

Impact of co-occurring mental disorders and chronic physical illnesses on frequency of emergency department use and hospitalization for mental health reasons

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Author contribution statement

LG and MJF designed the study with the collaboration of the other authors. LG performed the statistical analysis. GG and LG wrote the first version of the manuscript, which was revised by MJF and XM. All authors have read and approved the final manuscript.

Keywords

Co-occurring mental disorders, chronic physical illnesses, emergency department (ED) use, Hospitalization, Clinical variables, sociodemographic variables, service use variables

Abstract

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Background: Patients with mental disorders are at high risk for a wide range of chronic physical illnesses (CPI), often resulting in greater use of acute care services. This study estimated risk of emergency department (ED) use and hospitalization for mental health reasons among 678 patients with mental disorders and CPI compared to 1,999 patients with mental disorders only. Methods: Patients visiting one of six Quebec (Canada) ED for mental health reasons and at onset of a mental disorder in 2014-15 (index year) were included. Negative binomial models comparing the two groups estimated risk of ED use and hospitalization at 12-month follow-up to index ED visit, controlling for clinical, sociodemographic, and service use variables. Results: Patients with mental disorders, more severe overall clinical conditions and those who received more intensive specialized mental health care had higher risks of frequent ED use and hospitalization. Continuity of medical care protected against both ED use and hospitalization, while general practitioner consultations protected against hospitalization only. Patients aged 65+ had lower risk of ED use, whereas risk of hospitalization was higher for the 45-64 versus 12-24- year age groups, and for men versus women. Conclusion: Strategies including assertive community treatment, intensive case management, integrated co-occurring treatment, home treatment and shared care may improve adequacy of care for patients with mental disorders-CPI, as well as those with mental disorders only whose clinical profiles were severe. Prevention and outreach strategies may also be promoted, especially among men and older age groups.

Contribution to the field

Patients with mental disorders and chronic illnesses were more likely than those with mental disorders only to experience frequent emergency department use and hospitalization for mental health reasons. Findings also confirmed that patients with more severe medical conditions who received intensive specialized mental health care were at greater risk for frequent emergency department use and hospitalization. Older patients were at less risk for emergency department use, but these patients, as well as men, were more frequently hospitalized. Higher continuity of physician care protected against frequent emergency department use and hospitalization. Strategies such as assertive community treatment, intensive case management, integrated co-occurring treatment, home treatment and shared care between psychiatrists and primary care services may be implemented to improve the adequacy of care for patients with mental disorders and chronic illnesses or for those with mental disorders only whose clinical profiles are relatively more severe. Prevention and outreach strategies should also be strongly promoted to reduce frequent emergency department use and hospitalization among older age groups, and particularly among men.

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In review

Impact of co-occurring mental disorders and chronic physical illnesses on frequency of emergency department use and hospitalization for mental health reasons

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Keywords: co-occurring mental disorders, chronic physical illnesses, emergency department use, hospitalization, clinical variables, sociodemographic variables, service use variables

Impact of co-occurring mental disorders and chronic physical illnesses on frequency of emergency department use and hospitalization for mental health reasons

1. Introduction

—Emergency department (ED) and inpatient hospital services are among the costliest forms of healthcare (1, 2), often serving as a barometer for the quality of healthcare systems (3-5). Frequent ED use or hospitalization may reflect poor access, continuity, or inappropriate outpatient care (3, 6). Patients with mental disorders (MD) including substance-related disorders (SRD) and with chronic physical illnesses (CPI) are high ED users, which ~~substantially~~ contributes substantially to ED overcrowding (7-9). They are also hospitalized and readmitted more often than patients without MD or CPI (10-13). Co-occurring CPI frequently occurs among patients with MD (14-18). MD-CPI are associated with patient disability (19), social dysfunction (20), treatment complications (21), poor quality of life (19) and higher risk of mortality (22). Patients with MD-CPI also face challenges in seeking care (6, 23), as healthcare systems tend to favor treatment of individual diseases rather than multimorbidity, ~~whereas~~ the treating MD and CPI in isolation is generally ineffective (24, 25). As well, CPI in patients with MD are often under-diagnosed or undertreated (18, 23), particularly among patients with serious MD-CPI making limited use of primary care (23, 26, 27). Other care-related challenges involve socio-economic barriers (28) and social stigma (29). General practitioners (GP) are usually viewed as inadequately equipped to treat more ~~complex~~serious or ~~serious~~complex MD (28, 30).

The overall, combined effect of ~~overall MD and CPI, compared to MD only, on~~ acute care service use for mental health (MH) reasons among patients with MD and CPI, compared with MD only, has rarely been assessed. Studies have more often investigated ~~more~~ ED use and hospitalization for medical reasons. ~~Among Of~~ the few studies that compareding MD-CPI with

MD or CPI only, most found that patients with MD-CPI were more likely than those with CPI or MD only to use ED frequently (31-33), to require hospitalization (34) and to face longer duration of hospital stay (32). ~~However~~Moreover, numerous studies have compared ED use and hospitalization for MH reasons, but only in terms of specific CPI and MD (31, 33, 35), e.g., diabetes and schizophrenia or serious MD (31, 33, 35), cancer and common MD (32), epilepsy and MD (36), migraine and MD (34), and CPI and MD among self-harming adolescents (25).

Most studies comparing ing patients with MD-CPI to those with MD or CPI only have have ~~also~~ controlled for few clinical and socio-demographic variables (18, 25, 33-37). ~~Study +~~Results showed that the risk of frequent ED use and hospitalization increased with ~~CPI-severity~~, of CPI ~~in among~~ patients with serious MD (24, 33) or depressive disorders (18). Being a ~~womean~~, younger and living in poorer neighbourhoods ~~were reported~~ly ~~increased~~ing ED use among patients with co-occurring schizophrenia and diabetes (31). Overall, this literature tended to omit ~~any~~ assessments of service use variables, although some studies did find that patients with MD-CPI ~~with higher and~~ more frequent ED ~~users use~~ were also more likely to use outpatient services, take medications (34, 38) and to be covered by health insurance (36).

Better knowledge of how MD-CPI, versus MD only, impact ED use and hospitalization for MH reasons, controlling for service use, may contribute to improvement in health service management (39). Adequate intensity, continuity, and diversity of care for patients with CPI or MD and access to a family doctor or psychiatrist, particularly among patients with MD-CPI, could lower rates of ED use or preventable hospitalization. This study ~~thus~~ aimed to compare frequencies of ED use and hospitalization for MH reasons among patients with MD only compared ~~with to~~ patients with MD-CPI, controlling for clinical, sociodemographic, and ~~various~~ service use variables. We hypothesized that patients with MD-CPI would make more frequent use of ED and

experience more frequent hospitalization for MH reasons, and that both (1) severity of MD-CPI and (2) less intensity, diversity or continuity of service use would increase frequency of ED use and hospitalization.

