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Urgent and emergency care for pedestrians injured in Brazilian traffic

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Abstract *This paper aimed to describe the epidemiological profile of pedestrians injured in traffic accidents treated at urgent and emergency facilities participating in the 2014VIVA Survey and the characterization of these events and consequences for these victims. This is a cross-sectional study conducted in the period from September to November 2014 in 24 Brazilian state capitals and the Federal District. We analyzed variables that characterize the victim, the accident and its severity and case outcome. We calculated simple and relative frequencies and performed a bivariate analysis by gender and age group. We used the Rao-Scott test with a 5% significance level in order to verify the independence of variables. Results show that 34.3% of attendances were for individuals aged 20-39 years, 54.2% had brown skin and 35.9% of individuals had up to 4 years of schooling. Run-overs occurred mainly at night (33.6%) and in the afternoon (31.3%). Most cases resulted in discharge in all age groups, but 41.6% of the elderly (60 years and over) required hospitalization. We stress the need for public investment, prioritizing pedestrian circulation in traffic and road infrastructure planning.*

Key words *Accidents, Traffic, External causes, Health surveys, Pedestrians*

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Introduction

Traffic injuries and deaths have increased worldwide and are listed as one of the leading causes of mortality, especially among young people aged 15-29 years[1]. In this context, in 2013, the mortality rate for these events worldwide was 17.4/100,000 inhabitants[1].

Some authors argue that traffic injuries and deaths have historically been addressed as fatalities but, in most cases, are the result of structural omissions in roads and vehicles conditions, oversight, incompetence, reckless behavior and negligence of users, whether drivers of vehicles or pedestrians[2].

The 2011 VIVA Survey data show that, of the 12,868 victims of traffic accidents attended in urgent and emergency services located in 24 capitals and the Federal District, 72.6% were males, 55.8% were aged 20-39 years and 10.6% were pedestrians[3].

Pedestrians, cyclists and motorcyclists are part of the most vulnerable traffic user group. According to the World Health Organization (WHO)[4], more than 270,000 pedestrians lose their lives every year in the streets worldwide. This represents 22% of all traffic fatalities in the world, and the death of pedestrians can reach 2/3 of traffic deaths in some countries. In addition to fatalities, there is still a significant proportion of events that produce permanent sequelae or disability in victims[4]. Some studies emphasize the severity of injuries that occur in motor vehicle collisions with pedestrians. Reith et al.[5] found that, compared to vehicle occupants, pedestrians injured in collision with vehicles had higher mortality (21.7% vs. 12.3% of occupants) and a higher proportion of patients who died in the first 24 hours of hospitalization (13.2% against 7% of occupants). Head and extremities traumas, including the pelvis were more frequently found among pedestrians than among occupants of damaged vehicles.

In 2013, Brazil recorded 8,220 deaths due to run-overs – as are called collisions between pedestrians and other road users – which corresponds to 18.9% of deaths from all road traffic accidents and a rate of 4.2 deaths/100,000 inhabitants (6.5 deaths/100,000 among men and 2.1 deaths/100,000 among women). The group of people aged 20-59 years was the most affected (4,632 deaths). However, older groups (60 years and over) recorded the highest rates, reaching 18.1 deaths/100,000 inhabitants in the group aged 80 and over[6].

In state capitals, rates ranged between 1.1 and 15.9 deaths/100,000 inhabitants among men. Belém, Fortaleza, Manaus and Vitória had the highest rates (above 10 deaths/100,000) in 2013. Natal, São Luís and Macapá recorded the lowest rates (below 3.5 deaths/100,000). Among women, rates were much lower, ranging from 0.5 to 4.1 deaths/100,000 inhabitants. The highest rates in this group were in Belém, Teresina and Vitória, and the lowest in Palmas, Maceió and Macapá[6].

