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The impact of online training of patients with repeated clinical calls on the number of repeated ambulance service requests in the pre-hospital Emergency in Iran

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Abstract

Frequent ambulance service requests is one of the common problems in medical emergency centers. This study aimed to determine the impact of online training of patients with repeated clinical calls on the number of ambulance service requests in the pre-hospital emergency and incident management center (Emergency Medicine Services, EMS) in Iran. This semi-experimental study was conducted on 63 patients who repeatedly contacted the EMS. Patients were divided into five groups based on their need and the type of disease. Then, each group separately received online training for one month. Data were collected by a checklist and analyzed using SPSS 18 software. *P*-values less than 0.05 were considered significant. According to the

results, the number of people with frequent calls decreased from 63 patients before the study to 40 people, but this difference was not statistically significant. However, the number of repeated ambulance requests decreased significantly from 173 calls to 101 calls ($P < 0.05$). According to the results, the use of the patient education in the EMS reduce repeated ambulance requests.

Introduction

The Emergency Medicine Services (EMS) plays a key role in providing services and saving the lives of patients.¹ The system was intended to provide timely care to victims of sudden and life-threatening injuries or emergencies.² The EMS, which is the main component of the emergency system, is the first point of care for emergency patients. The speed and accuracy of the care provided in this pre-hospital phase are critical. They directly influence the reduction of mortality and disability associated with accidents and diseases.³ Despite the developments and progress in EMS, the provision of services is facing many problems. One of these issues is the high demand for EMS,⁴ which is increasing annually.⁵ In Iran, the average growth rate of EMS missions is more than 16%, so approximately every six years, the number of EMS missions will double.⁶ The increased demand and calls for ambulance and EMS could have serious consequences that lead to the wasting of human and financial resources.⁷ Responding to many cases can result in delay in proper and timely care of emergency and high-priority patients. This increase in demand also has consequences, such as deprivation of rest, training, etc., for emergency personnel.⁸ In spite of the increased demand, some people frequently call the emergency department and request ambulance services while their problem can be resolved without such services.⁹ These people come from different age groups with similar characteristics and needs.⁵ There are several ways to avoid wasting resources due to high demand for ambulance services to reduce EMS calls as much as possible without compromising service quality.⁶ Recognizing and studying the characteristics and types of problems of frequent emergency callers and providing training programs for them are among the solutions to address frequent emergency calls. Many agencies seek to educate patients on the necessary conditions for using EMS. They also provide guidelines

to ensure the optimal use of both hospital and EMS.¹⁰ Teaching patients and their families has been recognized as a nursing function in all nursing fields and has been emphasized by clinical nurse associations worldwide.¹¹

With the further spread of COVID-19 and with changes in teaching methods from face-to-face to online teaching in social networks, online teaching has had the chance to show its potential more than ever.¹² This form of teaching is a new way of conveying concepts and content in a simple, comprehensive, and attractive way and is implemented using text, audio, image, and video. Online patient teaching is used as a main part of healthcare in developed countries and has been adopted by the World Health Organization as a convenient way to communicate with patients.¹³ The United States of America has proposed the Mobile Health Integrated System (MIHC), where patients receive remote education and care through mobile phones. The system makes it possible to provide patients with the care they need and educate patients and their families via telecommunication devices such as mobile phones. In this way, it can make a decisive contribution to reducing patient requests and reducing costs in emergency care systems.¹⁴

Various studies highlight the importance of education in reducing the repeated calls to emergency centers. For example, Edwards *et al.* (2015) reported the impact of a telecare training program in achieving a significant reduction in the number of calls and repeated requests.⁹ In another study, Rinke *et al.* (2012) investigated the impact of implementing the medical and social care program for patients on the number of calls and transfers by ambulance. He found that frequent calls to the EMS and transfers by ambulance were reduced by addressing the medical, psychological, and personal needs of patients.¹⁵ Lehm *et al.* (2017) also concluded that it is possible to provide medical services to level E (non-emergency) patients without sending an ambulance and only with education and counseling.¹⁶

The researcher found no studies in Iran that evaluated the implementation of patient education programs in EMS or evaluated their effectiveness in this area. This is while patient teaching is one of the main duties and functions of nurses. On the other hand, increase in EMS calls and requests, especially repeated requests, place much burden on the EMS in terms of patient lives and financial factors. The total number of calls received by the Rafsanjan EMS is over 100,000 calls per year, of which about 12,000 calls (about 10 percent) are repeated calls. Therefore, this

research aimed to investigate the impact of online training of patients with repeated clinical calls on the number of repeated ambulance requests in the EMS in Rafsanjan.

Materials and Methods

This semi-experimental study was conducted on 63 patients who repeatedly contacted the EMS of Rafsanjan in 2020. Patients who contacted the EMS more than twice a month and requested cardiac, respiratory, diabetes, seizure, and stroke emergency services, provided consent to participate in the study, were cooperative, had suitable conditions for learning, and were educable were included. The exclusion criteria included the patient's death during the study, the patient's migration from the research environment, the patient's refusal to continue cooperation, the patient's withdrawal from the WhatsApp training group, and contracting a disease, such as COVID-19.

