OCCUPATIONAL ACCIDENTS ENCOUNTERED PRE-HOSPITAL BY EMERGENCY MEDICAL SERVICES PERSONNEL AND EVALUATION OF FEEDBACK

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Abstract
This study aims to investigate occupational accidents and their contributing factors encountered by emergency medical services professionals. Workplace incident report forms submitted between January 2017 and November 2019 and determined by the Ankara provincial health directorate emergency health services have been evaluated. Evaluation of workplace accidents according to contributing factors has shown that most accidents occur due to mechanical (41.3%) and psychosocial (19.7%) factors. In this study, musculoskeletal system injuries were found to be the most observed result of occupational accidents (57.8%). While males encountered workplace accidents mostly due to ergonomic reasons, female personnel suffered accidents mainly due to biological factors. Thus, while female workers were more likely to be exposed to blood and bodily fluids, male workers were at risk to face accidents due to transportation. Further analysis showed that biological accidents were mostly seen in interns (50%), whereas the highest rates of ergonomic (29.1%) and psychosocial (22.5%) workplace accidents were seen among drivers. Pre-hospital emergency health care workers have a high risk of exposure to workplace accidents. It will be beneficial to develop strategies in order to decrease the risk of occupational incidents.
Key words: Pre-hospital emergency medical services, emergency medical services personnels, workplace accident, occupational hazard, occupational safety and health.

HASTANE ÖNCESİ ACİL SERVİS ÇALIŞANLARININ MARUZ KALDIĞI İŞ KAZALARI VE GERİ BİLDİRİMLERİNİN DEĞERLENDİRİLMESİ

Araştırma, 112 Ambulans Servisinde çalışan acil sağlık hizmetleri (EMS) personellerinin maruz kaldığı iş kazalarını ve etkileyen etmenlerini incelemeyi amaçlamaktadır. Ocak 2017-Kasım 2019 tarihleri arasında yapılan ve Ankara il sağlık müdürlüğü acil sağlık hizmetleri başkanlığınca tespit edilen tüm iş kazası bildirim formları analiz edilmiştir. Maruz kalınan kazaların risk etmenlerine göre dağılımı incelendiğinde 112 ambulans çalışanlarının en fazla mekanik (%41,3) ve psikososyal (%19,7) risklere bağlı iş kazası geçirdiği bulunmuştur. Bu araştırmada maruz kalınan iş kazaları sonrasında en çok kas iskelet sistemi yaralanması (%57,8) olduğu tespit edilmiştir. Erkekler kadınlara göre daha fazla ergonomik nedenlere bağlı iş kazası geçirirken, kadınların erkeklere göre daha fazla biyolojik nedenlere bağlı iş kazası geçirdiği tespit edilmiştir. Ayrıca, kadın personel erkeklere göre daha fazla kan ve vücut sıvılarına maruz kalırken, erkekler kadınlara göre daha fazla taşımaya bağlı nedenlerden kaza geçirdiği tespit edilmiştir. Biyolojik risklere bağlı iş kazalarına en çok stajyerler maruz kalırken (%50,0), ergonomik (%29,1) ve psikosoyal etmenlere (%22,5) sürücülerin maruz kaldığı bulunmuştur (%29,1 ve %22,5). Hastane öncesi acil sağlık hizmetleri çalışanlarının iş kazasına maruz kalma riski yüksektir. İş kazası riskini azaltmak için yeni stratejiler geliştirmek faydalı olabilir.
Anahtar kelimeler: Hastane öncesi acil sağlık hizmetleri, acil sağlık hizmetleri personeli, iş kazası, mesleksel kazalar, iş sağlığı ve güvenliği.