Run-overs accounted for 40,322 hospitalizations, which represented 19.6% of hospitalizations due to road traffic injuries in 2014 in Brazil. Most people hospitalized for this cause are male (69.4%)[7]. In 2013, the Unified Health System (SUS) spending on hospitalizations of injured pedestrians in traffic reached nearly 60 million Brazilian Reais, which represented 25% of expenditure in the sector on all hospitalizations due to road traffic accidents, second only to expenditure on the treatment of motorcyclists (49.6%). The average value of each pedestrian hospitalization was R$ 1,339.82 and the average stay in hospital was 6.8 days, preceded by the stay of truck occupants who had an average of 7.2 days[8].

These pedestrian deaths and injuries are preventable and have been the subject of effective interventions[4,9], but they still injure or kill a considerable portion of traffic users in Brazilian cities. The main risks to which pedestrians are exposed include issues related to the behavior of drivers (inappropriate speed, alcohol intake and driving); infrastructure (sidewalks and their maintenance, crosswalks and worksites, sign-regulated road crossing time); car designed with non-flexible bumpers, unfavorable to pedestrians in run-overs; in addition to trauma care services responsible for providing immediate assistance necessary to save the lives of pedestrians after accidents[4]. Many factors influence the risk and severity of pedestrian injuries such as head-on collision with motor vehicles, pedestrian impact location on the vehicle and the speed at which this collision occurs[10].

This paper aims to describe the epidemiological profile of pedestrians who have suffered road traffic injuries treated at urgent and emergency facilities participating in the 2014 VIVA Survey and characterization of events and their consequences to these victims.

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Materials and methodology

This is a cross-sectional study based on data collected by the 2014 VIVA survey, which makes up the Violence and Accidents Surveillance System (VIVA). The 2014 survey was the fifth edition and aimed generally at describing the epidemiological profile of victims of violence and accidents treated at selected urgent and emergency facilities. This survey included 86 urgent and emergency services located in 24 Brazilian state capitals and the Federal District, with the exception of Cuiabá and Florianopolis, which did not participate in the investigation due to local operational issues.

We conducted this survey following calculation of a representative sample of victims from external causes in selected services and based on data from the National Registry of Health Establishments (CNES) and the SUS Hospital Information System (SIH/SUS).

We calculated sample size based on data provided by Municipal Health Secretariats as to the number of attendances due to external causes in these services in September 2013, assuming coefficient of variation of less than 30% and standard error < 3, through which we stipulated a sample of at least 2,000 attendances due to external causes in state capitals. Collection took place between September and November 2014 in 12-hour shifts previously drawn by municipality and services, for a period of 30 days, totaling 60 shifts.

We recorded losses per each hospital's shift and recorded them in the field diary. Of the people approached for an interview in capital cities (n = 56,729), 679 (1.2%, ranging from 0.01% in João Pessoa and 3.9% in Manaus) refused to participate; thus, 56,050 people were interviewed. Of these, after database criticism (duplication exclusion, for example) we used 55,950 interviews, representing a loss of 9.9%.

We collected variables by completing the accidents and violence notification form, which was applied to victims treated in selected services and shifts. This instrument has the following blocks: (1) general data; (2) individual notification; (3) residence data; (4) data of attended individual; (5) event data; (6) violence; (7) sexual violence; (8) data of probable violence offender; (9) referral; (10) final data.

We used the following variables in this paper: gender (male and female), age group (0-9, 10-19, 20-39, 40-59 and 60 and over), race/color (white, black, yellow, brown, indigenous), schooling (0-4 years, 5-8 years, 9-11 years, 12 and more years of study), paid activity (yes or no); occupation according to the Brazilian Classification of Occupations (CBO); health insurance (yes or no); any physical, mental, visual, auditory disability or other (yes, no, not declared); victim's alcohol use in the last six hours (yes or no); state capital's service, day and time of event; day and time of attendance; other party involved in the accident (animal, car, bicycle, fixed object, bus, etc.); body part affected (mouth/teeth, head/face, abdomen/hip, upper or lower limbs, multiple organ/parts, etc.); type of injury (amputation, cut/laceration, sprain/strain, fracture, etc.); development (discharge, hospitalization, outpatient referral, death); and victim's perception of the intentionality of event (intentional, unintentional, does not know, ignored).

