The new Brazilian traffic code and some characteristics of victims in southern Brazil

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Abstract

***Objective*—The aim was to study characteristics of traffic accident victims before and after the implementation of the new Brazilian traffic code, in January 1998.**

***Subjects and methods*—The study population was car and motorcycle occupants seen in a pre-hospital care service in Londrina, Paraná State (Brazil) before the introduction of the new Brazilian traffic code, from 22 January to 21 July 1997, and after its implementation during the same period in 1998. Victims were analyzed over the time periods according to helmet and seat belt use, gender, underage driving, and alcohol on the breath.**

***Results*—Use of seat belts increased from 45% to 62.6% and of helmets from 31.2% to 66.2% after the introduction of the new Brazilian code. The proportion driving under age 18 and with perceptible alcoholic breath declined significantly only among motorcycle riders. There was a 20% decline in car occupant injuries along with a 9% reduction in motorcycle related injuries after the change of the law.**

***Conclusion*—Results favor the hypothesis that rigorous legislation increases safer practices in traffic, at least during the first months of its implementation.**

(*Injury Prevention* 2001;7:190–193)

Keywords: traffic accidents; legislation; seat belts; helmet

In Brazil, statistics indicate that intentional and unintentional injuries account for the second most important cause of death. Although homicides have become an important subgroup,[1] traffic accidents still prevail in the "unnatural causes of death" list in most capitals and medium sized cities.[2]

In Londrina, the third largest city of southern Brazil (population 450 000), traffic accidents present one of the highest mortality rates in the country when analyzed as "potential years of life lost". Moreover, the specific mortality rate for the city has shown an increase over the last few years, resulting in a rate of 37.2 per 100 000 inhabitants in 1994 and 1995[2]—higher than the national average. In Brazil, however, preventive measures are still weak and not standardized.

Some authors highlight the value of studies that evaluate the use of helmets and safety belts to better direct appropriate measures to high risk groups.[2 3] In Brazil such studies, however, show a lack of documentation on the use of safety equipment in police and hospital records of traffic accidents.

The new Brazilian traffic code, enforced since 22 January 1998, considers not using safety helmets, driving without a license or under the influence of alcohol (above 0.06%), and not using a safety belt, to be serious offenses.[4] These facts were widely publicized by the mass media at the time of their implementation, along with the prospect of more severe penalties. For example, a motorcycle rider caught not wearing a safety helmet, along with the fine, will be forbidden to drive for some time and will have his driving license temporarily suspended. Those driving without a license can have their vehicle impounded. As for those driving under the influence of alcohol, they can be fined, temporarily suspended from driving, have their license removed and/or vehicle impounded, or be arrested. If these drivers get involved in traffic accidents, they also face criminal law implications.[4]

In light of the implementation of the new Brazilian traffic code in early 1998, the objective of this study was to compare the traffic accident victims (occupants of cars and motorcycles), and their connection with some punishable offenses (failure to use safety equipment, intoxication, and underage driving), in the period before and immediately after the implementation of the new code.

Subjects and methods

Subjects were car occupants and motorcycle riders injured in a traffic accident and seen in a pre-hospital first aid center of the city of Londrina, Paraná State—the SIATE (Integrated Trauma and Emergency Aid Service). This is the only service that provides pre-hospital care to trauma victims within the municipality and metropolitan area, and it is activated by witnesses or relatives of the victims, through a three digit toll-free phone call. A doctor on duty answers the phone and, depending on some characteristics of the trauma, determines if the patient will be seen at the accident site by a doctor or by a paramedic. All available information on the victims, along with the accident report, is filed in report sheets (medical assistance registration form or paramedic assistance registration form), with daily updates made by nursing staff, and coded using the *International Classification of Diseases*, 10th revision (ICD-10).[5] Data are electronically processed by Epi-Info, version 6.04b.

