Attention and Related Factors in Tehran Night Shift Prehospital Emergency Personnel

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Article info:
Received: 26 Mar. 2015
Accepted: 19 Jul. 2015

Keywords:
Attention, Emergency medical services, Prehospital emergency staff

ABSTRACT

Background: Emergency medical services (EMS) staff can play an important role in the survival and prevention of serious injuries to patients if they are in good physical and mental health and focus on doing their jobs with sufficient attention. Therefore, a study was conducted to investigate attention level and its related factors in night shift prehospital emergency personnel.

Materials and Methods: This research is a descriptive-analytic study. A total of 114 Tehran prehospital emergency staff participated in this study. Pen and paper Bonnardel test and a questionnaire was used to collect information. The attention of the participants was assessed around 10-11 PM and 4-5 AM. The data were analyzed by using the Spearman correlation coefficient and independent t test.

Results: Mean attention level of EMS staff was 0.490±0.237 around 10-11 PM and 0.456±0.252 around 4-5 AM. There was no statistically significant difference between the attention level of prehospital emergency staff around 10-11 PM and 4-5 AM (P>0.01). Also, there was significant difference between age and the night attention (P<0.01).

Conclusion: The mean level of night attention of EMS staff was moderate. Therefore, based on the average number of daily missions in different bases, we recommend increasing the number of ambulances in the base or the number of bases in the crowded emergency areas. It is also necessary to increase welfare and nutritional facilities in prehospital emergency bases so that those who are older and experienced carry out fewer missions.

1. Introduction

If care entails focusing on something [1], carelessness will be a major cause of medical errors [2]. Medical emergencies are one of the medical professions in which inattention or low attention causes irreparable damages. These services are at the forefront of health care [3] and prehospital emergency personnel are often the first people to provide the medical care [4]. Therefore, these people are in a unique position [5]. They make key decisions in prehospital environment about starting therapy, prioritizing tasks required to deploy, and dispatching the patients [4, 6].

However, research does not fully support the correctness of clinical judgments of the emergency medical personnel [4, 5, 7]. Perhaps one of the reasons for misjudgments of emergency medical personnel is the special conditions of their working environment. These conditions may affect the attention of these people [8] and disrupt their focus when making decisions about patients. Night work as well as long and unpredictable work shifts of these people, increases the possibility of fatigue in this group of health care workers. This situation reduces their physical performance and capacity and increases the probability of making mistakes in their work [9].

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Low level of concentration predispose them to making human errors. Every year, 44000 to 98000 people die in US hospitals due to medical errors [10]. Mistake and carelessness in health care, not only harms the patients, but also hurt the personnel working in these centers. The first report in this regard was about a nurse infected with HIV by a needle in 1984 [11]. Some studies have indicated that the attention of the medical personnel on their duty may not be satisfactory. Ghods et al. (2013) in their study indicated that the average attention of nurses during the work was 17.32 out of 100 [12]. Also Shokrollahi (2011) in another study indicated that the average attention of night-shift nurses was between 56.17% and 63.27% [13]. In another similar study by Ebrahimian (2006), the average attention in night-working nurses ranged between 0.23 and 0.30 [2].

Despite the sensitivity of working in prehospital emergency at night shift, no study has been conducted on investigating the attention of prehospital emergency personnel in this shift. Therefore, it seems beneficial for both public health and prehospital emergency personnel to evaluate the attention of night-working emergency medical personnel. This study will also help authorities to wisely manage their human resources based on evidence-based findings. Thus, this study was conducted to investigate attention and its related factors in night-working prehospital emergency personnel.

2. Materials and Methods

This research was a cross-sectional descriptive-analytic study conducted in 2013. The study population comprised all people who were working as the operational staff of emergency in different wards of Tehran prehospitals. The study environment was 115 emergency centers in Tehran.

To obtain the samples, the quota sampling method was used. Since the working area of prehospital emergency activities in Tehran includes 4 regions (North, South, East and West), at first with regard to sample size, an appropriate quota (n=30) was allocated to each of these areas.

