

The Examination of Occupational Injuries in the Emergency Department

Acil Servise Başvuran Mesleki Yaralanmaların İncelenmesi

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ABSTRACT

Aim: While examining the demographic characteristics of injured individuals presenting to the emergency department due to occupational accidents, we also analyzed the types and mechanisms of injuries encountered based on the type of work causing the accident, assessed the adequacy of occupational safety measures, and investigated the patient burden on the emergency department caused by these cases. Emphasis was placed on the possibility of reducing the burden on the emergency department by completing the treatment of some occupational accident patients in occupational health clinics or primary care centers.

Material and Methods: We designed the study as a single-center, retrospective study. We included trauma cases who presented to the emergency department documented with occupational accident reports using the hospital automation system. Trauma patients aged 18 and above, presenting to the emergency department of a tertiary care and research hospital, were examined between January 1-2022, and December 31-2023. The study population was formed according to inclusion and exclusion criteria.

Results: Within the study, 887 patients were examined, of whom 80.8% were male. The mean age of the patients was 34 years. Penetrating-shearing instrument injury (35.4%) and blunt trauma (35.4%) were the most common injury mechanisms, with lacerations (34.6%) being the most common lesions. The upper extremities (41.3%) were the most commonly affected body regions. Furthermore, 74.7% of patients were found to belong to the group of cases treatable with simple medical interventions.

Conclusion: Based on our findings, we suggest that some of the existing diagnoses and medical interventions can be managed in occupational health clinics or primary care centers. Acting accordingly can alleviate the workload of emergency departments.

Keywords: Occupational accident, emergency department, trauma.

ÖZ

Amaç: Çalışmamız, iş kazaları nedeniyle acil servise başvuran hastaların demografik özelliklerini ve istihdamın türüyle ilişkili yaralanma türlerini ve mekanizmalarını inceledi. Ayrıca, iş güvenliği önlemlerinin etkinliğini ve bu yaralanmaların acil servis yükü üzerindeki etkisini değerlendirdik. Çalışma, belirli iş kazası vakalarının tedavisinin iş yeri veya aile hekimliği merkezlerinde tamamlanarak acil servisin yükünün hafifletilebileceğini önermektedir.

Gereç ve Yöntemler: Bu çalışma tek merkezli, retrospektif bir çalışma olarak planladı. Çalışmaya acil servise başvuran, iş kazası tutanağı tutulmuş travma vakaları dahil edildi. 1 Ocak 2022- 31 Aralık 2023 tarihleri arasında üçüncü basamak bir eğitim ve araştırma hastanesinin acil servisine başvuran 18 yaş üstü iş kazasına bağlı travma hastaları hastane otomasyon sistemi kullanılarak incelendi. Çalışma popülasyonu dâhil etme ve hariç tutma kriterlerine göre oluşturuldu.

Bulgular: Çalışma dâhilinde %80,8'i erkek 887 hasta incelenmiştir. Hastaların yaş ortalaması 34'tür. Penetrasyon-kesici alet yaralanması (%35,4) ve künt travma (%35,4) en sık yaralanma mekanizmalarıdır ve kesiler (%34,6) en sık lezyonlardır. Üst ekstremiteler (%41,3) en çok zarar gören vücut bölgeleridir. %74,7 hastanın ise basit tıbbi müdahale ile tedavi edilebilir hasta gurubunda olduğu tespit edilmiştir.

Sonuç: Verilerimiz doğrultusunda var olan tanı ve tıbbi müdahalelerin bir kısmının iş yeri hekimliği veya aile hekimliği merkezlerinde yapılabileceği tespit edilmiştir, bu doğrultuda hareket etmek acil servislerin iş yükünü azaltabilir.

Anahtar Kelimeler: İş kazası, acil servis, travma.

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Introduction

Surveillance of occupational injuries is necessary to guide educational and regulatory interventions, provide information for the development of new low-risk technologies, identify research priorities, and monitor progress towards injury reduction goals. Among various potential injuries, occupational injuries hold global significance (1).

Injuries arise from an imbalance between a wide range of biomechanical, physical, and psychological demands inherent in adverse working conditions and workers' ability to cope with them (2).

Work-related injuries and illnesses impose a significant human and economic burden on workers, employers, and society (3). The estimated economic loss caused by occupational injuries and illnesses is equivalent to %4 of the world's gross domestic product (4).

