospital in Toronto provided ethics approval for this study.

For the purposes of recruitment, families were considered as units. In instances where two adults of the same family unit were present, we randomly selected one adult for inclusion in the analysis. Of the 2,516 single adults and family units who were screened, 882 (35%) were ineligible to participate, and an additional 443 (18%) individuals declined to participate and two were identified as duplicate or invalid records. In total, 1,189 unique adults were included in the study, corresponding to a response rate of 73%.

Survey Instrument

Predisposing, enabling, and need factors were assessed using structured, in-person interviews at baseline within the framework of the Behavioral Model of Health Services Utilization for Vulnerable Populations.¹⁸ Predisposing factors included demographic (e.g., age, family status) and social structural attributes that affect the propensity to use services. Enabling factors included personal, family, and community factors (e.g., social support, perceived barriers to care) that impede or facilitate health service use. Need factors included symptoms or conditions (e.g., physical or mental health status) that precipitate service use.

The presence of alcohol, drug, and mental health problems was assessed using the Addiction Severity Index (ASI).^{19, 20} ASI scores were dichotomized for each subscale (0.17 for alcohol problems, 0.10 for drug problems, and 0.25 for mental health problems) using

cut-off scores for homeless persons.¹⁷ Propensity to underseek care was assessed on a four-point scale for seeking health care for: (i) weight loss of more than 10 pounds in a month when not dieting, (ii) shortness of breath with light exercise or light work, (iii) chest pain when exercising, (iv) loss of consciousness, fainting, or passing out, or (v) bleeding other than nosebleeds and not caused by accident or injury.²¹ One point was assigned for each symptom rated as “a little important” or “not at all important.”

Competing priorities were based on difficulty in meeting shelter, food, clothing, washing, or bathroom needs over the past 30 days using a four-point scale.²² Participants were classified as having competing priorities if they responded “usually” to any of the five items. Health locus of control, a measure of a person’s belief that their health is determined by their own behaviour, was assessed using Form A of the Multidimensional Health Locus of Control (MHLC) instrument for subscales internal control, external control from powerful others, and external control due to chance.²³ Perceived access to financial, instrumental and emotional social support from informal social networks, based on items adapted from Lam and Rosenheck,²⁴ was dichotomized to indicate the presence or absence of social support.²⁵

Perceived health status was measured using the validated 12-item Short Form (SF-12) Health Survey.^{26, 27} SF-12 physical component summary (PCS) and mental component summary (MCS) scores were calculated according to the publishers’ specifications and were standardized to the general U.S. population (mean=50, standard deviation=10), with higher scores representing better overall health status.²⁷ Chronic health conditions were based items from the National Survey of Homeless Assistance Providers and Clients and included diabetes, anemia, high blood pressure, heart disease or stroke, liver problems including hepatitis, arthritis or joint problems, cancer, problems walking, lost limb or other handicap, and HIV infection or AIDS.¹⁷

Administrative Data Linkage

Administrative data were accessed through the Institute for Clinical and Evaluative Services (ICES), an independent, non-profit organization partially funded by the Ontario Ministry of Health and Long-Term Care. Homeless participants were linked to administrative data using a unique 10-digit provincial health number for eligible individuals under the Ontario Health Insurance Plan. In instances where either the participants’ health number could not be obtained (3% of the sample) or the health number provided was not valid (an additional 3%), efforts were made to perform the linkage based on the participant’s first and last name, sex, and date of birth. Overall, linkage was successful for 1,165 (98%) of study participants.

Hospitalization data were obtained from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) and the Ontario Mental Health Reporting System (OMHRS). OMHRS was created in October 2005 to capture clinical, administrative, and resource information for all adult inpatient admissions to mental health beds in the province; it includes inpatient admissions to general hospitals with designated adult inpatient mental health beds, as well as inpatient admissions to specialty psychiatric hospitals and provincial psychiatric hospitals. Prior to October 1, 2005, discharge data for adult inpatient mental health beds were captured in CIHI-DAD. To identify these mental health records in CIHI-DAD, we extracted hospital discharge records where the most responsible service provider

was coded as “psychiatry;” these records were merged with the OMHRS records to create a separate psychiatric hospitalizations dataset. Institutions with designated adult inpatient mental health beds that had previously reported to CIHI-DAD were required to report to both CIHI-DAD and OMHRS during a dual reporting period from October 1, 2005 to March 31, 2006 (end of fiscal year). These duplicate psychiatric hospitalization records were identified in CIHI-DAD using an ICES-derived key variable and excluded from the merged dataset. Encounters related to pregnancy and childbirth were excluded to eliminate the effect of these discharges on sex-specific differences in hospitalization rates.

