

Injury control from the perspective of contextual pediatrics

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Abstract

Objective: To describe the relationship between injury control and contextual pediatrics.

Sources of data: Quasi-systematic review of MEDLINE, SciELO and LILACS databases, using combinations of the words contextual, community, injury, accident and violence; and non-systematic review of book chapters and classic articles.

Summary of the findings: Safety depends on the interaction of family habits, cultural patterns and surroundings. Contextual pediatrics sees the child, the family, and the community as a continuum; health diagnosis (sequential observation of problems and assets) is one of its cornerstones. Changing intrapersonal factors for injuries requires the use of both passive and active strategies. Family and cultural risk factors for injury: home overcrowding, moving, poverty, and young, illiterate and unemployed parents. The main neighborhood factors: material deprivation and traffic. Cultural factors: illiteracy, unsafe products, lack of mass transportation, handguns, workplaces without safety rules, faulty community organization, lack of communication between social sectors, inadequate legislation, low priority for safety among government actions, lack of economic resources, and low academic commitment with the field of safety.

Conclusions: The pediatrician's roles include strengthening of the longitudinal relationship with families, integrated interdisciplinary work, constructive intervention, partnership with community, counseling on injury risks pertaining to each developmental stage, by using lists with explicit processes and contents, and by handing out written materials. Active advocacy for safety promotion in different environments, besides the clinical setting.

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"Pediatrics is a contextual specialty concerned about children, their families, and the communities in which they live (...) Although the morbidity and mortality of children have changed over the past 150 years, the need for engaging in the community with families and community-based partners has not. Rather, the salience of community pediatrics has risen as the effects of societal forces have intensified and knowledge of the bioenvironmental interface has become more sophisticated (...) Pediatricians began collaborating with others in the community to prevent disease and promote health. Beyond the clinic doors, they found clear patterns and explanations. Child health outcomes were in a dynamic interplay with the environment, secular trends, commercial developments, the economy, family customs, and cultural norms."

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Modern paradigms: Contextual pediatrics and injury control*

The current tendency to base health care upon the integral valuation of each individual in his place and at his time, considering all circumstances in the surrounding environment, i.e., the sum of microenvironmental, cultural and social conditions that influence it, translates into an actual Kuhnian paradigm for medicine.²⁻⁴ This applies especially to pediatrics, as properly defined in the text above, which is an excerpt from a recent study published by four luminaries of this medical specialty,¹ whose clear conclusion is that the health of children and adolescents is reliant on a complex interaction between family habits, cultural norms, socioeconomic environment and secular trends.^{5,6}

However, one of the most relevant aspects of this paradigm is the acknowledgment that patients, regardless of their ages, should be the focus of attention.^{7,8} Figure 1 shows these concepts applied to injuries: the integration of the classic epidemiological model by William Haddon Jr., the phase-factor matrix, with the socioecological model by Uri Bronfenbrenner demonstrates how energy transfers between

the environment and children, which can cause injury to the latter, are influenced by the factors at each level of the socioenvironmental framework.^{19,20} The naive and exploitative behavior of young children and conscious risk-taking by adolescents are examples of intrapersonal factors. The interaction between a parent and his child, either to protect him or expose him to risks, is an example of an interpersonal factor. Institutional factors belong to instances in which individuals interact with the community, such as school and work. Among cultural factors there is a wide variety of values and social norms, as well as government policies and laws.¹⁹ Figure 1 also shows the close relationship between looking at health from a contextual perspective and notion of comprehensive control over the risk factors of all types of injuries (unintentional, violence and suicide) and their treatment at all levels (prehospital care to rehabilitation).^{21,22}

The concept of contextual pediatrics, which consists of the clinical practice that sees the child, family and community as a continuous set,²³ is not new. There have been reports of acknowledgment of the influence of family attitudes, environment and socioeconomic class on child development,

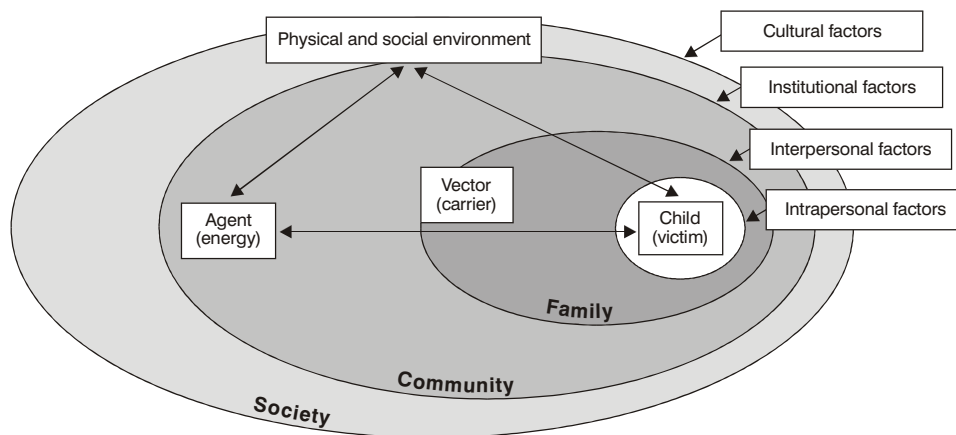


Figure 1 - Integration of the epidemiological model by Uri Bronfenbrenner with the context of physical injuries
Adapted from Runyan¹⁹ and Saluja et al.²⁰

