Telephone triage performed by nurses reduces non-urgent ambulance missions: a prospective observational study in Finland

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Abstract

Background: The increased workload of emergency medical services missions is a global phenomenon. Telephone triage by nurses has been suggested as a way to reduce the increasing use of EMS services by directing patient flow to appropriate care. This study aimed at determining whether assessment of needs for care by telephone nurses could guide patients to social and health care services in non-urgent missions after an emergency medical communication centre provider's risk assessment.

Methods: A prospective observational study was performed in Kainuu Hospital District in northern Finland in March to April 2018. All EMS missions classified as non-urgent by the EMCC were transferred to a telephone triage nurse, and patient guidance was recorded. Additionally, the International Classification of Primary Care classifications were recorded.

Results: A total of 700 non-urgent patients were studied. 63.7% of those were guided to EMS, whereas 17.3% were guided to other social and health care services. 19% of missions were handled by health advice and instructions issued by the nurse on the phone. The most common needs for care were general and unspecified symptoms, musculoskeletal symptoms and psychological issues.

Conclusion: By giving phone counselling, care instructions and directing patients to other social and health services, telephone triage reduces non-urgent EMS missions by a third. Our results imply that telephone triage is a viable model for non-urgent patients, but we suggest that safety has to be investigated in further studies.

Introduction

The increasing number of contacts made to emergency medical communication centres (EMCCs) and emergency medical services (EMS) is a global challenge.¹⁻⁴ In Finland, EMCCs, organized by the national dispatch authority, handle about 2.7 million emergency calls and dispatch about 750,000 EMS missions annually. The dispatch protocols in use are primarily designed to identify emergency patients, whereas the assessment of non-urgent situations often seems to fail.⁴⁻⁶

In the Finnish integrated EMCC system, the dispatcher assesses all 112 emergency calls for police, EMS or fire and rescue services and dispatches all necessary units. EMCC personnel have completed a formal 18 months of vocational education, but do not have the status of a health care professional. Recent studies have shown that approximately 40% of the patients encountered by EMS in Finland did not need to be transported by an ambulance.^{3, 7} In almost 80% of these non-transport patients, guidance and counselling by the paramedics was sufficient.^{3, 7} This may indicate that the dispatchers' training is not sufficient to assess less urgent conditions, which include assessment of care needs and guidance towards different forms of health care services.^{4, 8} Further, there is currently no mechanism available for the dispatcher to direct such calls to non-EMCC services.

Telephone triage and care needs assessment by a professional nurse in non-EMCC contexts has been shown to reduce emergency department (ED) visits, increase patient safety and patient satisfaction, and reduce the increasing strain on the EMS.^{2, 4, 9-11}

In a US study, nurse telephone triage of non-urgent patients reduced the EMS rate by 12%.¹² In countries where the EMCC system includes a nurse, the nurse's duties include care needs assessment, prioritization of care, counselling and directing patient flow to appropriate care.^{4, 13, 14} In Norway, a combine EMCC dispatch model can recognize nearly 95% of non-urgent patients.¹⁴

Nurse telephone triage and care needs assessment in the context of EMCC is a new and evolving concept in Finland which has not yet been clearly defined or studied. We hypothesized that assessing non-urgent missions by health care professionals before ambulance dispatch would improve patient guidance and reduce unnecessary use of EMS resources. We aimed to study the rate of non-urgent 112 calls which were guided to other social and health care services (i.e. not to EMS) or handled autonomously by the nurse. Additionally, to study the nature of these calls and the care needs of these patients, the International Classification of Primary Care (ICPC-2) classification was collected.

Methods

Dispatch system

All incoming 112 calls related to medical emergencies are assessed according to a national priority-based protocol. The calls are prioritized into four categories: A (suspected life threatening), B (other urgent but stable), C (semi-urgent, need for acute assessment) and D (non-urgent). A and B calls are lights and siren missions. In C and D calls the patient should be reached within 30 minutes and two hours from dispatch, respectively. Along with the priority rating, the reason for each mission is indicated with a dispatch code (e.g. chest pain, seizure, etc.).

