





Investigating the Relationship between Teamwork and Professional and Demographic Factors of Emergency Medical Technicians (EMTs) in Zanjan Province in 2019

Rashtchi V¹, Soleymani M^{2*}, Amini K³, Fallah R⁴

¹Anesthesiologist, Assistant professor, School of Nursing and Midwifery, Zanjan University of Medical Sciences, Zanjan, Iran

²Master's Student, School of Nursing and Midwifery, Zanjan University of Medical Sciences, Zanjan, Iran

³Ph.D Associate Professor, Zanjan Social Department of Health Research Center, Zanjan University of Medical Sciences, Zanjan, Iran

⁴Ph.D Assistant Professor, Department of Biostatistics, School of Medicine, Zanjan University of Medical Sciences, Zanjan, Iran

***Corresponding Author:** Master's student, School of Nursing and Midwifery, Zanjan University of Medical Sciences, Zanjan, Iran

Tel: 0098- 9141289509

Email: mostafa.soleymani20@gmail.com

Received: 6 July 2020

Accepted: 7 Sep 2020

Abstract

Background: There are not many studies on relationship between teamwork in pre-hospital Emergency Medical Services (EMS) and the relationship between teamwork and its consequences is complicated.

Objectives: Therefore, the goal of this research is studying the degree of teamwork and its relationship with job and demographic factors of the Emergency Medical Technicians (EMTs) in Zanjan Province.

Methods: This cross-sectional study focused on the correlation between inclination to teamwork and the demographic features of the EMTs, using a researcher-made demographic and job features instrument and Patterson's EMT-Teamwork scale. The data were analyzed through the SPSS. 16 software, and $p < 0.05$ level of significance was adopted. The ethical code of IR.ZUMS.REC.1398.243 for this research was obtained from Zanjan University of Medical Sciences.

Results: This cross-sectional study showed mean score of confrontation with teamwork to be 58.44 ± 17.25 and the highest score belonged to Interpersonal Conflict (IC). Furthermore, the mean score of inclination to teamwork was 63.71 ± 11.08 and the highest score in this respect belonged to the partner adaptability and leadership. The linear regression analysis also showed that total teamwork score was statistically significant with respect to the number of missions, workplace and the working environment.

Conclusion: The teamwork score of the Emergency Medical Technicians (EMTs) IN Zanjan was acceptable and total teamwork score was statistically significant with respect to number of missions, workplace and working environment of the Emergency Medical Technicians (EMTs) in Zanjan Province.

Keywords: *teamwork, emergency medical technicians, demographic*

Introduction

Teamwork consists of coordinated actions and behavior shown by members of a team to achieve common goal [1]. Teamwork is among main principles of complicated and highly detrimental working places [2]. A person's ability to offer an effective job in a team marks an important skill component for the medication personnel [3]. Research shows that in healthcare services, teamwork results in better safety of the patient, effective care and better working environment [4-

7]. Weaver et al. (2012) showed that low teamwork scores are linked with high reports of vulnerability [8]. Evidence shows that teamwork is necessary for growing order and discipline in health care when human resources are in shortage [9-10]. The most important pillar of medication is emergency cares, especially the pre-hospital one [11]. The Emergency Medical Services (EMS) are part of the chain of patient care and these individuals, as the immediate people accountable to people, are in emergency conditions and in

another words, they are in front line of medication [12]. They share a common goal, which consists of caring for and keeping patients and the truly injured individuals in a stable condition, and their safe transfer to a suitable destination to continue with medication. This requires teamwork [13]. The emergency medical teams often consist of two technicians in each ambulance and in any shift [14]. Effective communication among the team members depends on the members of the team, the working condition, adaptability with tools and standard behaviors, being a highly influential tool in minimizing the dangers caused by work, while raising the teamwork spirit [8]. The personality features of the members will have the highest impact on behavioral achievements of the team and the teamwork level has something to do with job factors of the team [15]. The Emergency Medical Technicians' (EMT) teams are different with teams of other organizations for different reasons. Patterson et al. showed in the US that mean score of teamwork of the emergency medical personnel is average to high but the scores are in extreme difference when it comes to different agencies and personnel with different job features [14]. In Iran, a study on the personnel caring for the cardiac patients showed that mean teamwork score of the personnel was on the average and the teamwork was linked with age, gender and job experience of the personnel [15]. Limited studies on teamwork in the pre-hospital emergency system do exist [16] and the relationship between familiarity with teamwork and its results is complicated. The goal of this study is investigating the degree of teamwork and its relationship with job and demographic factors of the Emergency Medical Technicians (EMTs) in Zanzan Province.

