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A Profile of Traumatic Brain Injury within Hospital Emergency Departments—A Retrospective Study in the Republic of Moldova

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Abstract

Background: Traumatic brain injury (TBI) is a critical public health and socio-economic problem throughout the world, making epidemiological monitoring of incidence, prevalence, and outcome of TBI necessary. TBI is a major cause of mortality and morbidity in adolescents, young adults, and the elderly, one of the leading causes being road traffic accidents. **Methods:** A retrospective study was conducted among patients with TBI within 2 medical institutions in Chisinau municipality: Emergency Medicine Institute (EMI) and *Valentin Ignatenco* Municipal Children's Hospital (MCH). A questionnaire was applied, completed on the basis of medical records according to the International Classification of Diseases (ICD) 10 codes. The collection period was August 1-October 31, 2018. Data were uploaded using the existing electronic data collection tool—Red Cap and analyzed through Microsoft Excel. Data collection was performed by a resident neurosurgery and a scientific researcher. The ethics committee's approval has been obtained. **Results:** There have been identified 150 patients: 57 cases (38.5%) of TBI among children and 93 cases (61.5%) among adults aged between 18 - 73 years old. A large majority (62%) of head injuries were among patients from the urban area (most in adults—60% and males—74%). The most common mechanisms of head injury were falls (53.3%) and road traffic injuries (24%), followed by assault (14.7%) and struck by/or against (8%). The distributions by place of occurrence highlighted that most injuries occurred at home (33.4%) and in transport area (25.3%). Most head injuries were registered among men 121 (81.2%) with a predominance of minor Glasgow Coma Scale (GCS) (65.1%), followed by moderate GCS (9.4%), while in women all cases with GCS minor (18.8%). **Conclusion:** The data obtained could be useful for the hospital administration in managing the necessary resources and for conducting information campaigns among the high-risk groups.

Keywords

Traumatic Brain Injury, Emergency Departments, TBI Registry, Prevention

1. Introduction

Traumatic Brain Injuries (TBI) remains a major cause of death and disability with an overwhelming impact on the health of patients and their families worldwide. Every year, around 50 million people suffer from a TBI worldwide, with over 80% occurring in developing countries [1], but a disproportionately high increase is expected in low- and middle-income countries (LMIC) [2] [3], which have 3 times higher the rates of brain injury than high-income countries [4] [5] [6]. Traumatic brain injury is a critical public health and socio-economic issues around the world, necessitating regular monitoring of the incidence, prevalence and outcome of TBI [2] [7].

The World Health Organization (WHO) estimates that low- and middle-income countries account for nearly 90% of global injury deaths, with approximately around 10 million people affected by TBI each year [8] [9]. At the same time, because TBI requires long-term care, WHO encourages to development and support of surveillance systems and well as the research aiming to measure the impact of TBI and developing of more effective preventive methods [8] [10].

In Europe, traumatic brain injuries in general accounted for the majority of trauma [11], each year around 2.5 million people suffer a TBI and 1 million are admitted to hospital for appropriate medical care; is the leading cause of death and disability in young adults with road traffic accidents being the most common cause and in elderly due to falls [1]. Falls and car accidents cause various types of injuries and remain among the major causes of trauma in specific population groups [12].

More and more highly developed countries are implementing TBI monitoring assessment systems, guidelines, and protocols, many of which are not applicable in LMIC countries, as data collection is difficult or even impossible. The Republic of Moldova has a high population general mortality rate, ranking among the countries with the highest mortality rate in the European Region; injuries, poisonings, and other consequences of external causes rank fourth [13]. Injury prevention is thus one of the priority areas for public health surveillance in the Republic of Moldova, however there are no official data with reference to TBI currently reported in the country. The findings of a recent study conducted in the Republic of Moldova highlighted significant gaps in surveillance, prevention, treatment and rehabilitation of TBI [2].

