

Research Article

Prehospital Predictors for Urgent Neurosurgical Intervention in the Head Trauma Patient: A 2-Year Multicenter Retrospective Study

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Received 17 April 2023; Revised 20 July 2023; Accepted 26 July 2023; Published 18 August 2023

Academic Editor: Roberto Cirocchi

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Background. Traumatic brain injury (TBI) is the main cause of disability in the world. Prehospital diagnosis of patients requiring rapid neurosurgical intervention and the earliest possible introduction of procedures preventing secondary brain injuries (SBI) are crucial. Methodology and Study Population. The authors of this paper assumed that certain age groups with specific injuries are more likely to require urgent neurosurgical intervention compared with patients who did not require such an intervention. Out of 54,814 head CT scans, based on the inclusion criteria, 7,864 were selected for the study. Data such as sex, age, the mechanism of injury, comorbid trauma, and abnormal findings in the examination of patients qualified for urgent neurosurgical intervention were analyzed in order to find statistically significant factors through a comparison with all head trauma patients. Results. Patients qualified for urgent neurosurgical intervention were significantly older compared with the others (63 years vs. 49 years). Patients transferred from the emergency department directly to the operating room were more often admitted to the hospital due to the fall (64.1% vs. 45.1%, p = 0.004). The following were observed much more commonly among the patients qualified for urgent neurosurgical intervention than in the entire study group of subjects with traumatic brain injury (TBI), e.g., calf deformity (2.2% vs. 0.1%, p = 0.019) and bleeding from the mouth (4.3% vs. 0.0%, p < 0.001). On the other hand, superciliary arch wounds were observed much less commonly than in the entire group (0.0% vs. 5%, p = 0.221). Conclusion. Patients admitted directly to the operating neurosurgical room from emergency departments constitute a small percentage of TBI patients, and their prognosis for normal performance status upon discharge is poor. Maximum efforts should be made to distinguish these patients and to start proper treatment even during prehospital care.

1. Introduction

Head trauma is an important and growing public health problem. Sometimes it is even referred to as a silent pandemic [1]. Traumatic brain injuries (TBIs) are the main cause of disability among healthy men around the world. In the USA alone, there were over 64,000 TBI-related deaths in 2020, which equates to 176 TBI-related deaths every day [2]. It is estimated that every year, 500–800 out of every 100,000 European residents will suffer from head trauma. As these data come primarily from developed countries, researchers suppose that these numbers may be three times higher in China and other developing countries [3]. Aging population is another problem. Until recently, TBI patients were mostly

young men involved in road traffic collision (RTC), while the current data show that almost one-third of TBI patients are people aged over 75, who suffer a fall. This age group also accounts for 32% of TBI-related hospitalizations and 28% of deaths [4]. Therefore, each year an estimated 69 million individuals will suffer a TBI, the vast majority of which will be mild (81%) or moderate (11%) in severity. Per capita, the highest annual incidence of all-cause TBIs is observed in the North America and Europe (1,299 and 1,012 cases per 100,000 people, respectively) [5]. It seems that knowledge about how to stop a pathophysiological trauma-related reaction in the brain and especially an effective and evidencebased medicine (EBM) treatment is disproportionately low. According to data from the current Brain Trauma Foundation guidelines, none of the work has produced even one valid conclusion, pharmacotherapy, or procedure improving TBI management in the last 20 years. Since most work does not provide any evidence, interest in research on this issue is declining among sponsors and pharmaceutical companies. For this reason, ongoing assessment of TBI patients admitted for neurosurgical treatment seems to be crucial. The authors decided to examine the demographic and clinical characteristics and the mechanism of trauma, which could indicate the need for urgent neurosurgical intervention at the stage of prehospital medicine.

1.1. Study Population. We retrospectively evaluated data from two clinical university hospitals from head trauma patients in 2018-2019. As the authors were aware of the risk that many CT results could be omitted if an appropriate ICD-10 S code was missing, the decision was made to request a list of all head CT scans ordered at the ED level from the authorities of both hospitals. In total, 54,814 results were received (29,141 CT scans from a trauma centre and 25,673 head CT scans from another university hospital, which is also the only thrombectomy center within a 100-km radius). All 54,814 hospital records of patients admitted to both EDs were analyzed. In any case where basic data on the reason for CT were missing, data were excluded (Figure 1). A total of 7,930 ED visits were obtained after applying the inclusion criteria: age >18 years, closed head trauma, patient delivered by an emergency medical team, referred, or presenting on their own due to head trauma, mention of head trauma in the emergency medical records or in the referral, signs of head trauma on physical examination, and preserved vital functions upon admission. The exclusion criteria were no signs of trauma on examination, no mention of head trauma in the medical record, stroke, and patients who underwent cardiopulmonary resuscitation before reaching hospital.

1.2. Statistical Analysis. The Mann–Whitney U test, Kruskal–Wallis test (with Dunn's post hoc test and correction for multiple Bonferonni testing), chi-square, and Fisher tests were used in the study. The Mann–Whitney U test is a nonparametric test used to compare numerical variables between two groups of observations. Statistically significant results obtained on its basis prove that there is a difference in the distribution of a given variable between these groups. The Kruskal–Wallis test is also a nonparametric test for comparing the distribution of a variable between multiple groups. In order to examine the relationship between categorical variables, the chi-square test or Fisher's test was used. The significance level was p = 0.05; however, statistically significant results were also indicated for the levels of p = 0.01 and p = 0.001.

2. Results

Table 1 shows general patient characteristics. Males comprised slightly more than 60% of the patients (n = 4753, 60.3%), while females nearly 40%. The median age was 49.3 years; the standard deviation was over 42% of the mean value, which indicates significant age diversity. On an average, women were 55 years of age, while the mean age of men were 45.5 years. The minimum age was identical in both groups (18 years), while the maximum age was slightly higher in women (104 years). Based on the analysis, it can be stated that there was a statistically significant age difference between men and women (p < 0.05). The analysis of the weekly distribution of patients revealed that in general, most patients were admitted on Mondays (15.0%), Sundays (14.9%), and Thursdays (14.9%). The fewest were admitted on Wednesdays (13.0%). No statistically significant differences were observed between individual years and months. After implementation of inclusion criteria, all 7,864 patients were divided into 5 groups: (1) those discharged directly from ED or admitted to nonneurosurgical ward, (2) C1-qualified for exigent neurosurgical intervention-direct transfer from ED to operating room, (3) C2-qualified for neurosurgical intervention <24 hours, (4) C3-admitted to the Department of Neurosurgery or observed in ED for 24 hours in order to perform a control head CT scan and assess the progression/regression of posttraumatic lesions, (5) C4-no neurosurgical indication for hospitalization but patients were on anticoagulants, dangerous mechanism of trauma, were severely vomiting, confused, or/and without good family care.

For each patient, the main mechanism of trauma was determined and assigned to one of the 13 categories. Patients were most commonly hospitalized because of a fall (46.4%), RTC (16.9%), and beating (13.2%). Less common causes included hitting (9.4%), fainting (5.7%), epilepsy (5.7%), and pedestrian hit by a car (1.9%). The other categories accounted for less than 1% of trauma mechanisms. All individual cases were classified into the category "other" (rape was an exception distinguished separately). Almost 21% of the patients did not present at the hospital at the day of injury. The majority presented between one and four days following the injury. However, some patients waited much longer, which can be seen by a large difference between the mean (about 4.5 days) and median (2 days) as well as a wide spread of observations (SD of about 12 days). The median Glasgow Coma Scale (GCS) score was 15. Loss of consciousness was reported in slightly over 42% of the patients, and 0.5% recalled the event only partially. Over 21% of the patients were admitted under the influence of alcohol, with a mean level of about 304 (±107) mg/dL. Neurological



FIGURE 1: Patients admitted to Emergency Medicine Departments of two clinical hospitals who underwent head CT scan.

abnormalities were found in 7.1% of the patients, with anisocoria being the most common (19.7%). Confusion (13%), paresis of the limb (8.1%), and amnesia (7.3%) were less common. Complaints were reported in 48% of the patients. Among them, the average number of complaints was two (± 1) . Physical examination showed abnormalities in over 65% of the patients. One or two abnormalities were usually found, although the record number was 10 in some cases. Other radiological examinations (apart from head CT that qualified patients for the study) were performed in almost 60% of the patients and included CT angiography (0.2%), X-ray (44%), CT (28.8%), and ultrasound (13.6%). It is worth noting that trauma CT was performed in 1.3% of the patients. Radiological examinations revealed 74 different abnormalities. The most common were nasal fracture (4.6%), orbital fracture (2.9%), maxillary sinus fracture (2.6%), and fracture of at least one rib (2.4%). Detailed analysis is shown in Table 2.

Patients qualified for urgent neurosurgery (C1) were significantly older compared with the others (mean of about 63 years vs. 49 years). However, no significant differences were found between the C1 and C2 groups, meaning that patients with delayed surgery were not significantly younger than those qualified for urgent neurosurgical intervention (63.31 vs. 58.76). There is a visible trend of a higher risk of more severe abnormalities in older patients; mean age changes depending on the group (C1: 63 years, C2: 59 years, others with diagnosed injury: 53 years, and no injury: 48 years). Age differences between the groups are presented in Figure 2. However, it is worth noting that SD values of the

age are quite similar in these groups. C1 patients who were admitted to the hospital on a day other than the day of injury presented significantly later than patients in the other groups (mean, 5.31 days vs. 4.67 days; median, 3.5 days vs. 2 days), including those in the C2 group (mean, 5.31 days vs. 2.68 days; median, 3.5 days vs. 2 days). The long period before arrival at the hospital from the time of the injury in patients qualified for urgent neurosurgical intervention resulted from the patient's refusal to transfer to the hospital immediately after the injury, explaining drowsiness/decrease in GCS with possible alcohol intoxication or loneliness and rare contact with the family. Which was easy to predict, GCS in C1 patients group had significantly lower scores than patients in the other groups (mean, 10.68 vs. 14.83; median 13 vs. 15), including those in the C2 group (mean, 10.68 vs. 12.99; median 13 vs. 15). The proportion of patients who lost consciousness was higher in the C1 group than in the other groups (67.7% vs. 42%) with no significant differences between the C1 and C2 groups. Data are summarized in Table 2.

Patients qualified for instant transfer to the operating room were more often admitted to the hospital due to the fall (64.1% vs. 45.1%). Less common causes were RTC (4.7% vs. 16.5%) and beating (4.7% vs. 13.0%). Significance results for individual trauma mechanisms are shown in Table 3. To verify between which mechanisms of trauma the groups differed significantly, tests for differences in proportions were carried out. Such an analysis showed that statistical significance (p value <0.05) was achieved for the fall and road traffic accident. The former was more common in the

Variables	Parameters	Overall $(N = 7930)$
	Female	39.5% (N = 3134)
Sex	Male	60.5% (N = 4795)
	Ν	7903
Area (viscour)	Mean (SD)	49.392(20.861)
Age (years)	Median (IQR)	47 (31–65)
	Range	5-104
	Fall	46.4% (N = 3588)
	Road traffic collision	16.9% (N = 1304)
	Beating	13.2% (N = 1023)
	Hitting	9.4% (N = 725)
	Fainting	5.7% (N = 442)
	Epilepsy	5.7% (N = 438)
Mechanism of trauma	Pedestrian hit by a car	1.9% (N = 143)
	Crushing between two objects	0.1% (N=9)
	Kick	0.1% (N=6)
	Head trauma during jump into the water	0.1% (N=6)
	Bruised by an animal	0.1% (N=6)
	Rape	0% (N = 1)
	Other	0.4% (N=37)
	$\mathbf{V}_{2,2}$	TO 10/ (N1 /200)
Arrival on the day of injury	IES	(0.00 = N) ($N = 0.000$)
	No	$20.6\% \ (N = 1630)$
	Ν	1625
Time from injury to arrival (days)	Mean (SD)	4.676 (12.102)
	Median (IQR)	2(1-4)
	Ν	5671
- , , ,	Mean (SD)	14.799 (1.142)
Glasgow Coma Scale	Median (IOR)	15 (15–15)
	Range	3-15
	Yes	42.2% (N = 2413)
Loss of consciousness	Recalls partially	0.5% (N = 26)
	No	57.3% (N = 3277)
	Yes	21.4% (N = 1700)
ALCONOL	No	78.6% (N = 6230)
	Ν	440
M1L-1 (/ 47.)	Mean (SD)	304.762 (107.588)
ALCOROL (INB/GL)	Median (IQR)	306.5 (247-377.75)
	Range	20-592
	Yes	7.1% (N = 551)
Neurological aphormalities	No	92.9% (N = 7260)
Ahnoundition found in abuniantian	Yes	65.2% (N = 4955)
ADITOTITATICES TOUTIG III PULYSICAL EXALITITIAUOLI	No	34.8% (N = 2650)

TABLE 1: General characteristics of all head trauma patients.

