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Editorial

Child, teenager, and traffic: some important considerations

A criança, o adolescente e o trânsito: algumas reflexões importantes

Delimitation of the problem

Currently, traffic accidents (TAs) cause the death of more than one million people throughout the world every year,¹ causing families to suffer and increasing the costs of healthcare and social security systems.² For the healthcare sector, TAs are worrisome due to their numbers, their impact on mortality and morbidity (because they affect young age groups with a high number of years of potential life lost [YPLL]), and consequent reduction in life expectancy, in addition to expenditures, overcrowding of emergency rooms, and rehabilitation costs due to sequelae, which also take their toll on families and the society.³ The statistics indicate that for each death caused by TAs, several other victims have to live with important sequelae, requiring rehabilitation services, treatments, and interventions.⁴ Therefore, both deaths and sequelae, as well as social security expenditures and the high cost of medical and hospital resources⁵ make TAs an important public health problem.

Despite the implementation of the new Brazilian Traffic Code⁶ in 1998, Brazil is still one of the countries with the most dangerous traffic. Authors point out that even with new laws, traffic control, vehicle safety, and red light cameras, the reduction in deaths and disabilities resulting from TAs is still not significant.⁷ The numbers reach approximately 40,000 deaths per year, and over 100,000 hospitalizations due to injuries resulting from TAs, not to mention the victims attended to in emergency rooms and then released. In addition, according to recent estimates, around 20% of patients discharged from hospitals will probably have some type of sequela.⁸

TAs are understood as “unintentional events involving vehicles for transportation of persons that, as happening on the thoroughfare, such event may cause injuries, leave sequelae, and cause death”.⁹ According to the International Classification

of Diseases (ICD-10, codes V01 to V99),¹⁰ TAs are included under transport accidents, which include not only land accidents, but also water and air accidents (Fig. 1). Among transport accidents, those taking place on land (frequently referred to as TAs) include different types of victims, such as: pedestrians, cyclists (both driver and passenger), motorcycle riders (both driver and passenger), occupants of three-wheeled motor vehicles (both driver and passengers), car occupants (both driver and passengers), occupants of pick-up trucks or vans (both driver and passengers), occupants of heavy transport vehicles (both driver and passengers), bus occupants (both driver and passengers), and other land transport accidents (animal, railway train, streetcar, special vehicle) (Fig. 1).

Regarding children and teenagers, researches have shown that their involvement in this type of event is increasing, mainly as pedestrians, cyclists and car occupants of up to 14 years old, becoming drivers after the age of 15.¹¹

It becomes essential to understand the circumstances in which TAs involving children and teenagers occur, as well as the associated factors and their magnitude regarding deaths and hospitalizations, in order to not only evidence such sad reality, but, especially, to indicate paths to search for solutions.

Morbidity and mortality of children and teenagers regarding traffic accidents

In Brazil, the magnitude and impact of the accidents are recorded in Hospital Information System (HIS) and the Mortality Information System (MIS), both managed by the Brazilian Ministry of Health, in which the main types of external causes (accidents and violence) determining hospitalizations and deaths, respectively, are recorded.

According to the HIS, from January to November of 2011, 28,754 children and teenagers (0 to 19 years old) were

