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Incidence of hospital mortality in polytrauma patients in a tertiary center in Bosnia and Herzegovina

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ABSTRACT

Introduction: In the late 70s of the last century, the mortality rate due to polytrauma amounted to 40%. This led to a new approach to this patient category with the goal of improving the treatment outcome. According to the German trauma register, the rate of mortality in polytrauma at the end of the last century was 18.6%. The goal of this study is to determine the incidence of hospital mortality in polytrauma patients in a tertiary institution in Bosnia and Herzegovina.

Methods: We analyzed patient medical records from the Intensive Care Unit of the Clinic of Orthopedics and Traumatology at University Clinical Center Sarajevo, from January 1, 2012 to December 31, 2012.

Results: There were 70 polytrauma patients in 2012, with average age 47.55 (range 8-77) years. Half of the patients were younger than 50 years. Age groups most frequently affected were 61 and older (25.7%), 51-60 years (24.3%), and 31-40 years (21.4%). Lethal outcome occurred in 10 patients (14.3%), while 60 patients (85.7%) survived and were treated until discharge or transfer to a different department. The average Injury Severity Score (ISS) in patients with lethal outcome was 71.50, while in survivors was 37. The largest percentage of lethal outcomes was recorded in cases of traffic accidents.

Conclusion: The mortality rate among hospitalized polytrauma patients in the tertiary institution in Bosnia and Herzegovina is similar to reported mortality rates in other countries with developed healthcare system.

Keywords: incidence; hospital mortality; polytrauma

INTRODUCTION

The global aim of treatment in case of life-threatened, polytrauma patients is to lower the mortality rate by timely prevention and treatment of shock, shortening the duration of tissue hypoperfusion and hypoxia - prehospital and harmonization of prehospital and hospital level toward definitive care, i.e. team work through established trauma system (1).

The incidence of mortality in polytrauma patients depends on a number of factors related to all levels of healthcare. During the late 1970s and early 1980s the percentage of lethal outcomes in polytrauma patients significantly decreased with the development of advanced trauma centers in the USA and Germany, which included special programs of

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education and the introduction of specific protocol in regards to the approach to these patients. One of the countries that has a completely elaborated the trauma system is Australia. These models are transferred to a large number of countries around the world, and produce similar results. The largest percentage of lethal outcomes in polytrauma patients occurs during the first 24 hours, in other words, directly after the accident. In polytrauma, a specific percentage of deaths are unavoidable and some injuries because of their localizations cause death shortly after, and no treatment can delay that outcome (2).

In the late 70s of the last century, the mortality rate of polytrauma was around 40%, which led to development of new approach to this category of patients with the goal of improving the treatment outcome.

Hass et al. reported on the basis of retrospective analysis at Humboldt University Clinic in Berlin, that the rate of mortality decreased from 40% in 1972 to 18% in 1991 (3). Similar results were published by Regel et al. from Unfallchirurgische Klinik Hannover, Germany, in the study of 3406 patients (4). Probst et al. conducted long retrospective study of period 1975-2004 with 4849 patients. Lethal outcome in the first, second and third decade had a decreased to 37%, 22%, and 18%, respectively (5). According to data published in the German Trauma register DGU (Deutsche Gesellchaft fur Unfallchirurgie); the rate of mortality of polytrauma at the end of the last century was 18.6% (6,7). Ruchholtz et al. conducted a retrospective study in 105 surgical clinics in Germany, from which 11.013 patients were included in a period 1993-2005. The rate of mortality from 22.8% in 1993 decreased to 18.7% in 2005 according to this study published by the Trauma register DGU (8).

The Injury Severity Score (ISS) is an established medical score for assessing the trauma severity. It correlates with mortality, morbidity and hospitalization time after trauma. In a study of Mathess et al. in patients with ISS 36.8+/-10.9 (≥25) mortality rate was 31.7% (9). According to American College of Surgeons in a group with ISS between 16-24, the mortality rate was about 6%, while in the group with ISS >24 it was about 32% (10-13).

Bosnia and Herzegovina healthcare system is complex and not well developed. There are no published data about the mortality in hospitalized polytrauma patients. Our aim is to analyze the incidence of mortality and characteristics of the hospitalized polytrauma patients in a tertiary healthcare institution in Bosnia and Herzegovina.