Data are essential for understand TBI incidence and risk factors, to evaluate the best treatment options, to estimate healthcare needs, and to prioritize prevention approaches. However, many LMIC countries do not yet have a TBI surveillance or registry systems. The most efficient mechanism to collect information about TBI is through retrospective review of medical records. Medical records, on the other hand, frequently lack systematically collection of comparable data across patients, and very often do not collect sufficient detail for research studies. To examine the trends in TBI and the quality of data available in medical records, we aim to describe traumatic brain injuries among patients treated at Emergency Department of two major hospitals in the Republic of Moldova using the available medical records.

2. Material and Methods

2.1. Data and Study Design

This is a retrospective study of patients treated for traumatic brain injury admitted to the Emergency Department (ED) of two major emergency hospitals—the Emergency Medicine Institute (EMI) and the *Valentin Ignatenco* Municipal Children's Hospital (MCH) in 2018, in Chisinau municipality, the capital of Republic of Moldova, with a population of nearly 800,000 inhabitants. There has been used data from the INITIatE TBI Retrospective Registry, piloted for the first time in the country, part of the international project—INITIatE (International Collaboration to increase Traumatic Brain Injury Surveillance in Europe). A data collection tool (questionnaire) was developed. Data for this pilot project were coordinated nationally by the *Nicolae Testemitanu* State University of Medicine and Pharmacy from the Republic of Moldova, and internationally by the Department of Public Health, *Babeș-Bolyai* University, Cluj-Napoca and College of Public Health, the University of Iowa.

2.2. Settings and Population

All patients of all ages with an ICD 10 code indicating any type of head injury, who received care at EMI and MHC in Chisinau, between August 1 and October 31 2018 were included in the analysis. The selected time period was constrained by the requirements of the pilot project and the total number of injuries that were needed to pilot test the instrument retrospectively; further on, to serve as a prospective data collection basis. All patients in the ED who corresponded to the definition of TBI included in the patient medical records within the set-up period served as a case for further observations. For 2018, in the Emergency Medicine Institute, where hospitalized a total of 77,245 patients, of which 22,724 injured, 699 TBI related (this is a republican hospital, the total population of RM being 2,640,000 citizens; in the Municipal Children's Hospital where hospitalized a total of 46,848 patients, of which 11,300 injured, 639 TBI related (this is a municipal hospital, the total municipal population is 779,000 citizens).

2.3. Data Collection Process

A data collection form was developed based on existing guidelines from the World Health Organization and US registries. One resident in neurosurgery and a scientific researcher trained in data collection and coding procedures, collected data by hand from the patients' medical records. Collected variables were defined by the INITIatE TBI Retrospective Registry, and after collection, the information was uploaded into computer databases using the existing electronic data collection tool—Red Cap. The study form (questionnaire) contains the patient's general data and 4 modules with close-ended questions. The main module includes general information about the patient, date and time of injury, type of address and TBI type according to ICD-10. The following modules refer to: information about the patients external risk factors (place of injury occurrence, intent, type and mechanism), traumatic brain injury at the pre-hospital level (neurological assessment, ABS, vital signs, GSC, consciousness state, diagnosis tests), traumatic brain injury at the hospital (mechanical ventilation, antiseizure and hyperosmolar medication, surgery performed, ICP monitor/ventriculostomy placed) and patient discharge information (date and diagnosis code of discharge, principal cause of death in case of death).

2.4. Study Variables

The unit of our analysis was the TBI injured patient, who received care within both emergency departments of Emergency Medicine Institute and *Valentin Ignatenco* Municipal Children's Hospital in Chisinau municipality, Republic of Moldova. Data from the study form relates to all the variables included in the INITIatE TBI Retrospective Registry. There has been collected general data, such as: age, sex, employment and social status, followed by specific variables related to TBI, such as: information about the patient's external risk factors (place of occurrence, intent, mechanism, alcohol and drug screening), pre-hospital diagnosis (GCS Score, ABC Status on arrival, vital signs, ACE and confounding factors), hospital diagnosis and patient discharge information.