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Introduction

Occupational accidents are defined by the International Labor Organization as "unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work which results in one or more workers incurring a personal injury, disease or death" (1). The International Labor Organization (ILO)/World Health Organization (WHO) joint committee (1950) describes occupational health and safety as follows: a scientific field aiming to uphold and sustain the highest level of physical, psychological, and social wellbeing for the workers, to prevent the disruption of workers' health due to work conditions, to protect workers from workplace factors disrupting health, to procure the best available work physiologically and psychologically suitable for the worker and to further sustain it, and to adapt work conditions towards the needs of the worker (2). The execution of occupational health and safety regulations requires a well-developed and coordinated system, consisting of intra- and extra-organizational specialists, lawful authorities, employers, employees, worker's representatives, and professionals of occupational health and safety (3).

Worldwide reports show 160 million new cases of occupational diseases every year, while 300 million nonfatal workplace injuries occur. Additionally, more than 3.2 million worker fatalities are recorded due to illness and injury. Four percent of the gross world product is lost due to occupational hazards (4).

Healthcare professionals constitute a significant fraction of occupational health and safety issues worldwide. Emergency Medical Services (EMS) professionals are especially under tremendous risk in terms of occupational injuries. Occupation-related fatalities are found to be 60% higher for EMS workers compared to the general population and 2.5 times higher than that of the total working population (5, 6). Fatalities occur mostly due to traffic accidents (6). Risk of fatal occupational hazards is especially high in ambulance helicopter workers (7). Additionally, approximately 20,000 non-fatal injuries are reported each year (5). The rates of taking medical leave following an occupational injury are high, resulting in approximately a 250 billion dollar loss per year in the United States (8, 9).

Research about injuries related to workplace accidents in ambulance personnel in the United States of America (USA) has shown that rate of injury is higher in this group than that of other healthcare personnel and all other sectors' national rates of injury (10, 11). Another study conducted in Australia illustrates that the risk of musculoskeletal, psychological and neurological injury rates are higher in ambulance professionals compared to other healthcare employees (12). Two distinct studies conducted in the US conclude that rate of injury due to occupational hazards in EMS personnel is 86% in females and 50% in males, and most reported injuries are to the musculoskeletal system, especially to the lower back (13). In a study on occupational accidents encountered by emergency medical technicians and paramedics in Turkey, results showed that 94.9% reported verbal abuse, 39.8% psychical abuse from patient relatives, 81.4% encountered motor vehicle accidents, 52.2% needlestick injuries,

30.9% eye splashing with blood or body fluids, and 22.5% sharps injuries. Accordingly, said occupational groups were found to have a high risk of workplace injuries (14).

Risk factors affecting the wellbeing of healthcare workers are divided into biological, chemical, physical, ergonomic, and psychosocial groups. According to USA's National Institute for Occupational Safety and Health (NIOSH) data, 29 types of physical, 25 types of chemical, 24 types of biological, 10 types of psychosocial, and 6 types of ergonomic risk factors are identified (15).

In this study, all occupational incident report forms submitted to Ankara EMS Headquarters between January 2017 and November 2019 have been analyzed, and will be used in the further analysis of socio-demographic aspects of the personnel and of descriptive qualities of the accidents, the types of accidents encountered, and risk factors that precipitate occupational hazards. It is considered that this study will prove beneficial to the revision of institutional regulations regarding occupational health and safety in emergency medical services, thus leading to an improved and safer work environment for emergency medical personnel.

Materials And Methods

Design of Study

This study has been designed as a retrospective descriptive model. Özdamar describes retrospective studies as "studies that involve collection of data prior to the current date in order to analyze past events". The main purpose of descriptive models used in research is to portray the existing situation as it is (16).

In this study, 1143 occupational hazard reports submitted to the EMS Headquarters, namely Emergency Health Services of Ankara Provincial Health Directorate between January 2017 and November 2019 have been sorted and categorized, and the resulting data used. The final data has been analyzed using the IBM SPSS 25.0 package program.

The socio-demographic properties and descriptive data concerning occupational hazards in this study have been defined as follows: age, gender, title, time of employment in Ankara EMS, status of training in Occupational Health and Safety (OHS), status of taking medical leave, time of occupational incident, time of incident in relation to given case, triage code of given case, types of hazard, subtypes of hazard, types of incidents suffered.

