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Epidemiology of Road Traffic Injuries Treated in a Large Romanian Emergency Department in Tîrgu-Mureş Between 2009 and 2010

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Abstract

Objective—Road traffic injuries are one of the leading causes of preventable unintentional injury. The European Injury Database estimated that in European Union (EU)-27 countries, road traffic injuries account for 10% of all injuries treated in the emergency department or admitted to the hospital, accounting for 4.2 million victims each year. We examined the characteristics and outcomes of road traffic injuries treated in a large emergency department in Romania by different types of road users.

Methods—Secondary data analysis was conducted on a sample of patients who suffered a transport-related injury and received care at the Emergency Department of Mures County Emergency Hospital in Romania. Data was collected by 2 trained emergency physicians between March 2009 and July 2010, as part of the European Injury Database project. Information about demographics, mechanism, nature, place of occurrence, and activity of injury; treatment and follow-up; and mode of transport were described for 5 different categories of road users: animal-drawn vehicle (operator and passenger), passenger car (driver and passenger), motorcycle (driver and passenger), bicyclist, and pedestrian.

Results—A total of 2,782 patients were treated in the emergency department, of which 718 (25.8%) were road traffic injuries. The male-to-female ratio was 2:1. The highest percentage of patients were injured in passenger cars (49%), followed by motorcycles (16.7%). For both types of road users, the majority of patients were between the ages of 18 and 29. Pedestrian injuries accounted for 14.6%, of which a third were children up to the age of 17 and 40% were adults and elderly over the age of 50. The majority of patients were injured due to contact with a moving object (48.1%), followed by contact with static object (23.5%), then falling, stumbling, jumping,

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or being pushed (19.6%). Contusion and bruises (54.9%) were the most common diagnosis, followed by fractures (20.1%) and open wounds (10.2%) for all road user categories. The most common part of the body injured for all road user categories was the head region (42.3%). Of the 34.9% patients treated and admitted to the hospital, 30% had a length of stay between 4 and 7 days.

Conclusions—Understanding the extent, nature, and characteristics of road traffic injuries may help to identify vulnerable road users in specific settings and implement the most effective prevention strategies targeting the most affected populations.

Keywords

injuries; traffic accidents; patients; public health surveillance; road safety

Background and Aims

Road traffic injuries (RTIs) represent a major threat to public health. Currently, RTIs are the eighth leading cause of death globally, the leading cause of death among people aged 15–29, and estimated to become the fifth leading cause of death for all age categories by 2030 (World Health Organization [WHO] 2013). Each year, more than one million people are killed on the world’s roads (WHO 2009, 2013), and between 20 and 50 million—20 for every fatality—suffer a nonfatal injury as a result of road traffic crashes (WHO 2013; WHO Regional Office for Europe 2009). In the European Union (EU)-27, approximately 31,000 people in 2010 were killed in road traffic crashes (Jost et al. 2011). Within the European Region, a disproportionate burden lies in low-income and middle-income countries, where the death rates are twice as high as in high-income countries (WHO 2013). Romania is one such country, and as a country with a quickly developing economy and rapidly growing road infrastructure, now is an ideal time to promote road traffic safety interventions.

RTIs affect safety and quality of life of all age groups and categories of road users, with youth and the elderly, as well as pedestrians and bicyclists, being particularly vulnerable (Ameratunga et al. 2006; WHO 2009, 2013). In low-income and middle-income countries, pedestrians and cyclists count for over a third of all road traffic deaths (WHO 2013). In Romania, the risk of being killed in road traffic per kilometer ridden is 30 times higher than in Norway, one of the best performing countries (Jost et al. 2011). According to the Road Safety Performance Index (PIN) report from 2012, Romania is the only country included in the study in which the number of young people killed on the roads increased since 2001 (Jost et al. 2012).

These injuries and deaths have a great social and economic impact. RTIs put a significant financial burden on individuals and families, including the cost of prolonged medical care and adverse social, physical, and psychological effects (Mohan et al. 2006) affecting road users differently, putting a higher burden on pedestrians and motorcyclists (Mayou and Bryant 2003). It is estimated that in low-income and middle-income countries including Romania, RTIs cost between 1 and 2% of the gross national product (WHO 2013). Accurate data are needed in order to understand the extent and nature of injuries (Christoffel and Gallagher 2006), but Romania fails to provide an inclusive nationwide surveillance system for RTI deaths that allows describing the incidence, nature, and characteristics of these injuries.