Study area

This prospective observational study was performed in the county of Kainuu in northern Finland between 1 March and 28 April 2018. Kainuu consists of eight municipalities and 74,000 inhabitants. The population density is 3.7 inhabitants per km², and from the most rural parts the transport time to the nearest central hospital is more than 1.5 hours. There are 14 EMS units in the study area staffed by advanced and basic level paramedics. EMS provides about 25,000 missions annually, 5000 of which are non-urgent priority D calls.

In Kainuu there is a 24-hour telephone triage service located in the central hospital of the county, providing health care guidance and counselling to citizens in acute non-emergency situations. There are about ten telephone triage nurses, all with long work experience on duty, knowledge of the area services and training in assessing the need for care over the phone. Triage nurses use regional triage guidelines to make a care need assessment over the phone. They have access to the patient's history in patient databases and can consult a doctor at the ED if necessary. The nurses document the need for care using the ICPC-2 classification. The ICPC-2 classification is a global system designed using the international ICD-10 classification of diseases.¹⁵ ICPC-2 takes note of the reasons for the patient's encounter, the state of the patient's view, the treatment process and the staff's view of the patient's health problems.¹⁵

Data collection

During the study period, all 112 calls for EMS classified by the EMCC as non-urgent D calls were transferred to the nurse telephone triage instead of leading to the dispatch of an EMS unit. Direct call transmission was not possible – nurses used a callback system instead. Calls related to secondary or inter-facility transports and childbirth were excluded.

The data were extracted from the EMS database, hospital records and a structured form filled in by a nurse for each case. The patient background variables such as age, gender, time of the call, call processing times and dispatch code were collected. The nurses documented the needs for care according to the ICPC-2 classification and the actual patient guidance and counselling performed. The guidance was classified into three main categories: the call led to a mission for an EMS unit; the patient was instructed to contact other social or health care services; or the situation was managed over the phone by giving health care instructions and counselling. Contacting other services was further classified in more detail as follows: community paramedic; home care nurse; psychiatric nurse; social services; on-call doctor appointment; non-urgent doctor appointment; or other. Patient data from the transferred calls to EMS were also collected.

Statistical analyses

The data were analysed using IBM SPSS Statistics for Windows, version 25.0, using descriptive statistical methods (frequencies, percentages, mean, standard deviation). No formal sample size was calculated due to the audit nature of the study.

Ethical and safety considerations

The study was approved by Kainuu Central Hospital (142/13900/18) and Oulu University Hospital Regional Ethics Committee (91/2017). Informed consent was not required.

The mission processing times were continuously monitored by the EMS field commander. Since national EMS regulations require that the patients prioritized as non-urgent have to be reached within two hours, the mission was automatically transferred to an EMS unit if the call transferred from the EMCC to the nurse could not be assessed or completed within an hour, or the patient could not be contacted. In addition, if severe symptoms or disturbances in the patient's vital functions were detected during the phone assessment, an EMS unit was immediately dispatched with higher priority. The study group collected on a weekly basis follow-up data for all patients whether they were admitted to intensive care or died within 48 hours.

Results

Demographics

During the study period the EMCC handled a total of 2864 EMS-related calls, of which 765 classified as non-urgent were transferred to the telephone triage nurse. After exclusions, 700 calls were included in the final analysis (Fig. 1). The mean age of the patients was 72 years, with an equal number of males and females. In only five cases did the call involve a paediatric patient less than 16 years of age (Table 1). A third of the contacts to the EMCC occurred during office hours (Mon–Fri, 8:00 a.m. to 4:00 p.m.), while 67% occurred outside office hours. During the study period, 10% of the patients called the EMCC more than once on a non-urgent matter.

