



One for all or all for one? An integrative review of research on frequent callers

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ABSTRACT

Objective: Telephone health services is an increasing and integral part of health care in several countries. Callers who call repeatedly, in the current study “frequent callers” are present in all kinds of healthcare services, often constitute a considerable proportion of the total amount of calls and are complicated to help. The aim was to provide a comprehensive overview of research on frequent callers at a variety of telephone health services.

Methods: An integrative literature review. Literature was searched for the period 2011–2020 in CINAHL Plus, MEDLINE, APA PsycArticles, APA PsycInfo, and PubMed, and resulted in the inclusion of 20 articles.

Results: Studies on frequent callers (FCs) were found in the context of emergency medical services, telephone helplines, primary healthcare, and specialist medicine clinics. Frequent calling was associated with psychiatric comorbidity, and the reasons for calling were often multifaceted.

Conclusion: The strategies suggested for handling calls involved an individual approach, which could be enabled through multidisciplinary work.

Innovation: The main findings indicate a need for a systematic approach and guidelines to enable optimal help for FCs. Cooperation among healthcare instances seems to contribute to a more individual care for FCs.

1. Introduction

Telephone health services have become an integral part of healthcare in several countries, for instance the UK, the US, Canada, Australia, and Sweden [1,2]. Callers who repeatedly contact telephone health services constitute a large group, accounting for a significant proportion of calls to these services [3,4]. This group of callers is labelled frequent callers (FCs) in some studies, but different terms and definitions exist; the impression, however, is that regardless of term they seem to describe the same phenomenon. Hence, they seek care and call repeatedly to telephone health services. The phenomenon seems to be familiar in different kinds of health care instances. It is unknown if FCs call several care instances at the same time during a period and requires more investigation. Nevertheless, in the current review, the term FCs is used throughout.

Answering FC calls can be stressful, and stress among telephone nurses is associated with a lower level of empathy [5]. FC calls often consume proportionately high levels of resources [6]. However, FCs are considered to have reasons for calling, and major mental and physical health problems [4] with psychiatric comorbidity [3,4,7]. Encounters with callers who have psychiatric illness tend to be more complex and time consuming [8]. In the current review the terms *psychiatric*

problems, comorbidity, and mental health problems are used, depending on which term the original study used.

Research on FCs has been conducted in different contexts, such as primary care, helplines, and emergency medical services (EMS) [3,6,9]. A helpline review suggests several techniques for handling FC calls, such as limiting the number of calls allowed, assigning a specific counsellor, following a treatment program over the telephone, or the service contacting the caller before they themselves call [3].

FC calls seems to constitute a challenge for healthcare organizations and telephone health services in how to best care for FCs, but research is scarce. To our knowledge, no previous studies have compiled research on FCs, regardless of context, terms, the performance of interventions, or suggestions for how to handle calls. There is thus a need for an overview of the studies performed regarding FCs in recent years, for inspiration in tailoring optimal care and support for callers who repeatedly seek help via telephone. The aim was thus to offer a comprehensive overview of research on FCs to a variety of telephone health services.

The following research questions were addressed:

1. In what countries and contexts, and with which focus, are frequent callers studied?

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2. Which designs and methods are used?
3. What are the terms and definitions used for calling repeatedly?
4. What proportions of calls do those from frequent callers constitute?
5. What are the characteristics of frequent callers and what are their reasons for calling frequently?
6. What strategies are suggested for handling these calls?

2. Methods

An integrative literature review is a method of conducting a review that allows to include different methodologies [10]. The integrative method was found suiting for the current review where the aim was to capture all research conducted about FCs in the last ten years. The literature review was conducted in line with strategies for enhancing rigor in integrative reviews [10]. These are described in the following stages: problem identification, literature search, data evaluation, data analysis, and presentation. The analysis was performed according to Whittemore and Knalf [10] in a stepwise manner, described in the *Analysis* section. The current review constitutes the third study of a research project involving FCs [5,11].