Analysis

Hospitalization rates were calculated by dividing the total number of discharges by the total period under observation. Dates of death were obtained from the RPDB and used to adjust person-time of observation. Rates were calculated separately for medical/surgical and psychiatric discharges. Reasons for medical/surgical hospitalization were derived based on the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canadian Enhancement (ICD-10-CA) codes for the most responsible diagnosis (i.e., the diagnosis that contributed to the longest duration of stay in hospital).²⁸ Reasons for psychiatric hospitalization were derived based on ICD-10-CA codes for the most responsible diagnosis (for DAD records) or the Diagnostic and Statistical Manual of Mental Disorders, 5th revision (DSM-IV), diagnostic codes for the primary provisional diagnosis at admission (for OMHRS records).²⁹ ICD-10-CA diagnoses were converted into DSM-IV classifications according to specifications provided in Appendix H of the DSM-IV.²⁹

Logistic regression was used to calculate odds ratios (OR) and 95% confidence intervals (CI) comparing (i) homeless participants with at least one medical/surgical discharge during the study period to those without a medical/surgical discharge and (ii) homeless participants with at least one psychiatric discharge during the study period to those without a psychiatric discharge. Backward stepwise selection was used to identify significant predictors, using $p < 0.10$ as the significance level for entry into the model and $p > 0.05$ as the significance level for removal. The demographic group variable was forced into all multivariate regression models regardless of significance. Interaction terms between demographic group and all significant variables were examined to test for effect modification; none of the tested interaction terms were significant. Independent variables were assessed for multicollinearity, and no problems were detected. Social support variables were added to the survey partway through the study enrollment period; consequently, social support data are missing for approximately 20% of participants. These variables were examined in univariate analyses but were not included in multivariate analyses to maximize our analytic sample size. All analyses were performed using SAS 9.2 statistical analysis software (SAS Institute, Cary, NC).

RESULTS

The sample of 1,165 homeless adults included 587 (50.4%) single adult men, 296 (25.4%) single adult women, and 282 (24.2%) adults in families who were mostly single mothers accompanied by their dependent children ($n=201/282$; 71.3%) (Table 1). During the study

period, 227 (19.5%) participants had a medical/surgical hospitalization and 134 (11.5%) had a psychiatric hospitalization, including 48 (4.1%) who had both a medical/surgical and psychiatric hospitalization. These individuals contributed a total of 921 hospitalizations during the study period, of which 548 (59.5%) were medical/surgical and 373 (40.5%) were psychiatric.

The mean rate of medical/surgical hospitalizations was 0.17 discharges per person-year (SD=0.79; range=0.00 to 14.91 discharges per person-year) and the mean rate of psychiatric hospitalizations was 0.09 discharges per person-year (SD=0.38; range=0.00 to 4.82 discharges per person-year). The mean duration of follow-up was 3.9 years (SD=0.3 years; range=1.1–4.3 years). Injuries, poisonings, and other external causes (n=103) were the most common reasons for medical/surgical hospitalization, while schizophrenia and other psychotic disorders (n=147) were the most common reasons for psychiatric hospitalization (Table 2).

Medical/surgical Hospitalizations

Family adults, as compared to single adult males, were relatively less likely to have a medical/surgical discharge during the study period (Table 3). Predisposing factors significantly associated with medical/surgical hospitalization in univariate analyses were older age, black race/ethnicity (as compared to white), birth in Canada, higher monthly incomes, and sexual assault in the past 12 months. Enabling factors significantly associated with medical/surgical hospitalization were having a primary care provider and higher MHLC powerful others subscale scores. In terms of need factors, participants with lower PCS-12 scores and those with a greater number of chronic health conditions were more likely to have a medical/surgical hospitalization.

In adjusted analyses, family adult status remained significantly and independently associated with medical/surgical hospitalization. Other significant factors included birth in Canada, having a primary care provider, lower MHLC powerful others subscale scores, lower PCS-12 scores, and a greater number of chronic health conditions.