The census sampling method was used, and all the cases that requested ambulance service twice a month or more were recorded. According to the Rafsanjan EMS automation system (ASAYAR), the center received 25,762 calls in the three months preceding the study. This period covered September, October, and November of 2021. Of these, 1,768 were repeated calls. Among the repeated calls received by the EMS, 310 calls were repeated requests for ambulance services, of which 173 calls were made by the studied patients. Of these 173 calls, 37 were for diabetes, 39 for respiratory diseases, 54 for heart diseases, 18 for seizures, and 25 for strokes. It should be noted that the 173 repeated calls were made by 63 patients with underlying diseases. The studied population was also the same people who were trained.

Data were collected using a checklist, which was completed based on the information received from the ASAYAR system. The ASAYAR electronically recorded all repeated calls for this study: i) repeated clinical calls received by the dispatch unit, ii) for patients with chronic diseases, and iii) involving at least two ambulance requests per month for the same illness. Age, gender, and place of residence were also recorded.

After obtaining the code of ethics (ID IR.RUMS.REC.1399.204) and the necessary permits from Rafsanjan University of Medical Sciences, the researcher referred to Rafsanjan EMS and started

the sampling. The researcher identified all the repeated calls received by the EMS requesting an ambulance service during the 3 months through the ASAYAR system and recorded the reason for the call and the type of illness of the patient. Eligible patients were included in the study using the census method. All research units were provided with necessary explanations about the objectives of the study and written informed consent was obtained from the patients. The classification of patients in this study was based on the most prevalent disease categories identified from the medical emergency center's contact records. The patients were divided into 5 groups based on the type of underlying disease (diabetes, respiratory, heart, seizure, and stroke), and separate groups were created for them on WhatsApp messenger. The principal researcher and the research team were also members in the WhatsApp group to monitor and manage the training. The information checklist was completed for each patient before starting the training. The patients were then asked daily questions about their problems and diseases, and they received their answers through videos and training based on the latest guidelines. According to the training given to patients on the first day, group activities began at 8 AM, and patients asked questions about their problems, which were answered at 9 PM. The educational content was developed by the principal investigator under the research team's supervision. It was based on the latest self-care and training guidelines from the following 2018 editions of *Brunner & Suddarth's Textbook of Medical-Surgical Nursing*: "Cardiovascular," "Gas Exchange and Respiratory Function," "Metabolic and Endocrine Function," and "Nerves."¹⁷ Training Protocol: This details the structured training provided, which included: Sessions Content: Educating patients on recognizing 'red flag' symptoms that necessitate an emergency call (e.g., acute chest pain, severe dyspnea) versus non-urgent issues that should be directed to their primary care physician. Appropriate Use: Clear guidelines on the proper use of this education program for routine inquiries, and reporting non-critical changes in their condition. Emphasis on Safety: Explicit instructions against self-medication or discontinuing prescribed treatments without consulting a healthcare professional. Discouraging self-medication was a cornerstone of our patient education. We clarify that the platform's purpose was to facilitate professional guidance, not to empower unsupervised treatment decisions. In the first session, the training was conducted in person by the principal researcher to introduce how to use the software and ensure that the patients were able to use it. The training period was 1 month long. The number of training files a patient received, such as videos, images, and text, depended on their training needs. In this study,

the education and self-care method was used for patient education. After the completion of the training program, all the ambulance calls and repeated requests of all patients in all 5 groups were monitored and recorded for 3 months. Finally, the data from the 3 months before the study and the 3 months after the study were compared and analyzed. It should be noted that any emergency calls and requests of the patients were responded, regardless of their self-care training. We emphasized that the goal of this study was not to replace their primary care physician but to create a more efficient channel for these specific, frequent concerns, thereby reducing unnecessary emergency dispatches while ensuring patient safety. Data were analyzed using descriptive statistics, including frequencies and percentages. The chi-square test was used for inferential statistics. SPSS version 18 was used for data analysis, and in all cases, the significance level was considered less than 0.05.

Results

The results of the present study showed that most of the participating patients were aged 30–60 years before the training and over 60 years after the training. According to the results, although the number of participants decreased in both age groups, especially in the 30–60 years age group, the chi-square test did not show any difference between the two groups ($P = 0.41$). Also, out of the 63 patients who entered the study, 38 were men and 25 were women. This number decreased by a total of 23 people after the training, but the chi-square test did not show a statistically significant difference in the gender of the callers before and after the training ($P = 0.45$).

According to the results, before and after the training, the highest number of participants resided in urban areas. However, there was no significant difference between the two groups ($P = 0.56$) (Table 1).

Based on the results, the repeated ambulance service request rate decreased from 173 out of 310 calls (55.80%) in the three months before the training to 101 out of 224 calls (45.09%) in the three months after the training ($p\text{-value} = 0.01$) (Table 2).

According to the results, the number of repeated calls requesting an ambulance decreased in most patient's groups. Conversely, a non-significant increase in calls was observed in the

subgroup of patients with a history of stroke (from 25 to 27 calls). The result of the chi-square test showed a statistically significant difference in the number of requests according to the underlying disease studied in the 3 months before and 3 months after the intervention in all patients groups ($P = 0.007$) (Table 3).

