

# Work-related injuries sustained by emergency medical technicians and paramedics in Turkey

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## ABSTRACT

**BACKGROUND:** Evaluated in the present study were locations, descriptions, and results of work-related injuries (WRIs) sustained by emergency medical technicians (EMTs) and paramedics in Turkey's most crowded city, İstanbul.

**METHODS:** After the present study had been accepted by the urban health authority, a questionnaire was emailed to the healthcare personnel of İstanbul's 195 ambulance stations.

**RESULTS:** Included in the present study were the responses of 901 members of staff (660 EMTs and 241 paramedics), with a mean age of 29.5±6.1 (min: 18; max: 61). The majority of participants (94.9%) had encountered verbal abuse from the public, and 39.8% had encountered physical violence from patients' relatives. Levels of satisfaction with work in emergency medical services (EMS) was also evaluated, and 510 participants (57.6%) were unhappy. Regarding gender, female employees were more likely to be verbally attacked ( $p=0.01$ ), while males were more likely to be physically attacked ( $p=0.001$ ). It was reported that motor vehicle accidents (MVAs) were the most common cause of WRIs (81.4%), followed by needle-stick injuries (52.2%), ocular exposure to blood and other fluids (30.9%), and sharp injuries (22.5%). Only 10.5% ( $n=95$ ) of WRIs were reported to authorities; 488 (54.2%) of participants just attended to the practice to prevent possible WRIs.

**CONCLUSION:** For paramedics and EMTs, risk of WRI is obviously high. Strategies to decrease and prevent verbal and physical violence should be developed.

**Keywords:** Accident; ambulance; paramedic; work-related.

## INTRODUCTION

Emergency medical technicians (EMTs) and paramedics take immediate care of patients who are injured or unhealthy, and ensure their transportation to or from the hospital. Time spent at work is relatively longer for these healthcare em-

ployees, compared to those in other fields.<sup>[1,2]</sup> Risk of injury to EMTs and paramedics is reportedly significantly higher, and the rate of work-related injuries (WRIs) has increased.<sup>[3]</sup>

Motor vehicle accidents (MVAs) play a primary role in all kinds of frequently encountered WRIs. Mortality rates have risen by 40% in Turkey, due to the increased use of ambulances (increased by 83.2%).<sup>[4]</sup> Nevertheless, due to insufficient reporting of WRIs world-wide, it is now crucial that reliable information regarding WRIs sustained by EMTs and paramedics be obtained in Turkey and in other countries.

It is important to note that the most common WRIs sustained by EMTs and paramedics involve contact with blood-borne pathogens from needle sticks, injuries sustained during transportation (lifting and moving patients, etc.), wounds sustained due to patient violence, and injuries sustained as a re-

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sult of traffic accidents while on duty in ambulances.<sup>[5,6]</sup> There are many other potential causes of WRIs, such as conflict with patients' relatives, stressful conditions, and long working hours, all of which can negatively affect personnel health.

In the present study, locations, descriptions, and results of WRIs sustained by EMTs and paramedics in Turkey's most populous city were analyzed.

## MATERIALS AND METHODS

The present study was performed between March and July of 2014 in Turkey's multicultural hub, İstanbul (approximate population: 14 million). The study was approved by the Health Directorate of İstanbul. There are a total of 195 ambulance stations in the city (123 on the European side and 72 on the Asian side). These stations contain 248 emergency rescue ambulances and 1401 healthcare personnel (1099 EMTs and 302 paramedics). Following the study's subsequent ac-

ceptance by the urban health authority, a questionnaire was emailed to all emergency healthcare personnel, who were instructed to fully complete it.

Participants were strongly advised not to enter any personal information, and were informed that collected data would be used only for scientific analysis. EMTs and paramedics with less than 1 year of experience who declined to participate were exempted.

The questionnaire included 23 multiple choice questions regarding frequently encountered scenarios during which WRIs may be sustained in the field of emergency medical services (EMS).