The International Labour Organization estimates that approximately 340 million occupational accidents occur worldwide each year, with an annual estimate of about 2.3 million fatalities due to occupational accidents and work-related diseases (5). According to data from the Turkish Social Security Institution (SSI), in the year 2022, 465.769 (79.1%) were male out of a total of 588.823 individuals who experienced occupational accidents, and a total of 1.517 individuals, of which 1.478 (97.4%) were male, were reported deceased (6).

Accurate public health surveillance provides estimates of the magnitude of the problem, identifies high-risk groups, guides prevention strategies, and assesses their effectiveness, making it an important component in reducing the burden of occupational injuries and illnesses (7).

The greatest cost of occupational injuries is incurred in developing countries, where the workforce is most densely concentrated. In these nations, many individuals work in hazardous industries such as agriculture, logging, and mining, where safety standards or regulations may be lacking (8).

Since most occupational injury cases present to the emergency department, research conducted in emergency departments is important for elucidating occupational injuries (9).

While eliminating occupational accidents may be challenging, many workplace accidents can be prevented with simple measures (10).

Based on the hypothesis that many existing workplace accidents are simple in nature, our aim was to reduce the workload of the emergency department by elucidating the mechanisms of occupational accidents and identifying the necessity for medical intervention. Additionally, we aimed to investigate injury mechanisms according to occupational sectors.

Material and Methods

The study was retrospectively designed by examining cases of occupational accidents presenting to the adult emergency department of Kanuni Training and Research Hospital, affiliated with the Health Sciences University, Trabzon School of Medicine. Ethical approval for the study was obtained from the relevant university ethics committee

(Ethics No: 2024/88). Patients who presented to the emergency department due to occupational accidents and had an accident report filed during the 24-month study period were included. Patients under 18 years of age, those who refused emergency department treatment, and those with incomplete data in the records were considered exclusion criteria. Information regarding the type, mechanism, and organ system affected by the injury, as well as the feasibility of treatment with simple medical intervention, was obtained from the occupational accident reports (11). The need for imaging for diagnosis, as well as the treatment process and outcome of hospitalized patients, was obtained from the hospital automation system.

Statistical Analysis

All data obtained from the study were recorded in a Microsoft Excel file and analyzed. All analyses were conducted using Jamovi v.1.6 statistical software (The Jamovi Project (2021) Computer Software, version 1.6. Sidney, Australia). Categorical data were represented in the form of frequency (n) and corresponding percentage values. Normally distributed continuous variable data were defined as mean plus standard deviation (SD), and non-normally distributed data were defined as median and interquartile range (IQR). The assessment of distributional normality was conducted employing the Shapiro-Wilk test. Student's t-test was applied for comparing continuous variables with normal distribution, and Mann-Whitney U test was applied for variables with non-normal distribution. The chi-square test was employed to assess the association between categorical variables across different groups.

Results

Within the scope of our study, there were 983 patient admissions to the emergency department due to occupational injuries between January 1-2022, and December 31-2023. During the same period, a total of 268.130 patient admissions were recorded in our emergency department. Due to missing data in the records of 96 patients with documented occupational accident reports, they could not be included in the study. Additionally, occupational comparisons could not be made in the statistical analysis as only the professional information of 34 patients from various occupational sectors could be accessed.

Among the 887 patients who presented to the emergency department due to occupational accidents meeting the inclusion criteria, 717 (80.8%) were male, and 170 (19.2%) were female. The median age of the patients was 34 (IQR 26-44). Imaging studies were not conducted for 277 (31.2%) patients, while 355 (40%) patients underwent only X-ray examinations, and 255 (28.8%) patients underwent other imaging methods. Treatment with simple medical intervention was sufficient for 663 (74.7%) patients. Hospitalization was required for treatment in 94 (10.6%) patients, and 69 (7.8%) patients underwent surgery for various reasons. Four (0.5%) patients died due to their injuries from occupational accidents. The demographic characteristics and clinical course of the patients are summarized in Table 1.

Characteristics	All patients (n=887)
Gender	
Male, n (%)	717 (80.8)
Female, n (%)	170 (19.2)
Age (years), median (IQR)	34 (26-44)
Imaging	
None, n (%)	277 (31.2)
X-ray, n (%)	355 (40.0)
CT or MRI, n (%)	255 (28.8)
Simple Medical Intervention, n (%)	663 (74.7)
Surgical Intervention, n (%)	69 (7.8)
Hospitalization, n (%)	94 (10.6)
Mortality, n (%)	4 (0.5)

IQR: Interquartile Range (25p, 75p), CT: Computed tomography, MRI: Magnetic resonance imaging