2. Methods

2.1. Study ~~context~~~~population and design~~

This study was conducted in the province of Quebec~~province of (Canada)~~, which ~~constituted~~ accounts for 22% of the Canadian population. Responsibility for ~~In~~ Quebec, health and social services ~~is are~~~~were~~ integrated withi~~in~~ a single~~ame~~ ministry. ~~M~~Hental health ~~is was~~ one of ~~the~~ nine service programs ~~of~~under the Quebec Ministère de la Santé et des Services sociaux (Ministry of Health and Social Services) (40). A major global health reform in 2015 lead to the creation of 22 integrated health and social services centers, resulting into the~~resulting from the~~ merger of almost all~~nearly all health and social~~~~previous~~ institutions, establishments found in each network like hospitals, community health care centers, and ~~and~~ nursing homes, with, foster homes, insuring all ~~healthcare and social services~~ in each of the ~~their~~ respective networks. ~~MH~~~~s~~ Specialized MH services in ~~these~~ integrated networks are offered in psychiatric departments of general hospitals or ~~by~~in psychiatric hospitals. ~~Public~~~~MH~~ ~~p~~Public primary care MH services are offered ~~by~~ ~~community health centers and~~ by GP general practitioners working in private medical clinics, in most cases, and or now mostly in family medicine groups. Over 60% of Quebec GP work in these family group group practices, benefitting from added psychosocial clinicians like nurses and social workers and enhanced secretarial support. They Family medicine groups iensure ~~ensure~~ patient registration, better access to care and care continuity through expanded days and hours of medical coverage, including walk-in clinics (41). ~~MH~~~~pr~~Primary ~~MH~~ care is also provided in community healthcare centers offering ~~mainly~~ mainly psychosocial interventions, and where~~although~~ ~~some~~

GP also worked there on a salaried basis, ~~contrary to~~ whereas most physicians are paid remunerated on a fee-for-service basis. ~~this later offering GP group practice and multidisciplinary teams.~~ ~~MH Community MH organizations (e.g., crisis centers, self-help groups) and psychologists working in private clinics~~ practice complete the Quebec MH system. ~~—MH community organizations (e.g. crisis centers, self-help groups, supported employment, etc.) and psychologists working in private clinics complete the Quebec MH system.~~

2.2. Study population and design

This 4-year cohort study (2012-13 to 2015-16) investigated 12,000 patients identified through provincial ~~medical administrative clinical administrative~~ databases who visited at least one of six Quebec ~~(Canada)~~ ED in 2014-15 (index year) for MH reasons, including SRD. Only patients at ~~with a new~~ onset of a MD at index ED visits, i.e., incident cases ~~who had not received MD diagnosis not diagnosed with MD~~ in the ~~2~~ previous 2 years, were included in the study (n=2,819). Of these patients, 142 who were ~~participants were excluded because they had~~ diagnosed with incident ~~incident chronic being incidents cas for chronic~~ physical illnesses ~~, after their~~ date of their index ~~-ED index date of visit recruitment in 2014-2015 (90 participants)~~ were excluded from the study, or they were as were those hospitalized for more than 90 days after following the index-first ED visit (42). ~~Of these, 142 patients hospitalized more than 90 days after index ED visits or during the 12-month follow-up period were excluded from the study, preventing us to adequately asses because outpatient care for these patients the outcomes measured in over the following 12-month follow-up period would~~ could not be adequately assessed. Bringing the final sample was thus consisted ~~of~~ of ~~to n=~~ 2,677 patients, 12 + years old ~~or older~~ and eligible for health insurance under the Quebec ~~H~~ health Insurance care Regime (*Régie de l'assurance maladie du Québec* [RAMQ]). ~~Pour~~ Patients were further divided into two groups: those with MD-CPI (n=678: 25% ~~: 75%~~) and/or

patients with MD only (n=1,999: 75%). CPI were identified for the two-year period preceding index ED visits in 2014-15, at which time a incident MD cases new-onset MD were diagnosed (43). Six ED were selected for the study from located in major Quebec cities located in within university or peripheral health regions were selected for the study. The Quebec Access to Information Commission authorized the study and the ethics committee of a MH university institute approved the study protocol.

2.2.2.3. 2.2 Data sources

Data for the study were obtained from the Quebec Health Insurance Regime (RAMQ) database, which contains Quebec medical administrative data including billing files for medical services provided by physicians on a fee-for-service basis, patient diagnoses and patient sociodemographic demographic and socioeconomic information, including material and social deprivation indices. Only 6% of billing occurred outside the public system in 2016-17 (RAMQ, 2020). Hospitalization data were obtained from the “Maintenance et exploitation de données pour l’étude de la clientèle hospitalière” (Med-Echo) database. ED use data (e.g., reasons for ED visits) were provided by the “The Quebec ED database (Banque de données commune des urgences)” (BDCU) provided additional information (e.g., reasons for ED visits) BDCU database, while the “The local community health service center database (Système d’information clinique et administrative des centres locaux de services communautaires)” (I-CLSC) database offer provided complementary data on MH primary care psychosocial interventions and GP medical care provided by salaried GP paid on salary dispensed in services community healthcare centers. Data from these databases sources were merged for each patient using a unique encrypted identifier.

2.4.3 Variables

The dependent variables were frequency of ED use and frequency of hospitalization for MH reasons at 12 months ~~after following the 2014-15-index ED visits in 2014-2015,~~ with MH including SRD and suicidal behaviors (e.g., ideation, ~~suicide-attempts~~). ED use or hospitalization for physical conditions (primary or secondary diagnoses) were excluded. Main independent variables were the two groups compared: MD-CPI and MD only. Control variables included clinical, sociodemographic, and service use variables. Clinical variables involved ~~various~~-MD, SRD and CPI, with severity -levels of severity levels of CPI (0-3+) ~~measured with based on~~ the Elixhauser Comorbidity Index. ~~The diagnoses for MD or SRD were excluded for calculate for Elixhauser Comorbidity Index, so 27 CPI for two years period prior to index ED visits. (44, 45).~~ MD included common MD (adjustment, depressive and anxiety disorders), serious MD (schizophrenia spectrum and other psychotic disorders, bipolar disorders), and personality disorders, ~~while and~~ SRD included (alcohol and drug use and induced disorders, ~~and drug-related disorders: abuse or dependence, induced disorders,~~ intoxication and withdrawal). CPI comprised consisted of major illness categories (e.g., hypertension, liver or valvular illnesses, coagulopathy). ~~The Four diagnoses categories involving MD and SRD were~~ are ~~excluded from the original Elixhauser Comorbidity Index list of 31 CPI, the four diagnostics of MD and SRD were excluded~~ (44, 46). Diagnostic codes for MD, SRD, and ~~CPI and MD from~~ the RAMQ were based on the International Classification of Diseases Ninth Revision (ICD-9); ~~and from those in the~~ MED-ECHO and ~~the~~ BDCU on the Tenth Revision (ICD-10-CA) (Table 1). ~~The Elixhauser Comorbidity Index provided measures on 27 CPI for the two year period prior to index ED visits. These RAMQ e-codes for definition cases from for case definition database RAMQ have good reliability and sensitivity (43, 47, 48). The diagnoses for MD or SRD were excluded for calculate for Elixhauser Comorbidity Index, so 27 CPI for two years period prior to index ED visits.~~

Sociodemographic variables measured at index ED visits included age, sex, and material and social deprivation. Deprivation indices were calculated using based on the smallest dissemination areas where an individual lived place of residence as determined by postal code and reported in the 2011 derived from the 2011 Canadian census. The Material Deprivation Index measures the ratio in a area of population employment, average income and number of individuals without a high school diploma for a given area in an area; while the Social Deprivation Index calculates proportions of individuals living alone, without spouse, and single-parent families (49). Deprivation indices were calculated using the smallest dissemination areas determined by postal code, from the 2011 Canadian census. Both indices are classified in five quintiles, the fifth representing highest level of deprivation. In this study, material and social deprivation were regrouped and tested divided into three groups: least deprived (quintiles 1-2), moderately deprived (quintile 3) and most deprived (quintiles 4-5) or, with with no assignment, including or not assigned for. This last group, those later included including homeless individuals who were homeless, incarcerated or living in or people, in jail or in other institutions such as nursing homes.)