Variables	Parameters	Overall $(N = 7930)$
Common inter-	Yes	48% (N = 3649)
Comptaints	No	52% (N = 3951)
	Ν	4955
	Mean (SD)	1.49 (0.855)
the number of adnormances found in physical examination	Median (IQR)	1 (1-2)
	Range	1-10
	Ν	3649
T_{1}	Mean (SD)	1.956(1.045)
the number of complaints	Median (IQR)	2(1-3)
	Range	1-10
	Yes	59.4% (N = 4710)
kadiological examination (more than nead UI scan)	No	40.6% (N = 3215)
	Yes	$0.2\% \ (N=15)$
C1 anglography	No	99.8% (N = 7915)
X	Yes	44% (N = 3492)
Δ-1άγ	No	56% (N = 4438)
	Yes	28.8% (N = 2282)
	No	71.2% (N = 5648)
T 1 + + + + + + + + + + + + + + + + + +	Yes	$13.6\% \ (N = 1075)$
Outrasouria	No	86.4% (N = 6855)
Ę	Yes	1.3% (N = 101)
Irauma CI	No	98.7% (N = 7829)
	C1—urgent surgery	0.8% (N = 64)
	C2—delayed surgery	$2.2\% \ (N = 177)$
	C3—24-hour follow-up	1.4% (N = 108)
	C4—no neurosurgical indication for hospitalization but patients were on	
Classification	anticoagulants, dangerous mechanism of trauna, were severely vomiting, confused,	0.1% (N=6)
	or/and without good family care	
	Abnormalities in radiological examinations other than head CT	$18.8\% \ (N = 1487)$
	No abnormalities	76.7% (N = 6075)
Ahnormalitias in radialacial araminations	Yes	23.2% (N = 1841)
	No	76.8% (N = 6089)
	Ν	1841
The number of abnormalities found in radiological evamination	Mean (SD)	1.734 (1.381)
The manner of activiting to and all randogree evaluation	Median (IQR)	1 (1-2)
	Range	1-13
Referral to another ward	Yes	11.2% (N = 887)
NCICITAL IN ANNULUL WALK	No	88.8% (N = 7034)

TABLE 1: Continued.

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Variables	Parameters	Overall $(N = 7930)$
	Discharge	88% (N = 6969)
	Referral to another ward	8.5% (N = 672)
Final patient status	Patient left the ward	$1.5\% \ (N = 120)$
	Death	$0.8\% \ (N=66)$
	Patient did not give consent for hospitalization	1.2% (N = 94)

Variables	Parameters	C1 (N=64)	Others $(N = 7853)$	Test	P value
Sex	Female Male	32.8% (N = 21) 67.2% (N = 43)	39.6% (N = 3110) 60.4% (N = 4742)	Chi-square	0.3276
Age (years)	<i>N</i> Mean (SD) Median (IQR) Range	64 63.31 (21.79) 66.5 (41.5–81) 18–95	7826 49.27 (20.82) 47 (31–65) 5–104	Mann–Whitney U	<0.001
Time from injury to arrival (days)	<i>N</i> Mean (SD) Median (IQR) Range	16 5.31 (4.61) 3.5 (2-6.25) 1-14	1605 4.67 (12.17) 2 (1-4) 1-240	Mann-Whitney U	0.0138
Glasgow Coma scale	<i>N</i> Mean (SD) Median (IQR) Range	47 10.68 (4.64) 13 (5.5–15) 3–15	5617 14.83 (1) 15 (15–15) 3–15	Mann-Whitney U	<0.001
Loss of consciousness	Yes Recalls partially No	67.7% (N = 21) 0% (N = 0) 32.3% (N = 10)	42% (N=2386) 0.5% (N=26) 57.5% (N=3265)	Fisher	0.0184

TABLE 2: Comparison of	patient	characteristic	variables in	relation	to the	variable:	classification
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The bold values indicate significance.



FIGURE 2: Relationship between the variables: age (years) and classification.

TABLE 3: Detailed summary of the mechanisms of trauma in relation to patient classification.

Mechanism of trauma	C1 $(N = 64)$	Others $(N = 7853)$	P value*
Fall	64.1% (N=41)	45.1% (N = 3540)	0.004
Road traffic collision	4.7% (N=3)	16.5% (N = 1298)	0.017
Beating	4.7% (N=3)	13% (N = 1020)	0.074
Hitting	3.1% (N=2)	9.2% (N=723)	0.144
Fainting	4.7% (N=3)	5.6% $(N=437)$	0.975
Epilepsy	9.4% $(N=6)$	5.5% (N = 431)	0.280
Pedestrian hit by a car	3.1% (N=2)	1.8%~(N=141)	0.746
Alcohol	—	0.1% (N = 10)	1.000
Crushing between two objects	—	0.1% (N=9)	1.000
Kick	—	0.1% (N=6)	1.000
Head trauma during jumping into the water	—	0.1% (N=6)	1.000
Bruised by an animal	—	0.1% (N=6)	1.000
Rape	—	0% (N=1)	1.000
Other	1.6% (N=1)	0.3%~(N=26)	0.544

 $^{*}p$ value of significance test for differences in proportions. The bold values indicate significance.

C1 group than in the other groups (64.1% vs. 45.1%), while the latter less common (4.7% vs. 16.5%). To verify differences between all patients who had neurosurgery intervention (<24 from transfer to hospital) with patient without neurosurgery during hospital stay, between which mechanisms of trauma and the groups differed significantly with tests for differences in proportions were carried out again (C1 + C2 group vs. rest of the patients). This analysis showed that statistical significance (p value <0.05) was achieved for the fall and RTC. The former was more common in the C1 and C2 groups than in the other groups (61.5% vs. 46%), while the latter less common (10.4% vs. 17.1%). Differences were also observed for beating (6.5% vs. 13.5%) and hitting (3.9% vs. 9.6%), which occurred less frequently in the C1 and C2 groups than in the others. In contrast, epilepsy-related injuries were more common in the C1 and C2 groups (10.8% vs. 5.5%).

The number of patients under the influence of alcohol between C1 and all other head trauma patients' groups was comparable and with no statistically significant difference. However, C1 patients under the influence of alcohol had higher mean blood alcohol levels than patients from other groups (mean, 476 mg/dL vs. 303.98 md/dL; median 476 mg/dL vs. 306 mg/dL) (Figure 3). The alcohol level was associated with a significantly lower risk of death. Using the test for differences in proportions, the occurrence of neurological abnormalities was compared between C1 patients and all the other patients. Significant differences (p value <0.05) are summarized in Table 4.

Neurological abnormalities were significantly more commonly reported in C1 group patients (71.9% vs. 39.9%). The C1 and C2 groups did not differ significantly in specific neurological abnormalities (p value >0.05). Every patient admitted for urgent neurosurgical intervention had a concurrent injury of another body part. Compared with other patients, a significantly higher percentage of patients admitted for urgent neurosurgical intervention (C1) had the following: deformity of the lower leg, bleeding from the mouth, bleeding from the nose, hematoma in the parietal region, wound of the occiput, wound in the temporal region, contusion of the shoulder, contusion of the occiput, and palpable skull fracture. Among the complaints, significant differences were found for pain in the cervical spine/neck which was uncommon in the C1 group (0.0% vs. 12.2%). The following Table 5 shows signs and symptoms classified into those found on physical examination and those reported by the patients. There were a lot of complaints significantly differentiating the C1 and C2 groups from all the other head trauma patients. These included the following:

(i) More common in C1 + C2: convulsions with loss of consciousness (0.5% vs. 0%, p = 0.004), bleeding from the ear (4.2% vs. 0.1%, p < 0.001), bleeding from the mouth (1.6% vs. 0%, p < 0.001), bleeding from the nose (3.7% vs. 1.1%, p < 0.004), periorbital ecchymosis (3.7% vs. 1%, p = 0.002), bilateral periorbital ecchymosis (8.4% vs. 4.9%, p = 0.044), wound of the occiput (12% vs. 5.4%, <0.001), contused wound in the temporal region



FIGURE 3: Relationship between the variables: alcohol (mg/dL) and classification.

(1.6% vs. 0.2%, p = 0.002); contusion of the hand (2.1% vs. 0.6%, p = 0.049), and palpable skull fracture (2.6% vs. 0.1%, p < 0.001).

(ii) More common in the other group than in C1 + C2: wound of the superciliary arch (1.6% vs. 5.1%, p = 0.041);

Among the complaints, significant differences were found for the following sings and/or symptoms: Pain in the cervical spine/neck–less common in C1 and C2 patients than in the other patients with any signs and/or symptoms (3.7% vs. 12.3%, p < 0.001), vomiting–more common in C1 and C2 patients than in the other patients with any signs and/or symptoms (7.9% vs. 3.7%, p = 0.006). Death occurred more frequently in C1 patients than the rest of the patients (32.8% vs. 0.6%) and more often in the C1 or C2 groups than the rest of the patients (19.5% vs. 0.2%).

3. Discussion

The primary assumption of this article was, based on the most significant possible number of subjects, to extract new data on prehospital abnormalities in physical examination, which may indicate the need for urgent neurosurgical intervention. TBI remains the leading cause of death, longterm disabilities in previously healthy adults. Head trauma is one of the main causes of death in trauma patients. In North America, TBI kills 7 patients every hour [2, 4]. Although exact number is hard to determine, it is assessed that TBI affects 27-69 million people and their families every year [6, 7]. Due to the poorly explored effective treatments for TBI (most guidelines are based on weak data), surviving patients leave the hospital requiring many years of intensive rehabilitation, especially when they are in a minimally conscious state or in a persistent vegetative state [7]. According to a study conducted in 16 European countries, the number of years of life lost due to head trauma in Europe in 2013 was 1.3 million overall (1.1 million in males and 271,000 in females) [8]. From the perspective of head trauma patients, it is extremely important to initiate appropriate procedures to prevent secondary brain injury as early as

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TABLE 4: Detailed summary of neurological abnormalities in relation to patient classification.

Signs	C1 (N=41)	Others $(N = 508)$	P value*
Aphasia	7.3% (N=3)	2.2% (N=11)	0.134
Aggression	2.4% (N=1)	0.6% (N=3)	0.701
Anisocoria	19.5% (N=8)	19.7% (N = 100)	1.000
Asymmetry of the nasolabial folds	2.4% (N=1)	0.4% (N=2)	0.543
Incomprehensible speech	—	2% (N=10)	0.764
No verbal response	14.6% (N=6)	2.8% (N = 14)	<0.001
No response to pain	2.4% (N=1)	—	0.105
No response to light	12.2% (N=5)	2.6% (N=13)	0.004
Patient on sedatives	4.9% (N=2)	1.4% (N=7)	0.290
Delirium	4.9% (N=2)	0.4% (N=2)	0.022
Patient on drugs	_	4.3%~(N=22)	0.344
Paresis	17.1% (N=7)	8.1% (N=41)	0.094
Amnesia	_	7.3% (N=37)	0.143
Positive Babinski sign	9.8% (N=4)	3% (N = 15)	0.065
Axial compression	—	1.4% (N=7)	0.974
Decreased muscle tone in the limbs	2.4% (N=1)	_	0.105
Lowered corner of the mouth	4.9% (N=2)	0.8% (N=4)	0.100
Nystagmus	4.9% (N=2)	3.9% (N=20)	1.000
Reduced response to light	_	1.8% (N=9)	0.826
Dementia	_	2% (N=10)	0.764
Agitation	7.3% (N=3)	2.4% (N=12)	0.169
Reduced response	2.4% (N=1)	2.4% (N=12)	1.000
Paralysis of the lower limbs	2.4% (N=1)	_	0.105
Spasms	2.4% (N=1)	_	0.105
Positive Romberg test	_	6.3% (N=32)	0.190
Sleepiness	9.8% (N=4)	2.8% (N = 14)	0.049
Confusion	14.6% (N=6)	13% (N = 66)	0.953
Psychomotor retardation	4.9% (N=2)	2% (N=10)	0.503
Neck stiffness	4.9% (N=2)	0.4% (N=2)	0.022

The bold values indicate significance.

possible. Maintaining normoxia and normotension are crucial. Pathophysiological reactions leading to post-traumatic coagulopathy (SWINE), fever, and glucose level fluctuations are other processes that threaten the development of secondary brain injury and decrease the chances of successful treatment completion. A single drop of systolic blood pressure <100 mmHg doubles mortality, and if SBP drops below 70 mmHg, it increases the death risk 6-fold [9].

The authors focused on the most commonly reported patient's complaints and on abnormal physical examination findings-apart from evident external symptoms of head trauma and a low GCS score-that may raise suspicion of head trauma requiring urgent neurosurgical intervention. Our analysis revealed few interesting insights, a lot corresponds to the data from most European countries, where a shift in the age of head trauma patients from young patients to those >65 years old has been observed in recent years [10]. In contrast with a paper by Bossers et al. [7], the most common cause of injuries in our study was falls on the same level. The incidence of serious injuries in the elderly is increasing, and the most common cause of injury is falls; falls are also the main cause of death in this group of patients [11]. Motor vehicle accidents were the most common cause of head trauma in a Dutch study but not even ranked among subjects who were qualified for urgent neurosurgical intervention in our study. All kinds of vehicles accidents were preceded by falls and resulted from epilepsy to beating. An

aging society, the growing population of people who use various types of medications which affect blood clotting, polypharmacy, and the resulting falls all combine with poorly explored treatments for TBI to create a situation in which nearly one in five patients does not survive until discharge.

