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Satisfaction of 30,402 callers to a medical helpline of the Emergency Medical Services Copenhagen

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Abstract

Objectives

To keep healthcare systems sustainable for future demands, many countries are developing a centralized telephone line for out-of-hours primary care services. To increase the quality of such services, more information is needed on factors that influence caller-satisfaction. The aim of this study was to identify demographic and call-related characteristics that are associated with the patient satisfaction of callers to a medical helpline in Denmark.

Design

Retrospective cohort study on patient registry data and questionnaire results.

Setting

Non-emergency medical helpline in the Capital Region of Denmark.

Participants

A random sample of 30,402 callers to the medical helpline between May 2016 and May 2018.

Primary and secondary outcome measures

Responses of a satisfaction questionnaire were linked to demographic and call-related dispatch data. Associations between the characteristics were analyzed with multivariate logistic regression analysis with satisfaction as the dependent variable. A subgroup analysis was performed on callers for children aged between 0-4 years.

Results

Of the 30,402 analyzed callers, 89.5% were satisfied with the medical helpline. Satisfaction was associated with calling for a somatic injury (OR 1.87, 95% CI 1.64–2.13), receiving a face-to-face consultation (OR 2.18, 95% CI 1.96-2.43), and a waiting time less than 10 minutes (OR 1.63, 95% CI 1.42-1.87). Callers for a 0-4 year old patient were more likely to be satisfied when they called for a somatic illness or received a telephone consultation, compared to the rest of the population ($p<0.0001$).

Conclusion

Callers were in general satisfied with the medical helpline. Satisfaction was associated with reason for encounter, triage response, and waiting time. People calling for 0-4 year old patients were, compared to the rest of the population, more frequently satisfied when they called for a somatic illness or received a telephone consultation.

Keywords

Out-of-hours healthcare - Patient satisfaction – Telephone triage - Denmark

Strengths and limitations of this study

• The satisfaction questionnaire ran over a two-year period, which ensured a large sample size (n=30,402) and allowed for conducting a subgroup analysis.

• The short length of the questionnaire enabled people to respond who would normally not respond to long questionnaires, such as parents of children or patients with a psychiatric illness.

• Responses to the satisfaction questionnaire were linked to internal patient registry data, which provided more information on the characteristics of the respondents.

• Although data on non-receivers of the questionnaire was analyzed, the analysis was limited because characteristics of non-respondents could not be obtained due to regulations around patient data protection.

Introduction

Member States of the European Union (EU) face growing and changing healthcare needs due to population ageing and tight budgetary constraints (1). To keep the healthcare systems sustainable for the future, EU countries are working on initiatives towards more integrated care models (2). More integrated and people-centered healthcare systems are expected to provide services that are of better quality, financially more sustainable and more responsive to personal preferences and needs (3-5). One way to make the healthcare provision more integrated, is to vertically integrate the primary and secondary healthcare services (2). Hence, many EU countries are working on initiatives to change the out-of-hours (OOH) pre-hospital care towards a closer collaboration between the general practitioners (GPs) and hospital emergency departments. This can be done by establishing national telephone numbers that centralize the OOH calls and triage (6).

Such an OOH telephone line has been established in Copenhagen, which has one of the most comprehensive emergency medical services (EMS) system in Europe (7). The aim of this so-called 1813 medical helpline is to provide always available easy access to healthcare, and at the same time relieve the pressure on the hospital emergency departments (8, 9). An OOH telephone triage system may reduce GP visits and the immediate medical workload (10-12). Yet, to increase the effectiveness of the system, more detailed information is needed on several aspects of the system, among which patient satisfaction (10). This is a desired outcome of care, both incorporating interpersonal relationships, specific components of technical care and the outcomes of care (13). Analyzing patient satisfaction scores can provide information about whether interventions result in better outcomes from the perspective of the patient, and consequently improve the quality of patient-centered healthcare systems (14). Since patients' level of satisfaction depends on many factors, including demographic factors, call-specific experiences and expectations (15-18), constant monitoring of satisfaction in various settings is required.

Therefore, a continuously running questionnaire was established to monitor the patient satisfaction of the callers to the 1813 medical helpline of the EMS Copenhagen on a structural basis. The aim of this study was to use the questionnaire to identify the demographic and call-related characteristics that are associated with the reported patient satisfaction of the callers to this medical helpline. Furthermore, a subgroup analysis was performed of calls concerning 0-4 year old children, because of their frequent use of the medical helpline.

Materials and Methods

Study design and setting

This retrospective cohort study was performed on the 1813 medical helpline for non-emergency OOH calls to the EMS Copenhagen. Outside GP working hours (between 4 pm and 8 am on weekdays, in weekends and during holidays), the 1.8 million citizens of the region can call two telephone numbers when they have health issues (19, 20). They can dial 112 to reach the Emergency Medical Dispatch Center (EMDC-112) for emergency situations and for the less urgent, not life-threatening health problems the 1813 medical helpline (21). This medical helpline handles on average 924,000 calls a year, of which most are answered by triage nurses (8). They pre-assess the need for the caller to access acute medical help, which makes them play a dominant role in gatekeeping the healthcare system (22, 23). The triage nurses can respond with several actions such as: booking an appointment at an acute admission center, emergency clinic or psychiatric admission center, forward the call to the EMDC-112 or a doctor, plan a home visit, recommend the patient to contact the GP on the next working day, or give telephone advice for self-care (20, 22).

Every day, a random sample of 200 callers were sent a text message to the phone number they called the medical helpline with. The text message comprised two questions: *"Are you overall satisfied with the contact you had with the medical helpline 1813?"*, and: *"Were your questions answered during the contact with the medical helpline 1813?"*. The callers were asked to answer those questions on a five-point Likert scale answer category, containing: "to a great extent", "to some extent", "to a moderate extent", "to a limited extent", or "not at all". Furthermore, they had the option to answer: "not applicable" or "don't know".

Data collection and processing

Data was collected via two data sources: the patient satisfaction questionnaire and internal patient registration that provided data on: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, and profession of the call-handler(s). Patients were included if they called the medical helpline between May 18, 2016 and April 30, 2018. Based on ethical considerations, patients were excluded if they were sent a questionnaire but failed to respond. Callers were also excluded when they answered "not applicable" or "don't know" to the first question about their satisfaction, since it was outside the scope of the study. Call observations were removed when the call lasted less than 15 seconds or when the

patient's age did not range between 0 and 100 years (caused by errors in the patient registration).

Respondents were classified to be "satisfied" when they answered to the satisfaction question of the questionnaire: "to a great extent", "to some extent" or "to a moderate extent". Patient age was categorized into six groups (< 5, 5-17, 18-39, 40-59, 60-79 and ≥ 80 years), based on the pattern of disease and the organization of the system where children (0-18 year old) sometimes receive a face-to-face consultation at another department of the hospital. Other variables that were categorized are: reason for encounter (somatic illness, somatic injury, psychiatric illness or other), triage response (face-to-face consultation, telephone consultation, ambulance dispatch or other), time of the call (daytime (08:00-15:59) weekday, daytime OOH, and evening/night OOH), waiting time (<3, 3-6, 6-10, 10-20 and ≥ 20 minutes, later categorized into 0-10, 10-20 and ≥ 20 minutes) and consultation time (< 3, 3-6, 6-10 and ≥ 10 minutes, later dichotomized into < 6 minutes and ≥ 6 minutes). The profession of the first call-taker could be: nurse, physician, priority physician (answers prioritized calls from healthcare facilities), and EMDC-112-dispatcher.

Statistical analyses

Descriptive statistics were used to describe the patients' characteristics with frequencies (number, percentage), and median values (Q1-Q3). Differences in characteristics between respondents and non-receivers of the questionnaire, as well as between the satisfied and dissatisfied respondents, were calculated with chi-square tests. The association between the patients' characteristics and satisfaction was analyzed using univariate and multivariate logistic regression. Results of these analyses were reported in odds-ratios (ORs) and 95% confidence intervals (95% CI). A full fitted model without a selection was created with: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, profession of first call-taker and being forwarded to a physician. A subgroup analysis was performed to compare the satisfied callers for 0-4 year old children with those being 5-100 years old for the variables that were found to be statistically significant in the multivariate analysis. Statistical significance was based on an alpha error of 0.05 and data was analyzed with SAS 9.4 (SAS Institute Inc., Cary, North Carolina).

Results

Characteristics of Study Subjects

Of the 1,843,094 calls during the study period, 1,731,556 calls were included (Figure 1). Among those were 30,402 respondents (response rate: 23.0%). The majority of the calls concerned females (54.8%) and the median age was 29 (11-53). Most of the calls were related to somatic illnesses (64.0%), followed by somatic injuries (26.9%). A face-to-face consultation was offered to 46.8% of the callers and 42.6% received a telephone consultation. Most of the calls were picked up by a nurse (75.7%) and 14.6% of those were forwarded to a physician.

Figure 1: Flowchart of the included study population

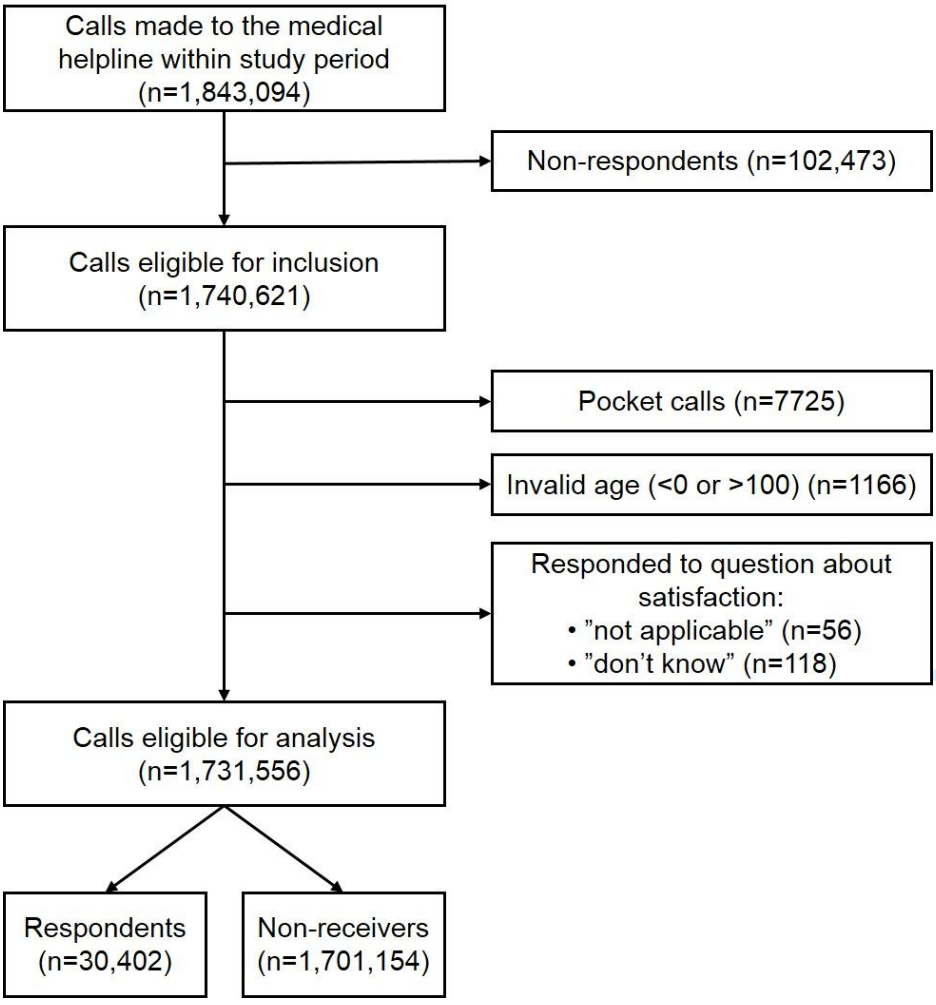


Table 1 shows the characteristics of the respondents, divided into satisfied and dissatisfied respondents, and the non-receivers. On all tested characteristics, the respondents differed from the non-receivers (p<0.0001). Respondents were more often female (54.8% vs 53.0%), were younger (median age 28 vs 29), and called more often for a somatic illness (47.7% vs 45.5%) or somatic injury (24.5% vs 19.1%). They were also more often offered a face-to-face consultation (53.3% vs 45.4%) and received less often a telephone consultation (36.4% vs 41.5%). Furthermore, respondents called more often during weekdays (14.9% vs 12.8%), had more often a nurse as the first call-taker (78.6% vs 74.4%) and their calls were less often forwarded to a physician (10.7% vs 10.8%).

Table 1: Characteristics of the respondents and non-receivers and the comparison between the respondents and non-receivers

	Respondents (n=30402)		Non-receivers (n=1701154)	P-value
	Satisfied (n=27205)	Dissatisfied (n=3197)		
Sex				
Female	14927 (54.9%)	1723 (53.9%)	901247 (53.0%)	<0.0001
Male	11802 (43.4%)	1372 (42.9%)	742677 (43.7%)	
Age				
0-4	5116 (18.8%)	509 (15.9%)	278601 (16.4%)	<0.0001
5-17	4981 (18.3%)	440 (13.8%)	230482 (13.6%)	
18-39	6860 (25.2%)	1182 (37.0%)	518393 (30.5%)	
40-59	5686 (20.9%)	669 (20.9%)	294642 (17.3%)	
60-79	3417 (12.6%)	241 (7.5%)	208682 (12.3%)	
≥ 80	669 (2.5%)	54 (1.7%)	113127 (6.7%)	
Reason for encounter				
Somatic illness	12907 (47.4%)	1599 (50.0%)	773868 (45.5%)	<0.0001
Somatic injury	7020 (25.8%)	412 (12.9%)	324253 (19.1%)	
Psychiatric illness	117 (0.4%)	12 (0.4%)	10842 (0.6%)	
Other	815 (3.0%)	235 (7.4%)	99232 (5.8%)	
Triage response				
Face-to-face consultation	15073 (55.4%)	1121 (35.1%)	772583 (45.4%)	<0.0001
Telephone consultation	9433 (34.7%)	1644 (51.4%)	706467 (41.5%)	
Ambulance	1124 (4.1%)	36 (1.1%)	54071 (3.2%)	
Other	1172 (4.3%)	325 (10.2%)	123328 (7.3%)	
Time of the call				
Daytime weekday	4035 (14.8%)	480 (15.0%)	216978 (12.8%)	<0.0001
Daytime OOH	4534 (16.7%)	541 (16.9%)	409131 (24.1%)	
Evening/night OOH	18636 (68.5%)	2176 (68.1%)	1075045 (63.2%)	
Waiting time				
0-3 minutes	14164 (52.1%)	1397 (43.7%)	860874 (50.6%)	<0.0001
3-6 minutes	4676 (17.2%)	558 (17.5%)	286752 (16.9%)	

	Respondents (n=30402)		Non-receivers (n=1701154)	P-value
	Satisfied (n=27205)	Dissatisfied (n=3197)		
6-10 minutes	3799 (14.0%)	445 (13.9%)	235531 (13.9%)	
10-20 minutes	3582 (13.2%)	556 (17.4%)	240072 (14.1%)	
≥ 20 minutes	984 (3.6%)	241 (7.5%)	77914 (4.6%)	
Consultation time				
0-3 minutes	9815 (36.1%)	1268 (39.7%)	641846 (37.7%)	<0.0001
3-6 minutes	12368 (45.5%)	1334 (41.7%)	740206 (43.5%)	
6-10 minutes	4247 (15.6%)	517 (16.2%)	264892 (15.6%)	
≥ 10 minutes	775 (2.9%)	78 (2.4%)	54210 (3.2%)	
First call-taker				
Nurse	21492 (79.0%)	2406 (75.3%)	1265043 (74.4%)	<0.0001
Physician	4984 (18.3%)	699 (21.9%)	388509 (22.8%)	
Priority physician	157 (0.6%)	35 (1.1%)	20527 (1.2%)	
112	0 (0.0%)	0 (0.0%)	12 (0.0%)	
Call forwarded to a physician[a]				
Yes	2748 (12.8%)	489 (20.3%)	184250 (14.6%)	<0.0001
No	18744 (87.2%)	1917 (79.7%)	1080743 (85.4%)	

OOH= out-of-hours.

[a] Percentage based on the number of calls that were in first instance picked up by a nurse.

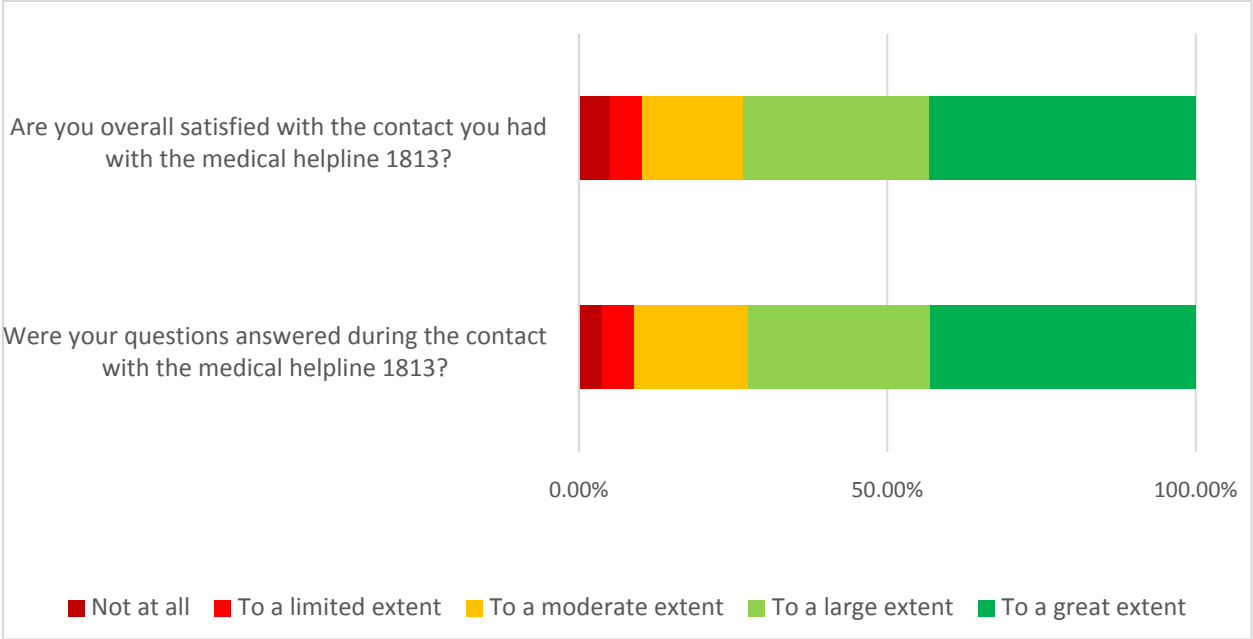
Patient Satisfaction

A total of 27,205 respondents (89.5%) indicated to be satisfied with their encounter with the medical helpline. A third of them (33.4%) indicated to be satisfied "to a great extent" (Figure 2). To the second question about whether the callers received an answer to their question, 90.0% replied at least "to a moderate extent" and 1.2% replied "don't know / not applicable". More than half of the respondents (63.5%) gave the same answers to both questions. Of those who indicated to be satisfied with the service, 97.6% replied to be given an answer to their question.

The satisfied respondents differed on all tested characteristics from the dissatisfied respondents ($p<0.0001$), except for gender and time of the call. Among others, the satisfied respondents concerned more often patients aged < 18 years old and > 60 years old (Table 1). Furthermore, respondents who called for a somatic illness were less often satisfied than respondents calling for a somatic injury (89.0% vs 94.5%). Of the people who called for a psychiatric illness, 90.7% were satisfied. People who received a face-to-face consultation or ambulance where more often satisfied (93.1% and 96.9% respectively) than patients who ended up with a telephone consultation (85.2%). The median waiting time of the satisfied respondents was almost 1.5 minutes shorter than that of the dissatisfied respondents (2:44

minutes vs 4:05 minutes). Of the people who had a waiting time longer than 20 minutes, 80.3% were satisfied and of those who talked to a physician, 86.6% were satisfied.

Figure 2: Distribution of the responses to the patient satisfaction questionnaire



Note: 360 respondents who answered "not applicable" or "don't know" to the second question are excluded in the figure.

Multivariate logistic regression analysis

Table 2 shows the associations between patient characteristics and satisfaction. Calling for a somatic injury was statistically significantly associated with satisfaction. People who received a telephone consultation were less likely to be satisfied. People were also less likely to be satisfied when they called during GP office hours and when they had a waiting time of more than 10 minutes. No statistically significant association was seen between consultation time and satisfaction. In the univariate analysis, the profession of the first call-taker was associated with satisfaction. Adding the variable to the multivariate model did not have an effect. Yet, people who were forwarded to a physician were less likely to be satisfied.

