Child & Youth Unintentional Injury:

1994-2003 10 Years in Review

Safe KIDS CANADA
Sécuri JEUNES CANADA

Updated July 2007

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Dear Friends,

What comes to mind when you think of the leading threat to children's health? If you are like many Canadians, disease or obesity might top your list. Yet injury is the single leading cause of death to Canadian children after the first year of life.

Safe Kids Canada was founded in 1992 by Dr. David Wesson, a surgeon at Toronto's Hospital for Sick Children who saw the devastating results of injury every day. Our mission is to help prevent injuries to children – not the minor bumps and bruises of everyday life, but the serious, often devastating injuries that lead to hospitalization or death.

In 1997, Safe Kids Canada launched Safe Kids Week, a national public awareness campaign that focuses on a specific injury topic each year. The campaign, Safe Kids Canada's largest communications initiative, has been a 10-year partnership with Johnson & Johnson. The relationship is more than a financial sponsorship; the company is an active partner in the campaign, harnessing its network of retail stores to distribute educational materials to parents.

About this report

As we approached the 10th anniversary of Safe Kids Week, it was time to ask: Have injury prevention efforts made a difference in the lives of Canadian children? We commissioned data from the Canadian Institute for Health Information and Statistics Canada to capture changes in the death and hospitalization trends for childhood injury over a 10-year period from 1994 to 2003, the most recent years for which data was available. Have injury rates dropped and, if so, in what areas? What other notable trends appear with regards to other factors, such as age or time of year?

The results show that the overall death rates for childhood injury have dropped by 37%, and hospitalization rates by 34%. In some areas, such as pedestrian injuries and poisoning, the rates have dropped by half. This is promising news indeed. But the data also graphically highlights specific areas that have not seen a significant drop in injury rates, areas that need increased attention.

In each section of this report, we present what we learned from the data, outline what works to prevent injuries, and describe what further changes are needed to keep children safe. This document is not intended to be a comprehensive look at all injury topics, but instead highlights issues that are a particular focus for Safe Kids Canada as a result of Safe Kids Week campaigns and other initiatives.

The data in this report focuses on children from birth to age 14 (inclusive) and is about unintentional injuries only, not those considered intentional (resulting from acts of violence or attempts at suicide). A detailed description of the methodology used in this report is on page 31.

The burden of injury

Despite the promising drop in injury rates, injury remains responsible for more deaths to Canadian children age 1 to 14 than any other cause. (Children from birth to age 1 are excluded because of a high infant mortality rate from prenatal conditions and congenital malformations.) The purpose of comparison is not to minimize the seriousness of other conditions, but to highlight that injury does not receive an appropriate amount of public attention and funding.

Over the 10-year period of this report, an estimated 390 children age 14 and under die every year and another 25,500 are hospitalized.

Safe Kids Canada would like to acknowledge the invaluable contribution and assistance of researchers at York University, the Canadian Institute for Health Information, Statistics Canada, CHIRPP (Canadian Hospital Injury Reporting and Prevention Program) and expert advisors across the country in producing this report.

Many people see injuries as "accidents" or as something that happens to others. Yet if more people knew the burden of injury and understood that injuries can be prevented, society would not tolerate the impact of this invisible epidemic.

Childhood injuries are a devastating problem around the world. The World Health Organization (WHO) reports that in 2002, more than 700,000 children age 14 and under were killed by an injury. WHO data shows that over 90% (approximately 630,000) of these injuries are due to unintentional causes.[1] This does not represent the full scope of the problem. Many children survive their injuries but live with permanent disabilities, both physical and emotional. For a child, this can mean a lifetime of living with the consequences of an injury. The stress on these children, their families, and the healthcare system cannot be underestimated. In Canada, injuries to children cost $4 billion a year.[2]

Safe Kids Canada is part of Safe Kids Worldwide, a global network of organizations, whose mission is to reduce preventable injuries around the world. Safe Kids Worldwide is working toward an overall global 25% reduction in preventable injuries by 2016.

Prevention works

Reducing childhood injuries requires a coordinated approach often referred to as the "three E's": education, engineering, and enforcement. Education includes public awareness campaigns, such as Safe Kids Week; engineering involves building safer environments, such as installing speed bumps; and enforcement comprises both improving public policy and enforcing laws or standards. Evaluation completes the picture by providing data on the most effective strategies. Research by the WHO has confirmed that these kinds of multidisciplinary methods are effective in reducing both the risk and severity of injuries in higher-income countries.[3]

Some Canadian initiatives over the last 10 years have resulted in a considerable increase in the use of proven safety measures, such as bike helmet and booster seat legislation. Canada needs more of these kinds of efforts.

No one organization can lay claim to reducing injuries, but collectively we are making a difference. The overall reduction in injury rates can be attributed in part to the combined efforts of legislators and public policy makers, medical and public health professionals, safety organizations, community partners that run local programs, and corporate sponsors. Special recognition goes to our founding sponsor and partner, Johnson & Johnson, which has generously sponsored both Safe Kids Canada and Safe Kids Week for 10 years.

Although injury prevention efforts have been increasing in the past decade, it is time to change the pervasive belief that injuries are "acts of fate" and to encourage society to view injuries as practitioners do – as significant, predictable, and preventable.

Preventing future injuries – A call to action

To move forward, injury prevention in Canada needs greater investment of public funds. Other countries have seen significant gains in reducing injuries by combining leadership and coordination with sustained infrastructure support.[4] If Canada attained a level of childhood injury control at a rate comparable to that achieved in Sweden, 1,233 Canadian children who died in the 4-year period between 1991 and 1995 would be alive today.[5]

In 2001, Safe Kids Canada made recommendations to the Commission on the Future of Health Care in Canada, urging the federal government to make injury prevention a high priority.

Currently, Safe Kids Canada is part of the effort behind a national injury prevention strategy before the federal government, calling for an annual $50 million federal investment to reduce injury for all Canadians, including children.

The strategy calls for 6 key components:

- Leadership for a national injury prevention strategy at the Public Health Agency of Canada
- Support for healthy public policy development
- Effective surveillance of injury patterns
- A research agenda to find solutions to injury problems
- Support for local injury prevention initiatives
- Support for public education and information

Canada needs a strategic vision for sustainable investment in injury prevention, with a goal of improving the coordination of efforts and translating current research into practice.

Collectively, we have more knowledge than 10 years ago about which initiatives work. But those of us who work in injury prevention need more complete, consistent, and better data about injury patterns; the ability to conduct targeted research into the effectiveness of injury prevention efforts; and coordinated resources to run programs and to change behaviour. We also support advances in treating injury within the healthcare system.

It only takes a second for a child's life to change forever. In 2003, the last year of data for our report, 300 children were killed and 20,500 were hospitalized from their injuries. We clearly have much more to do to protect Canadian children.

