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Characteristics of the Traumatic Forensic Cases Admitted To Emergency Department and Errors in the Forensic Report Writing

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ABSTRACT

Objective: To identify errors in forensic reports and to describe the characteristics of traumatic medico-legal cases presenting to the emergency department (ED) at a tertiary care hospital.

Methods: This study is a retrospective cross-sectional study. The study includes cases resulting in a forensic report among all traumatic patients presenting to the ED of Adiyaman University Training and Research Hospital, Adiyaman, Turkey during a 1-year period. We recorded the demographic characteristics of all the cases, time of presentation to the ED, traumatic characteristics of medico-legal cases, forms of suicide attempt, suspected poisonous substance exposure, the result of follow-up and the type of forensic report.

Results: A total of 4300 traumatic medico-legal cases were included in the study and 72% of these cases were male. Traumatic medico-legal cases occurred at the greatest frequency in July (10.1%) and 28.9% of all cases occurred in summer. The most frequent causes of traumatic medico-legal cases in the ED were traffic accidents (43.4%), violent crime (30.5%), and suicide attempt (7.2%). The most common method of attempted suicide was drug intake (86.4%). 12.3% of traumatic medico-legal cases were hospitalized and 24.2% of those hospitalized were admitted to the orthopedics service. The most common error in forensic reports was the incomplete recording of the patient's "cooperation" status (82.7%). Additionally, external traumatic lesions were not defined in 62.4% of forensic reports.

Conclusion: The majority of traumatic medico-legal cases were male age 18-44 years, the most common source of trauma was traffic accidents and in the summer months. When writing a forensic report, emergency physicians made mistakes in noting physical examination findings and identifying external traumatic lesions. Physicians should make sure that the traumatic medico-legal patients they treat have adequate documentation for reference during legal proceedings. The legal duties and responsibilities of physicians should be emphasized with in-service training.

Keywords: Medico-legal case; Forensic reports; Trauma; Emergency department.

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Introduction

A medico-legal case can be defined as a case of injury or ailment, etc., in which investigations by the law-enforcing agencies are essential to fix the responsibility regarding the causation of the injury or ailment. In simple language, it is a medical case with legal implications for the attending physician where the attending physician, after eliciting history and examining the patient, thinks that some investigation by law enforcement agencies is essential or a legal case requiring medical expertise when brought by the police for examination [1-4].

Any case of injury or ailment where some criminality is involved is called a medico-legal case. Duties assigned to physicians during medico-legal cases include determining the judicial nature of the case and to reporting the case to the appropriate authorities in the proper manner, completing a full and complete examination under appropriate conditions, and retention of all kinds of medical evidence and related material under proper conditions, and proper recording of the examination findings [3,4].

All patients presenting to the emergency department (ED) due to crushing, traffic accidents, firearms and explosive injuries, assault, burns, electric shock, asphyxia, torture, child abuse, falls and other injuries, poisoning, and suicide attempt are considered traumatic medico-legal cases [1,2]. Traumatic medico-legal cases occur frequently in the EDs, which are seen as the entrance to health institutions. The ED examinations often constitute the first step of forensic examination. Emergency physicians have a duty to evaluate cases of medico-legal trauma and to transmit judicial findings to the appropriate judicial authorities in accordance with accepted procedures [1].

Emergency physician's medical records and official reports are very important in the cases of legal problem. Forensic reports created by the EDs represent critical evidence for the judicial process. Inaccurate reports cause delays in judicial proceedings and result in misleading decisions that may lead to the loss of patient rights. Identification of mistakes and deficiencies in forensic reports will help prevent accusations such as "neglect of judicial responsibility" and "untruthful expertise"[5]. The identification of common patterns in traumatic medico-legal cases can be used to help minimize such incidents.

The aim of this study is to determine the demographic, epidemiological and outcomes of traumatic medico-legal cases presenting at the ED of a tertiary hospital. We also discuss mistakes and deficiencies in the organization of forensic reports which were written by emergency physicians within the framework of the current laws and international standards.

Materials and Methods

Study Design and Settings

Traumatic medico-legal cases which present to

Emergency Department of Adiyaman University Training and Research Hospital were evaluated between January 01, 2014 and December 31, 2014, retrospectively. Adiyaman University Training and Research Hospital is an important center serving the Southeastern Anatolia Region. The study was performed in compliance with the World Medical Association Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects and approved by the Medical Ethics Committee. This study was verified according to the checklist for observational studies in Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) and registered to clinicaltrials.gov (ID: NCT03133702).