Then, according to the allocated quota, the study samples were randomly selected. Inclusion criteria included working at least one year in prehospital emergency, having a good physical and mental health at the time of sampling, not using any medication, and signing the informed consent form. The reluctance of employees to participate in the study and the lack of compliance to the rules were the exclusion criteria. It was also necessary for the samples not to be on a mission at the time of sampling. If they were involved in emergency mission while completing the attention test, the test would be postponed to another time. Considering these circumstances, 114 patients were enrolled in this study from 120 allocated quota.

A questionnaire was used to collect the demographic information and some factors associated with attention. The questionnaire included items about age, marital status, job experience, educational degree, number of shifts per month, number of daily missions and habit of eating breakfast. To evaluate the attention of the personnel, crossing test of Bonnardel was used.

The test consists of a number of oriented circles that the testee (examinee) should be tested within 10 minutes to identify the symptoms similar to the 3 top marks. This test is known as pen and paper tests which estimates the attention level. Regarding its reliability, the test has been applied to evaluate the attention in several studies [2, 12, 13], also the test-retest method was used. To do so, the level of prehospital emergency care of 10 employees was estimated twice at an interval of 10 days and the correlation coefficient was obtained to be 0.93.

Before sampling, the filling method of Bonnardel test was taught to an individual in each base. Then at the beginning of each work shift, the test was delivered to the trained person and he was asked to conduct the test from the base personnel around 10-11 PM and 4-5 AM.

To obtain the degree of attention, the ratio of gained correct signs by the participants to the total number of test correct signs was calculated. To determine 24-hour attention, the average attention of each participant during the two evaluations was calculated and recorded. After correcting the tests, the obtained data were classified into 5 categories: 1) very low attention (scores between 0–0.2), 2) low attention (scores between 0.2–0.4), 3) moderate attention (scores between 0.4–0.6), 4) good attention (scores between 0.6–0.8) and 5) excellent attention (scores between 0.8-1.0).

Analysis of the results was conducted through both descriptive statistics (mean, frequency, and percentage) and analytical statistics (independent t test and Spearman correlation coefficient) using the SPSS19 statistical software and at a significance level of less than 0.05.

This study was approved by the Ethics Committee of Tehran University of Medical Sciences. To comply with the ethical issues in relation to the objective and the conducted method, some explanations were provided to the subjects and in case of agreeing to participate in the study, they were asked to complete and sign the informed consent approved by the university ethics committee.

3. Results

A total of 114 night-shift prehospital operational emergency staff in Tehran participated in this study. The mean (SD) of the age of the participants was 32.40 (5.58) years. Of them, 82 (71.9%) had an associate degree in medical emergency, 7 (6.1%) were anesthesia technicians and 25 (21.9%) had BS in nursing.

A total of 80 (70.2%) participants were married and the others were single. The average work experience of the participants was 7.50±4.60 years; the average number of their shifts per month was 12.68±4.34, and the average number of daily missions was 9.98±3.44. In addition, 92 (80.7%) individuals usually eat breakfast and 22 individuals do not eat breakfast.

Spearman correlation coefficients indicated that there is no significant relationship between any of the studied variables, except for the variable of "age" and the attention level of night shift staff at around 10-11 PM (Table 1).

The test also indicated that there was no significant relationship between any of the studied variables with the attention level of night shift staff around 10-11 PM (Table 2). Average attention rate of EMS workers around 10-11 PM was 0.490±0.237 and around 4-5 AM, 0.456±0.252. The independent t test indicated that there was no statistically significant difference between 10-11 PM and 4-5 AM periods regarding the attention level of prehospital emergency staff (Table 3).

Table 1. The frequency of variables based on the attention of prehospital emergency staff around 10-11 PM.

