Life Science Informatics Publications

Research Journal of Life Sciences, Bioinformatics, Pharmaceutical and Chemical Sciences

Journal Home page http://www.rjlbpcs.com/

RJLBPCS

ISSN 2454-6348

Original Research Article **DOI: 10.26479/2019.0501.26**

EVALUATION OF PENETRATING TRAUMA PATIENTS IN DEPARTMENT OF EMERGENCY MEDICINE

Serkan Dogan, Cesareddin Dikmetas, Ramiz Yazıcı, Utku Murat Kalafat, Melis Dorter*, Busra Bildik, Basar Cander

Ministry of Health, University of Health Sciences, Kanuni Sultan Suleyman Training and Research Hospital, Department of Emergency Medicine, Istanbul, Turkey.

ABSTRACT: Objective: Penetrating traumas may cause high rates of morbidity and mortality among all traumas.The aim of this study is to investigate the epidemiological and demographic features of penetrating traumas with a multidisciplinary approach, which can significantly decrease mortality and even morbidity. Materials and Methods: Between January 2017 and December 2017, 210 patients who presented to the emergency department due to penetrating trauma were reviewed retrospectively. For statistical analysis, NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) program was used. Significance was evaluated at least p <0.05. Results: A total of 210 patients were included in the study. There were % 86.2 men among the patients. The emergency service cost in patients who suffered from gunshot wounds was higher than the patients who suffered from penetrating stab wounds (p=0,023; p<0,05).It was seen that the patients who were came to the emergency service with gunshot wounds hospitalized longer than the other types of trauma patients in the emergency room (p=0,006; p<0,01). A significant direct correlation was found between the duration of emergency room stay and the application of procedures such as invasive intervention, radiology requests, laboratory requests, consultation (p=0,001; p<0,01). Conclusion: Penetrating traumas can often be fatal. As a result, penetrating traumas are frequently encountered in emergency services and with good management, the mortality and morbidity can be reduced in these types of traumas. We believe that more comprehensive multidisciplinary studies in terms of patient population will contribute to emergency service penetrating trauma management planning.

KEYWORDS: Emergency Service, Length of Stay, Penetrating Trauma, Outcome.

Peer review under responsibility of Life Science Informatics Publications

Corresponding Author: Dr. Melis Dorter* Ph.D.
Ministry of Health, University of Health Sciences, Kanuni Sultan Suleyman Training and Research Hospital, Department of Emergency Medicine, Istanbul, Turkey.
Email Address: melisdorter@gmail.com

1.INTRODUCTION

Trauma is a leading cause of death, especially in the 1-44 age group [1]. Penetrating traumas may cause high rates of morbidity and mortality among all these traumas [2]. The primary survey should proceed in a stepwise and systematic fashion for all trauma patients,regardless of injury pattern,and should address immediate threats to life[3]. Penetrating traumas can be identified as stabbing, piercing, piercing-stabbing and firearm injuries [4]. Although penetrating stab wounds are more common, they are less mortal than gunshot wounds [5]. Penetrating traumas continue to be an important cause of morbidity and mortality, which we encounter more frequently in emergency services with increasing violence [6]. Approximately 300 people per day sustain gunshot wounds from all causes combined in the United States[7]. There were approximately 125,000 assaults with knives and 140,000 cases of assaults with firearms in 2014 according to the Federal Bureau of Investigation[8]. Violent events and penetrating traumas are more common in men [9, 10]. There were %86.2 men among the patients in our study.In previous studies,the male ratio was reported to be higher[11, 12]. The aim of this study is to investigate the epidemiological and demographic features of penetrating traumas with a multidisciplinary approach, which can significantly decrease mortality and even morbidity.

