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Title	Characterizing frequent emergency department users in British Columbia, Canada: a retrospective analysis
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Reviewer 1	Ann Stewart
Institution	Family and Community Medicine, St Michael's Hospital, Toronto, Ont.
General comments (author response in bold)	<p>This is an interesting study. It is important to better understand frequent, and high costs users, as they highlight the weaknesses of our system, and identify ways it could be changed.</p> <p>Thank you for this positive feedback. We agree that these findings are interesting and have important healthcare system implications.</p> <p>The study is well designed but there are definitely limitations to database studies. The algorithm developed to identify scheduled revisits within 24 hours is interesting, and potentially innovative, but not validated (as the authors mention) and so merits more discussion in the methods – it makes sense that cellulitis would be a frequent cause for return visit – what about other similar items such as return for imaging (perhaps coded as a test, rather than a diagnosis?) or wound care?</p> <p>Thank you for this positive comment. We agree with the Reviewer's comments about our algorithm to identify scheduled revisits: while not validated, we attempted to verify its accuracy in our dataset. As suggested, we have added a more thorough discussion of our approach to identifying repeat visits in the Methods section under Frequent and Non-Frequent Users, as follows:</p> <p><i>Clinicians on our team determined that most scheduled revisits in BC are for intravenous antibiotics for cellulitis. We therefore developed an algorithm to identify ED visit strings occurring within 48 hours of one another with an initial diagnosis of cellulitis. To verify the accuracy of our approach, we examined diagnoses associated with 48-hour repeat ED visits in 2012/13: cellulitis was the most common specified diagnosis (12.1%), followed in frequency by abdominal pain (4.0%), follow-up examination (3.0%), and other medical care (2.3%).</i></p> <p>Can the authors further clarify why NACRS ED revisit is coded unreliably? And why there is so much missing data? The authors speculate that the missing data does not change the result, why do they think this?</p> <p>Unreliable coding for certain variables in NACRS relates to lack of mandatory reporting for these variables in Level 2 institutions, As suggested, we have added the following sentences to better explain unreliable coding and missing discharged diagnosis data within NACRS in the Interpretation section, under Limitations.</p> <p>Secondly, while NACRS has a scheduled ED revisit flag, it is not mandatory and therefore unreliably coded...</p> <p><i>Fifth, while missing data were nominal for most variables, we observed 25.8% and 26.5% missingness for NACRS discharge diagnoses for frequent and non-frequent users, respectively. While high, we do not suspect a systematic</i></p>

difference between groups, as there is no clinical reason that data abstractors would be more or less likely to code an ED diagnosis for frequent users. CIHI quality assurance indicates that missing ED diagnoses is due to incomplete reporting . Discharge diagnosis was a conditional mandatory field for Level 2 reporting facilities in BC during the study period (i.e., completion of either but not both of presenting complaint or discharge diagnosis was required) . To mitigate coding inconsistencies, we collapsed diagnosis information into ICD-10 chapters, as previously described.

Mental Health and Behaviour disorders appears as a top 5 diagnostic category for patients ranging in age from 18-59. This is a key group – but mental health and behaviour is a very broad category – no doubt the authors are limited by the data available, but it is possible to obtain more information about these users? In Ontario, it would be possible to breakdown the diagnostic codes for mental health into depression/anxiety – bipolar – schizophrenia – substance use. This type of subgroup analysis would be helpful to better characterize this key group. This analysis could also be done by looking at prescribed medications – what proportion are on opioids for example?

We agree that frequent users with mental health concerns is an important patient group, and that a more granular breakdown of their mental health co-morbidities is an important clinical question. We also agree that reporting rates of prescribed opioids would be interesting.

As suggested, we have provided the breakdown of diagnoses within the mental health chapter by ICD-10 blocks for frequent users overall and for those under 60 years of age. We have additionally assessed the number of patients who received an opioid prescription using AHFS classifications documented on Pharmanet. We present this information in Supplementary Table 2. We have furthermore added the following sentence to our Results section.

In 2015/16, 8.2% (23,153/283,403) of visits among frequent users aged 18-60 years were mental illness-related; among these, 40.7% (9431/23,153) were psychoactive substance use-related, 17.5% (4046/23,153) psychosis-related, 17.5% (4042/23,153) anxiety-related, and 12.4% (2877/23,153) mood disorder-related. Among frequent users 18-60 years old, 17.3% were prescribed an opioid medication in 2015/16 (Supplementary Table 1).

The “evanescent” nature of frequent users is interesting and it seem to be a new finding – can the authors provide more detail about this – do they suspect patients have a crisis lasting one- two years, and then get better - or connected to better resources or disappear from the system (death or move?)

We agree that the evanescent nature of frequent users is interesting and novel. As suggested, we have added the following sentence to the Interpretation section:

Our clinical suspicion is that many patients move into and out of the frequent user state as acute crises resolve.

The phrase “die often” does leave an unfortunate mental image, so perhaps the authors could use instead “increased mortality”.

We have made this suggested change to the Interpretation section.