2.5. Statistical Analysis

Descriptive statistics for TBI patients were calculated using *t*-tests and the significance threshold "p" ($p < 0.05$), necessary for testing the statistical significance. SPSS Statistics Base 20.0.0 was used to analyze data. Chi-square tests were used to determine if the distribution of injury intent and injury mechanism varied by age stratified by sex. Also, Chi-square tests were used to see if the sex, age, injury intent, and injury mechanism distribution differ by disposition. Statistical significance for the X^2 tests was set at $p < 0.05$.

3. Results

3.1. Sample Characteristics

During the study period, within both hospitals, *Valentin Ignatenco* Municipal Children's Hospital and Emergency Medicine Institute, 150 patients were treated for head injury, of which 122 (81.3%) were male and 28 (18.7%) were female (Table 1). There have been 57 cases (38.5%) of TBI among children, aged between 0-18 years old; most cases being in the age group 0 - 6 years old (48.3%), followed by the age group of 10 - 14 years old (21.4%). Among adult TBI patients, were 93 cases (61.5%), aged between 18 - 73 years old, of which most cases being in the age group of 36 - 59 years old (29.1%), followed by age group of 19 - 35 years old (18.7%) and >60 years old (13.7%). The highest proportion of head injuries occurred among employed individuals 29.3% followed by unemployed and students (each by 21.3%), agriculture field (2%), industry and housewife (each by 0.6%). Employment was unknown for 22.6% of the patients.

A large majority (62%) of head injuries were among patients from the urban area (most in adults—60% and male—74%) (Table 2).

Table 1. Demographic characteristics of TBI patients within the emergency departments.

Characteristic	N (%)
Age in years	
>60 years old	21 (13.7)
36 - 59 years old	44 (29.1)
19 - 35 years old	28 (18.7)
<18 years old	57 (38.5)
Total	150 (100.0)
Gender	
Male	122 (81.3)
Female	28 (18.7)
Total	150 (100.0)
Employment and social role	
Unemployed	35 (21.3)
Employed	44 (29.3)
Agriculture	3 (2.0)
Industry	1 (0.6)
Student	32 (21.3)
Housewife	1 (0.6)
Unknown	34 (22.6)
Total patients in study	150 (100.0)

Table 2. General particularities of TBI among patients treated at the ED.

Variables	Total	<18 years old	19 - 35 years old	36 - 59 years old	>60	X^2	p	Male	Female	X^2	p
	N (%)	N (%)	N (%)	N (%)				N (%)	N (%)		
Area											
Urban	93 (62.0)	40 (70.2)	16 (57.1)	28 (63.6)	9 (42.9)	5.21	0.15	74 (60.7)	19 (67.9)	0.5	0.47
Rural	57 (38.0)	17 (29.8)	12 (42.9)	16 (36.3)	12 (57.1)			48 (39.4)	9 (32.1)		
Mechanism of injury											
Road traffic injury	36 (24.0)	15 (26.3)	8 (28.6)	9 (20.5)	4 (19.0)	13.2	0.15	29 (23.8)	7 (25)	3.6	0.30
Fall	80 (53.3)	36 (63.2)	10 (35.7)	21 (47.7)	13 (61.9)			61 (50.8)	19 (67.9)		
Assault	22 (14.7)	6 (10.5)	6 (21.4)	9 (20.5)	1 (4.8)			20 (16.4)	2 (7.1)		
Struck by/or against	12 (8.0)		4 (14.3)	5 (11.4)	3 (14.3)			12 (9.8)			
Place of occurrence											
Home	50 (33.4)	25 (43.9)	6 (21.4)	10 (22.7)	9 (42.9)	25.5	0.01	36 (29.5)	14 (50)	6.6	0.15
Sports and athletics area, recreation area	18 (12)	4 (7.1)	4 (14.3)	9 (20.4)	1 (4.8)			18 (14.8)			
Transport area: public highway, street or road	38 (25.3)	11 (19.3)	12 (42.9)	11 (25)	4 (19.1)			32 (26.3)	6 (21.4)		
Industrial or construction area	19 (12.6)	5 (8.8)	2 (7.2)	11 (25)	1 (4.8)			14 (11.5)	5 (17.8)		
Farm or other place of primary production	14 (9.3)	5 (8.8)	3 (10.7)	3 (6.8)	4 (19.1)			14 (11.5)			
Other specified place of occurrence	8 (7.3)	7 (12.3)	1 (3.6)		2 (9.5)			8 (6.5)	3 (10.7)		
Intent											
Unintentional	132 (88)	54 (94.7)	22 (78.6)	36 (81.8)	19 (90.5)	6.1	0.10	106 (86.9)	26 (92.9)	0.76	0.38
Assault	18 (12)	3 (5.3)	6 (21.5)	8 (18.2)	2 (9,6)			16 (13.1)	2 (7.1)		