### Statistical Analysis

All data were analyzed using SPSS software (version 17.0; SPSS Inc., Chicago, IL, USA). Numerical variables are presented as median and interquartile ratio, while categorical variables are presented as frequencies (n) and percentages. Group comparisons were performed for numeric variables using the Kruskal–Wallis test, and the chi-square test was used for categorical variables. Post-hoc analysis was performed using the Mann–Whitney U test with Bonferroni correction. All hypotheses were two-tailed, and an alpha critical value of 0.05 was considered significant.

## RESULTS

A total of 1401 EMS personnel were identified, of whom 984

**Table 1.** Characteristics of participants (n=901)

	n	%
Gender		
Female	483	53.6
Age range		
18–25	194	21.5
26–30	408	45.3
31–35	203	22.5
35>	96	10.7
Run years in 112		
2–3 years	360	40.0
4–5 years	205	22.7
6 years and more	336	37.3
Exposed to verbal attack*		
By patient's relatives	649	72.0
By society	855	94.9
Exposed physical attack*		
By patient's relatives	359	39.8
By society	166	18.4
Reported by staff?		
Yes	249	27.6
Institute inquired after attack?		
Yes	137	15.2
Pleased to work in 112?		
Very well	51	5.7
Well	331	36.7
Not well	362	40.2
Not very well	157	17.4

\*Rate of attack during past 2 years.

**Table 2.** Frequency of WRI as reported by EMTs and paramedics during the past two years

Mechanism	Number of injuries	n	%
Motor vehicle accidents	None	168	18.6
	1	655	72.7
	2	58	6.5
	>2	20	2.2
Needlestick	None	431	47.8
	1	389	43.2
	2	54	6.0
	>2	27	3.0
Eye contact with blood and other bodily fluids	None	623	69.1
	1	201	22.3
	2	59	6.6
	>2	18	2.0
Sharp injuries	None	698	77.5
	1	168	18.6
	2	25	2.8
	>2	10	1.1

participated (70.2%). A total of 83 personnel (8.4%) who had been working in EMS for less than 1 year were excluded. A total of 901 personnel (660 EMTs and 241 paramedics) with a mean age of  $29.5 \pm 6.1$  (min=18, max=61) were included. Years spent with EMS (also known as the I12, after the EMS dialing code in Turkey) ranged from 2–3 for 40% of participants (n=360). Demographic characteristics are shown in Table 1. Participants were questioned regarding incidence of verbal violence (insults, swearing, etc.), as well as physical violence. Participants were asked whether they had been exposed to violence in either form by patients or their relatives in the past 2 years. Participants were also asked whether they had reported violent incidents to the administration. According to responses, 94.9% of participants had encountered verbal violence, and 39.8% had encountered physical violence from patients' relatives.

Participants were also asked to describe their level of satis-

faction with work in the I12, and 519 participants (57.6%) reported that they were not satisfied (Table 1). No significant difference in level of satisfaction was found between male and female employees ( $p=0.359$ ). In addition, no significant correlation was found between level of satisfaction and exposure to violence ( $p=0.762$  and  $p=0.284$ , respectively). However, level of satisfaction among those exposed to physical violence was significantly lower ( $p=0.001$  and  $0.03$ , respectively). While verbal violence was more prevalent among female employees ( $p=0.01$ ), physical violence was more prevalent among male employees ( $p=0.001$ ).

The most commonly reported causes of WRI were MVAs (81.4%), needle-stick injuries (52.2%), ocular contact with blood and other bodily fluids (30.9%), and sharp injuries (i.e., injuries by sharps other than needle sticks; 22.5%), respectively (Table 2).

A total of 81.4% of participants (n=733) had been in at least 1 traffic accident while on duty in an ambulance; most often, the ambulance had collided with another vehicle (53.6%). Three healthcare personnel and 7 others died as a result of these accidents. Personnel who had not been in an on-duty traffic accident were found to have higher levels of satisfaction with I12 employment ( $p=0.005$ ).