Currently, we do not have any effective prehospital tool for assessing patients' eligibility for urgent neurosurgical intervention. The GCS, as a simple and well-known scale, can yield widely varying scores and is useless after the administration of sedatives and analgesics-which is invariably part of the treatment in posttrauma patients-as well as in patients under the influence of alcohol. The pupillary assessment remains important, though 20% of the population has physiologic anisocoria and the clinical response to light may be disturbed by the administration of analgesics and sedatives. Also, the majority of people with posttraumatic anisocoria show no changes in CT. Norwegian HEMS project to implement CT scanner into their aircrafts, assays of SB100 in the patient's saliva or of the blood markers ubiquitin C-terminal hydrolase-L1 (UCHL-1) and glial fibrillary acidic protein (GFAP), or IT programs for evaluating indications for neurosurgical intervention, are unlikely to be introduced into the daily practice of prehospital teams for years to come [12-14]. Nonetheless, studies suggest that even basic prehospital emergency procedures in head trauma patients, such as ensuring appropriate oxygenation

$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Types Complaints	C1 (N=46)	Others $(N = 7032)$	P value
Deformity of the lower leg	Deformity of the nose	2.2% (N=1)	0.2% (N=13)	0.173
Deformity of the lower leg 2.2% (N-1) 0.1% (N-5) 0.019 Bleeding from the ear 2.2% (N-1) 0.2% (N-16) 0.239 Bleeding from the mouth 4.3% (N-2) 0% (N-16) 0.0007 Hematoma in the parietal region 2.2% (N-1) 0.% (N-34) 0.0007 Hematoma in the parietal region 2.2% (N-1) 0.5% (N-3) 0.134 Numerous abrasions of the head 2.2% (N-1) 0.5% (N-3) 0.073 Swelling and restriction of arm mobility 2.2% (N-1) 0.5% (N-3) 0.608 Swelling and restriction of arm mobility 2.2% (N-1) 0.5% (N-37) 0.668 Mound of the temple 2.2% (N-1) 0.5% (N-35) 0.231 Wound of the temple 2.2% (N-1) 0.5% (N-35) 0.231 Wound of the temple 17.4% (N-8) 5.5% (N-83) 0.002 Wound of the cociput 17.4% (N-8) 5.5% (N-83) 0.002 Wound of the cociput 17.4% (N-8) 1.0% (N-83) 0.000 Wound of the cociput 12.4% (N-8) 1.0% 0.001 Wound of the cociput	Deformity of the clavicle		0.1% (N=9)	1.000
Bleeding from the ear 2.2% (N=1) 0.2% (N=1) 0.2% Bleeding from the nouth 4.3% (N=3) 1.1% (N=8) 0.007 Henatom in the parietal region 2.2% (N=1) 0.% (N=1) 0.001 Periorbial ecolymosis 1.09% (N=3) 4.5% (N=43) 0.134 Numerous abrasions of the head 2.2% (N=1) 0.5% (N=7) 0.608 Swelling and restriction of arm mobility 2.2% (N=1) 0.5% (N=47) 0.735 Abrasion of the forehead 2.2% (N=1) 0.5% (N=47) 0.333 Wound of the forehead 2.2% (N=1) 0.5% (N=47) 0.333 Wound of the sepercillary arch - 2% (N=13) 0.667 Wound of the occiput 174% (N=8) 5.5% (N=388) 0.002 Wound of the coreint 2.2% (N=1) 0.2% (N=17) 0.281 Wound of the coreint 2.2% (N=1) 0.5% (N=7) 0.494 Wound of the terpie 8.7% (N=4) 1.5% (N=3) 0.636 Contusion of the shoulder 2.2% (N=1) 0.3% (N=2) 0.944 Wound of the terpie 2.2% (N=1)	Deformity of the lower leg	2.2% (N=1)	0.1% (N=5)	0.019
Bleeding from the mouth 4.3% $(N=2)$ 0% (N=3) 0.0001 Henatoma in the parietal region 2.2% $(N=3)$ 0.134 0.134 0.013 Periorbital eckynosis 10.9% $(N=3)$ 0.2% 0.134 0.134 Numerous abrasions of the head 2.2% $(N=1)$ 0.2% 0.735 0.608 Swelling from the restriction of arm mobility 2.2% $(N=1)$ 0.7% $(N=47)$ 0.735 Abrasion of the forchead 2.2% $(N=1)$ 0.7% $(N=47)$ 0.735 Wound of the orchead 2.2% $(N=1)$ 0.7% $(N=47)$ 0.735 Wound of the sociput 17.4% $(N=3)$ 0.667 $(N=4)$ 0.958 0.221 Wound of the sociput 17.4% $(N=3)$ 5.5% $(N=3)$ 0.002 Wound of the occiput 17.4% $(N=8)$ 5.5% $(N=3)$ 0.004 Wound of the occiput 2.2% $(N=1)$ 0.2% $(N=1)$ 0.4% 0.001 Wound of	Bleeding from the ear	2.2% (N=1)	0.2%~(N=16)	0.239
Bleeding from the nose 6.5% $(N=3)$ 1.1% $(N=80)$ 0.007 Hematoma in the parietal region 2.2% $(N=1)$ 0.0% $(N=3)$ 4.9% $(N=3)$ 0.134 Numerous abrasions of the head 2.2% $(N=1)$ 0.2% $(N=3)$ 0.068 Swollen face 2.2% $(N=1)$ 0.5% $(N=37)$ 0.608 Swollen face 2.2% $(N=1)$ 0.5% $(N=37)$ 0.608 Abrasion of the forchead 2.2% $(N=1)$ 0.5% $(N=37)$ 0.75 Abrasion of the forchead 2.2% $(N=1)$ 0.7% $(N=47)$ 0.735 Wound of the forchead 2.2% $(N=1)$ 0.7% $(N=47)$ 0.735 Wound of the forchead 2.2% $(N=1)$ 0.7% $(N=47)$ 0.735 Wound of the super-link of the start 2.2% $(N=1)$ 0.7% $(N=47)$ 0.735 Wound of the super-link of the start 2.2% $(N=1)$ 0.7% $(N=47)$ 0.735 Wound of the super-link of the start 2.2% $(N=1)$ 0.7% $(N=47)$ 0.735 Wound of the super-link of the start 2.2% $(N=1)$ 0.7% $(N=435)$ 0.221 Wound of the cocipital region - 2.3% $(N=38)$ 0.002 Wound of the cocipital region - 1.3% $(N=38)$ 0.002 Wound of the cocipital region - 1.2% $(N=38)$ 0.002 Wound of the forearm 2.2% $(N=1)$ 0.2% $(N=7)$ 0.049 Wound of the forearm 2.2% $(N=1)$ 0.2% $(N=37)$ 0.049 Contusion of the shoulder 2.2% $(N=1)$ 0.3% $(N=7)$ 0.042 Contusion of the shoulder 2.2% $(N=1)$ 0.4% $(N=30)$ 0.363 Contusion of the shoulder 2.2% $(N=1)$ 0.4% $(N=70)$ 0.128 Contusion of the parto-occipital region 4.3% $(N=2)$ 1.5% $(N=13)$ 0.309 Contusion of the parto-occipital region 4.3% $(N=2)$ 1.5% $(N=13)$ 0.309 Contusion of the parto-occipital region 4.3% $(N=2)$ 1.5% $(N=13)$ 0.309 Contusion of the parto-occipital region - 1.2% $(N=13)$ 0.309 Con	Bleeding from the mouth	4.3% (N=2)	0% (N=3)	<0.001
Hernatoma in the parietal region 2.2% (N=1) 0% (N=1) 0.001 Numerous abraions of the head 2.2% (N=1) 0.2% (N=33) 0.173 Swelling and restriction of arm mobility 2.2% (N=1) 0.7% (N=37) 0.608 Swollen face 2.2% (N=1) 0.7% (N=47) 0.735 Abrasion of the forehead 2.2% (N=1) 0.7% (N=47) 0.353 Wound of the supercillary arch — 5% (N=453) 0.221 Wound of the nose — 2% (N=139) 0.667 Wound in the parietal region — 1.2% (N=80) 0.378 Wound of the coreput $1.7.4\%$ (N=8) 5.5% (N=38) 0.002 Wound of the forehead 2.2% (N=1) 0.2% (N=17) 0.261 Wound of the forehead 2.5% (N=4) 1.6% (N=8) 0.001 Wound of the supercillar egion — 1.2% (N=77) 0.261 Wound of the supercillar egion 2.5% (N=1) 0.5% (N=33) 0.300 Contusion of the shoulder 2.2% (N=1) 0.5% (N=33) 0.300	Bleeding from the nose	6.5% (N=3)	1.1% (N=80)	0.007
Periorbital exchymosis10.9% $(N=5)$ 4.9% $(N=348)$ 0.134Numerous abrasions of the head2.2% $(N=1)$ 0.5% $(N=37)$ 0.608Swellen face2.2% $(N=1)$ 0.5% $(N=37)$ 0.608Swellen face2.2% $(N=1)$ 0.7% $(N=47)$ 0.735Abrasion of the torphe2.2% $(N=1)$ 0.4% $(N=47)$ 0.735Mound of the forehead2.2% $(N=1)$ 0.7% $(N=47)$ 0.735Wound of the sopercliary arch-5% $(N=353)$ 0.221Wound of the particlar region-4.9% $(N=345)$ 0.231Wound of the occiput17.4% $(N=8)$ 5.5% $(N=388)$ 0.022Wound of the protecting region-1.2% $(N=58)$ 0.964Wound of the forearm2.2% $(N=1)$ 0.2% $(N=158)$ 0.964Wound of the forearm2.2% $(N=1)$ 0.2% $(N=17)$ 0.261Wound of the forearm2.2% $(N=1)$ 0.2% $(N=17)$ 0.261Wound of the forearm2.2% $(N=1)$ 0.3% $(N=37)$ 0.369Contusion of the shoulder2.2% $(N=1)$ 0.3% $(N=37)$ 0.369Contusion of the forehead8.7% $(N=4)$ 1.8% $(N=131)$ 0.700Contusion of the nore-1.9% $(N=70)$ 0.128Contusion of the forehead2.7% $(N=4)$ 1.8% $(N=131)$ 0.700Contusion of the forehead8.7% $(N=2)$ 1.9% $(N=131)$ 0.700Contusion of the forehead8.7% $(N=2)$ 1.9% $(N=131)$ 0.700Contusion of the forehead8.7% $(N=2)$ 1.9% $(N=131)$ 0.700Contusion	Hematoma in the parietal region	2.2% (N = 1)	0% (N=1)	<0.001
Numerous abrasions of the head 2.2% (N = 1) 0.2% (N = 13) 0.073 Swelling and restriction of arm mobility 2.2% (N = 1) 0.5% (N = 47) 0.638 Abrasion of the forehead 2.2% (N = 1) 0.5% (N = 47) 0.733 Abrasion of the forehead 2.2% (N = 1) 0.5% (N = 47) 0.733 Wound of the temple 2.2% (N = 1) 6.7% (N = 47) 0.733 Wound of the superciliary arch - 2% (N = 35) 0.231 Wound of the ense - 2% (N = 35) 0.231 Wound of the coiput 1.7.4% (N = 8) 5.5% (N = 488) 0.002 Wound of the coiput 1.7.4% (N = 8) 5.5% (N = 488) 0.002 Wound of the temple 8.7% (N = 41) 1.6% (N = 109) 0.001 Wound of the forehead 2.2% (N = 1) 0.2% (N = 10) 0.036 Contusion of the shoulder 2.2% (N = 1) 0.1% (N = 70) 0.231 Wound of the forehead 8.7% (N = 4) 1.6% (N = 30) 0.363 Contusion of the shoulder 2.2% (N = 1) 0.1% (N = 10) 0.036 Contusion of	Periorbital ecchymosis	10.9% (N=5)	4.9% (N = 348)	0.134
Swelling and restriction of arm mobility 2.2% (N = 1) 0.7% (N = 37) 0.608 Swellen face 2.2% (N = 1) 0.7% (N = 47) 0.735 Abrasion of the temple 2.2% (N = 1) 0.7% (N = 47) 0.735 Wound of the torplet 2.2% (N = 1) 6.7% (N = 47) 0.535 Wound of the torplet 2.2% (N = 1) 6.7% (N = 47) 0.535 Wound of the spritely region - 2.9% (N = 139) 0.667 Wound of the parietal region - 4.9% (N = 345) 0.0378 Wound of the corput 17.4% (N = 8) 5.5% (N = 388) 0.002 Wound of the corput 17.4% (N = 8) 5.5% (N = 17) 0.264 Wound of the forearm 2.2% (N = 1) 0.3% (N = 88) 0.000 Wound of the forearm 2.2% (N = 1) 0.3% (N = 88) 1.000 Contusion of the forehead 8.7% (N = 4) 4.5% (N = 10) 0.636 Contusion of the shoulder 2.2% (N = 1) 0.3% (N = 33) 0.569 Contusion of the parietal region 4.3% (N = 2) 1.5% (N = 10) 0.220 Contusion of the parietal region	Numerous abrasions of the head	2.2% (N = 1)	0.2% (N=13)	0.173
Swollen face 2.2% (N = 1) 0.7% (N = 47) 0.73 Abrasion of the forehead 2.2% (N = 1) 0.7% (N = 47) 0.73 Wound of the temple 2.2% (N = 1) 0.7% (N = 47) 0.33 Wound of the upperciliary arch- 5% (N = 139) 0.667 Wound in the partella region- 4.9% (N = 139) 0.667 Wound of the cociput 7.4% (N = 80) 0.231 Wound of the cociput 7.4% (N = 80) 0.231 Wound of the cociput 7.4% (N = 88) 0.002 Wound of the cociput 7.4% (N = 10) 0.5% (N = 17) 0.261 Wound of the temple 8.7% (N = 1) 0.1% (N = 88) 1.000 Contusion of the the lip 2.2% (N = 1) 0.1% (N = 7) 0.049 Contusion of the shoulder 2.2% (N = 1) 0.1% (N = 7) 0.499 Contusion of the forchead 8.7% (N = 4) 4.8% (N = 33) 0.656 Contusion of the forchead 8.7% (N = 1) 0.1% (N = 7) 0.499 Contusion of the partel region- 1.9% (N = 124) 0.730 Contusion of the cociput 8.7% (N = 4) 2.1% (N = 10) 0.242 Contusion of the cociput 8.7% (N = 4) 1.4% (N = 8) 0.002 Contusion of the cociput 8.7% (N = 4) 1.4% (N = 7) 0.499 Contusion of the cociput 8.7% (N = 2) 1.4% (N = 7) 0.490 Contusion of the cociput 8.7% (N = 1) 1.4% (N = 7) 0.492 Contusion of the cociput 8.7% (N = 1) 1.4% (Swelling and restriction of arm mobili	2.2% (N=1)	0.5%~(N=37)	0.608