Continued

Work-related injury											
Yes	11 (7.3)		3 (10.7)	6 (13.6)	2 (9.5)	0.27	0.87	9 (7.4)	2 (7.1)	0.001	0.96
No	139 (92.7)	57 (100)	25 (89.3)	38 (85.3)	19 (90.5)			113 (92.6)	26 (92.9)		
Type of addressing											
Walk-in	28 (18.7)	18 (31.6)	5 (17.9)	5 (11.4)		10.4	0.01	19 (15.6)	9 (32.1)	4.1	0.04
Ambulance	122 (81.3)	39 (68.4)	23 (82.1)	39 (88.6)	21 (100)			103 (84.4)	19 (67.9)		
Time of injury											
00.00 - 8.00	25 (16.7)	5 (8.8)	8 (28.6)	9 (20.5)	3 (14.3)	30.3	0.002	24 (15.7)	1 (3.6)	4.88	0.29
8.00 - 12.00	35 (23.3)	13 (22.8)	3 (10.7)	6 (13.6)	13 (61.9)			29 (23.8)	6 (21.4)		
12.00 - 16.00	30 (20)	15 (26.3)	5 (17.8)	9 (20.4)	1 (4.8)			23 (18.8)	7 (25)		
16.00 - 20.00	34 (22.6)	15 (26.3)	7 (25)	9 (20.5)	3 (14.3)			26 (21.3)	8 (28.6)		
20.00 - 00.00	26 (17.3)	9 (15.8)	5 (17.8)	11 (25)	1 (4.8)			20 (16.4)	6 (21.5)		

The most common mechanisms of head injury were falls (53.3%) and road traffic injuries (24%), followed by assault (14.7%) and struck by/or against (8%). The distributions by place of occurrence highlighted that most injuries occurred at home (33.4%) and transport areas (25.3%), followed by industrial or construction areas (12.6%), sports and recreation areas (12%), and farm or other places of primary production (9.3%). The data indicate that most injuries that happen at home are among children (43.9%) and the elderly (42.9%). There is significant relationship between these variables (p = 0.01); half of which is among females. Injuries within the transport area vary more among males (26.3%), and those aged 19 - 35 years old (42.9%) and 36 - 59 years old (25%). In an equal measure (19.1%) the elderly gets injured in transport area, farm or other places of primary production.

The majority of head injuries (88%) were mentioned as unintentional, mostly among children and the elderly and 12% of head injuries were the result of assault, mostly in the male, age group of 36 - 59 years old.

The majority of the cases were not work related 139 (92.7%) equally distributed by gender; however, for 11 (7.3%) work related cases, with no case in children, the majority of cases were within the age group 36 - 59 years old (6, 13.6%), and male (9, 7.4%).