Service use variables measured at 12-month follow-up were to index ED visits controlled for intensity, continuity, and diversity of patient care, as possible which may influences on ED use and hospitalization. These variables included: frequency of consultations with usual GP, or usual outpatient psychiatrist; main medical-physician care-provider (none, GP only, psychiatrist only, both GP and psychiatrist or no main provider); continuity of physician care; and number of psychosocial MH interventions in local community health care service centers. To qualify as U“usual GP”, was defined as having at least two consultations had to have been made with a single GP, or at least two consultations with more than one GP working in the same family medicine group (50). Over 60% of Quebec GP work in family group practices, benefitting from

multidisciplinary teams including nurses and other psychosocial clinicians (e.g., social workers) and enhanced secretarial support. They ensure patient registration, better access to care and care continuity through expanded days and hours of medical coverage, including walk-in clinics. Regarding “usual psychiatrist”, if the patients who made had only one out-patient psychiatric consultation had to have made, he/she must have had at least two consultations with his/her their GP, which referred to as collaborative care (51). Continuity of physician care was measured with the Usual Provider Continuity Index, which described the proportion of visits to the usual GP and usual outpatient psychiatrist of total visits made (52), with a score of ≥ 0.61 as the cut-off for high continuity of care (53). Interventions in local community health service centers referred to psychosocial interventions (excluding GP interventions) provided by multidisciplinary psychosocial MH teams, mainly involving individual or group therapy.

2.5.4. Data analyses

Descriptive analyses were performed comparing the two main independent variables (patients with MD-CPI and MD only) and sociodemographic, clinical and service use control variables and both dependent variables (or outcomes for: ED use and hospitalization). Frequencies and percentages were calculated for all variable each control variable for: CPI those only CPI. As missing values were less fewer than 0.5%, and complete case analysis was ere thus used (54). The intraclass correlation coefficient (ICC) was small (0.036), indicating that low correlation among patients in hospital settings was low, and making further multilevel analysis unnecessary multilevel analysis. unnecessary. Intercorrelation tests were also produced, ed to analyzing associations between each independent and control variable; , and variables those with correlation coefficients > 0.7 were eliminated. Negative binomial models were developed, ed to explore differences between the two main independent variables (MD-CPI and MD only) on the

outcomes, frequency of ED use and frequency of hospitalization for MH reasons at 12-month follow-up to index ED visits to the (2014-2015) index visit, controlling for key clinical, sociodemographic, and service use variables. Negative binomial analysis showed a better goodness-of-fit than results for the zero-inflated models. Based on the Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC), as criteria for the model selection, the models with the smallest AIC or BIC were chosen as the final multivariate models. Interactions between sex and the patient groups were not significant. Data analysis was performed using STATA 17.0 software.

Descriptive analyses were performed for the dependent variables and control variables. Frequencies and percentages were calculated for each control variable and the two groups, patients with MD only and with MD-CPI. Missing values were less than 0.5%, using complete case analysis (54). The intraclass correlation coefficient (ICC) was small (0.036), indicating that correlation among patients in hospital settings was low and multilevel analysis unnecessary. Correlation tests were used to test the association between variables. Using the Akaike's Information Criterion (AIC) and Bayesian information criterion (BIC) as criteria for model selection, negative binomial models showed better goodness-of-fit than a zero-inflated model so were used to explore differences between the two patient groups on the main outcomes, frequency of ED use and frequency of hospitalization for MH reasons at 12-month follow-up to index ED visits (2014-2015), controlling for key clinical, sociodemographic, and service use variables. A final model with smallest AIC or BIC was chosen. Interactions between sex and the patient groups were not significant. Data analysis was performed using STATA 17.0 software.

3. Results

At 12-month follow-up, 10% of the cohort (95% CI: 9-11) had made no ED visits, 51% (95% CI: 48-52) only one, and 39% (95% CI: 37-40) two or more visits for MH reasons, with a mean of 1.82 visits (SD: 2.08; range: 0-26; median: 1; IQR: 1), while 77% were not hospitalized (mean: 0.29; SD: 0.62; range: 0-9; median: 0; IQR: 1). Of the 2,677 patients, 52% (95% CI: 50-54) had common MD, 19% (95% CI: 17-20) serious MD, 12% (95% CI: 11-13) personality disorders and 21% (95% CI: 20-23) SRD (Table 2). Regarding CPI, cardiovascular illnesses (35%; 95% CI: 33-37) were most prevalent, followed by chronic pulmonary illnesses and complicated or uncomplicated diabetes (16% each; 95% IC: 14-18) (Figure 1). However, CPI severity index levels were low, with 89% (95% CI: 87-90) in cases having a score (of index 0). Of the 2,677 patients, 37% (95% CI: 35-39) of patients were 25-44 years old and 52% (95% CI: 50-54) were men. Ratings of 4 and 5, or not assigned, in the Material and Social Deprivation Indices were rated 4 and 5 or not assigned were, for 45% (95% CI: 43-47) for material deprivation and 62% (95% CI: 60-64) for social deprivation of the sample respectively. For this cohort At 12-month follow-up, 10% (95% CI: 9-11) of patients had made no ED visits, 51% (95% CI: 48-52) only one, and 39% (95% CI: 37-40) two or more visits for MH reasons, with a mean 1.82 visits (SD: 2.08; (range: 0-26; median: 1; IQR: 1 SD: 2.08). Regarding hospitalization, 77% were not hospitalized (mean: 0.29; SD: 0.62; range: 0-9; median: 0; IQR: 1 SD: 0.62) during 12-month follow-up. Of the 2,677 patients, 52% had common MD, 19% serious MD, 12% personality disorders and 21% SRD (Table 2). After Following index ED visits, 51% (95% CI: 49-52) and 68% (95% CI: 67-70) reported no consultation with their usual GP or psychiatrist; 37% (CI: 35-39) of the sample had no main physician provider (either GP or psychiatrist), while GP were assigned as the main providers for 31% (95% CI: 29-33%) of the patients. In For the entire sample cohort Of the patients, 41% (95%

CI: 39-42) received high scores for continuity of physician care, and 30% (95% CI: 286-323) for psychosocial-MH interventions in local-community health care service-centers.

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Table 3 shows comparative results for ~~MD-only and~~ MD-CPI and MD only on frequency of ED use at 12-month follow-up, controlling for clinical, sociodemographic, and service use variables. Risk of ED use among Ppatients with MD-CPI ~~had a~~increased 4517% (IRR=1.4517; 95% CI=1.05-1.2630) higher risk of frequent ED use compared to those with MD only. SRD increased the risk by to 39% (IRR=1.3439; 95% CI=1.4923-1.584), while severity scores for chronic illnesses ranged from 1 to 3, increasing risk by to 39% (IRR=1.39; 95% CI=1.2317-1.5665) for patients with a severity score of 1 and by to up to by as high as 8440% (IRR=1.8440; 95% CI=1.1759-2.131.67) for those scoring 23. Patients 65 years+ had 2825% (IRR= 0.7275; 95% CI= 0.6164- 0.84) less risk of frequent-ED use versus patients-those 12-24 years old. ED use increased of 25% (IRR=1.25; 95% CI=1.12-1.39) among patients having 1-3 consultations with their usual psychiatrist or 1-3 psychosocial interventions in community healthcare centers (IRR=1.25; 95% CI=1.14-1.37); while ED use augmented of 31% among patients having 4+ consultations (IRR=1.31; 95% CI=1.18-1.46) with their usual psychiatrist and of 27% (IRR=1.27; 95% CI=1.14-1.40) among those having 4+ psychosocial interventions in community healthcare centers. Patients who consulted their psychiatrist and were followed in local community health service centers likely make more use of ED, at with 25% (IRR=1.25, 95% CI=1.12-1.39) formaking 1 to 3 psychiatric consultations and at 3331% (IRR=1.3331, 95% CI=1.20-1.47) formaking 4+ consultations respectively, and while at about roughly 25% (IRR=1.25, 95% CI=1.12-1.39)

~~received for 1 to 4+ interventions at local community health service centers.~~ High continuity of ~~physician~~ care decreased the risk of ~~frequent~~ ED use ~~by to 2223%~~ (IRR=0.7877; 95% CI=0.70769-0.8786).