2. MATERIALS AND METHODS

Between January 2017 and December 2017, 210 patients who presented to the emergency department due to penetrating trauma were reviewed retrospectively. Patient data were obtained from patient files and electronic hospital records in the hospital archive. The study was prepared in accordance with the principles of Helsinki Declaration. Patient's age, sex, the manner of application (with an ambulance or etc.), GCS, the mechanism of trauma,traumatic body area, intervention or procedure, requested radiological examination, requested consultations, clinical outcome, length of hospitalization and emergency service cost were recorded in case data form. For statistical analysis, NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) program was used. Mann Whitney U test was used to compare descriptive statistical methods (Mean, Standard Deviation, Median, Frequency, Ratio, Minimum, Maximum) as well as two groups of variables that did not show normal distribution in comparison of quantitative data. Oneway Anova test was used for comparison of the three groups with normal distribution and Kruskal Wallis test was used for the comparison of the groups with three and more groups not showing normal distribution. Spearman's

Correlation Analysis was used to evaluate the relationships between variables. Pearson's chi-square test and Fisher-Freeman-Halton test were used to compare qualitative data. Significance was evaluated at least $p < 0.05$.

3. RESULTS AND DISCUSSION

The study was prepared between January 2017 and December 2017 in Kanuni Sultan Suleyman Training and Research Hospital Emergency Department; % 13,8 (n = 29) of the patients were female and % 86,2 (n = 181) were male of total 210 cases. The descriptive characteristics of the cases were given in Table 1.

Table 1: Distributions of Descriptive Properties

		N	%
Age (year)	Min-Max (Median)	2-71 (27)	
	Mean±SD	28,21±10,98	
Gender	**Female**	29	13,8
	Male	181	86,2
The manner of application	**Without ambulance**	102	48,6
	Ambulance	108	51,4
The mechanism of trauma	**Piercing-stabbing**	156	74,3
	Gun shot	54	25,7
Traumatic body area	**Head**	28	13,3
	Thorax	48	22,9
	Abdomen	42	20,0
	Extremity	139	66,2
	Other	7	3,3
GCS	**3**	4	1,9
	8	1	0,5
	15	205	97,6

When the clinical features of the cases were examined, it was seen that % 76.2 of the patients had radiological examination and % 48.1 of the patients requested consultation. The most requested department was orthopedics and traumatology with % 51.5. % 25.2 of the cases were hospitalized. When the duration of stay in the emergency room was examined, it was found that they remained at most % 40 (n = 84) for 1-3 hours (Table 2). Emergency service costs ranged from 2,92 to 1.151,46 USA dollars and the average was found as 72,82 ± 101,33 USA dollars (Table 3).

Table 2: Duration of Stay in Emergency Department and Distribution of Emergency Service Costs

		N	%
Duration of stay	**0-1 hour**	42	20,0
	1-3 hours	84	40,0
	3-6 hours	55	26,2
	6-12 hours	23	11,0
	12-24 hours	3	1,4
	>24 hours	3	1,4
Emergency Service Cost (USA Dollars)	Min-Max (Median)	2,92-1.151,46 (46,86)	
	Mean±SD	72,84±101,33	

The duration of emergency stay according to arrival is statistically significant (p=0,001; p<0,01). In the group coming with their own possibility, the rate of stay of 0-1 hours was higher than those with ambulance. Those who came to the emergency room with an ambulance had a rate of staying longer than 6 hours higher than those who came with their own possibility (Table 3). The duration of emergency stay according to trauma mechanism is statistically significant (p=0,006; p<0,01). The rate of stay in the emergency room was 0-1 hours higher in the patients who were injured by the piercing tool. The rate of staying in the emergency room for 3-6 hours was higher in the patients who were suffered by gunshot wound (Table 3). The duration of emergency stay according to the presence of head injury is statistically significant (p=0,019; p<0,05). The duration of stay of 1-3 hours was higher in patients without head trauma, and the duration of stay in 3-6 hours was higher in patients with head trauma (Table 3). The duration of emergency stay according to the presence of extremity trauma is statistically significant (p=0,001; p<0,01).The duration of stay of 0-1 hour was higher in patients with extremity trauma. The rate of staying longer than 6 hours was higher in those without extremity trauma (Table 3).