Table 1. The Patients' Demographic Data and Baseline Characteristics

When examining factors affecting mortality in patients injured in occupational accidents, neither age nor gender showed an association with mortality ($p=1.0$ for gender ($p>0.05$), Fisher's exact test; $p=0.105$ for age ($p>0.05$), Mann-Whitney U test). There was an association between injuries that could not be treated with simple medical intervention and mortality compared to injuries that could be treated with simple medical intervention ($p=0.004$, Fisher's exact test). Among the 69 (7.78%) patients who underwent surgery, two patients died, and among the 818 (92.2%) patients who did not undergo surgery, two patients also died, indicating an association between undergoing surgery and mortality ($p=0.032$, Fisher's exact test). Hospitalized patients had a higher mortality rate compared to non-hospitalized patients ($p=0.001$, Fisher's exact test). The statistical analysis of mortality is summarized in Table 2. Among the most common injury mechanisms encountered by victims of occupational accidents, penetrating-shearing instrument injury (314, 35.4%), blunt trauma (314, 35.4%), and fall and sprain injuries (176, 19.8%) are the most frequent forms of injury. Significant associations were found between the type of injury mechanisms and the feasibility of treatment with simple medical intervention ($p=0.001$, chi-square test). Additionally, the trauma mechanisms were significant in terms of hospitalization for treatment ($p=0.001$, chi-square test). However, there was no significant result when questioning the trauma mechanisms regarding

the need for surgery ($p=0.322$, chi-square test). Blunt traumas, with 97 cases of injuries unresolved by simple medical intervention, constituted the most common group requiring hospitalization, while falls and sprains were the most common group requiring hospitalization. Moreover, blunt traumas were the group with the highest surgical requirement.

In 206 cases (23.2%) of occupational accident cases presenting to the emergency department, no lesions were detected, and for the 201 patients in whom no lesions were detected, a decision was made for treatment with simple medical intervention. The three most common types of lesions encountered were incisions (307, 34.6%), abrasions and ecchymosis (183, 20.6%), and fractures (134, 15.1%). When analyzed according to the type of wound, significant associations were established between the types of injuries and the feasibility of treatment with simple medical intervention ($p=0.001$, chi-square test), the need for hospitalization ($p=0.001$, chi-square test), and the need for surgical treatment ($p=0.001$, chi-square test). Among the group of patients who could not be treated with simple medical intervention, fractures ranked first with 132 patients, of whom 56 required hospitalization and 37 required surgical treatment.

When considering the affected body regions of patients who experienced work-related injuries, the upper extremity (366, 41.3%), lower extremity (158, 17.8%), and head-neck and face regions (142, 16%) rank as the top three. Significant associations were established between the feasibility of treatment with simple medical intervention ($p=0.001$, chi-square test), the need for hospitalization ($p=0.001$, chi-square test), and the need for surgical treatment ($p=0.025$, chi-square test) when compared based on the affected body region. Of the 87 upper extremity injuries that could not be treated with simple medical intervention, the highest number of patients requiring hospitalization for treatment was 28. Upper extremity traumas also ranked first in the group of patients whose treatment was completed surgically, with 36 cases. The classification of the patient population according to the need for simple medical intervention, hospitalization, and surgical treatment, along with the statistical analysis, is summarized in Table 3.

Characteristics	All patients (N=887)	Mortality	Non-Mortality	p value
Gender				
Male, n (%)	717 (80.8)	4	713	1.000 [^]
Female, n (%)	170 (19.2)	0	170	
Age (years), median (IQR)	34 (26-44)	44.5 (37.8-53.0)	34 (26.0-43.5)	0.105 [*]
Simple medical intervention				
Yes, n (%)	663 (74.7)	0	663	0.004[^]
No, n (%)	224 (25.3)	4	220	
Surgical intervention				
Yes, n (%)	69 (7.78)	2	67	0.032[^]
No, n (%)	818 (92.2)	2	816	
Hospitalization				
Yes, n (%)	94 (10.6)	4	90	0.001[^]
No, n (%)	793 (89.4)	0	793	

*IQR: Interquartile range (25p, 75p), *: Mann-Whitney U test, ^: Fisher's exact test,*