Table 2: Likelihood (OR) of satisfaction for different demographic and call-related characteristics

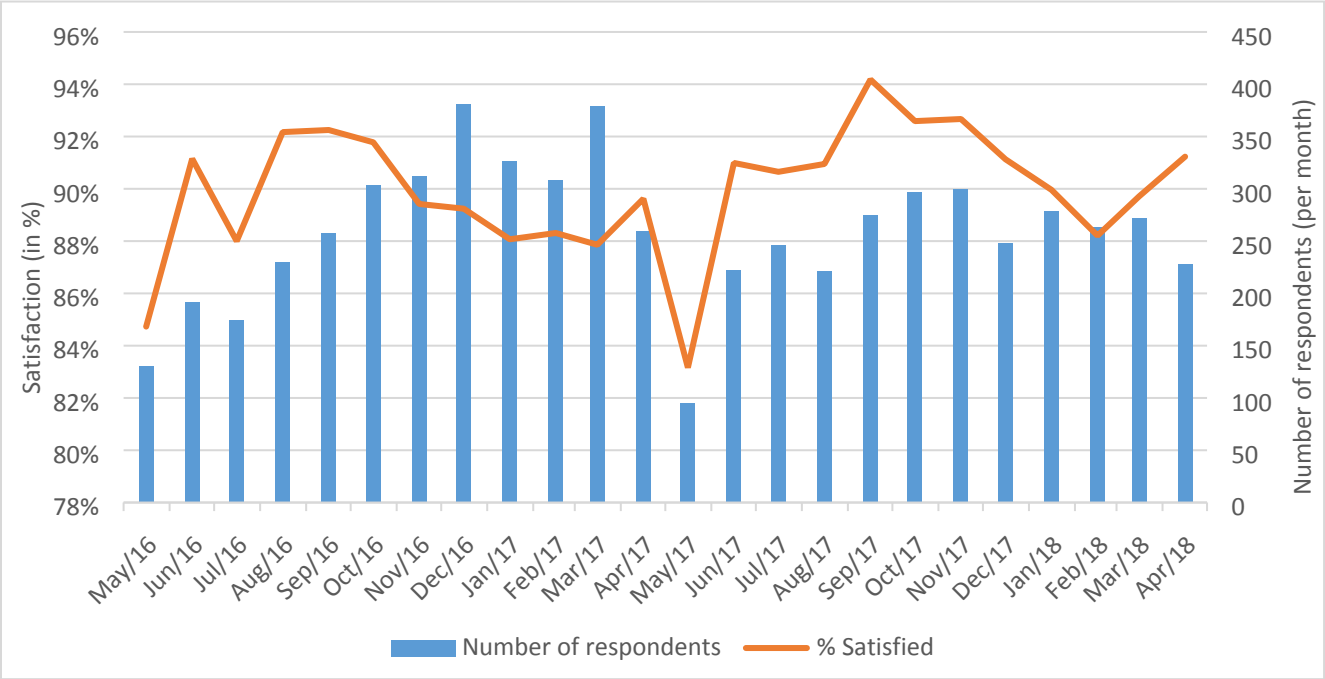
	Crude OR (95% CI) n=21938[a]	Adjusted OR (95% CI) n=19394[a]
Gender		
Female (ref)	1	1
Male	0.99 (0.92 – 1.07)	0.83 (0.75 – 0.92)
Age		
0-4	1.73 (1.55 – 1.93)	2.08 (1.79 – 2.42)
5-17	1.95 (1.74 – 2.19)	1.81 (1.56 – 2.11)
18-39 (ref)	1	1
40-59	1.46 (1.32 – 1.62)	1.34 (1.17 – 1.54)
60-79	2.44 (2.11 – 2.82)	2.55 (2.07 – 3.14)
≥ 80	2.14 (1.61 – 2.84)	2.19 (1.41 – 3.43)
Reason for encounter		
Somatic illness (ref)	1	1
Somatic injury	2.111 (1.89 – 2.36)	1.87 (1.64 – 2.13)
Triage response		
Face-to-face consultation (ref)	1	1
Telephone consultation	0.43 (0.39 – 0.46)	0.46 (0.41 – 0.51)
Time of the call		
Daytime weekday	1.00 (0.88 – 1.14)	0.67 (0.56 – 0.80)
Daytime OOH (ref)	1	1
Evening/night OOH	1.02 (0.93 – 1.13)	0.95 (0.82 – 1.09)
Waiting time		
0-10	1	1
10-20	0.68 (0.62 – 0.75)	0.61 (0.53 – 0.70)
≥ 20 minutes	0.43 (0.37 – 0.50)	0.34 (0.28 – 0.40)
Consultation time		
0-6 minutes	1	1
≥ 10 minutes	0.99 (0.90 – 1.09)	1.06 (0.93 – 1.20)
First call-taker		
Nurse (ref)	1	
Physician	0.78 (0.72 – 0.86)	
Call forwarded to a physician		
Yes	0.58 (0.52 – 0.64)	0.74 (0.64 – 0.85)
No	1	1

[a]The lowest amount of observations in the models.

0-4 year old subgroup analysis

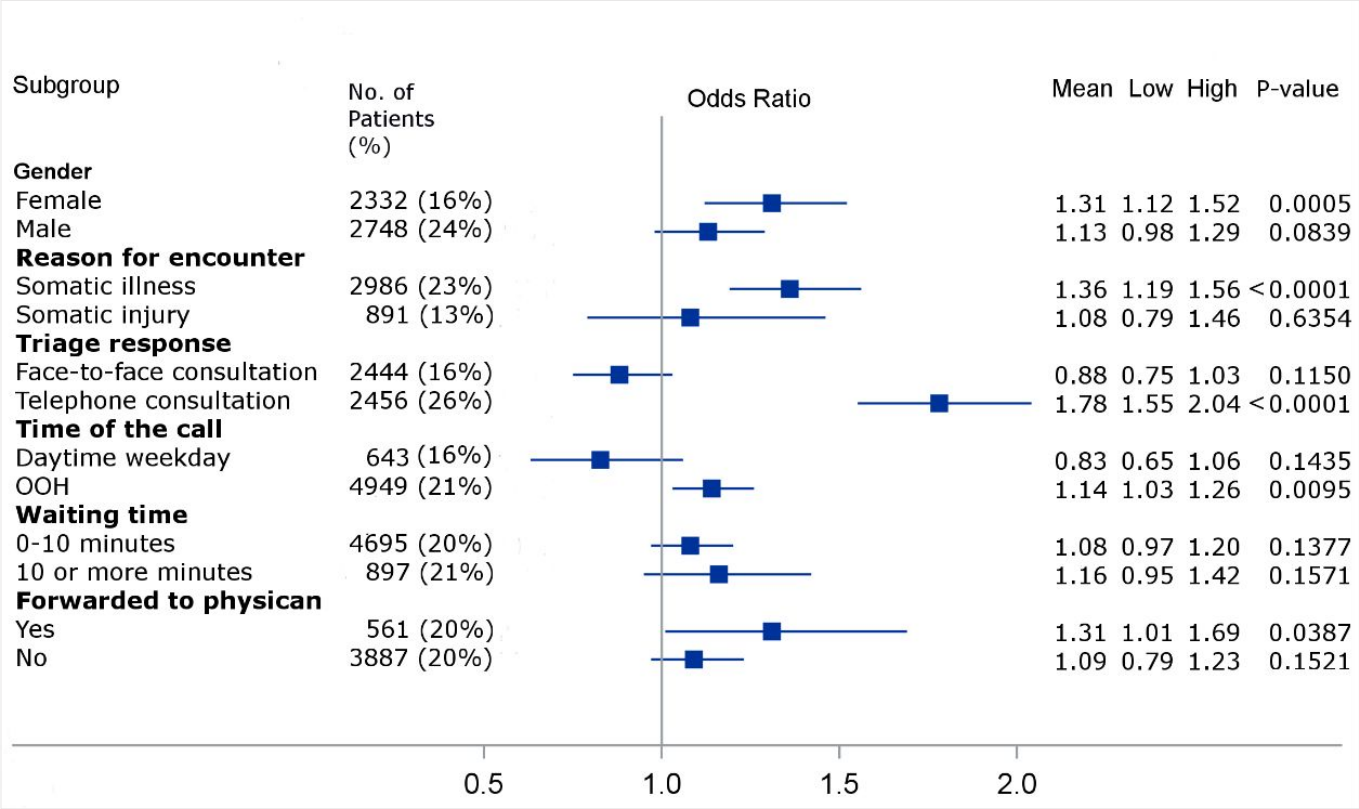
On average 90.2% of the respondents calling for a 0-4 year old child were satisfied, compared to 89.3% of the rest of the population. Although averages in satisfaction fluctuated per month, the overall satisfaction rate of people calling for a 0-4 year old child was stable over time (Figure 3).

Figure 3: Total number and percentage of satisfied respondents calling for a 0-4 year old patient per month



As shown in Figure 4, callers for 0-4 year old children were more likely to be satisfied when they called for a female (OR 1.31, 95% CI 1.12-1.52), and a somatic illness (OR 1.36, 95% CI 1.19-1.56). Compared to the rest of the population, they were also more likely to be satisfied when they received a telephone consultation (OR 1.78, 95% CI 1.55-2.04), called OOH (OR 1.14, 95% CI 1.03-1.26) and when their call was forwarded to a physician (OR 1.31, 95% CI 1.01-1.69).

Figure 4: Odds ratio (OR) and 95% confidence interval (95% CI) for demographic and call-related characteristics predicting satisfaction for 0-4 year old patients compared to 5-100 year old patients



Discussion

This study has indicated that caller satisfaction with the OOH medical helpline was significantly associated with gender, age, reason for encounter, triage response and waiting time. Furthermore, people who called during GP office hours were less likely to be satisfied than people calling OOH. People calling on behalf a 0-4 year old child were more likely to be satisfied compared to the rest of the population, when they called for a somatic illness, when they received a telephone consultation, when their call was made OOH and when their call was forwarded to a physician.

The satisfaction rate of 90% is in line with findings from previous studies (15, 24-26). Also, the other findings of this study were generally in accordance with previous studies, which showed associations between (dis)satisfaction and patient gender (27), age (28), call reason (26), triage response (15, 17, 29) and waiting time (15, 16, 27). Whereas another study also found an association with consultation length (16), this was not found in our study. This same study on a telephone service in Wales also found that patients who received a telephone consultation were more satisfied than patients who received a face-to-face consultation, which contradicts our findings as well (16). The multivariate analysis also showed that people whose call was forwarded to a physician were less likely to be satisfied. This might be induced by the reason why the call was forwarded in the first place, which were probably the more complex calls.

Our study's finding that people who call for a 0-4 year old children were on particular characteristics more likely to be satisfied compared to the rest of the population, could be explained by different expectations of callers. Studies have shown that a mismatch between a caller's request or expectation and triage outcome is associated with lower patient satisfaction (30-32). The findings of this study also indicate that subgroup analyses regarding determinants of satisfaction can be useful to design tailored quality improvement interventions of the OOH healthcare services.

The main strengths of this study were the long running time of the questionnaire on a daily basis, and the opportunity to link responses to internal patient registry data. This provided relevant information about the respondents' characteristics. In addition, the length of the questionnaire makes this study unique from other patient satisfaction studies, where often longer questionnaires are held (e.g. (15-17, 27, 28)). The major benefit of this short questionnaire is that it increased the feasibility of the study, since it is durable and easy to fill in. People, who normally do not have the time or the resources to fill in a long questionnaire,

did respond to this one. Examples are parents of young children and patients with a psychiatric illness. The long running period of this questionnaire benefited the internal validity of the study, as it showed stable satisfaction rates over time. The short period between the contact with the medical helpline and the delivery of the questionnaire to the caller's phone reduced the risk of recall bias.

However, the study was limited by the low response rate, the way the questionnaire was distributed and the form of the questionnaire. The low response rate may have induced a selection bias by self-selection of people who responded to the questionnaire, which was also indicated by the differences in characteristics between the respondents and the non-receivers in this study. Yet, the relevance of these small differences may be doubted. A study from the Netherlands that interviewed non-respondents of an OOH GP cooperative questionnaire found that most non-respondents gave reasons for not responding that were not directly related to their contact with the GP cooperative (17). The way the questionnaire was distributed limited the study in two ways. First, since the questionnaire was distributed via a text message to the phone of the caller, the respondent might not have been the patient to whom the answers were linked. Second, patients who called with an analog telephone did not get the opportunity to answer the questions. This could have led to an underrepresentation of certain population groups (e.g. elderly people). The short length of the questionnaire limits the study because of the difficulty to capture the dimensions of the whole service in two multiple choice questions. The analysis also showed that 64% of the respondents gave the same answers to both questions, which raises concern about the validity of the second question. Furthermore, this study did not include all determinants of satisfaction, such as self-perceived (improvement in) health (15, 27, 28).

Further studies could gather more insight about the reasons behind the satisfaction for the particular characteristics of the subgroup of callers for 0-4 year old children. Besides, other studies can explore the level of satisfaction of patients calling for a psychiatric illness, since this study found an unexpected high satisfaction rate of these people. This, in turn, could assist tailored-made conversation and decision support for the medical staff of the medical helpline to improve the service to all patients, who call for help and guidance.

Conclusions

This study showed that people are in general satisfied with an OOH medical helpline. Satisfaction was associated with calling for a somatic injury, being offered a face-to-face consultation, and having a short waiting time on the phone. People calling for 0-4 year old patients are more likely to be satisfied compared to the rest of the population when they call for a somatic illness, receive a telephone consultation, call OOH and when their call is forwarded to a physician. This study also showed that a text message with a short questionnaire is feasible to run on a daily basis and that it can provide valuable information for structural quality monitoring.

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Competing interests statement

All authors have not at any time received payment or services from a third party (government, commercial, private foundation, etc.) for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.). Neither have any authors other relationships or activities that readers could perceive to have influenced, or that give the appearance of potentially influencing, what is written in the submitted work. No patents, whether planned, pending or issued, broadly are relevant to the submitted work by any of the authors.

Author's contribution

NDZ, SNB, FL and HCC contributed to the design and implementation of the research. NDZ performed the analysis and SNB, FL and HCC aided in interpreting the results. NDZ and SNB designed the figures. NDZ wrote the paper in consultation with FL and HCC. HCC supervised the work.

Data sharing statement

No additional data are available.

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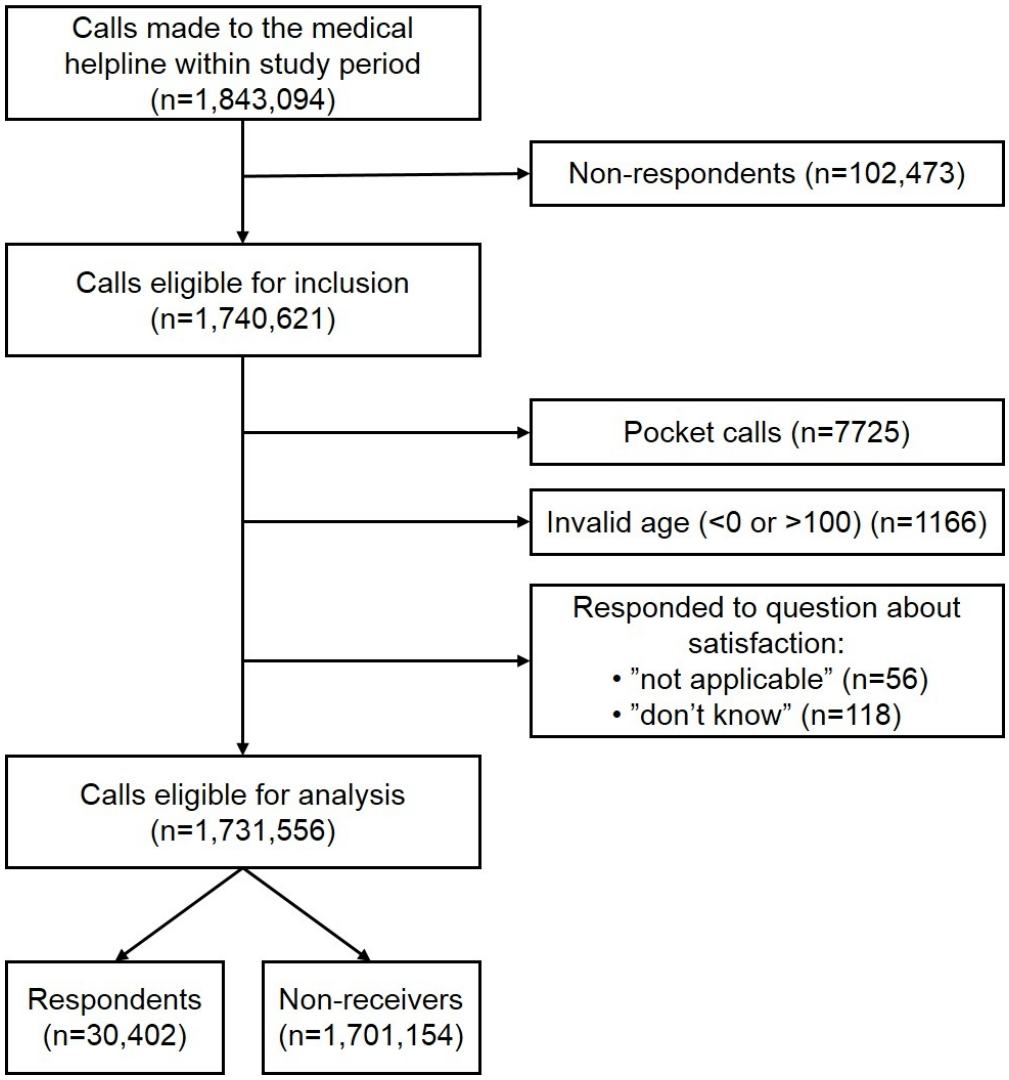

Figure 1: Flowchart of the included study population

165x178mm (150 x 150 DPI)

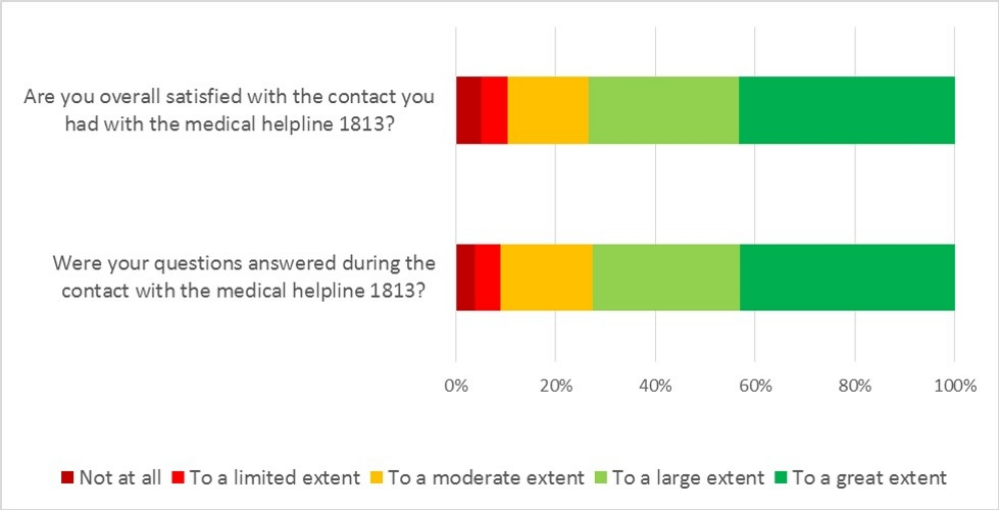

Figure 2: Distribution of the responses to the patient satisfaction questionnaire

216x110mm (115 x 115 DPI)

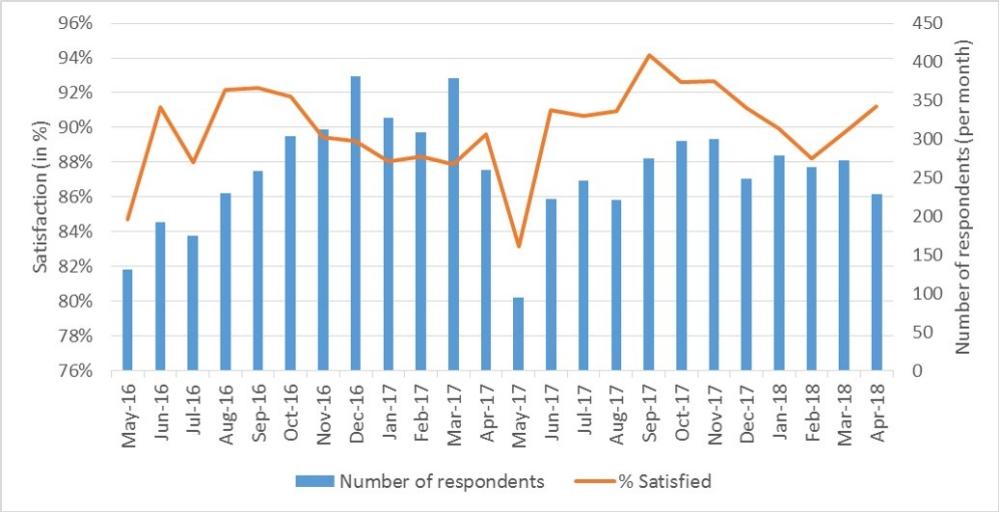

Figure 3: Total number and percentage of satisfied respondents calling for a 0-4 year old patient per month

248x127mm (106 x 106 DPI)

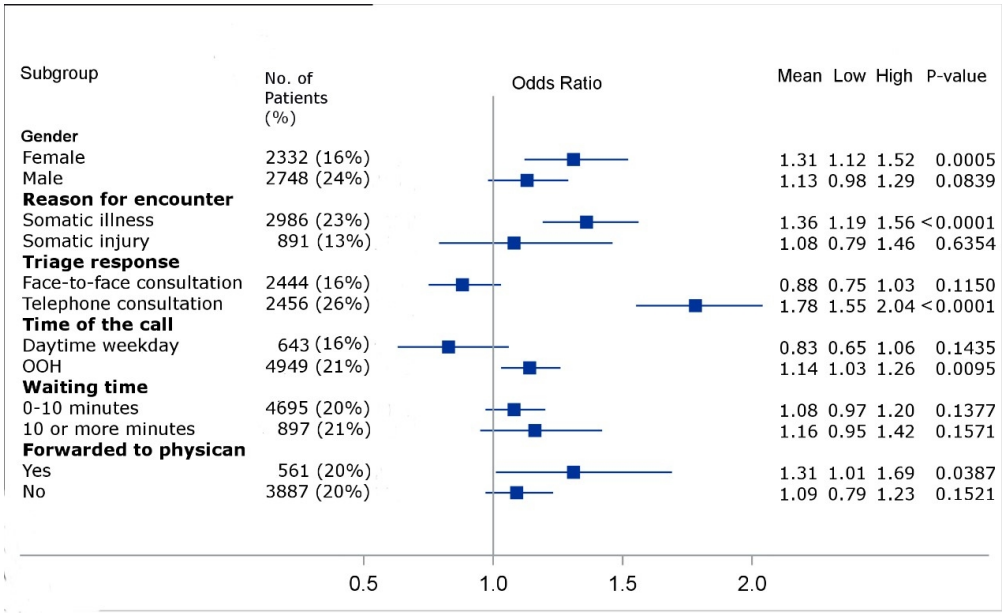

Figure 4: Odds ratio (OR) and 95% confidence interval (95% CI) for demographic and call-related characteristics predicting satisfaction for 0-4 year old patients compared to 5-100 year old patients

146x88mm (220 x 220 DPI)

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Satisfaction of 30,402 Callers to a Medical Helpline of the Emergency Medical Services Copenhagen: A Retrospective Cohort Study

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Satisfaction of 30,402 Callers to a Medical Helpline of the Emergency Medical Services Copenhagen: A Retrospective Cohort Study

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Abstract

Objectives

To keep healthcare systems sustainable for future demands, many countries are developing a centralized telephone line for out-of-hours primary care services. To increase the quality of such services, more information is needed on factors that influence caller-satisfaction. The aim of this study was to identify demographic and call-related characteristics that are associated with the patient satisfaction of callers to a medical helpline in Denmark.