Psychiatric Hospitalizations

Family adults were also relatively less likely to have a psychiatric hospitalization during the study period, while single adult females were more likely, as compared to single adult males (Table 4). Predisposing factors significantly associated with psychiatric hospitalization in univariate analyses were having a cumulative lifetime duration of homelessness of ≥ 2 years, being a current smoker, having a mental health problem in the past 30 days, and higher propensity to underseek care scores. Enabling factors significantly associated with psychiatric hospitalization were self-reported unmet needs for mental health care, lower MHLC internal subscale scores, and an absence of social support. In terms of need factors, both lower PCS-12 and lower MCS-12 scores were associated with psychiatric hospitalization.

In adjusted analyses, family adult status remained significantly and independently associated with psychiatric hospitalization during the study period. The association between single adult females and psychiatric hospitalization was marginally significant in adjusted analyses.

Current smokers, those who have mental health problems, and those who have lower MHLIC internal subscale scores had significantly higher odds of psychiatric hospitalization in adjusted analyses.

DISCUSSION

This study examines predisposing, enabling, and need factors associated with medical/surgical and psychiatric discharges from inpatient care among a population-based cohort of homeless adults under a system of universal health insurance. We found that 20% participants had a medical/surgical discharge and 12% had a psychiatric discharge over the course of the study, corresponding to an average annual rate of 0.17 discharges per person-year for medical/surgical hospitalizations and 0.09 discharges per person-year for psychiatric hospitalizations. These findings are consistent with self-reported rates of overnight hospitalization in the past year, which range from 10% to 30%, among homeless populations,^{1, 3-5} and are considerably higher than annual age-standardized acute inpatient hospitalization rates of just 7% for the general population of Ontario.³⁰

Our findings show that homeless adults in families, predominantly homeless women accompanied by their dependent children, were less likely to be hospitalized compared to single adult men. The association was stronger for psychiatric discharges. Homeless families in our study, as compared to single men and women, possess fewer predisposing, enabling and need factors that influence the likelihood of health services use. Homeless families in our sample are younger, have been homeless for shorter durations of time, are more likely to be visible minorities or immigrants, have more education and higher monthly incomes, have fewer chronic health conditions and are less likely to have recent mental health or substance use problems.³¹ Together with previous work, these findings suggest that homeless families are a distinct population who are overall healthier and may have less need for health services, perhaps reflecting a lower burden of physical and psychiatric illness.³² Alternatively, homeless families may have been recruited into our study during a period when they were experiencing temporary or episodic homelessness and may not have been exposed to the same degree of physical, mental/emotional and social stressors as their single adult counterparts experiencing chronic homelessness.^{9, 33} However, the inverse association between family status and hospitalization remained significant even after adjusting for predisposing, enabling and need factors, suggesting the presence of other, possibly unmeasured, factors that may confound this relationship. Immigrants in our study were also less prone to medical/surgical hospitalization during the study period. As with homeless families, recent immigrants may be a distinct subgroup of the homeless population who tend to be healthier with less need for health services.¹⁴ A similar protective effect of immigrant status has been observed for emergency department visits.³⁴

Homeless participants who have a primary care provider tend to have a higher likelihood of medical/surgical hospitalization. This finding is contrary to studies of non-homeless populations that show that continuity of care may prevent hospitalization.^{35, 36} The contradictory finding may result because having a primary care provider improves access to inpatient acute care for homeless adults, independent of the effects of health status. Alternatively, having a primary care provider may serve as a marker for more serious,

complex health conditions that require frequent management in primary care settings. Participants who had stronger beliefs that their health was under external control by powerful others – for example, physicians – were also more likely to have a medical/surgical hospitalization.²³ This finding again highlights the important association between having a primary care provider and the likelihood of hospitalization.

Not surprisingly, need factors were strong predictors of medical/surgical hospitalization. These factors were also associated with the likelihood of psychiatric hospitalization in univariate analyses, although they did not remain significant in the final multivariate model. For psychiatric hospitalization, having a mental health problem in the past month was the strongest predictor of hospitalization in adjusted analyses. These findings are consistent with previous research that suggests that substance abuse and mental illness together account for the majority of hospitalizations among homeless persons.^{37, 38} Hospitalizations due to substance abuse and mental illness as well as preventable conditions such as injuries, poisonings, and other circumstances of external causes comprised the primary reasons for medical/surgical and psychiatric hospitalization in this study.

