Association between mood disorders and frequent emergency department use: a cross-sectional study

Christophe A. Fehlmann1,2,3 · Marcel Miron-Celis2 · Yue Chen2 · Jeffrey Perry1,2,4 · Debra Eagles1,2,4

Received: 27 April 2021 / Accepted: 24 August 2021 / Published online: 20 October 2021
© The Author(s) 2021

Abstract
Objectives Frequent emergency department (ED) use is a growing problem that is associated with poor patient outcomes and increased health care costs. Our objective was to analyze the association between mood disorders and the incidence of frequent ED use.

Methods We used the Canadian Community Health Survey conducted by Statistics Canada, 2015–2016. Mood disorder was defined as depression, bipolar disorder, mania, or dysthymia. Frequent ED use was defined as 4 or more visits in the year preceding the interview. Multivariable log-binomial regression models were used to determine the associations between mood disorders and frequent ED use.

Results Among the 99,009 participants, 8.4% had mood disorders, 80.3% were younger than 65, and 2.2% were frequent ED users. Mood disorders were significantly associated with the 1-year cumulative incidence of frequent ED use (RR = 2.5, 95% CI 2.2–2.7), after adjusting for several potential confounders.

Conclusions This national survey showed that people with a mood disorder had a three-fold risk of frequent ED use, compared to people without mood disorder. These results can inform the development of policies and targeted interventions aimed at identifying and supporting ED patients with mood disorder.

Keywords Emergency department · Frequent · Psychiatric · Mood disorders · Geriatric

Christophe A. Fehlmann
cfehlmann@toh.ca
Marcel Miron-Celis
mmiro029@uottawa.ca
Yue Chen
yue.chen@uottawa.ca
Jeffrey Perry
jperry@toh.ca
Debra Eagles
deagles@toh.ca

1 Ottawa Hospital Research Institute, Ottawa, ON, Canada
2 School of Epidemiology and Public Health, University of Ottawa, Ottawa, ON, Canada
3 Department of Anaesthesiology, Clinical Pharmacology, Intensive Care and Emergency Medicine, Geneva University Hospitals, Geneva, Switzerland
4 Department of Emergency Medicine, University of Ottawa, Ottawa, ON, Canada
Clinicians’ capsule

What is known about the topic?
Risk factors for frequent emergency department (ED) use include age and mental health conditions.

What did this study ask?
What is the association between mood disorders and being a frequent ED user?

What did this study find?
Our study suggests that there is a positive association between mood disorders and frequent ED use.

Why does this study matter to clinicians?
This study should encourage the development of policies and targeted interventions for patients with mood disorders to decrease the burden associated with frequent ED use.

Introduction

Frequent emergency department (ED) users, usually defined as patients with four or more emergency department visits per year, are a critical issue in emergency medicine. They represent between 4 and 16% of all ED users and account for 15% to almost 50% of all ED visits. Frequent ED use is associated with increased hospital admission and mortality [1]. The number of frequent ED users is rising, with a 66% increase over 10 years. This has significant implications for patients and the healthcare system contributing to the overcrowding of EDs and increased resource utilization.

Known risk factors for frequent ED use include female sex, young age, low socioeconomic status, low education level, substance use, fair or poor self-reported health, increased number of chronic conditions and mental health conditions (depression, anxiety). Mental health conditions are especially important because the proportion of ED visits due to mental illness increased by almost 30 percent, from 48.7 per 1000 ED visits in 1992 to 62.5 in 2001 [2]. Moreover, patients with depression or anxiety have a higher risk of hospitalization for non-psychiatric conditions, by affecting self-management and treatment adherence [3].

Most of the studies on frequent ED users were performed outside Canada. A recent study identified patients’ characteristics associated with frequent ED use in Alberta and Ontario [4]. However, this study was based on administrative data, without health-related variables. A better understanding of factors associated with frequent ED use in our country is needed to develop targeted interventions to improve care for this population and to increase efficient health care utilization.

The objective of this study was therefore to investigate the association between mood disorders and frequent emergency department use.

Methods

This report follows the STROBE Statement guidelines for reporting cross-sectional studies.

Study design, setting, and participants

This study analyzed data from the Canadian Community Health Survey (CCHS)—Mental Health collected by Statistics Canada (Ottawa, Ontario) in 2015–2016. The CCHS is
a cross-sectional survey and collects information on various dimensions of health for the Canadian population. For this analysis, we included adult participants aged 18 or over and excluded those with missing values for mood disorders or ED visits.