Methods

This descriptive-cross-sectional survey was done in the setting of the Pre-hospital Emergency Medical Service (EMS) of Zanzan Province from September to November 2019. Having obtained the ethics code from Zanzan University of Medical Sciences, all (n=251) the pre-hospital EMS technicians in Zanzan Province, who were busy in the urban and road bases as technicians, were chosen on stratified random sampling method as the statistical population. The pre-hospital EMS technicians were all male and

served emergency missions on two working shifts in the urban and road bases. The sample size was estimated with 95% confidence interval and error level of 5% after a content, clarity, format and item relevance study on 30 of the personnel and the number of the sample was estimated to be 151. The samples represented seven layers and represented a single layer in nearby cities. They were included in the study after specification of the number of personnel in each city. The participants were from Zanzan Province pre-hospital EMS with job experience record in the pre-hospital EMS for more than one year or without engagement in a second job and they were excluded from the survey on their will.

Having briefed them on the study goals, the participating personnel were informed of the way to fill up the questionnaire, confidentiality of the information and their interest in cooperation and were then instructed to sign the informed consent form. 220 questionnaires on demographic information of the participant personnel and Patterson's Teamwork Scale were then distributed and were collected after completion. A total of 153 emergency personnel filled up the questionnaires.

The tools used in this study were as follows: The questionnaire of demographic features, including age, marital status and number of children and job factors, including salary level, employment, job experience, office location, type of base, educational status number of missions in each shift, type of shift and number of working hours per week. The EMT-Teamwork questionnaire of Patterson et al. (2011) was introduced and its validity was estimated [17]. The EMT-Teamwork Questionnaire was translated and re-translated per translation principles. The content and face validity of the instrument was checked by giving it to 10 members of the board of instructors of Zanzan University of Medical Sciences. After obtaining their views, necessary corrections were made and the necessary validity of the questionnaire was obtained. The reliability of the questionnaire was checked prior to the study through piloting on 30 people and the Cronbach's In order for reliability of the questionnaire, will be estimated, using Cronbach's alpha formula was 0.768. The questionnaire had 45 items, including nine sub-scales in two conflict and non-conflict groups. The non-conflict sub-scale had 33 items

in five sub-sets of Team Orientation (TO), Team Structure and Leadership (TSL), the Partner Communication, Team Support and Monitoring (PCTSM), the Partner Trust and Shared Mental Models (PTSMM) and the Partner Adaptability and Backup Behavior (PABUB), five-point Likert scale. The Conflict Scale had 12 items in four sub-sets, including Process Conflict (PC), Strong Task Conflict (STC), Mild Task Conflict (MTC) and Interpersonal Conflict (IC), which were answered on five-point Likert scale.

Data Analysis

After collection of the data, they were put into the SPSS version 16 for analysis. To report the qualitative data, percentage was used, while for the quantitative data, mean and standard deviation were used. To check any relationship between the

job factors and the teamwork scores, multiple linear regression model was used.

Results

Investigation of the demographic and job features shows that all the technicians were male and held undergraduate and BS degrees in Emergency Medicine, nursing and anesthesiology. The mean age of the personnel was 33.86 ± 7.04 and about 62 percent of the personnel had less than 10 years of working experience. More than 85% of the personnel were busy in 24-hour shifts and about 55% of the people reported that they worked with a permanent employee in the working shift. More than 80% of the people worked for more than 72 hours a week and more than half of people did for more than 96 hours a week. Table 1 shows overall results in detail.