There are 152 EMS teams serving under Ankara's EMS Administration with a total of 1838 professionals consisting of 994 female and 844 male employees. Of these employees, 915 serve as emergency medical technicians (EMT), 486 as paramedics (PM), 353 as drivers, 59 as doctors and 25 as nurses.

Health Sciences University Gülhane Training and Research Hospital was approved by the local ethics committee for research studies (Date: 24.12.2019, No: 19/420)

Evaluation of Data

Along with descriptive statistical methods such as frequency, percentage, average, standard deviation, median, and minimum-maximum, the Pearson's chi-square ($\chi 2$) test has also been used to compare qualitative data. The conformity of data to normal distribution

has been evaluated using the Kolmogorov – Smirnov test. Quantitative data showing normal distribution has been evaluated using the Independent Samples t Test. Values with a probability (p) less than α=0.05 are considered significant and it is accepted that a difference between groups exists. Larger values are considered insignificant and there is no difference between groups.

Results

Table 1 shows the socio-demographic characteristics and defining information regarding the incidents of EMS personnel who encountered occupational accidents during January 2017-November 2019. Accordingly, 41.6% of the employees who experienced a work-related accident were male, and 58.4% were female. Of these, 61.6% were between 26 and 35 years of age, while the average age was 31.1 ± 6.2 (median: 31, min: 18, max: 60 years). The distribution of personnel who encountered an incident was as follows: 49.2% were EMTs, 22.6% drivers, 19.9% paramedics, 3.8% doctors, 2.7% nurses, and 1.7% interns. Evaluation of the time of employment in Ankara EMS revealed that 21.8% of personnel were employed for less than one year, 47.4% between 1-5 years, and 29% more or equal to five years. It should be noted that 93.3% of those who suffered an occupational incident have had OHS training (Table 1).

It has been found that 37.7% of workers have taken medical leave after suffering a work-related accident. The total number of days of medical leave taken was 1,900, whereas the average off-duty days were 4.4 ± 4.2 (median: 3, min: 1 and max: 45 days) (Table 1).

A relation was also found between the time of day and accident rates. Occupational incidents were likely to occur between 16:00-23:59 with a rate of 42.2% (Table 1).

Looking at the time of accident in relation to the given case, 75.5% of the incidents occurred during treatment of the patient. Triage codes of given cases were 33.9% yellow, 31.1% green, 16.4% red, and 2.3% were black (Table 1).

Looking at the distribution of occupational accidents suffered according to risk factors, it has been found that most incidents (41.3%) occur due to mechanical reasons. Of these reasons, 16.3% are equipment-related, 13.3% due to unsuitable flooring, 7.3% due to traffic accidents, and 4.0% are due to emergency braking of the vehicle (Table 2).

Accidents that occurred due to psychosocial reasons comprised 19.7% of all accidents. More specifically, 55.1% were the result of physical violence, 21.3% verbal abuse, 16.9% physical and verbal abuse together, and 1.3% was due to workplace-related stress (Table 2).

The rate of workplace accidents associated with ergonomic reasons was 16.8%. Transportation of the patient was the most encountered risk factor with a rate of 87%, followed by postural disorders with 13% (Table 2).

Sixteen percent of workplace incidents occurred due to biological factors, with the most risk being exposure to blood and body fluids (93.4%) (Table 2).

Accidents due to chemical risk factors constituted 4.1% of all incidents. Of these, 95.7% occurred due to exposure to noxious gases and chemical agents (Table 2).

The outcome of occupational

accidents is a 57.8% injury of the musculoskeletal system. The frequency of observing musculoskeletal injuries together with psychological trauma is 14.2%. Other consequences include sharps injuries with 12.9%, psychological trauma with 4.2%, intoxications with 4.2%, contamination with blood and body fluids with 2.4%, and psychological uneasiness with 1.3% (Table 2).

