A register-based observational study on frequent users of emergency services in a Finnish emergency clinic.

Jonna Levola  jonna.levola@hus.fi
Helsingin ja Uudenmaan sairaanhoitopiiri
Corresponding Author
ORCiD: 0000-0002-4707-1485

Eila Sailas
Helsingin ja Uudenmaan sairaanhoitopiiri

Timo Säämänen
Helsingin ja Uudenmaan sairaanhoitopiiri

Leena Turunen
Helsingin ja Uudenmaan sairaanhoitopiiri

Annika Thomson
Helsingin ja Uudenmaan sairaanhoitopiiri

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Abstract

Background: The focus of emergency room (ER) treatment is on acute medical crises, but frequent users of ER services often present with various needs. The objectives of this study were to obtain information on frequent ER service users and to determine reasons for their ER service use. We also sought to determine whether psychiatric diagnoses or ongoing use of psychiatric or substance use disorder treatment services were associated with frequent ER visits. Methods: A cohort (n=138) of frequent ER service users with a total of 2585 ER visits during a two-year-period was identified. A content analysis was performed for 10% of these visits. Register data including ICPC-2 –codes and diagnoses were analyzed and multivariable models were created in order to determine whether psychiatric diagnoses and psychosocial reasons for ER service use were associated with the number of ER visits after adjusting for covariates. Results: Patients who were younger, had a psychiatric diagnosis and engaged in ongoing psychiatric and other health services, had more ER visits than those who were not. Having a psychiatric diagnosis was associated with the frequency of ER visits in the multivariable models after adjusting for age, gender and ongoing use of psychiatric or substance use disorder treatment services. Reasons for ER-service use according to ICPC-2 –codes were inadequately documented. Conclusions: Patients with psychiatric diagnoses are overrepresented in this cohort of frequent ER service users. More efficient treatments paths are needed for patients to have their medical needs met through regular appointments.

Background
Emergency room (ER) services are specialized in providing care for patients in need of acute medical attention. Earlier research has found that 8% of ER service users were responsible for 28% of ER visits (1). This group also uses more hospital services in general (2). Some patients seek help at the ER repeatedly because it is a place, where they feel safe and perceive their treatment needs are met (3-5). However, frequent users of ER services are often viewed by staff as difficult (6) or hard to treat (7). They will often present with psychiatric and substance related issues, social problems such as homelessness, as well as medically unexplained symptoms (8-10). In many cases, the problems are such that cannot be resolved in ER services, but could benefit from a more comprehensive treatment plan.

According to WHO (11), making a treatment plan together with the patient increases the patients' commitment to treatment, helps to achieve treatment goals and decreases the financial burden of health service use.

While psychiatric symptoms predict higher use of health care services (12), it has also been shown that people with severe mental illness are inadequately treated for their somatic illnesses and are at an increased risk for death from somatic causes (13). There is a substantial risk, in ER as well as non-emergency services, that somatic complaints are overlooked among these persons. This could be the result of misinterpreting somatic complaints as manifestations of a psychiatric illness or focusing on psychiatric rather than somatic reasons for seeking help. A recent meta-analysis by Sprah et al. (14) also found, that physical comorbid conditions were more common among readmitted psychiatric patients to psychiatric care than among patients with single admissions.

The focus of treatment in the ER is on acute medical crises, but frequent users of ER services often present with various needs. More information on this small, but
economically important group of patients is needed when planning comprehensive treatment services. The objectives of this study were 1) to describe the population who frequently use ER services, 2) to determine whether psychiatric diagnoses or psychosocial reasons for ER service use were overrepresented among these frequent ER service users and 3) to determine whether ongoing use of psychiatric or substance use services was associated with frequent ER visits.

Methods

This study was carried out at Hyvinkää hospital area in the Hospital District of Helsinki and Uusimaa. The ER services at Hyvinkää hospital provide 24-hour medical care to five communities encompassing 196,000 people (May 2017) and both rural and urban areas in Southern Finland. Materials used in this study consist of electronic health records retrieved from the electronic health care record database of the Hospital District of Helsinki and Uusimaa. Analyses were performed anonymously without any information regarding identity. The data was handled, and statistical analyses performed by the third author (TS).

The study was approved by the ethical committee of the Hospital District of Helsinki and Uusimaa.

Identification of the cohort

The process of identifying the study cohort is presented in Figure 1. ER service use was defined as any contact with the ER department which resulted in admitting the patient into the ER, contacts via phone were not included. Immediately after retrieving the health records, personal identification numbers and names were removed and replaced with study identification numbers. After anonymization, the number of ER visits per patient during the study period were extracted to identify
the cohort of frequent ER service users. As there is no consensus as to what is
defined as “frequent use of ER services”, patients were identified as frequent users
of ER services according to the definition used e.g. by Young et al. (4) and Saarento
et al. (15). According to this definition, in this study, patients were included if they
had over six visits per year over a ten-year period i.e. 60 ER visits during 2007—
2017. This resulted in a cohort of 187 adult individuals.