We calculated simple and relative frequencies of variables and conducted a bivariate analysis according to gender and age group. We used the Rao-Scott test[11,12] to verify the independence of variables, which consists of a modified Pearson's chi-square test that considers the complex sampling plan, adopting a 5% significance level. Our analysis considered the primary sampling units and strata weights. We used the Complex Samples module SPSS 20.0 to perform all analyzes.

The National Commission of Ethics in Research (CONEP), Ministry of Health, approved the study under Opinion No. 735.933/2014. The verbal consent of the patient or his legal guardian was obtained at the time of interview. This procedure replaced the signing of the Consent Form (CF) and is justified by the fact that this is a specific Health Surveillance activity nationwide. It is noteworthy that, as recommended under Resolution 466/2012, we ensured participants' total anonymity, as well as the freedom to interrupt the interview at any time, without any harm to the victim or his/her family.

Results

In the 2014 VIVA Survey, we collected data on 15,499 attendances due to road traffic injuries, of which 12.5% (1,611) were pedestrians. The Southeast and Northeast recorded 35.6% and 30.8% of these attendances, respectively. With regard to state capitals, we highlight Rio de Janeiro (14.2%), São Paulo (12.9%) and Recife (8.8%).

We reviewed victims' profile in Table 1 and found that 34.3% of attended in urgent and emergency services were individuals aged 20-39 years, 54.2% mulatto and 35.9% with up to 4

years of schooling. We also observed that 91.8% had no health insurance plan and that 96.3% declared they did not have any kind of disability. In 47.6% of pedestrians who reported they were working, we found that 35.2% said the event occurred on the way to work. Importantly, 46.5% of treated pedestrians were unemployed, 4.2% were domestic or general services workers, 2.1% were bricklayers, 1.3% were administrative clerks/assistants and 1.1% were drivers; other occupations appear in much smaller proportions and 17.4% of records did not provide information on this variable. Around 12.3% of victims reported alcohol consumption. The bivariate analysis presented in Table 1 showed a statistically significant difference only for age ($p = 0.006$) and alcohol use ($p < 0.001$) variables.

The event was intentional in 7.1% of cases. Of these, 51.6% were male pedestrians. There was no statistically significant difference between genders (data not shown in table).

We can observe some features of the events in Table 2. We note that the highest percentage of collisions that injured or killed pedestrians occurred on Monday (18.2%), followed by Friday (16.0%). We identified small differences in gender distribution, however, these were not statistically significant ($p = 0.120$). Events occurred mostly in evenings (33.6%) and afternoons (31.3%). When comparing men and women data, it was clear that there were differences in the distribution of events with regard to the time of day.

Among men, 34.2%, 10.0% and 25.1% of the accidents occurred, respectively, at night,

Table 1. Profile of pedestrians attended in urgent and emergency facilities participating in the VIVA Survey in 24 Brazilian state capitals and the Federal District, 2014, by gender.