Current smoking status was also associated with an increased likelihood of psychiatric hospitalization, a somewhat surprising finding, but one that may indicate that substance use is a coping mechanism for mental health problems. The extremely high smoking rates among study participants (>70%) is notable, given that only 17% of Canadians report being current smokers.³⁹ Finally, participants who believed that their health status was the result of their own behavior, as opposed to chance or external control from others, had a decreased likelihood of psychiatric hospitalization.²³

Limitations

Certain limitations to this study should be acknowledged. Health care utilization was assessed using administrative data in Ontario; as such, hospitalizations that occurred out-of-province may have been missed. Predictors of hospitalization were assessed at one point in time using a cross-sectional survey and cannot be assumed to be constant for the entire duration of follow-up. The sampling strategy excluded individuals who do not use shelters or meal programs; however, prior research suggests that this unsheltered homeless population in Toronto is very small.⁴⁰ Homeless participants were required to have a valid provincial health number, which may have biased the sample towards individuals who have better health care access. Furthermore, 18% of homeless individuals who were screened declined to participate, which may have decreased the representativeness of the sample.

Conclusions

The frequent use of inpatient services among homeless persons can have considerable consequences for the health care system, such as longer inpatient stays and higher attributable costs.^{37, 41} In this study, poor health status and the presence of mental health problems were strong predictors of medical/surgical and psychiatric hospitalizations, respectively. The findings also suggest that many of these hospitalizations are potentially avoidable, particularly for medical/surgical hospitalizations where the largest number of diagnoses could be attributed to injuries, poisonings, and other external causes. In contrast,

the large number of psychiatric hospitalizations for schizophrenia and other psychotic disorders may represent a necessary and unavoidable use of mental health services. Improved access to primary and preventative health services for homeless individuals as well as improvements to their social circumstances and living situations, including access to affordable and stable housing,^{37, 41} merit further consideration. Doing so has the potential to reduce the use of costly inpatient health care.

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Table 1

Characteristics of homeless participants

Characteristic	Overall (N=1165)	Medical/surgical Hospitalization (N=227)	Psychiatric Hospitalization (N=134)
Predisposing Factors			
Demographic group, n (%)			
Single adult male	587 (50.4)	127 (56.0)	70 (52.2)
Single adult female	296 (25.4)	60 (26.4)	52 (38.8)
Family adult	282 (24.2)	40 (17.6)	12 (9.0)
Age (years), mean (SD)	36.1 (12.4)	40.1 (13.4)	35.6 (11.4)
Lifetime duration of homelessness, n (%)			
Less than 2 years	584 (50.1)	106 (46.7)	55 (41.0)
2 years or more	581 (49.9)	121 (53.3)	79 (59.0)
Race/ethnicity, n (%)			
White	650 (55.8)	139 (61.2)	76 (56.7)
Black	260 (22.3)	36 (15.9)	30 (22.4)
Aboriginal	96 (8.2)	29 (12.8)	12 (9.0)
Other visible minorities	159 (13.7)	23 (10.1)	16 (11.9)
Place of birth, n (%)			
Canada	796 (68.3)	173 (76.2)	97 (72.4)
Outside Canada	369 (31.7)	54 (23.8)	37 (27.6)
Highest level of education, n (%)			
Some high school or less	587 (50.5)	123 (54.2)	72 (53.7)
High school diploma or equivalent	248 (21.3)	39 (17.2)	25 (18.7)
College/vocational training or higher	327 (28.1)	65 (28.6)	37 (27.6)
History of traumatic brain injury, n (%)			
Physical assault in past 12 months, n (%)	330 (28.6)	70 (31.1)	35 (26.1)
Sexual assault in past 12 months, n (%)	63 (5.5)	20 (8.9)	12 (9.0)
Current smoker, n (%)	826 (71.0)	173 (76.2)	110 (82.1)
Alcohol problem in past 30 days, ^a n (%)	339 (29.1)	72 (31.7)	36 (26.9)
Drug problem in past 30 days, ^a n (%)	458 (39.1)	96 (42.3)	57 (42.5)
Mental health problem in past 30 days, ^a n (%)	438 (37.6)	91 (40.1)	83 (61.9)
Propensity to underseek care score, n (%)			
0	670 (57.5)	135 (59.5)	64 (47.8)
1	228 (19.6)	45 (19.8)	32 (23.9)
2 or more	267 (22.9)	47 (20.7)	38 (28.4)
Enabling Factors			
Monthly income, n (%)			
<\$500	562 (49.5)	96 (43.1)	62 (46.6)
\$500–\$999	313 (27.6)	74 (33.2)	47 (35.3)
\$1,000	260 (22.9)	53 (23.8)	24 (18.1)
Has a primary care provider, n (%)	865 (74.4)	190 (83.7)	107 (79.9)