We selected the victims who had been classified in the V40 to V49 codes (car occupants) and the V20 to V29 codes (motorcycle riders)

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Table 1 Traffic accident victim data before and after the new Brazilian code implementation (car occupants)

Variables	No (%) before (1997)	No (%) after (1998)	p Value
Gender			
Male	336 (63.8)	261 (63.5)	0.99
Female	191 (36.2)	150 (36.5)	
Age of driver (years)			
<18	4 (1.7)	4 (2.1)	1.00
⩾18	233 (98.3)	186 (97.9)	
Seat belt use			
Yes	218 (45.0)	236 (62.6)	0.00*
No	266 (55.0)	141 (37.4)	
Alcoholic breath			
Yes	100 (19.0)	70 (17.0)	0.49
No	426 (81.0)	341 (83.0)	

*Statistically significant.
Missing information was excluded.

of ICD-10[5] and who were injured just after the implementation of the new traffic code and those injured before the implementation of the code, in the same period of 1997.

The two groups of victims injured during the second period (post-law) were then compared to those in the first period (pre-law). The comparison was established as to gender, underage driving, use of seat belt or helmet, and perception of alcohol breath by paramedics. Incidence rates were not calculated because of the absence of suitable denominators.

To examine differences between the two periods the χ^2 or Fisher's exact test were used.

Results

Data from 2364 victims were analyzed. In 1997 (pre-law) there were 1274 victims: 747 (58.6%) motorcycle riders and 527 (41.4%) car occupants; in the second period there were 1090 victims, 679 (62.3%) motorcycle riders and 411 (37.7%) car occupants. These numbers denote a reduction of 20% of car and 9.1% of motorcycle accident victims, respectively.

Car occupants had a mean (SD) age of 30.5 (15.5) years in 1997 (median age 28.0 years) with a slight decrease in these values in 1998 (mean (SD) age 27.9 (13.7) years and median age 25.0 years). The mean (SD) age of motorcycle riders was 25 (9.1) years in 1997 (median age 23.0 years); in 1998 the mean (SD) age of these victims was 27.2 (10.0) years (median age 25.0 years).

Male victims prevailed in both periods, both in car and motorcycle accidents. When comparing the time periods before and after the implementation of the new traffic code, no statistical difference was found as to gender in either category of victim (tables 1 and 2).

Table 2 Traffic accident victim data before and after the new Brazilian code implementation (motorcycle riders)

Variables	No (%) before (1997)	No (%) after (1998)	p Value
Gender			
Male	604 (80.9)	533 (78.5)	0.30
Female	143 (19.1)	146 (21.5)	
Age of driver (years)			
<18	50 (9.0)	28 (5.4)	0.03*
⩾18	505 (91.0)	486 (94.6)	
Use of helmet			
Yes	224 (31.2)	434 (66.2)	0.00*
No	494 (68.8)	222 (33.8)	
Alcoholic breath			
Yes	157 (21.0)	104 (15.3)	0.01*
No	590 (79.0)	575 (84.7)	

*Statistically significant.
Missing information was excluded.

Key points

- New traffic laws were evaluated in a Brazilian city.
- New legislation increased safer practices in traffic.
- Car related injuries declined more than motorcycle related injuries.
- Motorcycle riders were the main type of victim.
- Helmet use increased from 31.2% to 66.2% among motorcyclists.
- Underage driving declined, but just among motorcycle riders.
- There is still room for improvement in compliance with the laws.

In spite of being underage, some victims were driving at the time of the injury, which is against the law. After the new code, there was a statistically significant reduction in underage drivers only among motorcycle victims (from 9.0% to 5.4%; table 2).

As to "use of safety equipment," tables 1 and 2 show a significant increase in the number of victims using safety equipment (helmets and seat belts) after the new code was enforced. The percentage of victims in which SIATE paramedics perceived alcohol breath decreased, although this reduction was statistically significant only for motorcycle riders.

Discussion

Because we studied only the crash victims, the remainder of users of vehicles on public roads was excluded. This may have limited the scope of conclusions concerning the frequency of lawbreakers in the population. Another limitation is that many of the data we obtained were given by the victims, and for some of the variables (that is, use of safety equipment) there could have been a reporting bias, with a subsequent artificial increase in the use of safety equipment. Nevertheless, the fact that the data were obtained from the same source (prehospital treatment) in the two time periods minimizes this effect.