2.1. Search methods

The searches were performed with guidance from a librarian, according to the guidelines in Preferred Reporting Items for Systematic Reviews and Meta-Analyses [12]. The databases searched were CINAHL Plus, MEDLINE, APA PsycArticles, APA PsycInfo, and PubMed. The search terms were *frequent callers*, *repeated callers*, and *frequent users*. The terms were used separately or together with AND, OR, and with an asterisk to include different inflections of the words (for example, call*). All the found articles' reference lists were screened for additional data.

2.2. Screening and study selection process

The inclusion criteria were peer-reviewed articles in English, published during the period 2011–2020, reporting about the phenomenon of calling repeatedly to healthcare, including support telephone lines. The ten-year span was chosen due to the rapid changes within digital care and organizations of telephone health services, to capture up-to-date research. The inclusion criterion was all possible research on FCs, regardless of method or healthcare context, in order to answer research question 1. The exclusion criteria were review articles, articles that turned out not to be about FCs and articles that were predominantly about frequent attenders. The study selection process was conducted by the first author with assistance with double-checking and reading from the last author and resulted in 24 included articles. For more information about the literature searches and literature selection, see Fig. 1.

2.3. Quality appraisal

To include high-quality studies, the first measure taken was to exclude any articles published in journals with an impact factor lower than 1.0. The remaining articles were assessed according to the Mixed Methods Appraisal Tool for critical appraisal [13]. This tool, designed for systematic mixed-method studies reviews, was considered suitable. The quality assessment led to the exclusion of one further article, as it was not possible to assess according to the tool. Hence, 20 articles were considered relevant for inclusion in this study.

2.4. Analysis

Data analysis followed four steps: data reduction; data display; data comparison; and conclusion drawing and verification [10]. In the first step, an article matrix was created and information was sorted into answers to the research questions. The matrix enabled a systematic comparison of

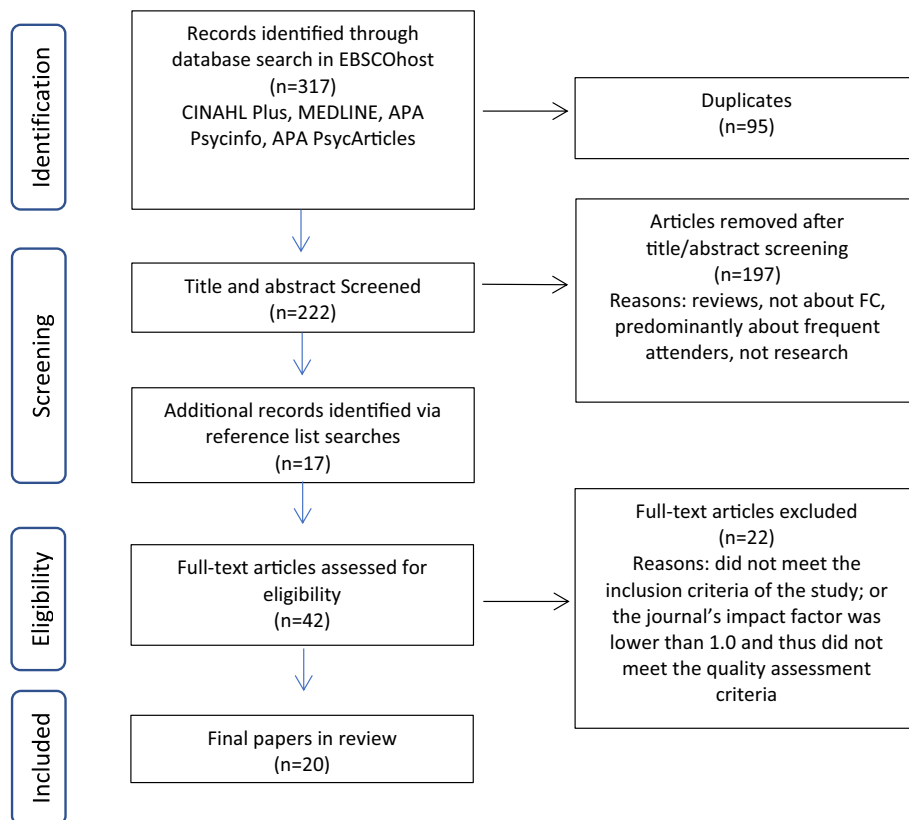


Fig. 1. PRISMA flowchart of search process.