A large proportion of patients asked for ambulance help (81.3%, there is significant relationship between these variables, p = 0.01). The most requested periods of the day with head trauma were recorded between 8.00 - 12.00 for 35 (23.3%) patients (mostly elderly and children) and 16.00 - 20.00 for 34 (22.6%) patients. Presents the interests, distribution of cases according to the time of the day and mechanism of injury: most of the assaults registered from the noon to 8.00, falls in the period of 8.00 - 12.00 and road traffic injuries within 12.00 - 16.00, there is significant relationship between these variables (p = 0.002).

3.2. Characteristics of TBI Patients Health Status by the Glasgow Coma Scale at Pre-Hospital and Emergency Departments Level

The level of consciousness of the TBI patients was compared using GCS at the injury site and emergency department.

Pre-hospital, 83.9% of the TBI patients had a GCS of 13 to 15, indicating a minor TBI; their status remained stable and did not change at ED. The 9.4% of patients with a GCS of 9 - 12, indicating a moderate TBI, also remained stable from the field to ED. GCS scores varied between 0.7% and 1.3% of patients with a GCS of 8 in the pre-hospital period and ED indicating severe brain injury, Coma I. While, in the case of the injured in Coma II, GCS of 6-7p, there was observed an improvement in the injured consciousness status from 3.3% to 2.7%, respectively. No changes in the Coma III, GCS 4-5 for 2.7% of cases, and no patients were registered in the Coma IV, GCS of 0-3p. The data resulting from the comparison of GCS indicators at the pre-hospital level with those within the ED leads us to believe that they have not changed and that the parameters of health indices have not changed if summarized up into minor, moderate, or severe GCS.

Depending on the time of seeking specialized medical help, some changes were observed (**Table 3**).

Patients treated within the first hour after receiving specialized medical assistance following trauma were: 54.5% children under the age of 18 years old, followed by the elderly over the age of 60 years old (18.2%). The majority of addresses after specialized medical care were reached by ambulance (68.2%). Addresses after medical assistance for up to one hour took occurred in the home environment (54.5%), followed by road traffic injuries (13.6%), and the same locations remain when compared with the medical addresses between 1 - 4 hours (31.2% and 23.7%, respectively). After 4 hours and more after the TBI, addresses after medical care were from those cases due to road crashes (30.4%), followed by false (27.5%). We note that none of those who were addressed within the first

Table 3. Characteristics of TBI patients health status by GCS based on the addressing time.

Time	GCS preHospital, N (%)			Total, N/%	X^2	p-value
	severe	moderate	minor			
<1 h	-	1 (4.5)	21 (95.5)	22 (14.7)	29.4	0.00001
1 - 4 h	4 (6.9)	4 (6.9)	50 (86.2)	58 (39.3)		
>4 h	6 (8.7)	9 (13)	54 (78.3)	69 (46%)		
Total	10	14	125	149		

hour of receiving assistance showed significant changes, only a case of transition from 14p GCS to pre-hospital to 15p GCS to ED. GCS changes slightly in patients who are referred for help between 1 - 4 hours after trauma and no changes in patients who are addressed for medical assistance after 4 hours.

Presents an interest in the gender distribution of GCS (Table 4). In total, 121 (81.2%) head injuries were registered among men, with a predominance in minor GCS (65.1%), followed by moderate GCS (9.4%), while all cases in women are with GCS minor (18.8%).