Discussion

The present study aimed to investigate the impact of online training of patients with repeated clinical calls on the number of repeated ambulance requests in the EMS in Rafsanjan. The results of the present study showed that the number of people who repeatedly requested ambulance services decreased after the training. However, this decrease was not statistically significant, which may be due to the small number of sample size. The number of repeated ambulance requests in patients with underlying diseases of diabetes, respiratory, heart, and seizures decreased significantly after training, but this rate increased significantly in patients with a history of previous stroke. In this regard, no similar studies were found in Iran, but studies were found in other countries emphasizing the importance of the role of education in reducing frequent calls to the EMS. Among these studies, we can point to the study by Peralta *et al.* (2020) and Rinke *et al.* (2012), who found a significant reduction in repeated calls and frequent ambulance requests from EMS after the completion of a training program.^{15,18} In another study, Agarwal *et al.* (2019) found that after completing the health promotion care and education program, requests decreased by 41% and the number of people requesting ambulance services decreased by 35%.⁵ Snooks *et al.* (2019) also said that advice provided by a general practitioner was effective in reducing the number of repeated calls.¹⁹ The results of these studies are consistent with the results of the present study.

Søvsø *et al.* (2019) also reported the high number of repeated calls to the emergency center and stated that most of the repeated requests were related to cardiac and respiratory diseases and seizures.²⁰ In this study, the researchers also suggested providing patients with self-care training to reduce this demand. This suggestion was used in the present study. Consistent with our findings, Edwards *et al.* (2015) demonstrated that a multi-component intervention significantly reduced ambulance calls. Their intervention included counseling on emergency service use,

coordinating with the patient's doctor, providing social and mental health services, conducting face-to-face meetings, and offering self-care training for patients and families. As a result, the number of monthly calls decreased from five to zero.⁹

According to the research team's experience, high numbers of calls to the EMS can potentially divert the EMS services away from those in life-threatening situations. Disruptions in providing services to emergency patients have several critical consequences. They increase the workload for both dispatch center and ambulance personnel. This overload impairs the focus and decision-making ability of dispatchers during emergencies. Furthermore, such disruptions accelerate the depreciation of ambulance vehicles. Therefore, measures, such as public information services and self-care training for patients and families, can reduce calls to emergency centers and the related consequences, complications, and problems. This study had some limitations. One limitation was that the COVID-19 outbreak, as a confounding factor, may have caused public anxiety and stress^{21,22} and, consequently inappropriate use of emergency services,²³ may have increased the number of repeated ambulance requests. To prevent the impact of this variable as a confounding factor on the study results, patients who exhibited symptoms of COVID-19 or influenza during the study were excluded from the study by the study exclusion criteria. Other limitations of this study include its single-center nature and limited sample size. Consequently, the generalizability of the findings requires caution. For future research, it is suggested that the training program be conducted face-to-face by doctors and nurses.

Conclusions

The results of this study showed that raising awareness of self-care methods among people with chronic conditions through online training significantly reduced the number of repeated clinical ambulance requests as well as the number of callers to the EMS. It is hoped that the study can be helpful in providing an effective method to reduce repeated ambulance requests. Therefore, we recommend that all medical centers use a patient education approach to reduce such calls.

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Table 1. Frequency of demographic characteristics of patients with repeated clinical calls in prehospital.

time Variable		Before education		After education		Chi-square Statistical test	P value
		Frequency	percent	Frequency	percent		
Age (yr)	30-60	32	50.79	17	42.50	0.67	0.41
	60 and up	31	49.21	23	57.05		
Sex	Male	38	60.31	27	67.50	0.54	0.46
	Female	25	39.68	13	32.50		
Residence	City	39	61.90	27	67.50	0.33	0.56
	Village	24	38.10	13	32.50		

Table 2. Frequency of repeated clinical calls in prehospital in 3 month before and after intervention.

time Variable		Before education		After education		Chi- square Statistical test	P value
		Frequency	percent	Frequency	percent		
Total calls		310	100	224	100	6.005	0.01
Repeated clinical calls		173	55.80	101	45.09		

Table 3. Comparison the number of repeated ambulance service requests by patients according to the disease (cardiac, respiratory, diabetes, stroke and seizure) in three-month period before and after the intervention.

time disease	Before education		After education		Chi-square Statistical test	P value
	Frequency	percent	Frequency	percent		
Diabetic	37	21.38	15	14.85	7.220	0.007
Respiratory disease	39	22.54	22	21.78		
Cardiac disease	54	31.21	28	27.72		
Previous stroke disease	25	14.45	27	26.73		
Seizure	18	10.40	9	8.91		

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Ethical statements: the Ethics Committee of Rafsanjan University of Medical Sciences approved this study (IR.RUMS.REC.1399.204). Written informed consent was obtained from the patients. Samples were explained the purpose of the study and were assured that their information would be kept confidential. Written informed consent was obtained from all individual participants included in the study. All procedures were performed in accordance with the ethical guidelines outlined in the Declaration of Helsinki.