Abrasion of the forchead $2.2\% (N = 1)$ $3.4\% (N = 241)$ 0.075 Wound of the supercliny arch $5\% (N = 471)$ 0.735 Wound of the supercliny arch $5\% (N = 355)$ 0.221 Wound of the supercliny arch- $2\% (N = 13)$ 0.667 Wound in the parieto occipial region- $4.9\% (N = 345)$ 0.6231 Wound of the occiput $17.4\% (N = 8)$ $5.5\% (N = 385)$ 0.0021 Wound of the cyclid- $1.2\% (N = 82)$ 0.964 Wound of the forearm $2.2\% (N = 1)$ $0.2\% (N = 17)$ 0.261 Wound of the forearm $2.2\% (N = 1)$ $0.3\% (N = 88)$ 1.000 Wound of the forearm $2.2\% (N = 1)$ $0.3\% (N = 88)$ 1.000 Contusion of the shoulder $2.2\% (N = 1)$ $0.5\% (N = 88)$ 1.000 Contusion of the shoulder $2.2\% (N = 1)$ $0.5\% (N = 83)$ 0.636 Contusion of the forehead $8.7\% (N = 4)$ $4.5\% (N = 33)$ 0.636 Contusion of the parietal region $4.3\% (N = 2)$ $1.7\% (N = 120)$ 0.128 Contusion of the parietal region $4.3\% (N = 2)$ $1.7\% (N = 120)$ 0.222 Contusion of the exciput- $1.4\% (N = 80)$ 0.023 Contusion of the exciput- $1.4\% (N = 82)$ 0.964 Contusion of the cyclid- $1.3\% (N = 6)$ 0.000 Contusion of the cyclid- $1.3\% (N = 6)$ 0.020 Contusion of the cyclid- $1.3\% (N = 6)$ 0.020 Contusion of the cy	Swollen face	2.2% (N = 1)	0.7%~(N=47)	0.735
Abrasion of the temple 2.2% (N=1) 0.7% (N=47) 0.353 Wound of the soperciliary arch - 5% (N=35) 0.221 Wound of the nose - 2% (N=13) 0.667 Wound in the parietal region - 4.9% (N=345) 0.231 Wound of the corput 17.4% (N=8) 5.5% (N=438) 0.002 Wound of the corput 17.4% (N=8) 5.5% (N=432) 0.964 Wound of the corput 17.4% (N=8) 5.5% (N=42) 0.964 Wound of the forearm 2.2% (N=1) 0.2% (N=10) 0.001 Wound of the forearm 2.2% (N=1) 1.3% (N=80) 1.000 Contusion of the shoulder 2.2% (N=1) 0.5% (N=7) 0.499 Contusion of the shoulder 2.2% (N=1) 0.6% (N=30) 0.369 Contusion of the shoulder 2.2% (N=1) 0.6% (N=30) 0.360 Contusion of the spreader groin $ 1.9\%$ (N=131) 0.700 Contusion of the spreader groin $ 1.8\%$ (N=124) 0.300 Contusion of the	Abrasion of the forehead	2.2% (N=1)	3.4% (N = 241)	0.953
Wound of the specializary arch $ 5\%$ (N = 471)0.635Wound of the nose $ 2\%$ (N = 139)0.667Wound in the parietal region $ 4.9\%$ (N = 345)0.231Wound of the occiput 17.4% (N = 8) 5.5% (N = 388)0.002Wound of the orciput 17.4% (N = 8) 5.5% (N = 388)0.002Wound of the orgetid $ 1.2\%$ (N = 82)0.964Wound of the forearm 2.2% (N = 1) 0.2% (N = 17)0.261Wound of the temple 8.7% (N = 4) 1.6% (N = 88)1.000Contusion of the shoulder 2.2% (N = 1) 0.1% (N = 7)0.049Contusion of the forchead 8.7% (N = 4) 4.8% (N = 335)0.369Contusion of the shoulder 2.2% (N = 1) 0.6% (N = 39)0.636Contusion of the parietal region $ 1.9\%$ (N = 124)0.730Contusion of the parietal region $ 1.9\%$ (N = 124)0.730Contusion of the parietal region $ 1.9\%$ (N = 124)0.031Contusion of the exciput $ 1.4\%$ (N = 96)0.874Contusion of the exciput $ 1.4\%$ (N = 80)0.862Tenderness of the occiput $ 1.4\%$ (N = 80)0.632Tenderness of the occiput $ 1.4\%$ (N = 124)0.033Pain in the bioulder $ 2.2\%$ (N = 1) 1.000 Pain in the boulder $ 2.2\%$ (N = 10) 0.862 Tenderness of the occiput $ 1.4\%$ (N = 80) <td>Abrasion of the temple</td> <td>2.2% (N = 1)</td> <td>0.7%~(N=47)</td> <td>0.735</td>	Abrasion of the temple	2.2% (N = 1)	0.7%~(N=47)	0.735
Wound of the supercliatry arch - 5% (N = 353) 0.221 Wound of the nose - 2% (N = 139) 0.667 Wound in the parieto-ccipital region - 1.1% (N = 80) 0.978 Wound of the occiput 17.4% (N = 8) 5.5% (N = 388) 0.002 Wound of the occiput 17.4% (N = 8) 5.5% (N = 138) 0.002 Wound of the forearm 2.2% (N = 1) 0.2% (N = 17) 0.261 Wound of the tip 2.2% (N = 1) 1.3% (N = 8) 1.000 Contusion of the shoulder 2.2% (N = 1) 0.1% (N = 7) 0.049 Contusion of the rorehead 8.7% (N = 4) 4.8% (N = 335) 0.369 Contusion of the rorehead 8.7% (N = 4) 4.8% (N = 130) 0.700 Contusion of the parieto-occipital region - 1.8% (N = 124) 0.738 Contusion of the ropart region 4.3% (N = 2) 1.7% (N = 10) 0.422 Contusion of the ropart region 4.3% (N = 2) 1.7% (N = 10) 0.422 Contusion of the ropedit region - 1.4% (N = 60) 0.862 Contusion of t	Wound of the forehead	2.2% (N=1)	6.7% (N = 471)	0.353
Wound of the nose-2% (N=139)0.667Wound in the parieto-occipital region-4.9% (N=345)0.231Wound of the occiput17.4% (N=8)5.5% (N=388)0.002Wound of the exciput-1.2% (N=82)0.964Wound of the exciput2.2% (N=1)0.2% (N=17)0.261Wound of the lip2.2% (N=1)0.1% (N=70)0.001Wound of the lip2.2% (N=1)0.1% (N=70)0.049Contusion of the shoulder2.2% (N=1)0.1% (N=7)0.369Contusion of the harder8.7% (N=4)4.8% (N=335)0.369Contusion of the harder2.2% (N=1)0.6% (N=39)0.636Contusion of the parietal region-1.9% (N=131)0.700Contusion of the parietal region-1.8% (N=124)0.300Contusion of the parietal region4.3% (N=2)1.% (N=10)0.422Contusion of the parietal region-1.4% (N=96)0.874Contusion of the parietal region-1.4% (N=96)0.874Contusion of the cociput-1.4% (N=96)0.862Tenderness of the cociput-1.4% (N=96)0.862Tenderness of the cociput-1.4% (N=83)1.000Palpable skull fracture6.5% (N=3)0.196 (N=6)0.001Palpable skull fracture6.5% (N=3)0.196 (N=6)0.001Palpable skull fracture6.5% (N=3)0.196 (N=6)0.001Palpable skull fracture6.5% (N=1)1.2% (N=83)0.002Pain in the	Wound of the superciliary arch		5% (N=355)	0.221
Wound in the pariet-accipital region 4.9% (N = 345)0.231Wound of the occiput17.4% (N = 8) 5.5% (N = 388)0.002Wound of the orciput17.4% (N = 8) 5.5% (N = 388)0.002Wound of the forarm2.2% (N = 1) 0.2% (N = 17)0.261Wound of the forarm2.2% (N = 1) 0.2% (N = 17)0.261Wound of the bip2.2% (N = 1) 1.5% (N = 88)1000Contusion of the shoulder2.2% (N = 1) 0.9% (N = 73)0.049Contusion of the forehead8.7% (N = 4)4.8% (N = 335)0.369Contusion of the nose-1.9% (N = 131)0.700Contusion of the nose-1.9% (N = 131)0.700Contusion of the parieto-occipital region-1.8% (N = 124)0.302Contusion of the parieto-occipital region-1.9% (N = 10)0.422Contusion of the occiput8.7% (N = 4)2.1% (N = 145)0.009Contusion of the eyelids1.2% (N = 10)Contusion of the eyelids-1.4% (N = 98)0.862Contusion of the eyelids-1.2% (N = 11)1.000Palpable skull fracture6.5% (N = 1)1.1% (N = 75)0.934Contusion of the face2.2% (N = 1)1.1% (N = 6)-Contusion of the scuptu-1.2% (N = 83)1.000Palpable skull fracture6.5% (N = 3)0.10% (N = 6)-Contusion of the face2.2% (N = 1)1.4% (N = 83)1.000Palpable skull fractur	Wound of the nose		2% (N=139)	0.667
Wound in the parieto-occipital region - 1.1% (N = 80) 0.978 Wound of the occipit 17.4% (N = 1) 5.5% (N = 388) 0.002 Wound of the eyelid - 1.2% (N = 12) 0.964 Wound of the temple 2.7% (N = 1) 0.2% (N = 10) 0.001 Wound of the temple 2.7% (N = 1) 0.1% (N = 7) 0.049 Contusion of the shoulder 2.2% (N = 1) 0.1% (N = 7) 0.049 Contusion of the shoulder 2.2% (N = 1) 0.1% (N = 7) 0.049 Contusion of the haree 2.2% (N = 1) 0.1% (N = 7) 0.049 Contusion of the parietal region - 1.9% (N = 13) 0.700 Contusion of the parietal region - 1.9% (N = 14) 0.730 Contusion of the parietal region 4.3% (N = 2) 1.7% (N = 15) 0.009 Contusion of the cciput - 1.4% (N = 96) 0.374 Contusion of the face 2.2% (N = 1) 1.1% (N = 5) 0.993 Tenderness of the cociput - 1.4% (N = 80) 0.334 Contusion of the face 2.2% (N	Wound in the parietal region		4.9% (N = 345)	0.231
Wound of the equid $17.4\% (N=8)$ $5.5\% (N=388)$ 0.002 Wound of the equid- $1.2\% (N=1)$ $0.2\% (N=1)$ 0.964 Wound of the foreram $2.2\% (N=1)$ $1.3\% (N=88)$ 1.000 Contusion of the shoulder $2.2\% (N=1)$ $1.3\% (N=88)$ 1.000 Contusion of the forehead $8.7\% (N=4)$ $4.8\% (N=335)$ 0.369 Contusion of the forehead $8.7\% (N=4)$ $4.8\% (N=335)$ 0.369 Contusion of the nee $2.2\% (N=1)$ $0.6\% (N=39)$ 0.636 Contusion of the parietal region- $1.9\% (N=70)$ 0.128 Contusion of the parieto-occipital region $4.3\% (N=2)$ $1.7\% (N=120)$ 0.422 Contusion of the occiput $8.7\% (N=4)$ $2.1\% (N=70)$ 0.128 Contusion of the occiput $8.7\% (N=4)$ 0.790 0.422 Contusion of the explids- $1.4\% (N=96)$ 0.874 Contusion of the explids- $1.4\% (N=98)$ 0.662 Tenderness of the occiput- $1.2\% (N=12)$ 0.993 Tenderness of the occiput- $1.2\% (N=12)$ 0.964 Multisite injury $2.2\% (N=1)$ $1.1\% (N=75)$ 0.993 Pain in the shoulder- $2.3\% (N=12)$ 0.964 Multisite injury $2.2\% (N=1)$ $1.4\% (N=83)$ 0.633 Pain in the bip $2.2\% (N=1)$ $1.3\% (N=2)$ 0.964 Multisite injury $2.2\% (N=1)$ $0.964 (N=2)$ $0.966 (N=2)$ Pain in the abdomen- $1.2\% (N=83)$ 0.633 Pain	Wound in the parieto-occipital region	1	1.1% (N=80)	0.978
Wound of the eyelid - 1.2% (N=82) 0.964 Wound of the tormple 8.7% (N=4) 1.6% (N=109) 0.001 Wound of the lip 2.2% (N=1) 1.3% (N=88) 1.000 Contusion of the shoulder 2.2% (N=1) 0.1% (N=7) 0.049 Contusion of the shoulder 2.2% (N=1) 0.6% (N=39) 0.636 Contusion of the haree 2.2% (N=1) 0.6% (N=39) 0.636 Contusion of the parietal region - 1.9% (N=131) 0.700 Contusion of the parietal region - 1.8% (N=124) 0.730 Contusion of the cociput 8.7% (N=4) 2.1% (N=145) 0.009 Contusion of the cociput 8.7% (N=4) 2.1% (N=145) 0.009 Contusion of the face 2.2% (N=1) 1.4% (N=96) 0.874 Contusion of the face 2.2% (N=1) 1.4% (N=98) 0.862 Tenderness of the occiput - 1.2% (N=83) 1.000 Palpable skull fracture 6.5% (N=3) 0.1% (N=6) <0.001	Wound of the occiput	17.4% (N=8)	5.5% (N = 388)	0.002