3.3. Characteristics of TBI Patients for Fall-Related

From the total number of TBI patients, 80 (53.3%) cases of TBI have been identified as a result of falls (Table 5), aged between 0 - 88 years old, of which 61 (76.3%) were male and 19 (23.8%) female. Most cases of falls occur among children with 36 (45% cases), followed by the age group of 36 - 59 years old with 21 (26.3%). The age group of >60 years old is on the 3rd place with 13 (16.3%) and the age group of 19 - 35 years old with 10 (12.5%). More than half of the cases were related to urban areas (51, 63.8%). For all age groups, falls are associated with home, in 46 (57.5%) cases (mostly among children and the elderly); followed proportionally among farm or other place of primary production and industrial or construction areas (mostly among the age group of 36 - 59 years old) by 12.5% each. Most of the cases were not work-related (92.5%) and 7.5% were work-related among the age group of 19 - 59 years old. TBI patients who have fallen, take ambulance in proportion of 87.3%, there is significant relationship between these variables ($p = 0.01$). According to the time of injury, the majority of cases occur within 8.00 - 12.00 with 28.8% (mostly among children and elderly); following the period of 16.00 - 20.00 with 22.5% and 20.00 - 00.00 with 20% (mostly among children and age groups of 36 - 59 years old and 19 - 35 years old).

3.4. Characteristics of TBI Patients as Result of Road Accidents

From the total number of TBI patients, there have been identified 36 (24%) cases of TBI as a result of road traffic accidents (Table 6), aged between 0 - 73 years old, of which 58.3% were male adults and 41.7% were young minors until 18 years old (22.2% male, 19.4% female). Most of the patients are students aged 15 - 17 years and 25 - 29 years old (39.4%), followed by those employed aged 30 years

Table 4. Characteristics of TBI Patients health status by GCS based on gender.

GSC score	Male N (%)	Female N (%)	Total N (%)	X^2	p-value
Minor (13 - 15 p)	97 (65.1)	28 (18.8)	125 (83.9)	2.94	0.22
Moderate (9 - 12 p)	14 (9.4)	0 (0)	14 (9.4)		
Severe (3 - 8 p)	10 (6.7)	0 (0)	10 (6.7)		
Total	121 (81.2)	28 (18.8)	149 (100)		

Table 5. Characteristics of TBI patients for fall-related.

Variation	Total N (%)	<18 years old N (%)	19 - 35 years old N (%)	36 - 59 years old N (%)	>60 years old N (%)	X^2	p	Male N (%)	Female N (%)	X^2	p
Area											
Urban	51 (63.8)	25 (69.4)	8 (80)	13 (61.9)	5 (38.5)	5.28	0.15	40 (65.5)	11 (57.9)	0.36	0.54
Rural	29 (36.3)	11 (30.6)	2 (20)	8 (38)	8 (61.5)			21 (34.2)	8 (42.1)		
Place of occurrence											
Home	46 (57.5)	24 (66.7)	5 (50)	9 (42.8)	8 (61.5)	6.4	0.69	33 (55.1)	13 (68.4)	1.98	0.57
Industrial or construction area	10 (12.5)	3 (8.2)		7 (33.3)				7 (11.5)	3 (15.8)		
Farm or other place of primary production	10 (12.5)	4 (8.4)	2 (20)	2 (9.5)	2 (15.4)			10 (16.4)	1 (5.3)		
Other specified place of occurrence	14 (17.7)	5 (14)	3 (30)	3 (14.4)	3 (23.1)			11 (17.9)	3 (15.9)		
Work-related injury											
Yes	6 (7.5)		2 (20)	4 (19)		1.09	0.57	4 (6.6)	2 (10.5)	0.32	0.56
No	74 (92,5)	36 (100)	8 (80)	17 (81)	13 (100)			57 (93,4)	17 (89.5)		
Type of addressing											
walk-in	18 (12.7)	14 (38.8)	2 (11.1)	2 (5)		10.9	0.01	11 (9.9)	7 (22.6)	2.9	0.08
ambulance	62 (87.3)	22 (61.2)	8 (88.9)	19 (95)	13 (100)			50 (90.1)	12 (77.4)		
Time of injury											
00.00 - 8.00	9 (11.3)	2 (5.6)		4 (19)	3 (23.1)	14.1	0.29	9 (14.8)		5.28	0.25
8.00 - 12.00	23 (28.8)	9 (25)	1 (10)	6 (28.6)	7 (53.8)			19 (31.1)	4 (21.1)		
12.00 - 16.00	14 (17.5)	8 (22.2)	4 (40)	2 (9.5)				9 (14.8)	5 (26.3)		
16.00 - 20.00	18 (22.5)	9 (25)	3 (30)	4 (19)	2 (15.4)			14 (23)	4 (21.1)		
20.00 - 00.00	16 (20)	8 (22.2)	2 (20)	5 (23.8)	1 (7.7)			10 (16.4)	6 (31.6)		