Design

Retrospective cohort study on patient registry data and questionnaire results.

Setting

Non-emergency medical helpline in the Capital Region of Denmark.

Participants

A random sample of 30,402 callers to the medical helpline between May 2016 and May 2018.

Primary and secondary outcome measures

Responses of a satisfaction questionnaire were linked to demographic and call-related dispatch data. Associations between the characteristics were analyzed with multivariable logistic regression analysis with satisfaction as the dependent variable. A subgroup analysis was performed on callers for children aged between 0-4 years.

Results

Of the 30,402 analyzed callers, 89.5% were satisfied with the medical helpline. Satisfaction was associated with calling for a somatic injury (OR 1.87, 95% CI 1.64–2.13), receiving a face-to-face consultation (OR 2.18, 95% CI 1.96-2.43), and a waiting time less than 10 minutes (OR 1.63, 95% CI 1.42-1.87). Callers for a 0-4 year old patient were more likely to be satisfied when they called for a somatic illness or received a telephone consultation, compared to the rest of the population ($p<0.0001$).

Conclusion

Callers were in general satisfied with the medical helpline. Satisfaction was associated with reason for encounter, triage response, and waiting time. People calling for 0-4 year old patients were, compared to the rest of the population, more frequently satisfied when they called for a somatic illness or received a telephone consultation.

Keywords

Out-of-hours healthcare - Patient satisfaction – Telephone triage - Denmark

Strengths and limitations of this study

• The satisfaction questionnaire ran over a two-year period, which ensured a large sample size (n=30,402) and allowed for conducting a subgroup analysis.

• The short length of the questionnaire enabled people to respond who would normally not respond to long questionnaires, such as parents of children or patients with a psychiatric illness.

• Responses to the satisfaction questionnaire were linked to internal patient registry data, which provided more information on the characteristics of the respondents.

• Although data on non-receivers of the questionnaire was analyzed, the analysis was limited because characteristics of non-respondents could not be obtained due to regulations around patient data protection.

Introduction

Member States of the European Union (EU) face growing and changing healthcare needs due to population ageing and tight budgetary constraints (1). To keep the healthcare systems sustainable for the future, EU countries are working on initiatives towards more integrated care models (2). More integrated and people-centered healthcare systems are expected to provide services that are of better quality, financially more sustainable and more responsive to personal preferences and needs (3-5). One way to make the healthcare provision more integrated, is to vertically integrate the primary and secondary healthcare services (2). Hence, many EU countries are working on initiatives to change the out-of-hours (OOH) pre-hospital care towards a closer collaboration between the general practitioners (GPs) and hospital emergency departments. This can be done by establishing national telephone numbers that centralize the OOH calls and triage (6).

Such an OOH telephone line has been established in Copenhagen. The aim of this so-called 1813 medical helpline is to provide always available easy access to healthcare, and at the same time relieve the pressure on the hospital emergency departments (7, 8). An OOH telephone triage system may reduce GP visits and the immediate medical workload (9-11). Yet, to increase the effectiveness of the system, more detailed information is needed on several aspects of the system, among which patient satisfaction (9). This is a desired outcome of care, both incorporating interpersonal relationships, specific components of technical care and the outcomes of care (12). Analyzing patient satisfaction scores can provide information about whether interventions result in better outcomes from the perspective of the patient, and consequently improve the quality of patient-centered healthcare systems (13). Since patients' level of satisfaction depends on many factors, including demographic factors, call-specific experiences and expectations (14-17), constant monitoring of satisfaction in various settings is required.

Therefore, a continuously running questionnaire was established to monitor the patient satisfaction of the callers to the 1813 medical helpline of the EMS Copenhagen on a structural basis. The aim of this study was to use the questionnaire to identify the demographic and call-related characteristics that are associated with the reported patient satisfaction of the callers to this medical helpline. Furthermore, a subgroup analysis was performed of calls concerning 0-4 year old children, because of their frequent use of the medical helpline.

Materials and Methods

Study design and setting

This retrospective cohort study was performed on the 1813 medical helpline for non-emergency OOH calls to the EMS Copenhagen. Outside GP working hours (between 4 pm and 8 am on weekdays, in weekends and during holidays), the 1.8 million citizens of the region can call two telephone numbers when they have health issues (18, 19). They can dial 112 to reach the Emergency Medical Dispatch Center (EMDC-112) for emergency situations and for the less urgent, not life-threatening health problems the 1813 medical helpline (20). This medical helpline handles on average 924,000 calls a year, of which most are answered by triage nurses (7). They pre-assess the need for the caller to access acute medical help, which makes them play a dominant role in gatekeeping the healthcare system (21, 22). The triage nurses can respond with several actions such as: booking an appointment at an acute admission center, emergency clinic or psychiatric admission center, forward the call to the EMDC-112 or a doctor, plan a home visit, recommend the patient to contact the GP on the next working day, or give telephone advice for self-care (19, 21).

Every day, a random sample of 200 callers of the previous day were sent a text message to the phone number they called the medical helpline with. The text message comprised two questions: *"Are you overall satisfied with the contact you had with the medical helpline 1813?"*, and: *"Were your questions answered during the contact with the medical helpline 1813?"*. The callers were asked to answer those questions on a five-point Likert scale answer category, containing: "to a great extent", "to a large extent", "to a moderate extent", "to a limited extent", or "not at all". Furthermore, they had the option to answer: "not applicable" or "don't know".

Patient and Public Involvement

No patient involved.

Data collection and processing

Data was collected via two data sources: the patient satisfaction questionnaire and internal patient registration that provided data on: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, and profession of the call-handler(s). Patients were included if they called the medical helpline between May 18, 2016 and April 30, 2018. Permission from individual patients is not required for this type of study in Denmark.

However, based on ethical considerations, patients were excluded if they were sent a questionnaire but failed to respond. Callers were also excluded when they answered "not applicable" or "don't know" to the first question about their satisfaction, since it was outside the scope of the study. Call observations were removed when the call lasted less than 15 seconds or when the patient's age did not range between 0 and 100 years (caused by errors in the patient registration).

Respondents were classified to be "satisfied" when they answered to the satisfaction question of the questionnaire: "to a great extent", "to a large extent" or "to a moderate extent". Patients' age was categorized into six groups (< 5, 5-17, 18-39, 40-59, 60-79 and ≥ 80 years), based on the pattern of disease and the organization of the system where children (0-18 year old) sometimes receive a face-to-face consultation at another department of the hospital. Other variables that were categorized are: reason for encounter (somatic illness, somatic injury, psychiatric illness or other), triage response (face-to-face consultation, telephone consultation, ambulance dispatch or other), time of the call (daytime (08:00-15:59) weekday, daytime OOH, and evening/night OOH), waiting time (<3, 3-6, 6-10, 10-20 and ≥ 20 minutes, later categorized into 0-10, 10-20 and ≥ 20 minutes) and consultation time (< 3, 3-6, 6-10 and ≥ 10 minutes, later dichotomized into < 6 minutes and ≥ 6 minutes). The profession of the first call-taker could be: nurse, physician, priority physician (answers prioritized calls from healthcare facilities), and EMDC-112-dispatcher.

Statistical analyses

Descriptive statistics were used to describe the patients' characteristics with frequencies (number, percentage), and median values (Q1-Q3). Differences in characteristics between respondents and non-receivers of the questionnaire, as well as between the satisfied and dissatisfied respondents, were calculated with chi-square tests. The association between the patients' characteristics and satisfaction was analyzed using univariable and multivariable logistic regression. Results of these analyses were reported in odds-ratios (ORs) and 95% confidence intervals (95% CI). A full fitted model without a selection was created with: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, profession of first call-taker and being forwarded to a physician. A subgroup analysis was performed to analyze the characteristics of the satisfied callers for 0-4 year old children with the variables that were found to be statistically significant in the multivariable analysis. Statistical significance was based on an alpha error of 0.05 and data was analyzed with SAS 9.4 (SAS Institute Inc., Cary, North Carolina).

Results

Characteristics of Study Subjects

Of the 1,843,094 calls during the study period, 1,731,556 calls were eligible (Figure 1). Among those were 30,402 respondents (response rate: 23.0%). The majority of the calls concerned females (54.8%) and the median age was 29 (11-53). Most of the calls were related to somatic illnesses (64.0%), followed by somatic injuries (26.9%). A face-to-face consultation was offered to 46.8% of the callers and 42.6% received a telephone consultation. Most of the calls were picked up by a nurse (75.7%) and 14.6% of those were forwarded to a physician.

Respondents were more often female (54.8% vs 53.0%), were younger (median age 28 vs 29), and called more often for a somatic illness (47.7% vs 45.5%) or somatic injury (24.5% vs 19.1%). They were also more often offered a face-to-face consultation (53.3% vs 45.4%) and received less often a telephone consultation (36.4% vs 41.5%). Furthermore, respondents called more often during weekdays (14.9% vs 12.8%), had more often a nurse as the first call-taker (78.6% vs 74.4%) and their calls were less often forwarded to a physician (10.7% vs 10.8%). Table 1 shows the characteristics of the respondents, divided into satisfied and dissatisfied respondents, and the non-receivers. On all tested characteristics, the respondents differed from the non-receivers ($p<0.0001$).

Patient Satisfaction

A total of 27,205 respondents (89.5%) indicated to be satisfied with their encounter with the medical helpline. A third of them (33.4%) indicated to be satisfied "to a great extent" (Figure 2). To the second question about whether the callers received an answer to their question, 90.0% replied at least "to a moderate extent" and 1.2% replied "don't know / not applicable". More than half of the respondents (63.5%) gave the same answers to both questions. Of those who indicated to be satisfied with the service, 97.6% replied to be given an answer to their question.

The satisfied respondents differed on all tested characteristics from the dissatisfied respondents ($p<0.0001$), except for gender and time of the call. Among others, the satisfied respondents concerned more often patients aged < 18 years old and > 60 years old (Table 1). Furthermore, respondents who called for a somatic illness were less often satisfied than

respondents calling for a somatic injury (89.0% vs 94.5%). Of the people who called for a psychiatric illness, 90.7% were satisfied. People who received a face-to-face consultation or ambulance where more often satisfied (93.1% and 96.9% respectively) than patients who ended up with a telephone consultation (85.2%). The median waiting time of the satisfied respondents was almost 1.5 minutes shorter than that of the dissatisfied respondents (2:44 minutes vs 4:05 minutes). Of the people who had a waiting time longer than 20 minutes, 80.3% were satisfied and of those who talked to a physician, 86.6% were satisfied.

Table 1: Characteristics of the respondents and non-receivers and the comparison between the respondents and non-receivers

	Respondents (n=30402)		Non-receivers (n=1701154)	P-value
	Satisfied (n=27205)	Dissatisfied (n=3197)		
Sex				
Female	14927 (54.9%)	1723 (53.9%)	901247 (53.0%)	<0.0001
Male	11802 (43.4%)	1372 (42.9%)	742677 (43.7%)	
Missing	476 (1.7%)	102 (3.2%)	57230 (3.4%)	
Age				
0-4	5116 (18.8%)	509 (15.9%)	278601 (16.4%)	<0.0001
5-17	4981 (18.3%)	440 (13.8%)	230482 (13.6%)	
18-39	6860 (25.2%)	1182 (37.0%)	518393 (30.5%)	
40-59	5686 (20.9%)	669 (20.9%)	294642 (17.3%)	
60-79	3417 (12.6%)	241 (7.5%)	208682 (12.3%)	
≥ 80	669 (2.5%)	54 (1.7%)	113127 (6.7%)	
Reason for encounter				
Somatic illness	12907 (47.4%)	1599 (50.0%)	773868 (45.5%)	<0.0001
Somatic injury	7020 (25.8%)	412 (12.9%)	324253 (19.1%)	
Psychiatric illness	117 (0.4%)	12 (0.4%)	10842 (0.6%)	
Other[a]	7161 (26.3%)	1174 (36.7%)	592191 (34.8%)	
Triage response				
Face-to-face consultation	15073 (55.4%)	1121 (35.1%)	772583 (45.4%)	<0.0001
Telephone consultation	9433 (34.7%)	1644 (51.4%)	706467 (41.5%)	
Ambulance	1124 (4.1%)	36 (1.1%)	54071 (3.2%)	
Other[a]	1575 (5.8%)	396 (12.4%)	168033 (9.9%)	
Time of the call				
Daytime weekday	4035 (14.8%)	480 (15.0%)	216978 (12.8%)	<0.0001
Daytime OOH	4534 (16.7%)	541 (16.9%)	409131 (24.1%)	
Evening/night OOH	18636 (68.5%)	2176 (68.1%)	1075045 (63.2%)	
Waiting time				
0-3 minutes	14164 (52.1%)	1397 (43.7%)	860874 (50.6%)	<0.0001
3-6 minutes	4676 (17.2%)	558 (17.5%)	286752 (16.9%)	
6-10 minutes	3799 (14.0%)	445 (13.9%)	235531 (13.9%)	
10-20 minutes	3582 (13.2%)	556 (17.4%)	240072 (14.1%)	

	Respondents (n=30402)		Non-receivers (n=1701154)	P-value
	Satisfied (n=27205)	Dissatisfied (n=3197)		
≥ 20 minutes	984 (3.6%)	241 (7.5%)	77914 (4.6%)	
Consultation time				
0-3 minutes	9815 (36.1%)	1268 (39.7%)	641846 (37.7%)	<0.0001
3-6 minutes	12368 (45.5%)	1334 (41.7%)	740206 (43.5%)	
6-10 minutes	4247 (15.6%)	517 (16.2%)	264892 (15.6%)	
≥ 10 minutes	775 (2.9%)	78 (2.4%)	54210 (3.2%)	
First call-taker				
Nurse	21492 (79.0%)	2406 (75.3%)	1265043 (74.4%)	<0.0001
Physician	4984 (18.3%)	699 (21.9%)	388509 (22.8%)	
Priority physician	157 (0.6%)	35 (1.1%)	20527 (1.2%)	
112	0 (0.0%)	0 (0.0%)	12 (0.0%)	
Missing	572 (2.1%)	57 (1.8%)	27063 (1.6%)	
Call forwarded to a physician[b]				
Yes	2748 (12.8%)	489 (20.3%)	184250 (14.6%)	<0.0001
No	18744 (87.2%)	1917 (79.7%)	1080743 (85.4%)	

OOH = out-of-hours.
[a] Includes missing values
[b] Percentage based on the number of calls that were in first instance picked up by a nurse.

Multivariable logistic regression analysis

Calling for a somatic injury was statistically significantly associated with satisfaction (OR: 1.87, 95% CI: 1.64-2.13). People who received a telephone consultation were less likely to be satisfied (OR: 0.46, 95% CI 0.41-0.51). People were also less likely to be satisfied when they had a waiting time of more than 10 minutes (OR: 0.61, 95% CI: 0.53-0.70) and especially a waiting time more than 20 minutes (OR: 0.34, 95% CI: 0.28-0.40). No statistically significant association was seen between consultation time and satisfaction. In the univariable analysis, the profession of the first call-taker was associated with satisfaction. Adding the variable to the multivariable model did not have an effect. Yet, people who were forwarded to a physician were less likely to be satisfied (OR: 0.74, 95% CI: 0.64-0.85) (Table 2).

Table 2: Likelihood (OR) of satisfaction for different demographic and call-related characteristics

	Crude OR (95% CI) n=21938[a]	Adjusted OR (95% CI) n=19394[a]	
Gender			
Female (ref)	1	1	
Male	0.99 (0.92 – 1.07)	0.83 (0.75 – 0.92)	*
Age			

0-4	1.73 (1.55 – 1.93)	2.08 (1.79 – 2.42)	*
5-17	1.95 (1.74 – 2.19)	1.81 (1.56 – 2.11)	*
18-39 (ref)	1	1	
40-59	1.46 (1.32 – 1.62)	1.34 (1.17 – 1.54)	*
60-79	2.44 (2.11 – 2.82)	2.55 (2.07 – 3.14)	*
≥ 80	2.14 (1.61 – 2.84)	2.19 (1.41 – 3.43)	*
Reason for encounter			
Somatic illness (ref)	1	1	
Somatic injury	2.111 (1.89 – 2.36)	1.87 (1.64 – 2.13)	*
Triage response			
Face-to-face consultation (ref)	1	1	
Telephone consultation	0.43 (0.39 – 0.46)	0.46 (0.41 – 0.51)	*
Time of the call			
Daytime weekday	1.00 (0.88 – 1.14)	0.67 (0.56 – 0.80)	*
Daytime OOH (ref)	1	1	
Evening/night OOH	1.02 (0.93 – 1.13)	0.95 (0.82 – 1.09)	
Waiting time			
0-10 minutes (ref)	1	1	
10-20 minutes	0.68 (0.62 – 0.75)	0.61 (0.53 – 0.70)	*
≥ 20 minutes	0.43 (0.37 – 0.50)	0.34 (0.28 – 0.40)	*
Consultation time			
0-6 minutes (ref)	1	1	
≥ 6 minutes	0.99 (0.90 – 1.09)	1.06 (0.93 – 1.20)	
First call-taker			
Nurse (ref)	1		
Physician	0.78 (0.72 – 0.86)		
Call forwarded to a physician			
Yes	0.58 (0.52 – 0.64)	0.74 (0.64 – 0.85)	*
No (ref)	1	1	

[a]The lowest amount of observations in the models.
* P-value < 0.05

0-4 year old subgroup analysis

On average 90.2% of the respondents calling for a 0-4 year old child were satisfied, compared to 89.3% of the rest of the population. Although averages in satisfaction fluctuated per month, the overall satisfaction rate of people calling for a 0-4 year old child was stable over time (Figure 3).

As shown in Figure 4, callers for 0-4 year old children were more likely to be satisfied when they called for a female (OR 1.31, 95% CI 1.12-1.52), and a somatic illness (OR 1.36, 95% CI 1.19-1.56). Compared to the rest of the population, they were also more likely to be satisfied when they received a telephone consultation (OR 1.78, 95% CI 1.55-2.04), called OOH (OR 1.14, 95% CI 1.03-1.26) and when their call was forwarded to a physician (OR 1.31, 95% CI 1.01-1.69).

Discussion

This study has indicated that caller satisfaction with the OOH medical helpline was significantly associated with gender, age, reason for encounter, triage response and waiting time. Furthermore, people who called during GP office hours were less likely to be satisfied than people calling OOH. People calling on behalf a 0-4 year old child were more likely to be satisfied compared to the rest of the population, when they called for a somatic illness, when they received a telephone consultation, when their call was made OOH and when their call was forwarded to a physician.

The satisfaction rate of 90% is in line with findings from previous studies (14, 23-25). Also, the other findings of this study were generally in accordance with previous studies, which showed associations between (dis)satisfaction and patient gender (26), age (27), call reason (25), triage response (14, 16, 28) and waiting time (14, 15, 26). Whereas another study also found an association with consultation length (15), this was not found in our study. This same study on a telephone service in Wales also found that patients who received a telephone consultation were more satisfied than patients who received a face-to-face consultation, which contradicts our findings as well (15). The multivariable analysis also showed that people whose call was forwarded to a physician were less likely to be satisfied. This might have been induced by the reason why the call was forwarded in the first place, which were probably the more complex calls. Besides, it could have been influenced by a difference in expectation callers had about their call-taker.

Our study's finding that people who call for a 0-4 year old children were on particular characteristics more likely to be satisfied compared to the rest of the population, could be explained by different expectations of callers. Studies have shown that a mismatch between a caller's request or expectation and triage outcome is associated with lower patient satisfaction (29-31). The findings of this study also indicate that subgroup analyses regarding determinants of satisfaction can be useful to design tailored quality improvement interventions of the OOH healthcare services.

The main strengths of this study were the long running time of the questionnaire on a daily basis, and the opportunity to link responses to internal patient registry data. This provided relevant information about the respondents' characteristics. In addition, the length of the questionnaire makes this study unique from other patient satisfaction studies, where often longer questionnaires are held (e.g. (14-16, 26, 27)). The major benefit of this short questionnaire is that it increased the feasibility of the study, since it is durable and easy to fill

in. People, who normally do not have the time or the resources to fill in a long questionnaire, did respond to this one. Examples are parents of young children and patients with a psychiatric illness. The long running period of this questionnaire benefited the internal validity of the study, as it showed stable satisfaction rates over time. The short period between the contact with the medical helpline and the delivery of the questionnaire to the caller's phone reduced the risk of recall bias.

However, the study was limited by the low response rate, the way the questionnaire was distributed and the form of the questionnaire. The low response rate may have induced a selection bias by self-selection of people who responded to the questionnaire, which was also indicated by the differences in characteristics between the respondents and the non-receivers in this study. Yet, the relevance of these small differences may be doubted. A study from the Netherlands that interviewed non-respondents of an OOH GP cooperative questionnaire found that most non-respondents gave reasons for not responding that were not directly related to their contact with the GP cooperative (16). The way the questionnaire was distributed limited the study in two ways. First, since the questionnaire was distributed via a text message to the phone of the caller, the respondent might not have been the patient to whom the answers were linked. Second, patients who called with an analog telephone did not get the opportunity to answer the questions. This could have led to an underrepresentation of certain population groups (e.g. elderly people). The short length of the questionnaire limits the study because of the difficulty to capture the dimensions of the whole service in two multiple choice questions. The analysis also showed that 64% of the respondents gave the same answers to both questions, which raises concern about the validity of the second question. Furthermore, this study did not include all determinants of satisfaction, such as self-perceived (improvement in) health (14, 26, 27).

Further studies could gather more insight about the reasons behind the satisfaction for the particular characteristics of the subgroup of callers for 0-4 year old children. Besides, other studies can explore the level of satisfaction of patients calling for a psychiatric illness, since this study found an unexpected high satisfaction rate of these people. This, in turn, could assist tailored-made conversation and decision support for the medical staff of the medical helpline to improve the service to all patients, who call for help and guidance.

Conclusions

This study showed that people are in general satisfied with an OOH medical helpline. Satisfaction was associated with calling for a somatic injury, being offered a face-to-face consultation, and having a short waiting time on the phone. People calling for 0-4 year old patients are more likely to be satisfied compared to the rest of the population when they call for a somatic illness, receive a telephone consultation, call OOH and when their call is forwarded to a physician. This study also showed that a text message with a short questionnaire is feasible to run on a daily basis and that it can provide valuable information for structural quality monitoring.