International Classification of Primary Care 2 (ICPC–2) –codes are used to classify
reasons for contacts e.g. in primary care or general practice (16). Reasons for
visiting the ER were analyzed according to ICPC–2 –codes. Psychosocial reasons
included psychiatric, substance related and social ICPC–2 –codes. The time of day
and week for the ER visits were analyzed in order to determine whether ER visits
due to psychosocial reasons occur at distinct times compared to other visits.

Information regarding diagnoses were also available for these visits. ICPC–2 –codes
have been used at Hyvinkää hospital systematically only since the beginning of
2016, therefore frequent ER users from 2016 to 2017 were included in the study (n
= 138, a total of 2775 ER visits).

Content analysis

After identifying the frequent ER using cohort, the health records and the textual
content of a random sampling of every tenth ER visit of every individual in the
cohort were further analyzed by the fourth author (LT). In the case of six visits no
documentation was found (content analysis performed for 267 visits). Socio-

demographic variables, substance use and use of other medical and social services
during the study period were identified when possible.

Statistical analyses
Differences between groups were calculated using the Mann-Whitney U-test (non-normal distribution) for variables having two groups and Kruskal-Wallis for variables with more than two groups. Poisson regression was used in the multivariable models.

For the multivariable analyses, data were grouped in two ways. First, according to the primary reason for the ER visit according ICPC-2-codes. Second, the presence of psychiatric diagnoses was screened and the patients were grouped into two categories: no psychiatric diagnosis and psychiatric diagnosis (incl. substance use disorders (SUDs); F00–F99) according to the International Classification of Diseases, tenth revision (ICD-10) (17).

The groups were compared according to number of ER visits during 2016–2017 (model 1). Then age and gender were included as covariates (model 2). Thirdly, in order to evaluate the effect of ongoing treatment services on number of ER visits, ongoing psychiatric or SUD treatment use was also added into the models (model 3).

Extracted data were categorized and coded into variables and analyzed with SPSS version 22.0. All results were considered statistically significant with a p-value of <0.05.

Results

The characteristics of 138 patients who were identified as frequent users of ER services are displayed in Table 1. The mean number of visits per patient was 18 (range 1–105 visits). The primary reasons for ER visits according to ICPC-2-codes are displayed in Figure 2. The most common reasons for ER service use—when documented - fell under the category “General and unspecified”. During the study
period, 29.0% of the cohort visited the ER due to psychosocial reasons. Having a psychosocial reason for using ER services was more common during evening, nights and weekends, than during office hours.

Content analysis

Of the ER visits which underwent content analysis (n = 267), social problems, such as economic distress, were reported as the primary cause in 12.7% (n = 34) of visits and 5.2% (n = 14) visits involved self-harming behaviour. An involuntary referral to a psychiatric inpatient unit was made on a single instance. Of the 138 patients with frequent ER service use, 41.3% (n = 57) had a psychiatric diagnosis, 34.8% (n = 48) were involved in existing psychiatric outpatient care and 7.2% (n = 10) in SUD treatment.

Substance use was documented in 29.2% (n = 78) of all 267 visits with alcohol (23.2% of visits, n = 62), benzodiazepines (7.1%, n = 19) and opioids (5.2%, n = 14) being the most commonly reported substances. Of all visits where substance use was recorded (n = 73), use of more than one substance was reported in 23.3% (n = 17) of these cases, 13.7% (n = 10) were involved in existing SUD treatment and 17.8% (n = 13) psychiatric outpatient care.

Multivariable analyses

Among frequent ER service users, having a psychiatric diagnosis was associated with the number of ER visits (IRR 1.59, 95% confidence interval (C. I.) 1.25—1.89). This association persisted after controlling for age, gender and ongoing use of psychiatric or SUD treatment services (IRR 1.50, 95% C. I. 1.17—1.93). Having a psychosocial reason for ER service use was not associated with the number of ER visits (IRR 0.97, 95% C. I. 0.74—1.28).
Discussion

The burden of poor mental health is increasing and affects a substantial part of the population (18,19) and causes society and the individuals themselves social and economic strain. This is line with the findings of this study where psychiatric diagnoses were notably more common among this population of frequent ER service users compared to the general population (20). Having a psychiatric diagnosis was associated with a higher number of ER visits. This association was statistically significant after adjusting for age, gender and use of psychiatric or SUD treatment services. Having a psychosocial reason for ER service use was not associated with the number of ER visits.