Attention Level / Variables		Very low		Low		Moderate		Good		Excellent		Total		P Value
		n	%	n	%	n	%	n	%	n	%	n	%	
Age, Y	20-25	0	0	0	0	2	28.6	3	42.9	2	28.6	7	6.2	0.032
	25.1-30	5	11.6	5	11.6	17	39.5	13	30.2	3	7	43	37.7	
	30.1-35	9	26.5	7	20.6	10	29.4	5	14.7	3	8.8	34	29.8	
	35.1-40	3	16.7	2	11.1	10	55.6	1	5.6	2	11.1	18	15.8	
	>40	2	16.7	1	8.3	6	50	2	16.7	1	8.3	12	10.5	
Education	Medical emergency	15	18.3	10	12.2	30	36.6	18	22	9	11	82	71.9	0.943
	Anesthesiology technician	2	18.6	2	28.6	2	28.6	1	14.3	0	0	7	6.1	
	Nurse	2	8	3	12	13	52	5	20	2	8	25	22	
Marital status	Single	6	17.6	4	11.8	10	29.4	11	32.4	3	8.8	34	29.8	0.455
	Married	13	16.3	11	13.8	35	43.8	13	16.3	8	10	80	70.2	
Job experience, Y	1-5	7	15.2	6	13	18	39.1	11	23.9	4	8.7	46	40.4	0.589
	5.1-10	8	17.8	7	15.6	14	31.1	12	16.7	4	8.9	45	39.5	
	10.1-15	1	6.7	1	6.7	11	73.3	0	0	2	13.3	15	13.2	
	15.1-20	3	50	0	0	1	16.7	1	16.7	1	16.7	6	5.3	
	>20	0	0	1	50	1	50	0	0	0	0	2	1.8	
Average number of work shifts	<5	0	0	0	0	0	0	0	0	0	0	0	0	0.658
	5-9	11	14.9	11	14.9	32	43.2	13	17.6	7	9.5	74	64.9	
	10-14	4	30.8	1	7.7	2	15.4	4	30.8	2	15.4	13	11.4	
	≥15	4	14.8	3	11.1	11	40.7	7	25.9	2	7.4	27	23.7	
Number of daily missions	<5	0	0	3	25	5	41.7	2	16.7	2	16.7	12	10.5	0.218
	5-9	5	8.2	8	13.1	32	52.5	10	16.4	6	9.8	61	53.5	
	10-14	14	36.8	4	10.5	7	18.4	11	28.9	2	5.3	38	33.3	
	≥15	0	0	0	0	1	33.3	1	33.3	1	33.3	3	2.6	
Habit to eat breakfast	Yes	18	19.6	12	13	34	37	20	21.7	8	8.7	22	19.3	0.277
	No	1	4.5	3	13.6	11	50	4	18.2	3	13.6	92	80.7	

Table 2. The frequency of variables based on the attention of prehospital emergency staff around 4-5 AM.

Attention Level / Variables		Very low		Low		Moderate		Good		Excellent		Total		P Value
		n	%	n	%	n	%	n	%	n	%	n	%	
Age, Y	20-25	1	14.3	1	14.3	2	28.6	2	28.6	1	14.3	7	6.2	0.832
	25.1-30	7	16.3	9	20.9	16	37.2	7	16.3	4	9.3	43	37.7	
	30.1-35	13	38.2	5	14.7	9	26.5	2	5.9	5	14.7	34	29.8	
	35.1-40	4	22.2	2	11.1	7	38.9	2	11.1	3	16.7	18	15.8	
	>40	2	16.7	1	8.3	5	41.7	3	25	1	8.3	12	10.5	
Education	Medical emergency	18	22	13	15.9	27	32.9	14	14.1	10	12.2	82	71.9	0.486
	Anesthesiology technician	3	42.9	1	14.3	3	42.9	0	0	0	0	7	6.1	
	Nurse	6	24	4	16	9	36	2	8	4	16	25	22	
Marital status	Single	8	23.5	6	17.6	11	32.4	6	17.6	3	8.8	34	29.8	0.841
	Married	19	23.8	12	15	28	35	10	12.5	11	13.8	80	70.2	
Job experience, Y	1-5	10	21.7	8	17.4	18	39.1	6	13	4	8.7	46	40.4	0.728
	5.1-10	12	26.7	6	13.3	14	31.1	6	13.3	7	15.6	45	39.5	
	10.1-15	2	13.3	3	20	6	40	2	13.3	2	13.3	15	13.2	
	15.1-20	3	50	0	0	1	16.7	1	16.7	1	16.7	6	5.3	
	>20	0	0	1	50	0	0	1	50	0	0	2	1.8	
Average number of work shifts	<5	0	0	0	0	0	0	0	0	0	0	0	0	0.208
	5-9	16	21.6	15	20.3	28	37.8	9	12.2	6	8.1	74	64.9	
	10-14	4	30.8	2	15.4	3	23.1	1	7.7	3	23.1	13	11.4	
	≥15	7	25.9	1	3.7	8	29.6	6	22.2	5	18.5	27	23.7	
Number of daily missions	<5	0	0	5	41.7	3	25	2	16.7	2	16.7	12	10.5	0.662
	5-9	12	19.7	11	18	25	41	8	13.1	5	8.2	61	53.5	
	10-14	15	39.5	1	2.6	11	28.9	5	13.2	6	15.8	38	33.3	
	≥15	0	0	1	33.3	0	0	1	33.3	1	33.3	3	2.6	
Habit to eat breakfast	Yes	24	26.1	11	12	32	34.8	14	15.2	11	12	22	19.3	0.971
	No	0	13.6	7	31.8	7	31.8	2	9.1	3	13.6	92	80.7	