This study builds on the data collected through the pilot initiative of the European Injury Database (IDB) in Romania on developing one common hospital-based injury data collection system in all EU-member states (Kisser et al. 2009). This analysis focuses on RTIs with the objective of describing their characteristics and outcomes taking into consideration 5 different road user categories: animal-drawn vehicle (operator and passenger), passenger car (driver and passenger), motorcycle (driver and passenger), bicyclist, and pedestrian.

Patients and Methods

Data and Study Design

This prospective study was conducted as part of the EU Injury Database (EU-IDB), a project implemented in the Emergency Department of Mures County Emergency Hospital, Tirgu-Mures, Romania (Consumer Safety Institute 2005). The Emergency Department serves Mures County with a population of 580,228 inhabitants registered in 2010 (Mures County Authority for Statistics 2011), but patients from neighboring counties may receive treatment as well. Between March 2009 and July 2010, 2,782 patients who suffered an injury event and received care at the Emergency Department of Mures County Emergency Hospital, Tirgu-Mures, were registered in the EU-IDB surveillance system; the study sample is representative only for the county. Of the 2,782 patients, 764 (26.6%) were recorded as transport injury events, and data for the transport module were collected. A total of 32 (4.2%) cases were excluded from this analysis because we could not identify the mode of transport and the role of the injured person in the event, and 14 (1.8%) cases were excluded because the mode of transport indicated that the crash did not occur on a public roadway (e.g., all-terrain vehicle, railway train, vehicle used in agriculture). Thus, the total sample population included 718 (25.8%) patients treated for roadway injuries.

Study Variables

The unit of our analysis was the injured individual, focusing on differences between road users, which was constructed using the role of the injured person as coded in the EU-IDB surveillance system. Trauma reports were collected using the EU-IDB data coding and data collection standards by 2 emergency physicians (Gal et al. 2012). Data included 18 core variables, a narrative, and 5 specific modules of data collected for subsets of injured individuals: hospital admissions, intentional self-harm, sport, transport, and violence (Consumer Safety Institute 2009; Gal et al. 2012). Information about demographics, mechanism, place of occurrence, and activity when injured were used from the 18 core variables to identify the characteristics of road traffic injuries. Nature of injury, a core variable, and 2 of the specific modules, admissions and transport, were used to collect variables that described the diagnosis and treatment of patients by specific road user category. The following categories were selected: animal-drawn vehicle (operator and passenger), passenger car (driver and passenger), motorcycle (driver and passenger), bicyclist, and pedestrian. Passenger car was defined as light transport vehicles (non-trucks) with 4 or more wheels and motorcycles included any motorized 2-wheeled vehicle. This study used the following variables of interest, which were collected as part of the transport module: mode of transport, role of injured person, and as part of the counterpart and the admissions module: the treatment and follow-up of the patient, to describe the characteristics and outcomes of RTIs.

Statistical Analysis

Descriptive statistics to compare patients as different road users in the road traffic injury event were calculated and compared using χ^2 tests for categorical variables, using SPSS (SPSS Inc., Chicago, IL) statistical software version 17.0.

Results

Characteristics of Road Traffic Injury Patients

Among the 718 patients treated for trauma as a consequence of road traffic events, 49% (n = 352) were drivers and passengers of light transport vehicles with 4 or more wheels, followed by drivers and passengers of motorized 2-wheeled vehicles (n = 120; 16.7%) and pedestrians (n = 105; 14.6%). Males comprised more than two thirds of the patients (n = 480, 66.9%) and females about a third (n = 238, 33.1%; Table 1).