Comparisons made according to gender show a statistically significant difference regarding age, time of employment, type of hazard, subtype of hazard and type of incident suffered. Firstly, it was noted that male workers were of older age, while female workers have been employed for a longer period of time. Males suffered ergonomic-natured occupational accidents almost twice as much as female workers, with males at 23.4% and females at 12.1%. On the other hand, 20.4% of females encountered biological incidents, which is more than twice for that of males (9.9%). Female professionals suffered contaminations with blood and body fluids much more frequently (19.3%) compared to males (8.8%). It was also found that women suffered more accidents due to emergency braking of the vehicle (5.5%) while only 1.9% of males were injured. Accidents due to transportation were seen at a higher rate in male professionals (21.3%) whereas for females this rate was only 9.9%. Lastly, 16.9% of female workers suffered sharps injuries, which was more than twice as much compared to male workers (7.2%) (Table 3).

Comparisons made according to the time of employment revealed a statistically significant difference ($p<0.05$) between the time of employment and types of hazard. Pairwise comparisons were made in order to find between which types of hazard the difference existed. A difference was noted between accidents due to biological reasons and accidents due to mechanical and ergonomic reasons. Those with 1-5 years of work experience were found to be more prone to accidents of a mechanical nature (43.5%) than others, while those with a time of employment of more or equal to five years were less likely to suffer ergonomic-natured accidents (12.3%) and personnel with a time of employment of 1-5 years were less likely to suffer biological-natured accidents (12.9%). No statistically significant difference was found between the subtype of hazard and the incidents suffered regarding times of employment ($p>0.05$) (Table 4).

A statistically significant difference was observed ($p<0.05$) between profession groups and types of hazard in the comparisons made according to profession title. Pairwise comparisons were made in order to identify between which types of hazard the difference existed. Variances were found between accidents due to biological reason and all other hazard types. Also, differences were noted between incidents suffered due to ergonomic reasons and accidents due to mechanical and psychosocial reasons. The following are the most seen types of hazards in relation to the job titles: it was found that interns suffered biological (50.0%) and chemical (10.0%), drivers suffered ergonomic (29.1%) and psychosocial (22.5%), and doctors suffered mechanical (54.5%) hazards (Table 5).

Table 1: Socio-demographic and defining information.

Variables		n	%
Gender	Male	475	41.6
	Female	668	58.4
Age (years)	≤ 25 years	219	19.2
	26-35 years	704	61.6
	>35 years	220	19.2
	avg. ± SD	31.1 ± 6.2	
	Median (Min-Max)	31 (18 – 60)	
Title	EMT	562	49.2
	Driver	258	22.6
	Paramedic	228	19.9
	Doctor	44	3.8
	Nurse	31	2.7
	Intern	20	1.7
Time of Employment in Ankara EMS	<1 year	249	21.8
	1-5 years	542	47.4
	≥ 5 years	332	29
	Intern	20	1.7
	avg. ± SD	3.7 ± 3.6	
	Median (Min-Max)	2.9 (0.1 – 28)	
Status of OHS training	None	77	6.7
	Present	1,066	93.3
Status of Medical Leave	No	712	62.3
	Yes	431	37.7
	Total Days of Sick Leave	1,900	
	avg. ± SD	4.4 ± 4.2	
	Median (Min-Max)	3 (1 – 45)	
Time of Incident	00:00-07:59	190	16.6
	08:00-15:59	471	41.2
	16:00-23:59	482	42.2
Time of incident in relation to given case	Prior	105	9.2
	During	863	75.5
	After	82	7.2
	Other	93	8.1
Triage of Case	Green	356	31.1
	Yellow	387	33.9
	Red	188	16.4
	Black	26	2.3
	N/A	186	16.3

Table 2: Distribution of encountered occupational accidents according to risk factors.