Variables

Frequent ED use was defined as 4 or more visits to the ED in the past 12 months, the most common cut-off. Mood disorder was defined as positive if participants answered “Yes” to the question “Do you have a mood disorder such as depression, bipolar disorder, mania or dysthymia?”. Potential confounders were age, sex, living arrangement, marital status, educational attainment, immigrant status, alcohol consumption, smoking status, having a regular health care provider, presence of a chronic health condition and total household income.

Statistical analysis

As this was a study based on a survey already realized, no formal sample size calculation was computed. We measured the 1-year cumulative incidence of frequent ED use according to mood disorders, age, and other study variables. A Chi-square test was used for group comparison. Missing data were recoded as “unknown”. Log binomial regression model was used to evaluate the association between the mood disorders and frequent ED use, before and after adjusting for confounders, and crude and adjusted risk ratios (RR) were calculated. Covariates were chosen a priori, based on previous knowledge. We performed a sensitivity analysis to test different cut-offs for the definition of frequent ED use (3 and 5 visits a year). For all tests, a two-sided p value below 0.05 was considered significant. Finally, the CCHS used a complex survey design, with stratification, clustering, and unequal selection probabilities for sampling. This was taken into consideration by using sampling weight and average design effect. Statistical analysis was performed using STATA version 17 (Stata Corporation, College Station, TX, USA).

Results

A total of 100,679 adults participated in the CCHS 2015–16. We excluded 1670 (1.7%) records for missing information (195 for mood disorder, 1475 for ED use), thus 99,009 people were included in the analysis. Among them, 9424 (8.4%) had a mood disorder.

Overall, the 1-year cumulative incidence of frequent ED use was 2.2%. Frequent ED use was more common in people with mood disorders than in people without (6.7% versus 1.8%, p < 0.001). Table 1 shows the incidence of frequent ED use among different risk factors, stratified by mood disorder.

Mood disorder was significantly associated with frequent ED use, with an unadjusted RR of 3.8 (95% CI 3.4–4.1). People with mood disorder had a 2.5-fold higher risk to be frequent ED users (95% CI 2.2–2.7), compared to people without mood disorder after adjustment for age, sex, marital status, living status, education level, total household income, immigrant status, alcohol consumption, smoking status, and presence of chronic health conditions. This association was persistent in our sensitivity analyses.

Discussion

This large national study, based on data collected through the Canadian Community Health Survey, showed that mood disorder was associated with frequent ED use.

Our finding that patients with mood disorders were 2.5 times more likely to be frequent ED users is consistent with previous studies. In a large-scale US case–control study, Niedzwiecki et al. showed that mental health diagnosis during an ED visit, primary discharge diagnosis related to mental health, and more severe mental health diagnosis were all associated with more ED visits in the following year [5]. However, their results were based on discharge diagnoses rather than mental illness as a comorbidity. In our study, we focussed on mental illness as a comorbidity, to give a more global picture. In the same goal and based on in-person interviews, Mehl-Madrona demonstrated that 93% of frequent ED users had a psychiatric comorbidity, compared to 50% of matched non-frequent users [6]. However, as the number of patients was small, no adjustment was possible. Moreover, about half of the identified frequent users refused to participate, which may have resulted in selection bias. Finally, Hunt et al., based on a similar survey, showed that poor mental health was associated with a higher likelihood of frequent ED use, with an adjusted odds ratio of 1.70 [7]. The higher risk ratio we found in our analysis could be explained by the use of different exposure measurements (i.e. a diagnosis of mood disorder rather than a score of mental health).

This study has several noteworthy strengths. Firstly, our results are based on a large sample size that allows us to observe even small differences and control for many variables, increasing the internal validity of the results. Secondly, this was a national survey with a robust sampling strategy. Then, to define frequent ED use, we adopted the most commonly used definition but did a sensitivity analysis using other cut-offs that confirmed our results.

Some limitations should be mentioned. A cross-sectional study does not allow conclusions to be drawn regarding
Table 1  One-year cumulative incidence of frequent emergency department use according potential risk factors, stratified by mood disorders ($N=99,009$)