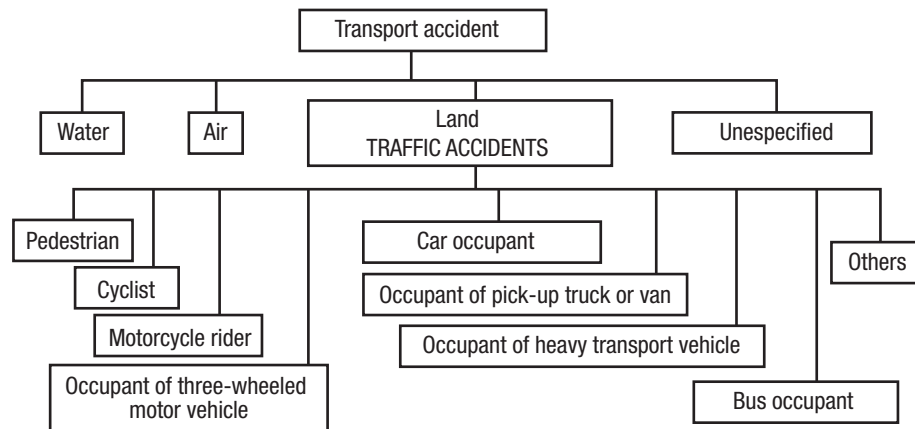


Fig. 1 – Distribution of transport accidents according to Chapter XX of the International Classification of Diseases (ICD-10), with emphasis on land accidents (traffic accidents). Source: MS/SVS/DASIS – Mortality Information System (Sistema de Informações de Mortalidade - SIM). Preliminary data.

Type of traffic accidents	Male				
	0 to 4 years	5 to 9 years	10 to 14 years	15 to 19 years	Total
V01-V09 Pedestrian	850	1,700	1,872	1,909	6,331
V10-V19 Pedal cyclist	152	601	987	991	2,731
V20-V29 Motorcycle rider	266	335	858	7,590	9,049
V30-V39 Occupant of three-wheeled motor vehicle	6	2	5	34	47
V40-V49 Car occupant	194	257	286	907	1,644
V50-V59 Occupant of pick-up truck	4	4	6	13	27
V60-V69 Occupant of heavy transport vehicle	5	6	17	28	56
V70-V79 Bus occupant	3	1	8	28	40
V80-V89 Others	146	250	426	861	1,683
TOTAL	1,363	3,156	4,465	12,361	21,608
Type of traffic accidents	Female				
	0 to 4 years	5 to 9 years	10 to 14 years	15 to 19 years	Total
V01-V09 Pedestrian	503	794	671	659	2,627
V10-V19 Pedal cyclist	77	240	221	133	671
V20-V29 Motorcycle rider	137	154	372	1,648	2,311
V30-V39 Occupant of three-wheeled motor vehicle	3	3	5	15	26
V40-V49 Car occupant	97	143	178	405	823
V50-V59 Occupant of pick-up truck	2	18	2	4	26
V60-V69 Occupant of heavy transport vehicle	3	3	3	9	18
V70-V79 Bus occupant	8	3	15	8	34
V80-V89 Others	83	119	132	276	610
TOTAL	913	1,477	1,599	3,157	7,146

Fig. 2 – Distribution of hospitalizations in the SUS due to land transport accidents (V01-V89) by gender, type of victim, and age group (0 to 19 years), Brazil, 2011. Source: SIH / SUS.

Table 1 – Distribution of hospitalizations in the Brazilian Unified Health System (Sistema Único de Saúde - SUS) due to land transport accidents (V01-V89) by type of victim and age group (0 to 19 years), Brazil, 2011.

Group of causes	Age group					Total
	Less than 1 year old	1 to 4 years old	5 to 9 years old	10 to 14 years old	15 to 19 years old	
Pedestrian (V01-V09)	169	1,184	2,494	2,543	2,568	8,958
Cyclist (V10-V19)	26	203	841	1,208	1,124	3,402
Motorcycle riders and occupant of three-wheeled motor vehicle (V20-V39)	114	298	494	1,240	9,287	11,433
Car occupant and occupant of pick-up truck or van (V40-V59)	62	235	422	472	1,329	2,520
Occupant of heavy transport vehicle (V60-V69)	3	5	9	20	37	74
Bus occupant (V70-V79)	1	10	4	23	36	74
Other and unspecified transport accidents (V80-V89)	50	179	369	558	1,137	2,293
TOTAL	425	2,114	4,633	6,064	15,518	28,754

Source: Ministry of Health – SUS Hospital Information System (Sistema de Informações Hospitalares – SIH/SUS).

hospitalized in Brazil due to TAs, totaling an average of 87 hospitalizations per day (Table 1). For both males and females, pedestrian collisions and accidents with bicycles were the main causes of hospitalizations due to TA in the age group of 0 to 14 years old, while accidents involving motorcycles is the leading cause of hospitalizations due to TA from ages 15 to 19 years, followed by pedestrian collisions and accidents in which the victim was a car occupant (Fig. 2).