Service guidance and patients' needs for care

According to the care need assessment performed by triage nurses, 63.7% (446) of the missions were transferred to the EMS. In 17.3% (121), the patient was directed to other social and health care services, whereas health care instructions and advice via telephone was sufficient in 19% (133) of cases (Fig. 1).

The main reasons for patient contact according to the dispatch codes and ICPC-2 classification are presented in Table 1. The most common reasons were general and unspecified symptoms, musculoskeletal symptoms, falls and psychological or mental health problems (Additional Table 1).

Calls transferred from telephone triage to EMS units

Among the calls transferred to EMS units (446), 56% (250 patients) resulted in transportation by the EMS: 184 patients to the central hospital, 98 patients to a municipal health care centre and one patient to a nursing home. The majority of the transports were categorized as non-urgent by the paramedics. Of the 196 non-transported patients, 74 (37.8%) were treated at the scene by the paramedics, 78 (39.8%) did not need any acute care and 23 (11.7%) were guided to use transportation other than an ambulance (e.g. taxi, own car) to the health care centre or ED. In patients with no need for acute care, the three most common main categories in the ICPC-2 classification were general symptoms, musculoskeletal symptoms and psychological or mental health problems, representing 62.8% of calls.

Frequent callers

During the study period, 10% of the patients called the EMCC more than once on a non-urgent matter.

This 10% comprised 29.3% of all patient contact with the EMCC. The assessment of treatment needs in these frequent callers did not differ from the overall study population (Table 2): the most common reasons for contact in these frequent callers were general symptoms, musculoskeletal symptoms and psychological or mental health problems (Table 2).

Safety

The mean nurses' callback process time was 6.5 minutes; 92% of calls were performed within 15 minutes. In six cases the mission priority was upgraded by the triage nurse. Three patients needed intensive care, and three patients died within 48 hours of the primary call. However, the post-evaluation carried out by the study group did not reveal any errors during the initial health care assessment.

Discussion

This study showed that about one-third of non-urgent emergency missions transferred from the integrated EMCC system to a telephone triage nurse can be handled with health advice or guidance towards other social and health care resources than EMS. However, despite the secondary triage performed by the triage nurses, more than half of the non-urgent patients assessed at the scene by paramedics did not require acute care. A majority of non-urgent contacts concerned elderly people and related to general weakness, unspecified symptoms or musculoskeletal problems. These results confirmed the challenge of making successful care need assessment by telephone, but they also imply the secondary triage's ability to reduce the unnecessary workload of EMS units.

In our series the reduction of unnecessary EMS workload was up to 36%, as these situations could be handled by counselling and guidance to use other health care services. This was significantly more than in a US study in which it was shown that telephone triage of non-urgent patients reduced the EMS workload by 12%.¹² Telephone triage with EMS protocols for non-transport decisions can reduce unnecessary ED visits even more, which could have significant impacts on resource planning in the overall health care system.

This study showed that 43.9% of cases which were diverted to EMS by the telephone triage did not need transportation by the ambulance. About four in ten of these patients could stay at home after medical assessment or treatment by the EMS crew, while another four in ten did not need any acute care or transportation. These results were similar to what has been reported in other studies covering northern Finland.^{3, 7} Further research is needed for this particular patient group: EMCC dispatchers and telephone triage nurses classify them as EMS patients, but then the EMS crew cannot find anything in them that would require care or transportation. What is more, this patient group seems to appear globally in previous surveys.^{3, 7, 16, 17} In our study the most common symptoms of these patients were general and unspecified symptoms, musculoskeletal symptoms and psychological or mental health problems, which indicates the essential difficulty for assessing these symptoms over the telephone.