* The discussion about an international consensus on the terminology for the external causes of injuries to human beings, albeit essential to the quality and comparability of collected data on a worldwide basis, is seemingly far from being solved.⁹⁻¹¹ This involves us, Portuguese speakers, but less than it should.¹²⁻¹⁴ In English, most experts tend to adopt the so-called "energy definition", according to which an injury is a bodily harm produced by energy transfers with relatively sudden, distinguishable effects, which may be characterized by a physical lesion (in case of exposure to energy in amounts that exceed the limit of physiological tolerance) or as functional impairment (in case of deprivation of a vital element, such as oxygen). Psychological injuries are excluded from this context, but controversy exists on such exclusion. This is the definition adopted by the International Classification of External Causes of Injury (ICECI), which belongs to the WHO Family of International Classifications, which de-emphasizes the term accident, replacing it by the syntagm "unintentional injury event."¹⁵ Brazilian dictionaries regard the terms *injúria* (injury) and *lesão* (lesion) as near-synonyms – both compatible with the definition of physical damage and moral offense –, however, the former is more strongly associated with external causes.^{16,17} Moreover, the term lesion is more restricted to anatomy and pathology in Portuguese and does not encompass, for instance, drowning, poisoning and emotional harm. For that reason and in order to be in harmony with the international terminological tendency, this study uses just the word injury to refer to the damage inflicted on an individual by external causes, although the Brazilian Center for Classification of Diseases (the Collaborating Center for the WHO Family of International Classifications in Portuguese) officially uses the term "lesão" (lesion) to convey such meaning.¹⁸

which date back to the origins of pediatrics, in the late 19th century.^{24,25} Nevertheless, only in the second half of the past century did pediatrics place scientific emphasis on the so-called "new morbidity:" behavioral disorders, learning disabilities and family problems²⁶ (Table 1). But even then, priority care was given to children; although socioenvironmental influences were valued, the idea of contextual approach was poor.

Table 1 - Secular trends in pediatric morbidity*

Classical pediatric morbidity (1900s-1955s):

- Infectious diseases
- High infant mortality rates
- Poor nutrition
- Few cures for chronic disease
- Epidemics (eg, polio, influenza)

The new morbidity (1955s-1990s):

- Family dysfunction[†]
- Learning disabilities
- Emotional disorder[†]

Beyond the new morbidity (1990s):

- Social disarray[†]
- Political ennui, wars[†]
- New epidemics (violence[†], AIDS, cocaine, homelessness)
- Increased survivorship[†]

Millennial morbidity (present)

- Socioeconomic influences[†]
- Health resources access disparity[†]
- Technological influences on health (including TV)[†]
- Obesity
- Mental illnesses

* Adapted from Palfrey et al.¹ and Haggerty.²⁷

† Diseases or morbidity factors related to worsening of injuries control.

Only in the past 15 years have there been concerted initiatives for child and adolescent family-centered and community-based care, one of whose key aspects is health diagnosis, which includes sequential observation of problems and assets of families and of their surroundings^{23,27} (Table 2). One of the most comprehensive among such initiatives is the Bright Futures project, developed by Morris Green and Judith Palfrey,²⁸ focused on well-child care, which suggests that care should be based upon a "vertical connection" between pediatricians and all other health professionals of a given service, combined with a "horizontal connection" with different community-based programs by neighborhood associations, day care centers, schools, churches and public health services. Devised in the early 1990s, the Bright Futures project was one of the first practical applications of contextual pediatrics.²⁹ In each of 21 health supervision visit guidelines, ranging from the prenatal period to late adolescence, there is a detailed family-targeted anticipatory guidance manual, which always starts with healthy lifestyle habit recommendations, placing emphasis on injury

prevention.²⁸ Table 3 shows examples of trigger questions aimed at generating a discussion about safety at two different ages. The entire material is freely available from the Internet.²⁸

Table 2 - Contextual pediatrics: assessment of family strengths and problems

Strengths (Resilience factors)

- Stable family
- Affections
- Considering the child as a priority
- Considering health as a priority
- Protecting the child from daily stressors
- Effective communication
- Competent models
- Social supports
- Quality schools
- Neighborhood resources

Problems (Vulnerability factors)

- Life stress
- Death of one of the parents
- Poverty, social disparity
- Racism
- Poor schools
- Social withdrawal
- Lack of affection
- Urban violence
- War

Adapted from Green²³ and Haggerty.²⁷

In the meantime, at the turn of the 20th century, pediatrics is faced with a web of morbidity factors that extend beyond the "new morbidity," whose relationship with sociocultural variables is well documented.¹ The major factors are: mood swings and anxiety in children and adolescents, unsafe sexual activity, teenage pregnancy, obesity, and disproportionately high rates of injuries (caused by violence at school, pedestrian/motor vehicle collisions, household firearms, alcohol and drug abuse, exposure to violence in the mass media and to toxic substances in the environment). These health problems directly depend on present-time factors: poverty, unequal wealth distribution, wide variety of values, beliefs and customs in the family environment, adverse working conditions among women, larger number of separations/divorces, single fathers/mothers, child labor, urban violence, poor traffic control, drug trafficking, inappropriate sexual behavior, incoordinate influence of technological advances and negative influence of the media, mainly television and Internet.^{1,24,30-32} Due to these factors, experts have recommended that pediatricians take on their political role of child advocates and engage more actively in partnerships with community groups,^{8,24,30,31,33,34} in addition to the implementation of evidence-based community pediatrics training.^{26,32,35,36}