The sex distribution of patients injured as pedestrians was almost equal: 54.3% (n = 57) were males and 45.7% (n = 48) were females, although males comprised a far higher proportion of injured bicyclists, motorcycle occupants, and operators and passengers of animal-drawn vehicles. The sex distribution across all road user categories was statistically significant (P < .001). The highest proportion of patients treated for RTIs was young adults aged 18–29 (n = 219; 30.5%), followed by adults aged 30–39 (n = 120; 16.7%) and elderly aged 60+ (n = 93; 13.0%). Among young adults, 60.2% (n = 132) were injured as drivers and passengers of light transport vehicles with 4 or more wheels and 25.6% (n = 56) as drivers and passengers of motorized 2-wheeled vehicles. Children up to the age of 17 comprised 33.3% (n = 35) of pedestrian injuries and adults and elderly over age 50 comprised 40% (n = 42). The age distribution for patients injured as pedestrians was similar to the distribution of patients injured as bicyclists, although when we look at the other road user categories, the age distribution varies.

The mechanism of injury differed by road users (Table 2). Blunt force trauma from contact with a moving object was the primary mechanism for 48.1% of all road traffic injuries, followed by contact with a static object (23.5%). Falling, stumbling, jumping, or being pushed caused one in 5 injuries (19.6%). The majority of pedestrians were injured due to contact with a moving object (n = 90; 85.7%), whereas the mechanism of injury for bicyclists (n = 50; 56.8%), motorcycle occupants (n = 50; 41.7%), and animal-drawn vehicle occupants (n = 30; 76.9%) was recorded as a fall from the vehicle (e.g., bicycle, motorcycle, animal-drawn carriage).

The majority of injuries occurred on streets and highways (n = 513, 71.4%), followed by countryside areas (n = 21; 2.9%) and transport areas (n = 17; 2.4%). For pedestrians injured on streets and highways (n = 53), we looked at the recorded narrative to identify whether they were on a crosswalk or outside the crossing. Information was available for 45 of the cases (84.9%), out of which 22 of the pedestrians were injured on the crossing, 9 outside the crossing, and 6 while walking alongside the road. In terms of activity when injured, 12.5% (n = 89) of the patients were injured during paid work activities and 19.0% (n = 135) during unpaid work activities.

Road users differed in their distributions of type of injury, body region injured, and treatment/follow-up (all P < .001).

Contusions and bruises were the most frequent injury suffered by all road users (n = 394, 54.9%), followed by fractures and open wounds (Table 3). A total of 144 patients (20.1%) had suffered a fracture and 73 patients (10.2%) had an open wound. Contusions (42.9%), fractures (26.7%), and open wounds (10.5%) were the most common injuries for pedestrians. Half of the bicyclists had suffered a contusion (n = 44, 50.0%), followed by fractures (n = 15, 17.0%) and open wounds (n = 14, 15.9%). Traumatic brain injuries consisting of concussions (1.0% of all injuries) and other specified brain injuries (0.7%) were relatively low and were most common among pedestrians, motorcyclists, and motor vehicle occupants. The proportion of injuries to the head and trunk was fairly consistent by road user categories and accounted for fewer than 5% of all injuries. The proportion of upper and lower extremities, however, differed by road user. Pedestrians, bicyclists, and motorcyclists had more injuries to the lower extremities when compared to upper extremities, whereas passenger car occupants and animal-drawn vehicle occupants had more injuries to the upper extremities than the lower extremities. Injuries to the head region accounted for almost half of injuries to bicyclists (n = 41; 46.6%), passenger car occupants (n = 167; 47.9%) and operators and passengers of animal-drawn vehicles (n = 18; 46.2%).

More than 80% of patients who suffered an RTI required treatment from the emergency department and other medical specialties; 49.9% of the patients were treated and referred for further treatment, and 34.9% of patients were treated and admitted to the hospital. Of those admitted to the Tirgu-Mures Hospital, 30% had a length of stay between 4 and 7 days, and 49.7% spent more than 8 days in the hospital. Patients with RTIs had comparable hospital lengths of stay when compared with EU-IDB patients who suffered falls (49.1%; N = 86 stayed more than 8 days in the hospital) but had longer hospital stays than patients with unintentional struck-by injuries (33.3%; N = 25) or poisoning (23.8%; N = 5).