Table 3: Evaluation of Duration of Stay in Emergency Service by Demographic and Arrival Characteristics

		Duration of stay(hour)				
		0-1 hour (n=42)	**1-3 hours (n=84)**	**3-6 hours (n=55)**	**>6 hours (n=29)**	**p**
Age (year)	Min-Max (Median)	4-71 (24,5)	7-65 (27)	2-54 (28)	16-53 (23)	[a]**0,831**
	Mean±SD	27,12±13,48	28,00±10,54	29,13±9,44	28,69±11,34	
Gender	**Female**	11 (37,9)	9 (31)	6 (20,7)	3 (10,3)	[b]**0,112**
	Male	31 (17,1)	75 (41,4)	49 (27,1)	26 (14,4)	
Arrival Characteristics	**Without ambulance**	37 (36,3)	34 (33,3)	23 (22,5)	8 (7,8)	[b]**0,001****
	Ambulance	5 (4,6)	50 (46,3)	32 (29,6)	21 (19,4)	
Mechanism of trauma	**Piercing-stabbing**	39 (25)	63 (40,4)	34 (21,8)	20 (12,8)	[c]**0,006****
	Gunshot	3 (5,6)	21 (38,9)	21 (38,9)	9 (16,7)	
Traumatic body area						
Head	**No**	38 (20,9)	78 (42,9)	41 (22,5)	25 (13,7)	[b]**0,019***
	Yes	4 (14,3)	6 (21,4)	14 (50)	4 (14,3)	
Thorax	**No**	37 (22,8)	66 (40,7)	41 (25,3)	18 (11,1)	[c]**0,075**
	Yes	5 (10,4)	18 (37,5)	14 (29,2)	11 (22,9)	
Abdomen	**No**	37 (22)	66 (39,3)	46 (27,4)	19 (11,3)	[c]**0,108**
	Yes	5 (11,9)	18 (42,9)	9 (21,4)	10 (23,8)	
Extremity	**No**	5 (7)	29 (40,8)	19 (26,8)	18 (25,4)	[c]**0,001****
	Yes	37 (26,6)	55 (39,6)	36 (25,9)	11 (7,9)	
Other	**No**	42 (20,7)	81 (39,9)	53 (26,1)	27 (13,3)	[b]**0,430**
	Yes	0 (0)	3 (42,9)	2 (28,6)	2 (28,6)	

[a]Oneway ANOVA Test [b]Fisher Freeman Halton Test [c]Pearson Chi-Square Test

*p<0,05 **p<0,01

According to the duration of emergency stay, the clinical outcome was statistically significant (p=0,001; p<0,01). The rate of hospitalization in patients with an emergency longer than 6 hours was found to be higher than those who stayed for 0-1 hours, 1-3 hours and 3-6 hours. In the emergency patients, the rate of discharge was higher than those who stayed for 6 hours and longer. The rate of discharge was found to be higher in the patients who remained in the emergency room

for 0-1 hours than those who stayed for 1-3 hours. The evaluation of consultations, clinical outcome and the duration of the visits are given in Table 4.

Table 4: Evaluation of the Duration of Stay in Emergency Service by Clinical Characteristics