Funding statement

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Competing interests statement

All authors have not at any time received payment or services from a third party (government, commercial, private foundation, etc.) for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.). Neither have any authors other relationships or activities that readers could perceive to have influenced, or that give the appearance of potentially influencing, what is written in the submitted work. No patents, whether planned, pending or issued, broadly are relevant to the submitted work by any of the authors.

Author's contribution

NDZ, SNB, FL and HCC contributed to the design and implementation of the research. NDZ performed the analysis and SNB, FL and HCC aided in interpreting the results. NDZ and SNB designed the figures. NDZ wrote the paper in consultation with FL and HCC. HCC supervised the work.

Data sharing statement

No additional data are available.

Figure legends and captions

Figure 1: Flowchart of the included study population

Of the 1,843,094 calls during the study period, 1,731,556 calls were eligible (Figure 1).

Table 1: Characteristics of the respondents and non-receivers and the comparison between the respondents and non-receivers

Table 1 shows the characteristics of the respondents, divided into satisfied and dissatisfied respondents, and the non-receivers. On all tested characteristics, the respondents differed from the non-receivers ($p<0.0001$).

Figure 2: Distribution of the responses to the patient satisfaction questionnaire

Figure 2 shows the distribution of the answers that the respondents gave to the two questions of the questionnaire. Respondents who answered “Don’t know” or “Not applicable” are excluded.

Table 2: Likelihood (OR) of satisfaction for different demographic and call-related characteristics

Calling for a somatic injury was statistically significantly associated with satisfaction (OR: 1.87, 95% CI: 1.64-2.13). People who received a telephone consultation were less likely to be satisfied (OR: 0.46, 95% CI 0.41-0.51). People were also less likely to be satisfied when they had a waiting time of more than 10 minutes (OR: 0.61, 95% CI: 0.53-0.70) and especially a waiting time more than 20 minutes (OR: 0.34, 95% CI: 0.28-0.40). No statistically significant association was seen between consultation time and satisfaction. In the univariable analysis, the profession of the first call-taker was associated with satisfaction. Adding the variable to the multivariable model did not have an effect. Yet, people who were forwarded to a physician were less likely to be satisfied (OR: 0.74, 95% CI: 0.64-0.85) (Table 2).

Figure 3: Total number and percentage of satisfied respondents calling for a 0-4 year old patient per month

On average 90.2% of the respondents calling for a 0-4 year old child were satisfied, compared to 89.3% of the rest of the population. Although averages in satisfaction fluctuated per month, the overall satisfaction rate of people calling for a 0-4 year old child was stable over time (Figure 3).

Figure 4: Odds ratio (OR) and 95% confidence interval (95% CI) for demographic and call-related characteristics predicting satisfaction for 0-4 year old patients compared to 5-100 year old patients

As shown in Figure 4, callers for 0-4 year old children were more likely to be satisfied when they called for a female (OR 1.31, 95% CI 1.12-1.52), and a somatic illness (OR 1.36, 95% CI 1.19-1.56). Compared to the rest of the population, they were also more likely to be satisfied when they received a telephone consultation (OR 1.78, 95% CI 1.55-2.04), called OOH (OR 1.14, 95% CI 1.03-1.26) and when their call was forwarded to a physician (OR 1.31, 95% CI 1.01-1.69).

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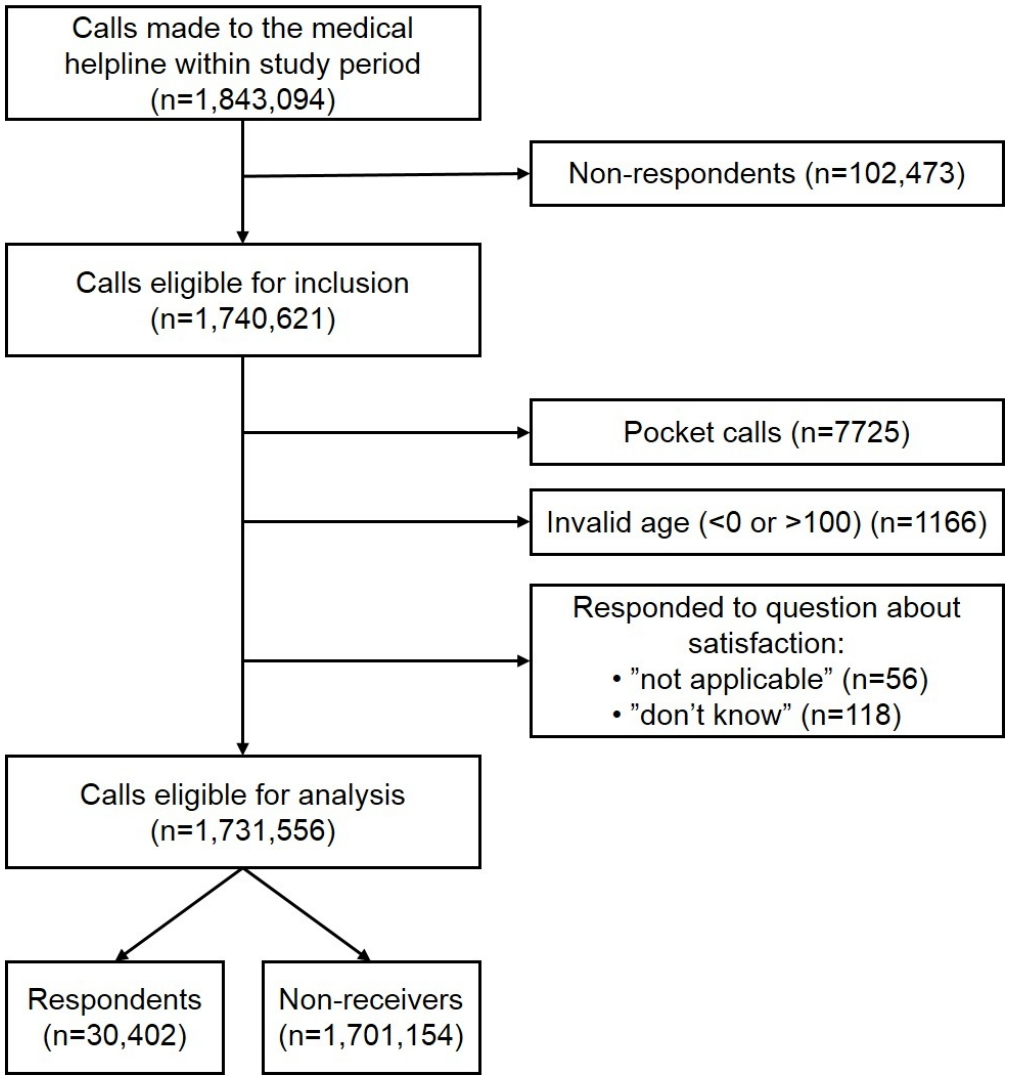

Figure 1: Flowchart of the included study population

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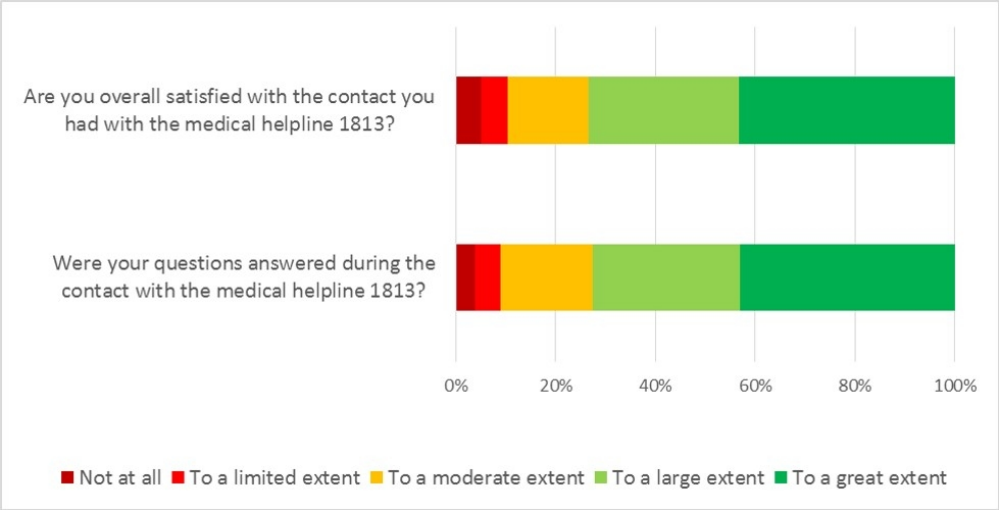

Figure 2: Distribution of the responses to the patient satisfaction questionnaire
Note: 360 respondents who answered "not applicable" or "don't know" to the second question are excluded in the figure.

216x110mm (115 x 115 DPI)

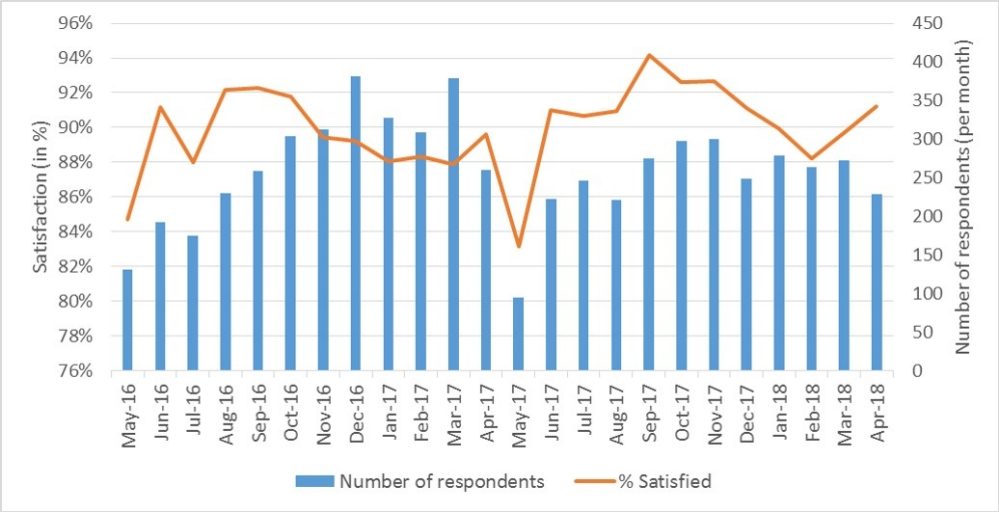

Figure 3: Total number and percentage of satisfied respondents calling for a 0-4 year old patient per month

248x127mm (106 x 106 DPI)

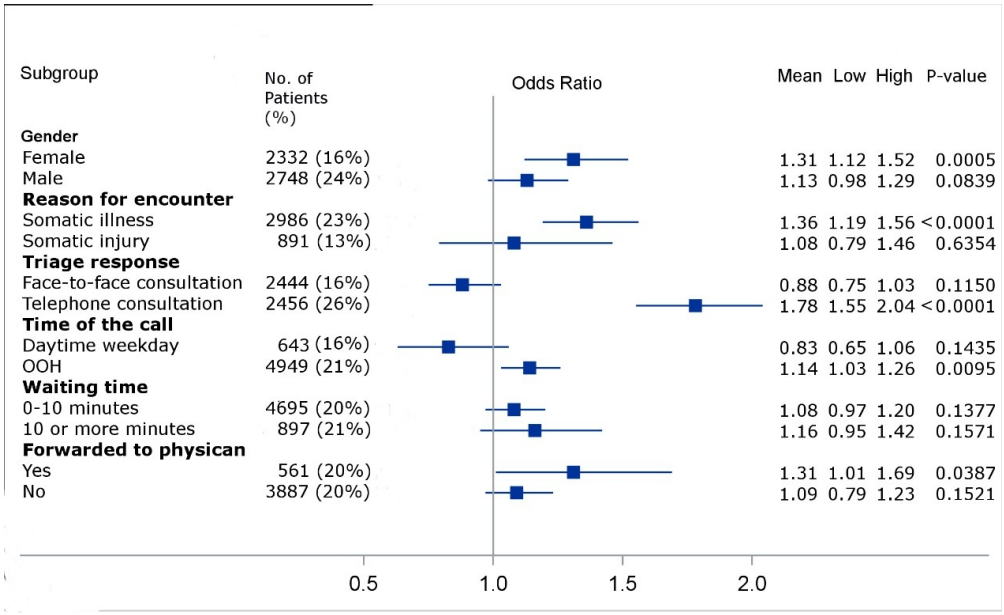

Figure 4: Odds ratio (OR) and 95% confidence interval (95% CI) for demographic and call-related characteristics predicting satisfaction for 0-4 year old patients compared to 5-100 year old patients

146x88mm (220 x 220 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract Abstract Design: "Retrospective cohort study on patient registry data and questionnaire results"
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported "Since patients' level of satisfaction depends on many factors, including demographic factors, call-specific experiences and expectations (14-17), constant monitoring of satisfaction in various settings is required. Therefore, a continuously running questionnaire was established to monitor the patient satisfaction of the callers to the 1813 medical helpline of the EMS Copenhagen on a structural basis." p.4
Objectives	3	State specific objectives, including any prespecified hypotheses "The aim of this study was to use the questionnaire to identify the demographic and call-related characteristics that are associated with the reported patient satisfaction of the callers to this medical helpline." p.4
Methods		
Study design	4	Present key elements of study design early in the paper "Every day, a random sample of 200 callers were sent a text message to the phone number they called the medical helpline with." p.5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection "This retrospective cohort study was performed on the 1813 medical helpline for non-emergency OOH calls to the EMS Copenhagen. (…) Data were collected via two sources: the patient satisfaction questionnaire and internal patient registration that provided data on: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, and profession of the call-handler(s). (…) Patients were included if they called the medical helpline between May 18, 2016 and April 30, 2018." p.5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up "Patients were included if they called the medical helpline between May 18, 2016 and April 30, 2018. Based on ethical considerations, patients were excluded if they were sent a questionnaire but failed to respond. Call observations were removed when the call lasted less than 15 seconds or when the patient's age did not range between 0 and 100 years (caused by errors in the patient registration)." p.5-6
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable "Data were collected via two sources: the patient satisfaction questionnaire and internal patient registration that provided data on: gender, age, reason for

		encounter, triage response, time of the call, waiting time, consultation time, and profession of the call-handler(s).” p.5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias “Differences in characteristics between respondents and non-receivers of the questionnaire (…)” were analysed to proxy potential differences between characteristics of respondents and non-respondents. p.6
Study size	10	Explain how the study size was arrived at “Figure 1: Flowchart of the included study population”. “Of the 1,843,094 calls during the study period, 1,731,556 calls were eligible (Figure 1).” p.7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why “Respondents were classified to be “satisfied” when they answered to the satisfaction question of the questionnaire: “to a great extent”, “to some extent” or “to a moderate extent”. Patients’ age was categorized into six groups (< 5, 5-17, 18-39, 40-59, 60-79 and ≥ 80 years), based on the pattern of disease and the organization of the system where children (0-18 year old) sometimes receive a face-to-face consultation at another department of the hospital. Other variables that were categorized are: reason for encounter (somatic illness, somatic injury, psychiatric illness or other), triage response (face-to-face consultation, telephone consultation, ambulance dispatch or other), time of the call (daytime (08:00-15:59) weekday, daytime OOH, and evening/night OOH), waiting time (<3, 3-6, 6-10, 10-20 and ≥ 20 minutes, later categorized into 0-10, 10-20 and ≥ 20 minutes) and consultation time (< 3, 3-6, 6-10 and ≥ 10 minutes, later dichotomized into < 6 minutes and ≥ 6 minutes). The profession of the first call-taker could be: nurse, physician, priority physician (answers prioritized calls from healthcare facilities), and EMDC-112-dispatcher.” p.6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding “Descriptive statistics were used to describe the patients’ characteristics with frequencies (number, percentage), and median values (Q1-Q3). Differences in characteristics between respondents and non-receivers of the questionnaire, as well as between the satisfied and dissatisfied respondents, were calculated with chi-square tests. The association between the patients’ characteristics and satisfaction was analyzed using univariable and multivariable logistic regression” p.6
		(*b*) Describe any methods used to examine subgroups and interactions “A subgroup analysis was performed to compare the satisfied callers for 0-4 year old children with those being 5-100 years old for the variables that were found to be statistically significant in the multivariable analysis.” p.6
		(*c*) Explain how missing data were addressed In Table 1, the frequencies of missing values are displayed. p.8-9
		(*d*) If applicable, explain how loss to follow-up was addressed
		(*e*) Describe any sensitivity analyses
Results		

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed "Figure 1: Flowchart of the included study population".
		(b) Give reasons for non-participation at each stage "Callers were also excluded when they answered "not applicable" or "don't know" to the first question about their satisfaction, since it was outside the scope of the study." p.5-6
		(c) Consider use of a flow diagram See Figure 1.
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders "Table 1: Characteristics of the respondents and non-receivers and the comparison between the respondents and non-receivers" p.8-9
		(b) Indicate number of participants with missing data for each variable of interest In Table 1, the frequencies of missing values are displayed. p.8-9
		(c) Summarise follow-up time (eg, average and total amount) Not applicable.
Outcome data	15*	Report numbers of outcome events or summary measures over time
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included "Table 2: Likelihood (OR) of satisfaction for different demographic and call-related characteristics" p.9-10
		(*b*) Report category boundaries when continuous variables were categorized "Respondents were classified to be "satisfied" when they answered to the satisfaction question of the questionnaire: "to a great extent", "to some extent" or "to a moderate extent". Patients' age was categorized into six groups (< 5, 5-17, 18-39, 40-59, 60-79 and ≥ 80 years), based on the pattern of disease and the organization of the system where children (0-18 year old) sometimes receive a face-to-face consultation at another department of the hospital. Other variables that were categorized are: reason for encounter (somatic illness, somatic injury, psychiatric illness or other), triage response (face-to-face consultation, telephone consultation, ambulance dispatch or other), time of the call (daytime (08:00-15:59) weekday, daytime OOH, and evening/night OOH), waiting time (<3, 3-6, 6-10, 10-20 and ≥ 20 minutes, later categorized into 0-10, 10-20 and ≥ 20 minutes) and consultation time (< 3, 3-6, 6-10 and ≥ 10 minutes, later dichotomized into < 6 minutes and ≥ 6 minutes). The profession of the first call-taker could be: nurse, physician, priority physician (answers prioritized calls from healthcare facilities), and EMDC-112-dispatcher." p.6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses "On average 90.2% of the respondents calling for a 0-4 year old child were satisfied, compared to 89.3% of the rest of the population. Although averages in satisfaction

		fluctuated per month, the overall satisfaction rate of people calling for a 0-4 year old child was stable over time (Figure 3).” p.10
Discussion		
Key results	18	Summarise key results with reference to study objectives “This study has indicated that caller satisfaction with the OOH medical helpline was significantly associated with gender, age, reason for encounter, triage response and waiting time. Furthermore, people who called during GP office hours were less likely to be satisfied than people calling OOH. People calling on behalf a 0-4 year old child were more likely to be satisfied compared to the rest of the population, when they called for a somatic illness, when they received a telephone consultation, when their call was made OOH and when their call was forwarded to a physician.” p.11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias “However, the study was limited by….” p.12
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence “This study showed that people are in general satisfied with an OOH medical helpline. Satisfaction was associated with calling for a somatic injury, being offered a face-to-face consultation, and having a short waiting time on the phone. People calling for 0-4 year old patients are more likely to be satisfied compared to the rest of the population when they call for a somatic illness, receive a telephone consultation, call OOH and when their call is forwarded to a physician. This study also showed that a text message with a short questionnaire is feasible to run on a daily basis and that it can provide valuable information for structural quality monitoring.” p.13
Generalisability	21	Discuss the generalisability (external validity) of the study results “Hence, many EU countries are working on initiatives to change the out-of-hours (OOH) pre-hospital care towards a closer collaboration between the general practitioners (GPs) and hospital emergency departments. This can be done by establishing national telephone numbers that centralize the OOH calls and triage (6).” p.4
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based “This study was supported by an unrestricted grant from The Laerdal Foundation.” p.13

*Give information separately for exposed and unexposed groups.

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Satisfaction of 30,402 Callers to a Medical Helpline of the Emergency Medical Services Copenhagen: A Retrospective Cohort Study

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Satisfaction of 30,402 Callers to a Medical Helpline of the Emergency Medical Services Copenhagen: A Retrospective Cohort Study

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Abstract

Objectives

To keep healthcare systems sustainable for future demands, many countries are developing a centralized telephone line for out-of-hours primary care services. To increase the quality of such services, more information is needed on factors that influence caller-satisfaction. The aim of this study was to identify demographic and call-related characteristics that are associated with the patient satisfaction of callers to a medical helpline in Denmark.

Design

Retrospective cohort study on patient registry data and questionnaire results.

Setting

Non-emergency medical helpline in the Capital Region of Denmark.

Participants

A random sample of 30,402 callers to the medical helpline between May 2016 and May 2018.

Primary and secondary outcome measures

Responses of a satisfaction questionnaire were linked to demographic and call-related dispatch data. Associations between the characteristics were analyzed with multivariable logistic regression analysis with satisfaction as the dependent variable. A subgroup analysis was performed on callers for children aged between 0-4 years.

Results

Of the 30,402 analyzed callers, 73.0% were satisfied with the medical helpline. Satisfaction was associated with calling for a somatic injury (OR: 1.96, 95% CI: 1.72–2.23), receiving a face-to-face consultation (OR: 2.27, 95% CI: 2.04-2.50), and a waiting time less than 10 minutes (OR: 1.82, 95% CI: 1.56-2.08). Callers for a 0-4 year old patient were more likely to be satisfied when they called for a somatic illness or received a telephone consultation, compared to the rest of the population ($p<0.0001$).

Conclusion

Callers were in general satisfied with the medical helpline. Satisfaction was associated with reason for encounter, triage response, and waiting time. People calling for 0-4 year old patients were, compared to the rest of the population, more frequently satisfied when they called for a somatic illness or received a telephone consultation.

Keywords

Out-of-hours healthcare - Patient satisfaction – Telephone triage - Denmark

Strengths and limitations of this study

• The satisfaction questionnaire ran over a two-year period, which ensured a large sample size (n=30,402) and allowed for conducting a subgroup analysis.