Allyson Hewitt
Executive Director
June 2006

Key findings

- In 1994, 500 children from birth to age 14 died and 32,500 were hospitalized for unintentional injuries. Ten years later, in 2003, 300 children died and 20,500 were hospitalized.
- The overall injury death rate among children from birth to age 14 declined by 37% between 1994 and 2003.
- The overall rate of injury hospitalizations from birth to age 14 declined by 34% between 1994 and 2003.
- The three leading causes of injury-related death are motor vehicle collisions (17%), drowning (15%), and pedestrian (14%).
- The major cause of injury-related hospitalization is falls, accounting for nearly half (44%) of all admissions. Of these, 7% happen on playgrounds, and 37% take place at home, schools, and elsewhere. All other causes of injury each accounted for less than 10% of hospitalizations.
- The highest decline in combined death and hospitalization rates was for pedestrian injuries (52%). The decline of injury rates for other mechanisms is as follows: poisoning (49%), threats to breathing (48%), child passenger injuries (46%), burns (43%), falls (40%), bike injuries (29%), drowning (28%), and playground falls (27%).

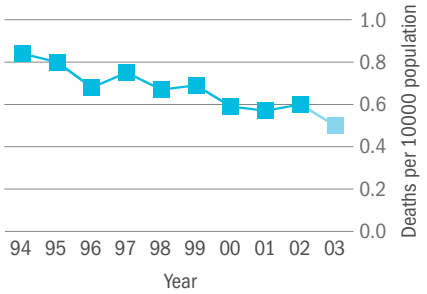
Death rates

Over the 10-year period, an estimated average of 390 Canadian children age 14 and under died from unintentional injuries each year.

The injury death rate among children age 14 and under declined by 37% between 1994 and 2003.

Rates of unintentional injury deaths among Canadian children aged 0-14 years, 1994-2003

Source: Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



The decline in injury deaths suggests that prevention efforts are having an impact. As one example, injury declines related to cycling may be due to an increase in the use of bike helmets due to legislation and education, although there may also be a decrease in cycling.

Hospitalization rates

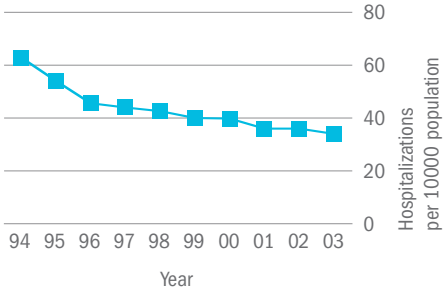
Over the 10-year period, an estimated average of 25,500 children age 14 and under were hospitalized each year for serious injuries such as traumatic brain injuries, internal injuries, and complex fractures.

When evaluated against the population data, this means that 1 in every 230 Canadian children age 14 and under is hospitalized for a serious injury in any given year.

The rate of injury hospitalizations for children age 14 and under declined by 34% between 1994 and 2003.

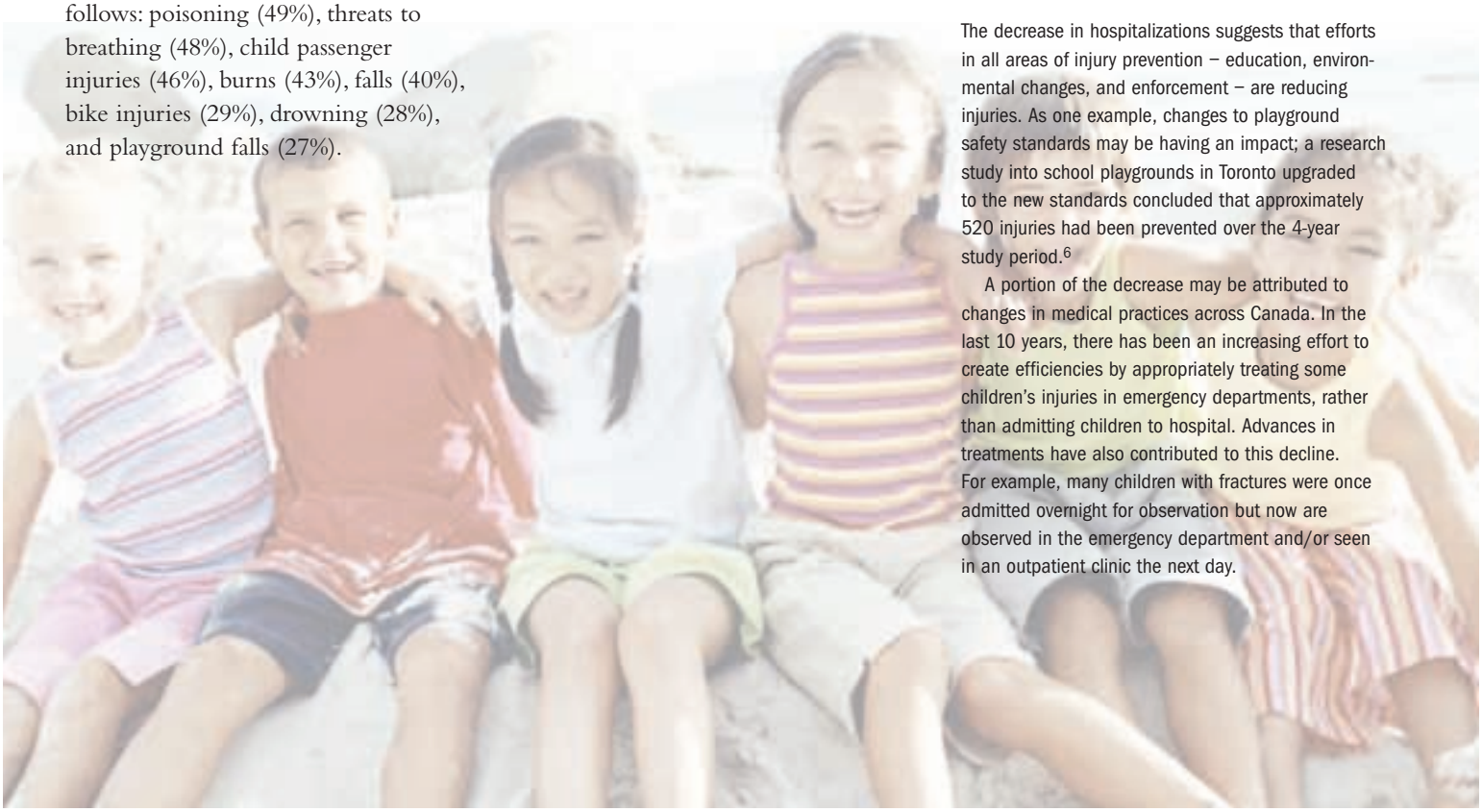
Rates of unintentional injury hospitalizations among Canadian children aged 0-14 years, 1994-2003

Source: Canadian Institute for Health Information



The decrease in hospitalizations suggests that efforts in all areas of injury prevention – education, environmental changes, and enforcement – are reducing injuries. As one example, changes to playground safety standards may be having an impact; a research study into school playgrounds in Toronto upgraded to the new standards concluded that approximately 520 injuries had been prevented over the 4-year study period.[6]

A portion of the decrease may be attributed to changes in medical practices across Canada. In the last 10 years, there has been an increasing effort to create efficiencies by appropriately treating some children's injuries in emergency departments, rather than admitting children to hospital. Advances in treatments have also contributed to this decline. For example, many children with fractures were once admitted overnight for observation but now are observed in the emergency department and/or seen in an outpatient clinic the next day.