Table 2. Statistical Analysis for Mortality

Characteristics	All patients (n=887)	SMI (n=663)	Non-SMI (n=224)	p*	Hospita lization (n=94)	Non- Hospitalizatio n (n=793)	p*	SI (n=69)	Non-SI (n=818)	p*
Trauma Mechanism, n (%)										
Penetrating-shearing instrument injury	314 (35.4)	270	44		16	298		24	290	
Blunt trauma	314 (35.4)	217	97		34	280		26	288	
Falls and sprains	176 (19.8)	108	68		36	140		18	158	
Burning	23 (2.6)	18	5		2	21		0	23	
Inhaler accident	22 (2.5)	21	1	0.001	0	22	0.001	0	22	0.322
Weight lifting	18 (2.0)	16	2		0	18		0	18	
Electric shock	9 (1.0)	5	4		4	5		1	8	
Blast and pressure	6 (0.7)	4	2		2	4		0	6	
Chemical burns	5 (0.6)	4	1		0	5		0	5	
Wound Type, n (%)										
None	206 (23.2)	201	5		3	203		0	206	
Incision	307 (34.6)	265	42		15	292		20	287	
Abrasion and ecchymosis	183 (20.6)	168	15		7	176		4	179	
Fracture	134 (15.1)	2	132		56	78		37	97	
Hematoma	38 (4.3)	27	11	0.001	4	34	0.001	1	37	0.001
Extremity amputation	12 (1.4)	0	12		3	9		5	7	
Dislocation	4 (0.5)	0	4		3	1		2	2	
Intracranial hemorrhage	1 (0.1)	0	1		1	0		0	1	
Pneumothorax	1 (0.1)	0	1		1	0		0	1	
Pulmonary contusion	1 (0.1)	0	1		1	0		0	1	
Affected Organ or System, n (%)										
None	76 (8.5)	74	2		2	74		0	76	
Head, neck, and face	142 (16.0)	106	36		19	123		6	136	
Thorax	44 (5.0)	14	30		20	24		3	41	
Abdomen	24 (2.7)	13	11		5	19		2	22	
Vertebra	9 (1.0)	7	2	0.001	0	9	0.001	0	9	0.025
Upper extremity	366 (41.3)	279	87		28	338		36	330	
Lower extremity	158 (17.8)	110	48		19	139		21	137	
Eye	66 (7.5)	59	7		0	66		1	65	
Urogenital	2 (0.2)	1	1		1	1		0	2	

IQR: Interquartile Range (25p, 75p), *: χ^2 test, SMI: Simple medical intervention SI: Surgical intervention,

Table 3. Statistical Analysis for Simple Medical Intervention, Hospitalization, Surgical Intervention

Discussion

In our study, 717 (80.2%) were male and 170 (19.8%) were female individuals, with a median age of 34 (IQR 26-44), were victims of occupational accidents. Similar numbers were reported in a study conducted at a tertiary hospital in Denizli province in 2012, where upon examining the distribution by gender, 13.6% (n=72) were female (86.4% (n=456) were male), with a mean age of 32.7±9.7 for the entire group (12). Additionally, a study published in 2018 showed that approximately 80% of occupational accidents involved male individuals, which is consistent with the results of our study (13). Our study supports the literature in indicating that occupational accidents are more commonly observed in males.

Penetrating-shearing tool injuries (35.4%), blunt trauma (35.4%), and fall and sprain injuries (19.8%) are common mechanisms of injury leading to admission to our emergency department. According to the study by A. Tadros et al., the most common mechanisms of injury are fall and crush injuries (13). Similarly, in a study conducted by Ruchi Bhandari et al., blunt trauma and injuries related to falls were also among the leading mechanisms of injury (14). The variation in results across different studies may be influenced by the diversity in regional occupational sectors. Incisions (34.6%), abrasions and ecchymosis (20.6%), and fractures (15.1%) are commonly encountered types of lesions in our cases. In the study by Bhandari et al., sprains, lacerations, contusions, and fractures were also among the most frequent types of lesions, yielding similar results to our study (14).

According to our study, when considering body regions, injuries to the upper extremity (41.3%), lower extremity

(17.8%), and head-neck and face regions (16%) rank as the top three. In the study by Hösüklükler et al., although with different proportions, the extremities and head-neck regions were among the most injured organ systems, with the upper extremity (56.9%) and head-neck (20.9%) regions being prominent (15).

In the study conducted at our tertiary hospital, 74.7% of occupational accident patients could be treated with simple medical interventions. Additionally, 31.2% of these patients did not even undergo imaging procedures. Given this, it is important for occupational accident victims to utilize primary care facilities or workplace health services before ER where the diagnosis and treatment of critical patients take precedence. This is crucial for reducing the increasing workload of healthcare professionals in emergency departments and enabling them to allocate their motivation and attention to more urgent cases.

Furthermore, out of 983 patient admissions, 96 were found to have missing data. More significantly, only 34 patients' occupational information could be accessed. Consequently, there is insufficient information about injury characteristics according to occupational types based on the identified geography. The accuracy of this data is crucial for increasing preventive measures that can be taken according to industries to prevent potential accidents and raise awareness among employees about accidents.