Variables	n	%
Mechanical	**472**	**41.3**
Equipment (Tools and gear)	186	39.4
Unsuitable Flooring	152	32.2
Traffic Accident	84	17.8
Emergency Braking of Ambulance	46	9.7
Other	4	0.8
Psychosocial	**225**	**19.7**
Physical Abuse	124	55.1
Verbal Abuse	48	21.3
Verbal/Physical Abuse	38	16.9
Work-related Stress	15	6.7
Ergonomic	**192**	**16.8**
Transport	167	87.0
Postural Disorders	25	13.0
Biological	**183**	**16.0**
Exposure to Blood and Body Fluids	171	93.4
Other	12	6.6
Chemical	**47**	**4.1**
Noxious Gases – Chemical Agents	45	95.7
Other	2	4.3
Other	**24**	**2.1**
Types of Incidents Suffered		
Musculoskeletal System Injuries*	661	57.8
MSI + Psychological Trauma	162	14.2
Sharps Injuries	147	12.9
Psychological Trauma	48	4.2
Intoxication	48	4.2
Contamination with blood and body fluids	27	2.4
Psychological Uneasiness	15	1.3
Other	35	3.1

**: MSI.*

Table 3: Comparisons according to gender.

	Female (n=668)	Male (n=475)	p
Age (years) *	30.2 ± 5.3	32.4 ± 7.1	**<0.001** [a]
Time of employment (years) *	4.1 ± 3.2	3.3 ± 4.0	**<0.001** [a]
Type of Hazard n(%)			**p***
Mechanical	295 (44.2)	177 (37.3)	**<0.001** [b]
Psychosocial	116 (17.4)	109 (22.9)	
Ergonomic	81 (12.1)	111 (23.4)	
Biological	136 (20.4)	47 (9.9)	
Chemical	22 (3.3)	25 (5.3)	
Other	18 (2.7)	6 (1.3)	
Subtype of Hazard n(%)			
Violence	108 (16.2)	102 (21.5)	**<0.001** [b]
Equipment	111 (16.6)	75 (15.8)	
Exposure to blood and body fluids	129 (19.3)	42 (8.8)	
Transport	66 (9.9)	101 (21.3)	
Unsuitable flooring	90 (13.5)	62 (13.1)	
Traffic Accident	56 (8.4)	28 (5.9)	
Emergency Braking of Ambulance	37 (5.5)	9 (1.9)	
Noxious Gases – Chemical Agents	21 (3.1)	24 (5.1)	
Postural Disorders	15 (2.2)	10 (2.1)	
Work-related Stress	8 (1.2)	7 (1.5)	
Other	27 (4.0)	15 (3.2)	
Types of Incidents Suffered n(%)			
Musculoskeletal System Injuries	374 (56.0)	287 (60.4)	**<0.001** [b]
MSI + Psychological Trauma	79 (11.8)	83 (17.5)	
Sharps Injury	113 (16.9)	34 (7.2)	
Psychological Trauma	29 (4.3)	19 (4.0)	
Intoxication	23 (3.4)	25 (5.3)	
Contamination with blood and body fluids	19 (2.8)	8 (1.7)	
Psychological Uneasiness	8 (1.2)	7 (1.5)	
Other	23 (3.4)	12 (2.5)	

*a: Independent Samples t Test, b: Pearson Chi-Square Test, *: Mean ± Standard Deviation*

Table 4: Comparisons according to time of employment.