Table 4 presents results for ~~MD-CPI MD-only~~ compared with MD ~~only-CPI~~ on ~~frequency~~ of hospitalization at 12-month follow-up, controlling for the same ~~previous~~ variables ~~as above~~. Patients with MD-CPI had ~~6359%~~ (IRR=1.6359; 95% CI=1.3530-1.9694) ~~more~~ greater risk of ~~frequent~~ hospitalization than those with MD only. Serious MD increased the risk ~~of hospitalization to by 62%~~ (IRR=1.62; 95% CI=1.36-1.92). ~~whereas Risk of hospitalization for patients with common MD and personality disorders decreased the risk by to 3337%~~ (IRR=0.63; 95% CI=0.53-0.74 IRR=0.67; 95% CI=0.51-0.88) ~~and, for patients with personality disorders, by and 3732% respectively~~ (IRR=0.6368; 95% CI=0.5351-0.7489). Compared with patients ~~aged 11~~ 2-24 years old, those ~~in the 45-64 years and 65+ age groups~~ were ~~2526%~~ (IRR=1.265; 95% CI=1.01-1.56) and ~~those 65+ were 8588%~~ (IRR=1.8588; 95% CI=1.3941-2.4649) more ~~likely to exposed to be more frequently~~ hospitalized. Men were at 17% (IRR=1.17; 95% CI=1.01-1.36) greater risk for hospitalization than women. Patients who received 1-3 outpatient psychiatric consultations were ~~189%1.89 times~~ (IRR=2.89; 95% CI=2.29-53.65) more likely to being ~~frequently~~ hospitalized, while the likelihood for those with 4+ consultations increased ~~3.25 times fold to 323%~~ (IRR=4.2325; 95% CI=3.4547-5.18122). ~~By contrast, risk of frequency of hospitalization decreased to 36%~~ (IRR=0.6564; 95% CI=0.52-0.7989) for those receiving high continuity of ~~physician~~ care, and to 29% (IRR=0.71; 95% CI=0.57572-0.888879) after 4+ consultations with the ~~patient~~ usual ~~patient~~ GP.

4. Discussion

This study was original in measuring frequencies of both ED use and hospitalization for MH

reasons, comparing patients ~~with MD only and patients~~ with MD-CPI and patient those with MD only, and controlling for multiple clinical, sociodemographic, and service use variables. Overall, we found that one patient in four had MD-CPI. As patients recruited from ED ~~tend to include many with more~~ tend to be affected with serious or complex MD, and most ~~patients~~ in this sample also experienced material or social deprivation, ~~a~~ high prevalence of MD-CPI ~~was~~ was expected. As well, ~~few~~ most patients had ~~not~~ used ED at least once by 12-month follow-up, ~~if not, most had in fact used ED~~ several times, while nearly one fourth were hospitalized.

~~In line with our first hypothesis,~~ Patients with MD-CPI were more likely to ~~have made~~ make frequent use of ED ~~and to~~ be hospitalized for MH reasons than those with MD only by during the 12-month follow-up period, confirming hypothesis one. Previous studies found that frequent psychiatric ED users were often affected by co-occurring CPI (7, 14). A recent systematic review also identified higher risk of psychiatric hospitalization among patients with MD-CPI (17). The present study was, however, one of the first to estimate levels of risk for ED use and hospitalization for MH reasons among patients with ~~MD-CPI-MD~~, compared to patients with MD only. Overall, the increased risk for ED use was significant, but modest (15%), ~~for ED use~~, while hospitalization risk was substantially elevated ~~for hospitalization (at 63%)~~.

The findings also partially confirm the second hypothesis that having more serious medical conditions, including SRD or severe CPI, would increase ED use, and that serious MD would increase ~~augment~~ hospitalization rates. Patients with SRD are ~~known to be~~ known to be high ED users (55, 56), and to use few ~~often consulting little~~ outpatient services ~~without in addition to low~~ treatment compliance or motivation (57, 58). Severity of CPI was found to ~~increased~~ the risks of ED use and hospitalization for medical reasons, ~~as reported elsewhere~~ (17, 24, 33). Studies have also identified CPI ~~were also identified in studies~~ as key determinants of high ED use for MH

reasons, ~~and with~~ serious MD ~~aan added-main driver~~ impetus for hospitalization (59, 60). Other studies reported that patients with MD-CPI were less likely than others to receive care for CPI from their GP ~~for CPI~~ (61, 62), suggesting that they may have used psychiatric ED for medical issues. ~~One s~~ Studies on determinants of hospitalization for medical reasons found a relationship between that personality disorders prevent and low hospitalization_ (59, 63). ~~This It~~ may be partially ~~be explained~~ ~~partially~~ by negative attitudes ~~and stigmatization of~~ among hospital staff and stigmatization experienced by ~~towards~~ among patients ~~with~~ personality disorders, and more particularly ~~with~~ borderline personality disorders, ~~whohich~~ are viewed as ~~perceived to be by them~~ ~~s~~ difficult patients, being often violent and often manipulative or violent (64, 65). Hospitalization is usually considered ~~not in appropriate for these patients, excepted for~~ except in cases of acute crisi ss requiring short-stay admission (64) ~~for those while other research outlined that such patients. More appropriate a, which are were often offered alternative t~~ Treatments other than hospitalization are recommended for patients with personality disorders, are recommended more appropriate treatments than hospitalization like including outpatient psychiatric treatment (66) or psychosocial treatments (67, 68). The finding that risk of hospitalization decreased ~~in~~ among patients with common MD is easily explained by ~~the fact that~~ research showing the effectiveness of primary care treatment is usually adequate for adjustment, anxiety and depressive disorders (69, 70), and that these conditions require less frequent hospitalization than ~~in~~ serious MD.

Regarding the third hypothesis related to quality of services, only high continuity of physician care protected ~~from~~ against both ED use and hospitalization, ~~whereas receiving more while~~ intensive care from the usual GP ~~care was the sole protection again prevented~~ hospitalization. ~~Receipt of h~~ High continuity of of physician care is a key recovery indicator, particularly among patients with MD, CPI, or co-occurring problems diagnoses (71, 72). Previous

studies have demonstrated that higher continuity of care ~~protected against both~~ is associated with less frequent ED use (8, 73) and hospitalization (74). ~~Another close measure for continuity of care,~~ Receiving intensive care from GP (4+ consultations yearly) after onset of a MD, is another continuity of care measure and key indicator for quality of care and patient recovery (75, 76), was found to. ~~Essentially, this variable~~ decreased ~~the risk of~~ frequency of hospitalization. ~~Maybe~~ It is possible that access to GP for consultations by patients was not ~~were not able to~~ sufficiently rapid that their use of ~~receive their patients rapidly enough to protect them from~~ ED for MH problems consultations could be avoided, or reduced. ~~Patients with MD or both MD-CPI often face crisis situations involving psychological distress or suicidal behaviors, which may~~ also exacerbate co-occurring problems. As such, close follow-up by GP may have helped patients avoid ~~guard against decompensation~~ decompensation, while ~~favoring supporting their treatment~~ adherence to treatment and motivation to seek care, as well as protecting them against hospitalization. ~~In this cohort,~~ Some 50% of patients in the sample also reported making no GP consultations ~~and and~~ some 4 of 10 patients had no medical provider, pointing to important unresolved issues involving access to ~~physician~~ medical care for this population.

Surprisingly, the study revealed that receiving more intensive outpatient care ~~with from~~ psychiatrists increased the risks of both frequent ED use and hospitalization. ~~This,~~ results may points that may to ~~be explained by a certain~~ lack of ~~treatment~~ appropriateness or diversity in outpatient psychiatric treatments commensurate with the needs of patients ~~with such~~ affected by very complex and serious conditions consulting in requiring highly specialized care. Previous research has shown similar results (14, 59). ~~C~~ By contrast, community healthcare centers also offered psychosocial interventions to more vulnerable individuals who which perhaps had led to these patient higher risks of frequent ED use. These organizations also provided more treatments

for individuals with common MH problems, which may explain the lack of association with risk of hospitalization.