Conclusion

Our study supports the literature indicating that occupational accidents are observed more frequently in males. Penetrating-cutting tool injuries and blunt trauma are the main mechanisms of injury in workplace accidents. Cuts,

abrasions, bruises, and fractures are the types of lesions we commonly encounter. In our study, upper extremity, lower extremity, head, neck, and facial injuries were the most frequently encountered body regions in occupational accidents.

The registered total number of occupational accidents in Turkey, which was 430.985 in 2018, showed a rapid increase to 422.463 in 2019, 384.262 in 2020, 511.084 in 2021, and 588.823 in 2022 (6). Each year, the increase in the number of occupational accidents inevitably leads to an increase in the workload in the healthcare sector, along with an increase in societal loss of life and property. Particularly, having knowledge about regional industries such as agriculture and industrial activities will contribute to foreseeing trauma patients' conditions and shaping training activities aimed at enhancing the knowledge and skills of healthcare professionals

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References

1. Ng ZX, Teo LT, Go KT, Yeo YT, Chiu MT. Major workplace related accidents in Singapore: a major trauma centre's experience. *Ann. Acad. Med. Singapore* 2010; 39: 920–7.
2. Chau N. 2011. Injury proneness. In: Cooper CL, Burke RJ, Clarke S, editors. *Occupational health and safety*. England: Gower Publishing Ltd, pp. 119–136.
3. Waehrer G, Leigh JP, Cassady D, Miller TR. Costs of occupational injury and illness across states. *J Occup Environ Med*. 2004 Oct;46(10):1084-95. doi: 10.1097/01.jom.0000141659.17062.4b.
4. Takala J. Introductory report: decent work–safe work. Paper presented at: XVIth World Congress on Safety and Health at Work; May 2002; Vienna, Austria. International Labour Office. Available at: https://www.researchgate.net/publication/232158056_Introductory_Report_Decent_Work_-_Safe_Work.
5. International Labour Office. *Global Trends on Occupational Accidents and Diseases*. Available at: https://webapps.ilo.org/static/english/osh/en/story_content/external_files/fs_st_1-ILO_5_en.pdf. Accessed 25 May 2024.
6. Social Security Institution. *Annual Health Statistics*. <https://www.sgk.gov.tr/Istatistik/Yillik/fcd5e59b-6af9-4d90-a451-ee7500eb1cb4/> Accessed May 25, 2024.
7. Shire JD, Marsh GM, Talbott EO, Sharma RK. Advances and current themes in occupational health and environmental public health surveillance. *Annu Rev Public Health*. 2011;32:109-132. <https://doi.org/10.1146/annurev-publhealth-082310-152811>.

8. El-Menyar A, Mekkodathi A, Al-Thani H. Occupational injuries: global and local perspectives. *Nepal J Epidemiol*. 2016;6(2):560.
9. Ozkan S, Kiliç S, Durukan P, Akdur O, Vardar A, Geyik S, İkizceli I. Occupational injuries admitted to the Emergency Department. *Ulus Travma Acil Cerrahi Derg*. 2010 May;16(3):241-7.
10. Fubini L, Pasqualini O, Ferro E, et al. Injury narratives in occupational safety and health prevention in Italy. *Occup Med (Lond)*. 2019 Dec 7;69(7):500-503. doi: 10.1093/occmed/kqz135.
11. Guzel S, Balci Y, Cetin G. Forensic Medical Evaluation of Assault Offenses Defined in the Turkish Penal Code. Available at: <https://www.atk.gov.tr/tckyaralama24-11-15.pdf>. Accessed May 25, 2024.
12. Dağlı B and Serinken M. Occupational injuries admitted to the emergency department. *Eurasian Journal of Emergency Medicine* (2012).
13. Tadros A, Sharon M, Chill N, Dragan S, Rowell J, Hoffman S. Emergency department visits for work-related injuries. *Am J Emerg Med*. 2018 Aug;36(8):1455-1458. doi: 10.1016/j.ajem.2018.04.058.
14. Bhandari R, Marsh SM, Reichard AA, Tonozzi TR. Characterizing emergency department patients who reported work-related injuries and illnesses. *Am J Ind Med*. 2016 Aug;59(8):610-20. doi: 10.1002/ajim.22607.
15. Höşükler E, Turan T, Erkol ZZ. Analysis of injuries and deaths by trauma scores due to occupational accidents. *Ulus Travma Acil Cerrahi Derg*. 2022 Sep;28(9):1258-1269. doi: 10.14744/tjtes.2022.22796.