Characteristic	Overall (N=1165)	Medical/surgical Hospitalization (N=227)	Psychiatric Hospitalization (N=134)
Unmet need for health care, n (%)	192 (16.5)	37 (16.3)	23 (17.2)
Unmet need for mental health care, n (%)	121 (10.5)	28 (12.4)	28 (21.1)
Competing priorities, n (%)	62 (5.3)	11 (4.9)	10 (7.5)
MHLC internal subscale score, mean (SD)	27.6 (5.5)	27.2 (6.0)	26.2 (6.3)
MHLC chance subscale score, mean (SD)	19.6 (6.4)	19.8 (6.3)	19.8 (6.8)
MHLC powerful others subscale score, mean (SD)	21.0 (6.9)	22.4 (6.5)	21.9 (6.5)
Social support – loan, n (%)	647 (68.0)	110 (64.7)	64 (59.3)
Social support – ride to appointment, n (%)	551 (58.0)	88 (51.8)	48 (44.4)
Social support – suicide, n (%)	655 (69.5)	114 (67.1)	56 (51.9)
Need Factors			
PCS-12 score, mean (SD)	46.0 (11.2)	41.4 (12.5)	43.7 (12.1)
MCS-12 score, mean (SD)	40.7 (13.2)	40.0 (12.8)	38.2 (12.8)
Number of chronic health conditions, ^b n (%)			
None	470 (40.4)	54 (23.8)	49 (36.6)
1	324 (27.8)	58 (25.6)	34 (25.4)
2	202 (17.4)	54 (23.8)	25 (18.7)
3 or more	168 (14.4)	61 (26.9)	26 (19.4)

^a Alcohol, drug, and mental health problems in the past 30 days were assessed using the Addiction Severity Index (ASI).^{18–20}

PCS = Physical Component Summary; MCS = Mental Component Summary; MHLC = Multidimensional Health Locus of Control; SD = standard deviation

^b Chronic health conditions include diabetes; anemia; hypertension; heart disease and stroke; liver problems (including chronic viral hepatitis); arthritis or joint problems; cancer; physical handicaps; or HIV/AIDS.

Table 2

Most responsible diagnosis for hospitalization

Most Responsible Diagnosis ^c	N (%)
Medical/surgical Hospitalizations^d	
Infectious and parasitic diseases	38 (6.9)
Neoplasms	23 (4.2)
Endocrine, nutritional and metabolic diseases	17 (3.1)
Mental and behavioural disorders	19 (3.5)
Diseases of the nervous system	18 (3.3)
Diseases of the circulatory system	48 (8.8)
Diseases of the respiratory system	48 (8.8)
Diseases of the digestive system	90 (16.4)
Diseases of the skin and subcutaneous tissue	23 (4.2)
Diseases of the musculoskeletal system and connective tissue	32 (5.8)
Diseases of the genitourinary system	33 (6.0)
Symptoms, signs and abnormal clinical and laboratory findings	34 (6.2)
Injury, poisoning and certain other consequences of external causes	103 (18.8)
Factors influencing health status and contact with health services	14 (2.6)
Other diagnoses	8 (1.5)
TOTAL	548 (100.0)
Psychiatric Hospitalizations^e	
Delirium, dementia, and amnestic and other cognitive disorders	6 (1.6)
Substance-related disorders	52 (13.9)
Schizophrenia and other psychotic disorders	147 (39.4)
Mood disorders	67 (18.0)
Adjustment disorders	6 (1.6)
Personality disorders	11 (2.9)
Other diagnoses	10 (2.7)
Missing diagnoses ^f	74 (19.8)
TOTAL	373 (100.0)

^cFor CIHI-DAD records: based on most responsible diagnosis using ICD-10-CA diagnostic codes; for OMHRS records: based on primary provisional diagnosis at admission using DSM-IV diagnostic codes.

^dAmong 227 (19.5%) homeless participants with medical/surgical hospitalization during study period.

^eAmong 134 (11.5%) homeless participants with psychiatric hospitalization during study period.