METHODS

We used patient's medical records dating January 1st to December 31st 2012, at the Intensive Care Unit (ICU) of the Clinic of Orthopedics and Traumatology. The study included all polytrauma patients treated in that period at the ICU. Polytrauma was defined as significant injuries of three or more points in two or more different anatomic Abbreviated Injury Scale (AIS) regions in conjunction with one or more additional variables from the five physiologic parameters (14-15). We recorded multiple medical and demographic parameters from the medical records of the patients, including their ISS score.

Most commonly used scales for assessing the severity of trauma are the Trauma score (TS), Abbreviated Injury Scale (AIS), Injury Severity Scale (ISS), Revised Trauma Score (RTS), Glasgow Coma Scale (GSC), TRISS system and others (3,16).

RESULTS

There were 70 patients treated during year 2012 at the Intensive Care Unit of the Clinic for Orthopedic Surgery and Traumatology, Clinical Center of the University of Sarajevo, Bosnia and Herzegovina. The highest percentage of polytrauma patients were observed at age group of 61 years and older (25.7%), and from 51-60 years (24.3%). The average age of patients with polytrauma was 47.55 (range 8-77) years. Male patients were dominant with 77.11% (n=54), compared to females with 22.9% (n=16). The difference in polytrauma frequency in the age groups related to gender were not significant ($\chi 2 = 5.592$; $p > 0.05$) (Table 1).

Among male patients the most prevalent occupation was worker (51.9%), while the women were most often housewives (56.3%) (Table 2).

The most common cause of injury in both genders was fall in 40 (57.1%) cases, followed by traffic accident in 22 (31.4%) cases, while injury by firearms

was recorded in only one male patient (1.9%). The causes of polytrauma related to gender are shown in Table 3.

Lethal outcome occurred in 10/70 (14.3%) cases treated at Intensive Care Unit, while 60/70 (85.7%) survived, were treated, and then transferred to different department. The mortality rate according to causes of polytrauma is shown in Table 4. The incidence of mortality was significantly different according to the cause of injury. A patient with firearm injuries had the lethal outcome, while the highest incidence of mortality had been recorded among patients injured in traffic accidents (27.3%) and falls (7.5%), $\chi 2 = 11.701$; $p = 0.008$.

The average ISS score in patients with lethal outcome due to polytrauma was 71.50, while in the patients who survived it was 37 (Table 5).

DISCUSSION

Polytrauma occurs in 3-8% of all traumas, but it is the leading cause of mortality and has significant impact on morbidity. Mortality at the site of injury is 50-80%. Trauma outcome studies are very important as they serve as a medical audit and a measure for quality of care provided to trauma patients in the prehospital and in hospital setting. These studies are also useful tool to revise, renew and improve assessment and therapeutic methods in early trauma care (17). In our study the most common mechanism of injury in both gender was fall in 28 (51.9%) male and 12 (75%) female patients, followed by traffic accident - 19 (35.2%) male and 3 (18.8%) female patients. In the study by El Mestoui Z. et al., Incidence and etiology of mortality in polytrauma patients in a Dutch level I trauma center, the predominant mechanisms of injury were falls from height (n=55, 26.8%), followed by bicycle accidents (n=33, 16. 1%). This may be because bicycles are a very common mode of transportation in Amsterdam. Remarkably, most of these patients sustained CNS injury (87.9%) (17).

The most common cause of polytrauma in Croatia are traffic accidents (67%) and falls from height (31%) while the average age of polytraumatised patient is 40 years (18).