As for mortality, the MIS registered, in 2010, 5,127 deaths of children and teenagers who were victims of TAs in Brazil, with an average of 14 deaths per day. Among fatal victims of TAs, the categories “pedestrian” and “car occupant” were predominant among children and teenagers, except for the age group of 15 to 19 years old, in which the motorcycle, together with the car, arise as the main vehicles involved in fatal accidents (Table 2).

The predominance of deaths and hospitalizations caused by pedestrian collisions in the age group from 0 to 14 years is demonstrated by several studies that emphasize that pedestrians and children are the most vulnerable

groups.^{12,13} Scholars emphasize that pedestrians account for almost one third of TA deaths in Brazil, causing a great number of fatal victims, of which approximately 70% are children or elderly people.¹⁴

Children are the most frequent pedestrian collision victims, especially in the age group from 5 to 9 years, reaching a coefficient of 2.2 deaths per 100,000 inhabitants, the highest lethality when compared to other types of TA.^{15,16}

Hospitalizations and deaths by motorcycle accidents also draw attention. Researchers emphasize that motorcyclists occupy the first place among TA victims and that they have a death risk seven times higher than car drivers.¹⁷

In four large urban centers (Belém, Recife, São Paulo and Porto Alegre), TAs involving motorcyclists yielded victims in 82% of the cases.¹⁸ Additionally, the cost of TA caused by motorcycles corresponded to R\$ 1,400.00 per each motorcycle in use, which totaled R\$ 5.3 billion between 1998 and 2006.¹⁹

In addition to death and hospitalization data available in MIS and HIS, data on minor injuries that do not result in

Table 2 – Distribution of deaths due to land transport accidents (V01-V89) by type of victim and age group (0 to 19 years), Brazil, 2010.

CID10 group	Age group					Total
	Less than 1 year old	1 to 4 years old	5 to 9 years old	10 to 14 years old	15 to 19 years old	
Pedestrian (V01-V09)	22	195	233	230	401	1,081
Cyclist (V10-V19)	1	6	19	68	86	180
Motorcycle riders and occupant of three-wheeled motor vehicle (V20-V39)	10	16	22	106	1,301	1,455
Car occupant and occupant of pick-up truck or van (V40-V59)	49	112	150	163	690	1,164
Occupant of heavy transport vehicle (V60-V69)	1	7	7	9	31	55
Bus occupant (V70-V79)	2	4	6	5	9	26
Other and unspecified transport accidents (V80-V89)	29	89	106	168	774	1,166
TOTAL	114	429	543	749	3,292	5,127

hospitalization or death must be considered, which represent a great demand for emergency care services.

In this sense, aiming at complementing the information system, in 2006 the Ministry of Health implemented the Injury Surveillance System Network in Sentinel Services (Rede de Serviços Sentinelas de Vigilância de Violências e Acidentes - VIVA Network), in order to record emergency assistance provided in cases of accidents and violence. Such surveillance strategy aims at knowing the distribution, magnitude, tendency, and risk factors of violence and accidents, in addition to identifying the social, economic, and environmental constraints of their occurrence in order to support the planning and application of adequate prevention and control interventions.²⁰

A study carried out based on Viva Network data²⁰ identified TAs as the second leading cause of emergency care services. Most of these accidents involved motorcycles and bicycles.

Other studies also showed the involvement of children and teenagers in TAs, who required emergency care.^{21,22}

Why and how traffic accidents happen: Potentiating factors

Child and teenager as victim

Pedestrians

As reported, the studies indicate that, among TAs involving children, cases of pedestrian collision are those with higher mortality.²³

In 2009, over 1,000 Brazilian children were involved in such accidents; therefore, it is important to understand the circumstances and factors related to these events.