Psychosocial MH interventions in local community healthcare service centers usually targeted more the vulnerable population, which perhaps had led to these patient higher risks of frequent ED use. The tendency of these organizations to offer more treatment for common MD (63) likely also explains the lack of association with hospitalization rates.

Among sociodemographic variables, age influenced was associated with both ~~frequent~~ ED use and hospitalization, while sex was ~~only~~ associated with hospitalization only. Compared with patients aged in the 12-24 age group, those 65+ were less likely to use ED for MH reasons, which may be possibly because MD are often underdiagnosed or undertreated among older patients among older patients, whereas CPI ~~is~~ are more commonly addressed -(77, 78). Yet patients 65+, and as well as those in the 45-64 age group, -were at relatively greater risk for ~~frequent~~ hospitalization -than the 12-24 year age group. Alternative Sources of care other than hospitalization to hospitalization is are usually preferred ~~for~~ by younger patients, due to the perceived ~~impact of~~ stigma (79, 80). Moreover, the finding elevated that men had an elevated risk of hospitalization ~~among men~~ may be explained by the fact that they research suggesting that men oftengenerally use MD services as a last resort, after once their ~~needs~~ MH problems become quite serious (81). Men also use primary care less than women (82).

This study had ~~certain~~ several limitations. First, Quebec medical administrative databases administrative databases were developed primarily for financial purposes, and as such, ~~not research~~ as such, the results, and thus only represent only a proxy for patient needs. Second, key data including ethnicity, medication compliance, -or, side-effects of anti-psychotic medications, and or use of psychosocial hospital teams, community MH organizations community-based

~~services or psychologists in private practice~~ that may have potentially impacted frequency of ED use and hospitalization were not available ~~from these study from the Quebec~~ databases. Third, use of the ICD-9 codification and not ICD-10 in from the RAMQ database, and use of the Elixhauser Comorbidity Index; -originally developed for mortality and not for rather than ED use and hospitalization may have slightly had underestimated the impact of CPI some on the study results (44, 46) the study did not consider specific categories of CPI, even though frequency of ED use and hospitalization may vary by specific diagnoses. Fourth, ~~like he study do not assess ER in rural area, the result may not be generalizable to rural population.~~ Finally, the study findings results of the study may not be generalizable to patients with MD ~~without any who do not use ED use, and or to patients~~ living in rural areas or in countries without a public healthcare insurance system ~~or in rural areas.~~

5. Conclusions

Overall, patients with MD-CPI were more likely than those with MD only to experience frequent ED use and hospitalization for MH reasons. Findings also confirmed that patients with more severe medical conditions who received ~~more~~ intensive specialized MH care were at greater risk for frequent ED use and hospitalization. Older patients were at less ~~at~~ risk for ED use, but ~~older these patients, as well as and men, those later as well as older and men patients~~ were more frequently hospitalized. Higher continuity of physician care protected against frequent ED use and hospitalization. Strategies such as assertive community treatment, intensive case management, integrated co-occurring treatment, home treatment, and shared care between psychiatrists and primary care services ~~that~~ may be implemented to improve the adequacy of care for patients with MD-CPI or for those with MD only ~~with more whose severe~~ clinical profiles are relatively more severe ~~include assertive community treatment, intensive case management, integrated co-~~

occurring ~~treatment~~care, home treatment, and shared care between psychiatrists and primary care services. Prevention and outreach strategies ~~may~~should also be ~~more~~ strongly promoted to reduce frequent ED use and hospitalization among older age groups, and particularly among men.

Data Availability Statement

In accordance with ~~the~~ relevant ethics regulations ~~offer~~ the province of Quebec, the principal investigator is responsible for preserving the confidentiality of the study data.

Author contributions

LG, MJF and XM designed the analytic plan for the article. LG produced the quantitative analyses and tables. LG, ~~and~~ GG and MJF wrote the ~~article~~first draft. ~~MJF and~~ XM reviewed the manuscript prior to submission. All authors ~~thus~~ contributed to the article and approved the submitted version.

Declaration of Competing Interest

The authors declare no conflicts of interest with respect to the research, authorship and/or publication of this article.

Abbreviations

AIC: Akaike's Information Criterion

BIC: Bayesian information criterion

BDCU: Emergency Department Database (*Banque de données commune des urgences*)

ED: Emergency departments

GP: General practitioners

ICC: Intraclass Correlation Coefficient

ICD: International Classification of Diseases

MED-ECHO: Hospitalization Database (*Maintenance et exploitation des données pour l'étude de la clientèle hospitalière*)

MD: Mental disorders

SRD: Substance-related disorders

RAMQ: Quebec Health Insurance Regime (*Régie de l'assurance maladie du Québec*)

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REFERENCES

1. Vigod SN, Taylor VH, Fung K, Kurdyak PA. Within-hospital readmission: an indicator of readmission after discharge from psychiatric hospitalization. *Can J Psychiatry*. (2013); 58: 476-81. doi: 10.1177/070674371305800806
2. Galarraga JE, Pines JM. Costs of ED episodes of care in the United States. *The American journal of emergency medicine*. (2016); 34: 357-65. doi: 10.1016/j.ajem.2015.06.001
3. Sorup CM, Jacobsen P, Forberg JL. Evaluation of emergency department performance - a systematic review on recommended performance and quality-in-care measures. *Scand J Trauma Resusc Emerg Med*. (2013); 21: 62. doi: 10.1186/1757-7241-21-62
4. Aaronson EL, Marsh RH, Guha M, Schuur JD, Rouhani SA. Emergency department quality and safety indicators in resource-limited settings: an environmental survey. *Int J Emerg Med*. (2015); 8: 39. doi: 10.1186/s12245-015-0088-x
5. Fleury MJ, Fortin M, Rochette L, Grenier G, Huynh C, Pelletier E, et al. Assessing quality indicators related to mental health emergency room utilization. *BMC Emerg Med*. (2019); 19: 8. doi: 10.1186/s12873-019-0223-8
6. Chwastiak LA, Davydow DS, McKibbin CL, Schur E, Burley M, McDonell MG, et al. The effect of serious mental illness on the risk of rehospitalization among patients with diabetes. *Psychosomatics*. (2014); 55: 134-43. doi: 10.1016/j.psych.2013.08.012
7. Fleury MJ, Rochette L, Grenier G, Huynh C, Vasiliadis HM, Pelletier E, et al. Factors associated with emergency department use for mental health reasons among low, moderate and high users. *Gen Hosp Psychiatry*. (2019); 60: 111-9. doi: 10.1016/j.genhosppsych.2019.07.006
8. Gentil L, Grenier G, Vasiliadis HM, Huynh C, Fleury MJ. Predictors of Recurrent High Emergency Department Use among Patients with Mental Disorders. *Int J Environ Res Public Health*. (2021); 18. doi: 10.3390/ijerph18094559
9. Slankamenac K, Heidelberger R, Keller DI. Prediction of Recurrent Emergency Department Visits in Patients With Mental Disorders. *Frontiers in Psychiatry*. (2020); 11: 48. doi: 10.3389/fpsyt.2020.00048
10. Mark TL, Tomic KS, Kowlessar N, Chu BC, Vandivort-Warren R, Smith S. Hospital readmission among medicaid patients with an index hospitalization for mental and/or substance use disorder. *The journal of behavioral health services & research*. (2013); 40: 207-21. doi: 10.1007/s11414-013-9323-5
11. Gentil L, Grenier G, Fleury MJ. Factors Related to 30-day Readmission following Hospitalization for Any Medical Reason among Patients with Mental Disorders: Facteurs lies a la rehospitalisation a 30 jours suivant une hospitalisation pour une raison medicale chez des patients souffrant de troubles mentaux. *Can J Psychiatry*. (2021); 66: 43-55. doi: 10.1177/0706743720963905
12. Chiu YM, Vanasse A, Courteau J, Chouinard MC, Dubois MF, Dubuc N, et al. Persistent frequent emergency department users with chronic conditions: A population-based cohort study. *PLoS One*. (2020); 15: e0229022. doi: 10.1371/journal.pone.0229022
13. Sarkies M, Long JC, Pomare C, Wu W, Clay-Williams R, Nguyen HM, et al. Avoiding unnecessary hospitalisation for patients with chronic conditions: a systematic review of implementation determinants for hospital avoidance programmes. *Implement Sci*. (2020); 15: 91. doi: 10.1186/s13012-020-01049-0
14. Brennan JJ, Chan TC, Hsia RY, Wilson MP, Castillo EM. Emergency department utilization among frequent users with psychiatric visits. *Acad Emerg Med*. (2014); 21: 1015-22. doi: 10.1111/acem.12453
15. Razzano LA, Cook JA, Yost C, Jonikas JA, Swarbrick MA, Carter TM, et al. Factors associated with co-occurring medical conditions among adults with serious mental disorders. *Schizophr Res*. (2015); 161: 458-64. doi: 10.1016/j.schres.2014.11.021
16. Goldman ML, Mangurian C, Corbeil T, Wall MM, Tang F, Haselden M, et al. Medical comorbid diagnoses among adult psychiatric inpatients. *Gen Hosp Psychiatry*. (2020); 66: 16-23. doi: 10.1016/j.genhosppsych.2020.06.010