the study articles according to characteristics and specific variables. In the second step, data were extracted from the articles and converted into displays that gathered data from multiple sources on specific variables. The displays visualized patterns and relationships in the material and served as a starting point for interpretation. In the third step, a conceptual map was drawn, and relationships were depicted between variables, in which patterns were identified. In the fourth and final step, a higher level of abstraction was strived for, subsuming the particulars into the general. Commonalities and differences were identified. The integrative models were continually revised, striving for them to be vigorous but still enabling the inclusion of as much data as possible. All conclusions were verified against primary source data. Thereafter, an integrated summation of the topic was constructed. Documentation on reflections and ideas was conducted during all the steps of the analysis process.

3. Results

Twenty articles answered the study aim of providing a comprehensive overview of research on FCs at a variety of telephone health services and were thus included in this review. For an overview of the articles, see Appendix A. The results are presented according to the research questions, but first an integration of the study results is displayed, see Fig. 2.

3.1. Countries and contexts where frequent callers have been studied

All the studies were conducted in Western countries, with just over a quarter conducted on different kinds of helplines, mostly in Australia [14-19]; see Table 1. The most common context of the studies was EMS [20-26]. EMS, medical/nursing lines, and specialist medical clinics constituted three quarters of the studies; see Table 1.

3.2. Designs, methods, and focuses of the studies

Fifteen of the studies had a quantitative design and five a qualitative design. The majority of the investigated material from patient data registers or surveys was comprised of retrospective cross-sectional studies; see Appendix A. Many of the studies investigated sociodemographic and clinical characteristics of FCs, constituting three quarters of the included studies. In four of the studies the reasons for FC calls were included in the aim [16,19,26,28], and two of them investigated the FCs' perspective [16,26]. The remaining two studies investigated the experiences of telephone nurses answering FC calls [11,33].

3.3. Terms and definitions for calling repeatedly

Nine of the studies used the term *frequent callers*, which was the most common [11,18-22,28,31,33]. Four used the term *repeated callers* [14,17,23,32], and four used the term *frequent users* (of EMS calls or helplines) [15,16,25,26]. The remaining studies used the terms *high-frequent callers* [29], *high telephone encounters* [30], and *frequent EMS caller* [24]. How often someone should call in order to be considered an FC varied considerably between studies. Only two studies, both conducted on EMS in Canada [25,26], used the same time frequency definition: five times or more in a year. Two studies used the agreed-on definition within EMS in the UK, namely five or more calls per month or 12 calls over a three-month period [22], although one of these studies was conducted in Canada [26]. For an overview of definitions see Table 2.

3.4. Proportions of frequent caller calls in services

Several studies stated that a minority of patients account for many of the calls [17,19,28-31]. The FC group could account for, at the highest, 89% of calls [31]. According to one of the studies, around 50 callers had contributed to 20% of the total call volume over a four-year timespan. These callers had called thousands of times [17]. It could be a case of FCs calling 70 days per year [29], or 15% of callers generating more than ten telephone encounters yearly and making half of all calls [30]. FCs used face-to-face healthcare services in addition to calling and were more likely to be dissatisfied with these services [16,30]. During the day, when other healthcare services were available, the calls from FCs decreased [21].

From the perspective of telephone nurses answering FC calls, the calls were perceived as complex and demanding to manage and contributed to an increased workload [11,33]. Further, telephone nurses were afraid of missing new acute symptoms due to the feeling of already "knowing" the caller [11]. FC calls also had a significant impact on helplines [18]. Further, frequent telephone calls were associated with caregivers' negative perceptions of the caller, which could undermine the treatment relationship [29].