	Gender						
	Male		Female		Total		
Variable	n	%	n	%	n	%	p value
Age group							0.006
0 to 9	175	15.0	86	9.4	261	12.7	
10 to19	139	14.0	134	19.8	273	16.4	
20 to 39	318	36.4	207	31.2	525	34.3	
40 to 59	195	22.3	150	25.8	345	23.8	
60 and over	109	12.2	85	13.8	194	12.8	
Race							0.581
White	232	29.4	175	32.7	407	30.8	
Black	130	14.0	94	13.3	224	13.7	
Yellow	8	0.6	7	0.8	15	0.7	
Brown	556	55.2	383	52.8	939	54.2	
Indigenous	6	0.8	5	0.4	11	0.6	
Schooling (years)							0.279
0 to 4	334	37.5	190	33.8	524	35.9	
5 to 8	168	23.2	121	20.9	289	22.2	
9 to 11	205	29.8	205	36.0	410	32.5	
12 and over	32	4.7	46	5.7	78	5.2	
Event on the way to work							0.894
Yes	184	34.9	118	35.5	302	35.2	
No	434	65.1	297	64.5	731	64.8	
Health insurance plan							0.085
Yes	63	9.6	38	6.3	101	8.2	
No	811	90.4	597	93.7	1408	91.8	
Disability							0.870
Yes	41	3.8	23	3.6	64	3.7	
No	857	96.2	623	96.4	1480	96.3	
Alcohol use							<0.001
Yes	149	16.1	39	7.0	188	12.3	
No	720	83.9	597	93.0	1317	87.7	

early morning and morning. Regarding women, these percentages were 32.6%, 5.4%, 29.8%, respectively. A statistically significant difference was found (p = 0.027) for this comparison. In 46.7% of run-overs, the other party involved was an automobile, and 36.6% a motorcycle. Again, although there were some differences in the distribution between genders and there was no statistical significance (p = 0.084).

The most affected body parts were the lower and upper limbs (47.8%), followed by injuries of multiple organs (28.0%). Regarding the type of injury, we noted that fractures, amputations and traumas were the most common bodily injuries (39.0%), according to data in Table 3. Most of the pedestrians (63.4%) were discharged after treatment in urgent and emergency services. Around 29.8% of men and 25.8% of women were hospitalized. There was no statistically significant difference for these variables when comparing genders.

Table 4 shows the results of the bivariate analysis of some event features according to the age of the victim. Regarding the injured body part, we observed that multiple organs and head / neck injuries stand out among children (0-9 years). Upper and lower limbs and multiple organs were the most frequently affected body parts among those in the age group 10-59 years and among the elderly. In the latter age group, we also observed a high percentage of head and neck injuries. The analysis showed a significant difference between the affected body part and age (p < 0.001). Regarding the type of injury, we observed that cuts and lacerations stand out among children, followed by fractures/amputations/traumas, whereas there is a higher frequency of concussions, sprains and strains among adolescents and young adults (10-39 years). From the age of 40, including the elderly, fractures, amputations and traumas prevail. There was a statistically significant difference for the analysis of the type of injury by age (p < 0.001). While exploring the relationship between the type of vehicle involved and the age of the victim, we noted that motorcycles stand out among children. Cars are the vehicles most commonly involved in pedestrian injuries in all the remaining age groups. Motorcycles also appear with high percentages in elderly injuries. Worth mentioning also is that 9.6% of children were run over by bicycles, while 9.5% of people aged 20-39 years and 7.1% of the elderly were hit by buses. The relationship between the type of vehicle and victim's age was significant (p =

Table 2. Characterization of events involving pedestrians attended in urgent and emergency facilities participating in the VIVA Survey in 24 Brazilian state capitals and the Federal District, 2014, by gender.

Variable	Gender				Total		p value
	Male		Female				
	n	%	n	%	n	%	
Day of event							0.120
Sunday	136	12.8	81	11.8	217	12.4	
Monday	161	18.7	111	17.4	272	18.2	
Tuesday	121	13.7	111	15.6	232	14.5	
Wednesday	116	12.4	95	14.7	211	13.3	
Thursday	108	11.7	88	13.5	196	12.4	
Friday	141	15.2	101	17.2	242	16.0	
Saturday	160	15.5	81	9.8	241	13.2	
Time of event							0.027
Morning	218	25.1	176	29.8	394	27.0	
Afternoon	302	30.7	225	32.2	527	31.3	
Night	332	34.2	225	32.6	557	33.6	
Early morning	81	10.0	30,0	5.4	111	8.1	
Other party involved							0.084
Car	415	48.4	294	44.3	709	46.7	
Motorcycle	339	34.8	260	39.3	599	36.6	
Bus	54	7.5	32	5.4	86	6.6	
Bicycle	32	2.9	30	5.6	62	4.0	
Other	60	6.4	30	5.4	90	6.0	

Table 3. Characterization of the outcomes of traffic-related injuries involving pedestrians attended in urgent and emergency facilities participating in the VIVA Survey in 24 Brazilian state capitals and the Federal District, 2014, by gender.