In our study non-urgent EMS missions appear in all age groups, and no gender differences were identified. But the particular problems of the elderly population are clearly apparent. These problems are diverse and unspecified, and the necessary health tasks are divided into virtually all care needs in the ICPC-2 classification. Previous research results from ICPC-2 were not available for non-

emergency patients for comparative purposes, but in more than half of the contacts in our study reasons were general weakness, unspecified symptoms or musculoskeletal problems (or pain related thereto). In addition, psychiatric symptoms, including problems stemming from heavy alcohol usage, play a fairly large part in the missions. This single result is indicative of the difficulty of telephone triage and the limitations of access to information over the telephone. Earlier studies have also found that non-urgent missions often include chronic illnesses that are difficult to diagnose, and links to social problems, for example the use of alcohol. With these tasks it is difficult to estimate the need for an EMS.^{3, 7}

In our study there were several patients who contacted the EMS service more than once; these results are similar to those from previous surveys regarding EMS frequent users.¹⁸ In our study these frequent callers are significant because they made one-third of all phone calls to the EMCC. During the two-month study period of our series, the highest phone call frequency for one patient was 15. In our study the most common symptoms in frequent callers were general and unspecified symptoms, musculoskeletal symptoms and psychological or mental health problems; purely social problems were rare in our series. However, the secondary triage by telephone nurses did not reduce ambulance missions to these patients. Psychiatric symptoms, including alcohol abuse problems, also occurred in previous surveys regarding EMS frequent users.^{3, 7}

Why do we have EMS frequent users? Are other health care services too small, or are the social problems and population inequalities of urbanized societies created by a lack of health care services other than emergency care? Earlier studies in northern Finland have identified an increasing need for non-urgent doctor appointments and community paramedic units.³ It has also been outlined that additional training for paramedics and so-called "see-and-treat" and "see-and-refer" services, instead of the existing "see-and-transport" system, would be more effective methods of managing the load of emergency EMS and ED patients.¹⁹ Could a telephone nurse do this work instead of EMS in the future? The question is certainly worth considering, and the phenomenon of repeated use of services offered and related background variables should be explored in the future. For patient safety, it is important to differentiate between callers who need immediate help and those who misuse the system and its resources.

Our study results clearly showed the need for telephone triage care instructions and service guidance. The telephone nurse gave independent care instructions to 20% of the patients. 86% of these occurred during on-call time. The large number of telephone controls during on-call time could be explained

by the lack of other services. However, people are also used to the fact that services are not available in the evening and at night, and are happy with the advice provided on the phone.

Our study showed that telephone triage care instructions and service guidance can help more than one-third of patients. The finding is particularly significant in Finland because all health counselling and service guidance missions are directed to the EMS by the EMCC. It is therefore necessary to consider the extent to which EMS resources used for this type of service could be provided over the telephone. There should be a discussion on a societal and systemic level regarding the reasons for people calling the EMCC on small matters to get EMS or other health care services. In the case of frequent users and patients with multiple problems, increased resources for municipal health care and social services as well as optimally functioning care pathways should also be considered in the interests of both the workload of the EMS and emergency health care and the patient's good.

This was the first study to investigate the combination of integrated EMCC and telephone triage nurses in the Finnish EMS system. These results imply that secondary triage in non-urgent situations is recommended as a cost-effective and potentially safe system of patient guidance. Further studies are needed to identify those patients who do not have any need for acute care but are not recognized by the triage systems.

Limitations

This study had several limitations. Firstly, as a single centre study conducted over a short period, the results are not fully generalizable to other areas with different population structures and health care systems (this study was mostly based on a rural low-density area with limited health care resources). Secondly, human factors may distort the results, as the compliance of telephone nurses with predefined triage guidelines could not be documented during the study.

Conclusion

Triage and assessment by telephone nurse reduces the number of non-urgent EMS missions by a third. Yet in nearly half of the calls that were transferred from telephone triage to ambulance service, it still transpired that ambulance transportation was not needed. It would appear that telephone triage is a viable model for non-urgent EMS patients, but safety issues have to be more fully investigated in further studies.

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Legends to Tables and Figures

Figure 1. Flowchart of study selection and guidance provided by the telephone nurses.

Table 1. The study demographics and guidance given according to EMS dispatch categories and ICPC-2 categories.