Wound of the forearm $2.2\% (N=1)$ $0.2\% (N=17)$ 0.26 Wound of the temple $8.7\% (N=4)$ $1.6\% (N=10)$ 0.001 Wound of the lip $2.2\% (N=1)$ $1.3\% (N=88)$ 1.000 Contusion of the forehead $8.7\% (N=4)$ $4.8\% (N=335)$ 0.369 Contusion of the knee $2.2\% (N=1)$ $0.6\% (N=39)$ 0.636 Contusion of the parietal region - $1.9\% (N=70)$ 0.142 Contusion of the parieto-occipital region $4.3\% (N=2)$ $1.7\% (N=120)$ 0.4422 Contusion of the parieto-occipital region $4.3\% (N=2)$ $1.7\% (N=120)$ 0.4422 Contusion of the cociput $8.7\% (N=4)$ $2.1\% (N=145)$ 0.009 Contusion of the cociput $8.7\% (N=4)$ $2.1\% (N=75)$ 0.993 Tenderness of the coriput - $1.4\% (N=96)$ 0.362 Contusion of the acciput - $1.4\% (N=95)$ 0.092 Tenderness of the occiput - $1.4\% (N=6)$ 0.001 Palpable skull fracture $6.5\% (N=3)$ $1.1\% (N=6)$ 0.002 Palpain in the shoulder - $2.2\% (N=1)$	Wound of the eyelid		1.2% (N=82)	0.964
Wound of the temple 8.7% (N = 4) 1.6% (N = 109) 0.00 Wound of the forehead 2.2% (N = 1) 0.1% (N = 7) 0.049 Contusion of the forehead 8.7% (N = 4) 4.8% (N = 335) 0.369 Contusion of the knee 2.2% (N = 1) 0.6% (N = 39) 0.636 Contusion of the parietal region $ 1.9\%$ (N = 124) 0.730 Contusion of the parietal region $ 1.8\%$ (N = 124) 0.730 Contusion of the parieto-occipital region 4.3% (N = 2) $1.\%$ (N = 120) 0.422 Contusion of the cociput 8.7% (N = 4) 2.1% (N = 145) 0.009 Contusion of the occiput 8.7% (N = 4) 2.1% (N = 145) 0.009 Contusion of the occiput $ 1.4\%$ (N = 96) 0.874 Contusion of the occiput $ 1.4\%$ (N = 98) 0.862 Tenderness of the corvical spine $ 1.4\%$ (N = 82) 0.964 Multistic injury 2.2% (N = 1) 1.8% (N = 124) 0.009 Pain in the shoulder $ 3.9\%$ (N = 63) 1.000 Pain in the shoulder $ 3.9\%$ (N = 275) 0.324 Pain in the chest 2.2% (N = 1) 1.2% (N = 83) 1.000 Pain in the chest 2.2% (N = 1) 2.5% (N = 148) 0.633 Pain in the chest 2.2% (N = 1) 2.5% (N = 291) 0.855 Pain in the chest 2.2% (N = 1) 2.5% (N = 103) 0.302 Pain in the chest 2.2% (N = 1) 2.5% (N = 103) 0.303 Pain in the ches	Wound of the forearm	2.2% (N = 1)	0.2% (N = 17)	0.261
Wound of the lip2.2% $(N=1)$ 1.3% $(N=88)$ 1.000Contusion of the shoulder2.2% $(N=1)$ 0.1% $(N=7)$ 0.049Contusion of the forehead8.7% $(N=4)$ 4.8% $(N=335)$ 0.636Contusion of the nee2.2% $(N=1)$ 0.6% $(N=39)$ 0.636Contusion of the parietal region-1.9% $(N=131)$ 0.700Contusion of the parietal region-1.8% $(N=22)$ 1.7% $(N=120)$ 0.422Contusion of the carcipital region4.3% $(N=2)$ 1.7% $(N=120)$ 0.422Contusion of the cervical spine-1.4% $(N=96)$ 0.874Contusion of the cervical spine-1.4% $(N=96)$ 0.874Contusion of the cervical spine-1.4% $(N=96)$ 0.862Tenderness of the cervical spine-1.4% $(N=82)$ 0.964Multisite injury2.2% $(N=1)$ 1.1% $(N=82)$ 0.964Multisite injury2.2% $(N=3)$ 0.1% $(N=6)$ <0.001	Wound of the temple	8.7% (N=4)	$1.6\% \ (N = 109)$	0.001
Contusion of the shoulder2.2% $(N=1)$ 0.1% $(N=7)$ 0.049Contusion of the forchead8.7% $(N=4)$ 4.8% $(N=335)$ 0.369Contusion of the nose-1.9% $(N=131)$ 0.700Contusion of the parietal region-1.8% $(N=124)$ 0.730Contusion of the parieto-occipital region4.3% $(N=2)$ 1% $(N=70)$ 0.128Contusion of the parieto-uccipital region4.3% $(N=2)$ 1% $(N=70)$ 0.422Contusion of the cociput8.7% $(N=4)$ 2.1% $(N=145)$ 0.0099Contusion of the occiput8.7% $(N=4)$ 2.1% $(N=145)$ 0.0993Contusion of the face2.2% $(N=1)$ 1.1% $(N=96)$ 0.874Contusion of the cociput-1.4% $(N=96)$ 0.862Tenderness of the corciput-1.2% $(N=12)$ 0.964Multisite injury2.2% $(N=1)$ 1.8% $(N=124)$ 1.000Palpable skull fracture6.5% $(N=3)$ 0.1% $(N=775)$ 0.324Pain in the shoulder-2.1% $(N=148)$ 0.633Pain in the abdomen-2.1% $(N=148)$ 0.633Pain in the abdomen-1.2% $(N=855)$ 0.022Headache19.6% $(N=9)$ 3.26% $(N=2291)$ 0.085Pain in the corvical spine/neck-1.2% $(N=104)$ 0.930Pain in the corvical spine/neck-1.2% $(N=104)$ 0.930Pain in the chest2.2% $(N=1)$ 3% $(N=221)$ 0.085Pain in the chest2.2% $(N=1)$ 3% $(N=221)$ 0.085Pain in the chest2.2% $(N=1)$	Wound of the lip	2.2% (N = 1)	1.3% (N=88)	1.000
Contusion of the knee $8.7\% (N=4)$ $4.8\% (N=335)$ 0.536 Contusion of the nee $-2.2\% (N=1)$ $0.6\% (N=39)$ 0.636 Contusion of the parietal region $ 1.9\% (N=131)$ 0.700 Contusion of the parieto-occipital region $4.3\% (N=2)$ $1.9\% (N=70)$ 0.128 Contusion of the temporal region $4.3\% (N=2)$ $1.9\% (N=120)$ 0.422 Contusion of the cocciput $8.7\% (N=4)$ $2.1\% (N=120)$ 0.422 Contusion of the cocciput $ 1.4\% (N=60)$ 0.874 Contusion of the explids $ 1.4\% (N=96)$ 0.874 Contusion of the cocciput $ 1.4\% (N=82)$ 0.993 Tenderness of the occiput $ 1.2\% (N=82)$ 0.964 Multistic injury $2.2\% (N=1)$ $1.8\% (N=124)$ 1.000 Palpable skull fracture $6.55\% (N=3)$ $0.1\% (N=6)$ 0.001 Pain in the shoulder $ 3.9\% (N=275)$ 0.324 Pain in the shoulder $ 2.1\% (N=83)$ 1.000 Pain in the shoulder $ 2.1\% (N=83)$ 0.002 Pain in the corvical spine/neck $ 1.2\% (N=83)$ 0.002 Pain in the corvical spine/neck $ 1.2\% (N=82)$ 0.964 Pain in the corvical spine/neck $ 1.2\% (N=83)$ 0.002 Pain in the corvical spine/neck $ 1.2\% (N=83)$ 0.002 Pain in the corvical spine/neck $ 1.2\% (N=83)$ 0.002 Pain in the corvical spine $ 1.2\% (N=857)$ 0.32	Contusion of the shoulder	2.2% (N = 1)	0.1% (N=7)	0.049
Contusion of the knee 2.2% $(N=1)$ 0.6% $(N=39)$ 0.636 Contusion of the parietal region - 1.9% $(N=131)$ 0.730 Contusion of the parietal region 4.3% $(N=2)$ 1.% $(N=70)$ 0.128 Contusion of the temporal region 4.3% $(N=2)$ 1.7% $(N=120)$ 0.422 Contusion of the cociput 8.7% $(N=4)$ 2.1% $(N=145)$ 0.009 Contusion of the cociput 8.7% $(N=4)$ 2.1% $(N=70)$ 0.128 Contusion of the cociput 8.7% $(N=4)$ 2.1% $(N=145)$ 0.009 Contusion of the face 2.2% $(N=1)$ 1.8% $(N=28)$ 0.944 Multistic injury 2.2% $(N=1)$ 1.8% $(N=28)$ 0.944 Multistic injury 2.2% $(N=1)$ 1.8% $(N=21)$ 1.000 Palpable skull fracture 6.5% $(N=3)$ 0.1% $(N=6)$ <0.001	Contusion of the forehead	8.7% (N = 4)	4.8% (N = 335)	0.369
Contusion of the parietal region-1.9% (N=124)0.730Contusion of the parieto-occipital region4.3% (N=2)1.% (N=70)0.128Contusion of the temporal region4.3% (N=2)1.7% (N=120)0.422Contusion of the corput8.7% (N=4)2.1% (N=145)0.009Contusion of the cyclids-1.4% (N=96)0.874Contusion of the cervical spine-1.4% (N=96)0.874Contusion of the cervical spine-1.4% (N=75)0.993Tenderness of the cervical spine-1.2% (N=82)0.964Multisite injury2.2% (N=1)1.8% (N=124)1.000Palpable skull fracture6.5% (N=3)0.1% (N=6)<0.001	Contusion of the knee	2.2% (N=1)	0.6% (N = 39)	0.636
Contusion of the parietal region-1.8% $(N = 124)$ 0.730Contusion of the parieta-occipital region4.3% $(N = 2)$ 1.5% $(N = 70)$ 0.128Contusion of the occiput8.7% $(N = 4)$ 2.1% $(N = 145)$ 0.009Contusion of the excipital $N = 0$ $N = 146$ $(N = 96)$ 0.874Contusion of the face2.2% $(N = 1)$ 1.1% $(N = 96)$ 0.874Contusion of the face2.2% $(N = 1)$ 1.1% $(N = 96)$ 0.862Tenderness of the occiput- 1.2% $(N = 82)$ 0.964Multisite injury2.2% $(N = 1)$ 1.8% $(N = 124)$ 1.000Palpable skull fracture 6.5% $(N = 3)$ 0.1% $(N = 6)$ <0.001 Pain in the shoulder- 3.9% $(N = 275)$ 0.324 Pain in the abdomen- 2.1% $(N = 83)$ 1.000 Pain in the abdomen- 2.1% $(N = 83)$ 1.000 Pain in the chest 2.2% $(N = 1)$ $3.\%$ $(N = 221)$ 0.85 Pain in the chest 2.2% $(N = 1)$ $3.\%$ $(N = 221)$ 0.85 Pain in the chest 2.2% $(N = 10)$ 0.86 0.822 Pain in the lower limb- 1.2% $(N = 85)$ 0.922 Pain in the lower limb- 1.2% $(N = 85)$ 0.930 Pain in the lower limb- 1.2% $(N = 85)$ 0.930 Pain in the lower limb- 1.2% <	Contusion of the nose	—	1.9% ($N = 131$)	0.700
Contusion of the parteto-occipital region4.3% $(N = 2)$ 1% $(N = A)$ 0.128Contusion of the temporal region4.3% $(N = 2)$ 1.7% $(N = 120)$ 0.422Contusion of the occiput8.7% $(N = 4)$ 2.1% $(N = 145)$ 0.009Contusion of the eyelids-1.4% $(N = 96)$ 0.874Contusion of the face2.2% $(N = 1)$ 1.1% $(N = 75)$ 0.993Tenderness of the cervical spine-1.4% $(N = 98)$ 0.862Tenderness of the cervical spine-1.2% $(N = 82)$ 0.964Multisite injury2.2% $(N = 1)$ 1.8% $(N = 124)$ 1.000Palpable skull fracture6.5% $(N = 3)$ 0.1% $(N = 6)$ <0.001	Contusion of the parietal region		1.8% (N = 124)	0.730
Contusion of the temporal region4.3% $(N = 2)$ 1.7% $(N = 120)$ 0.422Contusion of the cyclids-1.4% $(N = 145)$ 0.009Contusion of the face2.2% $(N = 1)$ 1.1% $(N = 75)$ 0.933Tenderness of the cervical spine-1.4% $(N = 98)$ 0.862Tenderness of the cciput-1.2% $(N = 82)$ 0.964Multisite injury2.2% $(N = 1)$ 1.8% $(N = 124)$ 1.000Palpable skulf fracture6.5% $(N = 3)$ 0.1% $(N = 6)$ <0.001	Contusion of the parieto-occipital regio	4.3% (N = 2)	1% (N = 70)	0.128
Contusion of the occiput 8.7% ($N = 4$) 2.1% ($N = 145$) 0.009 Contusion of the face 2.2% ($N = 1$) 1.1% ($N = 75$) 0.933 Tenderness of the cervical spine $ 1.4\%$ ($N = 98$) 0.862 Tenderness of the occiput $ 1.4\%$ ($N = 82$) 0.964 Multisite injury 2.2% ($N = 1$) 1.8% ($N = 124$) 1.000 Palpable skull fracture 6.5% ($N = 3$) 0.1% ($N = 6$) <0.001 Pain in the shoulder $ 3.9\%$ ($N = 275$) 0.324 Pain in the abdomen $ 2.1\%$ ($N = 148$) 0.633 Pain in the abdomen $ 2.2\%$ ($N = 1$) 1.2% ($N = 855$) 0.022 Headache 19.6% ($N = 9$) 32.6% ($N = 2291$) 0.085 Pain in the chest 2.2% ($N = 1$) 3% ($N = 121$) 1.000 Pain in the chest 2.2% ($N = 1$) 3% ($N = 211$) 1.000 Pain in the chest 2.2% ($N = 1$) 3% ($N = 224$) 0.419 Pain in the lower limb $ 1.2\%$ ($N = 87$) 0.930 Pain in the elbow $ 1.2\%$ ($N = 84$) 0.950 Pain in the elbow $ 1.2\%$ ($N = 84$) 0.950 Pain in the occiput 2.2% ($N = 1$) 0.3% ($N = 20$) 0.323 Pain in the cociput 2.2% ($N = 1$) 0.3% ($N = 20$) 0.323 Pain in the cociput 2.2% ($N = 1$) 0.3% ($N = 20$) 0.323 Pain in the cociput 2.2% ($N = 1$) 0.3% ($N = 20$) 0.323 Pain in the	Contusion of the temporal region	4.3% (N = 2)	1.7% (N = 120)	0.422