|                          | No mood disorder | Mood disorder | %a | Total | Frequent ED users | %a | Total | Frequent ED users |
|--------------------------|-----------------|---------------|----|-------|-------------------|----|-------|-------------------|
| Age (years)              |                 |               |    |       |                   |    |       |                   |
| 18–34                    | 19,555          | 608           | 2.2| 2163  | 227               | 8.6|       |                   |
| 35–54                    | 26,164          | 540           | 1.5| 3260  | 246               | 5.6|       |                   |
| 55–64                    | 16,626          | 300           | 1.4| 2057  | 114               | 5.0|       |                   |
| 65–74                    | 15,946          | 318           | 1.4| 1298  | 79                | 7.0|       |                   |
| 75 and over              | 11,294          | 351           | 2.9| 646   | 45                | 10.9|       |                   |
| Sex                      |                 |               |    |       |                   |    |       |                   |
| Male                     | 42,271          | 929           | 1.7| 3169  | 200               | 5.0|       |                   |
| Female                   | 47,314          | 1188          | 1.9| 6255  | 511               | 7.1|       |                   |
| Marital status           |                 |               |    |       |                   |    |       |                   |
| Married/Common-law       | 50,916          | 1058          | 1.6| 3864  | 273               | 5.7|       |                   |
| Widowed/divorced/separated | 18,796      | 488           | 2.3| 2636  | 180               | 8.1|       |                   |
| Single                   | 19,586          | 561           | 2.0| 2901  | 254               | 7.4|       |                   |
| Unknown                  | 287             | 10            | 1.9| 23    | 4                 | 16.9|       |                   |
| Living arrangement       |                 |               |    |       |                   |    |       |                   |
| Living alone             | 25,787          | 614           | 1.9| 3601  | 254               | 6.2|       |                   |
| Living with others       | 63,330          | 1479          | 1.7| 5769  | 449               | 6.9|       |                   |
| Unknown                  | 468             | 24            | 4.3| 54    | 8                 | 5.0|       |                   |
| Highest level of education |             |               |    |       |                   |    |       |                   |
| Less than secondary school | 14,144      | 458           | 2.6| 1742  | 166               | 10.3|       |                   |
| Secondary school         | 20,244          | 529           | 2.1| 2312  | 215               | 7.9|       |                   |
| Post-secondary           | 54,057          | 1104          | 1.5| 5253  | 324               | 5.3|       |                   |
| Unknown                  | 1140            | 26            | 1.7| 117   | 6                 | 3.6|       |                   |
| Total household income   |                 |               |    |       |                   |    |       |                   |
| Low                      | 7935            | 315           | 3.1| 2007  | 216               | 8.7|       |                   |
| Medium                   | 32,051          | 909           | 2.4| 3647  | 281               | 7.8|       |                   |
| High                     | 49,486          | 888           | 1.4| 3756  | 214               | 5.3|       |                   |
| Unknown                  | 113             | 5             | 6.0| 14    | 0                 | 0.0|       |                   |
| Immigrant status         |                 |               |    |       |                   |    |       |                   |
| Non-immigrant            | 72,962          | 1885          | 2.1| 8270  | 641               | 7.0|       |                   |
| Immigrant                | 14,873          | 184           | 1.0| 1005  | 57                | 5.0|       |                   |
| Unknown                  | 1750            | 48            | 2.2| 149   | 13                | 6.9|       |                   |
| Alcohol consumption      |                 |               |    |       |                   |    |       |                   |
| Regular drinker          | 56,601          | 1073          | 1.4| 4989  | 327               | 5.6|       |                   |
| Occasional drinker       | 14,755          | 466           | 2.6| 1983  | 172               | 8.1|       |                   |
| Did not drink in the last 12 months | 17,780 | 569          | 2.3| 2404  | 210               | 8.1|       |                   |
| Unknown                  | 449             | 9             | 1.5| 48    | 2                 | 9.4|       |                   |
| Smoking status           |                 |               |    |       |                   |    |       |                   |
| Current smoker           | 16,406          | 546           | 2.9| 3129  | 297               | 7.7|       |                   |
| Former smoker            | 27,966          | 703           | 1.8| 2839  | 190               | 6.3|       |                   |
| Abstainer/experimental smoker | 44,833    | 858           | 1.4| 3422  | 220               | 6.2|       |                   |
| Unknown                  | 380             | 10            | 3.3| 34    | 4                 | 7.9|       |                   |
| Regular health care provider |           |               |    |       |                   |    |       |                   |
| Yes                      | 75,018          | 1787          | 1.8| 8395  | 634               | 6.8|       |                   |
| No                       | 14,471          | 329           | 1.6| 1021  | 77                | 6.2|       |                   |
| Unknown                  | 96              | 1             | 2.2| 8     | 0                 | 0.0|       |                   |
| Presence of a chronic health condition |           |               |    |       |                   |    |       |                   |
| No                       | 57,671          | 1031          | 1.4| 4658  | 283               | 5.1|       |                   |
causality, as such, it is possible that frequent ED use could also be a cause of mood disorders or could increase mood disorders diagnosis. A second limitation is the survey design, as most of the variables, were self-reported. This could result in misclassification and could bias our results toward or away from the null and affect the validity of our results. The same limitation applies to confounders such as socially undesirable behaviours, where patients could have underreported certain behaviours. Another limitation is the risk of residual confounding, which can affect the internal validity of our conclusion, especially if an important confounder was omitted. Finally, the generalizability of our results should be restricted to similar populations, especially in terms of health system organization and health conditions.