	<p>Tables are lengthy, quite busy and over inclusive. I would suggest they be broken down into smaller more focused tables which are easier to absorb. Eg – Table 1 Demographic Characteristics of Frequent and Non-Frequent Users, Table 2 ED Visit Characteristics of Frequent and Non-Frequent Users, Top 5 ED visit Diagnostic Categories – and so on. Don't include data not discussed in results/discussion.</p> <p>As suggested, we have revised our Tables and removed variables that we do not discuss in the Results of our manuscript.</p>
Reviewer 2	Christopher Fernandes
Institution	Emergency Medicine, Hamilton Health Sciences/McMaster University, Hamilton, Ont.
General comments (author response in bold)	<p>This paper used linked provincial databases to try and characterize frequent ED users in BC. While providing an interesting approach, the paper failed to describe why the definition that was used for this population was appropriate compared to other definitions that have been suggested. This establishes a standard without explaining or demonstrating why this should be so.</p> <p>We agree that our paper is interesting, and that definitions of frequent ED use are not universally established. Given a lack of standardization, we have opted to use an accepted definition used by the Canadian Institution for Health Information (CIHI) to facilitate future comparisons with the top 10% cohort of ED users identified by CIHI in other Canadian provinces, particularly in Alberta and in Ontario. This is work that we are currently undertaking in parallel to this submitted manuscript. We describe this in the Methods section under Frequent users, as follows:</p> <p><i>We chose the CIHI definition to facilitate future comparisons with a top 10% cohort of ED users in other Canadian provinces.</i></p> <p>Abstract--Good summary of the paper Thank you for this positive comment.</p> <p>Introduction--p.6, line 42--I am not sure that this is a contradiction. While these patients may have primary care physicians, this does not mean that they are using them. Also, given your results on p. 11, the data would suggest that frequent ED users are using their primary care physicians inappropriately e.g. scattered visits amongst multiple practitioners.</p> <p>Thank you for this comment. We agree and have amended the referenced sentence in the Introduction as follows:</p> <p><i>For instance, over 93% of frequent users are attached to primary care, though the continuity and appropriateness of these relationships have not been explored.</i></p> <p>p. 6, lines 34-48--You would seem to be delineating the conceptual and operational approaches previously discussed by CIHI.</p> <p>We agree and also feel that this section of our Introduction outlines previously discussed national approaches.</p> <p>Methods--p.7, line 14--why is the data so old?</p> <p>There is an inherent delay in obtaining provincial data through PopData BC, given required steps for verification, linkage, and data sharing agreements. We have added an acknowledgement of the age of our data in our</p>

Limitations section:

Finally, due to inherent delays in accessing provincial data through PopData, our lack of more recent data may not reflect current ED visit patterns.

--p. 7, line 47--I am not sure why this number was used. Other data, including what has come from CIHI, would suggest that 1% or 5% may also be appropriate. Others look at cost, and at other variables.

We agree that frequent ED users are not universally defined. We opted to use a standard definition established by CIHI (top 10% of ED users) in order to facilitate future comparisons with the top 10% cohort of ED users identified by CIHI in other Canadian provinces, particularly in Alberta and in Ontario. This is work that we are currently undertaking in parallel to this submitted manuscript. We have added a sentence clarifying our rationale in the Methods section, under Frequent and Non-Frequent Users.

--p.11, line 17--does this not suggest that we are not adequately recognizing or capturing the correct diagnoses on patients that are frequent users?

We agree that broad discharge diagnoses may reflect difficulty ascertaining a definitive diagnosis for frequent users' conditions. This may reflect vague or atypical presentations making definitive diagnosis difficult. However, lack of granularity within our administrative data make it difficult to ascertain with certainty the reason behind broad diagnoses. We therefore have elected to present our findings without imposing an interpretation, and instead allow readers to interpret them based on their own clinical experiences.

--p.13, line 14--this would seem to contradict your suggestion on p. 6, line 42.

We appreciate this comment and the opportunity to clarify. To explain the distinction, while simple liaison to primary care as a general measure has not been universally successful, tailored evidence-based follow-up may be appropriate for specific clinical frequent user subgroups. We have amended the referenced sentence in our Interpretation section as follows:

For these subgroups, clinicians should consider... ensuring that timely access to community-based treatment and supports tailored to specific clinical and psychosocial needs are available from the ED.

--p. 13, lines 38-48--this would seem to suggest a case-management approach.

We agree, and have added case management to our list of suggested interventions in the Interpretation section.

--Conclusion--The conclusions are overly broad compared to what is provided in the abstract.

As suggested, we have revised our Conclusion section to be more aligned with the concluding section of our Abstract.

--References--while interesting, not all 53 references are relevant. I would suggest reducing the number to less than 20.

[Editorial note: ensure all references are relevant but you do not need to reduce the number of relevant citations.]

We have reviewed all references and ensured that they are relevant.

Table 1--the data on top 5 ED visit diagnostic categories by age could be summarized in the text.

As suggested, we have revised Table 1 to include Top 5 diagnostic categories for frequent users overall. We have summarized age category-specific diagnostic data in the text.