Contusion of the eyends $ 1.4\%$ (N = 96) 0.874 Contusion of the face 2.2% (N = 1) 1.1% (N = 96) 0.862 Tenderness of the occiput $ 1.4\%$ (N = 98) 0.862 Tenderness of the occiput $ 1.2\%$ (N = 82) 0.964 Multisite injury 2.2% (N = 1) 1.8% (N = 124) 1.000 Palpable skull fracture 6.5% (N = 3) 0.1% (N = 6) $c0.001$ Pain in the shoulder $ 3.9\%$ (N = 275) 0.324 Pain in the shoulder $ 2.1\%$ (N = 83) 1.000 Pain in the abdomen $ 2.1\%$ (N = 855) 0.022 Headache19.6\% (N = 9) 32.6% (N = 2291) 0.085 Pain in the crevical spine/neck $ 1.2\%$ (N = 855) 0.022 Headache19.6\% (N = 9) 32.6% (N = 2291) 0.085 Pain in the chest 2.2% (N = 1) 3% (N = 211) 1.000 Pain in the lower limb $ 1.5\%$ (N = 163) 0.581 Pain in the lower limb $ 1.2\%$ (N = 87) 0.930 Pain in the elbow $ 1.2\%$ (N = 84) 0.950 Pain in the elbox $ 1.2\%$ (N = 84) 0.950 Pain in the cociput 2.2% (N = 1) 0.1% (N = 172) 0.533 Pain in the back $ 1.2\%$ (N = 84) 0.950 Pain in the back $ 1.2\%$ (N = 172) 0.533 Pain in the thoracic spine $ 1.7\%$ (N = 172) 0.576 Pain in the thoracic spine $ 1.7\%$ (N = 1	Contusion of the occiput	8.7% (N = 4)	2.1% (N = 145)	0.009
Contuston of the face 2.2% $(N=1)$ 1.1% $(N=75)$ 0.993 Tenderness of the occiput- 1.4% $(N=98)$ 0.862 Tenderness of the occiput- 1.2% $(N=82)$ 0.964 Multisite injury 2.2% $(N=1)$ 1.8% $(N=124)$ 1.000 Palpable skull fracture 6.5% $(N=3)$ 0.1% $(N=6)$ <0.001 Pain in the shoulder- 3.9% $(N=275)$ 0.324 Pain in the shoulder- 3.9% $(N=275)$ 0.324 Pain in the abdomen- 2.2% $(N=1)$ 1.2% $(N=83)$ 1.000 Pain in the cervical spine/neck- 12.2% $(N=855)$ 0.022 Headache 19.6% $(N=9)$ 32.6% $(N=2291)$ 0.085 Pain in the chest 2.2% $(N=1)$ 3% $(N=211)$ 1.000 Pain in the knee- 2.3% $(N=163)$ 0.581 Pain in the lower limb- 1.5% $(N=87)$ 0.930 Pain in the lower limb- 1.2% $(N=87)$ 0.930 Pain in the emporal region 2.2% $(N=1)$ 0.1% $(N=9)$ 0.367 Pain in the back- 1.2% $(N=84)$ 0.950 Pain in the occiput 2.2% $(N=1)$ 0.3% $(N=20)$ 0.323 Pain in the hand- 2.4% $(N=172)$ 0.553 Pain in the thoracic spine- 1.7% $(N=117)$ 0.763 Pain in the thoracic spine- 1.7% $(N=117)$ 0.763 Pain in the thoracic spine- 1.7% $(N=12)$ 0.151 Sleepiness 2.2% $(N=1)$ <td>Contusion of the eyelids</td> <td></td> <td>1.4% (N = 96)</td> <td>0.8/4</td>	Contusion of the eyelids		1.4% (N = 96)	0.8/4
Inderness of the cervical spine-1.4% $(N = 88)$ 0.862Tenderness of the occiput-1.2% $(N = 82)$ 0.964Multisite injury2.2% $(N=1)$ 1.8% $(N=124)$ 1.000Palpable skull fracture6.5% $(N=3)$ 0.1% $(N=6)$ c0.001 Pain in the shoulder-3.9% $(N=275)$ 0.324Pain in the shoulder-2.2% $(N=1)$ 1.2% $(N=83)$ 1.000Pain in the abdomen-2.1% $(N=148)$ 0.633Pain in the cervical spine/neck-1.2% $(N=855)$ 0.022Headache19.6% $(N=9)$ 32.6% $(N=2291)$ 0.085Pain in the chest2.2% $(N=1)$ 3% $(N=211)$ 1.000Pain in the hade-2.3% $(N=163)$ 0.581Pain in the lower limb-1.5% $(N=104)$ 0.829Pain in the lower limb-1.2% $(N=87)$ 0.930Pain in the lobw-1.2% $(N=84)$ 0.950Pain in the temporal region2.2% $(N=1)$ 0.1% $(N=9)$ 0.387Pain in the back-1.2% $(N=84)$ 0.950Pain in the back-1.2% $(N=12)$ 0.553Pain in the back-1.7% $(N=117)$ 0.763Pain in the thoracic spine-1.7% $(N=117)$ 0.763Pain in the tribs2.2% $(N=1)$ 2.8% $(N=194)$ 1.000Nausea2.2% $(N=1)$ 0.3% $(N=21)$ 0.343Vomiting8.7% $(N=4)$ 3.8% $(N=268)$ 0.183Visual disturbances-1.5% $(N=108)$ 0.380	Contusion of the face	2.2% (N = 1)	1.1% (N = 75)	0.993
Indefines of the occiput-1.2% $(N=2)$ 0.964Multisite injury2.2% $(N=1)$ 1.8% $(N=124)$ 1.000Palpable skull fracture6.5% $(N=3)$ 0.1% $(N=6)$ <0.001 Pain in the shoulder-3.9% $(N=275)$ 0.324Pain in the hip2.2% $(N=1)$ 1.2% $(N=83)$ 1.000Pain in the abdomen-2.1% $(N=148)$ 0.633Pain in the cervical spine/neck-12.2% $(N=855)$ 0.022 Headache19.6% $(N=9)$ 32.6% $(N=2291)$ 0.085Pain in the chest2.2% $(N=1)$ 3% $(N=163)$ 0.581Pain in the knee-2.3% $(N=163)$ 0.581Pain in the lower limb-1.5% $(N=104)$ 0.829Pain in the lower limb-1.2% $(N=87)$ 0.930Pain in the temporal region-1.2% $(N=87)$ 0.930Pain in the temporal region-1.2% $(N=104)$ 0.829Pain in the back-1.2% $(N=87)$ 0.930Pain in the temporal region-2.4% $(N=12)$ 0.419Pain in the thoracic spine-1.7% $(N=117)$ 0.763Pain in the hand-2.4% $(N=12)$ 0.475Pain in the thoracic spine-1.7% $(N=402)$ 0.475Fainting after injury2.2% $(N=1)$ 0.3% $(N=21)$ 0.343Nausea2.2% $(N=1)$ 0.3% $(N=21)$ 0.343Vomiting8.7% $(N=4)$ 3.8% $(N=20)$ 0.343Visual disturbances-1.5% $(N=108)$ 0.808	Tenderness of the cervical spine	—	1.4% (N = 98)	0.862
Multisle injury 2.2% (N = 1) 1.8% (N = 124) 1.000 Palpable skull fracture 6.5% (N = 3) 0.1% (N = 6) <0.001 Pain in the shoulder $ 3.9\%$ (N = 275) 0.324 Pain in the hip 2.2% (N = 1) 1.2% (N = 83) 1.000 Pain in the abdomen $ 2.1\%$ (N = 148) 0.633 Pain in the crevical spine/neck $ 12.2\%$ (N = 855) 0.022 Headache 19.6% (N = 9) 32.6% (N = 2291) 0.085 Pain in the chest 2.2% (N = 1) 3% (N = 211) 1.000 Pain in the lower $ 2.3\%$ (N = 163) 0.581 Pain in the lower limb $ 1.5\%$ (N = 104) 0.829 Pain in the lower limb $ 1.2\%$ (N = 87) 0.930 Pain in the lower limb $ 1.2\%$ (N = 87) 0.930 Pain in the lower legion 2.2% (N = 1) 0.1% (N = 9) 0.087 Pain in the back $ 1.2\%$ (N = 84) 0.950 Pain in the back $ 1.2\%$ (N = 84) 0.950 Pain in the occiput 2.2% (N = 1) 0.3% (N = 20) 0.323 Pain in the thoracic spine $ 1.7\%$ (N = 117) 0.763 Pain in the ribs 2.2% (N = 1) 2.3% (N = 12) 0.433 Vomiting after injury 2.2% (N = 1) 0.3% (N = 21) 0.343 Vomiting after injury 2.2% (N = 1) 0.3% (N = 21) 0.343 Vorinting after injury 2.2% (N = 1) 0.3% (N = 20) 0.435 Dizzness/balance	Multisite inium	2.20((N-1))	1.2% (N = 82)	0.964
Parable skull facture $(N=3)$ $(N=6)$ $(N=6)$ $(N=6)$ Pain in the shoulder- $3.9\% (N=275)$ 0.324 Pain in the hip $2.2\% (N=1)$ $1.2\% (N=83)$ 1.000 Pain in the abdomen- $2.1\% (N=148)$ 0.633 Pain in the cervical spine/neck- $12.2\% (N=855)$ 0.022 Headache $19.6\% (N=9)$ $32.6\% (N=2291)$ 0.085 Pain in the chest $2.2\% (N=1)$ $3\% (N=211)$ 1.000 Pain in the knee- $2.3\% (N=163)$ 0.581 Pain in the lower limb- $1.5\% (N=104)$ 0.829 Pain in the lower limb- $1.2\% (N=87)$ 0.930 Pain in the lower limb- $1.2\% (N=87)$ 0.930 Pain in the dow- $1.2\% (N=84)$ 0.950 Pain in the back- $1.2\% (N=84)$ 0.950 Pain in the occiput $2.2\% (N=1)$ $0.3\% (N=20)$ 0.323 Pain in the onciput $2.2\% (N=1)$ $0.3\% (N=20)$ 0.323 Pain in the toracic spine- $1.7\% (N=117)$ 0.763 Pain in the toracic spine- $1.7\% (N=112)$ 0.151 Nausea $2.2\% (N=1)$ $0.2\% (N=12)$ 0.475 Fainting after injury $2.2\% (N=1)$ $0.3\% (N=21)$ 0.343 Vomiting $8.7\% (N=4)$ $3.8\% (N=268)$ 0.183 Visual disturbances- $1.5\% (N=108)$ 0.808	Delmahla skull fra sture	2.2% (N = 1)	1.8% (N = 124)	1.000
Pain in the shoulder $ 3.5\% (N=273)$ 0.324 Pain in the shoulder $ 1.2\% (N=13)$ 1.000 Pain in the abdomen $ 2.1\% (N=148)$ 0.633 Pain in the cervical spine/neck $ 12.2\% (N=855)$ 0.022 Headache $19.6\% (N=9)$ $32.6\% (N=2291)$ 0.085 Pain in the chest $2.2\% (N=1)$ $3\% (N=211)$ 1.000 Pain in the knee $ 2.3\% (N=163)$ 0.581 Pain in the lower limb $ 1.5\% (N=104)$ 0.829 Pain in the lowscral region $ 3.2\% (N=224)$ 0.419 Pain in the elbow $ 1.2\% (N=87)$ 0.930 Pain in the temporal region $2.2\% (N=1)$ $0.1\% (N=9)$ 0.087 Pain in the back $ 1.2\% (N=84)$ 0.950 Pain in the occiput $2.2\% (N=1)$ $0.3\% (N=20)$ 0.323 Pain in the occiput $2.2\% (N=1)$ $0.3\% (N=20)$ 0.323 Pain in the hand $ 2.4\% (N=172)$ 0.553 Pain in the tribs $2.2\% (N=1)$ $0.2\% (N=10)$ 0.475 Fainting after injury $2.2\% (N=1)$ $0.2\% (N=12)$ 0.151 Sleepiness $2.2\% (N=1)$ $0.3\% (N=20)$ 0.343 Vomiting $8.7\% (N=4)$ $3.8\% (N=268)$ 0.183 Visual disturbances $ 1.5\% (N=108)$ 0.808	Paipable skull fracture	0.5% ($N = 3$)	0.1% (N = 0) 3.0% (N = 275)	< 0.001
Pain in the hip $2.2\% (N = 1)$ $1.2\% (N = 35)$ 1.003 Pain in the abdomen- $2.1\% (N = 148)$ 0.633 Pain in the crvical spine/neck- $12.2\% (N = 855)$ 0.022 Headache $19.6\% (N = 9)$ $32.6\% (N = 2291)$ 0.085 Pain in the chest $2.2\% (N = 1)$ $3\% (N = 211)$ 1.000 Pain in the knee- $2.3\% (N = 163)$ 0.581 Pain in the lower limb- $1.5\% (N = 104)$ 0.829 Pain in the lower limb- $1.2\% (N = 87)$ 0.930 Pain in the temporal region $2.2\% (N = 1)$ $0.1\% (N = 9)$ 0.087 Pain in the temporal region $2.2\% (N = 1)$ $0.1\% (N = 9)$ 0.87 Pain in the back- $1.2\% (N = 84)$ 0.950 Pain in the occiput $2.2\% (N = 1)$ $0.3\% (N = 20)$ 0.323 Pain in the back- $1.7\% (N = 117)$ 0.763 Pain in the thoracic spine- $1.7\% (N = 117)$ 0.763 Pain in the ribs $2.2\% (N = 1)$ $2.8\% (N = 194)$ 1.000 Nausea $2.2\% (N = 1)$ $0.3\% (N = 2)$ 0.475 Fainting after injury $2.2\% (N = 1)$ $0.3\% (N = 21)$ 0.343 Vomiting $8.7\% (N = 4)$ $3.8\% (N = 268)$ 0.183 Visual disturbances- $1.5\% (N = 108)$ 0.808	Pain in the shoulder	2.29((N-1))	3.9% (N = 2/3) 1.20% (N = 82)	0.324
Pain in the abdother $ 2.1\%$ (N = 143) 0.053 Pain in the cervical spine/neck $ 12.2\%$ (N = 855) 0.022 Headache19.6% (N=9) 32.6% (N = 2291) 0.085 Pain in the chest 2.2% (N = 1) 3% (N = 211) 1.000 Pain in the lower limb $ 2.3\%$ (N = 163) 0.581 Pain in the lower limb $ 1.5\%$ (N = 104) 0.829 Pain in the lower limb $ 1.5\%$ (N = 104) 0.829 Pain in the lower limb $ 1.2\%$ (N = 87) 0.930 Pain in the elbow $ 1.2\%$ (N = 87) 0.930 Pain in the temporal region 2.2% (N = 1) 0.1% (N = 84) 0.950 Pain in the back $ 1.2\%$ (N = 84) 0.950 Pain in the back $ 1.2\%$ (N = 172) 0.553 Pain in the back $ 1.2\%$ (N = 117) 0.763 Pain in the thoracic spine $ 1.7\%$ (N = 117) 0.763 Pain in the ribs 2.2% (N = 1) 2.8% (N = 194) 1.000 Nausea 2.2% (N = 1) 0.3% (N = 21) 0.443 Vomiting after injury 2.2% (N = 1) 0.3% (N = 21) 0.343 Vomiting 8.7% (N = 4) 3.8% (N = 268) 0.183 Visual disturbances $ 1.5\%$ (N = 108) 0.808	Pain in the hip	2.2% ($N = 1$)	1.2% (N = 83) 2.1% (N = 1.48)	1.000