4. Discussion

The information resulted from the personal characteristics of the subjects indicated that the average age of prehospital emergency personnel participating in the study was 32.4±5.85 years and the mean duration of their job experience was 7.50±4.60 years. In most relevant studies conducted in Iran, most of the participants were young and had a job experience of 5 to 10 years. For example, the mean age of the participants in a study conducted to investigate the attention of Damghan hospitals ICU staff, was 29.56±4.95 years and the average job experience of these individuals was 6.8±4.9 years [2]. In a study conducted by Ghods et al. (2013), 62.5% of intensive care unit nurses were under 30 years old and 56.3% had a job experience of less than 5 years [12]. But in a study con-

Table 3. Comparison of attention level around 10-11 PM with 4-5 AM in the prehospital emergency staff.

Attention level \ Times		10-11 PM			4-5 AM			P Value
		n	%	Mean±SD	n	%	Mean±SD	
Attention level	Very low	19	16.7	0.490±0.237	27	23.7	0.456±0.252	0.203
	Low	15	13.2		18	15.8		
	Moderate	45	39.5		39	34.2		
	Good	24	21.1		16	14		
	Excellent	11	9.6		14	12.3		
	Total	114	100		114	100		

ducted by Asaroodi (2008) to investigate the causes of late dispatch of ambulances in Mashhad, the average job experience of prehospital emergency staff was reported at 135.00±22.78 months (more than 11 years) [14]. The young age of the individuals in this study (in comparison to the study conducted by Asaroodi) was due to a large number of young graduates who got an associate degree in the field of prehospital emergency and employed by the prehospital medical emergency system in recent years. In any case, these findings suggest that the human resource in the prehospital emergency of the country is young and there is still enough time to promote physical and mental health of employees in this area and prevent burnout.

The results indicated that 71.9% of the participants had an associate degree in medical emergency. This issue confirms the youngness of human resources in this field which has been mentioned above. In the study conducted by Asaroodi, 22.3% of the subjects had diploma, 33.9% had associate degree, 26.2% had BS, and 17.5% had professional doctorate [14]. The results also indicated that 70.2% of the participants were married and others were single. In a study conducted by Mahmoudi (2007) on nurses in intensive care units, he found that 84% of the subjects were married [15]. In the study conducted by Ghods (2013), only 18.8% of the nurses were single [12].

The results indicated that the average number of prehospital emergency staff work shift in Tehran is 12.68±4.34 shifts per month. In other relevant studies conducted in Iran, the mean work-shift have been reported to be in this range. Ebrahimian (2003) in his study indicated that the average number of night-work shifts in the intensive care unit nurses is 10.00±2.18 [16]. However, in countries such as Japan and America, the work time of the medical personnel usually does not exceed 36 hours per week [17, 18]. Presumably, the more work-shift in prehospital emergency is due to the expansion of prehospital emergency services, shortage of human resources, and a greater willingness of the personnel to work in more shifts to afford living costs.