Data Collection

Data were obtained from hospital medical records, forensic reports, and patient ED charts. Demographic characteristics, time of presentation to the ED (month, season), traumatic characteristics of medico-legal cases (e.g. traffic accident, poisoning, suicide attempt, fall, occupational accident, gunshot wound, stab wound, burn, electric shock, sexual abuse, victim of violent crime), form of suicide attempt, suspected poisonous substance exposure, the result of follow-up (discharge, hospitalization, referral to another institution, death) and the type of forensic report (definite-provisional) were recorded in a standardized study form. Traumatic medico-legal cases presenting at the Emergency Department of Adiyaman University Training and Research Hospital were included in the study. Cases in which the forensic report and patient the ED charts could not be retrieved and nontraumatic medico-legal cases were excluded from the study.

Outcome Measures

The primary outcome measure was the demographic and clinical characteristics of traumatic medico-legal cases which applied the ED. The secondary outcome measure was the evaluation of the accuracy of the forensic reports.

Definitions

Evaluation of the accuracy of the forensic reports was carried out by two forensic medicine specialists in accordance with principles stated in the published by the Ministry of Health General Directorate of Primary Health Services, B.10.0.TSH.013.003-13292 dated 22.09.2005.

Traffic accident, poisoning, suicide attempt, fall, occupational accident, gunshot wound, stab wound, burn, electric shock, sexual abuse, a victim of violent crime was defined as medico-legal cases. If the evaluation of the patient was completed as a result of the forensic examination, the forensic report that was written was defined as a definite forensic report (final report). If the trauma findings were not yet fully diagnosed, the written forensic report was defined as

a provisional forensic report (first, temporary report). Road traffic accidents, in-car accidents, motorcycle accidents and bicycle accidents were included in the traffic accident group. The patients were analyzed in groups according to age: 0-17 years, 18-44 years, 45-64 years, and over 65 years old.

Statistical Analysis

The data were initially entered into the Microsoft Office Excel 2007 software and were checked whether they are correct or not via patient's medical records. The data was analyzed using Statistical Package for the Social Sciences (SPSS Inc., Chicago, Illinois, USA) version 16.0 software. Numerical variables are expressed as mean±standard deviation (SD). Categorical variables are expressed as number and percentage. Distribution difference of medico-legal cases according to age groups was evaluated using the Chi-squared test.

Results

We evaluated 4330 traumatic medico-legal cases. We were unable to retrieve the forensic reports for a total of 30 patients who were excluded from the study as a result. A total of 4300 traumatic medico-legal cases were included in the study.

Demographic Characteristics of Traumatic Medico-Legal Cases

Of all traumatic medico-legal cases, 72% (n=3094)

were male and 28% (n=1206) were female. The mean age of the patients was 28.3±15.5 years (range: 0-96 years). The majority of the traumatic medico-legal cases were between the age of 18 and 44 years old (n=2658, 61.9%, $p<0.05$, Table 1). 10.1% (n=435) of traumatic medico-legal cases presented to the ED in July (Figure 1). The largest proportion of medico-legal cases by season occurred in summer (n=1243, 28.9%), followed by spring with 26.3% (n=1130), autumn with 24.6% (n=1057) and winter with 20.2% (n=870).

Traumatic Characteristics

The majority of traumatic medico-legal cases occurred due to traffic accidents (n=1868, 43.4%), followed by the victim of violent crime (30.5%) and suicide attempt (7.2). The distribution of all medico-legal cases according to the nature of the trauma is shown in Table 2.

Of all traumatic medico-legal cases, 7.2% were due to attempted suicide. The mean age of these patients was 24.84±9.56 years (range: 13-73 years). The proportion of patients presenting to the ED due to attempted suicide was higher among patients aged 18-44 relative to other age groups (n=232, 75.3%) (Table 3). Suicide attempt cases were most commonly caused by drug intake (n=266, 86.4%) (Table 4). Of the 27 (0.6%) cases due to poisoning, the most common active substance was carbon monoxide (n=14, 51.8%) (Table 5).