ICPC–2 –codes are designed to reflect subjective reasons for seeking medical attention. Individuals with mental health or substance use related problems do not necessarily seek help from the ER for psychosocial reasons. If an individual e.g. self-mutilates, the reason for seeking help is determined to be somatic, even though the underlying causes have to do with mental health problems. Thus, the finding in this study that psychosocial reasons for ER service use are not associated with the number of visits do not necessarily reflect that psychosocial problems were not present. One must note, however, that people with severe mental illness are inadequately treated for their somatic illnesses, and their somatic complaints must be addressed in concordance with general treatment guidelines.

Ongoing use of psychiatric or SUD treatment services did not markedly change the association between having a psychiatric diagnosis and the number of ER visits in this population of frequent ER users. This may reflect that the reasons for ER service use were not related to psychiatric illness, which is supported by the fact that psychosocial reasons for ER service use were not statistically associated with
number of ER visits. An alternative explanation could be, that despite presenting with somatic reasons according to ICPC-2 -codes, the underlying causes are, in fact, related to psychiatric illnesses and ongoing treatment has failed to respond adequately to the patients’ needs.

Stenius-Ayoade et al. (21) studied health service use of homeless persons and found that visits after office hours at the ER were significantly associated with co-occurring psychiatric and substance use disorders. Accordingly, our study showed that most ER visits due to psychosocial reasons took place outside office hours. The fact that psychosocial reasons constitute a large part of after hour visits at the ER, may reflect these patients’ inability to organize their lives according to societal norms and hours. On the other hand, more flexible office hours could help diminish the need for ER service use. Many of the psychosocial reasons for seeking help at the ER are non-urgent, which is reflected in this study e.g. by the lack of emergency referrals to psychiatric inpatient care. Non-urgent reasons for seeking help cause unnecessary crowding of the ER which may result in a delay for providing acute care.

Purdie et al. (22) found that a typical frequent visitor (more than six visits during six months or 12 visits during 12 months) of ER services was typically an unemployed, single, 48.5-year-old male, who arrived by ambulance. The most common diagnosis was alcohol use disorder (87.5%) followed by epilepsy (31.0%). The frequent users of ER services in our study were more often women than men and younger age was associated with more ER visits. The reason for these differences in relation to previous findings are somewhat unclear. A possible explanation may be that the ER services in Hyvinkää Hospital encompass both specialized care as well as self-referral services. Women use more health services
than men (23,24), in general, and this may be reflected in the ER when no referral is needed. Frequent visitors at psychiatric emergency services have been described as younger in previous studies (25,26).

SUDs have previously been reported to be common among frequent ER service users (10). Diagnoses of SUDs and use of SUD treatment services were quite rare in the present study (n = 21, 15% of frequent ER service users), which is somewhat surprising given that alcohol and substance use was documented quite often and with respect to previous research findings. Alcohol use was unsurprisingly the most common substance recorded in the context of ER visits in this study, where ca. 80% of cases with documented substance use involved alcohol. This was an expected finding due to the leading role of alcohol among substances of use in Finland where, on average, 12.1 liters of 100% alcohol is annually consumed per every ≥15-year-old inhabitant (27). Half of this amount is consumed by 10% of the population (28).

Problems with illicit use of prescription medications (benzodiazepines and opioids) were also fairly common in this study, whereas illegal drug use was more infrequent. Opioids and benzodiazepines are frequently seen in polysubstance abuse and are the most common findings in overdose related deaths (29).

Our study has several strengths. The use of register data is reliable and objective without problems of attrition. However, shortcomings in documentation can lead to missing data as was found here in the case of inadequately documented ICPC-2 codes. This missing data is most likely missing at random and would not bias the results. The content analysis of patient records allows for more in-depth information on ER visits compared to using register data only. A limitation is that information on the use of other ER services elsewhere in Finland was not available.

The results of this study suggest that more diverse treatment paths where
psychiatric, substance use and social services are integrated are needed to meet the needs of these frequent users of ER services. Interventions for alcohol and substance use which are applicable to ER settings are warranted. Future research may wish to further characterize this population of frequent ER service users with regard to morbidity and mortality as well as evaluate how innovative treatment regimens succeed in meeting the treatment needs of this population.

Conclusions
This study was designed with the purpose of obtaining more information on frequent users of ER services. We found that patients who were younger, had a psychiatric diagnosis and were engaged in ongoing psychiatric and other health services, had more ER visits than those who were not. Psychosocial ICPC-2 reasons for visiting the ER peaked outside office hours. On the basis of these results, we conclude that treatment paths where psychiatric, substance use and social services are integrated must be developed to meet the needs of frequent users of ER services.