• The short length of the questionnaire enabled people to respond who would normally not respond to long questionnaires, such as parents of children or patients with a psychiatric illness.

• Responses to the satisfaction questionnaire were linked to internal patient registry data, which provided more information on the characteristics of the respondents.

• Although data on non-receivers of the questionnaire was analyzed, the analysis was limited because characteristics of non-respondents could not be obtained due to regulations around patient data protection.

Introduction

Member States of the European Union (EU) face growing and changing healthcare needs due to population ageing and tight budgetary constraints (1). To keep the healthcare systems sustainable for the future, EU countries are working on initiatives towards more integrated care models (2). More integrated and people-centered healthcare systems are expected to provide services that are of better quality, financially more sustainable and more responsive to personal preferences and needs (3-5). One way to make the healthcare provision more integrated, is to vertically integrate the primary and secondary healthcare services (2). Hence, many EU countries are working on initiatives to change the out-of-hours (OOH) pre-hospital care towards a closer collaboration between the general practitioners (GPs) and hospital emergency departments. This can be done by establishing national telephone numbers that centralize the OOH calls and triage (6).

Such an OOH telephone line has been established in Copenhagen. The aim of this so-called 1813 medical helpline is to provide always available easy access to healthcare, and at the same time relieve the pressure on the hospital emergency departments (7, 8). An OOH telephone triage system may reduce GP visits and the immediate medical workload (9-11). Yet, to increase the effectiveness of the system, more detailed information is needed on several aspects of the system, among which patient satisfaction (9). This is a desired outcome of care, both incorporating interpersonal relationships, specific components of technical care and the outcomes of care (12). Analyzing patient satisfaction scores can provide information about whether interventions result in better outcomes from the perspective of the patient, and consequently improve the quality of patient-centered healthcare systems (13). Since patients' level of satisfaction depends on many factors, including demographic factors, call-specific experiences and expectations (14-17), constant monitoring of satisfaction in various settings is required.

Therefore, a continuously running questionnaire was established to monitor the patient satisfaction of the callers to the 1813 medical helpline of the EMS Copenhagen on a structural basis. The aim of this study was to use the questionnaire to identify the demographic and call-related characteristics that are associated with the reported patient satisfaction of the callers to this medical helpline. Furthermore, a subgroup analysis was performed of calls concerning 0-4 year old children, because of their frequent use of the medical helpline.

Materials and Methods

Study design and setting

This retrospective cohort study was performed on the 1813 medical helpline for non-emergency OOH calls to the EMS Copenhagen. Outside GP working hours (between 4 pm and 8 am on weekdays, in weekends and during holidays), the 1.8 million citizens of the region can call two telephone numbers when they have health issues (18, 19). They can dial 112 to reach the Emergency Medical Dispatch Center (EMDC-112) for emergency situations and for the less urgent, not life-threatening health problems the 1813 medical helpline (20). This medical helpline handles on average 924,000 calls a year, of which most are answered by triage nurses (7). They pre-assess the need for the caller to access acute medical help, which makes them play a dominant role in gatekeeping the healthcare system (21, 22). The triage nurses can respond with several actions such as: booking an appointment at an acute admission center, emergency clinic or psychiatric admission center, forward the call to the EMDC-112 or a doctor, plan a home visit, recommend the patient to contact the GP on the next working day, or give telephone advice for self-care (19, 21).

Every day, 200 callers of the previous day were selected by a simple random sampling method (23) and sent a text message to the phone number they called the medical helpline with. The text message comprised two questions: *"Are you overall satisfied with the contact you had with the medical helpline 1813?"*, and: *"Were your questions answered during the contact with the medical helpline 1813?"*. The callers were asked to answer those questions on a five-point Likert scale answer category, containing: "to a great extent", "to a large extent", "to a moderate extent", "to a limited extent", or "not at all". Furthermore, they had the option to answer: "not applicable" or "don't know".

Patient and Public Involvement

No patient involved.

Data collection and processing

Data was collected via two data sources: the patient satisfaction questionnaire and internal patient registration that provided data on: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, and profession of the call-handler(s). Patients were included if they called the medical helpline between May 18, 2016 and April 30, 2018. Patients who were referred to the medical helpline after calling 112 were excluded for

selection, because from them there were no telephone numbers available in the system. Permission from individual patients is not required for this type of study in Denmark. A request was sent to the Research Ethics Committee in the Capital Region of Denmark, but approval was not needed for this study (J.number 19042590). However, based on ethical considerations, patients were excluded if they were sent a questionnaire but failed to respond. Callers were also excluded when they answered "not applicable" or "don't know" to the first question about their satisfaction, since it was outside the scope of the study. Call observations were removed when the call lasted less than 15 seconds or when the patient's age did not range between 0 and 100 years (caused by errors in the patient registration).

For the descriptive analyses, respondents were classified according to the satisfaction question of the questionnaire into satisfied ("to a great extent" or "to a large extent"), neutral ("to a moderate extent"), and dissatisfied ("to a limited extent" or "not at all"). Patients' age was categorized into six groups (< 5, 5-17, 18-39, 40-59, 60-79 and ≥ 80 years), based on the pattern of disease and the organization of the system where children (0-18 year old) sometimes receive a face-to-face consultation at another department of the hospital. Other variables that were categorized are: reason for encounter (somatic illness, somatic injury, psychiatric illness or other), triage response (face-to-face consultation, telephone consultation, ambulance dispatch or other), time of the call (daytime weekday, daytime OOH, and evening/night OOH), waiting time (<3, 3-6, 6-10, 10-20 and ≥ 20 minutes, later categorized into 0-10, 10-20 and ≥ 20 minutes) and consultation time (< 3, 3-6, 6-10 and ≥ 10 minutes, later dichotomized into < 6 minutes and ≥ 6 minutes). The profession of the first call-taker could be: nurse, physician, priority physician (answers prioritized calls from healthcare facilities), and EMDC-112-dispatcher.

Statistical analyses

Descriptive statistics were used to describe the patients' characteristics with frequencies (number, percentage), and median values (Q1-Q3). The representativeness of the respondents for the total population was determined by firstly estimating the characteristics of the non-respondents by assuming the same proportions among receivers and non-receivers. Subsequently, the proportions of the non-respondents were estimated by subtracting the number of respondents from this total estimated numbers of receivers. Differences in characteristics between the satisfied and dissatisfied respondents were calculated with chi-square tests. The association between the patients' characteristics and satisfaction was analyzed using univariable and multivariable logistic regression. Here, the satisfied

respondents were compared with the dissatisfied respondents, which left the intermediate group of respondents out of the analyses. Results of these analyses were reported in odds-ratios (ORs) and 95% confidence intervals (95% CI). For the multivariable analysis, a full fitted model without a selection was created, since there was no solid evidence available in previously published scientific literature about potential relevant variables. Variables that were entered to the model were: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, profession of first call-taker and being forwarded to a physician. Thereafter, a subgroup analysis was performed to analyze the characteristics of the satisfied callers for 0-4 year old children, who were relatively frequent callers based on the distribution of the population by age in the Copenhagen region. Another univariable analysis comparing the proportion of satisfied callers for 0-4 year old children with the rest of the population was performed with the variables that were found to be statistically significant in the multivariable analysis. Statistical significance was based on an alpha error of 0.05 and data was analyzed with SAS 9.4 (SAS Institute Inc., Cary, North Carolina).

Results

Characteristics of Study Subjects

Of the 1,843,094 calls during the study period, 1,731,556 calls were eligible (Figure 1). Among those were 30,402 respondents (response rate: 23.0%). The majority of the calls concerned females (54.8%) and the median age was 29 (11-53). Most of the calls were related to somatic illnesses (64.0%), followed by somatic injuries (26.9%). A face-to-face consultation was offered to 46.8% of the callers and 42.6% received a telephone consultation. Most of the calls were picked up by a nurse (75.7%) and 14.6% of those were forwarded to a physician.

Table 1 shows the characteristics of the respondents, divided into satisfied, neutral, and dissatisfied respondents, and those of the non-receivers. On all tested characteristics, the respondents differed from the non-receivers ($p<0.0001$). Assuming that the receivers of the questionnaire have the same proportions of characteristics as the non-receivers, the respondents were less often older than 80 years (2.4% vs 7.9%), called more often for a somatic injury (24.4% vs 17.4%) and received more often a face-to-face consultation (53.3% vs 43.0%).

Patient Satisfaction

A total of 22,203 respondents (73.0%) indicated to be satisfied with their encounter with the medical helpline ("to a great extent": 43.3%; "to a large extent": 30.1%). Another 4894 respondents replied "to a moderate extent" (16.3%) and 3097 (10.3%) indicated to be dissatisfied ("to a limited extent": 5.3%; "not at all: 5.0%). (Figure 2). To the second question about whether the callers received an answer to their question, 71.7% replied at least "to a large extent" and 1.2% replied "don't know / not applicable". More than half of the respondents (63.5%) gave the same answers to both questions. Of those who indicated to be satisfied with the service, 65.2% replied to be given an answer at least "to a large extent" to their question.

The satisfied respondents differed on all tested characteristics from the dissatisfied respondents ($p<0.0001$), except for gender and time of the call. Among others, the satisfied respondents concerned more often patients aged < 5 years old and ≥ 60 years old (Table 1). Furthermore, respondents who called for a somatic illness were less often satisfied than respondents calling for a somatic injury (72.6% vs 80.4%). People who received a face-to-face consultation or ambulance where more often satisfied (77.4% and 88.5%, respectively) than patients who ended up with a telephone consultation (67.1%). The median waiting time of the satisfied respondents was almost 1.5 minutes shorter than that of the dissatisfied respondents (2:30 minutes vs 4:05 minutes). Of the people who had a waiting time longer than 20 minutes, 49.3% were satisfied and of those who talked to a physician, 67.4% were satisfied.

Table 1: Characteristics of the respondents and non-receivers and the estimated difference between respondents and non-respondents

	Respondents (n=30402)			**Non-receivers (n=1701154)**	**Difference % respondents vs % estimation non-respondents**
	Satisfied (n=22203)	**Neutral (n=5002)**	**Dissatisfied (n=3197)**		
Sex					
Female	12103 (54.5%)	2824 (56.5%)	1723 (53.9%)	901247 (53.0%)	2.5%
Male	9738 (43.9%)	2064 (41.3%)	1372 (42.9%)	742677 (43.7%)	-0.3%
Missing	362 (1.6%)	114 (2.3%)	102 (3.2%)	57230 (3.4%)	-1.9%

	Respondents (n=30402)			Non-receivers (n=1701154)	Difference % respondents vs % estimation non-respondents
	Satisfied (n=22203)	Neutral (n=5002)	Dissatisfied (n=3197)		
Age					
0-4	4169 (18.8%)	947 (18.9%)	509 (15.9%)	278601 (16.4%)	2.8%
5-17	4116 (18.5%)	865 (17.3%)	440 (13.8%)	230482 (13.6%)	5.6%
18-39	5350 (24.1%)	1510 (30.2%)	1182 (37.0%)	518393 (30.5%)	-5.2%
40-59	4689 (21.1%)	997 (19.9%)	669 (20.9%)	294642 (17.3%)	5.5%
60-79	2942 (13.3%)	475 (9.5%)	241 (7.5%)	208682 (12.3%)	-0.3%
≥ 80	575 (2.6%)	94 (1.9%)	54 (1.7%)	113127 (6.7%)	-5.5%
Missing	362 (1.6%)	114 (2.3%)	102 (3.2%)	57227 (3.4%)	4.0%
Reason for encounter					
Somatic illness	10533 (47.4%)	2374 (47.5%)	1599 (50.0%)	773868 (45.5%)	3.0%
Somatic injury	5977 (26.9%)	1043 (20.9%)	412 (12.9%)	324253 (19.1%)	7.0%
Psychiatric illness	92 (0.4%)	25 (0.5%)	12 (0.4%)	10842 (0.6%)	-0.3%
Other[a]	5601 (25.2%)	1560 (31.2%)	1174 (36.7%)	592191 (34.8%)	-9.5%
Triage response					
Face-to-face consultation	12527 (56.4%)	2546 (50.9%)	1121 (35.1%)	772583 (45.4%)	10.3%
Telephone consultation	7437 (33.5%)	1996 (39.9%)	1644 (51.4%)	706467 (41.5%)	-6.5%
Ambulance	1027 (4.6%)	97 (1.9%)	36 (1.1%)	54071 (3.2%)	0.8%
Other[a]	1212 (5.5%)	363 (7.3%)	396 (12.4%)	168033 (9.9%)	-4.4%
Time of the call					
Daytime weekday	3353 (15.1%)	682 (13.6%)	480 (15.0%)	216978 (12.8%)	2.8%
Daytime OOH	3606 (16.2%)	928 (18.6%)	541 (16.9%)	409131 (24.1%)	-9.5%
Evening/night OOH	15244 (68.7%)	3392 (67.8%)	2176 (68.1%)	1075045 (63.2%)	7.0%
Waiting time					

	Respondents (n=30402)			Non-receivers (n=1701154)	Difference % respondents vs % estimation non-respondents
	Satisfied (n=22203)	**Neutral (n=5002)**	**Dissatisfied (n=3197)**		
0-3 minutes	11989 (54.0%)	2175 (43.5%)	1397 (43.7%)	860874 (50.6%)	0.9%
3-6 minutes	3904 (17.6%)	772 (15.4%)	558 (17.5%)	286752 (16.9%)	0.5%
6-10 minutes	3057 (13.8%)	742 (14.8%)	445 (13.9%)	235531 (13.9%)	0.2%
10-20 minutes	2649 (11.9%)	933 (18.7%)	556 (17.4%)	240072 (14.1%)	-0.6%
≥ 20 minutes	604 (2.7%)	380 (7.6%)	241 (7.5%)	77914 (4.6%)	-0.7%
Consultation time					
0-3 minutes	7919 (35.7%)	1896 (37.9%)	1268 (39.7%)	641846 (37.7%)	-1.6%
3-6 minutes	10134 (45.6%)	2234 (44.7%)	1334 (41.7%)	740206 (43.5%)	2.1%
6-10 minutes	3505 (15.6%)	742 (14.8%)	517 (16.2%)	264892 (15.6%)	0.2%
≥ 10 minutes	645 (2.9%)	130 (2.6%)	78 (2.4%)	54210 (3.2%)	-0.5%
First call-taker					
Nurse	17654 (79.5%)	3838 (76.7%)	2406 (75.3%)	1265043 (74.4%)	5.7%
Physician	3942 (17.8%)	1042 (20.8%)	699 (21.9%)	388509 (22.8%)	-5.3%
Priority physician	125 (0.6%)	32 (0.6%)	35 (1.1%)	20527 (1.2%)	-0.7%
112	0 (0.0%)	0 (0%)	0 (0.0%)	12 (0.0%)	0.0%
Missing	482 (2.2%)	90 (1.8%)	57 (1.8%)	27063 (1.6%)	0.6%
Call forwarded to a physician[b]					
Yes	2073 (11.7%)	675 (17.6%)	489 (20.3%)	184250 (14.6%)	0.4%
No	15581 (88.3%)	3163 (82.4%)	1917 (79.7%)	1080743 (85.4%)	-0.4%

OOH = out-of-hours.

[a] Includes missing values

[b] Percentage based on the number of calls that were in first instance picked up by a nurse.

Multivariable logistic regression analysis

Calling for a somatic injury was statistically significant associated with satisfaction (OR: 1.96, 95% CI: 1.72-2.23). People who received a telephone consultation were less likely to be satisfied (OR: 0.44, 95% CI: 0.40-0.49). People were also less likely to be satisfied when they had a waiting time of more than 10 minutes (OR: 0.55, 95% CI: 0.48-0.64) and especially a waiting time more than 20 minutes (OR: 0.25, 95% CI: 0.20-0.30). No statistically significant association was seen between consultation time and satisfaction. In the univariable analysis, the profession of the first call-taker was associated with satisfaction. Adding the variable to the multivariable model did not have an effect. Yet, people who were forwarded to a physician were less likely to be satisfied (OR: 0.68, 95% CI: 0.58-0.78) (Table 2).

Table 2: Likelihood (OR) of satisfaction for different demographic and call-related characteristics

	Crude OR (95% CI) n=19476[a]	Adjusted OR (95% CI) n=16307[a]	
Gender			
Female (ref)	1	1	
Male	1.01 (0.94 - 1.09)	0.84 (0.75 – 0.93)	*
Age			
0-4	1.81 (1.62 - 2.02)	2.21 (1.90 – 2.57)	*
5-17	2.07 (1.84 - 2.32)	1.93 (1.65 – 2.26)	*
18-39 (ref)	1	1	
40-59	1.55 (1.40 - 1.72)	1.42 (1.23 – 1.63)	*
60-79	2.70 (2.33 – 3.12)	2.82 (2.29 – 3.49)	*
≥ 80	2.35 (1.77 – 3.13)	2.35 (1.49 – 3.68)	*
Reason for encounter			
Somatic illness (ref)	1	1	
Somatic injury	2.20 (1.97 – 2.47)	1.96 (1.72 – 2.23)	*
Triage response			
Face-to-face consultation (ref)	1	1	
Telephone consultation	0.40 (0.37 – 0.44)	0.44 (0.40 – 0.49)	*
Time of the call			
Daytime weekday	1.05 (0.92 – 1.20)	0.65 (0.54 – 0.78)	*
Daytime OOH (ref)	1	1	
Evening/night OOH	1.05 (0.95 – 1.16)	0.95 (0.82 (1.09)	
Waiting time			
0-10 minutes (ref)	1	1	
10-20 minutes	0.60 (0.55 – 0.67)	0.55 (0.48 – 0.64)	*
≥ 20 minutes	0.32 (0.27 – 0.37)	0.25 (0.20 – 0.30)	*
Consultation time			
0-6 minutes (ref)	1	1	
≥ 6 minutes	1.01 (0.91 – 1.11)	1.08 (0.95 – 1.23)	
First call-taker			
Nurse (ref)	1		

Physician	0.76 (0.69 – 0.83)		
Call forwarded to a physician			
Yes	0.52 (0.47 – 0.58)	0.68 (0.58 – 0.78)	*
No (ref)	1	1	

[a]The lowest amount of observations in the models.

* P-value < 0.05

0-4 year old subgroup analysis

On average 74.1% of the respondents calling for a 0-4 year old child were satisfied, compared to 73.0% of the rest of the population. Although averages in satisfaction fluctuated per month, the overall satisfaction rate of people calling for a 0-4 year old child was stable over time (Figure 3).

As shown in Figure 4, callers for 0-4 year old children were more likely to be satisfied when they called for a somatic illness (OR: 1.15, 95% CI: 1.06-1.26) and received a telephone consultation (OR: 1.45, 95% CI: 1.31-1.59). They were less likely to be satisfied when they received a face-to-face consultation (OR: 0.88, 95% CI: 0.80-0.97) and called during GP office hours (OR: 0.84, 95% CI: 0.70-1.00).

Discussion

This study has indicated that caller satisfaction with the OOH medical helpline was significantly associated with gender, age, reason for encounter, triage response and waiting time. Furthermore, people who called during GP office hours were less likely to be satisfied than people calling OOH. People calling on behalf a 0-4 year old child were more likely to be satisfied compared to the rest of the population, when they called for a somatic illness and when they received a telephone consultation, but less likely to be satisfied when they received a face-to-face consultation and called during GP office hours.

The satisfaction rate of 73% is in line with findings from previous studies (14, 24-26). Also, the other findings of this study were generally in accordance with previous studies, which showed associations between (dis)satisfaction and patient gender (27), age (28), call reason (26), triage response (14, 16, 29) and waiting time (14, 15, 27). Whereas another study also found an association with consultation length (15), this was not found in our study. This same study on a telephone service in Wales also found that patients who received a telephone consultation were more satisfied than patients who received a face-to-face consultation, which contradicts our findings as well (15). The multivariable analysis also showed that people whose call was forwarded to a physician were less likely to be satisfied. This might have been induced by the reason why the call was forwarded in the first place, which were probably the more complex calls. Besides, it could have been influenced by a difference in expectation callers had about their call-taker.

Our study's finding that people who call for a 0-4 year old children were on particular characteristics more likely to be satisfied compared to the rest of the population, could be explained by different expectations of callers. Studies have shown that a mismatch between a caller's request or expectation and triage outcome is associated with lower patient satisfaction (30-32). The findings of this study also indicate that subgroup analyses regarding determinants of satisfaction can be useful to design tailored quality improvement interventions of the OOH healthcare services.

The main strengths of this study were the long running time of the questionnaire on a daily basis, and the opportunity to link responses to internal patient registry data. This provided relevant information about the respondents' characteristics. In addition, the length of the questionnaire makes this study unique from other patient satisfaction studies, where often longer questionnaires are held (e.g. (14-16, 27, 28)). The major benefit of this short questionnaire is that it increased the feasibility of the study, since it is durable and easy to fill

in. People, who normally do not have the time or the resources to fill in a long questionnaire, did respond to this one. Examples are parents of young children and patients with a psychiatric illness. The long running period of this questionnaire benefited the internal validity of the study, as it showed stable satisfaction rates over time. The short period between the contact with the medical helpline and the delivery of the questionnaire to the caller's phone reduced the risk of recall bias.

However, the study was limited by the low response rate, the way the questionnaire was distributed and the form of the questionnaire. The low response rate and the fact that the questionnaire could not be sent to analog telephones may have induced a selection bias by self-selection of people who responded to the questionnaire. When estimating the characteristics of the non-respondents based on the non-receivers, it seemed that respondents were less often older than 80 years, called more often for a somatic injury and received more often a face-to-face consultation. Yet, the relevance of these estimated differences may be doubted. A study from the Netherlands that interviewed non-respondents of an OOH GP cooperative questionnaire found that most non-respondents gave reasons for not responding that were not directly related to their contact with the GP cooperative (16). The way the questionnaire was distributed also limited the study because the respondent might not have been the patient to whom the answers were linked. That means that the caller could have other demographic characteristics than was assumed in this study. This is especially a relevant limitation for the analysis of the callers for the 0-4 year old patients. The short length of the questionnaire limits the study because of the difficulty to capture the dimensions of the whole service in two multiple choice questions. The analysis also showed that 64% of the respondents gave the same answers to both questions, which raises concern about the validity of the second question. Furthermore, this study did not include all determinants of satisfaction, such as self-perceived (improvement in) health (14, 27, 28).