Variable	Gender				Total		p value
	Male		Female				
	n	%	n	%	n	%	
Body part affected							0.953
Head/neck	181	18.5	112	18.2	293	18.4	
Spine/chest/abdomen/genitals/anus	50	5.5	43	6.4	93	5.9	
Upper and lower limbs	410	47.8	290	47.8	700	47.8	
Multiple organs/parts	269	28.2	183	27.7	452	28.0	
Type of injury							0.276
No injury	32	3.1	37	4.8	69	3.8	
Concussion/sprain and strain	242	30.5	201	34.5	443	32.2	
Cut and laceration	267	24.0	160	21.8	427	23.1	
Fracture/Amputation/Traumas	374	40.7	236	36.5	610	39.0	
Poisoning, burns and other	9	1.7	12	2.4	21	2.0	
Outcome							0.214
Discharge	519	61.2	414	66.6	933	63.4	
Outpatient referral	80	7.0	41	6.5	121	6.8	
Hospitalization	285	29.8	175	25.8	460	28.2	
Other	14	2.0	7	1.1	21	1.6	

Table 4. Characterization of events involving pedestrians attended in urgent and emergency facilities participating in the VIVA Survey in 24 Brazilian state capitals and the Federal District, 2014, by age group.

Variable	Age group												p value
	0 to 9		10 to 19		20 to 39		40 to 59		60 and over		Total		
	n	%	n	%	n	%	n	%	n	%	n	%	
Body part affected													< 0.001
Head/neck	77	30.4	50	18.2	83	16.1	42	12.7	38	22.4	290	18.3	
Spine/chest/abdomen/genitals/anus	16	5.0	10	3.7	33	5.7	21	6.2	13	9.7	93	5.9	
Upper and lower limbs	80	30.2	124	52.1	276	58.8	162	49.3	57	29.6	699	48.0	
Multiple organs/parts	78	34.3	74	26.0	112	19.4	105	31.9	75	38.3	444	27.8	
Type of injury													< 0.001
No injury	13	5.0	15	4.5	23	4.3	12	2.8	6	2.0	69	3.8	
Concussion/sprain and strain	52	19.3	89	36.7	175	40.5	89	29.7	37	22.8	442	32.3	
Cut and laceration	103	37.7	71	22.9	122	19.2	87	22.5	43	20.7	426	23.2	
Fracture/Amputation/Traumas	89	37.2	90	34.7	184	34.9	140	40.7	97	51.9	600	38.7	
Poisoning, burns and other	3	0.8	3	1.2	3	1.1	9	4.1	3	2.7	21	2.0	
Other party involved													0.010
Car	88	37.6	133	53.1	239	46.6	161	50.5	83	41.8	704	46.8	
Motorcycle	119	45.8	93	32.5	171	35.2	126	33.8	83	40.9	592	36.5	
Bus	6	1.8	14	5.1	41	9.5	12	5.9	12	7.1	85	6.6	
Bicycle	25	9.6	5	1.9	16	3.1	10	3.1	6	5.3	62	4.0	
Other	14	5.2	16	7.3	32	5.6	20	6.8	8	5.0	90	6.0	
Outcome													0.002
Discharge	165	64.2	178	72.1	320	67.8	182	59.3	82	47.5	927	63.5	
Hospitalization	65	26.6	69	21.8	129	23.8	115	32.1	77	41.6	455	28.1	
Outpatient referral	20	7.3	14	5.0	47	7.7	22	5.6	18	8.7	121	6.9	
Other	3	1.9	2	1.0	3	0.6	8	3.0	4	2.1	20	1.6	

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0.010). We found that, in all age groups, most cases resulted in patient discharge. However, our attention is drawn to the fact that 41.6% of individuals aged 60 years and over required hospitalization. The analysis between age group and outcome showed significant difference between the categories (p = 0.002).