Needle-stick injuries frequently occurred as a result of intravenous line procedures (55.3%) and processes conducted in the ambulance (34.7%; Table 3). As the age of employees increased, the number of needle-stick injuries decreased ( $r=-0.63$ ,  $p=0.02$ ). In addition, the number of needle-stick injuries decreased with augmentation of years spent in the I12 ( $r=-0.43$ ,  $p=0.01$ ). Responses regarding the most common causes of WRIs are described in Table 4. Most frequently reported were injuries sustained while riding in ambulances (30.9%). A total of 82.2% of respondents (n=741) reported that they were properly gloved, and 37.4% (n=337) reported that they were properly masked while routinely performing their jobs.

**Table 3.** Data regarding mechanisms and results of injuries\*

	n	%
<b>Mechanisms of MVAs</b>		
Ambulance collision with another vehicle	483	53.6
Ambulance crashed by another vehicle	424	47.1
Sudden break (injured inside ambulance)	276	30.6
Collision with other object	140	15.5
Derailing from road	96	10.6
Other	27	3.0
<b>The result of accident</b>		
No injury	442	49.1
Only injured by myself	58	6.4
Injured only the one of I12 staff	168	18.6
Injured more than one of I12 staff	42	4.7
Injured someone on the other vehicle	114	12.7
Injured on pedestrian	36	4.0
Injured patient inside of the ambulance	28	3.1
Other	11	1.2
<b>Mechanisms of needlestick injuries</b>		
During IV procedures	321	55.3
Recapping	161	27.7
Puncture by other needles (following improper disposal of needles)	64	11.0
Other	35	6.0
<b>Location of the personnel when the needlestick injury occurred</b>		
Inside the cruising ambulance	313	34.7
Inside the stationary ambulance	125	13.9
On the field	151	16.7

\*Some subjects selected more than one choice.

**Table 4.** Most common causes of WRI, according to respondents\*

Feasible reason of the WRI regarding the respondents	n	%
Cruising ambulance	278	30.9
Hurrying up	231	25.6
Carelessness	141	15.6
Patient's movement	119	13.2
Failure in disposal of devices, needles etc.	104	11.5
Due to the relatives of the patient	14	1.6
Other	21	2.3

\*Some subjects selected more than one choice.

Only 10.5% (n=95) of WRIs were properly reported to authorities. In association, 488 (54.2%) participants had reportedly attended an orientation designed to provide information regarding prevention of WRIs.

## DISCUSSION

The present is among the largest studies of WRIs in EMS. Data indicates that 58% of participants were generally dissatisfied with EMS employment. The rate of verbal and physical violence against healthcare personnel is significantly high, and physical violence negatively affects levels of satisfaction. Findings indicate that exposure to both chronic and critical incident stressors increases the risk of EMS personnel developing post-traumatic stress reactions.<sup>[7]</sup>

It has been demonstrated that EMS personnel encounter violence in the workplace world-wide, regardless of the country's development status.<sup>[8,9]</sup> In a study conducted in Australia, the rate of attacks on paramedics was doubled, compared to the rate of attacks on police officers.<sup>[10]</sup> Several factors contribute to patient violence toward EMS personnel; proper measures taken to prevent and reduce patient violence may decrease WRIs.<sup>[11]</sup> News portraying EMS personnel in an unfavorable light is prevalent in the Turkish media,<sup>[12]</sup> and there can be no doubt that this increases the rate of violence, causing health service personnel additional, unnecessary stress.

The present study demonstrated that the risk of WRIs to EMS personnel is higher than may have been expected. It was reported that 81% of participants had experienced at least 1 MVA, and that 52% had experienced at least 1 needle-stick injury in the past 2 years. Furthermore, the study demonstrated that needle-stick injuries most commonly occurred during intravenous administration while the ambulance was in motion. İstanbul has a very severe traffic problem, and arrival times of ambulances often surpass acceptable margins. This delay leads to ambulances rushing more, increasing the risk that EMS members will experience accidents and sustain WRIs. It is not surprising that only 10.5% of serious WRIs, including needle sticks, penetrating injuries, and ocular contact with fluids were reported to proper authorities. In a similar study performed in another large city in Turkey, only 12% of WRIs sustained by EMS personnel were properly reported.<sup>[13]</sup> Unfortunately, the deficiency in WRI reporting is general.