Discussion

Our study describes the characteristics and outcomes of RTIs by road users, as defined by the EU-IDB. The need for care and the characteristics of injuries were different when compared by road user categories. Pedestrians, bicyclists, and motorcyclists were disproportionately affected by RTIs, requiring more medical treatment than occupants of passenger cars. These results are consistent with prior research (Haddak et al. 2014; Hatamabadi et al. 2012). Specific causes of bicyclists' and motorcyclists' RTIs have not been identified in Romania, but infrastructures such as bicycle lanes and policies such as mandatory helmet laws that have been associated with reduced RTIs in other countries are not yet present in Romania. In 2010, 37% of all road traffic deaths were attributed to pedestrians (WHO 2013). We found that pedestrians frequently suffered nonfatal injuries, as pedestrians comprised nearly 15% of the sample. More than half of those with a known location were injured either on the crossing ($n = 22$) or outside the crossing ($n = 9$) on a nonintersection segment of the street. The risk for crosswalk collisions has been previously reported (e.g., Kraus et al. 1996; Rivara et al. 1989), which contributed much of this excess to increased pedestrian exposure at crosswalks. However, preventive action should be focused on prioritizing the pedestrian right-of-way in the roadway as well as reduced illegal pedestrian crossing. Prior research in Romania found that on local roads pedestrian errors (e.g. jaywalking) were common, whereas on national roads vehicle errors (e.g., speeding) were common (Hamann et al. 2014).

Half of the total number of RTIs were occupants of passenger cars, one third of whom were young adults aged 18 to 29. Children, whose exposure as motor vehicle occupants is increasing, accounted for 13.1% of these injuries. Romania has few roadway safety laws, and existing laws are poorly promoted and enforced; there is a critical need for improved passenger restraint laws for all ages and occupant position, law enforcement, and road safety campaigns to educate both drivers and passengers. In 2008, the effectiveness of the enforcement of child restrain laws in Romania was rated as 3 out of 10 in the European status report on road safety (WHO 2009), and although wearing a seat belt is mandatory for all car passengers, there is no national estimate of the proportion of seat belt usage for back seat passengers. The estimates for drivers and front seat passengers is below 50% (WHO 2013).

Of all injuries treated in the Emergency Department of Mures County Emergency Hospital, one out of 4 were related to road traffic. The average hospital stay was between 4 and 7 days among the admitted patients, which was similar to those reported by other trauma surveillance systems in Brazil (Carreiro et al. 2014) and Belgrade (Bumbasirevic et al. 2014). A slightly lower proportion of patients in our registry (34%) were admitted to the hospital when compared with a sample of road traffic crash injuries in Turkey (51%; Karadana et al. 2013).

Romania is the only country included in the Road Safety PIN report from 2012, which had an increase in the number of young people killed on the roads (Jost et al. 2012). Young adults required emergency care treatment for injuries, including road traffic injuries, more frequently than for any other health condition (Fortuna et al. 2010). Our data show that young adults between the ages of 18 and 29 represent the highest proportion of individuals who required a visit to the emergency department due to RTIs (30.5%; $n = 219$), data supported by previous studies as well (Blaizot et al. 2013; Goniewicz et al. 2012). At the national level, personal motor vehicles represent an increasing proportion of transportation. Exposure data reveal that in 2010 there were 73.3 billion vehicle-kilometers traveled, out of which 74% were represented by passenger cars. Although this exposure is twice as low as the European average (Dacota Project 2012), Romania registers one of the highest numbers of road traffic crashes in Europe (European Commission 2013). The mix of roadway users is increasingly diverse in Romania and contributes to RTI risk. For example, animal-drawn vehicles are found on rural roads as well as national and European roads, which have much higher speeds (Hamman et al. 2014). Animal-drawn vehicles pose risks for crash incidence because they move more slowly than other lane-occupying vehicles and often lack visibility enhancements such as headlights. Occupants are also at increased risk for injury due to the unavailability of any type of restraints or side protection.