3.5. Reasons for calling and characteristics of frequent callers

The majority of the studies included in this review [11,14-16,18,20-22,25,26,28-33] describe FCs as having multiple and complex health issues that cause them to call. Over time, they can develop dependent calling behavior [15]. There may be lack of insight among FCs in the difference between their need for emergent treatment and conditions that can be managed via alternative pathways, e.g., community nurse service. The ambulance service was reported to be a factor that contributed to the behavior

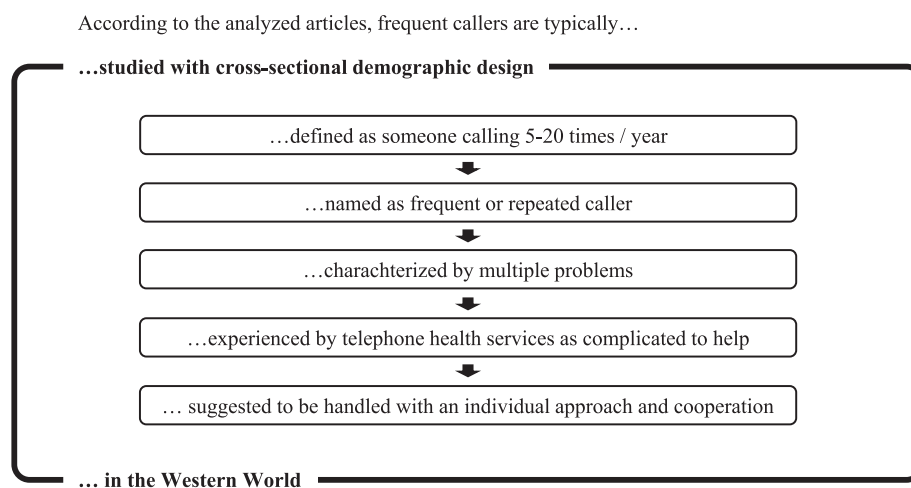


Fig. 2. Integrative model of frequent callers.

Table 1
Countries and contexts of the included studies.

Country Context	Canada	Australia	Denmark	US	UK	Sweden	Ireland
Emergency medical services (n = 7)	[25,26]			[23]	[20-22]	[24]	
Helplines (n = 6)		[14-16,18,27]					[17]
Specialist medicine clinics (n = 4)				[28-31]			
Medical and nurse lines (n = 3)			[11,32,33]				

of calling repeatedly, as they are obliged to always offer calls with instant access, which reassured callers [21]. Significant life changes such as social isolation and chronic disease [16,17], or discharge from hospital or release from prison [22], were associated with frequent calling [16,17,22]. FCs often called for mental health issues [14-17,20,26]. This was also a common denominator of the two studies from the caller perspective [15,26]. FCs were found to call for the same reasons as other callers, but more often called repeatedly to talk about their feelings [19]. Even when studies differed in, for example, context (EMS and helpline), FCs sought help for mental health issues. Seven of the studies more specifically reported a connection between anxiety and calling repeatedly [11,14,16,25,28,30,31], one reporting that 67% of FCs had anxiety or depression [25]. Overall, psychiatric problems were reported as a common reason for calling repeatedly in eight of the studies [11,21,25,28-31,33]. In two studies, an association was found between frequent calling and medical narcotic use [29,30], and a higher proportion of callers who were opioid users had a psychiatric diagnosis [29]. Further, three studies reported that FCs called more often for suicidal intentions [16,20,21]. Regarding medical diagnosis among FCs to EMS, FCs' primary reasons for calling were more frequently for abdominal pain, breathing problems, chest pain (non-traumatic) [21,24], headache, psychiatric problems, and suicide attempts [21]. Further, the most common final diagnosis (addressed in hospital) was chronic obstructive pulmonary disease [24]. Four studies found that FCs were associated with having pain [21,24,28,30]. Seven studies reported that FCs were more likely to have a chronic disease [16,20,22,24,26,28,30]. Besides this, four studies reported that FCs had economic problems [14,16,25,32]. A combination of chronic disease, social circumstances, mental health issues, and not understanding the purpose of the service (EMS) could drive frequent calling [26]. In a study investigating frequent fall-related calls, a third of older adults who called EMS due to a fall [23] called again for fall assistance. FCs in that study, who called more frequently, had an 80% chance of not needing an ambulance [23].