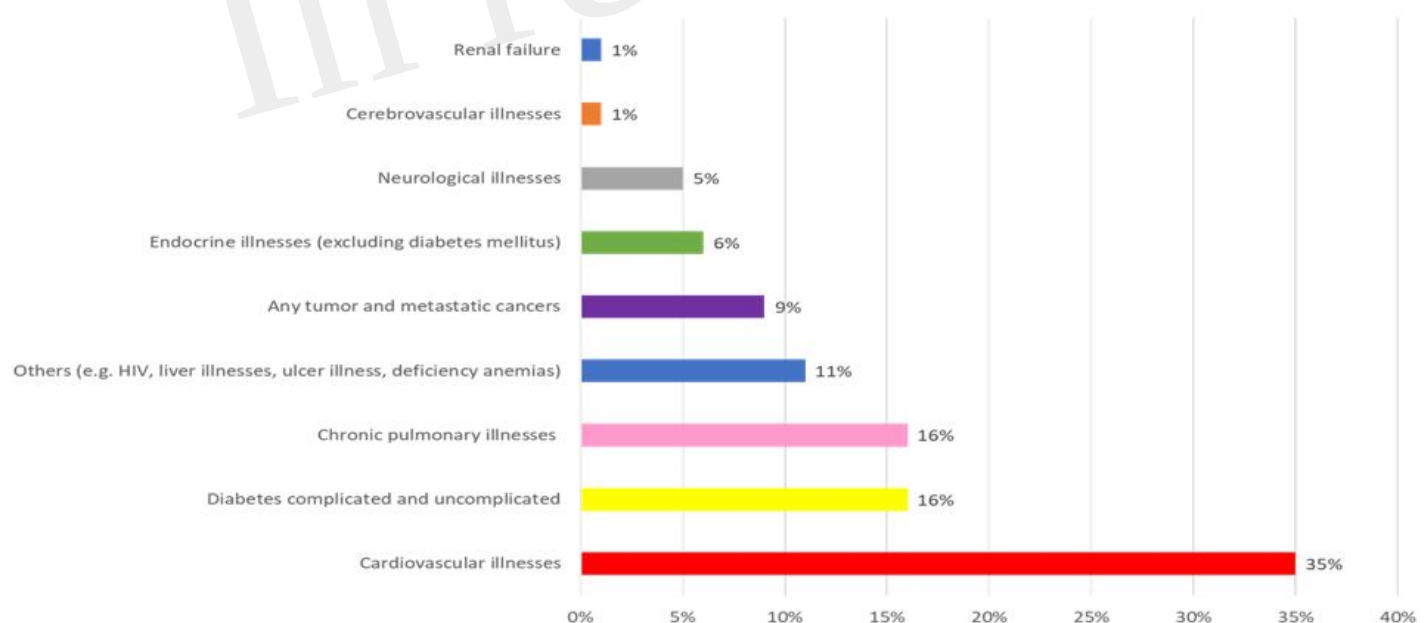
17. Sprah L, Dernovsek MZ, Wahlbeck K, Haaramo P. Psychiatric readmissions and their association with physical comorbidity: a systematic literature review. *BMC Psychiatry*. (2017); 17: 2. doi: 10.1186/s12888-016-1172-3
18. Simunovic Filipcic I, Filipcic I, Glamuzina L, Devcic S, Bajic Z, Bras M, et al. The effect of chronic physical illnesses on psychiatric hospital admission in patients with recurrent major depression. *Psychiatry Res*. (2019); 272: 602-8. doi: 10.1016/j.psychres.2018.12.178
19. Walker ER, Druss BG. Cumulative burden of comorbid mental disorders, substance use disorders, chronic medical conditions, and poverty on health among adults in the U.S.A. *Psychol Health Med*. (2017); 22: 727-35. doi: 10.1080/13548506.2016.1227855
20. Bhalla IP, Rosenheck RA. A Change in Perspective: From Dual Diagnosis to Multimorbidity. *Psychiatr Serv*. (2018); 69: 112-6. doi: 10.1176/appi.ps.201700194
21. Prince M, Patel V, Saxena S, Maj M, Maselko J, Phillips MR, et al. No health without mental health. *Lancet*. (2007); 370: 859-77. doi: 10.1016/S0140-6736(07)61238-0
22. Morden NE, Mistler LA, Weeks WB, Bartels SJ. Health care for patients with serious mental illness: family medicine's role. *J Am Board Fam Med*. (2009); 22: 187-95. doi: 10.3122/jabfm.2009.02.080059
23. Mitchell AJ, Lord O, Malone D. Differences in the prescribing of medication for physical disorders in individuals with v. without mental illness: meta-analysis. *Br J Psychiatry*. (2012); 201: 435-43. doi: 10.1192/bjp.bp.111.094532
24. Gaulin M, Simard M, Candas B, Lesage A, Sirois C. Combined impacts of multimorbidity and mental disorders on frequent emergency department visits: a retrospective cohort study in Quebec, Canada. *CMAJ*. (2019); 191: E724-E32. doi: 10.1503/cmaj.181712
25. Lidon-Moyano C, Wiebe D, Gruenewald P, Cerda M, Brown P, Goldman-Mellor S. Associations between self-harm and chronic disease among adolescents: Cohort study using statewide emergency department data. *J Adolesc*. (2019); 72: 132-40. doi: 10.1016/j.adolescence.2019.03.005
26. Chwastiak LA, Rosenheck RA, Kazis LE. Utilization of primary care by veterans with psychiatric illness in the National Department of Veterans Affairs Health Care System. *J Gen Intern Med*. (2008); 23: 1835-40. doi: 10.1007/s11606-008-0786-7
27. Fleury MJ, Farand L, Aube D, Imboua A. Management of mental health problems by general practitioners in Quebec. *Can Fam Physician*. (2012); 58: e732-8, e25-31. doi:
28. Ross LE, Vigod S, Wishart J, Waese M, Spence JD, Oliver J, et al. Barriers and facilitators to primary care for people with mental health and/or substance use issues: a qualitative study. *BMC Fam Pract*. (2015); 16: 135. doi: 10.1186/s12875-015-0353-3
29. Corrigan PW, Mittal D, Reaves CM, Haynes TF, Han X, Morris S, et al. Mental health stigma and primary health care decisions. *Psychiatry Res*. (2014); 218: 35-8. doi: 10.1016/j.psychres.2014.04.028
30. Castillejos Anguiano MC, Martin Perez C, Bordallo Aragon A, Sepulveda Munoz J, Moreno Kustner B. Patterns of primary care among persons with schizophrenia: the role of patients, general practitioners and centre factors. *Int J Ment Health Syst*. (2020); 14: 82. doi: 10.1186/s13033-020-00409-z
31. Kurdyak P, Vigod S, Duchon R, Jacob B, Stukel T, Kiran T. Diabetes quality of care and outcomes: Comparison of individuals with and without schizophrenia. *Gen Hosp Psychiatry*. (2017); 46: 7-13. doi: 10.1016/j.genhosppsych.2017.02.001
32. Mausbach BT, Decastro G, Schwab RB, Tiamson-Kassab M, Irwin SA. Healthcare use and costs in adult cancer patients with anxiety and depression. *Depress Anxiety*. (2020); 37: 908-15. doi: 10.1002/da.23059
33. Shim RS, Druss BG, Zhang S, Kim G, Oderinde A, Shoyinka S, et al. Emergency department utilization among Medicaid beneficiaries with schizophrenia and diabetes: the consequences of increasing medical complexity. *Schizophr Res*. (2014); 152: 490-7. doi: 10.1016/j.schres.2013.12.002
34. Minen MT, Tanev K. Influence of psychiatric comorbidities in migraineurs in the emergency department. *Gen Hosp Psychiatry*. (2014); 36: 533-8. doi: 10.1016/j.genhosppsych.2014.05.004