Discussion

The analysis of data from the 2014 VIVA Survey showed that the number of attendances for traffic-related injuries in urgent and emergency care services has increased compared to previous surveys, as well as the proportion of pedestrians in these attendances. In 2009, pedestrians accounted for 11.2%[13] of cases, 10.2%[3] in 2011 and 12.5% in 2014. However, these figures should be treated with caution, because they represent a part of the services performed in the country, in a limited period of 30 days and at specific state capital services that joined the VIVA Survey in the years studied.

Contrary to what the literature on the subject has discussed, the group of adults was the most frequent in the records of emergency care provided to pedestrians. This may be justified by the fact that other age groups that are more susceptible to serious injuries do not even reach emergency care services. In this regard, Niebuhr et al.[10] claim that, in a 35 km/h collision speed, the elderly are twice as likely to suffer serious injuries that can lead to death in traffic compared to adults.

The elderly and children have been identified as the main victims of run-overs[14]. Children are at high risk of suffering traffic-related injuries, which are main causes of childhood disability worldwide and are the second cause of mortality in this age group[15]. Among the elderly, those over 80 are the group most vulnerable to this type of accident. This may be related to the increased frailty, decreased mobility capacity, flexibility and strength, which gradually occur with the ageing process[16].

As in morbidity and mortality from violence, injuries and deaths that victimize pedestrians in traffic have a very similar profile, with excess mortality of young and mostly black and brown males. In this regard, Souza et al.[17] argue that traffic relationships are established by historically and culturally constructed power relations, in which different users, powers and unequal forces that are asymmetric and of different natures and meanings clash. This analysis showed the greater victimization of pedestrians with low schooling and unemployed.

We need to consider some risk factors, namely: (1) the use of alcohol, found in 12.3% of pedestrians attended in the 2014 VIVA Survey – a study in São Paulo[18] showed that a drunk pedestrian is 3.6 times more likely of being hit; (2) the use of a cellphone that causes a cognitive distraction in vehicle drivers, but also on who is circulating on foot. Nasar and Troyer[19] highlight that traffic-derived injuries associated with mobile phone use are underreported and may be even more significant because many patients do not report that distraction that caused the accidental event resulted from the use of a mobile phone; (3) poor street lighting: 33.6% of the events that injured or killed pedestrians and were recorded by the 2014 VIVA Survey occurred at night. Zegeer and Bushell[20] highlighted the importance of lighting for the protection of pedestrians, because a considerable percentage of deaths of these road users occurs at night or in poor light conditions; (4) the lack of equity in the Brazilian roads circulation spaces intended for pedestrians, who often need to walk on narrow, poorly maintained or obstructed sidewalks and also share their space with bicycles, motorcycles and other vehicles; (5) circulation planning issues, such as crossings intended for pedestrians who, in many places, are few and have a short crossing time and are marked by signs that emphasize car movement to the detriment of pedestrians; (6) poor roads, signaling and vehicles maintenance; (7) inadequate speed of different types of vehicles is a major risk for pedestrians. Some studies indicate that its reduction translates into effective preventive measure[15,21].

A small percentage of attended pedestrians had disabilities (3.7%). However, it is noteworthy that, even with regulations on accessibility in public spaces (Decree-Law 5.296/2004), people with disabilities or reduced mobility, including the elderly, still face various obstacles that make them vulnerable in traffic. Zegeer and Bushell[20] point out that many people with disabilities change their routes, use specialized services for their mobility or even avoid transit on public roads as strategies to avoid poor safety conditions.

