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# Surveying the quality of prehospital emergency services for the elderly falls 2017

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## Abstract:

**INTRODUCTION:** Falls are the most common cause of injuries in elderly population. This study aimed to determine the quality of prehospital emergency services (EMS) for the elderly falls in 2017.

**MATERIALS AND METHODS:** This cross-sectional study was carried out at the Pre-hospital Emergency Center of Kashan in 2017. The sample consisted of elderly people who had reported fall incidents in EMS. The questionnaire consisted of 7 areas with 54 items. Data collected by descriptive and inferential statistics of Friedman and Mann–Whitney were analyzed by SPSS v. 16 software.

**RESULTS:** The number of elderly people was 150 (58% female) and the average age was  $68.22 \pm 6.75$  years. Most falls (88.65%) occurred at home. The average performance scores (between 0 and 2) were as follows: assessment of the scene of the incident (1.51), primary assessment of the elderly (1.46), airway management (1.64), circulation management (1.78), fixation (1.82), secondary and continuous assessment (1.59), and patient transfer (1.68). It was found that secondary assessment and transfer of the male patients were significantly higher in quality than female patients ( $P < 0.05$ ).

**CONCLUSIONS:** In this research, the quality of care in all areas was reported to be desirable. It is recommended that the weaknesses of each area are investigated and the necessary strategies are taken into account such as staff training, changes in data collection forms, and training for the elderly.

## Keywords:

Elderly, fall, prehospital emergency, quality

## Introduction

Aging is not a new phenomenon, but considering the rising life expectancy and the number of the elderly people, its significance increases every day.<sup>[1]</sup> According to the WHO, people aged 60 or older are considered elderly.<sup>[2]</sup> When people are at an advanced age, falling is one of the greatest preventable problems at home, in hospitals and in nursing homes, and it is among the most important causes of their mortality and disability.<sup>[3]</sup> According to global statistics, the falling rate of the elderly is estimated to be between 35% and 45%<sup>[4]</sup> and its prevalence in Iran is 30%,

such that more than one-third of people over 60 years of age experiencing at least one fall annually.<sup>[5]</sup>

Consequences of the fall of the elderly are numerous, including various types of fractures, bruises, soft-tissue destruction, and ruptures.<sup>[6]</sup> In addition, loss of self-confidence, fear of falling again, incompetency in dealing with daily chores, and being rejected by others are other concerns that an elderly people experience. In turn, it leads to depression and isolation.<sup>[7]</sup> 25% of people suffer damage after falling, 35% are afraid of re-falling and 10%–15% of cases lead to fractures.<sup>[8]</sup> In general, 70%–80% of all fractures in the elderly are related to the fall.<sup>[9]</sup> In a study by Safa *et al.* (2016), 80.5% of the elderly were completely

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independent before injury, but trauma had a significant negative impact on their capabilities.<sup>[10]</sup>

In the meantime, proper prehospital emergency services (EMS), at the very early moments of the incident, could protect the elderly from further serious problems. The better, more precise and faster the treatment, the less the number of deaths and disabilities caused by the diseases, and the more the trust of the people in this system.<sup>[11]</sup> Therefore, the evaluation of performance indicators is a guarantee for improving the quality of services provided and the continued improvement of these indicators requires the creation of patient-centered elements focusing on quality systems and mechanisms. Furthermore, continuous monitoring of processes is a way to continue improving the quality of services in this sector.<sup>[12]</sup>

By studying the causes of falls and accidents, the prehospital emergency personnel are required to provide recommendations for preventing its recurrence. They have to register the mechanism of the incident in their forms. In the study of Iranfar *et al.* (2013), 60% of the elderly who had a fall in the nursing home mentioned similar incidents in the past year.<sup>[13]</sup> Borhaninejad (2015) also reported 33.8% of the elderly people have had a fall, which is a sign of the importance of preventing the incident. In particular, in many cases, environmental factors can lead to a preventable fall, and primary assessment by prehospital staff is the only source of information that is available to doctors and other health-care team members that can be used to take preventive measures.<sup>[14]</sup> Therefore, the accuracy and quality of the primary assessment of the prehospital is very important.<sup>[15]</sup>