		Duration of stay (hour)				
		0-1hour (n=42)	**1-3 hours (n=84)**	**3-6 hours (n=55)**	**>6 hours (n=29)**	**p**
Consultation request status	**No**	38 (34,9)	43 (39,4)	26 (23,9)	2 (1,8)	[c]**0,001****
	Yes	4 (4)	41 (40,6)	29 (28,7)	27 (26,7)	
•Requested consultations (n=101)						
Brain surgery	**No**	4 (4,2)	39 (41,1)	26 (27,4)	26 (27,4)	[b]**0,727**
	Yes	0 (0)	2 (33,3)	3 (50)	1 (16,7)	
General surgery	**No**	1 (1,6)	24 (39,3)	23 (37,7)	13 (21,3)	[b]**0,034***
	Yes	3 (7,5)	17 (42,5)	6 (15)	14 (35)	
Thoracic surgery	**No**	3 (3,2)	41 (44,1)	27 (29)	22 (23,7)	[b]**0,008****
	Yes	1 (12,5)	0 (0)	2 (25)	5 (62,5)	
Orthopedics	**No**	3 (6,1)	19 (38,8)	8 (16,3)	19 (38,8)	[b]**0,007****
	Yes	1 (1,9)	22 (42,3)	21 (40,4)	8 (15,4)	
Urology	**No**	3 (3,3)	39 (42,9)	27 (29,7)	22 (24,2)	[b]**0,173**
	Yes	1 (10)	2 (20)	2 (20)	5 (50)	
Other	**No**	4 (4,6)	37 (42,5)	26 (29,9)	20 (23)	[b]**0,264**
	Yes	0 (0)	4 (28,6)	3 (21,4)	7 (50)	
Clinical outcome	**Ex**	2 (4,8)	2 (2,4)	0 (0)	0 (0)	[b]**0,001****
	Operation	3 (7,1)	3 (3,6)	0 (0)	0 (0)	
	Hospitalization	0 (0)	13 (15,5)	8 (14,5)	14 (48,3)	
	Refer to another hospital	0 (0)	8 (9,5)	2 (3,6)	2 (6,9)	
	Discharged	36 (85,7)	57 (67,9)	45 (81,8)	13 (44,8)	
	Leave without permission	1 (2,4)	1 (1,2)	0 (0)	0 (0)	

[b]Fisher Freeman Halton Test [c]Pearson Chi-Square Test *p<0,05 **p<0,01

A positive correlation was found between age and emergency service cost (increased emergency service cost with increasing age) and a very weak relationship was found to be statistically significant at % 14.2 (r:0,142; p=0,040; p<0,05). Emergency service cost of the patients who came to the emergency room with their own means was found to be statistically lower than the ones that

came with the ambulance (p=0,001; p<0,01). Emergency service cost of the gunshot wound was found to be significantly higher than that of those with penetrating-tool injury (p=0,023; p<0,05). Emergency service cost was significantly higher in patients with thorax, abdomen and extremity trauma than those without thoracic trauma (p=0,001; p<0,01). A negative correlation was found between the GCS and the emergency service cost (decreasing the cost of emergency service as the GCS increased) and the weak relationship at 24.5% was found to be statistically significant (r:-0,245; p=0,001; p<0,01).(Table 5)

Table 5: Evaluation of Emergency Service Costs by Demographic and Arrival Features

			Emergency Service Cost (USA Dollar)		p
		N	Min-Max Median)	Mean±SD	
Age (year)	**r**	210	0,142		
	p		**0,040***		
Gender	**Female**	29	19,7-1993 (223,6)	362,35±441,56	[d]**0,513**
	Male	181	15,5-6110 (251,2)	390,20±552,46	
Arrival	**Without ambulance**	102	19,7-1447 (153,35)	264,78±254,87	[d]**0,001****
	Ambulance	108	15,5-6110 (294,3)	501,18±689,88	
Mechanism of trauma	**Piercing-stabbing**	156	19,7-1906 (224,1)	342,99±348,11	[d]**0,023***
	Gunshot	54	15,5-6110 (295,5)	511,64±874,08	

≠ The number of people in the group is not included in the evaluation since it is insufficient.

r: Spearman's Correlation Coefficient[d] Mann Whitney U Test [e]Kruskall Wallis Test *p<0,05 **p<0,01

DISCUSSION

Today, with the increase of violence, penetrating traumas are increasing [6]. In our study, we examined a total of 210 cases with % 86.2 male and % 74.3 with penetrating stabbing injuries. In the literature, Atescelik et al. found the most common injuries in men and also penetrating stabbing wounds were the most common injury type [13]. Previous studies have found that penetrating injuries are most common in male patients [14-18]. Macpherson et al. also found that the most common type of injury in their study was piercing stabbing tool injury [2]. In our study, the mean age of patients with penetrating injury was found to be 28,21 ± 10,98; Pallett et al. Found that the average age of the patients who were injured by a penetrating cutting tool was 16-24 years old [18]. Orthopedics and Traumatology were found to be the most requested department in our study.As shown in the results of our study, this situation was attributed to the occurrence of extremity injuries in penetrating traumas.In the study performed by Akoglu et al., injuries were mostly seen in the