The literature points out that this is a result of their reduced hazard perception, as they are not able to estimate the speed of vehicles when crossing a street, and also a result of not using the crosswalk, playing in streets where vehicles pass, not knowing traffic rules inherent physical and mental immaturity to follow traffic rules, and the sense of competition and speed characteristic of this age group. In addition, there is the urban conflict between vehicles and pedestrians, combined with the lack of respect for pedestrians by vehicle drivers.^{16,24}

Additionally, it is important to mention the total lack of protection of pedestrians, as they do not use any protective equipment that may reduce injuries and their sequelae, which are often fatal.

Although long term educational measures aiming to raise, a more conscious generation, aware of risks and with greater ability to face them are of extreme importance.

Nonetheless, it is necessary to observe that potentiating factors, such as disregarding traffic signs, speeding, and the major alcohol problem may contribute, even if the child cross the street on the crosswalk or is on the sidewalk, to children becoming victims. Enforcement, in this case, is an important element to prevent these events.

Cyclists

Accidents involving cyclists are not very emphasized as a cause of death. Nonetheless, studies performed based on

other information systems, such as the already mentioned VIVA, revealed the relevance of this type of TA, mainly among children and teenagers.^{25,26}

Authors draw attention to the fact that cyclists, as well as motorcycle riders, should be deemed more vulnerable in comparison with other types of vehicle drivers.

Occurrences of TA involving bicycles may be associated with its use as a form of leisure, as well as a mean of transportation to school, the lack of bicycle lanes and the poor quality of pathways, lack of recreation areas, in addition to ignorance of the laws and a lack of balance that may result in falls. The child or teenager that rides a bicycle unconsciously underestimates the risks to which he/she is exposed.^{17,27}

The lack of safety equipment, such as helmet, knee and elbow pads, and closed shoes is also emphasized. It is important to note that the Brazilian Traffic Code, in article 105, paragraph VI, considers the following equipment mandatory for bicycles: "helmet; bell; reflectors at the front, rear, side, and on the pedals; and a left rear view mirror", habits that, however, are not part of the life of Brazilian children and teenagers, resulting in more severe injuries in case of falls and collisions.

The same notes made with respect to pedestrian victims apply here.

Car passenger

The law establishes that children must be transported in the back seat of the vehicle, occupying the central position of the seat.⁶

According to Resolution 277/08 of the National Traffic Council (Contran), children of up to 1 year old should be transported in a baby car seat, placed in the back seat, rear-facing, with a slight inclination (Fig. 3A). Children of 1 to 4 years old must use a child safety seat (Fig. 3B). Children of 4 to 7 years old must use the booster seat fixed in the back seat with a 3-point seat belt (Fig. 3C). Children above 7 years old must use the seat belt (Fig. 3D). The higher the number of fixing points, the safer the seat belt will be. Those with three or more points are the best. Children of 10 years old or more are allowed to travel in the front seat.

In this aspect, it is important to note that the media many times has provided an effective contribution, showing that, even in severe accidents, including those with deaths, children were saved because they were properly transported.²⁸

However, no generalization should be made. A recent article in the newspaper O Estado de São Paulo reported that, in a police road block performed to verify children's transportation, one vehicle was stopped, fined, and seized, as legal rules were not being followed. The mother who was transporting her children improperly was then required to leave the vehicle and continue her travel by taxi - which, according to laws and regulations, is not required to have a child safety seat.²⁹

Regarding the seat belt, the World Health Organization mentions that it is still not frequently used despite the fact that it is an efficient measure to reduce the risk of severe injuries in case of TA.⁴ Studies show that the use of seat belt in the front seat is already widespread; however, its use in the back seat is still quite uncommon.³⁰ The authors also mention that if the parents do not set the example, children also tend not to use