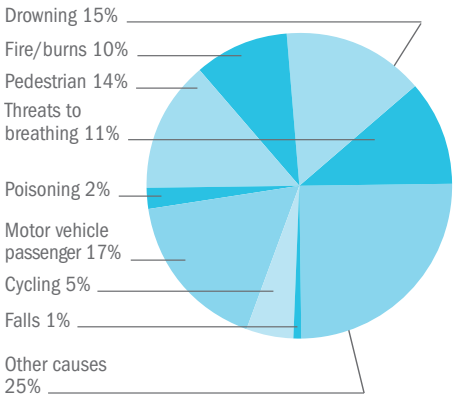


Causes of injury

The three leading causes of childhood injury death are motor vehicle collisions (17%), drowning (15%), and pedestrian injury (14%).

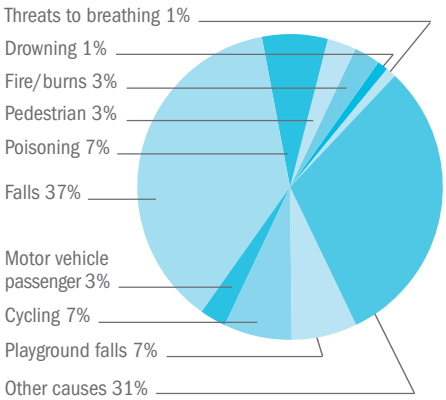
Major causes of unintentional injury deaths among Canadian children aged 0-14 years, 1994-2003

Source: Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



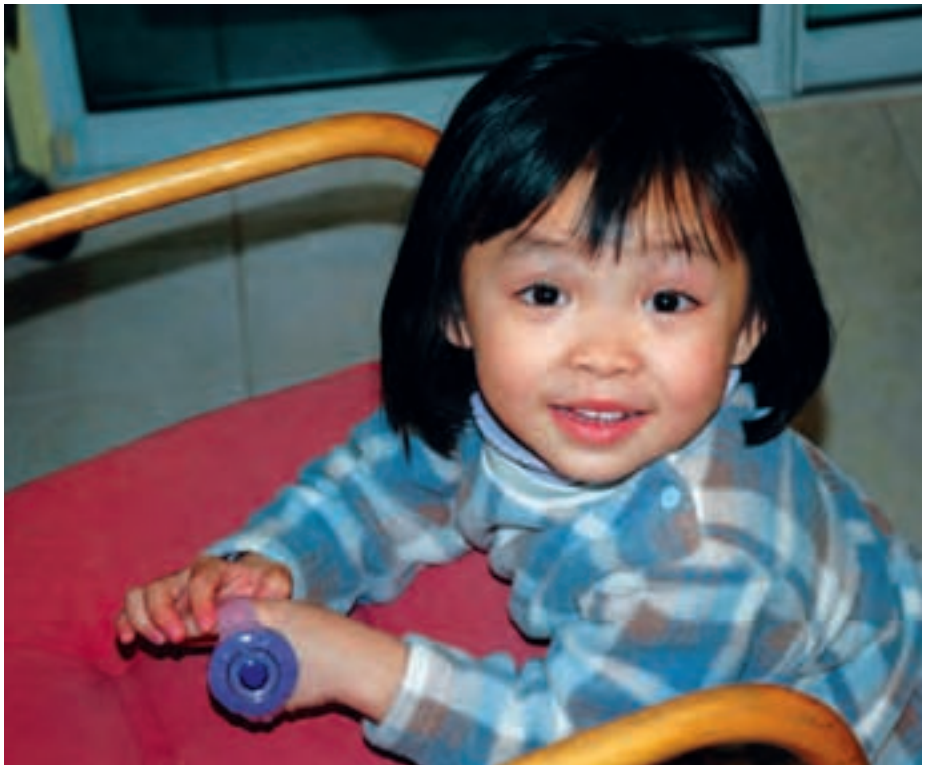
Major causes of unintentional injury hospitalizations among Canadian children age 0-14, 1994-2003

Source: Canadian Institute for Health Information



One cause of hospitalization clearly stands out from the others. Falls account for nearly half (44%) of all hospitalizations. Approximately 7% of falls take place at the playground; another 37% happen in other locations such as homes and schools.

Note: "Other causes" refers to types of childhood injury deaths that have not been covered in this report, such as sports-related deaths, firearms, or machinery. The data is gathered in such a way that it often captures whether a child was struck by and/or struck against something, rather than the activity that the child was involved in at the time of injury.



Comparison of injury to other causes of death

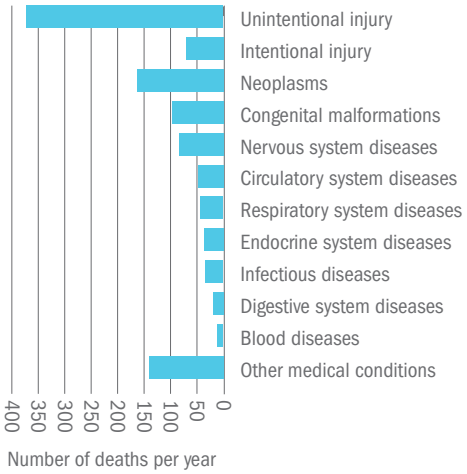
Despite the reduction in death rates, unintentional injury remains the leading cause of death for children ages 1 to 14.

The purpose of this comparison is not to minimize the seriousness of other conditions, but to highlight that injury does not receive an appropriate level of public attention.

A Safe Kids Canada survey in 2006 showed that the majority of parents do not understand the risk of serious injury to their children. Nearly one-quarter (24%) of Canadian parents believe that the leading health risk to children is obesity, inactivity, and nutrition, followed by "don't know" (23%), diseases such as cancer and diabetes (13%), and smoking and secondhand smoke (12%). Unintentional injury was ranked fifth (9%). Other causes mentioned less frequently included violence, drugs, foolish behaviour, and environmental causes/pollution.[7]

Causes of death to Canadian children age 1-14 years, 1994-2003

Source: Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Age

The main causes of death vary depending on the age group:

- **Under age 1:** threats to breathing (41%); motor vehicle passenger (14%); and drowning (8%)
- **Ages 1 to 4:** drowning (23%); motor vehicle passenger, burns and pedestrian (14% each); and threats to breathing (11%)
- **Ages 5 to 9:** motor vehicle passenger and pedestrian (18% each); drowning (13%); and burns (12%)
- **Ages 10 to 14:** motor vehicle passenger (19%); pedestrian (14%); drowning (10%); and cycling (9%)

The leading causes of hospitalization also vary by age group (only causes exceeding 10% are listed):

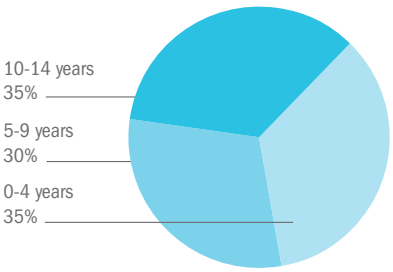
- **Under age 1:** falls (49%)
- **Ages 1 to 4:** falls (33%) and poisoning (18%)
- **Ages 5 to 9:** falls (36%) and playground falls (15%)
- **Ages 10 to 14:** falls (36%) and cycling (10%)

The growth and developmental stage of a child can play a role in injury. For example, children ages 1 to 4 are at high risk for drowning because they are attracted to water but do not understand its dangers. Children ages 5 to 9 and 10 to 14 are at higher risk for motor vehicle passenger injuries because they may not be safely seated or restrained in the car.