Treatment of Traumatic Medico-Legal Cases

Among the traumatic medico-legal cases presenting

Table 1. Distribution of traumatic forensic cases according to age groups

Age groups	n	%	p value
0-17 years	1036	24.1	
18-44 years	2658	61.9	
45-64 years	477	11.1	<0.05
≥65 years	129	3.0	
Total	4300	100	

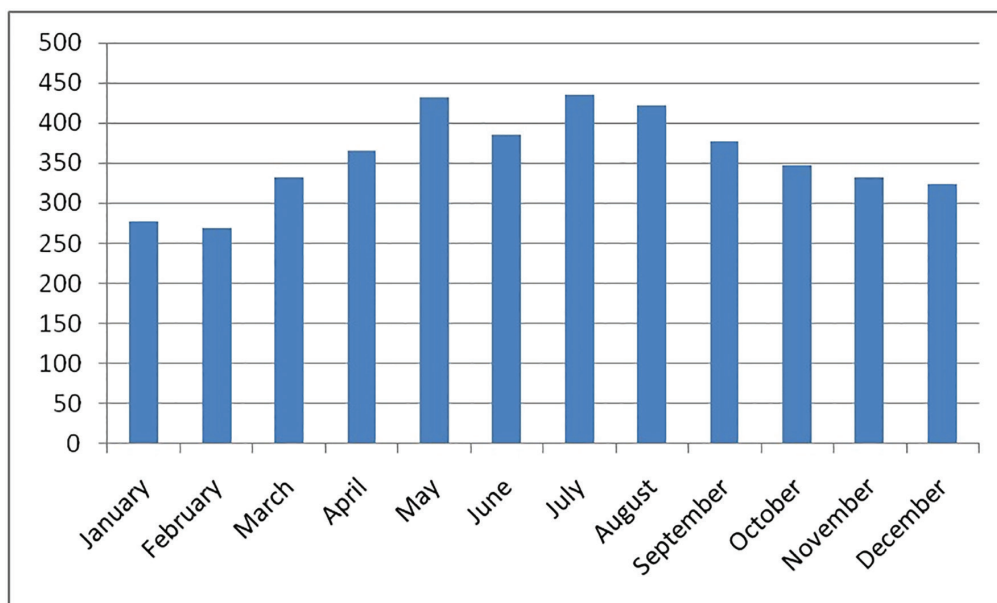


Fig. 1. Emergency department admissions of traumatic medico-legal cases by months

Table 2. Forensic cases according to the nature of the event

	n	%
Traffic accident	1868	43.4
Victim of violent crime	1310	30.5
Suicide attempt	309	7.2
Stab wounds	262	6.1
Fall	202	4.7
Occasional accident	201	4.7
Gunshot wound	54	1.3
Burn	32	0.7
Poisoning	27	0.6
Electric shock	21	0.5
Alcohol intoxication	7	0.2
Sexual abuse	6	0.1
Animal bite	1	0.02
Total	4300	100.0

Table 3. Distribution of suicide attempts according to age groups

Age groups	n	%
0-17 years	65	21.1
18-44 years	232	75.3
45-64 years	9	2.9
>65 years	2	0.6
Total	308	100.0

Table 4. Distribution of poisoning cases by substance

Poisoning substance	n	%
Carbon monoxide	14	51.9
Corrosive substrat	9	33.3
Chemical agent	4	14.8
Total	27	100.0

Table 5. Methods of suicide attempts

	n	%
Drug	266	86.4
Chemical agent	17	5.5
Sharp instrument	15	4.9
Corrosive substance	6	1.9
Falling from high	3	1.0
Hanging	1	0.3
Total	308	100.0

to the ED, 87.5% were discharged and 12.3% were hospitalized. 24.2% of hospitalized cases were admitted to the orthopedics service and 0.2% (n=7) were referred to another health care facility. The proportion of mortality among medico-legal trauma cases was 0.1% (n=3). The distribution of traumatic medico-legal cases according to the clinic admission is shown in Table 6.

Evaluation of Forensic Reports Written in the ED

Among the medico-legal trauma cases, 63% (n=2711) were classified as "definitive forensic reports" and 37% (n=1589) were classified as "provisional forensic reports". None of the forensic

Table 6. Hospitalized forensic trauma cases according to clinics

	n	%
Orthopedics	128	24.2
Intensive care unit	126	23.8
Neurosurgery	75	14.2
Plastic surgery	45	8.5
Thoracic surgery	39	7.4
Internal medicine	34	6.4
Pediatric surgery	27	5.1
General surgery	16	3.0
Cardiovascular surgery	12	2.3
Burn unit	9	1.7
Eye diseases	7	1.3
Psychiatry	3	0.6
Otorhinolaryngology	3	0.6
Gastroenterology	2	0.4
Total	529	100.0

reports had a judicial interpretation. The cause of the incident in all the cases was completely specified in the patient ED chart in cases of suicide attempt and poisoning with an active substance. When two forensic medicine specialists evaluated the accuracy of the forensic reports written emergency physicians, it was found that the cooperation status was not recorded in 82.7% (n=3556) of all forensic reports. External traumatic lesions were not identified in 62.4% (n=2683) of forensic reports. In 47.4% (n=2038) of written medico-legal cases, errors related to the specification of injury severity were identified. The general condition and consciousness status of the patient was incomplete in the documentation for 1.8% (n=77) of medico-legal cases.