Injury control is also a modern paradigm, since it is a theoretical and conceptual model that has been consolidated and shared by the entire academic community for nearly 50

years.³⁷ Its basic conception includes effective actions that can improve outcomes, either concerning the number and severity of injuries, or the victims' further quality of life).³⁸ Thus, the effectiveness of preventive programs has to be measured by the percentage of people whose behaviors are subject to intervention and by the amount of injuries that could be prevented. The outcomes of intervention studies in the field of clinical care should be assessed according to the improvement in functional results, such as return to school or work and cost-benefit ratio³⁸ (Figure 2).

The concept of injury control was established after the seminal studies by William Haddon Jr. and James J. Gibson, published in the early 1960s.³⁹ Haddon's phase-factor matrix, which is applied to the firearm problem in Table 4,

is a hallmark of that time. Until then, the field of the so-called accident prevention, with all pre-scientific notions of chance and unpreventability, drove researchers away.^{40,41} As knowledge about the epidemiology of trauma and about specific risk factors for each type of injury was scarce, the idea at the time was that the events which caused the injuries were just accidents, i.e., they were unpredictable or resulted from negligence.⁴¹ Therefore, preventive actions were based on anticipatory guidance with the aim of changing people's behavior; for instance, in case of children, by advising families to keep them under surveillance so as to avoid risks.⁴²

The formal acknowledgment of the importance of injuries as a serious public health problem, which required a technical

Table 3 - Contextual pediatrics: "trigger" questions to elicit discussions about safety

One year visit

How are things going in your family?
 What new things is Cindy doing?
 How does Cindy's father help take care of her?
 Who else can you turn to when you need help caring for Cindy?
 What are your child care arrangements? How do you feel about them?
 Is Cindy still fastened securely in a safety seat in the back seat everytime he rides in the car?
 Have you already turned the safety seat forward? Do you have to buy a new one?
 Have you moved?
 How have you childproofed your home? Have you provided outlet covers? Where do you keep household cleaners? Is your house equipped with window protections?
 Have you ever been worried that someone was going to hurt your child?
 Does anyone in your home have a gun? Does a neighbor or family friend? Where is it stored? And ammunition? Have you considered not owning a gun?

Adolescence visits:

Questions for the adolescent

How are you?
 What do you like to do for fun?
 Tell me some of the things you're really good at.
 What kinds of physical activities do you engage in? Any adventure sport?
 Do you enjoy drinking alcohol? And smoking?
 Are you worried about how much your friends drink or use drugs?
 Do you have a date? Does he have a car? Does he drink?
 What are the safety measures he takes when driving?
 Do you always wear a safety belt in the car?
 Do you ask your friend to do the same?
 Have you ever been in a car where the driver had been drinking?
 Do you wear a helmet when riding your bike?
 Have you ever been pressed to do things you don't want to?
 Have you ever been involved in fights at school? And in troubles with the police?
 Do you have access to a gun? Do any of your friend does?
 Have you ever witnessed violence?

Questions for the parent(s)

How have things changed now that Angela is a teenager?
 Have there been any major changes or stresses in your family since your last visit?
 What are some of the things you do together as a family?
 How often?
 What does Angela do after school?
 What do you think of Angela's choice of friends?
 What have you discussed about the risks of using alcohol, tobacco, and other drugs?
 Do you remind Angela to wear a safety belt in the car? Does he wear a helmet when riding a bike?
 Do you have a gun in your home? Does a neighbor or family friend? Where is it stored? And ammunition? Have you considered not owning a gun because of the dangers involved?