Proportion of unintentional injury deaths and hospitalizations among Canadian children by age group (age adjusted rates), 1994-2003

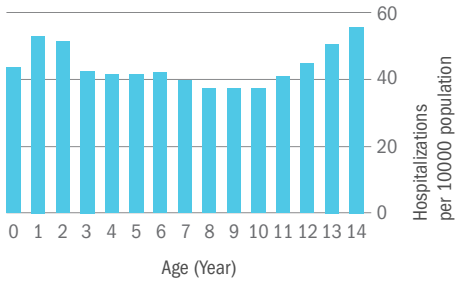
Sources: Canadian Institute for Health Information; Statistics Canada

[Deaths for 2003 were estimated from trends for the years 1994-2002]



Rates of unintentional injury hospitalizations among Canadian children by age, 1994-2003

Source: Canadian Institute for Health Information

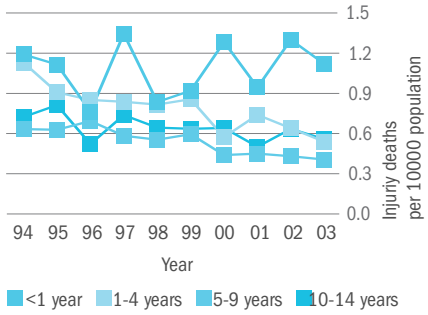


This chart illustrates that injury is a concern for all ages. It is interesting to note that there is a peak in the toddler years (ages 1 to 2), as well as a gradual rise that begins again in the preteen years and continues to increase throughout adolescence. The toddler stage is when children become mobile and start to explore their worlds, putting them at risk for many different hazards. The gradual increase starting at about age 11 speaks to the growing independence – and sometimes risk-taking – of preteen and adolescent years.

Rates of unintentional injury death among Canadian children by age group, 1994-2003

Source: Statistics Canada

[Deaths for 2003 were estimated from trends for the years 1994-2002]



Injury death rates decreased among children ages 1 to 4 by 52%, among ages 5 to 9 by 36%, and among ages 10 to 14 by 23%. There was no decline in the rate for children under age 1.

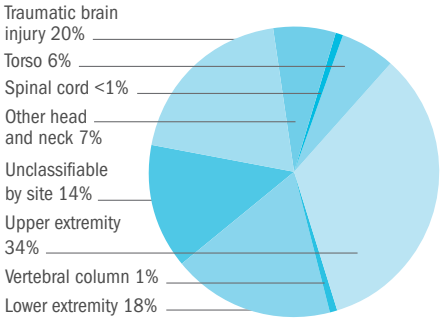
Types of injuries

There is a misconception on the part of many parents and caregivers that injuries are a normal part of childhood. Yet injuries are often serious, not bumps and bruises.

Approximately 1 out of every 230 Canadian children is admitted to hospital every year with a serious injury. One in 5 (20%) of these children will have suffered a traumatic brain injury.

Unintentional injury hospitalizations by body region among Canadian children aged 0-14 years, 1994-2003

Source: Canadian Institute for Health Information



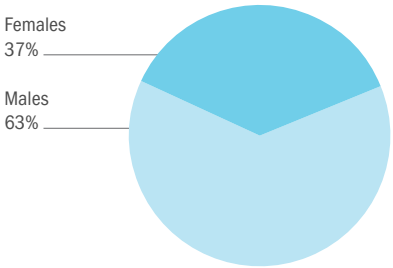
Gender

Some theories about gender differences in injury relate to potential predisposed differences such as higher impulsivity and activity levels in boys. Other theories look at socialization. For example, research shows that parents tend to treat boys and girls differently when it comes to responding to risk-taking in play – boys get more encouragement to take risks, while girls get more words of caution. Furthermore, children seem to internalize these different attitudes at a young age – by age 6, both boys and girls believe that girls are more likely to get hurt, even though boys actually get hurt more often.[8]

It is interesting to note, however, that injury rates for playground falls did not match this trend – boys and girls suffered nearly an equal amount of injuries.

Proportion of unintentional injury deaths and hospitalizations among Canadian children aged 0-14 years by gender, 1994-2003

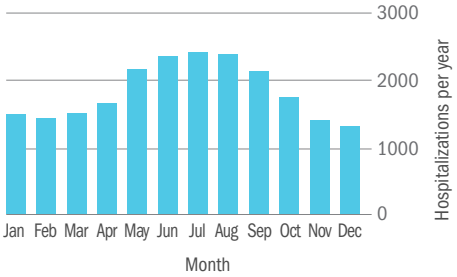
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Time of year

Unintentional injury hospitalizations among Canadian children aged 0-14 years by month, 1994-2003

Source: Canadian Institute for Health Information



Children are more likely to be injured during months with warmer weather, possibly due to increased outdoor activities and/or increased leisure time.

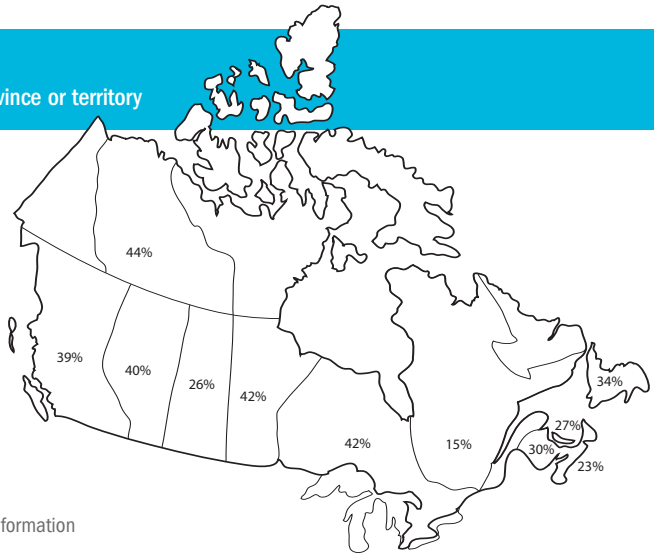
Region

The trend towards reduction of childhood injury is seen in all the provinces and territories across the country. However, there are variations in the magnitude of this change. These can be influenced by various factors including demographics, injury problems specific to an area, and the various prevention initiatives undertaken at the provincial or territorial level.

Hospitalization rate decline by province or territory

Province/Territory	*Decline*
Yukon, Northwest Territories and Nunavut	44%
British Columbia	39%
Alberta	40%
Saskatchewan	26%
Manitoba	42%
Ontario	42%
Quebec	15%
New Brunswick	30%
Prince Edward Island	27%
Nova Scotia	23%
Newfoundland	34%

Source: Canadian Institute for Health Information



10 years of Safe Kids Week

Bartek Roszack with his mom at Safe Kids Week 2002: Got wheels? Get a helmet!

In 1997, Safe Kids Canada launched Safe Kids Week, a national public awareness campaign to reach parents and caregivers through the media, community activities, and retailers.

The campaign focuses on a specific injury theme each year, highlighting what parents and caregivers can do to keep their children safe. This is part of Safe Kids Canada's overall philosophy of health promotion: If you're going to talk about the risks, you must also provide the solutions.