Discussion

Medico-legal cases constitute an important subset of patients seen by the EDs. Several previous publications have recognized the significance of medico-legal cases [2,4,5]. Accurate and comprehensive evaluation of medico-legal cases and preparation of a proper written forensic report is important for the protection of the rights and freedoms of persons suspected of involvement in the crime. However, when evaluated in the EDs setting, insufficient knowledge regarding forensic medical issues causes the problems in this process. As a result of these problems, patients and their relatives may face legal difficulties and physicians can be subject to criminal sanctions [4-7].

Studies by Demircan *et al.*, [8], Korkmaz *et al.*, [1] and Yavuz *et al.*, [5] found that traumatic medico-legal cases accounted for 3.7%, 7.0%, 6.0% of the ED cases, respectively. In our study, 0.43% of the patients presenting at the Emergency Department of Adiyaman University Training and Research Hospital were medico-legal trauma cases. Our hospital is the only medical care center in Adiyaman province, resulting in a much larger number of non-

judicial patient applicants and a relatively low rate of medico-legal cases.

Earlier studies have shown that medico-legal cases are more likely to involve men than women [1,5,9-11]. In previous investigations of medico-legal cases, the average age ranged from 23 to 33 years; our study was consistent with the literature in this regard. The majority of medico-legal trauma cases were male in our study, and more than half of the cases were concentrated in the 18-44 age group. The higher rate of medico-legal trauma among this population may be due to young men working high-risk jobs, and spending more time driving and engaged in social life [12,13].

A study by Altun *et al.*, [14] reported that traumatic medico-legal cases increase during the summer months. Turla *et al.*, [6] report that medico-legal cases occur at the lowest frequency during the winter months. The results of our study are similar to the literature [5,6,8-10]. Prolonged duration of daylight in the summer and the increase in daily activities of people as a natural consequence of this may contribute to increased risk of trauma.

Most medico-legal cases refer to the EDs due to trauma. Traffic accidents constitute a large proportion of medico-legal cases. Traffic accidents are an important public health problem for Turkey as well as other developing countries and thousands of people are injured or die every year [15]. According to a 2013 report from the World Health Organization, 1.2 million people die worldwide from traffic accidents each year, and traffic accidents are ranked 9th among causes of death globally [16,17]. As expected, traffic accidents account for the largest number of trauma cases in previous studies conducted in Turkey [5,7,18]. In our study, these cases ranked first, accounting for 43.4% of medico-legal trauma cases.

The ED applications for medico-legal trauma cases involving the victim of violent crime account for between 5.1% and 26.4% of medico-legal cases [8,12,13,18]. In our study, the victims of violent crime accounted for 30.5% of medico-legal cases. This high proportion is due in part to the sociocultural structure of Adiyaman. There are regional and cross-national variations in the relationship between suicide rates. While suicide rates are higher among younger age groups than older adults in some countries, in other countries, rates are lower among younger age groups [19,20]. In the present study, we found that suicide attempts were the most frequent between 18 and 44 years. Among adults, the most frequent agent in suicide attempts is drug intake [10]. In our study, the majority of suicide attempts, the 3rd most prevalent class of medico-legal cases, were caused by drug intake, followed by intake of chemical agents, and self-destructive cutting instruments.

Sharp instruments are also widely used in home and various business sectors. Such instruments, which do not require any criminal sanctions unless they are used outside their intended purposes, can

often be found at hand. These implements may also be involved in cases of self-defense, assault, and murder. In epidemiological studies involving injuries by sharp instruments, these injuries accounted for between 4.1% and 18% of cases [5,12,13,18]. In our study, this rate was 6.1%.

Falling is especially common for the elderly, children, and workers in high-risk jobs [8]. In our study, fall cases are ranked 5th at 4.7% of traumatic medicolegal cases. Other studies have reported incidence rates of 1.96% and 9.4% [5,15]. The majority of fall-related trauma cases are the result of accidents. However, suicide and homicide may also occur at relatively low rates [8]. A large proportion of fall-related injuries result from accidents and work safety training and inspections are essential to reduce the number of incidents.