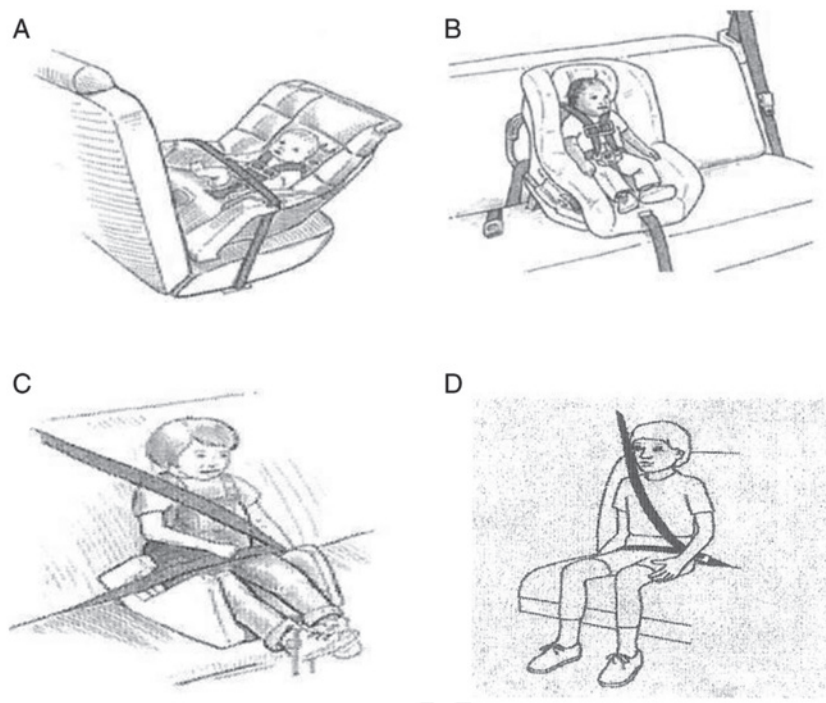


Fig. 3 – Illustration on how to safely transport a child by age.

Source: Safe Kids Brasil [Internet website]. Safe kids and protection tips. Available at: <http://www.criancasegura.org.br>

it.¹² In this regard, impact actions, such as traffic education and greater enforcement prove to be urgent.

Motorcycle passenger

Regarding the transportation of children as motorcycle passengers, it must be observed that it is only permitted after the age of seven years old, or when the child is deemed able to look after his/her own safety, and to wear a helmet adequate to his/her age.⁶ In addition to the safety equipment, the motorcycle driver must be twice as prudent. However, unfortunately, scenes of disrespect to the rules and, above all else, to the passenger's life are common. Usually it is possible to observe that the feet of the child being transported do not even reach the foot rests, and his/her helmet is sometimes too big, or it is not properly attached. The driver's lack of attention and disrespect to the law represent a great risk. In cities where the use of motorcycles is authorized, scenes of inadequate child transportation on motorcycles are everywhere. In these cases, enforcement actions aiming at protecting the child are absolutely necessary.

The school transportation issue

School transportation offered by the government or private institutions consists of providing a commute from home to

school, and vice-versa, to students enrolled in the regular school system.³¹

The safety of children or teenagers transported in these vehicles draws attention to two main elements: the vehicle and the driver. Some studies show the inadequacy of vehicles currently used to provide this service, whether due to the lack of seat belts, poor maintenance of vehicles, unprepared drivers, or risky driving behaviors.³²

Therefore, joint actions, involving standard-setting, management, and inspection bodies and service provider associations, as well as parents, are required to ensure the safety of school transportation vehicles.

When the child and the teenager "causes" traffic accidents

As a motorcycle rider or driver

The Brazilian law sets forth that a driver's license valid for motorcycles or vehicles can be granted from age 18 years; however, cases in which people under 18 years old driving vehicles (with or without parent's knowledge) cause accidents are frequent. Even for those who have recently obtained their driving licenses, studies confirm that the inexperience in driving can cause collisions and falls.³³

In this context, in addition to the little experience common to adolescent drivers, it is necessary to rethink the issue of illegality; the parents and guardians must be responsible for determining the use of the vehicle only by duly licensed persons.³⁴

The behavior also contributes significantly to the occurrence of the event, as the need to test limits and break rules, typical of adolescence, contributes to the high morbimortality resulting from TA. For teenagers, motorcycles and cars are seen as symbols of adventure and challenge.³⁵ Speeding, usually tested in “street racings” or group show-offs with stunts, makes the use of the vehicle dangerous and harmful. Immaturity, the feeling of omnipotence, the tendency to overestimate their abilities, and the little experience and ability to drive are risk behaviors that contribute excessively to the TA event.