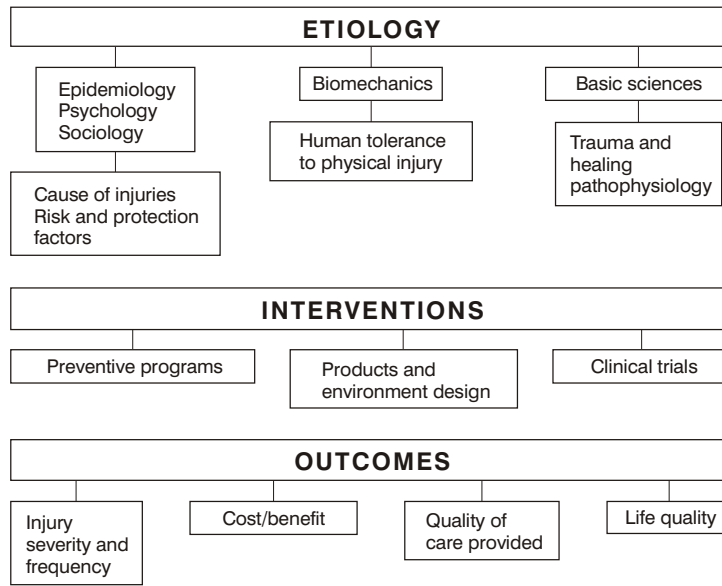


Figure 2 - Injury control conceptual model
Adapted from Rivara³⁸

Table 4 - Haddon matrix applied to the problem of violence with guns at school

	Host (students at school)	Agent/vehicle (revolvers and bullets)	Physical environment (school)	Social environment (community norms, rules, policies)
Pre-event (before the gun is fired)	Foster peaceful relationships among the young. Teach children about the dangers of carrying a gun to school. Teach parents about the dangers of letting their kids using guns. Teach the young how to recognize and report behavior that may indicate violence.	Construct guns with security devices, so that they can only be used by their owners.	Install metal detectors in schools. Eliminate object storage places (ex.: cupboards).	Adopt policies of notification of authorities when a student is suspect of carrying a gun. To forbid everyone to carry a gun at school. Reinforce restrictions on gun purchase.
Event (when the gun is pulled and let off)	Teach the young to protect themselves when they see a revolver or listen to gunshots.	Reduce the capacity of guns shooting multiple bullets. Modify bullets so that they became less lethal.	Install alarm systems that call the police as soon as a gun is seen.	Policemen on duty at schools to interfere in case of school fights. Security plan that enables students to escape the conflict area.
Post-event (after the victim was shot)	To teach first aid techniques and cardiorespiratory resuscitation to the young.	Reduce the capacity of guns shooting bullets continuously. Provide ambulance easy access at schools.	Provide easy access to effective emergency service.	Post-event advice to students, family and school staff.

Adapted from Runyan.¹⁹

and scientific approach, occurred after the appointment of Haddon, in the USA, in 1967, as the first director of the National Highway Safety Bureau, which gave rise to the powerful National Highway Traffic Safety Administration (NHTSA).^{37,39} Nevertheless, in the field of health, the great impulsion only occurred in the 1980s and 1990s, a period that was marked by great scientific achievements, during which an awful number of analytical epidemiological studies, real-time program assessments and intervention projects consolidated the injury control science.^{37,43,44} The most remarkable achievement of this era was the creation of the first national center for injury control, the National Center for Injury Prevention and Control (NCIPC), a member of the Centers for Disease Control (CDC).⁴⁵ Brazil does not have a similar governmental organization so far, although experts recommend it.¹⁴

In pediatrics, although the concern with injuries is an age-old one,⁴⁶ with studies published even in Brazil,⁴⁷ the precepts of the new injury control science only began to be implemented in the medical literature in the 1970s.⁴⁴ Its consolidation in clinical practice has been gradual and inconstant. A review on the effectiveness of safety guidance, based on pediatricians' clinical actions, found only 20 good-quality studies, published in the U.S. literature throughout nearly three decades; however, 18 of them yielded positive results.⁴⁸ Even the Injury Prevention Program (TIPP),^{49,50} developed by the American Academy of Pediatrics as a practical tool that is able to improve this situation, has been looked at with reserve, since the current consensus is that educational measures alone are not enough and that the participation of pediatricians in interdisciplinary actions and community actions is crucial for effective injury control.^{1,21,30,51-53}

This article aims to comment, in an essay format, some of the major strategies for injury control under the perspective of contextual pediatrics, following an order suggested by the model shown in Figure 1.

The victim: intrapersonal factors

There are several factors that are peculiar to children and adolescents that may increase or reduce their injury risks. Age is one of the main ones.^{43,54} In fact, specific injuries occur at definite ages; they represent windows of vulnerability in which children or adolescents face threats to their physical integrity, which demand some protective measures they are not yet mature enough to implement, or which they cannot use due to socioenvironmental influences. On the other hand, age also influences the severity of the injury. For instance, infants younger than two years are more prone to suffer brain injuries in case of head traumas than older children.⁴³ In general, infants are subject to risks imposed by third parties, being more prone to burns, poisonings, injuries from car crashes and falls. Preschoolers are more susceptible to being run over, falling from heights, hurting themselves with toys, and suffering lacerations; however, burns are still remarkable at this age. Among school-aged children, in addition to pedestrian/motor vehicle collisions, there is predominance

of bicycle falls, falls from heights, dental traumas, firearm injuries and lacerations. The major risks for adolescents are car and motorcycle crashes, pedestrian/motor vehicle collisions, bicycle falls, fractures associated with sports practice and drowning. Furthermore, homicide and drug abuse are a dire reality in adolescence.^{54,55}

Sex is also one of the pre-event factors: in the end of the first year of life, boys have twice as high a chance to suffer injuries as girls, a difference that increases with age.^{43,54,56} In adolescence, the risks of boys sustaining injuries, especially firearm-related injuries and drowning, increase tenfold in comparison to girls.¹⁴ These differences do not seem to be related to development, coordination or muscle strength, but to variations in exposure and behavior. For example, although boys have higher rates of traumas caused by bicycle falls, no difference exists when an adjustment is made considering exposure. On the other hand, this does not occur in relation to pedestrian/motor vehicle collisions, which appear to be more related to behavioral differences. Male adolescents suffer far more injuries in traffic than do girls, due to the combination of alcohol consumption and risky behavior.⁵⁴