	All missions	Health counselling	Service guidance	Divert to EMS
Missions, n (%)	700 (100.0)	133 (19.0)	121 (17.3)	446 (63.7)
Mean age, years	72	68	68	74
Male gender, n (%)	350 (50.0)	66 (18.9)	57 (16.3)	227 (64.9)
Children (<16v), n (%)	5 (0.7)	1 (20.0)	3 (60.0)	1 (20.0)
Time of missions, n (% within category)				
Office hours (8:00–16:00 Mon–Fri, n (%))	231 (33.0)	19 (14.3)	35 (28.9)	175 (39.2)
Out-of-office hours, n (%)	471 (67.3)	114 (85.7)	86 (71.1)	271 (60.8)
EMS dispatch category, n (% within category)				
<i>General weakness; unspecific symptoms</i>	276 (39.4)	46 (34.6)	44 (36.4)	186 (41.7)
<i>Back, limb or body pain</i>	134 (19.1)	35 (26.3)	30 (24.8)	69 (15.5)
<i>Fall</i>	84 (12.0)	8 (6.0)	10 (8.3)	66 (14.8)
<i>Psychiatric symptom</i>	70 (10.0)	14 (10.5)	13 (10.7)	43 (9.6)
<i>Nausea, diarrhoea, constipation, urinary symptom</i>	70 (10.0)	12 (9.0)	13 (10.7)	45 (10.1)
<i>Abdominal pain</i>	32 (4.6)	7 (5.3)	4 (3.3)	21 (4.7)
<i>Headache</i>	16 (2.3)	6 (4.5)	3 (2.5)	7 (1.6)
<i>Cut</i>	8 (1.1)	1 (0.8)	4 (3.3)	3 (.7)
<i>Rectal or vaginal bleeding</i>	5 (0.7)	0 (0)	0 (0)	5 (1.1)
<i>Nose or ear bleeding</i>	3 (0.4)	2 (1.5)	0 (0)	1 (0.2)
<i>Other bleeding</i>	2 (0.3)	2 (1.5)	0 (0)	0 (0)
ICPC-2 main category, n (% within category)				
<i>A General and unspecified</i>	225 (32.1)	30 (22.6)	26 (21.5)	169 (37.9)
<i>D Digestive</i>	81 (11.6)	19 (14.3)	12 (9.9)	50 (11.2)
<i>K Cardiovascular</i>	27 (3.9)	9 (6.8)	4 (3.3)	14 (3.2)
<i>L Musculoskeletal</i>	156 (22.3)	34 (25.6)	37 (30.6)	85 (19.1)
<i>N Neurological</i>	39 (5.6)	7 (5.3)	6 (5.0)	26 (5.8)
<i>P Psychological</i>	91 (13.0)	17 (12.8)	17 (14.1)	57 (12.9)
<i>R Respiratory</i>	29 (4.1)	6 (4.5)	8 (6.6)	15 (3.4)
<i>S Skin</i>	22 (3.1)	4 (3.0)	7 (5.8)	11 (2.5)
<i>U Urological</i>	12 (1.7)	1 (0.8)	3 (2.5)	8 (1.8)
<i>Z Social problem</i>	8 (1.1)	4 (3.0)	0 (0)	4 (0.9)
<i>Missing</i>	10 (1.4)			

Table 2. The service guidance and ICPC-2 categories in the frequent callers calls.

	All missions	Health counselling	Service guidance	Divert to EMS
Missions, n (%)	700 (100.0)	133 (19.0)	121 (17.3)	446 (63.7)
Frequent callers calls, n (%)	205 (100.0)	47 (22.9)	38 (18.5)	120 (58.5)
ICPC-2 main category, n (% within category)				
<i>A General and unspecified</i>	56 (27.3)	13 (27.6)	7 (5.8)	36 (30.0)
<i>L Musculoskeletal</i>	48 (23.4)	13 (27.6)	13 (18.4)	22 (18.3)
<i>P Psychological</i>	44 (21.5)	9 (19.1)	8 (21.1)	27 (22.5)
<i>Others</i>	51 (24.9)	11 (23.4)	10 (26.3)	30 (25.0)
<i>Missing</i>	6 (2.9)			

Additional Table 1. Telephone triage nurses' estimates using ICPC-2 (N = 700).