The lack of safety equipment, as a helmet and proper clothing for motorcycle riders, and the use of seat belt for car occupants, should also be emphasized.

Another factor that contributes to increase TAs is the failure to comply with traffic laws combined with impunity.¹³ Exceeding speed limits, disrespecting crosswalks and traffic signs, and running red lights, among other violations, are common behaviors, especially among young people.

The immaturity to understand and follow traffic rules is attributed to children. Teenagers are also affected by the challenging behavior resulting from the passion for speed and peer pressure.

The state is expected to better enforce the existing laws, which could significantly reduce deaths and injuries.³⁶ Indeed, scholars emphasize that education, awareness of laws and regulations, and enforcement of traffic laws are essential to control and prevent TAs.³

Another important factor to take into consideration when addressing TAs is the consumption of alcohol, whether during social interactions or alone, as it is a common habit almost everywhere in the world. Nonetheless, its consumption has been reported as a factor closely associated with TAs, since it reduces peripheral vision, reduces perception, leads to lack of coordination. Drivers jeopardize not only their own life, but the life of others, such as pedestrians and drivers/passengers in other vehicles.³⁷

A household survey conducted in 143 Brazilian cities revealed the habit of drinking and driving in both men and women.³⁸ Records of emergency care provided to TA victims indicated suspicion of alcohol consumption in 17% of the victims.³⁹ A study conducted in emergency rooms also evidenced the suspicion of alcohol/drug consumption among TA victims involving motorcycle riders.²¹ Worse still, some studies conducted with teenagers and young adults are showing that children are having an increasingly earlier contact with alcohol, are drinking more, and women are approaching the same level of drinking as men.⁴⁰

In an attempt to reduce deaths and sequelae resulting from alcohol consumption by vehicle drivers, the Brazilian Traffic Code (Código de Trânsito Brasileiro – CTB)⁶ of 1998 considers as a crime driving under the influence (concentration ≥ 0.6 grams of alcohol per liter of blood); on June 20, 2008, Law No. 11,705 (Brazilian Drinking and Driving Law) became effective,

changing the limit of blood alcohol content to zero (forbearance of up to 0.2 g/L) and setting forth higher penalties, including arrest in *flagrante delicto* if blood alcohol content is proved to be higher than 0.6 g/L.

Studies subsequent to the implementation of the Brazilian Drinking and Driving Law observed a reduction in mortality as a result of TA, as well as in hospitalization, length of hospital stay, and hospital expenses,⁴¹ showing that the Brazilian Drinking and Driving Law is an effective measure to prevent TAs.

Action is required, with respect to this important aspect, aiming not only at reducing TA morbimortality, but also at preventing health complications.

Children and teenagers flying kites

To fly kites is a habit ingrained not only in the population of Brazil, but also of other places, among them several Asian countries.

A product known as “manja” was developed in order to make the kite string more resistant; it is a mix of glue and powdered glass (or swarf), where the glue acts as a binder and the powdered glass or iron acts as an abrasive. The result is an extremely abrasive string intended to cut other kite strings.

Frequently, in addition to this “quality”, manja strings are capable of provoking severe accidents –sometimes fatal – with motorcycle riders in areas where children and teenagers fly kites, as the string may severely injure the driver’s cervical region, usually in a fatal way.

Recently, in São Paulo, a Military Police officer who was commuting from work to home was a victim of this type of accident, having his neck almost completely severed from his body, intense external bleeding, and immediate death. Other similar accidents have been reported, which led to the creation of a prevention equipment called the “antimanja antenna”.

These are other manja victims: aircraft, pedestrians, cyclists, parachutists, skaters, and others.

There are no statistics capable of measuring these accidents, as the type described is not provided for in the International Classification of Diseases – ICD10. This fact has led the Brazilian Center for Disease Classification to submit, in a meeting held in 2011 in South Africa, a proposal for the use of a specific code, which will allow for such measurement.