Kazemnejad (2015) stated that the average level of ambulance medical equipment according to the Ministry of Health and National Standards Organization was 55% and 53%, respectively. The average levels of ambulance equipment according to the above two standards were 94.6% and 93.7% in the ventilation/respiratory equipment group, 74.2% and 59.4% in injection/medication equipment group, 31% and 30% in treatment/life management equipment group, respectively. The responsiveness time on urban and road missions was in line with the standards of Ministry of Health.<sup>[16]</sup> In the study of Adib-Hajbagher *et al.* (2014), the results showed that a desirable quality was observed for the maintenance of the airway in 95% of cases, supply of respiration in 42%, provision of effective circulation in 39%, spinal effective fixation in 9.5%, and fixation of injured organs in 7.8%. Other cases were reported to be at an undesirable level.<sup>[17]</sup>

Boltz *et al.* (2015) stated that factors for improving the health-care process of the elderly include treating them

with respect, use of proper therapeutic procedures, the safe transfer of the elderly to the health center, which are indicators of high quality of performance in the emergency department.<sup>[18]</sup>

In a study with a quantitative-qualitative approach, Mould-Millman (2015) stated that EMS are growing and in order to evaluate the services, the structure and function of services should be evaluated quantitatively and qualitatively in a technical framework. In this study, some of the factors including guidelines for clinical care (such as primary and secondary assessment protocol) have been identified as ways to improve the quality of EMS.<sup>[19]</sup>

The assessment of the incident scene and the commitment of the technician to assess the location and patient, provision of the essential care, privacy and patient safety are among the ethical factors affecting the quality of the provision of EMS.<sup>[20]</sup> Carpenter *et al.* (2013) also described the patient's primary assessment, screening and standard-based practice as important factors in improving the quality of prehospital EMS.<sup>[21]</sup> Based on what has been said, attention to the quality of prehospital EMS, in addition to taking steps toward the goals and mission of this institution, can create the basis for satisfaction in society. In order to improve the quality of prehospital caring process, the existing situation should be evaluated. In this regard, due to the importance of this issue and the lack of similar studies in Iran, this study aimed assessing the quality of prehospital EMS in the elderly who had a fall and used these services in Kashan in 2017.

## Materials and Methods

### Type of research and participants

This cross-sectional study was conducted in Kashan and in the second quarter of 2017. The sample size of the study was estimated to be 137 based on the undesirable quality of immobilization (fixation) in traumatic patients (90%), with 95% confidence interval and 5% error,<sup>[17]</sup> taking into account the sample size calculation formula; and for a higher quality, 150 samples were investigated.

The inclusion criteria included the patient elderly (age over 60), the fall incidence, calling the prehospital emergency, and consent to participate in the study. It should be noted that the prehospital emergency department of Kashan has four districts (totally including four city bases and eight road bases); and according to type of research (fall of the elderly), only the urban emergency bases of Kashan (four bases) were included in this study.

### Instrument and method for data collection

The study instrument included a researcher-made questionnaire prepared by consulting experts and

based on the information, resources, books and journals available on this subject. The questionnaire had 7 areas and 54 items. The first area (assessment of the incidence scene and the observance of the protection against patient secretions) had 8 items, the second area (primary assessment of the elderly) had 10 items, the third area (airway management) had 9 items, the fourth area (circulation management) had 6 items, the fifth area (fixation) had 8 items, the sixth area (secondary and continuous assessment) had 4 items, and the seventh area (patient transfer) had 9 items with the scale (performed satisfactorily = 2, performed undesirably = 1, not performed = 0, no indication = x).

In order to determine the validity of the instrument, the views of faculty members and nurses who had enough experience and information were used and the scientific validity of the instrument was determined through content validity. The Content Validity Ratio was 0.62 and the Content Validity Index was 0.81, confirming the validity of the study. Cronbach's alpha coefficient was used to verify reliability of 88% and its reliability was confirmed. In order to score a checklist, the average score of each item was determined only for those needing it. For each area, the mean values were calculated and an average score higher than 1 showed a desirable performance and a score <1 showed undesirable performance.

The researcher was introduced to the head of the Emergency Services of Kashan by a letter of introduction from University Deputy of Research. Data were gathered after explanation of the research, objectives, method of implementation, and with the permission of the head of the center.