or more (27.3%), unemployed (21.2%), and agriculture (3%). All cases of road injury were unintentionally, with only 8.3% of adult males reporting work-related injuries. Although TBI cases as a result of road accidents are proportionally distributed in both rural and urban areas, there is a significant relationship between these variables ($p = 0.03$). Additionally, most cases occurred among children from urban areas and the age group of 19 - 35 years old in rural areas. Distribution by sex, underlines most case with males in rural areas and most cases with females in urban areas. Most patients reach the hospital by ambulance, and only 11.1% walk-in. All adult patients were diagnosed with intracranial injury, sequel (S06.xxxS) sequel, while minor patients were diagnosed with other specified injuries of the head, sequel (S09.8xxS). Cases of TBI within road accidents (83.3%) have taken place in transport areas (public highways, streets or roads) and the most affected age group is children. So far, 16.8% of cases from total, mostly

Table 6. TBI patients as result of road accidents.

	Total	<18 years old	19 - 35 years old	36 - 59 years old	>60 years old	X^2	p	Male	Female	X^2	p
Area	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**			**N (%)**	**N (%)**		
Urban	18 (50)	11 (73.3)		4 (44.4)	3 (75)	9.80	0.02	12 (41.4)	6 (85.7)	4.43	0.03
Rural	18 (50)	4 (26.7)	8 (100)	5 (55.6)	1 (25)			17 (58.6)	1 (14.3)		
Place of occurrence											
Transport area: public highway, street or road	30 (83.3)	10 (66.7)	8 (100)	8 (88.9)	4 (100)	2.43	0.48	25 (86.2)	5 (71.5)	0.88	0.34
Other specified place of occurrence	6 (16.8)	5 (33.5)		1 (11.1)				4 (14)	2 (28.6)		
Work-related injury											
Yes	3 (8.3)		1 (12.5)	1 (11.1)	1 (25)	1.20	0.75	3 (10.3)		0.23	0.62
No	33 (91.7)	15 (100)	7 (87.5)	8 (88.9)	3 (75)			26 (89.7)	7 (100)		
Type of addressing											
walk-in	4 (11.1)	3 (20)	1 (12.5)			0.58	0.90	3 (10.3)	1 (14.3)	0.08	0.75
ambulance	32 (88.9)	12 (80)	7 (87.5)	9 (100)	4 (100)			26 (89.7)	6 (85.7)		
Time of injury											
00.00 - 8.00	6 (16.7)	1 (6.7)	4 (50)	1 (11.1)		15.3	0.22	5 (17.2)	1 (14.3)	1.93	0.74
8.00 - 12.00	8 (22.2)	3 (20)	2 (25)		3 (75)			7 (24.1)	1 (14.3)		
12.00 - 16.00	11 (30.6)	5 (33.3)	1 (12.5)	4 (44.4)	1 (25)			9 (31)	2 (28.6)		
16.00 - 20.00	8 (22.2)	6 (40)	1 (12.5)	1 (11.1)				5 (17.2)	3 (42.9)		
20.00 - 00.00	3 (8.3)			3 (33.3)				3 (10.3)			

in the age group under 18, mention other specified places of occurrence, as assessing retrospectively we cannot get the occupant role and identify risk factors for the crash.