Currently, in some Brazilian cities, there are laws that prohibit the use and sale of manja. In the State of São Paulo, Law No. 12,192 of January 6, 2006, prohibits the use of manja or any other similar product that can be applied to kite strings.⁴²

Searching for solutions – what can be done?

Traffic education: The role of the family, the school, and the physician

Considering that children are the most common victims involved in pedestrian collisions and accidents with

bicycles, and also, considering their immaturity and lack of perception regarding traffic, the need to protect them becomes evident.

In this regard, educational programs aiming at teaching children and parents how to behave in traffic prove to be important, as well as ensuring spaces for children to play safely, away from vehicles.¹⁵

Studies indicate that, as we develop vaccines to prevent infectious diseases, we should also create “vaccines” to prevent accidents from happening, which is based on discussion and development of knowledge in schools, which are favorable spaces for the promotion of health.⁴³ It is essential to develop projects for traffic education (directed to both students and parents), addressing compliance with laws, the use of the seat belt and helmets, adequate transportation of children, and safety of pedestrians, among others. Therefore, in addition to the family, the school can contribute to educate pedestrians, passengers, and future drivers about the importance of appropriate traffic behaviors. It is necessary to invest in children's and teenagers' knowledge regarding traffic laws and signs, providing education and guidance in all environments: school, family, and community.⁴⁴

Due to the high incidence of TAs involving motorcycles, whose majority of drivers are teenagers and young adults, TA prevention programs have been focusing on motorcycle riders.^{14,17} Among the several strategies pointed out, changes in behavior and in the way people drive have been emphasized as extremely important. Avoiding risk behaviors such as speeding, risky maneuvers, and driving under the influence may significantly reduce TAs.

The physician plays an important role in the prevention of TAs, considering the numerous moments in which this professional is in contact with families.

Given that during medical consultation the doctor develops important (primary and secondary) prevention measures, seeking to identify risk factors in order to reduce or stop their progress, an educational process directed not only at awareness, but especially to better quality of life and health for people⁴⁵ should be emphasized. Scholars affirm that the healthcare professional is in an ideal position to advise, correlating prevention with the context of the child development, i.e., providing advice before periods of greater risk, promoting a safer lifestyle with respect to accidents.¹²

The obstetrician, for example, is responsible for guiding the pregnant woman about the correct use of the seat belt to protect herself and her fetus. Pursuant to the recommendation of the Brazilian Society of Pediatrics, the three-point seat belt should be used, keeping the lap belt as low and tight as possible, provided that the shoulder belt should cross the middle of the shoulder, passing between the breasts, never across the abdomen. When driving, the pregnant woman should slide back the driver's seat, as far as possible from the steering wheel without compromising safety. The distance between the abdomen and the steering wheel should be of at least 15 cm.⁴⁶

While in a maternity hospital, parents should be advised on the proper way to carry the newborn, which is often carried on the mother's lap – with or without the seat belt – in the front seat of the car. In this regard, it is worth mentioning

the interesting program developed and implemented by the municipal government of the city of Mauá, SP, which provides proper transportation to women who have recently given birth and their children in their return home from the maternity hospital.⁴⁷

At other stages of child growth, the pediatrician should be aware and should not miss opportunities to advise the family, especially on the proper way to transport children.

The adolescent medicine specialist, talking to the teenager individually or in groups about the risk behaviors related to TAs, plays a key role in the instruction and education regarding traffic.

The important role played by doctors who perform the exam required to grant the driver's license, who face young men and women getting their first driver's license, should be emphasized. This is a unique moment to talk about respecting traffic laws, regulations, and traffic signs; non-adoption of risk behaviors, such as speeding and especially alcohol and drug consumption; use of safety equipment; priority of pedestrians and pedal cyclists; among other advice mentioned throughout this text.

Other measures

It is also necessary to reflect on the road system, reducing urban conflict areas with the construction of footbridges, speed bumps, traffic lights, and spaces for safe circulation of pedestrians and vehicles, deviating car traffic from school areas, unblocked sidewalks separated from the streets by fences,²⁷ in addition to educational actions on pedestrian crossing to guide and emphasize the need to use crosswalks and footbridges, as well as respect to pedestrians by drivers and vehicles.