The results indicate the high number of daily missions in Tehran. Each staff member had an average of 9.98±3.44 missions per day. It seems that high population density in Tehran, large number of cardiac and respiratory patients due to air pollution and relatively low number of prehospital emergency centers in comparison to the population, is one of the main causes of the increase in the number of emergency missions in this city. In this regard, Moradian (2013) indicated that about 50% of ambulance dispatches in Shiraz has been done from a place other than the main center. He blamed the shortages of ambulances as the main reason behind that [3]. In a study by Jarl et al. (2007) reported the poor management in the distribution of ambulances, their inefficiency at times of increasing the number of missions, and long-term accountability [19]. Moradian in his study also stated that due to traffic the accountability over the standard time has increased ambulance requests which could increase the number of emergency missions in populated areas [3].

The results indicated that 80.7% of the participants had a habit of eating breakfast. Apparently, the existence of equipped kitchens, refrigerator and relatively sufficient food in the prehospital emergency centers encouraged the participants to have breakfast there. Since shift of prehospital emergency staff changes at 7.30 AM in the morning and they should sleep early at night so that they could get up at least one hour before the shift delivery, their tendency to eat breakfast at bases increases. Karimi (2008) indicated that the two main reasons of not eating breakfast are their late sleep and late wake up [20].

The results showed that the average attention of prehospital emergency personnel around 10-11 at night was moderate. Also the Spearman correlation coefficient showed that there is no significant difference between the demographic variables, except for the “age” and the attention level of EMS staff in the period of 10-11 at night. In this regard, 59.9% of over 30 years employees had a very low rate of attention and 31.6% of them had low attention. Marital status, abundant preoccupations of life in a big city like Tehran, doing hard work in multiple shifts, having a busy day of work, and inadequate rest are among the problems that lead to the low attention of older prehospital emergency staff in these hours. Therefore, working schedule of people over 30 years should be designed so that instead of 24-hour service, they work in shorter shifts with fewer hours, say 8 or maximum of 12 hours, or make them work on bases that have less workload. Because they are less accurate at these times and have higher possibility of making human error.

The results showed that the average attention of the participants in the period between 4 to 5 AM was moderate. In a study conducted by Shokrollahi et al. (2011), the average nursing attention was reported as 0.561±0.224 between 4 and 5 AM [13]. Ebrahimian et al. (2006) in their study showed that the average attention on night-shift ICU nurses between 4 and 5 AM was 0.23±0.19. They also showed that there is a significant difference between some variables such as age, number of night shifts in a month, and weight and the attention of night ICU nurses in these times, but there was no significant

difference between gender and educational level of nurses with their attention [2]. Also 45.4% of people who did not eat breakfast in the morning had low and very low level of attention in these hours. And since one of the reasons of people not eating breakfast is getting up late [20], measures should be implemented that these people use materials containing glucose in these hours [2, 22] so that if they get a mission in these hours their level of precision and focus be normal.

The mean attention level of the participants in both study periods was moderate. Considering the high sensitivity of work in the prehospital emergency ward this finding is somewhat disturbing. Furthermore, the present study was conducted at a time when these people were in their base and not busy with the mission and if their attention was measured at the time of the mission, different results could be obtained. It is likely that due to the stress of the mission and the release of hormones such as adrenaline, followed by a significant increase in blood sugar, the attention of staff during the mission increases. But this is more of a theory and its proof needs a more serious study with a different approach.

Although having the attention in the moderate level in all hours of the day among the staff was not desirable, remaining the attention in a fixed level shows that working conditions, workload, and the stress in prehospital environment is in a way that allows these people to have relative readiness in their working bases all the time to carry out their missions. Also, the results showed that the number of prehospital emergency missions in Tehran is high. In addition, the demographic and working variables except age did not have a significant effect on the working process of staff in this field.

In conclusion, we recommend that on the basis of the average number of daily missions in different bases, the number of ambulances in the base or the number of bases in the crowded emergency areas increases. It is also necessary to increase welfare and nutritional facilities in prehospital emergency bases so that those who are older work less with lower number of missions.

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