35. Albrecht JS, Hirshon JM, Goldberg R, Langenberg P, Day HR, Morgan DJ, et al. Serious mental illness and acute hospital readmission in diabetic patients. *Am J Med Qual.* (2012); 27: 503-8. doi: 10.1177/1062860612436576
36. Sajatovic M, Welter E, Tatsuoka C, Perzynski AT, Einstadter D. Electronic medical record analysis of emergency room visits and hospitalizations in individuals with epilepsy and mental illness comorbidity. *Epilepsy Behav.* (2015); 50: 55-60. doi: 10.1016/j.yebeh.2015.05.016
37. Bowen M, Marwick S, Marshall T, Saunders K, Burwood S, Yahyouche A, et al. Multimorbidity and emergency department visits by a homeless population: a database study in specialist general practice. *Br J Gen Pract.* (2019); 69: e515-e25. doi: 10.3399/bjgp19X704609
38. Shen C, Sambamoorthi U, Rust G. Co-occurring mental illness and health care utilization and expenditures in adults with obesity and chronic physical illness. *Dis Manag.* (2008); 11: 153-60. doi: 10.1089/dis.2007.0012
39. Sartorius N. Comorbidity of mental and physical disorders: a key problem for medicine in the 21st century. *Acta Psychiatr Scand.* (2018); 137: 369-70. doi: 10.1111/acps.12888
40. sociaux MdISedS. Projet de loi no 10 (2015, chapitre 1). Loi modifiant l'organisation et la gouvernance du réseau de la santé et des services sociaux notamment par l'abolition des agences régionales (2015) : Québec Ministère de la Santé et des Services sociaux; (2015).
41. Vérificateur général du Québec. Rapport du Vérificateur général du Québec à l'Assemblée nationale pour l'année 2015-2016. Vérification de l'optimisation des ressources, Automne 2015. Québec: Vérificateur général du Québec; 2015.
42. Hermann RC, Rollins CK, Chan JA. Risk-adjusting outcomes of mental health and substance-related care: a review of the literature. *Harv Rev Psychiatry.* (2007); 15: 52-69. doi: 10.1080/10673220701307596
43. Blais C, Jean S, Sirois C, Rochette L, Plante C, Larocque I, et al. Quebec Integrated Chronic Disease Surveillance System (QICDSS), an innovative approach. *Chronic Dis Inj Can.* (2014); 34: 226-35. doi: 10.1097/01.mlr.0000182534.19832.83
44. Quan H, Sundararajan V, Halfon P, Fong A, Burnand B, Luthi JC, et al. Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. *Med Care.* (2005); 43: 1130-9. doi: 10.1097/01.mlr.0000182534.19832.83
45. Simard M, Dubé M, Myles G, Sirois C. La prévalence de la multimorbidité au Québec : portrait pour l'année 2016-2017. Québec : Institut national de santé publique du Québec; 2019.
46. Simard M, Sirois C, Candas B. Validation of the Combined Comorbidity Index of Charlson and Elixhauser to Predict 30-Day Mortality Across ICD-9 and ICD-10. *Med Care.* (2018); 56: 441-7. doi: 10.1097/MLR.0000000000000905
47. Tu K, Mitiku T, Lee DS, Guo H, Tu JV. Validation of physician billing and hospitalization data to identify patients with ischemic heart disease using data from the Electronic Medical Record Administrative data Linked Database (EMRALD). *Canadian Journal of Cardiology.* (2010); 26: e225-e8. doi: 10.1016/s0828-282x(10)70412-8
48. Weisman A, Tu K, Young J, Kumar M, Austin PC, Jaakkimainen L, et al. Validation of a type 1 diabetes algorithm using electronic medical records and administrative healthcare data to study the population incidence and prevalence of type 1 diabetes in Ontario, Canada. *BMJ Open Diabetes Res Care.* (2020); 8. doi: 10.1136/bmjdr-2020-001224
49. Pampalon R, Hamel D, Gamache P, Raymond G. A deprivation index for health planning in Canada. *Chronic Dis Can.* (2009); 29: 178-91. doi: 10.1007/s11606-008-0692-z
50. Rodriguez HP, Marshall RE, Rogers WH, Safran DG. Primary care physician visit continuity: a comparison of patient-reported and administratively derived measures. *J Gen Intern Med.* (2008); 23: 1499-502. doi: 10.1007/s11606-008-0692-z
51. Dreier J, Comaneshter DS, Rosenbluth Y, Battat E, Bitterman H, Cohen AD. The association between continuity of care in the community and health outcomes: a population-based study. *Isr J Health Policy Res.* (2012); 1: 21. doi: 10.1186/2045-4015-1-21