Type of Hazard n(%)	**<1 Year (n=269)**	**1-5 Years (n=542)**	**≥ 5 Years (n=332)**	**p[a]**
Mechanical	104 (38.7)	236 (43.5%)	132 (39.8%)	**0.014**
Psychosocial	51 (19.0%)	102 (18.8%)	72 (21.7%)	
Ergonomic	43 (16.0%)	108 (19.9%)	41 (12.3%)	
Biological	49 (18.2%)	70 (12.9%)	64 (19.3%)	
Chemical	12 (4.5%)	20 (3.7%)	15 (4.5%)	
Other	10 (3.7%)	6 (1.1%)	8 (2.4%)	
Subtype of Hazard n(%)				
Emergency Braking of Ambulance	12 (4.5%)	22 (4.1%)	12 (3.6%)	0.239
Equipment	39 (14.5%)	93 (17.2%)	54 (16.3%)	
Unsuitable Flooring	35 (13.0%)	75 (13.8%)	42 (12.7%)	
Traffic Accident	17 (6.3%)	44 (8.1%)	23 (6.9%)	
Exposure to blood and body fluids	46 (17.1%)	64 (11.8%)	61 (18.4%)	
Transport	39 (14.5%)	96 (17.7%)	32 (9.6%)	
Postural Disorders	4 (1.5%)	12 (2.2%)	9 (2.7%)	
Noxious Gases – Chemical Agents	12 (4.5%)	19 (3.5%)	14 (4.2%)	
Violence	47 (17.5%)	96 (17.7%)	67 (20.2%)	
Work-related stress	4 (1.5%)	6 (1.1%)	5 (1.5%)	
Other	14 (5.2%)	15 (2.8%)	13 (3.9%)	
Types of Incidents Suffered n(%)				
Musculoskeletal System Injuries	144 (53.5%)	345 (63.7%)	172 (51.8%)	0.063
MSI* + Psychological trauma	34 (12.6%)	75 (13.8%)	53 (16.0%)	
Sharps Injury	40 (14.9%)	54 (10.0%)	53 (16.0%)	
Psychological Trauma	13 (4.8%)	21 (3.9%)	14 (4.2%)	
Intoxication	13 (4.8%)	20 (3.7%)	15 (4.5%)	
Contamination with blood and body fluids	7 (2.6%)	10 (1.8%)	10 (3.0%)	
Psychological Uneasiness	4 (1.5%)	6 (1.1%)	5 (1.5%)	
Other	14 (5.2%)	11 (2.0%)	10 (3.0%)	

**: Musculoskeletal System Injuries, a: Pearson Chi-Square Test*

Table 5: Comparisons according to title.

Type of Hazard n(%)	EMT (n=562)	PM (n=228)	Doctor (n=44)	Nurse (n=31)	Driver (n=258)	Intern (n=20)	p*
Biological	104 (18.5)	43 (18.9)	6 (13.6)	8 (25.8)	12 (4.7)	10 (50.0)	**0.001**
Ergonomic	73 (13.0)	33 (14.5)	5 (11.4)	5 (16.1)	75 (29.1)	1 (5.0)	
Chemical	17 (3.0)	10 (4.4)	2 (4.5)	2 (6.5)	14 (5.4)	2 (10.0)	
Psychosocial	111 (19.8)	42 (18.4)	7 (15.9)	3 (9.7)	58 (22.5)	4 (20.0)	
Mechanical	245 (43.6)	91 (39.9)	24 (54.5)	13 (41.9)	96 (37.2)	3 (15.0)	
Other	12 (2.1)	9 (3.9)	--	--	3 (1.2)	--	
Subtype of Hazard n(%)							
Emergency Braking of Ambulance	32 (5.7)	10 (4.4)	3 (6.8)	--	1 (0.4)	--	**--[a]**
Equipment	84 (14.9)	40 (17.5)	9 (20.5)	8 (25.8)	43 (16.7)	2 (10.0)	
Unsuitable Flooring	80 (14.2)	23 (10.1%)	9 (20.5%)	4 (12.9%)	35 (13.6%)	1 (5.0%)	
Traffic Accident	46 (8.2)	17 (7.5)	3 (6.8)	1 (3.2)	17 (6.6)	--	
Exposure to blood and body fluids	95 (16.9)	43 (18.9)	6 (13.6)	8 (25.8)	9 (3.5)	10 (50.0)	
Transport	61 (10.9)	28 (12.3)	2 (4.5)	4 (12.9)	71 (27.5)	1 (5.0)	
Postural Disorders	12 (2.1)	5 (2.2)	3 (6.8)	1 (3.2)	4 (1.6)	--	
Noxious Gases – Chemical Agents	17 (3.0)	9 (3.9)	2 (4.5)	2 (6.5)	13 (5.0)	2 (10.0)	
Violence	102 (18.1)	40 (17.5)	7 (15.9)	3 (9.7)	54 (20.9)	4 (20.0)	
Work-related Stress	9 (1.6)	2 (0.9)	--	--	4 (1.6)	--	
Other	24 (4.3)	11 (4.8)	--	--	7 (2.7)	--	
Types of Incidents Suffered n(%)							
Musculoskeletal System Injuries	315 (56.0)	127 (55.7)	28 (63.6)	18 (58.1)	169 (65.5)	4 (20.0)	**--[a]**
Contamination with blood and body fluids	14 (2.5)	7 (3.1)	2 (4.5)	1 (3.2)	2 (0.8)	1 (5.0)	
Sharps Injury	85 (15.1)	35 (15.4)	4 (9.1)	7 (22.6)	7 (2.7)	9 (45.0)	
Psychological Trauma	24 (4.3)	11 (4.8)	1 (2.3)	1 (3.2)	11 (4.3)	--	
MSI + Psychological Trauma	78 (13.9)	29 (12.7)	6 (13.6)	2 (6.5)	43 (16.7)	4 (20.0)	
Psychological Uneasiness	9 (1.6)	2 (0.9)	--	--	4 (1.6)	--	
Intoxication	17 (3.0)	10 (4.4)	3 (6.8)	2 (6.5)	14 (5.4)	2 (10.0)	
Other	20 (3.6)	7 (3.1)	--	--	8 (3.1)	--	