Table 1: Job and Demographic Features of the Emergency Medical Technicians (EMTs) in Zanjan Province

Features		Frequency	Percentage	Features		Frequency	Percentage
Age	23-30	60	38.2	Number of Missions in 24 Hours	Less than 5	99	63.1
	31-40	65	41.4		5-15	50	31.8
	41-55	28	17.8		More than 15	3	1.9
	Total Age Average	33.68±7.04		Working Place	Zanjan	35	22.9
Type of Shift	Hours with Permanent Colleague	2	1.3		City	118	77.1
	hours with Temporary colleague	16	10.4	Working Environment	Suburban	62	40.5
	24 hours with Permanent colleague	81	53		Urban	71	46.4
	24 Hours with Temporary Colleague	54	35.3		Urban and Suburban	20	13.1
Marital Status	Single	40	26.1	Working Hours Per Week	48 Hours	27	17.6
	Married	113	73.9		72 Hours	47	30.7
	Job Experience	1-5 Years	56		36.6	96 Hours	78
5-10 Years		40	26.1	Educational Status	Diploma	10	6.5
More than 10 Years		56	36.6		Undergraduate	70	45.8
Number of Children	0	57	37.3		Major	BS/BA	73
	1	48	31.4	Nursing		24	15.7
	2	33	21.6	Emergency Medicine		116	75.8
	3	13	8.5	Anesthesiology		10	6.5
	4	1	0.7				
	Level of income	Less than 3 Million Tomans	84	54.9		Employment	Permanent
3-4 Million Tomans		54	35.3	Contractual	39		25.5
4-5 Million Tomans		13	8.5	Temporary-to Permanent	72		47.1
More than 5 Million Tomans		2	1.3	Project-Based	10		6.5

In this study, the mean score of interest in teamwork was 63.71 ± 11.08 and the highest score in this scope belonged to Partner Adaptability and Backup Behavior. Furthermore, the score of confronting teamwork was equal to 58.44 ± 17.25

and the highest score was recorded with Interpersonal Conflict. Table 2 shows the scores for sub-groups of confrontation with teamwork and interest in teamwork.

Table 2: Descriptive Statistics of Scores of Confrontation with the Emergency Medical Technicians' (EMTs) Teamwork and Interest in Team Work

Dimensions of Confrontation	Mean (%) \pm SD(%)	Dimensions of Interest	Mean (%) \pm SD(%)
Teamwork Interest Total Score	63.71 \pm 11.08	Teamwork Confrontation Total Score	58.44 \pm 17.25
Mild Task Conflict (MTC)	48.14 \pm 25.49	Team Orientation (TO)	46.13 \pm 24.30
Strong Task Conflict (STC)	53.20 \pm 24.22	Team Structure and Leadership (TSL)	75.05 \pm 26.23
Process Conflict (PC)	64.37 \pm 26.13	The Partner Communication, Team Support and Monitoring (PCTSM)	73.74 \pm 15.95
Interpersonal Conflict (IC)	68.40 \pm 25.46	The Partner Trust and Shared Mental Models (PTSM)	43.87 \pm 23.93
		The Partner Adaptability and Backup Behavior (PABUB)	75.35 \pm 24.04

Linear regression analysis showed that total teamwork score of the Emergency Medical Technicians (EMTs) in Zanjan Province had negative relationship of significance with number of missions and total teamwork score had positive

relation of significance with the working place (city compared to Zanjan) and the working environment (suburban base compared to urban base).(in table 3).