Each year Safe Kids Week increases in scope and reach, with extensive national media coverage and community participation across the country. Hundreds of community partners run local programs during the campaign, from mall displays and hands-on prevention workshops to school-based programs and news conferences. Sponsor Johnson & Johnson also harnesses the power of its substantial retail network by recruiting stores to display and distribute safety information. Post-campaign evaluations have shown that approximately 1 in 10 Canadian parents learn the campaign's safety tips through retailers, media, or community partners.[9, 10]

While each year's Safe Kids Week has particular successes and notable events, some highlights stand out. A list of some of these milestones follows.

Safe Kids Week 2001: Hot water burns like fire

Tap water hotter than 49°C (120°F) can severely burn a child's sensitive skin. Most Canadians are unaware of the temperature of their hot tap water.[11] In many homes, it is routinely set at 60°C (140°F), leaving children vulnerable to severe scald burns in a matter of seconds.

As part of Safe Kids Week 2001, Safe Kids Canada and Johnson & Johnson produced and distributed temperature cards that could quickly measure the safety of hot tap water. Public health partners also used the cards to test the water in individual homes when conducting home visits. A post-campaign study showed that approximately 48% of Canadian families, exposed to the campaign, reduced the water temperature in their homes as a result of using the temperature cards.[12] The Safe Kids Week 2001 campaign reached a significant proportion of parents of young children.[13]

In the 5 years since the campaign, Safe Kids Canada has advocated "built-in" protection in Canadian homes. More than 300 partners have sent letters advocating for building code improvements to include water temperature control. In 2004, Ontario became the first province to move ahead with new building code regulation changes for decreased water temperature.

Safe Kids Week 2002: Got wheels? Get a helmet!

Bartek Roszack was riding his bike one summer day when he was struck by a car and dragged underneath, his head wedged between the car and a wheel. The driver, unaware that he had hit someone, stopped only when he heard screams from people on the sidewalk.

Bartek was stuck underneath the car and had to undo his bike helmet to get out. He was rushed to hospital but soon released with only minor scrapes and bruises. His head had been protected by the helmet, which was split into pieces.

Fourteen-year-old Bartek was a spokesperson for Safe Kids Week 2002, showing his broken helmet and encouraging other children and youth to wear theirs. While many families have told their compelling stories of injury during Safe Kids Week, Bartek's graphically illustrated how prevention efforts can work.

In hundreds of communities across Canada, partners also spread the message by running bike helmet fitting workshops and distributing $100,000 worth of helmets to low-income families, thanks to additional funding from Johnson & Johnson.

Bartek's incident occurred 4 years after his home province passed bicycle helmet legislation for children and youth under age 18. His mother knew about the legislation and had insisted that he wear a helmet. Since the 2002 campaign, Safe Kids Canada and its partners have continued to advocate for bicycle helmet legislation as a proven strategy to prevent head injuries and deaths. Only 6 provinces currently have legislation despite evidence of its effectiveness.[14]

Safe Kids Week 2003: From Cribs to Car Seats, Are Your Kids Safe?

Before 1989, baby walkers led to injuries to 1,000 young children every year in Canada. Walkers caused more serious injuries than any other children's product. In 1989, the Canadian Juvenile Products Association and Health Canada established a voluntary ban on walkers, but many continue to be available through secondhand stores, garage sales, street vendors, cross-border shopping, and the Internet. Walkers were also often handed down through families and friends. A 2003 survey by Safe Kids Canada showed that nearly one-third (32%) of parents were using or had recently used baby walkers with wheels for their young children.[15]

In 2003, Health Canada issued an advisory on the use of baby walkers and then contemplated a ban of the product. The program began a review of the industry standard, which included an extensive consultation with stakeholders.

To support Health Canada's efforts, Safe Kids Canada focused on the dangers of baby walkers during Safe Kids Week 2003. At the national media launch, baby walkers were lined up and dramatically crushed by a steamroller. The message: Wipe out walkers! Safe Kids Canada also launched an advocacy campaign on its website in support of a ban, with more than 300 parents, doctors, public health professionals, and community members writing to Health Canada.

In 2004, Health Canada banned the sale, import, and advertisement of baby walkers in Canada – a world first. Health Canada is to be commended for seeing the need to ban this dangerous product and for moving quickly to make it happen.

Safe Kids Week 2004: Age 4 to 9? It's Booster Seat Time!

In 2002, Safe Kids Canada knew that booster seat legislation was being considered by several provinces, and had been involved in some advocacy efforts. The 2004 Safe Kids Week campaign was designed to help raise public awareness of this often-neglected stage of child passenger safety that should follow car seat use, and to give additional weight to the push for booster seat laws. Two provincial laws have passed since then: Ontario (effective 2005) and Nova Scotia (effective 2007).

In Ontario, Safe Kids Canada consulted with the Ministry of Transportation on the development of Bill 73 – An Act to Enhance the Safety of Children and Youth on Ontario's Roads, providing injury statistics and data on the effectiveness of restraints. This was used by the ministry to develop the criteria for booster seats in the legislation, such as height, age, and weight. Safe Kids Canada was also kept up-to-date on the behind-the-scenes status of the bill, and provided additional supporting documentation at critical times, when the proposed legislation met with opposition or challenges. When the law was passed, Safe Kids Canada and the ministry worked together on public education efforts.

The Ontario Ministry of Transportation deserves recognition for the way it actively sought information and consultation from key stakeholders and kept them informed throughout the process. Nova Scotia should also be commended for creating a law based on height criteria and to age 9. Safe Kids Canada continues to work with other provinces and territories.

10 years of Safe Kids Week

Year	*Topic*
1997	Family safety **Family Safety**
1998	Home safety **Keep your kids safe at home**
1999	Road safety **Rally for Road Safety**
2000	Playground Safety **Keep Your Kids Safe at the Playground**
2001	Burn prevention **Hot water burns like fire**
2002	Helmet safety **Got wheels? Get a helmet!**
2003	Product safety **From Cribs to Car Seats, Are Your Kids Safe?**
2004	Child passenger safety **Age 4 to 9? It's Booster Seat Time!**
2005	Summer safety **Make it a Safe Kids Summer**
2006	Safe Kids Week: 10 year anniversary **Celebrating a Safe Kids Future**

Ontario Minister of Transportation Harinder Takhar accepting congratulations from Allyson Hewitt, Executive Director, Safe Kids Canada on the implementation of a booster seat law in Ontario, September 2005.

Child passenger safety

Injuries related to motor vehicle collisions are the leading cause of injury-related death for Canadian children.