This study has several limitations. The study was limited to the data available for the EU-IDB Pilot Project database, which collects information about the number of days spent in hospital for the admissions due to injuries but not on other admissions; therefore, a comparison with diseases was not possible. The EU-IDB surveillance system does not collect any data on protective measures or restraints specific to different type of road users, which might have helped in determining the small number of concussions but the high number of head injuries. The collected data are not representative for all traffic injuries among Romanian population, because the data were collected for a limited period of time and in only one setting. Due to the staffing limitations, data on all transport-related injuries were not collected. The results of this study encourage further investigation on the road traffic injury events, including exposure data and usage of safety measures when traveling.

Data from this study help identify vulnerable road users, which can help prioritize prevention efforts. For example, victims of RTIs were frequently young adults (18–29 years old) and men, who are consistently identified as high-risk populations (European Transport Safety Council 2013; Goniewicz et al. 2012; Mohan 2008). Prevention efforts should focus on improving driving behavior for these at-risk populations (European Transport Safety Council 2011, 2013). Improvements in road infrastructure and enhanced policies and law enforcement can help reduce crashes that result from an increasingly complex mix of roadway users, such as the pedestrians and bicyclists found to be at high risk in our study. Romanian efforts to reduce road traffic injuries will be most effective if they integrate policy, roadway environment/infrastructure improvements, enhanced vehicle safety requirements, and educational campaigns. Furthermore, these efforts will be most effective if they integrate multiple sectors and use an evidence-based approach.

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Table 1

Demographics of patients with road traffic injuries

	Total *N* (column%)	Road user categories						χ^2	*P* value
		Pedestrian *N* (%)	Bicyclist *N* (%)	Motorcycle (driver and passenger) *N* (%)	Passenger car (driver and passenger) *N* (%)	Animal-drawn vehicle (operator and passenger) *N* (%)	Other *N* (%)		
Total	718 (100.0)	105 (14.6)	88 (12.2)	120 (16.7)	352 (49.0)	39 (5.4)	15 (2.1)		
Sex									
Male	480 (66.9)	57 (54.3)	75 (85.2)	109 (90.8)	200 (57.0)	30 (76.9)	9 (60.0)	69.735	<.001
Female	238 (33.1)	48 (45.7)	13 (14.8)	11 (9.2)	151 (43.0)	9 (23.1)	5 (40.0)		
Age categories (years)									
0–9	57 (7.9)	19 (18.1)	10 (11.4)	0 (0.0)	25 (7.1)	3 (7.7)	0 (0.0)	172.21	<.001
10–17	71 (9.9)	16 (15.2)	18 (20.5)	14 (11.7)	21 (6.0)	1 (2.6)	1 (6.7)		
18–29	219 (30.5)	13 (12.4)	12 (13.6)	56 (46.7)	132 (37.6)	4 (10.3)	2 (13.3)		
30–39	120 (16.7)	5 (4.8)	7 (8.0)	23 (19.2)	76 (21.7)	6 (15.4)	3 (20.0)		
40–49	79 (11.0)	10 (9.5)	14 (15.9)	14 (11.7)	37 (10.5)	3 (7.7)	1 (6.7)		
50–59	79 (11.0)	12 (11.4)	17 (19.3)	7 (5.8)	31 (8.8)	8 (20.5)	4 (26.7)		
60+	93 (13.0)	30 (28.6)	10 (11.4)	6 (5.0)	29 (8.3)	14 (35.9)	4 (26.7)		