^fPrior to fiscal year 2008/2009, provisional diagnosis at admission was not a mandatory field in OMHRS for hospital stays <72 hours.

Table 3

Odds ratios and 95% confidence intervals for predictors of medical/surgical hospitalization during study period, 2004–2009

Characteristic	Univariate Model		Multivariate Model	
	OR (95% CI)	p-value	AOR (95% CI)	p-value
Predisposing Factors				
Demographic group				
Single adult male (ref)	1.00		1.00	
Single adult female	0.92 (0.65–1.30)	0.639	0.84 (0.58–1.21)	0.339
Family adult	0.60 (0.41–0.88)	0.010	0.63 (0.42–0.96)	0.031
Age (years)	1.03 (1.02–1.05)	<0.001		
Lifetime duration of homelessness				
Less than 2 years (ref)	1.00			
2 years or more	1.19 (0.89–1.59)	0.249		
Race/ethnicity				
White (ref)	1.00			
Black	0.59 (0.40–0.88)	0.010		
Aboriginal	1.59 (0.99–2.56)	0.055		
Other visible minorities	0.62 (0.39–1.01)	0.052		
Place of birth				
Outside Canada (ref)	1.00		1.00	
Canada	1.62 (1.16–2.26)	0.005	1.48 (1.03–2.12)	0.035
Highest level of education				
Some high school or less (ref)	1.00			
High school diploma or equivalent	0.70 (0.47–1.05)	0.082		
College/vocational training or higher	0.94 (0.67–1.31)	0.700		
History of traumatic brain injury	1.17 (0.872013;1.56)	0.302		
Physical assault in past 12 months	1.16 (0.85–1.60)	0.352		
Sexual assault in past 12 months	2.01 (1.16–3.48)	0.014		
Current smoker	1.39 (1.00–1.95)	0.053		
Alcohol problem in past 30 days ^g	1.17 (0.85–1.60)	0.333		
Drug problem in past 30 days ^a	1.17 (0.87–1.57)	0.306		
Mental health problem in past 30 days ^a	1.14 (0.85–1.53)	0.388		
Propensity to underseek care score				
0 (ref)	1.00			
1	0.97 (0.67–1.42)	0.893		
2 or more	0.85 (0.59–1.22)	0.374		
Enabling Factors				
Monthly income				
<\$500 (ref)	1.00			
\$500–\$999	1.50 (1.07–2.11)	0.019		

Characteristic	Univariate Model		Multivariate Model	
	OR (95% CI)	p-value	AOR (95% CI)	p-value
\$1,000	1.24 (0.86–1.81)	0.254		
Has a primary care provider	1.99 (1.36–2.90)	<0.001	1.77 (1.18–2.67)	0.006
Unmet need for health care	0.98 (0.66–1.45)	0.920		
Unmet need for mental health care	1.27 (0.81–2.00)	0.293		
Competing priorities	0.89 (0.45–1.73)	0.719		
MHLC internal subscale score	0.98 (0.96–1.01)	0.214		
MHLC chance subscale score	1.01 (0.98–1.03)	0.583		
MHLC powerful others subscale score	1.04 (1.02–1.06)	<0.001	1.03 (1.01–1.06)	0.006
Social support – loan	0.83 (0.59–1.18)	0.305		
Social support – ride to appointment	0.74 (0.53–1.03)	0.070		
Social support – suicide	0.87 (0.61–1.25)	0.453		
Need Factors				
PCS-12 score	0.96 (0.94–0.97)	<0.001	0.98 (0.96–0.99)	0.003
MCS-12 score	1.00 (0.98–1.01)	0.373		
Number of chronic health conditions ^h				
None (ref)	1.00		1.00	
1	1.68 (1.12–2.51)	0.011	1.46 (0.95–2.22)	0.081
2	2.81 (1.84–4.28)	<0.001	2.09 (1.31–3.33)	0.002
3 or more	4.39 (2.88–6.71)	<0.001	2.59 (1.55–4.31)	<0.001

^gAlcohol, drug, and mental health problems in the past 30 days were assessed using the Addiction Severity Index (ASI).^{18–20}

CI = confidence interval; OR = odds ratio; PCS = Physical Component Summary; MCS = Mental Component Summary; MHLC = Multidimensional Health Locus of Control; SD = standard deviation

^hChronic health conditions include diabetes; anemia; hypertension; heart disease and stroke; liver problems (including chronic viral hepatitis); arthritis or joint problems; cancer; physical handicaps; or HIV/AIDS.