extremities [19]. Bäckman et al.,reported that the most common location of firearm injury was the lower extremity[20]. Also abdominal traumas are important.We also used CT for this types of trauma too.Brenner et al studied penetrating abdominal traumas and they mentioned the importance of local wound exploration(LWE)[3]. In accordance to this study,patients who have a definitely negative LWE can be discharged from the emergency department without CT imaging[3]. The Western Trauma Association has published guidelines about using LWE[21, 22]. In our study,we used CT imaging for penetrating abdominal traumas because we think that LWE depends on the expert evaluating and the guide recommended the operating room is a preferred location for wound exploration.Emergency service costs ranged from 2,92 to 1.151,46 USA dollars and the average was found as 72,82 ± 101,33 USA dollars. In a study made by Pallett et al. In England, the cost of service for patients suffering from violence was determined as 2.781.411,60 dollars annually [23], the cost of patients with penetrating trauma is calculated as 10.114,22 dollars per patient [24]. In the study by Atescelik et al., it was found that the most frequent means of access to the emergency department was the private vehicle (% 55.8) [13]. Koksal et al., found the most frequent access to the emergency room with ambulances (% 74.6) [14]. We found that the rate of transportation of the patients to the emergency room was most frequently with ambulance (% 51.4). We can say that these differences between the studies depend on the regional transportation conditions and the location of the hospital to the city centers. The duration of emergency stay according to arrival is statistically significant ($p=0,001$; $p<0,01$). The rate of staying 0-1 hours was found to be higher in the patients who came with their vehicles than the ones who came with ambulance.The rate of staying longer than 6 hours was found to be higher in patients who came with ambulance. When the literature was examined, no study could be determined regarding the length of stay in the emergency room with an ambulance application. The more serious injuries of patients who applied with ambulances and the high number of interventions and investigations may explain the increase in this period, but this should be investigated with more population studies. We found that the rate of stay of 0-1 hours was higher in patients who came to the emergency room with penetrating-cutting tool injury than those with gunshot wounds. We found that the duration of stay in the emergency department lasted up to 6 hours in patients with gunshot wounds. When we look at the literature, in the study of Unlu et al., penetrating stabbing tool injuries are three times higher than gunshot wounds, but their mortality is lower [25]. In other studies, penetrating stabbing injuries are lighter than gunshot wounds, as they cause tissue and organ injuries to their reach in the body and only on their traces [3, 4, 5]. Since the more serious injuries cause longer stays in the emergency department and even in hospitals, patients with a firearm injury who can cause more serious injuries in our study have a long emergency service stay. According to the presence of head trauma, the duration of stay in the emergency room varies significantly. A study by Karaca et al. they found high mortality and morbidity rates in patients with gunshot wounds to the head area [17]. In our study, the most common penetrating trauma was

extremity traumas. Guven et al. found that extremities were the most frequently affected body region in gunshot wounds [26]. In the previous studies, Akoglu et al., found the extremities and Durdu et al., found the upper extremities as most affected body region in gunshot wounds [19, 27]. We believe that the reason for this is that the person uses both upper and lower extremities for defense purposes. In the study of Erdur et al., patients with high trauma scores (ISS> 12) were told that the duration of emergency room stay increased [28]. In other studies, patients with high trauma score (ISS> 50) had a high mortality rate [17]. We found that 0-1 hour emergency room stay rate was higher in patients with extremity trauma than those without extremity trauma. We also found that the rate of non-extremity trauma was higher in cases with longer (more than 6 hours) stay in the emergency department. We can explain this situation in accordance with the literature as it is directly proportional to the increase in emergency room stay in cases with high severity. Koksal et al. reported that % 1.4 of the patients died in the emergency department, % 1.4 had been discharged on their own request, % 12.6 were discharged after the initial intervention, % 12.6 were referred, and % 71.8 were admitted to various clinics [14]. In our case, % 1.9 (n=4) of the cases were ex; % 2.9 (n=6) were operated, % 16.6 (n=35) were hospitalized, % 5.7 (n=12) were referred, % 70.0 (n=147) were discharged, % 1.9 (n=4) were discharged voluntarily, and % 1.0 (n=2) left the hospital without permission and the rate of hospitalization and discharge was different from this study. We think that this situation depends on the socio-economic differences in the region where the institutions are located. It has been reported in the study of Karadag et al., that complicated health problems require more examination and consultation for diagnosis and emergency stay [29]. Also, Satar et al., reported that those with complex problems were staying longer in the emergency department [30]. In our study, the duration of stay in the emergency department, the radiological examination, the consultation and the emergency service costs were found to be higher in accordance with the literature ($p=0,023$; $p<0,05$). This can be explained by the fact that gunshot wounds cause more serious injuries and problems.