Table 2

Causes of road traffic injury events

	Road user categories								
	Total *N* (column%)	**Pedestrian *N* (%)**	**Bicyclist *N* (%)**	**Motorcycle (driver and passenger) *N* (%)**	**Passenger car (driver and passenger) *N* (%)**	**Animal-drawn vehicle (operator and passenger) *N* (%)**	**Other *N* (%)**	χ^2	***P* value**
Mechanism of injury									
Total	718 (100.0)	105 (100.0)	88 (100.0)	120 (100.0)	351 (100.0)	39 (100.0)	15 (100.0)		
Blunt force	546 (76.0)								
Contact with moving object	345 (48.1)	90 (85.7)	29 (33.0)	38 (31.7)	184 (52.4)	2 (5.1)	2 (13.3)	435.51	<.001
Contact with static object	169 (23.5)	0 (0.0)	5 (5.7)	25 (20.8)	133 (37.9)	1 (2.6)	5 (33.3)		
Struck by moving object before which person moved/was moved	17 (2.4)	10 (9.5)	1 (1.1)	2 (1.7)	1 (0.3)	3 (7.7)	0 (0.0)		
Other type of blunt force	15 (2.1)	0 (0.0)	0 (0.0)	3 (2.5)	8 (2.3)	3 (7.7)	1 (6.7)		
Crushing	21 (2.9)	4 (3.8)	2 (2.3)	2 (2.3)	11 (3.1)	0 (0.0)	2 (13.3)		
Falling, stumbling, jumping, pushed	141 (19.6)	1 (1.0)	50 (56.8)	50 (41.7)	5 (1.4)	30 (76.9)	5 (33.3)		
Other type of mechanism	10 (1.4)	0 (0.0)	1 (1.1)	0 (0.0)	9 (2.6)	0 (0.0)	0 (0.0)		
Place of occurence									
Total	718 (100.0)	105 (100.0)	88 (100.0)	120 (100.0)	351 (100.0)	39 (100.0)	15 (100.0)		
Streets and higways	513 (71.4)	53 (50.5)	62 (70.5)	83 (69.2)	282 (80.3)	21 (53.8)	12 (80.0)	161.424	<.001
On the crossing[*]		*22*							
Outside the crossing		*9*							
Side of the road		*6*							
Other		*8*							
Missing		*8*							
Transport area[**]	17 (2.4)	10 (9.5)	3 (3.4)	1 (0.8)	2 (0.6)	0 (0.0)	1 (6.7)		
Countryside area	21 (2.9)	2 (1.9)	2 (2.3)	5 (4.2)	1 (0.3)	11 (28.2)	0 (0.0)		
Other roadway, not further classified	160 (22.3)	39 (37.1)	18 (20.5)	30 (25.0)	65 (18.5)	6 (15.4)	2 (13.3)		
Unspecified	7 (1.0)	1 (1.0)	3 (3.4)	1 (0.8)	1 (0.3)	1 (2.6)	0 (0.0)		
Activity when injured									

	Road user categories								
	Total *N* (column%)	**Pedestrian *N* (%)**	**Bicyclist *N* (%)**	**Motorcycle (driver and passenger) *N* (%)**	**Passenger car (driver and passenger) *N* (%)**	**Animal-drawn vehicle (operator and passenger) *N* (%)**	**Other *N* (%)**	χ^2	***P* value**
Total ***	712 (100.0)	102 (100.0)	88 (100.0)	119 (100.0)	349 (100.0)	39 (100.0)	15 (100.0)		
Paid work	89 (12.5)	8 (7.8)	13 (14.8)	7 (5.9)	55 (15.8)	0 (0.0)	6 (40.0)	241.646	<.001
Unpaid work	135 (19.0)	17 (16.7)	22 (25.0)	20 (16.8)	34 (9.7)	38 (97.4)	4 (26.7)		
Other type of activity	138 (19.4)	34 (33.3)	26 (29.5)	33 (27.7)	45 (12.9)	0 (0.0)	0 (0.0)		
Traveling other	350 (49.2)	43 (42.2)	27 (30.7)	59 (49.6)	215 (61.6)	1 (2.6)	5 (33.3)		

* Information recoded from the narattive; available for half of the pedestrians suffering RTIs.

** Transport area includes public transport area, parking area, sidewalk; it includes highway, street, or road specified and not specified as public.