3.6. Suggested strategies for handling FC calls

Only one study had performed an intervention, and it was stated that multiple intervention strategies were required [20]. The effectiveness of an individual approach was demonstrated, and greater resources for the management of FCs were recommended [20]. Interventional approaches were suggested in two studies [21,26], for example developing a tool that could identify callers who are likely to become FCs, which could be used as part of a targeted intervention aimed at reducing use by FCs [21]. The importance of considering the complex and multiple needs of FCs in finding solutions or constructing interventions was underlined [15,16,18,20,26,30], especially with continuity of care components over a period [15,16]. Further, it was suggested that internet-based cognitive behavioral therapy may be useful in addressing underlying mental health issues [18]. Resolving

Table 2
Definitions of calling repeatedly.

Context	Frequency and timespan of calling repeatedly
Emergency medical services (n = 7)	4-5 times / year to 10 times / month
Helplines (n = 6)	0.7 calls / day to 20 or more / month
Specialist medicine clinics (n = 4)	2 calls / 3 months to 20 times / year
Medical and nurse lines (n = 3)	Twice / 48 h to once / week

callers' emotional or clinical needs may help in providing the appropriate care for FCs [22].

As seen in a nationwide study in the UK, several models of care for FCs already exist, e.g. flagged calls, contacts with callers and their GP, performing home visits, and multidisciplinary team meetings [22]. Telephone nurses within primary care used strategies such as providing follow-up calls, having good accessibility by telephone, working in teams, and making an individual care plan [33]. The last two items are congruent with another study involving telephone nurses [11].

It was pointed out that, since people who use telephone health services that offer counselling also contact other healthcare services such as GPs and mental health nurses to a higher degree, an improvement of coordination and an integration of healthcare providers could be beneficial [11,14,16,22]. More individualized care was suggested [17,20,23,25,29,30], e.g. the notion that patients characterized by opioid use need intensive psychological intervention [29]. Another suggestion entailed reducing the frequency of fall-related calls to EMS through targeted fall-prevention strategies [23]. Other suggestions for individualized care involved monitoring telephone activity, identifying patients at risk of high-cost care, and tailoring for specific clinical factors, e.g., pain or psychiatric comorbidity [30]. A need for guidelines and routines for improving the care for FCs was also indicated [33]. The integrated result for how FCs preferably should be handled, according to the study articles, is displayed in Fig. 3, which contributes to a wholeness of the review results, see Fig. 3.

4. Discussion and conclusion

4.1. Discussion

Via 20 articles from seven countries, the study results offer a comprehensive overview of research on FCs at a variety of telephone health services. The healthcare contexts included EMS, helplines, specialist medicine clinics, and medical and nurse lines. FCs are a heterogeneous group with different health problems, partly explained by healthcare and context differences. Still, the pattern of calling repeatedly is something they have in common.

Only two studies in the review were conducted from an FC perspective [15,26], and two studies from a healthcare personnel perspective [11,33]. These perspectives are worth investigating further, to tailor future interventions and enable optimal help for FCs. Most studies reviewed investigated sociodemographic and clinical characteristics of FCs [14,18,20,21,24,25,29,31,32]. The results of this review point to a lack of systematic methods and intervention studies within different telephone health service contexts, which might contribute to more general and national guidelines. If there were more national guidelines regarding how to handle FC calls, this would enable evaluations of the care offered to FCs.

The results point to variation in how to label and define the group of callers who contact telephone health services repeatedly. The terms and definitions also vary within the same context. In the UK there is a nationally agreed-on definition of FCs to EMS, which is used in two of the studies [22,26]; this is perhaps an example of how to find a way to using a common terminology, at least within the same healthcare context. Using the same terminology could clarify the group of FCs and facilitate the evaluation of care plans and interventions. The reason for labelling this group FC is to describe the group the phenomenon concerns, help them, and offer optimal

The way frequent callers (FCs) **are typically** seen and handled, according to the articles



An individual handles a group

- An individual health personell (HP) not coordinated with the rest
- FCs are not seen as individuals but as their "group" (the HP handles the FC in a standard way stipulated for the group rather than adjusted for the individual, the FC is not being adequately helped and calls again)

The way FCs preferably **should be** seen and handled, according to the articles



A group handles an individual

- Health personells coordinated
- FC is seen as an individual with a unique combination of multiple needs (the HPs handle the FC in a way appropriate for the individual, the FC is being helped and does not call again)

Fig. 3. How frequent callers are handled opposed to how they could be handled.

care. Despite this, the stigma involved with labelling an already vulnerable group is and should be considered.