In this study, the number of motorcycle riders was greater than car occupants in both time periods and the number of cases decreased only 9.1% after the new code, in comparison with 20% of car crash victims. This pattern may reflect the fact that motorcycles have increasingly been used by delivery services and, also, in the transport of passengers (motorcycle taxis) within the municipality. Despite the fact that motorcycles account for just 17% of all motor vehicles in our city, motorcycle related injuries constitute 40% of fatal traffic accidents each year. This indicates that the users of this mode of transport are at greatest risk of injuries because of factors such as their greater exposure of the body and the higher prevalence of risk behaviors.[3]

When comparing the two periods, the numbers involving age and sex did not differ significantly, although there was a small increase in the proportion of injuries involving female motorcycle riders in 1998. In spite of this, the male to female ratio was higher for motorcycle riders (4:1) than for car occupants (2:1) in 1998, similar to that previously found by Andrade, in the same city.[2]

Selecting only those victims driving the vehicle at the time of the injury, no decrease was observed in the number of underage victims driving a car, whereas among the motorcycle riders there was a significant decrease. It must be stressed, however, that the fact that the driver is licensed to drive a vehicle is no assurance of competence to do so, due to other factors, mainly cultural, which determine attitudes considered to be unsafe in traffic.[6] Besides continuous police surveillance of legal driving, measures to promote adequate traffic behavior have to be taken, along with the enforcement of stricter driving license tests, to reduce the present statistics of injuries in the municipality.

The use of safety belts is one of the major factors contributing to the decrease in the severity of the injuries and mortality involving occupants of motor vehicles.[7–9] In the present study, an important increase in the use of this equipment was reported in the second period, from 45.0% to 62.6%, attaining levels equal to the average in the United States (67%).[7] Híjar-Medina *et al* refer to the need to consider that seat belt use is determined by sociocultural factors.[8] They found that there was a link between the non-use of safety equipment with drinking before driving, excessive speed, nighttime, the size of the vehicle, and the type of the road where the event took place. Thus, many non-users of this equipment have other recognized risk factors for the occurrence of accidents, which may be acting synergistically, causing injuries. Therefore, in depth studies are needed to find the reasons that motivate some people to neglect the use of safety equipment, in spite of stricter legislation. We must stress, however, that this study did not evaluate the type and quality of seat belts, nor their adequacy to be adapted to people of different sizes and weights, even though those factors are extremely important in the prevention of specific injuries in car crashes.[7]

As for the use of a helmet, the comparison between the two periods shows an increase in their use: from 31.2% to 66.2%. This proportion of helmet users, after the new legislation was enforced, is still below the levels found in developed countries, where, after the enforcement of similar legislation, there has been significant increases in their use, varying between 80% to almost 100%.[6 10 11] In the state of Washington, US, Mock *et al* reported an increase from 41% to 80% in the use of safety helmets among victims admitted to a trauma center,[11] after the use of a safety helmet became mandatory, and Kraus *et al* reported an even greater rise in its use among motorcycle riders in the state of California (from 46% to 99%) in the first month after the use of helmet became mandatory.[10] In New Zealand, this percentage among youngsters is approximately 95%.[6] It is possible that the differences reported in the rates of safety helmet use, between this and other studies, are due to sociocultural and environmental factors as well as police surveillance and punishment of transgressions. Studies that shed light on the causes of these differences are fundamental to strategies to increase the use of this safety device.

Therefore, the 34% non-users of helmets after the implementation of the new code, must still be considered a high proportion because of the number of head injuries—major contributors to trauma related disabilities and death.[2 3 11] Similar to the use of safety belts, it should be noted that the type and standard of the helmets were not taken into account in this study, although these characteristics may result in different levels of protection.[6]

The use of alcohol is, in the literature, one of the most frequently reported risk behaviors for traffic injuries, and is associated with driving without a license, a seat belt or safety helmet, and driving above legal speed limits.[8 9 12] Despite the lack of accuracy, alcohol on the victims' breath was the only information available for the present study. Bearing this limitation in mind, a slight decrease was reported in the number of victims in which alcohol was noted, from 19% to 17% among car occupants (not significant) and from 21% to 15.3% ($p<0.01$) among motorcycle riders.