52. Breslau N, Reeb KG. Continuity of care in a university-based practice. *J Med Educ.* (1975); 50: 965-9. doi: 10.1097/00001888-197510000-00006
53. Romaine MA, Haber SG, Wensky SG, McCall N. Primary care and specialty providers: an assessment of continuity of care, utilization, and expenditures. *Med Care.* (2014); 52: 1042-9. doi: 10.1097/MLR.0000000000000246
54. Bartlett Foote S. Coexistence, conflict, and cooperation: public policies toward medical devices. *Journal of health politics, policy and law.* (1986); 11: 501-23. doi:
55. Huynh C, Ferland F, Blanchette-Martin N, Menard JM, Fleury MJ. Factors Influencing the Frequency of Emergency Department Utilization by Individuals with Substance Use Disorders. *Psychiatr Q.* (2016); 87: 713-28. doi: 10.1007/s11126-016-9422-6
56. Vu F, Daeppen JB, Hugli O, Iglesias K, Stucki S, Paroz S, et al. Screening of mental health and substance users in frequent users of a general Swiss emergency department. *BMC Emerg Med.* (2015); 15: 27. doi: 10.1186/s12873-015-0053-2
57. Coulson C, Ng F, Geertsema M, Dodd S, Berk M. Client-reported reasons for non-engagement in drug and alcohol treatment. *Drug Alcohol Rev.* (2009); 28: 372-8. doi: 10.1111/j.1465-3362.2009.00054.x
58. Brorson HH, Ajo Arnevik E, Rand-Hendriksen K, Duckert F. Drop-out from addiction treatment: a systematic review of risk factors *Clinical psychology review* (2013); 33: 1010-24. doi:
59. Penzenstadler L, Gentil L, Huynh C, Grenier G, Fleury MJ. Variables associated with low, moderate and high emergency department use among patients with substance-related disorders. *Drug Alcohol Depend.* (2020); 207: 107817. doi: 10.1016/j.drugalcdep.2019.107817
60. Germack HD, Caron A, Solomon R, Hanrahan NP. Medical-surgical readmissions in patients with co-occurring serious mental illness: A systematic review and meta-analysis. *Gen Hosp Psychiatry.* (2018); 55: 65-71. doi: 10.1016/j.genhosppsych.2018.09.005
61. De Hert M, Cohen D, Bobes J, Cetkovich-Bakmas M, Leucht S, Ndeti DM, et al. Physical illness in patients with severe mental disorders. II. Barriers to care, monitoring and treatment guidelines, plus recommendations at the system and individual level. *World Psychiatry.* (2011); 10: 138-51. doi: 10.1002/j.2051-5545.2011.tb00036.x
62. Lichstein JC, Domino ME, Beadles CA, Ellis AR, Farley JF, Morrissey JP, et al. Use of medical homes by patients with comorbid physical and severe mental illness. *Med Care.* (2014); 52 Suppl 3: S85-91. doi: 10.1097/MLR.0000000000000025
63. Penzenstadler L, Gentil L, Grenier G, Khazaal Y, Fleury MJ. Risk factors of hospitalization for any medical condition among patients with prior emergency department visits for mental health conditions. *BMC Psychiatry.* (2020); 20: 431. doi: 10.1186/s12888-020-02835-2
64. Bodner E, Cohen-Fridel S, Iancu I. Staff attitudes toward patients with borderline personality disorder. *Compr Psychiatry.* (2011); 52: 548-55. doi: 10.1016/j.comppsy.2010.10.004
65. Woollaston K, Hixenbaugh P. Destructive Whirlwind: nurses' perceptions of patients diagnosed with borderline personality disorder. *J Psychiatr Ment Health Nurs.* (2008); 15: 703-9. doi: 10.1111/j.1365-2850.2008.01275.x
66. Links PS, Ross J, Gunderson JG. Promoting Good Psychiatric Management for Patients With Borderline Personality Disorder. *J Clin Psychol.* (2015); 71: 753-63. doi: 10.1002/jclp.22203
67. Choi-Kain LW, Finch EF, Masland SR, Jenkins JA, Unruh BT. What Works in the Treatment of Borderline Personality Disorder. *Curr Behav Neurosci Rep.* (2017); 4: 21-30. doi: 10.1007/s40473-017-0103-z
68. Bateman AW, Gunderson J, Mulder R. Treatment of personality disorder. *Lancet.* (2015); 385: 735-43. doi: 10.1016/S0140-6736(14)61394-5
69. Combs H, Markman J. Anxiety disorders in primary care. *Med Clin North Am.* (2014); 98: 1007-23. doi: 10.1016/j.mcna.2014.06.003

70. Cameron C, Habert J, Anand L, Furtado M. Optimizing the management of depression: primary care experience. *Psychiatry Res.* (2014); 220 Suppl 1: S45-57. doi: 10.1016/S0165-1781(14)70005-8
71. Loranger C, Fleury MJ. Factors Associated with Perceived Continuity of Care Among Patients Suffering from Mental Disorders. *Community Ment Health J.* (2020); 56: 670-9. doi: 10.1007/s10597-019-00528-z
72. Biringer E, Hartveit M, Sundfor B, Ruud T, Borg M. Continuity of care as experienced by mental health service users - a qualitative study. *BMC Health Serv Res.* (2017); 17: 763. doi: 10.1186/s12913-017-2719-9
73. Singh P, Chakravarthy B, Yoon J, Snowden L, Bruckner TA. Psychiatric-related Revisits to the Emergency Department Following Rapid Expansion of Community Mental Health Services. *Academic emergency medicine : official journal of the Society for Academic Emergency Medicine.* (2019); 26: 1336-45. doi: 10.1111/acem.13812
74. Mitton CR, Adair CE, McDougall GM, Marcoux G. Continuity of care and health care costs among persons with severe mental illness. *Psychiatr Serv.* (2005); 56: 1070-6. doi: 10.1176/appi.ps.56.9.1070
75. Ride J, Kasteridis P, Gutacker N, Doran T, Rice N, Gravelle H, et al. Impact of family practice continuity of care on unplanned hospital use for people with serious mental illness. *Health Serv Res.* (2019); 54: 1316-25. doi: 10.1111/1475-6773.13211
76. Jacobs R, Aylott L, Dare C, Doran T, Gilbody S, Goddard M, et al. The association between primary care quality and health-care use, costs and outcomes for people with serious mental illness: a retrospective observational study. *Health Services and Delivery Research.* Southampton (UK)2020.
77. Byers AL, Arian PA, Yaffe K. Low use of mental health services among older Americans with mood and anxiety disorders. *Psychiatr Serv.* (2012); 63: 66-72. doi: 10.1176/appi.ps.201100121
78. Barry LC, Abou JJ, Simen AA, Gill TM. Under-treatment of depression in older persons. *Journal of affective disorders.* (2012); 136: 789-96. doi: 10.1016/j.jad.2011.09.038
79. Heflinger CA, Hinshaw SP. Stigma in child and adolescent mental health services research: understanding professional and institutional stigmatization of youth with mental health problems and their families. *Administration and policy in mental health.* (2010); 37: 61-70. doi: 10.1007/s10488-010-0294-z
80. Plaistow J, Masson K, Koch D, Wilson J, Stark RM, Jones PB, et al. Young people's views of UK mental health services. *Early intervention in psychiatry.* (2014); 8: 12-23. doi: 10.1111/eip.12060
81. Affleck W, Carmichael V, Whitley R. Men's Mental Health: Social Determinants and Implications for Services. *Can J Psychiatry.* (2018); 63: 581-9. doi: 10.1177/0706743718762388
82. Farrer LM, Walker J, Harrison C, Banfield M. Primary care access for mental illness in Australia: Patterns of access to general practice from 2006 to 2016. *PLoS One.* (2018); 13: e0198400. doi: 10.1371/journal.pone.0198400

Figure 1. Prevalence of chronic physical illnesses (CPI) major health categories



Cardiovascular illnesses included: hypertension, myocardial infarction, congestive heart failure, cardiac arrhythmias, valvular illnesses, peripheral vascular illnesses; **diabetes** included: diabetes mellitus type 2 and diabetes mellitus type 1 with systemic manifestations and without mention of complications; **chronic pulmonary illnesses** included: chronic obstructive pulmonary illnesses, pneumoconiosis and lung illnesses due to external agents; **other CPI** included: blood loss anemia, ulcer, liver illnesses, AIDS/HIV, rheumatoid arthritis/collagen vascular illnesses, coagulopathy, weight loss, paralysis, deficiency anemia; **any tumor and metastatic cancers** including malignant neoplasm with/without metastasis; **endocrine illnesses** included: hypothyroidism, fluid and electrolyte illnesses, obesity; **neurological illnesses** included: paralysis agitans, secondary Parkinsonism, Huntington's chorea, other chorea, spinocerebellar illnesses, anterior horn cell illnesses, multiple sclerosis, other demyelinating diseases of the central nervous system, convulsions, aphasia; **cerebrovascular illnesses** included: ocular ischemic syndrome, subarachnoid hemorrhage, intracerebral hemorrhage, other or unspecified intracranial hemorrhage, transient cerebral ischemia, acute but ill-defined cerebrovascular illnesses, late effects of cerebrovascular illnesses; **renal failure** included: hypertensive renal disease, chronic renal failure, unspecified renal failure.