In relation to Fig. 2, the model of the typical FC, the working environment in which healthcare personnel answer calls is important. Healthcare resources are limited, and calls are expected to be handled in a time-efficient manner. That telephone nurses have reported that FC calls are complex and demanding and increase their workload [33], parallel to their being afraid of missing new symptoms [11], is congruent with previous research on a stressful working environment being counterproductive when caring for vulnerable callers [22,34]. This occurs especially when FCs are seeking reassurance and the healthcare personnel are stressed, which can lower their empathy [5]. FCs constitute a large number of the total calls in six studies included in this review [17,19,28-31] and in previous research [3,4,6]. This large number of FCs likely has a great impact on healthcare organizations [18] and personnel, and affects other callers trying to reach the telephone health service [4,18]. It seems to be important to consider and sort out strategies for helping FCs, both to offer them custom care and to unburden the telephone healthcare services.

A striking finding is the multiple common denominators involving FCs in their reasons for calling and suggested strategies, despite the different contexts of the study articles. Among the studies included in this review, FCs had a higher risk of psychiatric comorbidity, anxiety, chronic disease, and pain. Considering these overrepresented health problems, a picture emerges of a typical FC as a vulnerable person. One of the most common reasons FCs contacted EMS was breathing problems [21,24]. Breathing problems are known to increase anxiety, which was a common reason for calling repeatedly. Another aspect worth considering is that some studies indicate that FCs make greater use of other healthcare instances as well [16,21,30], suggesting that they could be high consumers of care at several care instances simultaneously.

Several approaches and models for handling the repeated calls were suggested in the studies, and a common pattern could be identified. Suggestions were related to FCs' complex healthcare needs, such as a model more suited to these needs, an individual approach, multidisciplinary work, and cooperation with other healthcare instances. Components such as loneliness, social isolation, and mental health issues emerge in calls with FCs [14-17,20,26], and it is important to continue the research and reveal strategies for helping this large group of callers to a better suited healthcare. While offering optimal care is primarily in the interest of FCs themselves, it would also benefit other callers, healthcare personnel, the healthcare organization, and the welfare society. In summary, Fig. 3 demonstrates how

the current way of handling FCs may lead to their calling even more. To reduce the calling and offer FCs individualized care, healthcare services need to be coordinated. This could possibly enable the strategies suggested in this review for handling FCs' calls and allow the FC to be seen as an individual with a unique combination of multiple needs.

4.1.1. Strengths and limitations

A limited number of studies was found, mostly investigating FC demographics. This sheds light on the need for further studies, using varied methods, on the phenomenon of FCs. The suggestions for changes in how to help FCs that emerged in the results came partly from the articles' discussions; even though these parts referred to the articles' results, this could be considered a limitation in evidence. It was still found to be valuable to compile the suggestions, however, to discover patterns and suggestions for future interventions.

4.2. Innovation

The results of this integrative review of studies on FCs indicate a need for a systematic approach and guidelines to enable better help for FCs. Cooperation within and between healthcare instances is likely to enable the creation of more optimal care for FCs.

4.3. Conclusion

This integrative overview of the research on FCs contributes to filling a void in investigating research conducted on FCs, regardless of context. FCs seem to be present in different kinds of healthcare contexts, and their calls seem to constitute a considerable proportion of calls to telephone healthcare services. The studies included mostly investigate demographics with a retrospective or cross-sectional design. Different terms are used to describe callers who call repeatedly, the two most common are FCs and *repeated callers*. The studies have their origin in the US, Australia, and Europe. The results and discussion emphasize that the typical FC is a vulnerable person with a higher risk of psychiatric problems, chronic disease, and social isolation. The described strategies for handling FC calls are related to the complex and multifaceted problems FCs often have. Suggestions include individual care that considers the FC's complex life situation, enabled by coordinated care and cooperation between healthcare providers. As FCs often have vulnerable life situations, this needs to be considered in planning their care. More research from the FCs perspective is warranted.