This study has some potential but important clinical implications. Identifying patients with a high risk of frequent ED use could help improve their care. For mood disorders, a screening tool as proposed by Chang et al. can be used in the identification process [8]. Patients who are at high risk for frequent ED use could then be targeted for both ED and non–ED based interventions, such as case management programs [9]. Such interventions seem to be effective in decreasing ED visits. ED patients with mood disorder symptoms are likely to have complex psychiatric, medical and social histories that may need special ED-initiated interventions [10].

Some research perspectives are also to be noted. Although this study demonstrated an increased risk of frequent ED use among the psychiatric population, the reason for the ED visit was not documented. Frequent ED users likely attend the ED for psychiatric and non-psychiatric-related issues. A better understanding of the reason for ED attendance can be used to tailor specific interventions. Moreover, interventions targeting frequent ED users with mood disorders are scarce. Developing and testing such interventions could improve care for this vulnerable population.

In summary, this large, national survey showed that people with a mood disorder had a 2.5-fold risk to be frequent ED users, compared to people without mood disorder. These results can inform the development of policies and targeted interventions aimed at identifying and supporting ED patients with mood disorder, in an effort to mitigate the negative patient and healthcare system sequelae associated with frequent ED use.

Author contributions CAF, DE: conceptualization; CAF: data curation; CAF: formal analysis; CAF: investigation; CAF, YC, DE: methodology; MM-C: validation; CAF, DE: visualization; CAF: writing—original draft; CAF, MM-C, YC, JIP, DE: writing—review & editing.

Funding Open Access funding provided by Université de Genève. CA Fehlmann was supported by the Geneva University Hospital Fellowship Program. Geneva University Hospital was, however, not involved in this protocol.

Data availability The data that support the findings of this study have restrictions and so are not publicly available. Data are, however, available from the authors upon reasonable request.

Declarations

Conflict of interest The authors declare that they have no competing interests.

Ethical approval Institutional review board approval was not required for this project on anonymous data.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article’s Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article’s Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/.

References

1. Moe J, Kirkland S, Ospina MB, Campbell S, Long R, Davidson A, et al. Mortality, admission rates and outpatient use among frequent users of emergency departments: a systematic review. Emerg Med J. 2016;33(3):230–6.
2. Larkin GL, Claassen CA, Emond JA, Pelletier AJ, Camargo CA. Trends in U.S. emergency department visits for mental health conditions, 1992 to 2001. Psychiatr Serv. 2005;56(6):671–7.
3. Montserrat-Capdevila J, Godoy P, Marsal JR, Ortega M, Pifarre J, Alsed a M, et al. Mental disorders in chronic obstructive pulmonary diseases. Perspect Psychiatr Care. 2018;54(3):398–404.
4. Chen A, Ospina M, Moreau A, Melane P, Hu XJ, Fielding S, et al. Characteristics of frequent users of emergency departments in
Alberta and Ontario, Canada: an administrative data study. Can J Emerg Med. 2021;23(2):206–13.
5. Niedzwiecki MJ, Sharma PJ, Kanzaria HK, McConville S, Hsia RY. Factors associated with emergency department use by patients with and without mental health diagnoses. JAMA Netw Open. 2018;1(6):e183528.
6. Mehl-Madrona LE. Prevalence of psychiatric diagnoses among frequent users of rural emergency medical services. Can J Rural Med. 2008;13(1):22–30.
7. Hunt KA, Weber EJ, Showstack JA, Colby DC, Callaham ML. Characteristics of frequent users of emergency departments. Ann Emerg Med. 2006;48(1):1–8.
8. Chang G, Weiss AP, Orav EJ, Rauch SL. Predictors of frequent emergency department use among patients with psychiatric illness. Gen Hosp Psychiatry. 2014;36(6):716–20.
9. Pope D, Fernandes CM, Bouthillette F, Etherington J. Frequent users of the emergency department: a program to improve care and reduce visits. CMAJ. 2000;162(7):1017–20.
10. Boudreaux ED, Clark S, Camargo CA Jr. Mood disorder screening among adult emergency department patients: a multicenter study of prevalence, associations and interest in treatment. Gen Hosp Psychiatry. 2008;30(1):4–13.