Although the sensitivity of this method is low, estimates of alcohol drinking before driving in the present study, were higher than those reported by Andrade[2] (4.8%) in the first aid records of 1996 road accident victims seen in the city's emergency departments. None the less, they were much lower than the 42% figure of alcohol victims found among motorbikers hospitalized in California, US when tests were made to determine the blood alcohol concentration up to four hours after the injury.[12] This statistic highlights the need to establish protocols aimed at better identifying intoxicated drivers in our country, so that steps can be taken to prevent this behavior. As stated by Ross, it is also important to stress that, although legislation achieves an important reduction in traffic mortality rates, it does not address the social causes of alcoholism, and broader interventions should be sought.[13] Thus, legislative measures must be complemented by policies that also promote changes in social environments and not just in individual behavior. This includes measures related to the alcohol industry, publicity, and minimum age limits for buying and consumption, to diminish problems arising from alcohol abuse.[13 14]

In the present study, the comparison of some characteristics of the victims before and after the new traffic code indicates that stricter legislation may be effective in the reduction of risk behavior. There was an increase in the number of victims using safety equipment and a decrease in the number of underage drivers and victims under the influence of alcohol. The changes in the frequency of these occurrences

were greater among motorcycle than car occupants, although the number of car occupant victims declined more in the second period than motorcycle ones. Social or environmental factors other than the implementation of the new code may have played a part in altering these characteristics from one year to another. None the less, we could not identify any other substantial changes related to the public roads or the vehicles that would have modified exposure to crashes or injuries in our community. However, the new legislation appears to have resulted in increased police surveillance during the first six months. Between the first semester of 1997 (pre-law period) and the first semester of 1998 (post-law period) the number of lawbreakers fined for not wearing a safety belt increased from 25 to 822, and the number fined for not wearing a helmet increased from 1633 to 2194.

Implications for prevention

The introduction of stricter legislation combined with a nationwide media campaign had an immediate effect on improving protective behaviors of car occupants and motorcycle riders in our community. As a consequence of the new legislation, police surveillance appears also to have increased, which may have lead to a higher proportion of the use of protective devices and a lower level of some risk factors (drinking and driving, and underage driving) during the first months after the implementation of the code. Much of the improvement observed may be related to the fear of being caught by the police and of being penalized. This study reveals, also, that there is still room for improvement in compliance with some aspects of the legislation. Among these, the use of helmets is of special importance, because motorcycle riders are at a greatest risk of head injuries.

Finally, studies are needed to evaluate sociocultural and environmental factors that contribute to the occurrence of traffic injuries, so that more effective and comprehensive interventions can be adopted.

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Vietnam delays helmet regulation

Associated Press reported in May that, bowing to public pressure in a country where millions use motorbikes to get around, Vietnam's government has shelved a plan to fine urban riders who do not wear helmets. With accidents on the rise in chaotic streets crowded by millions of motorbikes—the chief means of transport in Vietnam—the government had planned to begin fining violators of a helmet law $1.40 from June. But many people complained that helmets would be uncomfortable in the nation's heat and humidity and said it would be impractical for hundreds at a time to carry them into movie theaters, restaurants, or wedding receptions.

The government decided to postpone indefinitely the planned fines in most cases. It is the third time Vietnam's Communist leadership has backed down on enforcing the helmet law. Under a new proposal, fines would be imposed only on motorcyclists travelling without helmets on highways, while those in cities would be encouraged—but not required—to wear protective headgear.

There are seven million motorbikes in Vietnam, whose population is 78 million. About half of the machines are in Hanoi, the capital, and Ho Chi Minh City, formerly Saigon. According to the National Committee for Traffic Safety, of 23 327 traffic accidents last year that killed 7927 people and injured more than 25 000, well over half—64.5%—involved motorcycles. The number of accidents was up 8.3% over the previous year, and the number of fatalities increased 11.7%.