In the present study, a total of 46% of participants had reportedly not undergone training related to WRIs, either before or after their EMS employment had begun. This is a significantly low rate. A close correlation between a safe working environment and safe work performed by EMS employees has been indicated.<sup>[14]</sup> In Turkey, programs specifically designed to train EMS personnel in WRI prevention and reduction should be performed and regularly repeated.

## Limitations

The present was a demonstrative study that included EMS personnel based in İstanbul. Due to conditions specific to İstanbul and the limited scope of the survey, results may not be indicative of general conditions in Turkey. While deaths resulting from WRIs were investigated, non-fatal injuries were not. Furthermore, the survey concerned WRIs sustained in the past 2 years. Accuracy of responses was not verified by an outside source.

## Conclusion

Risk of WRIs to paramedics and EMTs is obviously high. In order to decrease rates of physical and verbal violence against EMS personnel, additional planning and sanctions should be studied. In addition, organizations must ensure that a high level of morale is maintained. Most importantly, a mandatory certification course for all EMS and healthcare personnel should be conducted on an annual basis.

Conflict of interest: None declared.

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## ORJİNAL ÇALIŞMA - ÖZET

### Türkiye'de acil tıp teknisyenleri ve paramediklerin karşılaştıkları iş kazaları

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**AMAÇ:** Bu çalışmada, Türkiye'nin en kalabalık şehri olan İstanbul'da acil tıp teknisyenleri ve paramediklerin işle ilişkili yaralanmaları tanımlandı.

**GEREÇ VE YÖNTEM:** İstanbul'da toplam 195 ambulans istasyonu mevcuttur. Çalışma İstanbul İl Sağlık Müdürlüğü tarafından onaylandı. Çalışma anketi 112 sağlık çalışanlarının e-posta adreslerine gönderildi ve doldurulması istendi.

**BULGULAR:** Çalışmaya ortalama yaşları  $29.5 \pm 6.1$  (min: 18-maks: 61) olan 901 personel (660 acil tıp teknisyeni [ATT] ve 241 paramedik) katıldı. Çalışanların halk tarafından sözel şiddete uğrama oranı %94.9, hasta yakınları tarafından fiziksel şiddet oranı %39.8 olarak belirlendi. Bunun yanında çalışanların 112'de çalışmaktan memnun olup olmadığı araştırıldı. Beş yüz on (%57.6) katılımcı memnun değildi. Cinsiyete göre kadın katılımcılar sözel şiddete ( $p=0.01$ ), fakat erkek katılımcılar da fiziksel şiddete kadınlardan daha fazla maruz kalmıştı ( $p=0.01$ ). İş ilişkili yaralanmaların en çoğu motorlu araç kazaları (%81.4), iğne batma yaralanmaları (%52.2), kan veya vücut sıvıları ile göz teması (%30.9) ve keskin alet yaralanmaları (%22.5) idi. İş ilişkili yaralanmaların %10.5'i ( $n=95$ ) örneğin iğne batma yaralanmaları ve vücut sıvılarının göze teması gibi yaralanmalar yönetime rapor edilmiş ve bildirilmişti. Katılımcıların 488'i (%54.2) olası iş ilişkili yaralanmaları önlemek için hizmet içi eğitimlere katılmıştı.

**TARTIŞMA:** Ülkemizde iş ilişkili yaralanmalarda ATT ve paramediklerin riski oldukça açık bir şekilde yüksektir. Bu nedenle acil çağrı sistemi personele fiziksel-sözel şiddeti önlemek için daha ileri stratejiler geliştirilmeli ve iş kazalarına yönelik hizmet içi eğitimler artırılmalıdır.

**Anahtar sözcükler:** Ambulans; iş-ilişkili; kaza; paramedik.

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