4. CONCLUSION

Penetrating traumas can range from a superficial trauma to a fatal trauma. This type of trauma is more common in the male population, especially when it occurs outside the home and increases with violence. As a result, penetrating traumas are traumas that are frequently encountered in emergency services and have a good planning in management and may decrease their mortality and morbidity. We believe that more comprehensive multidisciplinary studies in terms of patient population will contribute to emergency service penetrating trauma management planning.

CONFLICT OF INTEREST

Authors declared that there is no conflict of interest.

REFERENCES

1. Minino AM, Heron MP, Smith BL. Deaths and death rates for the 10 leading causes of death in specified age groups: United States, preliminary 2004. Nat Vital Stat Rep 2006; 54(19);28-9.
2. Macpherson A, Schull M. Penetrating trauma in Ontario emergency departments: a population-based study. Can J Emerg Med 2007; 9(1):16-20.
3. Brenner M, Hicks C. Major Abdominal Trauma: Critical Decisions and New Frontiers in Management. Emerg Med Clin North Am. 2018 ;36(1):149-160.
4. Soybir GR. Trauma Epidemiology. Ertekin C, Taviloglu K, Guloglu R (eds). Trauma, 1.edition. Istanbul: Istanbul Medical Publishing, 2005:29.
5. Guloglu R, Yanar H. Abdominal Injuries. Ertekin C, Taviloglu K, Guloglu R (eds). Trauma, 1.edition. Istanbul: Istanbul Medical Publishing, 2005:876.
6. Isenhour JL, Marx M. Advances in Abdominal Trauma. Emerg Med Clin N Am. 2007; 25:713-33.
7. Slama R, Villaume F. Penetrating Vascular Injury: Diagnosis and Management Updates. Emerg Med Clin North Am. 2017 ; 35(4):789-801.
8. FBI UCR.2014. Available at:https://ucr.fbi.gov/crime-in-the-us/2014/crime-in-the us.2014/tables/table-15. Accessed December 15, 2016.
9. Bulut S. Investigation of violence incidents against students in schools in terms of some variables by using archival research method. Journal of Education Faculty of Abant İzzet Baysal University (2008).
10. Sagay, SS; Karakaya, Z; Demır, S. Evaluation Of The Cases Who Underwent Thoracotomy After Penetrating Chest Trauma.Journal Of Academic Emergency Medicine 2012; 11:197.
11. Mihalache S, Adăscăliţei PD. [Clinical aspects of cardiac stab wounds: report of 20 cases]. Rev Med Chir Soc Med Nat Iasi. 2005; 109(2):290-3.
12. Serio F, Fujii Q, Shah K, McCague A. Effects of Body Mass Index on Outcome Measures of the Patients with Penetrating Injuries; A Single Center Experience.Bull Emerg Trauma. 2018; 6(4):325-328.
13. Atescelik M, Gurger M. Examination of the Patients Presenting to the Emergency Department with Penentran Trauma. Konuralp Medical Journal 2014; 6(1):40-46.
14. Koksal O, Ozdemir F, Bulut M, Eren S. Analysis of Cases with Penetrating Stabbing Injury in the Emergency Department of Uludağ University Medical Faculty Hospital.Uludag University Faculty of Medicine Journal 2009; 35(2):63-7.
15. Chapdelaine A, Samson E, Kimberley MD, Viau L. Firearm related injuries in Canada: issues for prevention. CMAJ 1991; 145(10):1217-23.
16. Leyland AH. Homicides involving knives and other sharp objects in Scotland, 1981-2003. Journal of Public Health 2006; 28(2):145-7.