Researcher and research assistant were present at the Emergency Services Center of Kashan to be dispatched to the site with an emergency mission code as an expert supervisor in case an emergency call was received, and after getting a description of the fall incident. On the spot, by observing the actions of EMS personnel and the use of the researcher-made checklist, the author analyzed the quality of prehospital EMS. The research assistant had nursing degree and was sufficiently trained.

### Data analysis

After collecting data, their analysis was performed at descriptive and inferential levels (Mann-Whitney test to evaluate the quality of care in variables such as patient's gender and accident time and Friedman test to prioritize the areas) and by using SPSS/16 software (SPSS Inc., Chicago, Illinois). The significance level in all tests was 0.05. Furthermore, in the *t*-test, the mean of each item was assumed to be 2 (performed desirably).

### Ethical considerations

This study was approved by the Ethical Committee of Kashan University of Medical Sciences with the IR.KAUMS.REC.1395.146 code. Due to the use of information from elderly patients, ethical considerations were followed, including explanation of the subject matter to the study population; respect for scientific honesty and confidentiality; keeping privacy and anonymity. In this research, the moral standards of the Helsinki Treaty were observed. This research project has been funded by the deputy of research in Kashan University of Medical Sciences with the grant no. 95146.

### Results

The number of elderly people was 150 (58% female) and average age was  $68.22 \pm 6.75$  years. Ninety elderly (60%) had a history of falling in the past year and the highest number of incidents included indoor falls (88.65%) at the daytime (72%). Table 1 shows the characteristics of the elderly and the incident of falling in the missions of the prehospital EMS department.

In all areas examined, the average caring quality was above 1, indicating the best quality in all areas [Table 2]. The Friedman test showed that the caring quality provided was different in various areas ( $P = 0.0001$ ). The circulation management had the highest and the primary assessment had the lowest rank [Table 2].

**Table 1: The characteristics of the elderly and the fall incidents**

Variable	Criterion	Frequently distribution	Frequency (%)
Gender	Female	87	58
	Male	63	42
Marital status	Married	83	55.3
	Single or widow	77	44.7
Log of falls in last year	Yes	90	60
	No	60	40
Place of fall	Indoor	133	88.65
	Outdoor	12	8
	Nursery home	5	3.35
Time of fall	Day	108	72
	Night	38	25.3
Fall height	Balanced	98	65.3
	Nonbalanced	52	34.7
Type of damage	Fracture	69	46
	Soft tissue damage	73	48.7
	Invisible damage	8	5.3
Damage location	Head	15	10
	Vertebral column	10	6.7
	Hips	44	29.3
	Upper extremity	11	7.3
	Lower extremity	70	46.7

Table 3 lists some of the important items that have been considered. In most cases, care has been desirable. Getting a log and evaluating and recording the vital signs and the sensory motor status of the casualty and the preliminary review of the AVPU Scale (Alert, Voice, Pain, Unresponsive) were the most important factors that remained unassessed.

In assessing the score of care quality according to the variables studied, it was found that secondary assessment and transfer of the male patients were significantly higher in quality than female patients. Regarding the time of event, the care quality for circulation management, secondary assessment and total score had significantly higher scores at night. The score of the assessment quality of incidence scene and the secondary assessment was significantly higher in the

technicians with an associate degree than those with BA degree [Table 4].

## Discussion

This study indicated that the quality of care was at the optimum level in all seven areas. Nearly 60% of patients had a history of falling over the past year, suggesting that patients had a higher falling rate in comparison to other studies.<sup>[22]</sup> In this study, the incident scene evaluation and the protection against the patient secretions were desirable. In the study of Aacharia *et al.*, the incident scene assessment, the commitment of technicians to assess the location and the patient, provision of essential care, privacy and patient safety were among the known ethical determinants of the quality of EMS and were of a satisfactory status.<sup>[20]</sup>

In the study of Safa *et al.*, the findings showed that the mean age of participants was  $70.57 \pm 9.05$  years. Nearly 80.5% (three quarters) of the elderly were completely independent before the trauma, but trauma had a significant negative effect on their capabilities,<sup>[10]</sup> which is consistent with the results of this study.