Table 3: Relationship between Total Score of Teamwork and Job and Demographic Features based on Multiple Linear Regression (MLR) Model

Criterion variable		Teamwork			T	Sig
Predictor Variable		Non-Standard Coefficients	Standard Coefficient			
		B	Beta	Beta		
Age		0.226	0.373	0.253	1.313	0.4
Job Experience		0.362	0.533	0.142	0.238	0.5
Number of Missions		-1.543	0.466	-0.588	-2.214	0.001
Working Place	City& Zanjan	6.242	3.425	0.052	0.630	0.02
Working Environment	Urban and Suburban Bases	6.316	2.072	0.462	1.211	0.003
Working Hour per Week	72 Hours and 48 Hours	2.158	3.253	0.320	0.135	0.5
	96 Hours and 48 Hours	-3.362	2.871	-0.236	-0.321	0.3
Educational Status	Diploma and Undergraduate	2.207	5.292	0.501	0.05	0.6
	Diploma and BA/BS	-1.142	0.371	-0.562	-0.412	0.8
Type of Partner	Permanent and Contractual Partne	4.415	4.467	0.856	2.623	0.3
	Permanent and Project-Based Partner	0.347	6.351	0.322	0.561	0.9
	Permanent and Project-Based Partner	4.415	4.467	0.451	1.234	0.3
Type of Shift	12 Hours with Temporary Colleague and 12 Hours with Permanent Colleague	-7.346	11.176	-0.325	-1.456	0.06
	24 Hours with Permanent Colleague and 12 Hours with Permanent Colleague	-4.098	10.796	-0.632	-0.258	0.7
	24 Hours with Temporary Colleague and 12 Hours with Permanent Colleague	-4.541	10.971	-0.755	-1.125	0.6

Discussion

The study of the demographic features pointed to the mean age of 33 and 63% percent of the participants having less than 10 years of experience, indicating that the EMTs in Zanjan Province were young. The finding is in agreement with results of a study by Weaver et al. (2015) in the US. This study also showed that 53% of the people were below 35 years of age and 49% had less than 10 years of experience [8]. However, the results were in contradiction with results of the study by Patterson et al. (2010), which indicated that about 54% of the participants were above 40 years of age and 58% of the personnel had more than 10 years of experience [18]. It seems that the reason for difference in the results is that the academic pre-hospital Emergency Medical Services (EMS) in Iran is a newer experience than that of the US. Furthermore, the data relating to the two above-mentioned studies totally differed with that of this study in terms of the personnel's gender with respect to the fact that whole the pre-hospital EMS technicians involved in this study in Iran were male. More than half of the personnel had reported more than 96 hours per week work, which is to some extent in contradiction with the findings of a study by Patterson [18]. The higher figure relating to the working hour, reported in this study, showed personnel shortage, consequently extreme working load of the personnel.

Analysis of the data, obtained from 153 questionnaires, showed that the teamwork scores of the conflict and Non-Conflict sub-groups were satisfactory and were in agreement with results of a study by Patterson et al., who had studied several EMS agencies in the US and reported the technicians' teamwork scores falling within the range of 45 and 90 [14]. It also indicated that the EMS personnel teamwork scores was average to high. Despite the fact that ample studies show that stress, fatigue and repeated shift changes lead to lower teamwork and endanger it [14,18-19], the personnel in this study presented satisfactory teamwork score though reporting more shift changes and their having higher working hours. It seems that the EMS personnel in this study are highly committed to their job, leading to higher teamwork spirit. This needs further study in the future.

Salas et al. (2005) showed that the main components of teamwork were five general structures of team leadership, team orientation, mutual supervision, backup behavior and adaptability [20]. Investigation of teamwork areas based on Patterson teamwork measuring instrument showed that score of people ranges between 43 and 75. Though the mean teamwork score is satisfactory for the technicians under study, the low score of people in certain sub-groups under investigation justifies the weak perception on teamwork. Weaver et al. indicated that low teamwork score can increase job vulnerability, medical errors, bitter events and the behaviors that cause insecurity [18,17]. Necessary measures are suggested to be adopted to prevent such bitter events, which may endanger safety of the patients and the personnel, and through education and teamwork practices, teamwork function of the personnel can thus be promoted.