Motor vehicle collisions can cause multiple serious injuries such as damage to the spine and internal organs. Head injuries are also a risk for children, especially when they are not restrained properly.[16, 17] The risk of injury can be reduced by protecting children with the right kind of restraint for their age and size and using it correctly.[18, 19]

Key facts

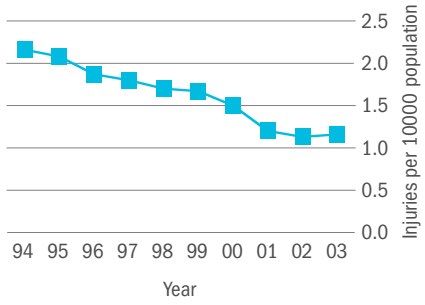
- An estimated 68 children age 14 and under are killed every year in motor vehicle crashes, and another 880 are seriously injured.
- Each year, Canadian children have an approximate 1 in 86,000 risk of dying and a 1 in 6,600 risk of being seriously injured as a passenger in a motor vehicle.
- When used correctly, car seats reduce the risk of death by 71% for infants under age 1 and 54% for children by ages 1 to 4.[20] Car seats also reduce the risk of hospitalization by 67% for children age 4 and under.[21] Booster seats provide 59% more protection than seat belts alone.[22]
- To be effective, car seats must be installed properly and used correctly every time. An estimated 44% to 81% of car and booster seats are not used correctly, putting children at risk.[23, 24, 25] In addition, nearly three-quarters of Canadian children between ages 4 to 9 are not protected by booster seats.[26]
- According to a recent analysis of severe injuries of child passengers, 92% of infants, 74% of toddlers, and 96% of school-aged children were not using the appropriate restraint at the time of the crash.[27]

Trends

Trends in motor vehicle occupant death and hospitalization rates among Canadian children aged 0-14 years, 1994-2003

Sources: Canadian Institute for Health Information; Statistics Canada

[Deaths for 2003 were estimated from trends for the years 1994-2002]

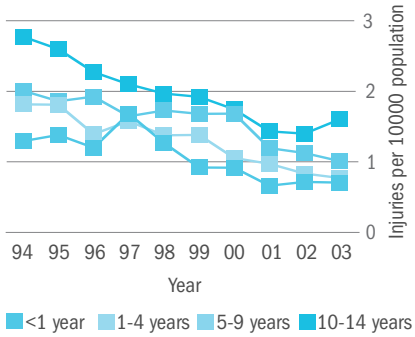


Hospitalization and death rates have declined by 46% over the 10-year period.

Trends in motor-vehicle occupant death and hospitalization rates among Canadian children by age group, 1994-2003

Sources: Canadian Institute for Health Information; Statistics Canada

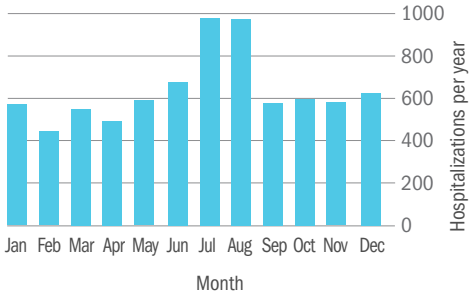
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Children ages 1 to 4 experienced the largest decline (58%), suggesting that car seat legislation introduced in most provinces in the 1980s is having an impact. The declines for all other age groups are also encouraging (under age 1, the rates declined by 46%; ages 5 to 9 by 50%; and ages 10 to 14 by 42%). Children ages 10 to 14 remain at highest risk for child passenger injuries. This illustrates the need to ensure that children in this age group are correctly restrained, ride in the back seat, and away from airbags.

Motor vehicle occupant hospitalizations among Canadian children aged 0-14 years by month, 1994-2003

Source: Canadian Institute for Health Information



The peak in child passenger injuries in July and August needs further research. It suggests increased exposure – for example, perhaps children are travelling in cars more often.

What works to prevent injury

Use car seats, booster seats, and seat belts correctly. Children should move through 4 stages of child restraints in the vehicle:

1. **Rear-facing car seat** until at least age 1 and at least 22 pounds (10 kg)
2. **Forward-facing car seat** until at least 40 pounds (18 kg), which is normally reached between ages 4 and 5
3. **Booster seat** until at least 80 pounds (36 kg) and 57 inches tall (145 cm), which are not usually reached until at least age 9
4. **Seat belt**

Used correctly, child restraints are effective because the car seat straps or seat belt are positioned over the parts of a child's body that are best able to absorb the forces of a crash.[28] The most common barriers to proper use of restraint systems include a lack of parental knowledge, inability to understand manufacturer's instructions, perceived discomfort for the child, expense, and the belief that seats do not provide extra safety.[29]

One common error is that car seat straps are left too loose, putting children at risk of being ejected during a crash.[30] Another error involves moving children from one stage of car seat use to another too early or by skipping a stage entirely. This can be dangerous; for example, a baby moved to a forward-facing car seat too soon is too small for the seat and may therefore be at increased risk of being ejected.[31] Children are also frequently moved directly from a car seat to a seat belt, rather than using a booster seat, which helps to position the belt correctly over children's bodies. When a child is too small for a seat belt, it puts her at risk for "seat belt syndrome," the medical term for the pattern of injuries to a child's internal organs and spine caused by an ill-fitting seat belt.[32, 33]

Keep children in the back seat. Research has shown that children age 12 and under who were restrained in the back seat had the lowest risk of dying in fatal crashes[34] and had a lower risk of serious injury compared to children in other seating positions.[35, 36] In addition, front seat air bags were designed for adults and can be dangerous to children and young adolescents. Air bags can expand with explosive speed. Alarmingly, frontal airbags have been shown to increase the risk of non-fatal injury to children by 84% compared to children in similar crashes who were not exposed to airbags in the front seat.[37] A recent American study found that children age 14 and under had the greatest likelihood of serious injury from airbag deployment.

Increase the correct use of child restraints through legislation, increased education campaigns, and enforcement. Legislation makes a difference.[38] In the 1970s and 1980s, the number of motor vehicle deaths and serious injuries convinced legislators to implement seat belt laws. Car seat laws soon followed. As a result, approximately 90% of Canadians now use seat belts,[39] and at least 75% use car seats.[40] In contrast, most children ages 4 to 9 are not correctly restrained in booster seats. They are required by law only in Quebec and Ontario and are reportedly used by only 28% of Canadian families.[41]

Community education campaigns, which may include giveaways and car seat training, help to increase awareness and use within targeted populations.[42, 43, 44] However, education campaigns work best when accompanied by legislation and enforcement. One American study found that booster seat use was significantly increased when a target population was exposed to an education program as well as a new law, compared to those who only knew about the law.[45] Enforcement programs, such as police spot checks for car seat use, help to increase awareness of laws and penalties.

Call to action

Enact booster seat legislation in all provinces and territories and increase enforcement. All Canadian provinces and territories should implement booster seat legislation as soon as possible and also upgrade existing car seat legislation to reflect best practices. Legislation should be harmonized across the country; current provincial and territorial laws vary widely on the age, height, and weight of children for various stages of child restraint use. Increased police awareness and enforcement programs will help to communicate the laws to parents.

Increase government investment in child passenger safety. As one example, Canada needs a nationally coordinated program that identifies, addresses, and evaluates child restraint issues such as simplifying car seat instructions and installation practices. Two key components of this would be an evaluated, funded, and sustainable training program for child restraint installation and an increase in public education. Another example includes setting road safety targets and then measuring changes over time for key injury issues such as passenger safety.[46, 47]

Make child restraint safety a priority in preventive healthcare.[48] Healthcare professionals – particularly physicians and nurses in pediatric settings, primary care and emergency rooms – are well positioned to begin to provide advice on an assessment of child restraint use as part of patient visits.[49] Research shows parents look for advice on childhood injury prevention from their primary care pediatrician.[50] Having a child in the correct restraint should be viewed in the same way as having every child immunized against infectious diseases.