The number of electrical injuries in Turkey is higher than the worldwide average and the rate of mortality associated with these injuries is high [21]. Electrical injuries are considered preventable accidents, and it is important to take preventive measures in homes and workplaces in this respect.

Guns play an important role in intentional violent injuries. Violence with arms continues to be a major problem, especially in the United States. In other countries, the supply and use rates of firearms are lower [8]. In studies conducted in our country, injuries from firearms occur at varying rates [5,18]. We found that the rate of a gunshot wound was 1.3%.

The frequency of poisoning among medico-legal cases varies between studies [5,12,13]. Regional and social differences may contribute to variation between studies. In our study, the rate of poisoning was 0.6% and the majority of poisoning cases were caused by carbon monoxide.

Korkmazet *et al.*, [1] reported that 68.5% the medico-legal cases were discharged from the ED and 25.7% were hospitalized. A study by Çakıret *et al.*, [15] reported that 51% of medico-legal cases were discharged from the ED. The rates of hospitalization in our study were less than rates reported in the literature. Our hospital is the only center in our city and, all the patients are brought to the ED directly without triage and regardless of emergency status.

In forensic reports listed as “provisional reports”, inadequate documentation of the reason for the provisional status is a common problem [3,7,22]. While there are adequate facilities for the final report, writing a judicial report as a “provisional report” extends the judicial process unnecessarily, causes justice to be delayed, and can lead to unnecessary paperwork and loss of work power by increasing the number of requests for definitive reports. In a two-center study in which judicial reports were prospectively examined, the provisional reporting rates were reported as 58.5% and 99.6%, respectively [22]. In our study, 63% of the forensic reports were designated “final reports”.

Earlier studies have shown that forensic reports

written by individuals other than forensic specialists may be incomplete and inaccurate and that the errors in the reports may negatively impact the judicial proceedings [1,6,7].

One of the elements that are required in order to issue a complete report is a detailed physical examination. It is also important to keep accurate, systematic, and detailed records. Inaccurate or misleading documentation of the specific nature of wounds encountered in medico-legal cases can lead to difficulties in the judicial phase [6,7]. A study found that external traumatic lesions were not documented in 30.5% of forensic reports, and in about half of the cases with external lesions lacked the detail required for forensic reports [6]. In our study, external traumatic lesions were not identified in 62.4% of forensic reports. The characteristics of wounds frequently encountered in medico-legal trauma cases are often not recognized by physicians. A regular forensic medicine training program should be administered to physicians to correct this situation.

A previous study reported that patient consciousness status, orientation, and cooperative status, which are the most important indicators of health status, were missing in the forensic reports [7]. Our study showed that cooperative status was not documented in the majority of forensic reports (82.7%). One reason for this may be that forensic reports are considered by some physicians as insignificant reports that can be subsequently modified.

The main purpose of forensic reports written by physicians is to answer the questions of judicial authorities [23]. The conclusion of a forensic report must clearly address whether “there is a situation that puts the life of the person at risk” and “whether or not the person was injured by a simple medical intervention”. If a life-threatening decision has been made, the basis for this conclusion must be clearly stated [6]. A study by Çoltu *et al.*, [24] found that the conclusion section of forensic reports, in which physician writes the final decision, was deficient

in 2.7% of cases. In our study, 47.4% of errors were related to the final decision. Outcomes of our study showed that when writing a forensic report in medico-legal cases, emergency physicians made mistakes in noting patients’ findings. This may reflect the level of uncertainty inherent in the ED care and physicians may be unwilling to make definitive conclusions in all cases.

Limitations

One of the limitations of the present study is that the study was conducted in a single center. Therefore, outcomes of the study are not generalized. However, this study describes most characteristics of medico-legal injuries referring to a large center. Another limitation is that we could not perform to study data the multivariable logistic regression analysis due to nature of our study.

Conclusions

In the present study, we found that the majority of medico-legal trauma cases occurred in individuals aged 18 to 44 years, and that medico-legal trauma involved males more commonly than females. The greatest number of incidents occurred during the summer months, particularly in July. The most common cause of medico-legal trauma cases in the ED was traffic accident followed by violent crime and suicide attempt. The most frequent method for suicide attempt was self-poisoning by drug overdose. The majority of cases were discharged with healing after treatment in the ED. The most common errors in forensic reports were the failure to record the cooperative status of the patient and poor identification of external traumatic lesions. By highlighting mistakes and deficiencies in forensic reports, we hope that new efforts can be made to provide pre- and post-graduate training on the preparation of forensic reports.

Conflicts of Interest: None declared.

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