Table 4

Odds ratios (OR) and 95% confidence intervals (CI) for predictors of psychiatric hospitalization among homeless participants during study period, 2004–2009

Characteristic	Univariate Model		Multivariate Model	
	OR (95% CI)	p-value	AOR (95% CI)	p-value
Predisposing Factors				
Demographic group				
Single adult male (ref)	1.00		1.00	
Single adult female	1.57 (1.07–2.32)	0.023	1.49 (0.99–2.26)	0.059
Family adult	0.33 (0.18–0.62)	<0.001	0.36 (0.18–0.69)	0.002
Age (years)	1.00 (0.98–1.01)	0.601		
Lifetime duration of homelessness				
Less than 2 years (ref)	1.00			
2 years or more	1.51 (1.05–2.18)	0.026		
Race/ethnicity				
White (ref)	1.00			
Black	0.99 (0.63–1.54)	0.948		
Aboriginal	1.08 (0.56–2.07)	0.819		
Other visible minorities	0.85 (0.48–1.49)	0.562		
Place of birth				
Outside Canada (ref)	1.00			
Canada	1.25 (0.83–1.86)	0.283		
Highest level of education				
Some high school or less (ref)	1.00			
High school diploma or equivalent	0.80 (0.50–1.30)	0.369		
College/vocational training or higher	0.91 (0.60–1.39)	0.671		
History of traumatic brain injury	0.99 (0.69–1.42)	0.957		
Physical assault in past 12 months	0.87 (0.58–1.31)	0.500		
Sexual assault in past 12 months	1.89 (0.98–3.65)	0.057		
Current smoker	2.01 (1.27–3.19)	0.003	1.78 (1.08–2.95)	0.025
Alcohol problem in past 30 days ⁱ	0.88 (0.59–1.32)	0.545		
Drug problem in past 30 days ^a	1.16 (0.81–1.68)	0.417		
Mental health problem in past 30 days ^a	3.10 (2.14–4.49)	<0.001	2.74 (1.86–4.03)	<0.001
Propensity to underseek care score				
0 (ref)	1.00			
1	1.55 (0.98–2.43)	0.060		
2 or more	1.57 (1.02–2.41)	0.039		
Enabling Factors				
Monthly income				
<\$500 (ref)	1.00			
\$500–\$999	1.43 (0.95–2.14)	0.088		

Characteristic	Univariate Model		Multivariate Model	
	OR (95% CI)	p-value	AOR (95% CI)	p-value
\$1,000	0.82 (0.50–1.35)	0.433		
Has a primary care provider	1.42 (0.91–2.21)	0.125		
Unmet need for health care	1.05 (0.65–1.70)	0.832		
Unmet need for mental health care	2.67 (1.67–4.26)	<0.001		
Competing priorities	1.52 (0.75–3.06)	0.245		
MHLC internal subscale score	0.95 (0.92–0.98)	0.002	0.95 (0.92–0.98)	0.003
MHLC chance subscale score	1.00 (0.98–1.03)	0.753		
MHLC powerful others subscale score	1.02 (1.00–1.05)	0.107		
Social support – loan	0.65 (0.43–0.98)	0.039		
Social support – ride to appointment	0.54 (0.36–0.81)	0.003		
Social support – suicide	0.42 (0.28–0.64)	<0.001		
Need Factors				
PCS-12 score	0.98 (0.97–1.00)	0.012		
MCS-12 score	0.98 (0.97–1.00)	0.018		
Number of chronic health conditions ^j				
None (ref)	1.00			
1	1.01 (0.63–1.60)	0.975		
2	1.21 (0.73–2.03)	0.459		
3 or more	1.57 (0.94–2.63)	0.083		

ⁱ Alcohol, drug, and mental health problems in the past 30 days were assessed using the Addiction Severity Index (ASI).^{18–20}

CI = confidence interval; OR = odds ratio; PCS = Physical Component Summary; MCS = Mental Component Summary; MHLC = Multidimensional Health Locus of Control; SD = standard deviation

^j Chronic health conditions include diabetes; anemia; hypertension; heart disease and stroke; liver problems (including chronic viral hepatitis); arthritis or joint problems; cancer; physical handicaps; or HIV/AIDS.