During the study period, most cases were recorded in August (52.8%); from total—most cases of accidents being registered 12.00 - 16.00; particularly per ages: 16.00 - 20.00-monstly among children under 18 years old (6, 40%). Data on addressing patients after medical assistance at ED departments indicates an equal distribution of addresses between 1 - 4 hours and 4 hours and more (44.4%) and only 4 (11.1%) in the first hour after trauma.

4. Discussion

To the best of our knowledge, this is the first study in the country piloting a Trauma Registry assessing the trends in TBI and describing the traumatic brain injuries among patients treated at Emergency Department using the available medical records. Our observations identify TBI as an important component of trauma care, due to the fact that 150 patients were hospitalized in just 3 months. Our findings that men were the most affected (81.3%) in our study are consistent with previous studies with more observations [14] [15]; while women in studies with fewer observations identified health care indicators worse than men [16]. Among children, the most affected age group was 0 - 6 years (48.3%), and among adults—the age group 36 - 59 years (29.1%). This data varies from country to country and may depend on the mechanism of the lesion: most TBIs are found in the 19 - 40 age group due to road traffic accidents [14] [17], while another finding shows that ages 30 - 60 years have a higher mortality rate than younger age groups [18]. We found that a large proportion on TBI were among urban adult patients (62%); while Brown *et al.* demonstrated vice versa higher proportion of cases in rural versus urban environments [19], so far, Chapital *et al.* identified no difference in mortality between rural and urban patients [14].

However, in our study, we noticed that half of children up to 18 years old (54.5%) and the elderly >60 years' old addressed in the first hour after medical assistance at the ED. Data from the literature show a strong relation between age and TBI outcome, with the elderly and children under 4 years old suffering the most [20], and more than 74% of patients arriving at the hospital more than one hour after the injury [6] [21]. Also, most of the total ED visits occurred between 08:00 and 20:00 [22], which is similar to our study findings. We found no significant differences between the GCS indicators at pre-hospital level with those within ED.

Our findings show that the most common mechanisms of head injury were falls (53.3%), followed by road traffic injuries (24%), which is similar to other studies [6] [14] [22]. This aligns with the data from the literature—falls are the leading cause of traumatic brain injury (TBI) for children in the 0 - 4-year age group [23] and for the elderly [24]. Compared to our observations, more cases were among males (76.3%), children (45%), and the age group of 19 - 35 years old (12.5%); most cases (57.5%) associated with the home environment.

Data show that road traffic injuries are currently the leading cause of TBI globally [8], and the WHO predicts that if proper measurements are not taken, road traffic injuries will be the seventh leading cause of death by 2030 [25]. In our study, TBI cases due to road traffic affect many males, equally distributed both in rural and urban areas, as well as specifically among children from urban areas and 19 - 35 years old in rural areas. Other similar study also had the most accident occurring in urban areas [26] and specific in male young age groups [27] [28].

5. Interest and Limits of the Study

This study is a contribution to the knowledge of prevention traumatic brain injuries in the Republic of Moldova and will contribute to develop a TBI surveillance system. This was a retrospective study and some limitations should be considered, as many variables had a high number of missing values and some variables were not systematically collected. Study data come from two medical units that provide country coverage, but the short time surveillance may influence our finds and could be slowly associated nationally. However, it will be interesting to compare these data with data, which are intended to be collected prospectively for a longer period as soon as such data become available.

6. Conclusion

Worldwide, traumatic brain injuries are a major cause of mortality and morbidity in adolescents, young adults and the elderly and one of the leading causes being falls and road traffic accidents. Even, injury prevention is one of the areas of public health surveillance in the Republic of Moldova—the country relying on among the countries with the highest mortality in the European Region, few data on TBI are available. Our results underline the importance of deeper research on this topic, highlighting the major risk groups, gender, and environment, time of the day and major causes of TBI. This data could be of interest for the hospital administration in managing the necessary resources and for conducting information campaigns developing health education programs among the high-risk groups.

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Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this paper.

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