17. Karaca MA, Kartal ND, Erbil B, Ozturk E, Kunt MM, Sahin TT, ‘et.al.’.Evaluation of gunshot wounds in the emergency department. Ulus Trauma Emergency Surgery Journal 2015; 21(4):248-55.
18. Pallett JR, Sutherland E, Glucksman E, Tunnicliff M, Keep JW. A cross-sectional study of knife injuries at a London major trauma centre. Ann R Coll Surg Engl 2014; 96(1):23-6.
19. Akoglu H, Denizbasi A, Unluer E, Guneysel O, Onur O. Demographic Characteristics of Trauma Patients Applying to the Emergency Department of Marmara University Hospital. Marmara Medical Journal 2005; 18(3);113-22.
20. Bäckman PB, Riddez L, Adamsson L, Wahlgren CM. Epidemiology of firearm injuries in a Scandinavian trauma center. Eur J Trauma Emerg Surg. 2018 .
21. Biffl WL, Kaups KL, Pham TN, Rowell SE, Jurkovich GJ, Burlew CC, Elterman J,Moore EE.Validating the Western Trauma Association algorithm for managing patients with anterior abdominal stab wounds: a Western Trauma Association multicenter trial.J Trauma. 2011 ;71(6):1494-502.
22. Biffl WL, Kaups KL, Cothren CC, Brasel KJ, Dicker RA, Bullard MK, Haan JM,Jurkovich GJ, Harrison P, Moore FO, Schreiber M, Knudson MM, Moore EE. Management of patients with anterior abdominal stab wounds: A Western Trauma Association multicenter trial. J Trauma. 2009; 66(5):1294-301.
23. Bellis MA, Hughes K, Anderson Z, Tocque K, Hughes S. Contribution of violence to health inequalities in England: demographics and trends in emergency hospital admissions for assault. J Epidemiol Community Health 2008; 62(12):1064-71.
24. Christensen MC, Nielsen TG, Ridley S, Lecky FE, Morris S. Outcomes and costs of penetrating trauma injury in England and Wales. Injury 2008; 39(9):1013-25.
25. Unlu AR, Ulger F, Dilek A, Baris S, Murat N,Sarihasan B. Evaluation of the Correlation of Revised Trauma Scores and Trauma and Injury Severity Scores with Prognosis in Intensive Care Trauma Patients. Turkish Journal of Anesthesia and Reanimation 2012; 40(3):128-35.
26. Guven HE, Bilge S, Aydın AA, Eryılmaz M. Comparison of the non-mortal gunshot and handmade explosive blast traumas during a low-intensity conflict on urban terrain. Turk J Surg 2018; 34(3):221-224.
27. Durdu T, Kavalcı C, Yılmaz F. Analysis of Trauma Cases Admitted to the Emergency Department. Journal of Clinical and Analytical Medicine 2012; 1:1-4.
28. Erdur B,Turkcuer I,Ergin A,Kabay B,Serinken M,Yuksel A.Cross-sectional analysis of trauma cases admitted to Pamukkale University Medical Faculty Emergency Department. Turk J Emerg Med 2007; 7:25-30.

29. Karadag B, Çat H, Ozturk AO, Basat O, Altuntas Y.Patient profile admitted to emergency department and taken to observation: a three-year examination. Academic Geriatrics Journal 2010; 2:176-85.
30. Satar S, Sebe A, Avcı A, Karakus A, Icme F. Elderly patient and emergency department. Journal of Çukurova University Faculty of Medicine 2004; 29(2):43-50.