Pain in the tervical spine/neck $ 12.2\% (N = 353)$ 0.022 Headache19.6% $(N = 9)$ $32.6\% (N = 2291)$ 0.085 Pain in the chest $2.2\% (N = 1)$ $3\% (N = 211)$ 1.000 Pain in the lower limb $ 2.3\% (N = 163)$ 0.829 Pain in the lower limb $ 1.5\% (N = 104)$ 0.829 Pain in the lower limb $ 1.2\% (N = 87)$ 0.930 Pain in the elbow $ 1.2\% (N = 87)$ 0.930 Pain in the temporal region $2.2\% (N = 1)$ $0.1\% (N = 9)$ 0.087 Pain in the back $ 1.2\% (N = 84)$ 0.950 Pain in the back $ 1.2\% (N = 102)$ 0.323 Pain in the back $ 1.2\% (N = 117)$ 0.763 Pain in the hand $ 2.4\% (N = 172)$ 0.553 Pain in the thoracic spine $ 1.7\% (N = 117)$ 0.763 Pain in the ribs $2.2\% (N = 1)$ $2.8\% (N = 194)$ 1.000 Nausea $2.2\% (N = 1)$ $0.3\% (N = 20)$ 0.475 Fainting after injury $2.2\% (N = 1)$ $0.3\% (N = 21)$ 0.475 Sleepiness $2.2\% (N = 1)$ $0.3\% (N = 21)$ 0.343 Vomiting $8.7\% (N = 4)$ $3.8\% (N = 268)$ 0.183 Visual disturbances $ 1.5\% (N = 108)$ 0.808 Dizziness/balance disorders $ 1.5\% (N = 537)$ 0.576	Pain in the convict spine/pack	—	2.1% (N = 148)	0.033
Pictuation19.0% $(N = 2)$ 32.0% $(N = 2231)$ 0.083Pain in the chest2.2% $(N = 1)$ 3% $(N = 2231)$ 1.000Pain in the knee-2.3% $(N = 163)$ 0.581Pain in the lower limb-1.5% $(N = 104)$ 0.829Pain in the lumbosacral region-3.2% $(N = 224)$ 0.419Pain in the elbow-1.2% $(N = 87)$ 0.930Pain in the temporal region2.2% $(N = 1)$ 0.1% $(N = 9)$ 0.087Pain in the back-1.2% $(N = 84)$ 0.950Pain in the occiput2.2% $(N = 1)$ 0.3% $(N = 20)$ 0.323Pain in the hand-2.4% $(N = 172)$ 0.553Pain in the thoracic spine-1.7% $(N = 117)$ 0.763Pain in the ribs2.2% $(N = 1)$ 2.8% $(N = 194)$ 1.000Nausea2.2% $(N = 1)$ 0.2% $(N = 12)$ 0.151Sleepiness2.2% $(N = 1)$ 0.3% $(N = 21)$ 0.343Vomiting8.7% $(N = 4)$ 3.8% $(N = 268)$ 0.183Visual disturbances-1.5% $(N = 108)$ 0.808Dizzines/balance disorders4.3% $(N = 2)$ 7.6% $(N = 537)$ 0.576	Pain in the cervical spine/neck	$\frac{-}{10.60\% (N-0)}$	12.2% (N = 655) 22.6% (N = 2201)	0.022
Pain in the clest $2.2\% (N=1)$ $3\% (N=211)$ 1.000 Pain in the knee- $2.3\% (N=163)$ 0.581 Pain in the lower limb- $1.5\% (N=104)$ 0.829 Pain in the lumbosacral region- $3.2\% (N=224)$ 0.419 Pain in the elbow- $1.2\% (N=87)$ 0.930 Pain in the temporal region $2.2\% (N=1)$ $0.1\% (N=9)$ 0.087 Pain in the back- $1.2\% (N=84)$ 0.950 Pain in the occiput $2.2\% (N=1)$ $0.3\% (N=20)$ 0.323 Pain in the occiput $2.2\% (N=1)$ $0.3\% (N=10)$ 0.323 Pain in the thoracic spine- $1.7\% (N=117)$ 0.763 Pain in the ribs $2.2\% (N=1)$ $2.8\% (N=194)$ 1.000 Nausea $2.2\% (N=1)$ $0.2\% (N=402)$ 0.475 Fainting after injury $2.2\% (N=1)$ $0.3\% (N=21)$ 0.343 Vomiting $8.7\% (N=4)$ $3.8\% (N=268)$ 0.183 Visual disturbances- $1.5\% (N=108)$ 0.808 Dizziness/balance disorders $4.3\% (N=2)$ $7.6\% (N=537)$ 0.576	Dein in the cheet	19.0% (N = 9) 2.2% (N = 1)	32.0% (N = 2291)	1.000
Pain in the knee $ 2.3\% (N - 163)$ 0.381 Pain in the lower limb $ 1.5\% (N = 104)$ 0.829 Pain in the lumbosacral region $ 3.2\% (N = 224)$ 0.419 Pain in the elbow $ 1.2\% (N = 87)$ 0.930 Pain in the temporal region $2.2\% (N = 1)$ $0.1\% (N = 9)$ 0.087 Pain in the back $ 1.2\% (N = 84)$ 0.950 Pain in the occiput $2.2\% (N = 1)$ $0.3\% (N = 20)$ 0.323 Pain in the back $ 2.4\% (N = 172)$ 0.553 Pain in the thoracic spine $ 1.7\% (N = 117)$ 0.763 Pain in the thoracic spine $ 1.7\% (N = 102)$ 0.475 Pain in the tibs $2.2\% (N = 1)$ $2.8\% (N = 194)$ 1.000 Nausea $2.2\% (N = 1)$ $0.2\% (N = 12)$ 0.475 Fainting after injury $2.2\% (N = 1)$ $0.2\% (N = 12)$ 0.343 Vomiting $8.7\% (N = 4)$ $3.8\% (N = 268)$ 0.183 Visual disturbances $ 1.5\% (N = 108)$ 0.808 Dizziness/balance disorders $4.3\% (N = 2)$ $7.6\% (N = 537)$ 0.576	Pain in the knee	2.2% ($N = 1$)	3% (N = 211) 2.3% (N = 163)	1.000
Pain in the lower mild $ 1.5\%$ $(N = 104)$ 0.329 Pain in the lumbosacral region $ 3.2\%$ $(N = 224)$ 0.419 Pain in the elbow $ 1.2\%$ $(N = 87)$ 0.930 Pain in the temporal region 2.2% $(N = 1)$ 0.1% $(N = 9)$ 0.087 Pain in the back $ 1.2\%$ $(N = 84)$ 0.950 Pain in the occiput 2.2% $(N = 1)$ 0.3% $(N = 20)$ 0.323 Pain in the hand $ 2.4\%$ $(N = 172)$ 0.553 Pain in the thoracic spine $ 1.7\%$ $(N = 117)$ 0.763 Pain in the ribs 2.2% $(N = 1)$ 2.8% $(N = 194)$ 1.000 Nausea 2.2% $(N = 1)$ 0.2% $(N = 402)$ 0.475 Fainting after injury 2.2% $(N = 1)$ 0.3% $(N = 21)$ 0.343 Vomiting 8.7% $(N = 4)$ 3.8% $(N = 268)$ 0.183 Visual disturbances $ 1.5\%$ $(N = 108)$ 0.808 Dizziness/balance disorders 4.3% $(N = 2)$ 7.6% $(N = 537)$ 0.576	Pain in the lower limb		2.5% (N - 103) 1.5% (N - 104)	0.331
Pain in the full boactal region $ 5.2\% (N = 224)$ 0.415 Pain in the elbow $ 1.2\% (N = 87)$ 0.930 Pain in the temporal region $2.2\% (N = 1)$ $0.1\% (N = 9)$ 0.087 Pain in the back $ 1.2\% (N = 84)$ 0.950 Pain in the occiput $2.2\% (N = 1)$ $0.3\% (N = 20)$ 0.323 Pain in the hand $ 2.4\% (N = 172)$ 0.553 Pain in the thoracic spine $ 1.7\% (N = 117)$ 0.763 Pain in the ribs $2.2\% (N = 1)$ $2.8\% (N = 194)$ 1.000 Nausea $2.2\% (N = 1)$ $5.7\% (N = 402)$ 0.475 Fainting after injury $2.2\% (N = 1)$ $0.3\% (N = 21)$ 0.343 Vomiting $8.7\% (N = 4)$ $3.8\% (N = 268)$ 0.183 Visual disturbances $ 1.5\% (N = 108)$ 0.808 Dizziness/balance disorders $4.3\% (N = 2)$ $7.6\% (N = 537)$ 0.576	Pain in the lumbosacral region		1.5% (N - 104) 3.2% (N - 224)	0.829
Pain in the endow $ 1.2\% (N-67)$ 0.930 Pain in the temporal region $2.2\% (N=1)$ $0.1\% (N=9)$ 0.087 Pain in the back $ 1.2\% (N=84)$ 0.950 Pain in the occiput $2.2\% (N=1)$ $0.3\% (N=20)$ 0.323 Pain in the hand $ 2.4\% (N=172)$ 0.553 Pain in the thoracic spine $ 1.7\% (N=117)$ 0.763 Pain in the ribs $2.2\% (N=1)$ $2.8\% (N=194)$ 1.000 Nausea $2.2\% (N=1)$ $5.7\% (N=402)$ 0.475 Fainting after injury $2.2\% (N=1)$ $0.3\% (N=21)$ 0.343 Vomiting $8.7\% (N=4)$ $3.8\% (N=268)$ 0.183 Visual disturbances $ 1.5\% (N=108)$ 0.808 Dizziness/balance disorders $4.3\% (N=2)$ $7.6\% (N=537)$ 0.576	Pain in the albow		3.270 (N - 224) 1 20% (N - 87)	0.419
Pain in the temporal region $2.2\% (N = 1)$ $0.1\% (N = 9)$ 0.087 Pain in the back- $1.2\% (N = 84)$ 0.950 Pain in the occiput $2.2\% (N = 1)$ $0.3\% (N = 20)$ 0.323 Pain in the hand- $2.4\% (N = 172)$ 0.553 Pain in the thoracic spine- $1.7\% (N = 117)$ 0.763 Pain in the ribs $2.2\% (N = 1)$ $2.8\% (N = 194)$ 1.000 Nausea $2.2\% (N = 1)$ $5.7\% (N = 402)$ 0.475 Fainting after injury $2.2\% (N = 1)$ $0.3\% (N = 21)$ 0.343 Vomiting $8.7\% (N = 4)$ $3.8\% (N = 268)$ 0.183 Visual disturbances- $1.5\% (N = 108)$ 0.808 Dizziness/balance disorders $4.3\% (N = 2)$ $7.6\% (N = 537)$ 0.576	Pain in the temporal region	2.2% (N-1)	(1.270 (1V - 87)) 0.1% (N - 9)	0.930
Pain in the back $ 1.2.\% (N = 04)$ 0.53% Pain in the occiput $2.2\% (N = 1)$ $0.3\% (N = 20)$ 0.323 Pain in the hand $ 2.4\% (N = 172)$ 0.553 Pain in the thoracic spine $ 1.7\% (N = 117)$ 0.763 Pain in the ribs $2.2\% (N = 1)$ $2.8\% (N = 194)$ 1.000 Nausea $2.2\% (N = 1)$ $5.7\% (N = 402)$ 0.475 Fainting after injury $2.2\% (N = 1)$ $0.3\% (N = 21)$ 0.343 Vomiting $8.7\% (N = 4)$ $3.8\% (N = 268)$ 0.183 Visual disturbances $ 1.5\% (N = 108)$ 0.808 Dizziness/balance disorders $4.3\% (N = 2)$ $7.6\% (N = 537)$ 0.576	Pain in the back	2.270 ($N = 1$)	1.2% (N-84)	0.087
Pain in the occipat $2.2 \times (N = 1)$ $0.5 \times (N = 20)$ 0.525 Pain in the hand- $2.4\% (N = 172)$ 0.553 Pain in the thoracic spine- $1.7\% (N = 117)$ 0.763 Pain in the ribs $2.2\% (N = 1)$ $2.8\% (N = 194)$ 1.000 Nausea $2.2\% (N = 1)$ $5.7\% (N = 402)$ 0.475 Fainting after injury $2.2\% (N = 1)$ $0.2\% (N = 12)$ 0.151 Sleepiness $2.2\% (N = 1)$ $0.3\% (N = 21)$ 0.343 Vomiting $8.7\% (N = 4)$ $3.8\% (N = 268)$ 0.183 Visual disturbances- $1.5\% (N = 108)$ 0.808 Dizziness/balance disorders $4.3\% (N = 2)$ $7.6\% (N = 537)$ 0.576	Pain in the occiput	2.2% (N-1)	0.3% (N-20)	0.950
Pain in the hand 2.4% $(N = 172)$ 0.533 Pain in the thoracic spine $ 1.7\%$ $(N = 172)$ 0.763 Pain in the ribs 2.2% $(N = 1)$ 2.8% $(N = 117)$ 0.763 Nausea 2.2% $(N = 1)$ 2.8% $(N = 194)$ 1.000 Nausea 2.2% $(N = 1)$ 5.7% $(N = 402)$ 0.475 Fainting after injury 2.2% $(N = 1)$ 0.2% $(N = 12)$ 0.151 Sleepiness 2.2% $(N = 1)$ 0.3% $(N = 21)$ 0.343 Vomiting 8.7% $(N = 4)$ 3.8% $(N = 268)$ 0.183 Visual disturbances $ 1.5\%$ $(N = 108)$ 0.808 Dizziness/balance disorders 4.3% $(N = 2)$ 7.6% $(N = 537)$ 0.576	Pain in the hand	2.270 (11-1)	2.4% (N-172)	0.525
Pain in the ribs 2.2% $(N=1)$ 2.8% $(N=117)$ 0.703 Pain in the ribs 2.2% $(N=1)$ 2.8% $(N=194)$ 1.000 Nausea 2.2% $(N=1)$ 5.7% $(N=402)$ 0.475 Fainting after injury 2.2% $(N=1)$ 0.2% $(N=12)$ 0.151 Sleepiness 2.2% $(N=1)$ 0.3% $(N=21)$ 0.343 Vomiting 8.7% $(N=4)$ 3.8% $(N=268)$ 0.183 Visual disturbances- 1.5% $(N=108)$ 0.808 Dizziness/balance disorders 4.3% $(N=2)$ 7.6% $(N=537)$ 0.576	Pain in the thoracic spine		1.7% (N-117)	0.555
Nausea 2.2% $(N=1)$ 2.5% $(N=194)$ 1.000 Nausea 2.2% $(N=1)$ 5.7% $(N=402)$ 0.475 Fainting after injury 2.2% $(N=1)$ 0.2% $(N=12)$ 0.151 Sleepiness 2.2% $(N=1)$ 0.3% $(N=21)$ 0.343 Vomiting 8.7% $(N=4)$ 3.8% $(N=268)$ 0.183 Visual disturbances- 1.5% $(N=108)$ 0.808 Dizziness/balance disorders 4.3% $(N=2)$ 7.6% $(N=537)$ 0.576	Pain in the ribe	2.2% (N-1)	2.8% (N = 194)	1 000
Fainting after injury 2.2% (N = 1) 3.7% (N = 402) 0.473 Fainting after injury 2.2% (N = 1) 0.2% (N = 12) 0.151 Sleepiness 2.2% (N = 1) 0.3% (N = 21) 0.343 Vomiting 8.7% (N = 4) 3.8% (N = 268) 0.183 Visual disturbances- 1.5% (N = 108) 0.808 Dizziness/balance disorders 4.3% (N = 2) 7.6% (N = 537) 0.576		2.270 (N-1) 2.2% (N-1)	5.0% (N = 402)	0.475
Valuating after injury $2.2\% (N=1)$ $0.2\% (N=12)$ 0.131 Sleepiness $2.2\% (N=1)$ $0.3\% (N=21)$ 0.343 Vomiting $8.7\% (N=4)$ $3.8\% (N=268)$ 0.183 Visual disturbances- $1.5\% (N=108)$ 0.808 Dizziness/balance disorders $4.3\% (N=2)$ $7.6\% (N=537)$ 0.576	Fainting after injury	2.2% (N = 1) 2.2% (N = 1)	0.2% (N = 12)	0.151
Vomiting 8.7% (N=4) 0.5% (N=21) 0.5% Visual disturbances- 1.5% (N=108) 0.808 Dizziness/balance disorders 4.3% (N=2) 7.6% (N=537) 0.576	Sleeniness	2.2% (N = 1) 2.2% (N = 1)	0.2% (N = 21)	0 343
Visual disturbances $ 1.5\%$ (N=108) 0.808 Dizziness/balance disorders 4.3% (N=2) 7.6% (N=537) 0.576	Vomiting	8.2% (N=4)	3.8% (N = 268)	0.545
Dizziness/balance disorders 4.3% (N=2) 7.6% (N=537) 0.576	Visual disturbances		1.5% (N = 108)	0.105
	Dizziness/balance disorders	4.3% (N=2)	7.6% (N = 537)	0.576