ICPC-2	N	%
A General and unspecified	225	32.1
A01 Pain general / multiple sites	18	2.6
A02 Chills	2	0.3
A03 Fever	27	3.9
A04 Weakness / tiredness general	164	23.4
A06 Fainting / syncope	1	0.1
A11 Chest pain NOS	5	0.7
A78 Infectious disease other / NOS	1	0.1
A80 Trauma / injury NOS	5	0.7
A91 Abnormal result investigation NOS	2	0.3
D Digestive	81	11.6
D01 Abdominal pain / cramps general	38	5.4
D09 Nausea	23	3.3
D11 Diarrhoea	6	0.9
D12 Constipation	11	1.6
D14 Haematemesis / vomiting blood	1	0.1
D16 Rectal bleeding	2	0.3
K Cardiovascular	27	3.9
K29 Cardiovascular symptom / complaint other	2	0.3
K74 Ischaemic heart disease with angina	1	0.1
K77 Heart failure	1	0.1
K79 Paroxysmal tachycardia	1	0.1
K80 Cardiac arrhythmia NOS	4	0.6
K85 Elevated blood pressure	16	2.3
K89 Transient cerebral ischaemia	2	0.3
L Musculoskeletal	156	22.3
L01 Neck symptom / complaint	3	0.4
L02 Back symptom / complaint	43	6.1
L04 Chest symptom / complaint	2	0.3
L05 Flank / axilla symptom / complaint	2	0.3
L08 Shoulder symptom / complaint	4	0.6
L09 Arm symptom / complaint	3	0.4
L11 Wrist symptom / complaint	3	0.4
L12 Hand / finger symptom / complaint	3	0.4
L13 Hip symptom / complaint	15	2.1
L14 Leg / thigh symptom / complaint	11	1.6
L15 Knee symptom / complaint	13	1.9
L16 Ankle symptom / complaint	8	1.1
L17 Foot / toe symptom / complaint	22	3.1
L19 Muscle symptom / complaint NOS	6	0.9
L29 Symptom / complaint musculoskeletal other	10	1.4
L80 Dislocation / subluxation	1	0.1
L81 Injury musculoskeletal NOS	7	1.0
N Neurological	39	5.6
N01 Headache	9	1.3
N07 Convulsion / seizure	1	0.1
N17 Vertigo / dizziness	23	3.3
N80 Head injury other	6	0.9
P Psychological	91	13.0
P16 Acute alcohol abuse	40	5.7
P19 Drug abuse	1	0.1
P29 Psychological symptom / complaint other	46	6.6
P77 Suicide / suicide attempt	3	0.4
P98 Psychosis NOS / other	1	0.1
R Respiratory	29	4.1
R02 Shortness of breath / dyspnea	14	2.0
R05 Cough	5	0.7

<i>R06 Nose bleed / epistaxis</i>	3	0.4
<i>R83 Respiratory infection other</i>	6	0.9
<i>R95 Chronic obstructive pulmonary disease</i>	1	0.1
S Skin	22	3.1
<i>S18 Laceration / cut</i>	17	2.4
<i>S29 Skin symptom / complaint other</i>	5	0.7
U Urological	12	1.7
<i>U02 Urinary frequency / urgency</i>	1	0.1
<i>U06 Heamaturia</i>	4	0.6
<i>U08 Urinary retention</i>	4	0.6
<i>U29 Urinary symptom / complaint other</i>	3	0.4
Z Social problems	8	1.1
<i>Z29 Social problem NOS</i>	8	1.1
Missing	10	1.4