The idea that some children are more prone to suffer traumas is a lay myth, scarcely supported by scientific studies. Although there is some relationship between the occurrence of injuries and the number of previous traumatic events,⁵⁷ as well as in cases of children with a less docile temperament,⁵⁸ the attempt to identify the children who are potentially at risk for repeated injuries is not useful in practice and diverts the central focus from environment management. In terms of preventive strategies, too little can be obtained by searching characteristics that could place some individuals at increased risk.^{44,59} Actually, there is evidence that the repetition of traumatic events is associated with at least one socioenvironmental risk factor, such as drug abuse, being a teenage mother, being a single caregiver, being a caregiver with a mental disease, and having a history of intrafamily violence.⁶⁰

The risk-taking behavior willingly assumed by adolescents – alcohol abuse, violation of traffic rules, reckless stunts on motorcycles or bicycles, refusal to wear safety devices, practice of dangerous sports, handling of firearms –, play an important role in the high rates of injuries at this age.^{43,54,56,61-63} In this area, there are no strategies that have been proven to be efficient. However, there are indications that, with the inclusion of safety education in school syllabuses, starting in preschool, it is possible to raise the awareness of at least part of the child and adolescent population and reduce the chances of negative behaviors.⁵⁶ A simultaneous strategy consists in convincing adolescent leaderships to take on attitudes that are considered safe, but not seen as “unhip,” thus having a positive influence on their peers.⁶⁴ On the other hand, there is an inverse relationship between educational expectations and aggressiveness among adolescents, which becomes one more field of action for pediatricians as advisors.⁶⁵

At least one study was able to positively change the behavior of adolescents regarding the use of safety belt

and bicycle helmet, which employed counseling strategies in an emergency service.⁶⁶ Pieces of evidence like this one have kindled the interest in the application of theories and models for behavioral changes to injury prevention,⁶⁷ after many years of believing that only passive protective measures were worthwhile. Today, it is common agreement that the change in intrapersonal factors that predispose to injuries demands the combined use of passive and active strategies.^{38,43,68} For instance, the use of infant safety seats, which can substantially reduce the traumatism in vehicle occupants, only becomes a passive protective measure if parents change their behavior and, besides complying with the law, by carrying children on the back seat, opt for safer restraint devices and have them properly installed.^{67,69} Nevertheless, there have not been sufficient studies so far with safe conclusions about the possibility of effectively reducing morbidity and mortality by way of behavior change models.⁷⁰

The microenvironment: interpersonal factors

The family is the first environmental circle that simultaneously protects children and may expose them to a many risks.⁶⁸ The main family and cultural variables associated with increased risk of injury are: household overcrowding, changes of address, poverty, younger parents with reading difficulties, unemployed parents, poorly built houses.⁷¹⁻⁷⁵ Even though poverty has been confirmed to increase the risk of injuries of all severity levels and types of trigger events, there is a stronger association with burns, pedestrian/motor vehicle collisions, bicycle falls, falls in general, and poisoning.^{72,76} At least one U.S. study has demonstrated a relationship between household overcrowding and risk of injuries for white children, but not for those of Hispanic immigrants, highlighting that every ethnic and sociocultural context has to be carefully evaluated.⁷⁷

The presence of certain objects in the household may be a resilience factor (e.g.: gate on the stairs, bars on the window, swimming pool grids and smoke detector) or a risk factor (e.g.: baby walker).^{72,78-81} There is also correlation of certain safety habits in the household, such as storage of sharp objects, with efficient reduction in the hospitalization rate caused by injuries.⁸² However, several studies warn against the moderate effect of counseling alone, even with home visits, underscoring that economic incentives for the access to safe products is much more effective.^{53,83}

No controlled studies have assessed the relationship between supervision of children by the parents or other adults and the occurrence of injuries.²⁰ Some studies have shown that adults tend to have a behavior that is not in accordance with their level of education and specific knowledge about child safety rules, allowing or encouraging children to take on responsibilities for which they are not mature enough, such as crossing the street by themselves.⁸⁴ Other studies show the level of continuity of supervision as a factor that is directly proportional to safety.⁸⁵ There is some evidence that the perception of caregivers about the

risks of a certain environment, which is linked to several social factors, is related to the reduction in the number of traumatic events.^{20,58} For example, the afore-mentioned study that showed an association between household overcrowding and risk of injuries only for some ethnic groups; authors argued that in some environmental contexts, the perception of risk leads to extra care and to efficient protection.⁷⁷ Another study revealed that up to 73% of parents (mainly fathers, comparatively to mothers) believe that young children learn some notions of safety by experiencing small traumas at home, which is not true. As young children depend on their caregivers for safety, such beliefs generate risks.⁸⁶

The capacity to teach children safety rules has also been studied. There is evidence that children under six years of age can only recall less than 50% of home safety rules (e.g.: not running with scissors or not touching hot pots), but the most important is that knowledge is not related to efficient injury prevention.⁸⁷ A study showed that a positive relationship between siblings is a predictor of choices for safer behaviors by school-aged children; older brothers and sisters were able to persuade younger brothers and sisters to avoid risks, but boys were more into playing games, whereas girls showed foresight and prudence.⁸⁸

A specific issue that is very much in vogue is the compliance with rules when meeting dogs, since children younger than 10 years are at greater risk of getting bitten. There is no scientific evidence of often-recommended strategies; it is recommendable not to have dogs in households with young children, especially breeds that have been described to cause injuries, such as pit bulls and rottweilers.⁵³