TABLE 5: Detailed summary of signs and symptoms in relation to patient classification.

The bold values indicate significance.

or maintaining normal pressure, are not performed correctly despite explicit guidelines [15]. In many countries, farreaching attempts to prevent secondary brain injury are undertaken, such as smooth driving on the way to the hospital due to the likely negative impact of braking on intracranial pressure [16].

3.1. Future Research and Limitations. Our study on "Prehospital predictors for urgent neurosurgical intervention in the head trauma patient" yielded several intriguing findings. Confirmation of these findings through prospective studies conducted by other centres could potentially lead to the implementation of early response systems during the anamnesis collection stage. With the aid of computer systems, we can access information on the mechanism of injury, external injuries, and the patients' age, even at the dispatcher stage, which allows the neurosurgical facilities to be available when the patient arrives in the hospital. We do not believe the addition or introduction of a new scale or tool would benefit these patients. Our model demonstrated the feasibility of establishing an out-of-hospital early warning system.

The first limitation is that this is a retrospective study. The environment in the emergency department is one typically characterized by urgency, and so, medical personnel may not be able to identify all signs and symptoms of trauma during the data collection stage, especially during intensive and life-threatening situations, where time constraints would pose a threat to the patient's life. Although it is a retrospective study, we thoroughly reviewed each patient's record to ensure that no signs of trauma were missed. All data collected including ambulance cards, ED cards, and all neurosurgical records were carefully checked not to miss any signs of trauma, that could impact the results of our study, but of course, it can have some biases. Another limitation of this study was that it did not account for potential confounding variables that may have influenced the outcome, such as the severity of the trauma, comorbidities, or medications taken by the patient. Definitely, the lack of data on the medication taken is an important limitation of the study, and the intake of anticoagulants can certainly affect the prognosis. Undoubtedly, a significant limitation of the study stems from the inadequate access to data concerning the use of medications (specifically anticoagulants), chronic illnesses, surgical procedures, and the presence of cancer in the participants' medical histories.. However, from our experience in prehospital medicine, we often do not know the list of medications taken by unconscious patients. Are we able to determine the severity of the injury (how many stairs the patient fell down) of an unconscious patient found by his family at home? We are almost certain that at the prehospital and early-hospital level, it is necessary to simplify similar examinations as much as possible and the mechanism of injury and visible injuries must be enough for us to assess the patient because the rest can only be guessed at. Furthermore, this study was

4. Conclusion

used in our centres.

TBI remains a condition that devastates the lives of patients and their families. Effective treatments for TBI are disproportionately poorly explored. This study indicates many statistically significant demographic, mechanism of trauma, and abnormal examination findings in head trauma patients, which may suggest that transfer to a facility with a neurosurgery department is required as early as the prehospital care stage. While patients admitted to neurosurgery departments constitute a small percentage of TBI patients, this group is characterized by high mortality and their prognosis for normal performance status upon discharge is poor.

serves 60,000 patients/year. Moreover, the treatment strat-

egies used in this study reflect the convention and tendencies

Abbreviations

- CT: Computed tomography
- EBM: Evidenced-based medicine
- ED: Emergency department
- EMS: Emergency medical services
- GCS: Glasgow Coma Scale
- NS: Neurosurgery
- RTC: Road traffic collision
- TBI: Traumatic brain injury.

Data Availability

The data used to support the findings of the study are available from the author upon request.

Ethical Approval

The study obtained the approval of the local ethics committee.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

J.N. designed and directed the project; A.D., J.N., M.K., E.N., A.L., and A.R. made the analysis of all head trauma patients; A.Ł., P.S., and J.N contributed to the interpretation of the results; and J.N. wrote the article.

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