The Global Report on Road Safety of the World Health Organization[1] highlights that increased motorization generated uncertainty for road users moving on foot or by bike. Road sharing by the variety of existing means of transport,

without care to consider the vulnerabilities of each of these stakeholders, fosters a higher rate of traffic-related injuries and deaths. Much has been done to promote non-motorized and on foot mobility, but we need strategies to ensure the safety of users, such as their separation from motor vehicles and high road speed.

The major boost to the automotive industry and easy purchase methods of automobiles and motorcycles in Brazil are reflected in the valuation of individual transport to the detriment of the collective and on-foot travel. DENATRAN data on the Brazilian fleet show that, in 2014, of the 86,700,490 registered vehicles, 55.3% were automobiles, motorcycles 22.2% and only 1.1% buses/minibuses. As noted in this analysis of the 2014 VIVA Survey, cars and motorcycles were the main vehicles involved in collisions with attended pedestrians. Bacchieri and Barros[22] add to this discussion that motorcyclists are twice more likely of running over a pedestrian compared to car drivers, in addition to their own personal likelihood of suffering serious injuries in traffic accidents.

A study conducted in São Paulo with road traffic injured victims treated in urgent and emergency care services showed that pedestrians were 2.73 times more likely to be hospitalized, referred or die compared to cyclists, which shows their greater vulnerability as road users[23]. Studying patients suffering traffic-related injuries in five European countries, Maydan et al.[24] found that the more severe injuries, mainly affecting the extremities, were significantly more frequent among pedestrians compared with other road users. Rubin et al.[25] studied patients injured in traffic, admitted to Israeli emergency hospitals for 16 years (1997-2012) and found that, of the 13,655 admitted pedestrians, 19.1% had upper limb fractures and 18% had multiple fractures.

In this study, people aged under 59 years most common outcome was discharge from urgent and emergency care, evidencing minor injuries in upper and lower limbs. Elderly injuries were more serious because most affected multiple organs, caused fractures, amputations or traumas and required hospitalization or referral to outpatient care. A study on elderly victims suffering road traffic injuries in Ribeirão Preto showed that 50.9% of them were discharged, but with sequelae, and other 10.3% died[26].

In Brazil, from 2000 to 2013, pedestrians accounted for 32.5% of the 410,448 hospitalizations identified as victims with diagnosis suggestive of physical sequelae of traffic-related injuries. Of these, 16.8% were "certainty" sequelae, that is, that they were visible consequences, actually resulting from the accident, such as crushing, amputation and nerve or spinal cord injuries[27]. In the 2014 VIVA Survey study, 28.1% of pedestrians attended in urgent and emergency care in the Brazilian state capitals required hospitalization for the care of injuries sustained in traffic.

It is important to note the limitations of this study and the quality of registration forms completion of these attendances. Some data such as age, gender, race/color, schooling, disability, alcohol use, occupation, outcome of attendances and even the displayed type of injury still need further clarification. Other data are not collected, such as the presence of temporary or permanent sequelae, procedures performed, the event location and road conditions. However, they could be instructive in identifying risk factors and resources required to address and prevent these events.

The costs of these accidents encompass human losses, with sequelae and deaths, and even impact spending on health services, rehabilitation, social security and work absenteeism. Some studies indicate that these costs are around 1% of Gross Domestic Product (GDP) in low-income countries and 2% in high-income countries[14].

Finally, it is noteworthy that international experience has shown that public investment should focus on pedestrian circulation who, hierarchically, should be given priority in the various stakeholders traffic mobility planning, in engineering highways and urban roads, including sidewalks and well-designed walkways, underground or elevated passages of high mobility and speed roads, safe traffic education as a school program and public awareness measures on pedestrians' protection needs, as well as stricter enforcement of traffic and safety laws.

Collaborations

LW Pinto, AP Ribeiro, CA Bahia and MG de Freitas participated equally in all stages of preparation of the article.

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