The surroundings: institutional factors

As the role of community as a health conditioning factor for the individuals who live in it is acknowledged, several studies try to assess the relationships between the surroundings and the risk of injuries. It has been underscored that defining the pre-event risks is not as important as assessing the risk factors that can be modified. These include pre-event factors (e.g.: physically separating cyclists from vehicle traffic; event-specific factors (use of helmets by cyclists); or post-event factors (efficiency of emergency services).^{21,38}

In the neighborhood, the major factors related to the increase in the risk of injuries are: poverty, low educational level and social environment with material deprivation.⁸⁹⁻⁹³ It is interesting to note that the relationship between socioeconomic background and fatal injuries is more consistent than nonfatal injuries.⁹⁴ Moreover, there is some evidence that independent neighborhood factors have a greater negative impact than personal or family factors.⁹⁵ Level of urbanization also plays a key role: there is greater risk of death from injuries in the countryside than in the city, except for intentional injuries. In metropolitan areas, the rate of injuries is higher in downtown areas, which are more densely populated, than in residential zones.⁵⁴

There is good evidence that home visits are efficient in reducing injuries among high-risk children. Nevertheless, since no publication has assessed the real world, mainly families with children without special risk factors, it is essential that any program be carefully evaluated as to their specific contexts before being implemented.⁹⁶

The safety of day-care-center attendants is an issue of growing importance, due to an increase in women's work. There is a paucity of reports on the differences of injury risks among children cared for by their mothers and those taken care of at day care centers; traumatic events at day care centers, which correspond to approximately 10% of the total events in this age group, are usually mild and associated with playgrounds.⁹⁷⁻⁹⁹ However, since there is a confirmed relationship between the compliance with safety rules by day care centers (including the level of education of their personnel) and a reduction in the number of injuries, experts are concerned with the exceeding risk that may be caused by spontaneous search for "informal" day care centers (with no inspection), due to economic and social reasons.⁹⁹

It is estimated that 10 to 20% of injuries among school-aged children occurs at school, and two thirds of these injuries occur during sports activities.⁴³ There is some evidence that the incidence of trauma at school varies considerably, but that it is associated with the length of stay in school, proportion between the number of teachers and students, special groups (for students with developmental disabilities).¹⁰⁰ Due to the importance of environmental safety promotion, experts recommend that pediatricians act as consultants, helping with the establishment of safety committees at schools.¹⁰¹

Traffic risks, as far as the issue of safety in the surrounding environment is concerned, deserve special attention; the marked predominance of deaths caused by motor vehicles has already resulted in their being described as children's natural predators.^{54,102} If, on the one hand, major improvements have been made in the protection of vehicle occupants by efficient application of laws that oblige the use of restraint devices, such as infant seats and safety belts,^{89,103} the same does not apply to pedestrian safety, especially in societies in which development is not so organized.¹⁰⁴⁻¹⁰⁶ Some studies describe a gradual reduction in the deaths of child pedestrians, but experts relate this finding more to the reduction in the number of children walking in the streets, due to other social matters (e.g.: violence) than to strategies for the control of pedestrian/motor vehicle collisions.^{54,104} Lack of improvements in this area is due to the complexity of causal factors: the major risk factors related to the victim are school age, unsafe behavior, poverty and male gender; the main risk factors related to the surrounding environment are traffic volume, average vehicle speed, legal speed limits (and their violation), location and type of houses, lack of leisure areas, inadequate protection of leisure areas, number of parked cars, and poor street lighting; the major risk related to drivers is alcohol consumption.^{107,108}

The concept of traffic calming, consolidated in the 1980s, combines multiple changes in traffic engineering (ostensive traffic signs, speed controllers, areas with restricted access to vehicles, pedestrian refuge islands, barriers, speed humps), which reduce the negative effects of the use of vehicles (mainly vehicle speed and inadequate driver's behavior) and improve road conditions for pedestrians. In terms of the surrounding environment, it is an interesting and thriving intervention, due to the reduction in the risk of pedestrian/motor vehicle collisions, and change of urban environments into more esthetically pleasant ones.⁵⁴ A systematic review revealed 16 controlled, before and after studies, which indicated an average reduction of 11% in traffic-related deaths by the use of traffic calming measures.¹⁰⁹

Society: cultural factors

Addressing the impact of the macroenvironment on injuries and their control requires some specific approaches. International studies underscore two major issues: the necessity for coordinated "top-down" actions, preferably by the management conducted by a nationwide government organization (e.g.: NCIPC, in the USA),^{22,110,111} and "top-down" initiatives, based on community projects (e.g.: safe communities of the WHO model).¹¹²⁻¹¹⁵ Such discussion does not usually include pediatricians in their major role as clinicians, except under circumstances in which they assume their responsibility of social and political participants.³¹