Invest in research related to the design and use of car seats. Would standardized car seat models make it easier for parents to use and install them correctly? Would children be safer if they stayed in a harness system past 40 pounds (18kg)? There is some research into these important questions, but it requires dedicated funding to continue.

Preventing drowning

Drowning is the second leading cause of injury-related death to Canadian children. It can happen quickly and silently; children who survive a near-drowning (submersion injury) frequently have long-term effects from brain injury, due to a period of time without breathing.[51]

Drowning occurs most commonly in swimming pools, open bodies of water (such as lakes or streams), and bathtubs. A child can also drown when her hair or a part of her body becomes caught in a pool or hot tub drain or grate, trapping her under the water.[52]

Key facts

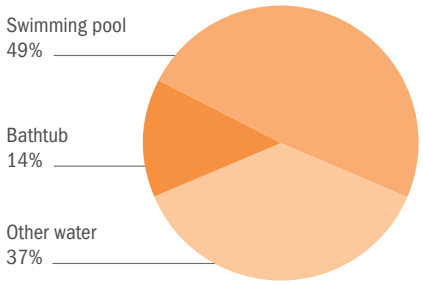
- An estimated 58 children age 14 and under drown every year in Canada, while another 140 are hospitalized for near-drowning.
- Every year, Canadian children have an approximate 1 in 100,000 risk of drowning and a 1 in 47,600 risk of near-drowning.
- While the majority (60%) of drowning incidents occur in summer, 19% happen in the spring, 13% in the fall, and 8% in the winter. Some of the winter and spring incidents may occur when a child falls through thin or melting ice.
- For children ages 1 to 4, drowning is the second-highest cause of injury-related death (15%), closely following motor vehicle crashes (17%).
- Lack of supervision is a critical factor in drowning for children of all ages. In a 10-year review of drowning incidents, the Canadian Red Cross found that 42% of drowning victims ages 5 to 14 did not have adult supervision at the time.[53] Another Canadian study showed that all children under age 2 who drowned in bathtubs had been left unsupervised for a period of time.[54]
- Drowning risks are closely tied to child development. Children under age 5 are attracted to water but lack a sense of danger. They are top heavy and vulnerable to falling into the water. Young children's lungs are smaller than adults' and fill quickly with water; they can drown quickly in as little as 5 cm (2 in) of water. From ages 5 to 14, children are at risk because they may overestimate their own skills, underestimate the depth of the water or strength of the current, or respond to a dare from a friend.

Trends

Proportion of drowning deaths and hospitalizations among Canadian children aged 0-14 years by location, 1994-2003

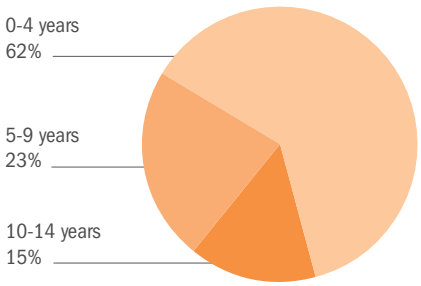
Sources: Canadian Institute for Health Information; Statistics Canada

[Deaths for 2003 were estimated from trends for the years 1994-2002]



Proportion of swimming pool related drowning deaths and hospitalization among Canadian children by age group (age-adjusted rates), 1994-2003

[Data note – these percentages take into account the population numbers for each age group]

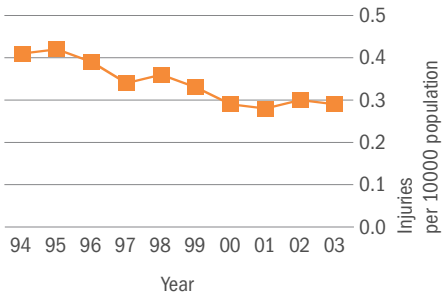


Half (49%) of all drowning deaths and near-drowning incidents occur in swimming pools. Although children under age 5 account for nearly two-thirds (62%) of these incidents, older children are also at risk. This speaks to the importance of ensuring that pools are surrounded by appropriate fencing to keep younger children from accessing the water without an adult's knowledge, and of supervising children of all ages when they swim or play near the water.

Trends in drowning death and hospitalization rates among Canadian children aged 0-14 years, 1994-2003

Sources: Canadian Institute for Health Information; Statistics Canada

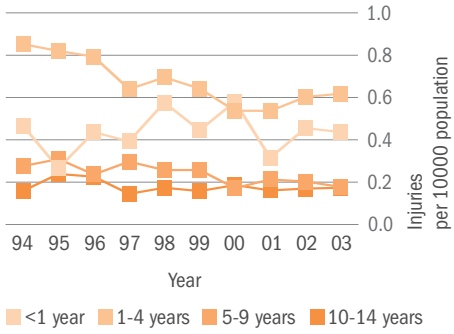
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Trends in drowning death and hospitalization rates among Canadian children by age group, 1994-2003

Sources: Canadian Institute for Health Information; Statistics Canada

[Deaths for 2003 were estimated from trends for the years 1994-2002]



Drowning and near-drowning rates have declined by 28% in the 10-year review period.

Children ages 1 to 4 remain at highest risk for drowning, although there was a decline of 27% over the 10-year period. There was no decline in children under age 1; the wide fluctuations in the graph for that age group are due to the small number of cases. Drowning and near-drowning incidents declined in children age 5 to 9 by 36%, but there was no change at all in 10 to 14 year-olds.

What works to prevent injury

Install 4-sided fencing around home swimming pools with an automatic, self-closing gate. Swimming pools are involved in nearly half of all drowning and near-drowning incidents for children age 14 and under. Pools are a particular hazard for children under age 5. A 1.2 m (4 ft) high, 4-sided fence with a self-closing gate helps prevent children from reaching the pool.[55] In many homes, the backyard is surrounded by a fence, but the pool can still be reached directly from the house. This allows children dangerous access to the pool.

Researchers estimate that proper fencing could prevent 7 out of 10 drowning incidents in private swimming pools for children under age 5.[56] Pool gates and fences should be made of vertical bars, not horizontal bars or chain-mesh because children can climb these.

Wear life jackets on boats. Approximately 90% of recreational boaters who have drowned in Canada were not wearing life jackets.[57] In some cases, the person who drowned had put on a life jacket but left the straps unbuckled. Boaters should choose life jackets that fit according to weight and buckle the straps. Canada's cold waters may make it hard for even a strong adult swimmer to survive until rescue without a life jacket.