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Credit authorship contribution statement

Sofia Skogevall: Conceptualization, Investigation, Methodology, Writing – original draft, Visualization. **Inger K. Holmström:** Conceptualization,

Supervision, Methodology, Writing – review & editing. **Elenor Kaminsky:** Conceptualization, Supervision, Methodology, Writing – review & editing. **Jakob Håkansson Eklund:** Conceptualization, Supervision, Methodology, Writing – review & editing.

Declaration of Competing Interest

The authors declare no conflicts of interest.

Appendix A. An overview of included articles

Study	Focus	Design	Participants/material	Data collection	Analysis
Agarwal et al., 2019	Describe frequent users of Emergency Medical Services (EMS).	Cross-sectional survey study	67 frequent EMS callers	A mailed self-administered survey with validated tools. The survey focused on demographics, social isolation, poverty, and quality of life.	Descriptive statistics
Bassilios et al., 2015	Sociodemographic and health-related characteristics of callers making repeated calls	Epidemiological data study	Data from a nationally representative community survey ($n = 8841$)	The original data were collected through face-to-face computer-assisted interviews	Secondary analysis. Callers and non-callers were compared.
Blakoe et al., 2019	Sociodemographic and health-related characteristics of callers making repeated calls	Descriptive and comparative quantitative study	Caller data (12,902 calls, with 464 making repeated calls within 48 h)	Calls were collected from the medical helpline's electronic records. The survey included self-reported health and worry, and registry data.	Logistic regression analysis (and crude logistic regression analysis)
Corral et al., 2015	Reasons that prompt patient calls	Retrospective cross-sectional study	Telephone calls ($n = 526$) to gastroenterology providers (patients = 209)	All telephone calls to gastroenterology providers registered in medical records during 2012	Chi-2 test to compare for differences in nominal variables. Student's test to compare continuous variables. Descriptive statistics.
Edwards et al., 2015	Profile FCs to ambulance services	Retrospective review	Patients who had been accepted for case management intervention by patient-centered action team during the period (110 FCs)	Data were extracted from the database for the two-year period. Patients' sociodemographic characteristics, call volume, and other measures	Descriptive analysis, Wilcoxon test to compare call volume pre- and post-intervention
Fisher et al., 2011	Identify characteristics of patients who frequently initiate contact.	Retrospective study	High-frequency (26) and low-frequency (18) callers.	All telephone calls received during a period of one year regarding demographic characteristics, diagnoses, and medication use. A questionnaire was administered to physicians and administrative staff.	Clinical records were analyzed. Comparison of high- and low-frequency callers. Chi-square test and analysis of variance.
Holmström et al., 2016	How telephone nurses describe their experiences of encounters with FCs	Descriptive interview study. Inductive approach.	Ten registered nurses from six different primary healthcare centers	Individual semi-structured interviews	Qualitative content analysis. The process involved a dialectic movement between whole-parts-whole.
Liu et al., 2011	Clinical correlates of frequent telephone healthcare utilization	Prospective cohort study	175 non-demented outpatients with Parkinson's disease, with 297 total calls in three months. Frequent and non-frequent caller groups were designated.	Anxiety inventory, depression inventory, obsessive compulsion inventory, disability scale, and Parkinson's Disease Quality of Life Questionnaire. All telephone calls from patients and caregivers were prospectively recorded.	Descriptive statistics. Univariate relationships were investigated using the sample t -test, Wilcoxon rank sum test, chi-square test, or Fisher's exact test.
Mahmuda et al., 2018	Frequent users' experiences regarding contacting EMS	Inductive interview study with grounded theory approach	Ten participants were selected consecutively from a list of frequent users of EMS	Semi-structured interviews were conducted (four in person and six via telephone). The interviewer sought to discuss key questions.	Data were used to draw insights from the reality of the callers' experiences. The coding process was iterative. All emerging themes were used.
Middleton et al., 2017	Differences in reasons for calling between frequent users and other users of crisis helplines	Survey study	315 callers completed the survey. 22 callers reported calling 20 or more times in the past month.	At the end of the call to Lifeline, the caller was asked to answer a brief survey.	Ordered logistic regression
Middleton et al., 2016	Why some users call crisis helplines frequently	Inductive interview study	19 callers	Semi-structured interviews via telephone	Inductive thematic analysis
Middleton et al., 2016	Relationship between frequent use of telephone helplines and health service use	Cohort study	Practice attendees ($n = 789$) with depressive symptoms	Telephone helpline use was measured at 3, 6, 9, and 12 months.	Ordered logistic regression
O'Neill et al., 2019	Which different groups of callers can be characterized by specific usage patterns	Quantitative cluster and periodicity analysis	3.5 million registered calls	Calls were extracted from a telephone informatics system over a three-year period.	Each telephone call was uniquely identified to enable analysis of repeat calls. Clustering and periodicity analysis were used.
Quatman et al., 2018	Evaluate the utility of monitoring EMS call patterns	Retrospective chart review	Fall-related calls ($N = 4084$) from people over 60 years of age	Calls were identified in charts from the health EMS database. A chart review was performed.	Descriptive statistics, bivariate comparisons. Kaplan-Meier plots for time to next call according to a specific call number.