In the Intensive Care Unit of the Clinic of Orthopedics and Traumatology in 2012 due to multiple traumas there were 10 (14.3%) deaths. Patients

TABLE 1. Incidence of polytrauma in different age groups in Bosnia and Herzegovina

Age group	Gender, n (%)		Total n (%)
	Male	Female	
8-20	2 (3.7)	1 (6.3)	3 (4.3)
21-30	7 (12.9)	3 (18.8)	10 (14.3)
31-40	10 (18.5)	5 (31.3)	15 (21.4)
41-50	4 (7.4)	3 (18.8)	7 (10.0)
51-60	15 (27.8)	2 (12.5)	17 (24.3)
61-77	16 (29.6)	2 (12.5)	18 (25.7)
Total	54 (77.1)	16 (22.9)	70 (100)

TABLE 2. Profession according to gender in baseline sample

Profession	n (%)		
	Male	Female	Total
Housewife	0 (0.0)	9 (56.3)	9 (12.9)
Retired	16 (29.6)	1 (6.3)	17 (24.3)
Worker	28 (51.9)	3 (18.8)	31 (44.3)
Clerk	5 (9.3)	3 (18.8)	8 (11.4)
Student	5 (9.3)	0 (0.0)	5 (7.1)
Total	54 (77.1)	16 (22.9)	70 (100)

χ^2=18.661; p<0.05

TABLE 3. Causes of polytrauma in patients in Bosnia and Herzegovina

Injury type	n (%)		
	Male	Female	Total
Fall	28 (51.9)	12 (75.0)	40 (57.1)
Traffic accident	19 (35.2)	3 (18.8)	22 (31.4)
Blunt trauma	6 (11.1)	1 (6.3)	7 (10.0)
Firearms	1 (1.9)	0 (0.0)	1 (1.4)
Total	54 (77.1)	16 (22.9)	70 (100)

χ^2=2.806; p>0.05

TABLE 4. Mortality rate according to the cause of injury

	Mortality, n (%)		Total n (%)
	No	Yes	
Cause of injury			
Fall from height	37 (92.5)	3 (7.5)	40 (100.0)
Firearms	0 (0)	1 (100)	1 (100.0)
Traffic accident	16 (72.7)	6 (27.3)	22 (100.0)
Blunt trauma	7 (100.0)	0 (0.0)	7 (100.0)
Total	60 (85.7)	10 (14.3)	70 (100.0)

χ^2=11.701; p=0.008

TABLE 5. Average ISS score in polytrauma patients according to outcome

Lethal outcome	n	ISS mean	SD	SEM	95% CI		Minimum	Maximum
					Lower	Upper		
No	60	37.23	12.93	1.67	33.89	40.57	17.00	63.00
Yes	10	71.50	3.53	1.11	68.97	74.02	66.00	75.00

F=68.52; p<0.05, ISS - Injury severity score

who have had a lethal outcome had an average ISS score of 71.5. Based on the obtained data, conditions were created for the guidelines that are given based on the ROC curve which indicates that based on the ISS, some patients require special attention in regards to those with multiple trauma whose ISS>63 because the incidence of mortality increases linearly after this cut-off ISS score.

In order to improve the quality of care and protect polytrauma patients, results should be constantly compared with the previous, as well as with other institutions, which in their own environment have a register of polytrauma, which must be based on the application of the trauma scoring scale. Without such parameters, it is impossible to compare the results and the quality of care for polytrauma patients in us with any other environment.

This study has proven that the majority of patients with multiple traumas, who died due to their injuries, mostly had a traffic accident. The team for the care of these patients consisted on average of 5 nurses and technicians, and the mortality rate in the first 24 hours was approximately 60% compared to the total number of patients who had a lethal outcome.

In B&H, there is no system developed strategy for care of patients with polytrauma, and there are not even elementary protocols of emergency diagnostic and therapeutic procedures for severe polytrauma patients. The severity of the trauma can be compared only using the scale in traumatology. The scales for evaluation of trauma have been used in the world for more than 20 years. In B&H, there is no obligation for the introduction of the scale for the evaluation of trauma in traumatology. One of the most famous experts in this field, H. Champion proved that statistics is a powerful replacement for clinical reporting, with the purpose of developing a trauma care system based on the data.

Health staff involved in the care of injured in B&H have no legal obligation for special education, which would ensure the quality of the overall care of patients with polytrauma, as it is standard in Western countries.

Without the right data on the current situation in our trauma center it is not possible to provide a projection that will improve outpatient services (outpatient emergency medical services, helicopter rescue service, the Office for Protection and Rescue) and hospital care, and lead to progress.

CONCLUSIONS

The mortality rate among hospitalized polytrauma patients in the tertiary institution in Bosnia and Herzegovina is similar to reported mortality rates in other countries with developed healthcare system.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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