This study showed that highest score in the sub-groups were related to the Partner Adaptability and Backup Behavior (PABUB) and Team Structure and Leadership (TSL) and the lower score belonged to the Partner Trust and Shared Mental Models (PTSMM) and Team Orientation (TO), respectively. The findings are in agreement with a study by Khooshab et al. (2018) in Iran in connection with medication personnel in the cardiac ward. This study showed that the highest score belonged to team leadership and the lower score to team structure [15].

Results of this study showed that total teamwork score of the EMTs in Zanjan Province was significant in connection only with number of missions, working environment and office. Results show that the higher is number of missions, the more teamwork will become problematic; moreover, compared to Zanjan and urban bases, the teamwork score is higher in bases in small cities and the sub-urban areas due to less job stress and lesser missions. Khooshab et al. showed that teamwork total mean score was related with age, gender and working experience of the experienced EMTs responsible for caring the cardiac patients [15]. Jassemi et al. (2013) also showed that teamwork attitude was significant with experience of the personnel and office of the nurses and physicians [21]. Mahfouzpour et al. (2009) proved relationship of significance between teamwork attitude of nurses and

physicians and the organization post variable; this is while, no relationship of significance was proved with other demographic variables under study like gender, working experience and marital status of the personnel [22].

The Emergency Medical Services (EMS) team, taking part in this study, consisted of two persons, working in 12- or 24-hour working shifts. A total of 54% of the people reported that their colleague in their working shift was permanent employee, having regular and predictable plan and other people did not have predictable program and permanent colleague. Though few studies have investigated the degree of communion and familiarity of the EMS coworkers, Patterson studies confirmed that each technician in EMS team co-worked 19 different technicians throughout the year [14] and Patterson's studies showed that the lower is the communion and familiarity of pre-hospital Emergency Medical Services, that is the less they have prior acquaintance, they will face more job vulnerabilities and the highest job vulnerabilities are reported in the first shift of the people when their co-workers work in a single shift for the first time [23].

Results of this study showed that the teamwork score of Zanjan Province EMTs was in a satisfactory level and the score was significant with number of missions, type of working environment and office: Regarding the results, the less number of the missions and less working environment (in small cities compared to Zanjan) is stressful, the better the teamwork of EMTs will be. It is recommended to do this study in wider communities and investigate more job and demographic variables to specify likely relationship between the score of teamwork and other factors.

This study for the first time ever used Patterson's EMT-Teamwork questionnaire to investigate the EMTs' teamwork in Iran. Prior to the study, a pilot study was done to check the validity and reliability. Among other strong points of this study is maximum coverage of technicians in a province and the results can be used for future policy making in Zanjan Province.

Alike other cross-sectional studies, the teamwork investigation can be generalized into a sample community and cannot be used for state policy

making. Countrywide investigation in the area is hoped to be made in the future.

Acknowledgements

This study was conducted under the support of Zanjan University of Medical Sciences. The ethics code for the study in the Ethics Committee of Zanjan University of Medical Sciences is IR.ZUMS.REC.1398.243. All the 115 Emergency officials in Zanjan Province and the emergency technicians in Zanjan, who provided necessary cooperation in collection of the data, are hereby appreciated. Meanwhile, the author acknowledges that there is no conflict of interest to declare in this article.

Conflict of interest

The author declares no conflicts of interest.

References

1. Salas E, DiazGranados D, Klein C, Burke Sh. Does Team Training Improve Team Performance? A Meta-Analysis. *Hum Factors*. 2009; 50(6): 903- 33.
2. Sauer J, Darioly A, Mast MS, Schmid PC, Bischof N. A multi-level approach of evaluating crew resource management training: a laboratory-based study examining communication skills as a function of team congruence. *Ergonomics*. 2010; 53(11): 1311- 24.
3. General Medical Council. Good Medical Practice [cited 2018]; Available from: URL: https://www.gmc-uk.org/guidance/good_medical_practiceasp
4. Kalisch BJ, Lee H, Rochman M. Nursing staff teamwork and job satisfaction. *J Nurs Manag*. 2010; 18(8): 938- 47.
5. Lemieux-Charles L, McGuire WL. What do we know about health care team effectiveness? A review of the literature. *Med Care Res Rev*. 2006; 63(3): 263- 300.
6. Manser T. Teamwork and patient safety in dynamic domains of healthcare: a review of the literature. *Acta Anaesthesiol Scand*. 2009; 53(2): 143- 51.
7. Welp A, Manser T. Integrating teamwork, clinician occupational well-being and patient safety â“ development of a conceptual framework based on a systematic review. *BMC Health Serv Res*. 2016; 16(1): 281.
8. Weaver MD, Patterson PD, Fabio A, Moore CG, Freiberg MS, Songer TJ. An observational