The Brazilian society is still halfway through the epidemiological transition between the stage at which proportional mortality from injuries is still increasing and the stage at which injury control begins to be successful.^{116,117} The common agreement among experts that the disorganized adaptation to modern technologies and products – without due attention to safety patterns and behaviors – increases the risk of injuries, leads to the acknowledgment of several negative socioenvironmental factors: high rates of functional illiteracy, excess of unsafe products, overcrowded households, excessive number of pedestrians on unsafe streets, lack of mass transportation, increase in handgun sales, work environments without safety rules, poor community organization, lack of communication between social sectors, inappropriate or wrongly applied laws, low safety priority among government actions, shortage of economic resources and low academic commitment to safety.^{54,76,89} Nonetheless, controversies exist on generalizations about the influence of socioeconomic differences and geographical and cultural transitions on the risks of injuries.^{52,118,119} As described above, several studies argue about the contribution of poverty alone to the increase in injury rates, suggesting that the proximity to relatives may yield positive results, that household overcrowding may be related to greater chances of supervision, that richer children may suffer more injuries while performing some activities and that children of separated parents may not have their injury risk increased.^{71,120-123}

A typical example of epidemiological transition is the Brazilian traffic, which has distinct elements coexisting with other elements that are characteristic of both developed and primitive societies.¹⁴ As in industrialized countries, traffic-related injuries are the major cause of death among preschoolers (which does not occur in very poor countries), maintaining this rank throughout school age, and being more remarkable during adolescence.¹²⁴ On the other hand, as in poor countries, the context of traffic in Brazil is full of contrasts, including predominance of pedestrians and a large number of circulating motorcycles.¹⁰⁵ Mortality has shown the same global upward tendency, whereas the opposite occurs in industrialized countries. In spite of this, several towns have succeeded in their strategies for traffic-related injury prevention, by enforcement of safety laws, usually with a narrow focus on issues such as the use of safety belts and speed controllers.¹⁰⁶

Some government actions have been especially important for safety promotion in Brazil. The implementation of the new Brazilian Traffic Code, in 1998, one of the few laws in the world that demand that children younger than 10 years ride on the back seat and wear a safety device, was efficient in determining the use of safety equipment and reducing underaged drinking and driving.¹²⁵⁻¹²⁷ The establishment of the Brazilian Policy for Reduction of Morbidity and Mortality from Injuries and Violence, in 2001, proposed the development of a set of systematic actions for the adoption of safe and healthy behaviors and environments, control over the occurrence of injuries, consolidation of care at all levels (prehospital, hospital and rehabilitation) and qualification of human resources, through the support for research development.^{128,129} A more recent example of society's response to a good government initiative is the significant support of the Disarmament Statute, through which thousands of firearms were given up to authorities.¹⁴

At the third sector level, Brazilian society has been quite active, with the creation of several nongovernmental organizations devoted to different safety promotion areas, especially traffic and violence, which have been efficient in raising the awareness of communities, implementing public policies, lobbying for the passing of safety laws and, especially, proposing creative actions.¹⁴ For instance, the *Vida Urgente* organization gives adolescents a safe ride home after a night out, thus reducing the risk of drunk driving.¹³⁰ Other examples include: *Viva Rio*, *Desarme.org*, Movement for the Prevention of Urban Risks, *Projeto não-violência*, *Instituto Sou da Paz*, Safe Kids Brasil, Program for Reduction of Aggressive Behavior among Students, and Brazilian Association of Injury Prevention.¹³¹⁻¹³⁸ The drawback is that, despite the great activities of these organizations, each in their field, there is no advanced pattern of communication and interdisciplinarity, which could considerably improve their collective action.¹⁴

Another macroenvironmental problem is the negative effect of market globalization on the safety conditions of less developed countries. The increase in trade flow, with the manufacture of consumer goods in Brazilian factories for later export, causes the number of traffic-related injuries to rise, which is aggravated by the disproportion between the

deterioration of circulating conditions and insufficient improvement in access to emergency care.¹³⁹

Finally, a specific cultural factor is the unsolved sociolinguistic problem with the supposedly harmful use of the word accident in injury control measures. Despite the reiterated allegations that the use of nonscientific terminology justifies, at least in part, that people and especially the government do not view injuries as they do diseases, there is a paucity of contextual studies in this area.^{14,22,140-143} For the time being, pediatricians can contribute by using clear vocabulary and objective instructions when talking with families, underscoring the basic idea that injuries are not accidents.¹⁴⁴

The pediatrician's roles

Contextual pediatrics, according to Morris Green, who coined the term, is a mere extension of traditional clinical practice, i.e., the major duty of every pediatrician.²³ In this regard, caring for children and adolescents, their families and their culture in a holistic fashion, considering a wide range of evidence-based therapeutic options – already referred to as holistic medicine –, is simply good medicine.³⁶ The best way for pediatricians to assume their roles in this process is by strengthening their longitudinal relationship with families, enjoying the opportunities for constructive intervention; by proposing a therapeutic alliance based on trust; by being able to refer the most difficult problems to other health professionals.²³