In this study, 88% of falls occurred in the house, which is in line with Jafarian *et al.* (2013), in which the highest incidence rate (24.9%) was on the stairs, and there was also a significant relationship between the fall incidence and the age above 75.<sup>[23]</sup>

**Table 2: The mean score and quality of service provided by prehospital emergency to elderly patients who had a fall**

Variable	Mean±SD	Mean score
Assessment of the incident scene and the patient's secretions protection	1.5±0.24	2.89
Primary assessment	1.46±0.21	2.41
Airway management	1.64±0.4	3.86
Circulation management	1.79±0.43	5.16
Fixation	1.82±0.26	4.90
Secondary and continuous assessments	1.59±0.75	4.76
Patient transfer	1.68±0.2	4.01

SD=Standard deviation

**Table 3: Quality of prehospital emergency services in some of the items examined**

Caring process	Performed		Not performed	No indications
	Desirable	Undesirable		
Incident scene assessment (safety, mechanism of injury, number of injuries and need for help)	142 (94.7)	2 (1.3)	6 (4)	0
Assessment of surroundings	21 (14)	128 (85.3)	1 (0.7)	0
In the case of possibility of damage to the spine, holding the head fixed by hand	86 (57.6)	14 (9.3)	20 (13.3)	30 (20)
Primary assessment of AVPU at the incident scene	101 (67.3)	26 (17.3)	23 (15.3)	0
Evaluation and recording of vital signs and the sensory-motor status of the casualty	111 (74)	14 (9.3)	25 (16.7)	0
A brief log of the patient	104 (96.3)	15 (10)	31 (20.7)	0
Quick transfer in the case of serious injury mechanism or critical physical findings	135 (90)	11 (7.3)	4 (2.7)	0
Evaluation of unobservable damage by checking nonresponse, and pupil response to light	100 (66.7)	47 (31.3)	3 (2)	0
Providing oxygen at a high concentration of 15 L/min through the mask if there is a problem of breathing in the patient	3 (2)	68 (45.3)	19 (12.7)	60 (40)
Carotid pulse control to check the circulation status	128 (85.3)	7 (11.3)	5 (3.3)	0
Establishment of double intravenous lines using catheters with a large internal diameter (14 or 16) and preferably starting the fluid therapy by the ringer-lactate serum	0	70 (46.7)	0	80 (53.3)
Fastening a tight necklace or collar in patients with suspected cervical lesions	102 (68)	8 (5.3)	9 (6)	31 (20.7)
Fixing the patient on a back board and moving him/her with a logroll technique	98 (65.3)	10 (6.7)	11 (7.3)	31 (20.7)
Controlling the pulses, senses and movement of the distal limbs before, during and after the splenectomy	98 (65.3)	0	21 (14)	31 (20.7)
If pelvic fracture is likely, the broken pelvis will be fixated and the patient will be quickly transferred to the trauma center	59 (39.3)	14 (9.3)	11 (7.3)	66 (44)
The patient's body is inspected for any obvious ulcers, deformities or asymmetries	108 (72)	9 (6)	2 (1.3)	31 (20.7)

AVPU Scale=Alert, Voice, Pain, Unresponsive

**Table 4: Review of the variables studied and the care quality in different areas**

Variable	Assessment of the incident scene	Primary assessment	Airway management	Circulation management	Fixation	Secondary and continuous assessment	Patient transfer	Total score
Gender								
Female	1.51±0.24	1.45±0.23	1.65±0.44	1.76±0.44	1.85±0.25	1.47±0.81	1.66±0.24	1.62±0.2
Male	1.51±0.23	1.48±0.17	1.63±0.35	1.83±0.42	1.78±0.27	1.77±0.61	1.72±0.12	1.67±0.2
P	0.963	0.282	0.454	0.127	0.193	0.007	0.010	0.056
Time of the incident								
Day	1.5±0.23	1.47±0.2	1.62±0.42	1.74±0.48	1.83±0.27	1.48±0.83	1.69±0.2	1.62±0.2
Night	1.5±0.27	1.46±0.21	1.71±0.36	1.95±0.18	1.79±0.22	1.96±0.13	1.67±0.19	1.72±0.1
P	0.708	0.732	0.162	0.004	0.314	0.001	0.684	0.001
Technician educational level								
Associate degree	1.6±0.22	1.49±0.22	1.76±0.34	1.72±0.57	1.84±0.23	1.37±0.82	1.72±0.32	1.64±0.2
BA degree	1.49±0.24	1.46±0.2	1.6±0.42	1.81±0.39	1.8±0.27	1.63±0.73	1.68±0.14	1.64±0.2
P	0.011	0.546	0.253	0.482	0.365	0.028	0.176	0.908