Further studies could gather more insight about the reasons behind the satisfaction for the particular characteristics of the subgroup of callers for 0-4 year old children. This, in turn, could assist tailored-made conversation and decision support for the medical staff of the medical helpline to improve the service to all patients, who call for help and guidance.

Conclusions

This study showed that people are in general satisfied with an OOH medical helpline. Satisfaction was associated with calling for a somatic injury, being offered a face-to-face consultation, and having a short waiting time on the phone. People calling for 0-4 year old patients are more likely to be satisfied compared to the rest of the population when they call for a somatic illness and receive a telephone consultation. This study also showed that a text message with a short questionnaire is feasible to run on a daily basis and that it can provide valuable information for structural quality monitoring.

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Competing interests statement

All authors have not at any time received payment or services from a third party (government, commercial, private foundation, etc.) for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.). Neither have any authors other relationships or activities that readers could perceive to have influenced, or that give the appearance of potentially influencing, what is written in the submitted work. No patents, whether planned, pending or issued, broadly are relevant to the submitted work by any of the authors.

Author's contribution

NDZ, SNB, FL and HCC contributed to the design and implementation of the research. NDZ performed the analysis and SNB, FL and HCC aided in interpreting the results. NDZ and SNB designed the figures. NDZ wrote the paper in consultation with FL and HCC. HCC supervised the work.

Data sharing statement

No additional data are available.

Figure legends and captions

Figure 1: Flowchart of the included study population

Of the 1,843,094 calls during the study period, 1,731,556 calls were eligible (Figure 1).

Table 1: Characteristics of the respondents and non-receivers and the estimated difference between respondents and non-respondents

Table 1 shows the characteristics of the respondents, divided into satisfied, neutral, and dissatisfied respondents, and those of the non-receivers. On all tested characteristics, the respondents differed from the non-receivers ($p<0.0001$).

Figure 2: Distribution of the responses to the patient satisfaction questionnaire

Figure 2 shows the distribution of the answers that the respondents gave to the two questions of the questionnaire. Respondents who answered "Don't know" or "Not applicable" are excluded.

Table 2: Likelihood (OR) of satisfaction for different demographic and call-related characteristics

Calling for a somatic injury was statistically significantly associated with satisfaction (OR: 1.96, 95% CI: 1.72-2.23). People who received a telephone consultation were less likely to be satisfied (OR: 0.44, 95% CI 0.40-0.49). People were also less likely to be satisfied when they had a waiting time of more than 10 minutes (OR: 0.55, 95% CI: 0.48-0.64) and especially a waiting time more than 20 minutes (OR: 0.25, 95% CI: 0.20-0.30). No statistically significant association was seen between consultation time and satisfaction. In the univariable analysis, the profession of the first call-taker was associated with satisfaction. Adding the variable to the multivariable model did not have an effect. Yet, people who were forwarded to a physician were less likely to be satisfied (OR: 0.68, 95% CI: 0.58-0.78) (Table 2).

Figure 3: Total number and percentage of satisfied respondents calling for a 0-4 year old patient per month

On average 74.1% of the respondents calling for a 0-4 year old child were satisfied, compared to 73.0% of the rest of the population. Although averages in satisfaction fluctuated per month, the overall satisfaction rate of people calling for a 0-4 year old child was stable over time (Figure 3).

Figure 4: Odds ratio (OR) and 95% confidence interval (95% CI) for demographic and call-related characteristics predicting satisfaction for 0-4 year old patients compared to 5-100 year old patients

As shown in Figure 4, callers for 0-4 year old children were more likely to be satisfied when they called for a somatic illness (OR: 1.15, 95% CI: 1.06-1.26) and received a telephone consultation (OR: 1.45, 95% CI: 1.31-1.59). They were less likely to be satisfied when they received a face-to-face consultation (OR: 0.88, 95% CI: 0.80-0.97) and called during GP office hours (OR: 0.84, 95% CI: 0.70-1.00).

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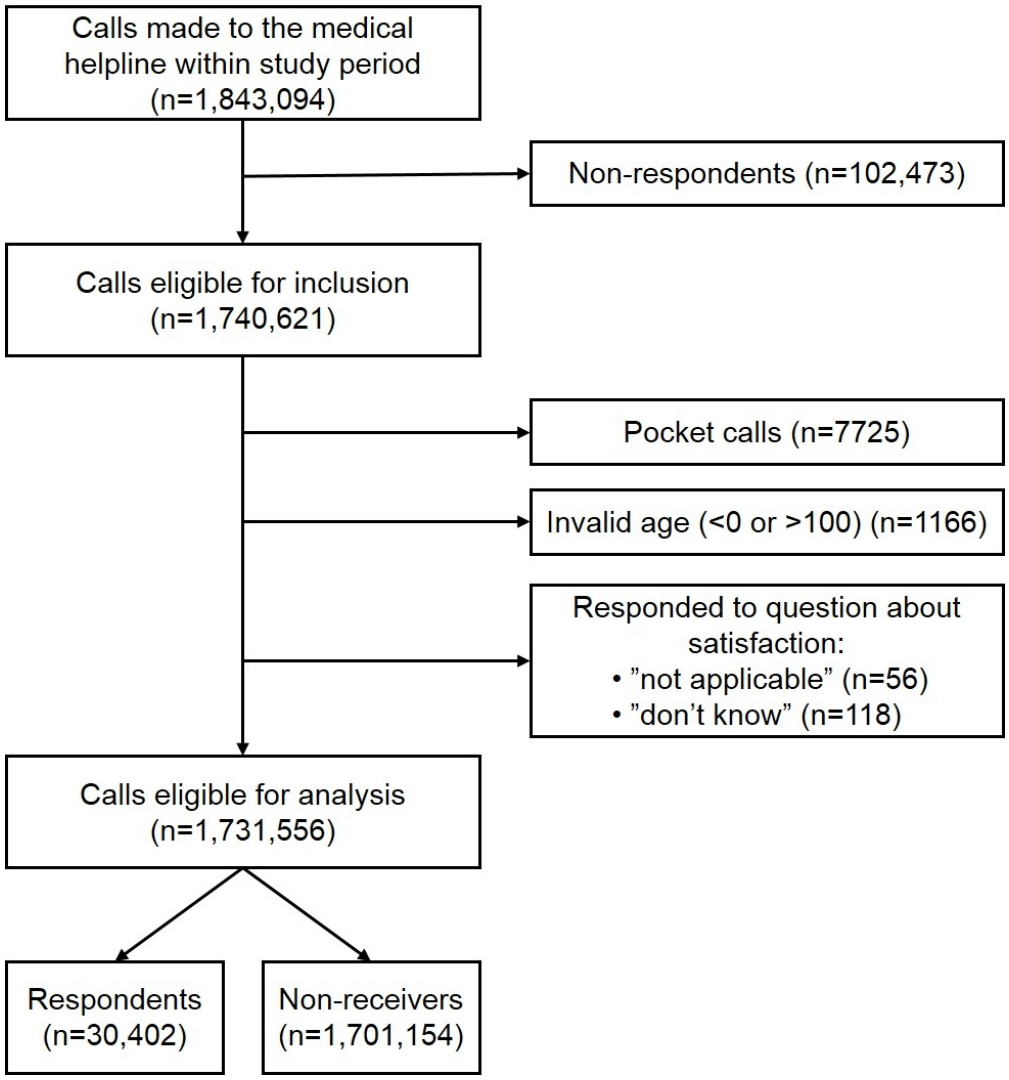

Figure 1: Flowchart of the included study population

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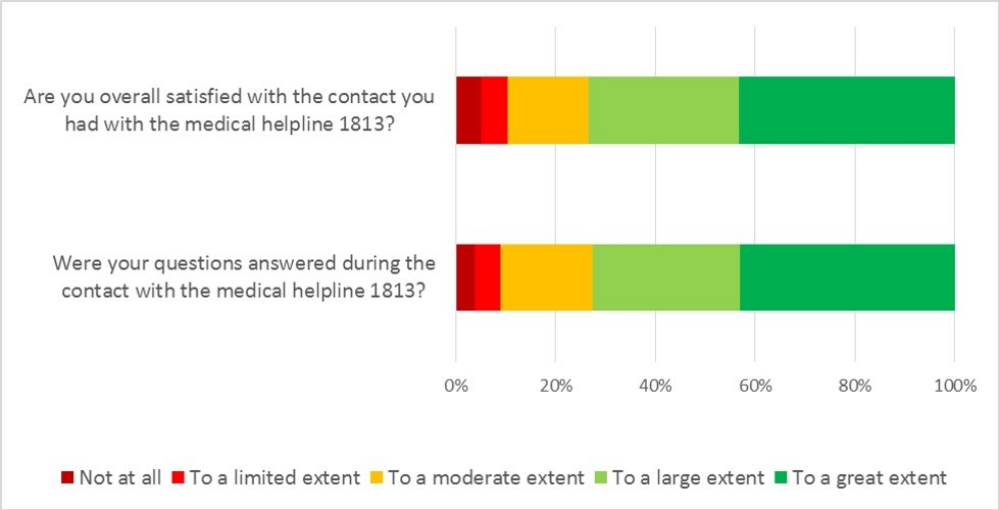

Figure 2: Distribution of the responses to the patient satisfaction questionnaire. Note: 360 respondents who answered "not applicable" or "don't know" to the second question are excluded in the figure.

216x110mm (115 x 115 DPI)

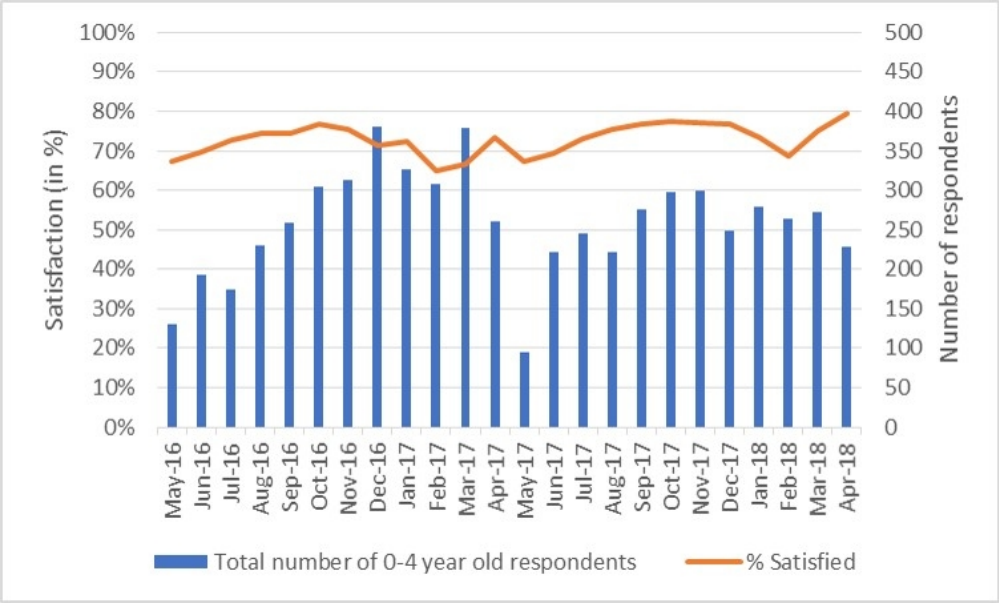

Figure 3: Total number and percentage of satisfied respondents calling for a 0-4 year old patient per month

127x76mm (150 x 150 DPI)

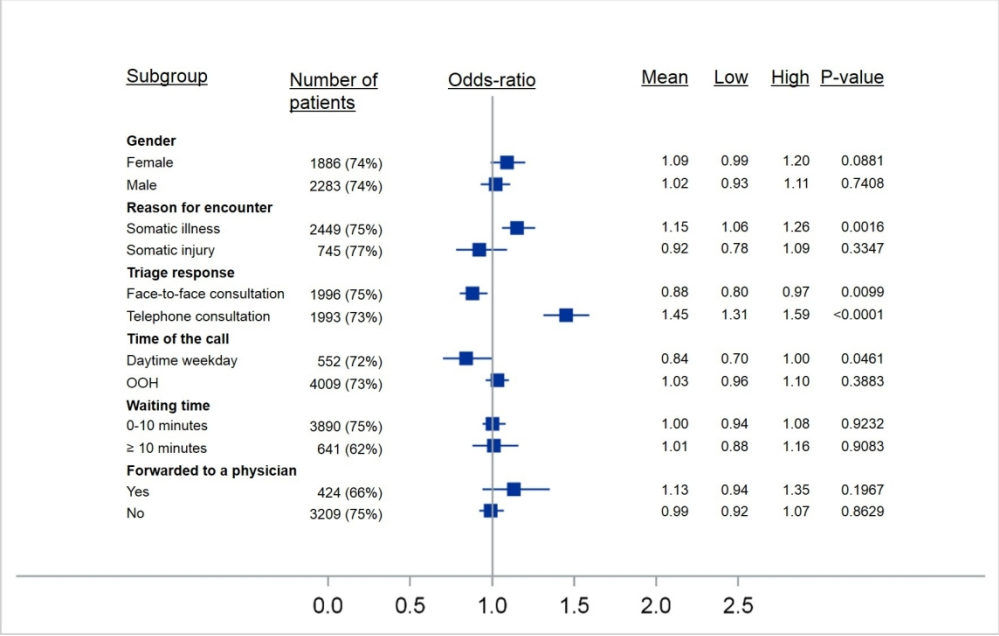

Figure 4: Odds ratio (OR) and 95% confidence interval (95% CI) for demographic and call-related characteristics predicting satisfaction for 0-4 year old patients compared to 5-100 year old patients

299x197mm (150 x 150 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract Abstract Design: "Retrospective cohort study on patient registry data and questionnaire results"
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported "Since patients' level of satisfaction depends on many factors, including demographic factors, call-specific experiences and expectations (14-17), constant monitoring of satisfaction in various settings is required. Therefore, a continuously running questionnaire was established to monitor the patient satisfaction of the callers to the 1813 medical helpline of the EMS Copenhagen on a structural basis." p.4
Objectives	3	State specific objectives, including any prespecified hypotheses "The aim of this study was to use the questionnaire to identify the demographic and call-related characteristics that are associated with the reported patient satisfaction of the callers to this medical helpline." p.4
Methods		
Study design	4	Present key elements of study design early in the paper "Every day, a random sample of 200 callers were sent a text message to the phone number they called the medical helpline with." p.5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection "This retrospective cohort study was performed on the 1813 medical helpline for non-emergency OOH calls to the EMS Copenhagen. (…) Data were collected via two sources: the patient satisfaction questionnaire and internal patient registration that provided data on: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, and profession of the call-handler(s). (…) Patients were included if they called the medical helpline between May 18, 2016 and April 30, 2018." p.5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up "Patients were included if they called the medical helpline between May 18, 2016 and April 30, 2018. Patients who were referred to the medical helpline after calling 112 were excluded for selection, because from them there were no telephone numbers available in the system. (…) However, based on ethical considerations, patients were excluded if they were sent a questionnaire but failed to respond. Callers were also excluded when they answered "not applicable" or "don't know" to the first question about their satisfaction, since it was outside the scope of the study. Call observations were removed when the call lasted less than 15 seconds or when the patient's age did not range between 0 and 100 years (caused by errors in the patient registration)." p.5-6
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed

Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable "Data were collected via two sources: the patient satisfaction questionnaire and internal patient registration that provided data on: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, and profession of the call-handler(s)." p.5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias "Differences in characteristics between respondents and non-receivers of the questionnaire (…)" were analysed to proxy potential differences between characteristics of respondents and non-respondents. p.6
Study size	10	Explain how the study size was arrived at "Figure 1: Flowchart of the included study population". "Of the 1,843,094 calls during the study period, 1,731,556 calls were eligible (Figure 1)." p.7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why "For the descriptive analyses, respondents were classified according to the satisfaction question of the questionnaire into satisfied ("to a great extent" or "to a large extent"), neutral ("to a moderate extent"), and dissatisfied ("to a limited extent" or "not at all"). Patients' age was categorized into six groups (< 5, 5-17, 18-39, 40-59, 60-79 and ≥ 80 years), based on the pattern of disease and the organization of the system where children (0-18 year old) sometimes receive a face-to-face consultation at another department of the hospital. Other variables that were categorized are: reason for encounter (somatic illness, somatic injury, psychiatric illness or other), triage response (face-to-face consultation, telephone consultation, ambulance dispatch or other), time of the call (daytime (08:00-15:59) weekday, daytime OOH, and evening/night OOH), waiting time (<3, 3-6, 6-10, 10-20 and ≥ 20 minutes, later categorized into 0-10, 10-20 and ≥ 20 minutes) and consultation time (< 3, 3-6, 6-10 and ≥ 10 minutes, later dichotomized into < 6 minutes and ≥ 6 minutes). The profession of the first call-taker could be: nurse, physician, priority physician (answers prioritized calls from healthcare facilities), and EMDC-112-dispatcher." p.6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding "Descriptive statistics were used to describe the patients' characteristics with frequencies (number, percentage), and median values (Q1-Q3). Differences in characteristics between respondents and non-receivers of the questionnaire, as well as between the satisfied and dissatisfied respondents, were calculated with chi-square tests. The association between the patients' characteristics and satisfaction was analyzed using univariable and multivariable logistic regression" p.6
		(*b*) Describe any methods used to examine subgroups and interactions "A subgroup analysis was performed to compare the satisfied callers for 0-4 year old children with those being 5-100 years old for the variables that were found to be statistically significant in the multivariable analysis." p.6
		(*c*) Explain how missing data were addressed In Table 1, the frequencies of missing values are displayed. p.8-9

		(*d*) If applicable, explain how loss to follow-up was addressed
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed "Figure 1: Flowchart of the included study population".
		(b) Give reasons for non-participation at each stage "Callers were also excluded when they answered "not applicable" or "don't know" to the first question about their satisfaction, since it was outside the scope of the study." p.5-6
		(c) Consider use of a flow diagram See Figure 1.
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders "Table 1: Characteristics of the respondents and non-receivers and the estimated difference between respondents and non-respondents" p.8-9
		(b) Indicate number of participants with missing data for each variable of interest In Table 1, the frequencies of missing values are displayed. p.8-9
		(c) Summarise follow-up time (eg, average and total amount) Not applicable.
Outcome data	15*	Report numbers of outcome events or summary measures over time
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included "Table 2: Likelihood (OR) of satisfaction for different demographic and call-related characteristics" p.9-10
		(*b*) Report category boundaries when continuous variables were categorized "Respondents were classified to be "satisfied" when they answered to the satisfaction question of the questionnaire: "to a great extent", "to some extent" or "to a moderate extent". Patients' age was categorized into six groups (< 5, 5-17, 18-39, 40-59, 60-79 and ≥ 80 years), based on the pattern of disease and the organization of the system where children (0-18 year old) sometimes receive a face-to-face consultation at another department of the hospital. Other variables that were categorized are: reason for encounter (somatic illness, somatic injury, psychiatric illness or other), triage response (face-to-face consultation, telephone consultation, ambulance dispatch or other), time of the call (daytime (08:00-15:59) weekday, daytime OOH, and evening/night OOH), waiting time (<3, 3-6, 6-10, 10-20 and ≥ 20 minutes, later categorized into 0-10, 10-20 and ≥ 20 minutes) and consultation time (< 3, 3-6, 6-10 and ≥ 10 minutes, later dichotomized into < 6 minutes and ≥ 6 minutes). The profession of the first call-taker could be: nurse, physician, priority physician (answers prioritized calls from healthcare facilities), and EMDC-112-dispatcher." p.6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

		"On average 74.1% of the respondents calling for a 0-4 year old child were satisfied, compared to 73.0% of the rest of the population. Although averages in satisfaction fluctuated per month, the overall satisfaction rate of people calling for a 0-4 year old child was stable over time (Figure 3)." p.10
Discussion		
Key results	18	Summarise key results with reference to study objectives "This study has indicated that caller satisfaction with the OOH medical helpline was significantly associated with gender, age, reason for encounter, triage response and waiting time. Furthermore, people who called during GP office hours were less likely to be satisfied than people calling OOH. People calling on behalf a 0-4 year old child were more likely to be satisfied compared to the rest of the population, when they called for a somatic illness and when they received a telephone consultation, but less likely to be satisfied when they received a face-to-face consultation and called during GP office hours." p.11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias "However, the study was limited by…." p.12
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence "This study showed that people are in general satisfied with an OOH medical helpline. Satisfaction was associated with calling for a somatic injury, being offered a face-to-face consultation, and having a short waiting time on the phone. People calling for 0-4 year old patients are more likely to be satisfied compared to the rest of the population when they call for a somatic illness, receive a telephone consultation, call OOH and when their call is forwarded to a physician. This study also showed that a text message with a short questionnaire is feasible to run on a daily basis and that it can provide valuable information for structural quality monitoring." p.13
Generalisability	21	Discuss the generalisability (external validity) of the study results "Hence, many EU countries are working on initiatives to change the out-of-hours (OOH) pre-hospital care towards a closer collaboration between the general practitioners (GPs) and hospital emergency departments. This can be done by establishing national telephone numbers that centralize the OOH calls and triage (6)." p.4
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based "This study was supported by an unrestricted grant from The Laerdal Foundation." p.13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely

available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

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Satisfaction of 30,402 Callers to a Medical Helpline of the Emergency Medical Services Copenhagen: A Retrospective Cohort Study

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Satisfaction of 30,402 Callers to a Medical Helpline of the Emergency Medical Services Copenhagen: A Retrospective Cohort Study

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Abstract

Objectives

To keep healthcare systems sustainable for future demands, many countries are developing a centralized telephone line for out-of-hours primary care services. To increase the quality of such services, more information is needed on factors that influence caller-satisfaction. The aim of this study was to identify demographic and call-related characteristics that are associated with the patient satisfaction of callers to a medical helpline in Denmark.

Design

Retrospective cohort study on patient registry data and questionnaire results.

Setting

Non-emergency medical helpline in the Capital Region of Denmark.

Participants

A random sample of 30,402 callers to the medical helpline between May 2016 and May 2018.

Primary and secondary outcome measures

Responses of a satisfaction questionnaire were linked to demographic and call-related dispatch data. Associations between the characteristics were analyzed with multivariable logistic regression analysis with satisfaction as the dependent variable. A subgroup analysis was performed on callers for children aged between 0-4 years.