Abbreviations
C. I. Confidence Interval
EREmergency Room
ICD-10International Classification of Diseases, tenth revision
ICPC-2International Classification of Primary Care 2
SUDSubstance Use Disorder

Declarations

Ethics approval
The study was approved by the ethical committee of the Hospital District of Helsinki
and Uusimaa.

Consent for publication
Not applicable.

Availability of data and materials
The datasets generated and/or analyzed during the current study are not publicly available due to them containing information that could compromise research participant privacy, but are available from the corresponding author on reasonable request.

Competing interests
The authors declare that they have no competing interests.

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Authors’ contributions
JL participated in designing the study, interpreting the results and was a major contributor in writing the manuscript. ES oversaw the process of designing and carrying out the study and contributed to interpreting the results and writing the manuscript. TS participated in designing the study as well as extracting the data and performed the statistical analyses. LT participated in designing the study and extracted the data. AT was responsible for designing the study and contributed to interpreting the results and writing the manuscript. All authors read and approved the final manuscript.

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Tables

Table 1. Characteristics and differences between groups (Mann-Whitney (U) or Kruskal-Wallis test \(X^2\) when comparing more than 2 groups, of frequent Hyvinkää hospital ER service users from 2016 – 2017 (n = 138).

|                                | n  | %   | Mean visits | U / X^2 | df |
|--------------------------------|----|-----|-------------|---------|----|
| Age, years                     |    |     |             |         |    |
| 18 - 25                        | 15 | 10.9%| 3.2         |         |    |
| > 25                           | 123| 89.1%| 1.8         |         |    |
| Gender                         |    |     |             |         |    |
| Male                           | 49 | 35.5%| 2.0         |         |    |
| Female                         | 89 | 64.5%| 2.0         |         |    |
| Employment                     |    |     |             |         |    |
| Unknown                        | 21 | 15.2%| 1.6         |         |    |
| Working                        | 35 | 25.4%| 1.9         |         |    |
| Sick leave/disability pension  | 84 | 60.9%| 2.1         |         |    |
| Any psychiatric diagnosis\(^1\)|    |     |             | 1570.5  | 1  |
| Yes                            | 57 | 41.3%| 2.5         |         |    |
| No                             | 81 | 58.7%| 1.6         |         |    |
| ER visit for psychosocial reasons\(^2\)|    |     |             | 1817.5  | 1  |
| Yes                            | 40 | 29.0%| 2.1         |         |    |
| Ongoing use of services |  |  |
|-------------------------|---|---|
|                         | No | 98 | 71.0% | 1.9 |

**Psychiatric services**

|                         | Yes | 48 | 34.8% | 2.5 |
|-------------------------|-----|----|-------|-----|
|                         | No  | 90 | 65.2% | 2.0 |

**SUD treatment services**

|                         | Yes | 10 | 7.2%  | 1.9 |
|-------------------------|-----|----|-------|-----|
|                         | No  | 128| 92.8% | 2.8 |

**Other health services**

|                         | Yes | 47 | 34.1% | 1.7 |
|-------------------------|-----|----|-------|-----|
|                         | No  | 91 | 65.9% | 2.4 |

**Social services**

|                         | Yes | 18 | 13.0% | 1.9 |
|-------------------------|-----|----|-------|-----|
|                         | No  | 120| 87.0% | 2.0 |

* p<0.05 ** p<0.01 *** p<0.001

1 Patients with an F-diagnosis at any time during 2016-2017
2 Patients with visits to ER due to psychosocial reasons according to ICPC-2 code at any time during 2016-2017

**Table 2. Association of psychiatric diagnoses and psychosocial reasons for ER service use to number of ER visits (Poisson regression).**

|                         | n  | Model 1\(^1\) |  | Model 2\(^2\) |  |
|-------------------------|----|----------------|---|----------------|---|
|                         | IRR| 95% C.I.       | IRR| 95% C.I.       |
| Any psychiatric diagnosis\(^4\) | 50 | 1.59***        | 1.25 - 1.89 | 1.56*** |
| ER visit for psychosocial reasons\(^5\) | 43 | 1.05           | 0.81 - 1.36 | 1.02 |

* p<0.05 ** p<0.01 *** p<0.001
1 Association with number of ER-visits, crude model
2 After adjustment for age and gender
3 After adjustment for age, gender and use of mental health or substance use services at any time during 2016-2017
4 Any F-diagnosis at any time during 2016-2017
5 According to ICPC-2 code at any time during 2016-2017
Figures

Total number of patients visiting the ER during 2007-2017 = 145 344

Total number of visits at the ER = 611 033

Number of patients with >60 visits during 2007-2017 = 187

Number of visits 15 582

Number of patients during 2016-17 = 138

Number of visits 2 585

Number of visits in content analysis 273

Figure 1

Identification of the study cohort.
Figure 2

Reasons for ER visits between 2016 – 17 according to time of day and Internation