(continued)

Study	Focus	Design	Participants/material	Data collection	Analysis
Ramos-Rivers et al., 2014	Analyze data on ingoing and outgoing calls and clinical factors	Prospective observational study	21,979 ingoing and outgoing calls in 2009 and 32,667 calls in 2010. Patients were stratified based on annual telephone encounter rates: 0–1 encounters per year (low), 2–5 per year, 6–10 per year, and 10 or more per year (high).	Data were extracted from the electronic medical records, e.g. demographics, annual number of clinical encounters, and psychiatric comorbidity. An IBD-specific quality of life measure and the short bowel disease questionnaire were obtained prospectively.	Pearson's Chi-square test, post-hoc comparisons, and ANOVA to compare the four call groups. Univariable logistic regression to compare telephone encounters and hospital admissions. Kaplan-Meier analysis and Cox regression adjusting for medications, to compare number of phone calls and risk of hospital admission.
Scott et al., 2014	Identify the characteristics of those who called the most frequently	Descriptive and comparative quantitative study	The top 100 FCs of 7808 calls made by FCs during the study period of April 2010 to March 2011	Call code and primary call reason and demographic information. FCs with >10% of calls were coded as psychiatric. A case-control group was created by randomly selecting 100 callers from the total population.	Analysis methods were population comparison, case control, and multiple regression methods.
Skogevall et al., 2020	TNs' experiences of FC calls	Survey study	199 telephone nurses	Demographic questions and seven open-ended questions	Answers were analyzed with inspiration from content and summative analysis.
Snooks et al., 2019	Describe service-wide and local policies, and results of any evaluation	National survey study	Twelve ambulance services	Structured questionnaire via email and telephone interviews	Descriptive and inductive thematic approach whereby theoretical perspectives were informed by the interpretation of raw data
Spittal et al., 2015	Determine whether frequent and non-frequent callers differ in sociodemographic characteristics	Descriptive data register study	An anonymous dataset with 411,725 calls made by 98, 174 individuals, of whom 2594 were FCs.	Comparison of frequent and non-frequent callers. Call level data were aggregated up to the person level.	Individuals were coded for suicide safety. Descriptive statistics. Multivariate regression analysis was performed in the primary analysis. Two sensitive analyses were performed to determine whether other data were affected by missing data.
Tärnqvist et al., 2017	Study patients who used the EMS at least four times in the studied year.	Retrospective observational study	339 individual patients who used the EMS on 1885 occasions	Information on pre-hospital assessment and on-scene and final diagnosis, collected from the hospital care records	Nested analysis of variance was used for <i>P</i> -value calculations regarding gender and age group comparisons.

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