Results

Of the 30,402 analyzed callers, 73.0% were satisfied with the medical helpline. Satisfaction was associated with calling for a somatic injury (OR: 1.96, 95% CI: 1.72–2.23), receiving a face-to-face consultation (OR: 2.27, 95% CI: 2.04-2.50), and a waiting time less than 10 minutes (OR: 1.82, 95% CI: 1.56-2.08). Callers for a 0-4 year old patient were more likely to be satisfied when they called for a somatic illness or received a telephone consultation, compared to the rest of the population ($p<0.0001$).

Conclusion

Callers were in general satisfied with the medical helpline. Satisfaction was associated with reason for encounter, triage response, and waiting time. People calling for 0-4 year old patients were, compared to the rest of the population, more frequently satisfied when they called for a somatic illness or received a telephone consultation.

Keywords

Out-of-hours healthcare - Patient satisfaction – Telephone triage - Denmark

Strengths and limitations of this study

• The satisfaction questionnaire ran over a two-year period, which ensured a large sample size (n=30,402) and allowed for conducting a subgroup analysis.

• The short length of the questionnaire enabled people to respond who would normally not respond to long questionnaires, such as parents of children or patients with a psychiatric illness.

• Responses to the satisfaction questionnaire were linked to internal patient registry data, which provided more information on the characteristics of the respondents.

• Although data on non-receivers of the questionnaire was analyzed, the analysis was limited because characteristics of non-respondents could not be obtained due to regulations around patient data protection.

Introduction

Member States of the European Union (EU) face growing and changing healthcare needs due to population ageing and tight budgetary constraints (1). To keep the healthcare systems sustainable for the future, EU countries are working on initiatives towards more integrated care models (2). More integrated and people-centered healthcare systems are expected to provide services that are of better quality, financially more sustainable and more responsive to personal preferences and needs (3-5). One way to make the healthcare provision more integrated, is to vertically integrate the primary and secondary healthcare services (2). Hence, many EU countries are working on initiatives to change the out-of-hours (OOH) pre-hospital care towards a closer collaboration between the general practitioners (GPs) and hospital emergency departments. This can be done by establishing national telephone numbers that centralize the OOH calls and triage (6).

Such an OOH telephone line has been established in Copenhagen. The aim of this so-called 1813 medical helpline is to provide always available easy access to healthcare, and at the same time relieve the pressure on the hospital emergency departments (7, 8). An OOH telephone triage system may reduce GP visits and the immediate medical workload (9-11). Yet, to increase the effectiveness of the system, more detailed information is needed on several aspects of the system, among which patient satisfaction (9). This is a desired outcome of care, both incorporating interpersonal relationships, specific components of technical care and the outcomes of care (12). Analyzing patient satisfaction scores can provide information about whether interventions result in better outcomes from the perspective of the patient, and consequently improve the quality of patient-centered healthcare systems (13). Since patients' level of satisfaction depends on many factors, including demographic factors, call-specific experiences and expectations (14-17), constant monitoring of satisfaction in various settings is required.

Therefore, a continuously running questionnaire was established to monitor the patient satisfaction of the callers to the 1813 medical helpline of the Emergency Medical Services (EMS) Copenhagen on a structural basis. The aim of this study was to use the questionnaire to identify the demographic and call-related characteristics that are associated with the reported patient satisfaction of the callers to this medical helpline. Furthermore, a subgroup analysis was performed of calls concerning 0-4 year old children, because of the frequent use of the medical helpline for this group.

Materials and Methods

Study design and setting

This retrospective cohort study was performed on the 1813 medical helpline for non-emergency OOH calls to the EMS Copenhagen. Outside GP working hours (between 4 pm and 8 am on weekdays, in weekends and during holidays), the 1.8 million citizens of the region can call two telephone numbers when they have health issues (18, 19). They can dial 112 to reach the Emergency Medical Dispatch Center (EMDC-112) for emergency situations and for the less urgent, not life-threatening health problems the 1813 medical helpline (20). This medical helpline handles on average 924,000 calls a year, of which most are answered by triage nurses (7). They pre-assess the need for the caller to access acute medical help, which makes them play a dominant role in gatekeeping the healthcare system (21, 22). The triage nurses can respond with several actions such as: booking an appointment at an acute admission center, emergency clinic or psychiatric admission center, forward the call to the EMDC-112 or a doctor, plan a home visit, recommend the patient to contact the GP on the next working day, or give telephone advice for self-care (19, 21).

Every day, 200 callers of the previous day were selected by a simple random sampling method (23) and sent a text message to the phone number they called the medical helpline with. The text message comprised two questions: *"Are you overall satisfied with the contact you had with the medical helpline 1813?"*, and: *"Were your questions answered during the contact with the medical helpline 1813?"*. The callers were asked to answer those questions on a five-point Likert scale answer category, containing: "to a great extent", "to a large extent", "to a moderate extent", "to a limited extent", or "not at all". Furthermore, they had the option to answer: "not applicable" or "don't know".

Patient and Public Involvement

No patient involved.

Data collection and processing

Data was collected via two data sources: the patient satisfaction questionnaire and internal patient registration that provided data on: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, and profession of the call-handler(s). Patients were included if they called the medical helpline between May 18, 2016 and April 30, 2018. Patients who were referred to the medical helpline after calling EMDC-112 were excluded for

selection, because from them there were no telephone numbers available in the system. Permission from individual patients is not required for this type of study in Denmark. A request was sent to the Research Ethics Committee in the Capital Region of Denmark, but approval was not needed for this study (J.number 19042590). However, based on ethical considerations, patients were excluded if they were sent a questionnaire but failed to respond. Callers were also excluded when they answered "not applicable" or "don't know" to the first question about their satisfaction, since it was outside the scope of the study. Call observations were removed when the call lasted less than 15 seconds or when the patient's age did not range between 0 and 100 years (caused by errors in the patient registration).

For the descriptive analyses, respondents were classified according to the satisfaction question of the questionnaire into satisfied ("to a great extent" or "to a large extent"), intermediate ("to a moderate extent"), and dissatisfied ("to a limited extent" or "not at all"). Patients' age was categorized into six groups (< 5, 5-17, 18-39, 40-59, 60-79 and ≥ 80 years), based on the pattern of disease and the organization of the system where children (0-18 year old) sometimes receive a face-to-face consultation at another department of the hospital. Other variables that were categorized are: reason for encounter (somatic illness, somatic injury, psychiatric illness or other), triage response (face-to-face consultation, telephone consultation, ambulance dispatch or other), time of the call (daytime weekday, daytime OOH, and evening/night OOH), waiting time (<3, 3-6, 6-10, 10-20 and ≥ 20 minutes, later categorized into 0-10, 10-20 and ≥ 20 minutes) and consultation time (< 3, 3-6, 6-10 and ≥ 10 minutes, later dichotomized into < 6 minutes and ≥ 6 minutes). The profession of the first call-taker could be: nurse, physician, priority physician (answers prioritized calls from healthcare facilities), and EMDC-112-dispatcher.

Statistical analyses

Descriptive statistics were used to describe the patients' characteristics with frequencies (number, percentage), and median values (Q1-Q3). The representativeness of the respondents for the total population was determined by firstly estimating the characteristics of the non-respondents by assuming the same proportions among receivers and non-receivers. Subsequently, the proportions of the non-respondents were estimated by subtracting the number of respondents from this total estimated numbers of receivers. Differences in characteristics between the satisfied and dissatisfied respondents were calculated with chi-square tests. The association between the patients' characteristics and satisfaction was analyzed using univariable and multivariable logistic regression. Here, the satisfied

respondents were compared with the dissatisfied respondents, which left the intermediate group of respondents out of the analyses. Results of these analyses were reported in odds-ratios (ORs) and 95% confidence intervals (95% CI). For the multivariable analysis, a full fitted model without a selection was created, since there was no solid evidence available in previously published scientific literature about potential relevant variables. Variables that were entered to the model were: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, profession of first call-taker and being forwarded to a physician. Thereafter, a subgroup analysis was performed to analyze the characteristics of the satisfied callers for 0-4 year old children, who were relatively frequent callers based on the distribution of the population by age in the Copenhagen region. Another univariable analysis comparing the proportion of satisfied callers for 0-4 year old children with the rest of the population was performed with the variables that were found to be statistically significant in the multivariable analysis. Statistical significance was based on an alpha error of 0.05 and data was analyzed with SAS 9.4 (SAS Institute Inc., Cary, North Carolina).

Results

Characteristics of Study Subjects

Of the 1,843,094 calls during the study period, 1,731,556 calls were eligible (Figure 1). Among those were 30,402 respondents (response rate: 23.0%). The majority of the calls concerned females (54.8%) and the median age was 29 (11-53). Most of the calls were related to somatic illnesses (64.0%), followed by somatic injuries (26.9%). A face-to-face consultation was offered to 46.8% of the callers and 42.6% received a telephone consultation. Most of the calls were picked up by a nurse (75.7%) and 14.6% of those were forwarded to a physician.

Table 1 shows the characteristics of the respondents, divided into satisfied, intermediate, and dissatisfied respondents, and those of the non-receivers. On all tested characteristics, the respondents differed from the non-receivers ($p<0.0001$). Assuming that the receivers of the questionnaire have the same proportions of characteristics as the non-receivers, the respondents were less often older than 80 years (2.4% vs 7.9%), called more often for a somatic injury (24.4% vs 17.4%) and received more often a face-to-face consultation (53.3% vs 43.0%).

Patient Satisfaction

A total of 22,203 respondents (73.4%) indicated to be satisfied with their encounter with the medical helpline ("to a great extent": 43.3%; "to a large extent": 30.1%). Another 4894 respondents replied "to a moderate extent" (16.3%) and 3097 (10.3%) indicated to be dissatisfied ("to a limited extent": 5.3%; "not at all: 5.0%). (Figure 2). To the second question about whether the callers received an answer to their question, 71.7% replied at least "to a large extent" and 1.2% replied "don't know / not applicable". More than half of the respondents (63.5%) gave the same answers to both questions. Of those who indicated to be satisfied with the service, 65.2% replied to be given an answer at least "to a large extent" to their question.

The satisfied respondents differed on all tested characteristics from the dissatisfied respondents ($p<0.0001$), except for gender and time of the call. Among others, the satisfied respondents concerned more often patients aged < 5 years old and ≥ 60 years old (Table 1). Furthermore, respondents who called for a somatic illness were less often satisfied than respondents calling for a somatic injury (72.6% vs 80.4%). People who received a face-to-face consultation or ambulance where more often satisfied (77.4% and 88.5%, respectively) than patients who ended up with a telephone consultation (67.1%). The median waiting time of the satisfied respondents was almost 1.5 minutes shorter than that of the dissatisfied respondents (2:30 minutes vs 4:05 minutes). Of the people who had a waiting time longer than 20 minutes, 49.3% were satisfied and of those who talked to a physician, 67.4% were satisfied.

Table 1: Characteristics of the respondents and non-receivers and the estimated difference between respondents and non-respondents

	Respondents (n=30402)			**Non-receivers (n=1701154)**	**Difference % respondents vs % estimation non-respondents**
	Satisfied (n=22203)	**Intermediate (n=5002)**	**Dissatisfied (n=3197)**		
Sex					
Female	12103 (54.5%)	2824 (56.5%)	1723 (53.9%)	901247 (53.0%)	2.5%
Male	9738 (43.9%)	2064 (41.3%)	1372 (42.9%)	742677 (43.7%)	-0.3%
Missing	362 (1.6%)	114 (2.3%)	102 (3.2%)	57230 (3.4%)	-1.9%

	Respondents (n=30402)			Non-receivers (n=1701154)	Difference % respondents vs % estimation non-respondents
	Satisfied (n=22203)	**Intermediate (n=5002)**	**Dissatisfied (n=3197)**		
Age					
0-4	4169 (18.8%)	947 (18.9%)	509 (15.9%)	278601 (16.4%)	2.8%
5-17	4116 (18.5%)	865 (17.3%)	440 (13.8%)	230482 (13.6%)	5.6%
18-39	5350 (24.1%)	1510 (30.2%)	1182 (37.0%)	518393 (30.5%)	-5.2%
40-59	4689 (21.1%)	997 (19.9%)	669 (20.9%)	294642 (17.3%)	5.5%
60-79	2942 (13.3%)	475 (9.5%)	241 (7.5%)	208682 (12.3%)	-0.3%
≥ 80	575 (2.6%)	94 (1.9%)	54 (1.7%)	113127 (6.7%)	-5.5%
Missing	362 (1.6%)	114 (2.3%)	102 (3.2%)	57227 (3.4%)	4.0%
Reason for encounter					
Somatic illness	10533 (47.4%)	2374 (47.5%)	1599 (50.0%)	773868 (45.5%)	3.0%
Somatic injury	5977 (26.9%)	1043 (20.9%)	412 (12.9%)	324253 (19.1%)	7.0%
Psychiatric illness	92 (0.4%)	25 (0.5%)	12 (0.4%)	10842 (0.6%)	-0.3%
Other[a]	5601 (25.2%)	1560 (31.2%)	1174 (36.7%)	592191 (34.8%)	-9.5%
Triage response					
Face-to-face consultation	12527 (56.4%)	2546 (50.9%)	1121 (35.1%)	772583 (45.4%)	10.3%
Telephone consultation	7437 (33.5%)	1996 (39.9%)	1644 (51.4%)	706467 (41.5%)	-6.5%
Ambulance	1027 (4.6%)	97 (1.9%)	36 (1.1%)	54071 (3.2%)	0.8%
Other[a]	1212 (5.5%)	363 (7.3%)	396 (12.4%)	168033 (9.9%)	-4.4%
Time of the call					
Daytime weekday	3353 (15.1%)	682 (13.6%)	480 (15.0%)	216978 (12.8%)	2.8%
Daytime OOH	3606 (16.2%)	928 (18.6%)	541 (16.9%)	409131 (24.1%)	-9.5%
Evening/night OOH	15244 (68.7%)	3392 (67.8%)	2176 (68.1%)	1075045 (63.2%)	7.0%
Waiting time					

	Respondents (n=30402)			Non-receivers (n=1701154)	Difference % respondents vs % estimation non-respondents
	Satisfied (n=22203)	**Intermediate (n=5002)**	**Dissatisfied (n=3197)**		
0-3 minutes	11989 (54.0%)	2175 (43.5%)	1397 (43.7%)	860874 (50.6%)	0.9%
3-6 minutes	3904 (17.6%)	772 (15.4%)	558 (17.5%)	286752 (16.9%)	0.5%
6-10 minutes	3057 (13.8%)	742 (14.8%)	445 (13.9%)	235531 (13.9%)	0.2%
10-20 minutes	2649 (11.9%)	933 (18.7%)	556 (17.4%)	240072 (14.1%)	-0.6%
≥ 20 minutes	604 (2.7%)	380 (7.6%)	241 (7.5%)	77914 (4.6%)	-0.7%
Consultation time					
0-3 minutes	7919 (35.7%)	1896 (37.9%)	1268 (39.7%)	641846 (37.7%)	-1.6%
3-6 minutes	10134 (45.6%)	2234 (44.7%)	1334 (41.7%)	740206 (43.5%)	2.1%
6-10 minutes	3505 (15.6%)	742 (14.8%)	517 (16.2%)	264892 (15.6%)	0.2%
≥ 10 minutes	645 (2.9%)	130 (2.6%)	78 (2.4%)	54210 (3.2%)	-0.5%
First call-taker					
Nurse	17654 (79.5%)	3838 (76.7%)	2406 (75.3%)	1265043 (74.4%)	5.7%
Physician	3942 (17.8%)	1042 (20.8%)	699 (21.9%)	388509 (22.8%)	-5.3%
Priority physician	125 (0.6%)	32 (0.6%)	35 (1.1%)	20527 (1.2%)	-0.7%
112	0 (0.0%)	0 (0%)	0 (0.0%)	12 (0.0%)	0.0%
Missing	482 (2.2%)	90 (1.8%)	57 (1.8%)	27063 (1.6%)	0.6%
Call forwarded to a physician[b]					
Yes	2073 (11.7%)	675 (17.6%)	489 (20.3%)	184250 (14.6%)	0.4%
No	15581 (88.3%)	3163 (82.4%)	1917 (79.7%)	1080743 (85.4%)	-0.4%

OOH = out-of-hours.

[a] Includes missing values

[b] Percentage based on the number of calls that were in first instance picked up by a nurse.

Multivariable logistic regression analysis

Calling for a somatic injury was statistically significant associated with satisfaction (OR: 1.96, 95% CI: 1.72-2.23). People who received a telephone consultation were less likely to be satisfied (OR: 0.44, 95% CI: 0.40-0.49). People were also less likely to be satisfied when they had a waiting time of more than 10 minutes (OR: 0.55, 95% CI: 0.48-0.64) and especially a waiting time more than 20 minutes (OR: 0.25, 95% CI: 0.20-0.30). No statistically significant association was seen between consultation time and satisfaction. In the univariable analysis, the profession of the first call-taker was associated with satisfaction. Adding the variable to the multivariable model did not have an effect. Yet, people who were forwarded to a physician were less likely to be satisfied (OR: 0.68, 95% CI: 0.58-0.78) (Table 2).

Table 2: Likelihood (OR) of satisfaction for different demographic and call-related characteristics

	Crude OR (95% CI) n=19476[a]	Adjusted OR (95% CI) n=16307[a]	
Gender			
Female (ref)	1	1	
Male	1.01 (0.94 - 1.09)	0.84 (0.75 – 0.93)	*
Age			
0-4	1.81 (1.62 - 2.02)	2.21 (1.90 – 2.57)	*
5-17	2.07 (1.84 - 2.32)	1.93 (1.65 – 2.26)	*
18-39 (ref)	1	1	
40-59	1.55 (1.40 - 1.72)	1.42 (1.23 – 1.63)	*
60-79	2.70 (2.33 – 3.12)	2.82 (2.29 – 3.49)	*
≥ 80	2.35 (1.77 – 3.13)	2.35 (1.49 – 3.68)	*
Reason for encounter			
Somatic illness (ref)	1	1	
Somatic injury	2.20 (1.97 – 2.47)	1.96 (1.72 – 2.23)	*
Triage response			
Face-to-face consultation (ref)	1	1	
Telephone consultation	0.40 (0.37 – 0.44)	0.44 (0.40 – 0.49)	*
Time of the call			
Daytime weekday	1.05 (0.92 – 1.20)	0.65 (0.54 – 0.78)	*
Daytime OOH (ref)	1	1	
Evening/night OOH	1.05 (0.95 – 1.16)	0.95 (0.82 (1.09)	
Waiting time			
0-10 minutes (ref)	1	1	
10-20 minutes	0.60 (0.55 – 0.67)	0.55 (0.48 – 0.64)	*
≥ 20 minutes	0.32 (0.27 – 0.37)	0.25 (0.20 – 0.30)	*
Consultation time			
0-6 minutes (ref)	1	1	
≥ 6 minutes	1.01 (0.91 – 1.11)	1.08 (0.95 – 1.23)	
First call-taker			
Nurse (ref)	1		

Physician	0.76 (0.69 – 0.83)		
Call forwarded to a physician			
Yes	0.52 (0.47 – 0.58)	0.68 (0.58 – 0.78)	*
No (ref)	1	1	

[a]The lowest amount of observations in the models.

* P-value < 0.05

0-4 year old subgroup analysis

On average 74.1% of the respondents calling for a 0-4 year old child were satisfied, compared to 73.0% of the rest of the population. Although averages in satisfaction fluctuated per month, the overall satisfaction rate of people calling for a 0-4 year old child was stable over time (Figure 3).

As shown in Figure 4, callers for 0-4 year old children were more likely to be satisfied when they called for a somatic illness (OR: 1.15, 95% CI: 1.06-1.26) and received a telephone consultation (OR: 1.45, 95% CI: 1.31-1.59). They were less likely to be satisfied when they received a face-to-face consultation (OR: 0.88, 95% CI: 0.80-0.97) and called during GP office hours (OR: 0.84, 95% CI: 0.70-1.00).

Discussion

This study has indicated that caller satisfaction with the OOH medical helpline was significantly associated with gender, age, reason for encounter, triage response and waiting time. Furthermore, people who called during GP office hours were less likely to be satisfied than people calling OOH. People calling on behalf a 0-4 year old child were more likely to be satisfied compared to the rest of the population, when they called for a somatic illness and when they received a telephone consultation, but less likely to be satisfied when they received a face-to-face consultation and called during GP office hours.

The satisfaction rate of 73% is in line with findings from previous studies (14, 24-26). Also, the other findings of this study were generally in accordance with previous studies, which showed associations between (dis)satisfaction and patient gender (27), age (28), call reason (26), triage response (14, 16, 29) and waiting time (14, 15, 27). Whereas another study also found an association with consultation length (15), this was not found in our study. This same study on a telephone service in Wales also found that patients who received a telephone consultation were more satisfied than patients who received a face-to-face consultation, which contradicts our findings as well (15). The multivariable analysis also showed that people whose call was forwarded to a physician were less likely to be satisfied. This might have been induced by the reason why the call was forwarded in the first place, which were probably the more complex calls. Besides, it could have been influenced by a difference in expectation callers had about their call-taker.

Our study's finding that people who call for a 0-4 year old childr were on certain characteristics more likely to be satisfied compared to the rest of the population, could be explained by different expectations of callers. Studies have shown that a mismatch between a caller's request or expectation and triage outcome is associated with lower patient satisfaction (30-32). The findings of this study also indicate that subgroup analyses regarding determinants of satisfaction can be useful to design tailored quality improvement interventions of the OOH healthcare services.

The main strengths of this study were the long running time of the questionnaire on a daily basis, and the opportunity to link responses to internal patient registry data. This provided relevant information about the respondents' characteristics. In addition, the length of the questionnaire makes this study unique from other patient satisfaction studies, where often longer questionnaires are held (e.g. (14-16, 27, 28)). The major benefit of this short questionnaire is that it increased the feasibility of the study, since it is durable and easy to fill

in. People who normally do not have the time or the resources to fill in a long questionnaire, did respond to this one. Examples are parents of young children and patients with a psychiatric illness. The long running period of this questionnaire benefited the internal validity of the study, as it showed stable satisfaction rates over time. The short period between the contact with the medical helpline and the delivery of the questionnaire to the caller's phone reduced the risk of recall bias.