**: Pearson Chi-Square Test, a: No comparison available due to high number of empty cell*

Discussion

EMS professionals are under various risks and threats due to the nature of service given and the work environment and conditions. For these reasons, occurrence of possible occupational hazards due to inadequate OHS precautions may lead to grave and life-threatening consequences. The identification of occupational accident types that EMS professionals are exposed to and the status of exposure are essential. In this study, 1143 occupational accident report forms submitted to Ankara EMS Headquarters between January 2017 and November 2019 have been evaluated. According to the outcomes of forms, there were a higher number of female employees than males and the average age was 31.1 ± 6.2 years. The number of EMTs to suffer an occupational accident was found to be higher in this study. The average time of employment in Ankara EMS was 3.7 ± 3.6 years. Also, it was noted that most employees have had OHS training. More than one third of the personnel who suffered a workplace accident took medical leave following the incident. Most accidents happened between hours 16:00-23:59, and during patient intervention. Also, most accidents occurred during intervention of a yellow coded case.

In this study, the status of occupational accidents has been evaluated depending on various factors. Observing the distribution of befallen accidents according to risk factors, it was concluded that EMS personnel suffered mostly mechanical (41.3%) and psychosocial (19.7%) natured occupational hazards. In another study examining the data of emergency medical professionals conducted by Reichard et al., the second most cause of injury (18%) was found to be associated with tools and equipment (5).

Ambulance professionals frequently encounter psychosocial hazard risk factors, specifically verbal and physical abuse. In this study, more than half of the employees (55.1%) reported to have undergone physical abuse, 21.3% verbal abuse, and 16.9% physical and verbal abuse combined. Yet another study conducted within Ankara EMS about employees to have suffered violence from patients and their relatives revealed a high rate of having been verbally abused (17). Mechem et al. (2002), in their study regarding emergency medical services consisting of firefighters and EMS professionals, stated that of the reported 1100 injury reports, 44 were due to assault and 35 of these (79.5%) assaults were directed at paramedics (18).

According to this study, occupational accidents mostly resulted in musculoskeletal injuries (57.8%). A study conducted about EMS workers by Maguire et al. (2005) showed musculoskeletal injuries, defined as “sprains, strains, and tears” by the US Department of Labor, to be the main reason in loss of workforce (19). Another study carried out between 2003-2007 with data of EMS personnel from National Electronic Injury Surveillance System (NEISS) showed that sprains and strains were the most observed injuries (33%) among nonlethal accidents (5).