*** Activity was unknown for 6 cases.

Table 3

Diagnosis and treatment of patients

	Total *N* (column%)	Road user categories: Pedestrian *N* (%)	Bicyclist *N* (%)	Motorcycle (driver and passenger) *N* (%)	Passenger car (driver and passenger) *N* (%)	Animal-drawn vehicle (operator and passenger) *N* (%)	Other *N* (%)	χ^2	*P* value
Type of injury									
Total	718 (100.0)	105 (100.0)	88 (100.0)	120 (100.0)	351 (100.0)	39 (100.0)	15 (100.0)	118.316	<.001
No injury diagnosis	2 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.6)	0 (0.0)	0 (0.0)		
Contusion, bruise	394 (54.9)	45 (42.9)	44 (50.0)	54 (45.0)	223 (63.5)	20 (51.3)	8 (53.3)		
Abrasion	16 (2.2)	4 (3.8)	3 (3.4)	6 (5.0)	3 (0.9)	0 (0.0)	0 (0.0)		
Open wound	73 (10.2)	11 (10.5)	14 (15.9)	12 (10.0)	26 (7.4)	6 (15.4)	4 (26.7)		
Fracture	144 (20.1)	28 (26.7)	15 (17.0)	32 (26.7)	58 (16.5)	9 (23.1)	2 (13.3)		
Luxation, dislocation	16 (2.2)	4 (3.8)	4 (4.5)	3 (2.5)	4 (1.1)	1 (2.6)	0 (0.0)		
Distorsion, sprain	26 (3.6)	0 (0.0)	0 (0.0)	3 (2.5)	22 (6.3)	1 (2.6)	0 (0.0)		
Crushing injury	4 (0.6)	1 (1.0)	0 (0.0)	0 (0.0)	1 (0.3)	1 (2.6)	1 (6.7)		
Concussion	7 (1.0)	3 (2.9)	0 (0.0)	1 (0.8)	3 (0.9)	0 (0.0)	0 (0.0)		
Other specified brain injury	5 (0.7)	2 (1.9)	0 (0.0)	2 (1.7)	1 (0.3)	0 (0.0)	0 (0.0)		
Injury to blood vessels	12 (1.7)	4 (3.8)	4 (4.5)	0 (0.0)	3 (0.9)	1 (2.6)	0 (0.0)		
Injury to muscle and tendon	1 (0.1)	0 (0.0)	0 (0.0)	1 (0.8)	0 (0.0)	0 (0.0)	0 (0.0)		
Injury to internal organs	14 (1.9)	3 (2.9)	2 (2.3)	5 (4.2)	4 (1.1)	0 (0.0)	0 (0.0)		
Multiple injuries	3 (0.4)	0 (0.0)	1 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)		
Other specified type of injury	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)		
Body region*									
Total	716 (100.0)	105 (100.0)	88 (100.0)	120 (100.0)	349 (100.0)	39 (100.0)	15 (100.0)	59.294	<.001
Head	303 (42.3)	37 (35.2)	41 (46.6)	34 (28.3)	167 (47.9)	18 (46.2)	6 (40.0)		
Trunk	202 (28.2)	24 (22.9)	20 (22.7)	28 (23.3)	110 (31.5)	15 (38.5)	5 (33.3)		
Upper extremities	88 (12.3)	12 (11.4)	11 (12.5)	23 (19.2)	36 (10.3)	4 (10.3)	2 (13.3)		
Lower extremities	107 (14.9)	28 (26.7)	15 (17.0)	28 (23.3)	32 (9.2)	2 (5.1)	2 (13.3)		
Multiple body parts	16 (2.2)	4 (3.8)	1 (1.1)	7 (5.8)	4 (1.1)	0 (0.0)	0 (0.0)		
Treatment and follow-up**									

	Total *N* (column%)	Road user categories						χ^2	*P* value
		Pedestrian *N* (%)	Bicyclist *N* (%)	Motorcycle (driver and passenger) *N* (%)	Passenger car (driver and passenger) *N* (%)	Animal-drawn vehicle (operator and passenger) *N* (%)	Other *N* (%)		
Total	703 (100)	103 (100.0)	86 (100.0)	116 (100.0)	347 (100.0)	37 (100.0)	14 (100.0)	41.693	<.001
Examined and sent home without treatment	107 (15.2)	11 (10.7)	8 (9.3)	8 (6.9)	76 (21.9)	3 (8.1)	1 (7.1)		
Treated and referred for further treatment	351 (49.9)	37 (35.9)	51 (59.3)	67 (57.8)	169 (48.7)	19 (51.4)	8 (57.1)		
Treated and admitted	245 (34.9)	55 (53.4)	27 (31.4)	41 (35.3)	102 (29.4)	15 (40.5)	5 (35.7)		

* Body region was missing for 2 cases.

** Treatment and follow-up were missing for 15 cases.