However, the study was limited by the low response rate, the way the questionnaire was distributed and the form of the questionnaire. The low response rate and the fact that the questionnaire could not be sent to analog telephones may have induced a selection bias by self-selection of people who responded to the questionnaire. When estimating the characteristics of the non-respondents, it seemed that respondents were less often older than 80 years, called more often for a somatic injury and received more often a face-to-face consultation. Yet, the relevance of these estimated differences may be doubted. A study from the Netherlands that interviewed non-respondents of an OOH GP cooperative questionnaire found that most non-respondents gave reasons for not responding that were not directly related to their contact with the GP cooperative (16). The way the questionnaire was distributed also limited the study because the respondent might not have been the patient to whom the answers were linked. That means that the caller could have other demographic characteristics than was assumed in this study. This is especially a relevant limitation for the analysis of the callers for the 0-4 year old patients. The short length of the questionnaire limits the study because of the difficulty to capture the dimensions of the whole service in two multiple choice questions. The analysis also showed that 64% of the respondents gave the same answers to both questions, which raises concern about the validity of the second question. Furthermore, this study did not include all determinants of satisfaction, such as self-perceived (improvement in) health (14, 27, 28).

Further studies could gather more insight about the reasons behind the satisfaction for the particular characteristics of the subgroup of callers for 0-4 year old children. This, in turn, could assist tailored-made conversation and decision support for the medical staff of the medical helpline to improve the service to all patients, who call for help and guidance.

Conclusions

This study showed that people are in general satisfied with an OOH medical helpline. Satisfaction was associated with calling for a somatic injury, being offered a face-to-face consultation, and having a short waiting time on the phone. People calling for 0-4 year old patients are more likely to be satisfied compared to the rest of the population when they call for a somatic illness and receive a telephone consultation. This study also showed that a text message with a short questionnaire is feasible to run on a daily basis and that it can provide valuable information for structural quality monitoring.

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Competing interests statement

All authors have not at any time received payment or services from a third party (government, commercial, private foundation, etc.) for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.). Neither have any authors other relationships or activities that readers could perceive to have influenced, or that give the appearance of potentially influencing, what is written in the submitted work. No patents, whether planned, pending or issued, broadly are relevant to the submitted work by any of the authors.

Author's contribution

NDZ, SNB, FL and HCC contributed to the design and implementation of the research. NDZ performed the analysis and SNB, FL and HCC aided in interpreting the results. NDZ and SNB designed the figures. NDZ wrote the paper in consultation with FL and HCC. HCC supervised the work.

Data sharing statement

No additional data are available.

Figure legends and captions

Figure 1: Flowchart of the included study population

Of the 1,843,094 calls during the study period, 1,731,556 calls were eligible (Figure 1).

Table 1: Characteristics of the respondents and non-receivers and the estimated difference between respondents and non-respondents

Table 1 shows the characteristics of the respondents, divided into satisfied, intermediate, and dissatisfied respondents, and those of the non-receivers. On all tested characteristics, the respondents differed from the non-receivers ($p<0.0001$).

Figure 2: Distribution of the responses to the patient satisfaction questionnaire

Figure 2 shows the distribution of the answers that the respondents gave to the two questions of the questionnaire. Respondents who answered "Don't know" or "Not applicable" are excluded.

Table 2: Likelihood (OR) of satisfaction for different demographic and call-related characteristics

Calling for a somatic injury was statistically significantly associated with satisfaction (OR: 1.96, 95% CI: 1.72-2.23). People who received a telephone consultation were less likely to be satisfied (OR: 0.44, 95% CI 0.40-0.49). People were also less likely to be satisfied when they had a waiting time of more than 10 minutes (OR: 0.55, 95% CI: 0.48-0.64) and especially a waiting time more than 20 minutes (OR: 0.25, 95% CI: 0.20-0.30). No statistically significant association was seen between consultation time and satisfaction. In the univariable analysis, the profession of the first call-taker was associated with satisfaction. Adding the variable to the multivariable model did not have an effect. Yet, people who were forwarded to a physician were less likely to be satisfied (OR: 0.68, 95% CI: 0.58-0.78) (Table 2).

Figure 3: Total number and percentage of satisfied respondents calling for a 0-4 year old patient per month

On average 74.1% of the respondents calling for a 0-4 year old child were satisfied, compared to 73.0% of the rest of the population. Although averages in satisfaction fluctuated per month, the overall satisfaction rate of people calling for a 0-4 year old child was stable over time (Figure 3).

Figure 4: Odds ratio (OR) and 95% confidence interval (95% CI) for demographic and call-related characteristics predicting satisfaction for 0-4 year old patients compared to 5-100 year old patients

As shown in Figure 4, callers for 0-4 year old children were more likely to be satisfied when they called for a somatic illness (OR: 1.15, 95% CI: 1.06-1.26) and received a telephone consultation (OR: 1.45, 95% CI: 1.31-1.59). They were less likely to be satisfied when they received a face-to-face consultation (OR: 0.88, 95% CI: 0.80-0.97) and called during GP office hours (OR: 0.84, 95% CI: 0.70-1.00).

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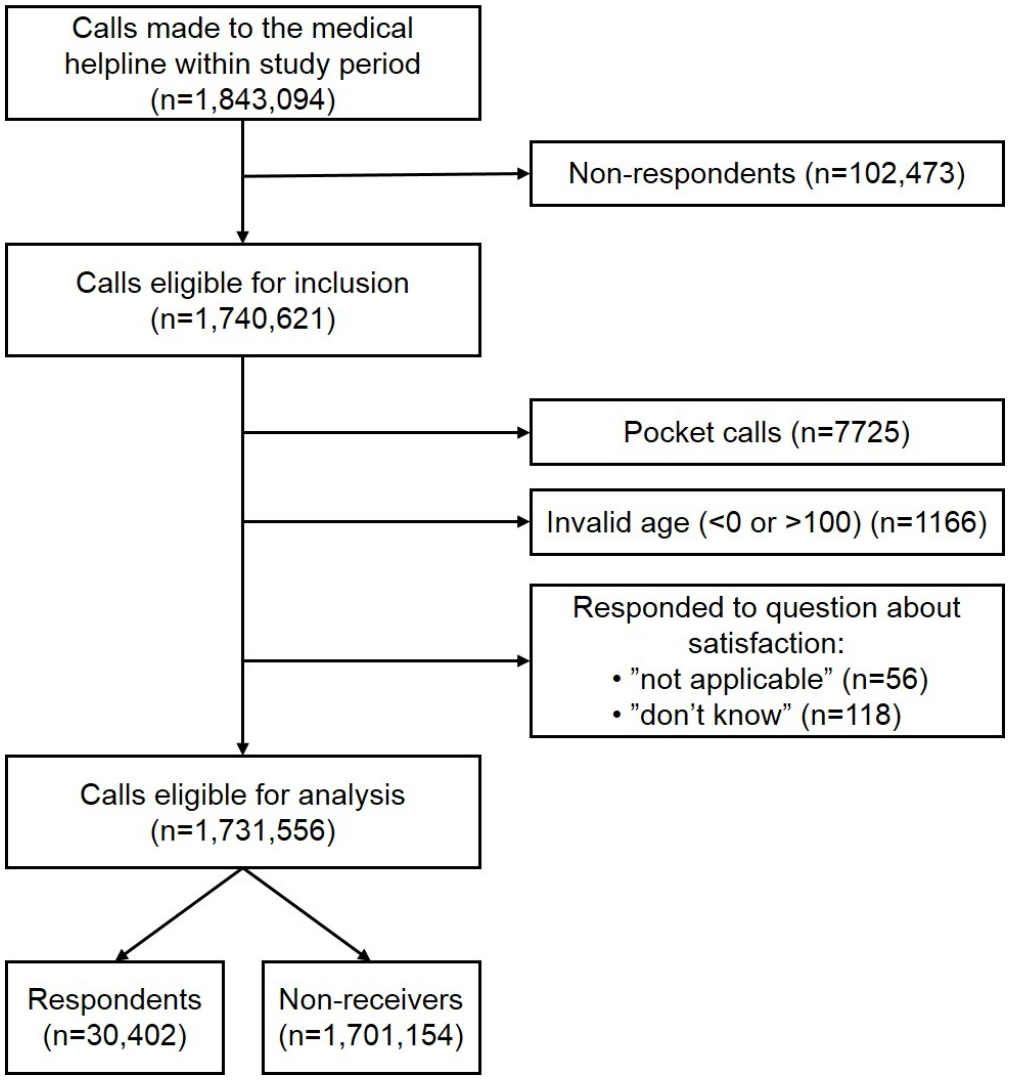

Figure 1: Flowchart of the included study population

165x178mm (150 x 150 DPI)

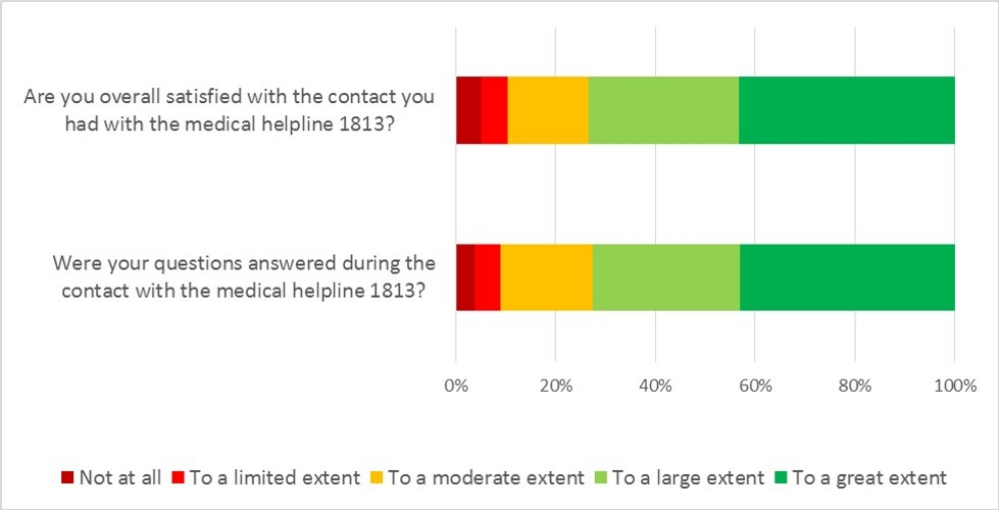

Figure 2: Distribution of the responses to the patient satisfaction questionnaire. Note: 360 respondents who answered "not applicable" or "don't know" to the second question are excluded in the figure.

216x110mm (115 x 115 DPI)

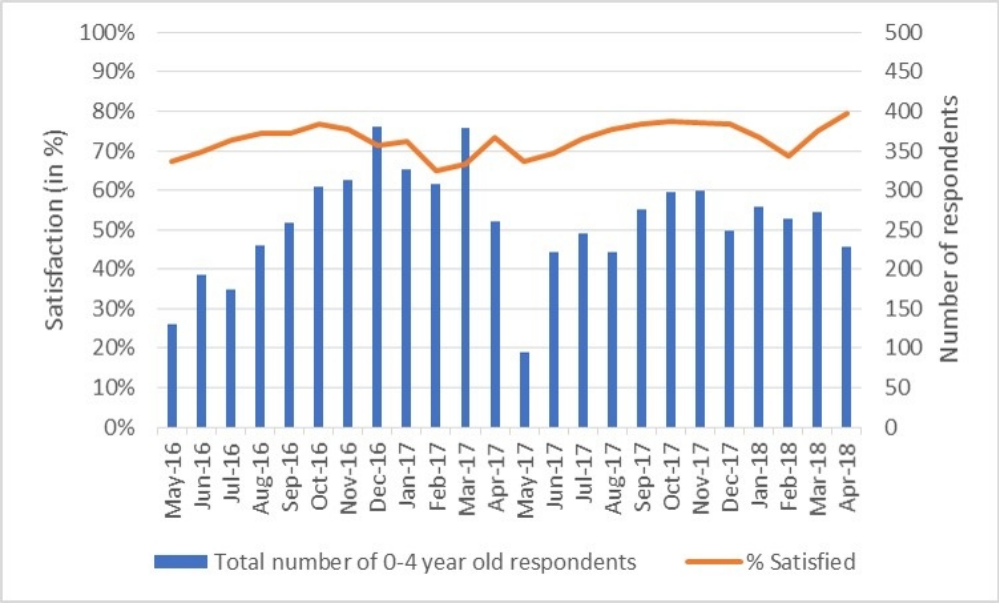

Figure 3: Total number and percentage of satisfied respondents calling for a 0-4 year old patient per month

127x76mm (150 x 150 DPI)

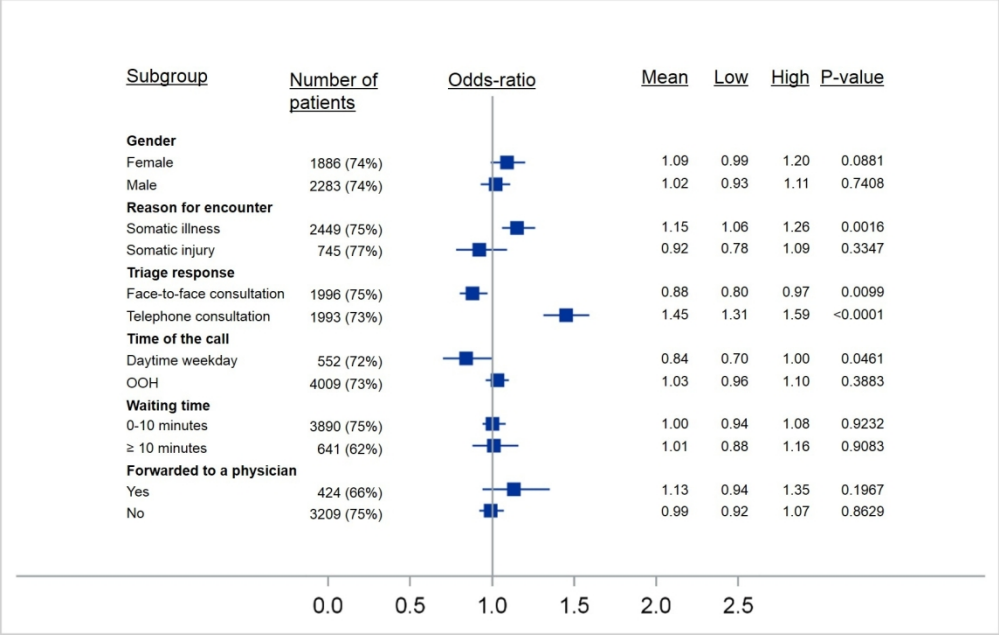

Figure 4: Odds ratio (OR) and 95% confidence interval (95% CI) for demographic and call-related characteristics predicting satisfaction for 0-4 year old patients compared to 5-100 year old patients

299x197mm (150 x 150 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract Abstract Design: "Retrospective cohort study on patient registry data and questionnaire results"
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported "Since patients' level of satisfaction depends on many factors, including demographic factors, call-specific experiences and expectations (14-17), constant monitoring of satisfaction in various settings is required. Therefore, a continuously running questionnaire was established to monitor the patient satisfaction of the callers to the 1813 medical helpline of the EMS Copenhagen on a structural basis." p.4
Objectives	3	State specific objectives, including any prespecified hypotheses "The aim of this study was to use the questionnaire to identify the demographic and call-related characteristics that are associated with the reported patient satisfaction of the callers to this medical helpline." p.4
Methods		
Study design	4	Present key elements of study design early in the paper "Every day, a random sample of 200 callers were sent a text message to the phone number they called the medical helpline with." p.5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection "This retrospective cohort study was performed on the 1813 medical helpline for non-emergency OOH calls to the EMS Copenhagen. (…) Data were collected via two sources: the patient satisfaction questionnaire and internal patient registration that provided data on: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, and profession of the call-handler(s). (…) Patients were included if they called the medical helpline between May 18, 2016 and April 30, 2018." p.5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up "Patients were included if they called the medical helpline between May 18, 2016 and April 30, 2018. Patients who were referred to the medical helpline after calling 112 were excluded for selection, because from them there were no telephone numbers available in the system. (…) However, based on ethical considerations, patients were excluded if they were sent a questionnaire but failed to respond. Callers were also excluded when they answered "not applicable" or "don't know" to the first question about their satisfaction, since it was outside the scope of the study. Call observations were removed when the call lasted less than 15 seconds or when the patient's age did not range between 0 and 100 years (caused by errors in the patient registration)." p.5-6
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed

Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable "Data were collected via two sources: the patient satisfaction questionnaire and internal patient registration that provided data on: gender, age, reason for encounter, triage response, time of the call, waiting time, consultation time, and profession of the call-handler(s)." p.5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias "Differences in characteristics between respondents and non-receivers of the questionnaire (…)" were analysed to proxy potential differences between characteristics of respondents and non-respondents. p.6
Study size	10	Explain how the study size was arrived at "Figure 1: Flowchart of the included study population". "Of the 1,843,094 calls during the study period, 1,731,556 calls were eligible (Figure 1)." p.7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why "For the descriptive analyses, respondents were classified according to the satisfaction question of the questionnaire into satisfied ("to a great extent" or "to a large extent"), neutral ("to a moderate extent"), and dissatisfied ("to a limited extent" or "not at all"). Patients' age was categorized into six groups (< 5, 5-17, 18-39, 40-59, 60-79 and ≥ 80 years), based on the pattern of disease and the organization of the system where children (0-18 year old) sometimes receive a face-to-face consultation at another department of the hospital. Other variables that were categorized are: reason for encounter (somatic illness, somatic injury, psychiatric illness or other), triage response (face-to-face consultation, telephone consultation, ambulance dispatch or other), time of the call (daytime (08:00-15:59) weekday, daytime OOH, and evening/night OOH), waiting time (<3, 3-6, 6-10, 10-20 and ≥ 20 minutes, later categorized into 0-10, 10-20 and ≥ 20 minutes) and consultation time (< 3, 3-6, 6-10 and ≥ 10 minutes, later dichotomized into < 6 minutes and ≥ 6 minutes). The profession of the first call-taker could be: nurse, physician, priority physician (answers prioritized calls from healthcare facilities), and EMDC-112-dispatcher." p.6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding "Descriptive statistics were used to describe the patients' characteristics with frequencies (number, percentage), and median values (Q1-Q3). Differences in characteristics between respondents and non-receivers of the questionnaire, as well as between the satisfied and dissatisfied respondents, were calculated with chi-square tests. The association between the patients' characteristics and satisfaction was analyzed using univariable and multivariable logistic regression" p.6
		(*b*) Describe any methods used to examine subgroups and interactions "A subgroup analysis was performed to compare the satisfied callers for 0-4 year old children with those being 5-100 years old for the variables that were found to be statistically significant in the multivariable analysis." p.6
		(*c*) Explain how missing data were addressed In Table 1, the frequencies of missing values are displayed. p.8-9

		(*d*) If applicable, explain how loss to follow-up was addressed
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed "Figure 1: Flowchart of the included study population".
		(b) Give reasons for non-participation at each stage "Callers were also excluded when they answered "not applicable" or "don't know" to the first question about their satisfaction, since it was outside the scope of the study." p.5-6
		(c) Consider use of a flow diagram See Figure 1.
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders "Table 1: Characteristics of the respondents and non-receivers and the estimated difference between respondents and non-respondents" p.8-9
		(b) Indicate number of participants with missing data for each variable of interest In Table 1, the frequencies of missing values are displayed. p.8-9
		(c) Summarise follow-up time (eg, average and total amount) Not applicable.
Outcome data	15*	Report numbers of outcome events or summary measures over time
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included "Table 2: Likelihood (OR) of satisfaction for different demographic and call-related characteristics" p.9-10
		(*b*) Report category boundaries when continuous variables were categorized "Respondents were classified to be "satisfied" when they answered to the satisfaction question of the questionnaire: "to a great extent", "to some extent" or "to a moderate extent". Patients' age was categorized into six groups (< 5, 5-17, 18-39, 40-59, 60-79 and ≥ 80 years), based on the pattern of disease and the organization of the system where children (0-18 year old) sometimes receive a face-to-face consultation at another department of the hospital. Other variables that were categorized are: reason for encounter (somatic illness, somatic injury, psychiatric illness or other), triage response (face-to-face consultation, telephone consultation, ambulance dispatch or other), time of the call (daytime (08:00-15:59) weekday, daytime OOH, and evening/night OOH), waiting time (<3, 3-6, 6-10, 10-20 and ≥ 20 minutes, later categorized into 0-10, 10-20 and ≥ 20 minutes) and consultation time (< 3, 3-6, 6-10 and ≥ 10 minutes, later dichotomized into < 6 minutes and ≥ 6 minutes). The profession of the first call-taker could be: nurse, physician, priority physician (answers prioritized calls from healthcare facilities), and EMDC-112-dispatcher." p.6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

		"On average 74.1% of the respondents calling for a 0-4 year old child were satisfied, compared to 73.0% of the rest of the population. Although averages in satisfaction fluctuated per month, the overall satisfaction rate of people calling for a 0-4 year old child was stable over time (Figure 3)." p.10
Discussion		
Key results	18	Summarise key results with reference to study objectives "This study has indicated that caller satisfaction with the OOH medical helpline was significantly associated with gender, age, reason for encounter, triage response and waiting time. Furthermore, people who called during GP office hours were less likely to be satisfied than people calling OOH. People calling on behalf a 0-4 year old child were more likely to be satisfied compared to the rest of the population, when they called for a somatic illness and when they received a telephone consultation, but less likely to be satisfied when they received a face-to-face consultation and called during GP office hours." p.11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias "However, the study was limited by…." p.12
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence "This study showed that people are in general satisfied with an OOH medical helpline. Satisfaction was associated with calling for a somatic injury, being offered a face-to-face consultation, and having a short waiting time on the phone. People calling for 0-4 year old patients are more likely to be satisfied compared to the rest of the population when they call for a somatic illness, receive a telephone consultation, call OOH and when their call is forwarded to a physician. This study also showed that a text message with a short questionnaire is feasible to run on a daily basis and that it can provide valuable information for structural quality monitoring." p.13
Generalisability	21	Discuss the generalisability (external validity) of the study results "Hence, many EU countries are working on initiatives to change the out-of-hours (OOH) pre-hospital care towards a closer collaboration between the general practitioners (GPs) and hospital emergency departments. This can be done by establishing national telephone numbers that centralize the OOH calls and triage (6)." p.4
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based "This study was supported by an unrestricted grant from The Laerdal Foundation." p.13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely

available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.