With regard to injury control, several studies have demonstrated that families see pediatricians as their first source of information about prevention and that they eventually learn better from them.^{48,145} Scientific evidence exists that family guidance about injury risks inherent to each stage of development can increase knowledge, as well as the adoption of efficient safety measures; also, primary care physicians are the ones who best engage in preventive guidance, with their conviction that it is an important health problem.^{55,76,103,146,147} However, it should be highlighted that a positive effect on the behavior of families in terms of safety only occurs if the access to products, such as bars for windows, safety seats, locker and door latches, by way of community-based programs, is allowed.¹⁴⁸ On the other hand, preventive guidance has been poorly practiced by pediatricians, who address safety issues in about 70% of appointments, but superficially.¹⁴⁹ Pediatricians should instruct on how to prevent each specific type of injury, focusing on simple measures, placing emphasis on passive protective measures, which may be able to render the household "injury-proof," by protecting children regardless of their individual behavior.^{68,89,150} Experts suggest that lists of safety issues per age group be used, with explicit process and content.¹⁴⁹ A more modern tool, whose use tends to increase, also in Brazil, is e-mailing, which offers the great advantage of allowing asynchronous communication, with the transfer of unlimited-sized files containing educational and audiovisual aids.^{151,152} Given that the handout of written material (printed or via e-mail) increases the efficiency of counseling,¹⁵³ pediatricians have

two excellent materials (in a format that allows printing and free reproduction) within the reach of their hands: the Passport for Safety, available from the SBP website (www.sbp.com.br/show_item2.cfm?id_categoria=24&id_detalhe=392&tipo_detalhe=s), and the Calendar of Safety Counseling, available from the SPRS website (http://www.sprs.com.br/home_sprs_2005_voce_precisa_detalhe.asp?C%F3digo=6). Both materials are based on scientific evidence and are inspired by the American Academy of Pediatrics Injury Prevention Program (www.aap.org/family/tippmain.htm).^{49,50}

Finally, a responsibility that should never be shirked by any pediatrician is to actively advocate safety promotion, in different situations, beyond clinical practice.^{33,43,104,154,155} There are three classic examples of pediatricians who developed efficient and focused actions on child safety: Abe Bergman, from Seattle, USA, who struggled to have the Flammable Fabric Act passed in 1977; Robert Sanders, from Tennessee, who, in that same year, after hard work, succeeded in passing the first state law that obliged children to be carried in safety seats in vehicles; and Murray Katcher, from Wisconsin, who, after 10 years of lobbying and spearheading community efforts, managed to set a national standard for water heater temperature control.⁴³ All of them were pioneers in what nowadays is denominated academic clinics, which seeks to turn scientific evidence into contextual changes in the name of health.¹⁵⁴ Advocating injury control is an art and a science, which consists in at least choosing a preventive strategy based on academic evidence, sending

clear messages to the right forums, gathering support from the community, studying and applying social marketing and behavior change theory principles and assessing results sequentially.^{43,154}

Conclusion: looking ahead to the present

The world epidemic of the so-called accidents and violence – injuries – has just begun: Table 5 shows how worse proportional morbidity and mortality from external causes will be in the next years, according to World Health Organization estimates.¹²⁴ However, by looking ahead, we see what is happening at present: with an increasingly more efficient control over communicable diseases, traffic injuries and violence (alongside wars, at the global level) become a priority in public health and an absolute priority for pediatricians. Presently, in Brazil, they cause up to two thirds of deaths among children and adolescents. Pediatricians do not witness these deaths, since even those cases that receive medical care are often treated by emergency crews, but pediatricians know these deaths will occur and that their commitment towards families goes way beyond preventive measures. In addition to their role of counselors and safety promotion advocates, described above, they are key to the “medical home,” which is characterized by easy access to continuous, comprehensive, family-centered, integrated and affective health care, which should also respect different cultural contexts.¹⁵⁶

In sum, pediatricians still need a lot of science and art to deal with the web of sociocultural factors that determine

Table 5 - Rank order of major diseases the cause life year loss*, in the world, 1990-2020

1990		2020
Lower respiratory infections	1	1 Ischaemic heart
Diarrhea	2	2 Depression
Perinatal diseases	3	3 Road traffic accidents
Depression	4	4 Cerebrovascular disease
Ischaemic heart	5	5 Pulmonary disases
Cerebrovascular disease	6	6 Lower respiratory infections
Tuberculosis	7	7 Tuberculosis
Measles	8	8 War injuries
Road traffic injuries	9	9 Diarrhea
Congenital anomalies	10	10 HIV
Malaria	11	11 Perinatal diseases
Pulmonary diseases	12	12 Violence injuries
War injuries	16	13 Congenital anomalies
Violence injuries	19	24 Malaria
HIV	28	25 Measles

* Disability Adjusted Life Years (DALYs). Adapted from Peden M, McGee K, Sharma G. The injury chart book: a graphical overview of the global burden of injuries. Geneva: World Health Organization, 2002.

injuries, as well as with their control. In the meantime, each individual must take on their role in the promotion of safety countermeasures in the community, by participating in an interdisciplinary work, and adapting the original concept of safe community¹¹² to their neighborhood. The mainstay of this effort is the academic research on the changes to children's health needs – and, in particular, on injury control. Although the nature of such changes is difficult to predict, pediatricians' actions should be based on them, instead of on predefined knowledge and skills.¹⁵⁷ In addition, it is crucial not to lose the perspective that injuries are directly related to socioeconomic inequalities; therefore, as any other citizen, pediatricians have to do their part in the improvement of democratic institutions which, in a final analysis, regulate social context.^{14,22,32}

As Robert J. Haggerty put it: "A major challenge to general pediatrics in the 21st century is this: How will we as a society and as a profession begin to deal with these most common disabling problems of young people? The solution will not be accomplished by pediatricians alone; we must become partners with others, or we will become increasingly irrelevant to the health of children".³⁰

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