Especially for cyclists, the construction of bicycle lanes throughout the urban area, as well as the creation of specific leisure areas, may provide more safety to children and teenagers who use bicycles for both leisure and as a means of transportation.^{15,44,48} The use of safety equipment contributes to these measures.

Together with education and road structure measures, a more effective and stringent enforcement is also necessary in order to penalize and prevent from driving those who disrespect traffic signs and laws, who do not use safety equipment, and who drive without a license or transport children improperly or without protection.

Currently, prevention programs seek to emphasize the adoption of a safe traffic behavior, proper transportation of children and teenagers, defensive driving, and more stringent laws, especially with respect to blood alcohol content.

In this aspect, some authors emphasize that while studies show a reduction in mortality due to TA after implementation of the Brazilian Drinking and Driving Law, loose or insufficient enforcement actions are a major drawback to the success of the intervention.⁴⁹ In countries such as Japan, France, Germany, the Netherlands, England, and Canada, where blood alcohol content limits are close to those tolerated by the CTB, TA mortality rates are extremely low as a result of strict enforcement actions and compliance

with the law,⁷ which suggests the need for more stringency in Brazil.

Some measures are suggested, such as frequent enforcement actions through police roadblocks and checkpoints, more severe sanctions with suspension of the violators' license, better control and more enforcement actions related to the sale and advertising of alcohol, placement of beer in the alcoholic beverage category and submitting it to the advertisement restrictions of this group, and increase of taxes on alcoholic beverages.⁵⁰

Considering that a great part of accidents resulting from the consumption of alcohol occur on weekend nights, some authors also emphasize the need for checkpoints with breathalyzer testing during those times.⁵¹

It is also important to note the problem of kites with manja, which harm many motorcycle riders. In addition to forbidding the sale and inspecting stores, it is essential to promote awareness campaigns directed to children, teenagers, and families, in addition to providing information on the problem in all means of communication, calling attention to the danger.

Engineering studies about the road system and the occurrence of TAs, especially in major urban centers, are also urgent in order to find solutions and alternatives to reduce the current urban conflict. Urban traffic planners and engineers are responsible for this work, which aims at slowing down or reducing traffic, increasing safety to pedestrians and cyclists, and contributing to the reduction in noise pollution.¹¹

It is also important to reflect on improving public transportation, investing in alternative and healthy means of transportation, e.g. the bicycle, and providing incentives for the rational use of cars, which will certainly contribute to the quality of life of the population, in addition to reducing TAs.

Some conclusions and recommendations

It is necessary to think not only about vehicle occupants as vulnerable users of the road system, but also about pedestrians, cyclists, and motorcycle riders.¹¹ Among these, children and teenagers play a major role with respect to the morbidity and mortality as a result of TA.

The current condition of children and teenagers with respect to traffic requires investments to reorganize urban areas and implement traffic education,¹² given that the most effective way to reduce these events is through primary prevention, i.e., addressing their determinant factors.³⁴

It is obvious that all possible ways require multi-sectorial actions involving the governmental and nongovernmental sectors, as well as society as a whole. It is necessary to join efforts aiming to reduce these accidents.

The need to combine education, health, legal, and public safety sectors in order to create and implement preventive actions is highlighted, as well as the need to train professionals from several areas to act, directly or indirectly, and face the problem.

In this regard, the role of society as a whole must be emphasized: healthcare professionals and others from several

areas, teachers, parents, and managers together in an effort to find ways to promote traffic safety for children and teenagers. It has become urgent to invest in preventive measures in order to reduce the suffering and disabilities of children, teenagers, and families, as well as the heavy economic burden imposed on society as a result of TAs.

This article evaluates the magnitude and the factors related to TAs involving children and teenagers, trying to find alternatives that can reduce these events and, consequently, avoid deaths, injuries, and disabilities. Accordingly, it contributes to expand the knowledge about some aspects related to traffic, and it may serve as a basis to considerations and development of policies regarding health promotion and prevention of these events.

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