This study is in line with Mould-Millman *et al.* (2015),<sup>[19]</sup> and Carpenter *et al.* (2013)<sup>[21]</sup> in terms of primary and secondary, and continuous assessment. In a study with a quantitative-qualitative approach, Mould-Millman *et al.* (2015) stated that EMS services are growing and the need has been identified for clinical care guidelines (such as the protocol of primary and secondary assessment) as a way to improve the quality of EMS.<sup>[19]</sup>

In this study, the maintenance of the airway with 86.3% and fixation with 90.4% were effective in providing prehospital EMS quality services, which is consistent with the study of Adib-Hajbagher *et al.* (2014), who showed that a desirable quality was observed for the maintenance of the airway in 95% of cases, supply of respiration in 42%, provision of effective circulation in 39%, spinal effective fixation in 9.5%, and fixation of injured organs in 7.8%.<sup>[17]</sup>

The results of the study were in line with the Kazemnejad's study (2015) in terms of the items related to the quality of the ambulance, who, in his study, examines time indices and ambulance standards and states that the insufficiency of ambulance equipment reduces the effectiveness of EMS.<sup>[16]</sup> In the present study, quality was measured in each area in accordance with the equipment required for the ambulance and there was no possibility of providing quality services without meeting ambulance medical equipment standards.

Furthermore, the present study is in line with Boltz *et al.* (2013) in this regard, in which the improvement factors of the EMS for the elderly included the use of proper therapeutic procedures, proper performance of the staff, and the safe transfer of the elderly to a health center in a safe and efficient environment.<sup>[18]</sup>

In other descriptive and survey studies, obligations for improving the quality of EMS have been addressed.<sup>[24,25]</sup> The quality of services in the area of assessment of the

incident was higher by technicians with associate degrees than those with a bachelor. The reason maybe that technicians with bachelor's degree were mostly nurses, while associates have been trained in medical EMS. Being trained in relevant areas can be effective in improving the quality of services and it is recommended that, if nurses are used, more attention is paid to specialized training.

### Conclusions

In explaining these findings, it can be argued that prehospital EMS require the development of both human and equipment dimensions to improve the quality of services. In the human dimension, requirements must be identified, training requirements defined, and job commitment improved. In-service training, simulation of incident scenes and operational training to make the personnel face with a variety of incidents can be a good training for human forces. Also taking into account their performance through validated checklists for job evaluation increases job commitment and job satisfaction and by increasing motivation, has a direct impact on the client satisfaction (which is the mission of the health-care sector of the country). In addition, the development of protocols and operating instructions for better and more effective communication between medical services and EMS can help improve the quality of both services. The agility of personnel also reduces service time and improves the quality of service. In the equipment dimension, the use of upgraded technologies, as well as equipping ambulances based on standards is important.

Given the lack of studies on the quality of prehospital EMS with respect to the elderly fall, this study is innovative in terms of the subject. According to the results of the study, it is recommended to improve the unduly methods and the quality of prehospital EMS by using appropriate training methods and educators as well as providing self-care courses for the elderly,

attending educational and cultural programs and even the use of modern technologies for them and their families so as to reduce the deaths and disabilities in the elderly due to falls.

In addition, it is suggested that in the clinical environment of the EMS, items related to the conditions of the elderly are added to the mission forms to make them more comprehensive-items such as environmental assessment and social assessment. This makes the health-care team more fully informed of the patient, and many of this information can be effective in health improvement and even prevention of the secondary injuries.

Among the limitations of this study, we can mention the lack of generalizability of the findings and the lack of comprehensive instruments and validation questionnaires.

The results of this study provide useful measures to be taken for the quality assessment of prehospital services in fall incidents, which are to be observed in various educational, and research areas. Although services were of satisfactory quality, there are still a lot of areas to be improved. By analyzing the quality of services, the financial and human resources can be moved toward proper targets to make the society more satisfied. It should be noted that in this study, the performance areas of the EMS were studied, but in further studies, investigation should be made of the type of responses, response timeliness, proper treatment of the patients, physical aspects such as equipment, facilities and the how the staff look, team work, sensitivity and intelligence, and other psychological aspects that are effective on the quality of service.

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### Conflicts of interest

There are no conflicts of interest.

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