The work method of emergency medical services differs from that of hospitals. Ambulance personnel work in 24 hour shifts to provide emergency medical aid to patients, while under pressure of time, in traffic with inadequate traffic regulations, with all

medical equipment required for intervention (oxygen tanks, defibrillators, medical intervention pack, gurney, medical waste bins, etc) placed in the cabin of the ambulance. As a consequence of the above-mentioned reasons, risk of accidents due to mechanical causes is found to be high. Due to the high risk of sharps injuries in emergency medical services, the use of personal protective equipment and sharps with added safety (injectors, IV branules, and lancets) has increased. Therefore, hazards due to biological reasons such as needlestick injuries or contamination with blood and body fluids have been found to occur less (16.0%) than accidents due to mechanical and psychosocial reasons.

According to this study, female workers are more likely to suffer occupational accidents. A statistically significant difference was found between the status of occupational accidents among EMS workers and gender. While male employees were more likely to encounter ergonomic-related injuries, especially those related to transportation of the patients, female personnel faced a higher risk regarding biological-natured incidents such as exposure to blood and body fluids. Varying results are seen in foreign-based literature about the distribution of gender in relation to injury following occupational accidents. In one of the two distinct studies conducted in the US, results showed a higher rate of injury in females, whereas in the other study, males had a higher rate of occupational injury than females (5, 19).

In Keskin's research (2019) concerning emergency department workers, the rate of facing an occupational accident was 62.7% in females, whereas said rate was 37.3% in males. No difference of statistical significance was found between females and males and risk of occupational hazard (20). A study conducted in a university hospital established that while females had a risk of 61.4% for workplace incidents, males had a 38.6% risk. No statistically significant difference was found between genders in the same study (21). Sharps injuries and contamination with blood and body fluids was more commonly observed in females (67.4%) according to a study conducted by Dikmen et al. (22). Females were found to be at 2.5 times more risk in encountering a workplace accident according to a study conducted in a university hospital by Davas et al. The fact that female professionals had a greater risk of exposure to sharps injuries and to abuse was stated in the same study (23).

Research investigating injuries and deaths among emergency medical technicians and health professionals in the US has indicated that women might carry a greater risk of work-related injury (8). In this study, the reason that a higher rate of workplace accidents was observed in women could be related to the high number of female workers employed in Ankara EMS. Furthermore, it is understood that gender-based differences in accident types is the result of the different duties undertaken by the two genders. Male workers usually face ergonomic-natured incidents because they commonly aid in the transportation and movement of the patient, which requires physical strength. They are therefore more prone to experience musculoskeletal injuries due to heavy lifting. Since female employees perform more tasks involving needles and sharp instruments, they are at more risk for biological hazards.

A difference of statistical

significance was found in this study, regarding the time of employment in EMS and facing an occupational accident. In relation to the time of employment, a difference was found between accidents due to biological reasons and accidents due to mechanical and ergonomic reasons. Workers of 1-5 years were more likely to suffer mechanical workplace accidents, and were less likely to encounter accidents due to biological reasons, whereas workers of 5 or more years encountered less ergonomic-natured accidents than others.

Lastly, a significant difference was seen between job titles and risk of occupational hazard. Biological accidents were mostly seen in interns (50.0%), while ergonomic and psychosocial incidents were usually encountered by drivers (29.1% and 22.5% respectively). A study regarding emergency medical services consisting of firefighters and EMS professionals, stated that of the reported 1100 injury reports, 44 were due to abuse and 35 of these (79.5%) assaults were directed at paramedics (18).

Limitations of Study

The sole use of occupational hazard report forms submitted to Ankara EMS Headquarters has been the limitation of this study.

Conclusion

Ankara Emergency Medical Services provide emergency healthcare and transportation to half million patients each year. Emergency healthcare professionals are exposed to countless risks during this process. This study provides evidence that EMS workers encounter a high rate of occupational accidents. Additional regulations must be established in order to decrease work-related risks and to provide a safer workplace for the professionals. Furthermore, revision of in-service training regarding occupational hazards must be arranged for maximum results and supplementary research must be made to develop evidence-based strategies.

Conflict of interest: None declared.

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