study of shift length, crew familiarity, and occupational injury and illness in emergency medical services workers. *Occup Environ Med.* 2015; 72(11): 798- 804.

9. Mitchell R, Parker V, Giles M, White N. Review: Toward realizing the potential of diversity in composition of interprofessional health care teams: an examination of the cognitive and psychosocial dynamics of interprofessional collaboration. *Med Care Res Rev.* 2010; 67(1): 3-26.

10. Retchin SM. A conceptual framework for interprofessional and co-managed care. *Acad Med.* 2008; 83(10): 929- 33.

11. Keebler JR, Lazzara EH, Misasi P. *Human Factors and Ergonomics of Prehospital Emergency Care.* 1st ed. Florida: CRC Press; 2017.

12. Ebrahimi H, Navidian A, Ameri M, Sadeghi M. Burnout, dimensions and its related factors in the operational staff of medicine emergency. *J Health Promotion Management.* 2014; 3(3): 16-26. [In Persian]

13. Khashayar P, Amoli HA, Tavakoli H, Panahi F. Efficacy of pre-hospital care in trauma patients in Iran. *Emerg Med J.* 2010; 27(6): 430- 32.

14. Patterson PD, Arnold RM, Abebe K, et al. "Variation in emergency medical technician partner familiarity." *Health Serv Res.* 2011; 46(4): 1319- 31.

15. Khoshab H, Nouhi E, Targari B, Ahmadi F. A survey on teamwork status in caring for patients with heart failure: A cross-sectional study. *J Interprof Care.* 2019; 33(1): 8- 14.

16. Soleimani M, Dadashzade A, Khani J. The need to pay attention to teamwork in pre-hospital emergency. *J Inj Violence Res.* 2019; 11 (4 Suppl 2): 149.

17. Patterson PD, Weaver MD, Weaver SJ, et al. Measuring teamwork and conflict among emergency medical technician personnel. *Prehosp Emerg care.* 2012; 16(1): 98-108.

18. Patterson PD, Suffoletto BP, Kupas DF, Weaver MD, Hostler D. Sleep quality and fatigue among prehospital providers. *Prehosp Emerg Care.* 2010; 14(2): 187- 93.

19. Kerai SM, Khan UR, Islam M, Asad N, Razzak J, Pasha O. Post-traumatic stress disorder and its predictors in emergency medical service personnel: a cross-sectional study from Karachi, Pakistan. *BMC Emerg Med.* 2017; 17(1): 26.

20. Salas E, Sims DE, Burke Sh. Is there a five big in Teamwork? *Small Group Res.* 2005; 36(5): 555- 99.

21. Jasemi M, Rahmani A, Aghakhani N, Hosseini F, Eghtedar S. Nurses and Physicians' viewpoint toward interprofessional collaboration. *Iran J Nurs.* 2013; 26(81): 1- 10. [In Persian]

22. Mahfoozpour S, Mojdekar R. Attitudes of Health Care providers toward Teamwork, Safety Climate and knowledge. *Advances in Nursing & Midwifery.* 2012; 21(76): 35- 41.

23. Patterson PD, Weaver MD, Landsittel DP, et al. Teammate familiarity and risk of injury in emergency medical services. *Emerg Med J.* 2016; 33(4): 280- 5.