Avoid baby bath seats. Babies under age 1 are more likely to drown in the bathtub than in any other location.[58] In 2005, Health Canada issued a product advisory stating it had received reports of 11 drowning deaths linked to the use of infant bath seats and bath rings since 1991. Three of these deaths were in 2004 alone.[59] In addition, Canadian paediatricians reported 20 injuries and 12 near-miss drowning incidents involving baby bath seats between 2003 and 2005.[60] Although warning labels may recommend that parents or caregivers stay close by, the product can mistakenly be seen as a safe substitute for supervision, giving adults the misconception that they can do other activities while the child is in the tub.[61, 62]

Teach children how to swim in combination with survival skills training. Research shows that swimming ability cannot by itself prevent drowning.[63] More than half of the Canadians who drown in recreational boating incidents could swim.[64] Programs that combine swimming lessons with survival skills training, such as how to swim safely in hazardous environments, are promising.[65] There is limited research on the effectiveness of swimming lessons in preventing drowning and near-drowning among children; it is best to ensure that children have training, but not assume it provides them with special protection or extra skills.[66] Parents whose children demonstrate advanced swimming abilities may be less vigilant about supervising them when they are in or around water. The children may also be overconfident.

Supervise closely. Adults should stand within arm's reach of any child under age 5 – or any older child who does not swim well – when he is in the water or playing near water. Studies show that a lack of supervision is a major factor in many drowning incidents.[67] For extra protection, young children can be put in life jackets when playing near the water. Older children who can swim still need to be watched carefully; they may get into trouble quickly, particularly in open water.

Call to action

Enact municipal legislation requiring 1.2 m (4 ft) high, 4-sided pool fencing with self-closing gates. Many municipal bylaws require only 3-sided fencing, meaning that fencing the backyard is sufficient. This does not protect children from accessing the pool directly from the house.

Amend the federal law on life jackets to require all boaters, children as well as adults, to wear a life jacket at all times when on board. Canadians continue to drown every year because they are not wearing life jackets.[68] The law does not currently require boaters to wear life jackets, only to have them on board.

Investigate a national ban of baby bath seats. Health Canada is currently reviewing drowning deaths involving baby bath seats.[69] Safe Kids Canada supports this research; bath seats and rings are not essential child care products and may present an unreasonable burden of injury.

Preventing threats to breathing

Threats to breathing – suffocation, strangulation, choking, and entrapment – are the fourth leading cause of injury-related death to Canadian children. Children who survive may suffer brain damage because they have been deprived of oxygen for a period of time.

Major threats to breathing for young children include choking on food and small objects, strangling on objects such as ropes or blind cords, and suffocating in cribs or beds.

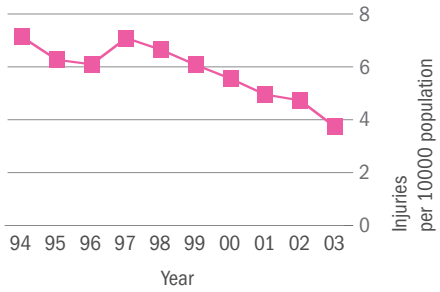
Key facts

- An estimated 44 children age 14 and under die every year in Canada from threats to breathing, while another 380 are hospitalized for serious injuries.
- Each year, Canadian children have a 1 in 132,800 risk of dying and a 1 in 15,400 risk of being seriously injured as a result of threats to breathing.
- 80% of children who are treated for threats to breathing are under age 5.
- Nearly all (94%) of hospitalizations due to threats to breathing are from choking on food or other objects, while the remaining 6% are related to a mechanical cause (for example, strangulation by blind cords).
- An American study found that latex balloons were the third most common cause of choking deaths for young children.[70] A piece of balloon is particularly difficult to dislodge from a child's airway. Researchers found that latex balloons were a risk to all age groups.[71]
- Children under age 5 are at particular risk of choking on food because they do not have the teeth required to grind food down to a small, safe size. Young children are also more likely to choke on food if they are running, laughing, talking, or crying while they have food in their mouth. One study showed that the majority of children choked on nuts, raw carrots, popcorn kernels.[72]
- Children may also be at risk due to fantasy play;[73] for example, a child may tie a rope around her neck to act like a dog on a leash.
- One Australian study of children age 14 and under looked at deaths from threats to breathing over a 10-year period and found that rope swings and rope material frequently proved fatal, especially for older children.[74]
- As of March 2006, 24 deaths and 21 near-miss incidents involving blind or curtain cords and chains have been reported.[75]

Trends

Trends in threat to breathing related death and hospitalization rates among Canadian children aged 0-14 years, 1994-2003

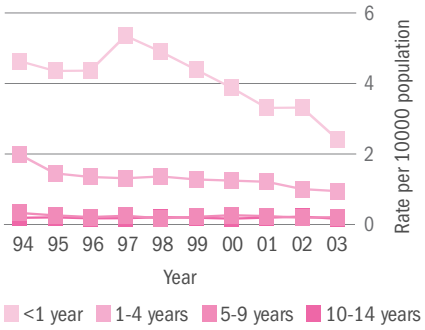
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



The decline during the 10-year period was 48%.

Trends in threat to breathing related death and hospitalization rates among Canadian children by age group, 1994-2003

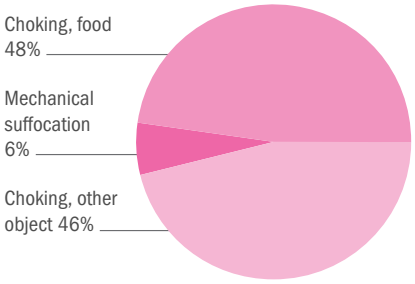
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Threat to breathing is predominantly an issue for children under age 5, particularly under age 1. The data shows an encouraging decline in rates for these age groups; there was a 48% decline in children under age 1, and a 52% decline in rates for children ages 1 to 4. The rate for children ages 5 to 9 dropped by 36%, and by 14% for ages 10 to 14.

Proportion of threat to breathing related hospitalizations among Canadian children aged 0-14 years, 1994-2003

Source: Canadian Institute for Health Information



The high incidence of choking – both on food and other objects – highlights the need to educate parents of young children about choking hazards and to continue to enhance standards to reduce these hazards to children.

What works to prevent injury

Keep choking hazards away from children under age 4 and eliminate or modify items in the home that could cause strangulation. Top causes of food-related choking include nuts, carrots or other hard fruits and vegetables, popcorn, and large pieces of hot dog.[76] Common mechanical causes include coins, batteries, small toys, and toy parts.[77] Objects that can fit into a cardboard toilet paper roll are a choking hazard. Common strangulation hazards include ropes or strings and blind or curtain cords. These cords should be cut short and tied out of reach.

Reduce the dangers of suffocation in the home through legislation. This is a highly effective measure to reduce injuries and deaths. For example, cribs and cradles had regulations last updated in 1986. These new regulations were updated to ensure that the mattress support was secured to prevent entrapment deaths.

Ensure children have safe sleeping environments. Young children should sleep in cribs or cradles that meet current safety standards. Between 1986 and 2006, 37 children died from entrapment in cribs; 36 of these cribs were made before 1986.[78] In addition, sleeping environments should be free of soft bedding that could suffocate a child, such as comforters, pillows, crib bumpers, and stuffed animals.[79] Sharing an adult bed with a baby is not recommended; Safe Kids Canada supports the Canadian Paediatric Society's recommendation that babies sleep in their own cribs for the first year of life.[80]

Call to action

Enhance consumer product safety in Canada. While the public may reasonably assume that if a children's product is for sale, it has been tested or inspected and is considered safe.[81] This is not necessarily the case. Serious product-related injuries to children continue. Safe Kids Canada calls for enhancements to product-related injury surveillance, reporting, enforcement and consumer education along with a renewal of product safety laws. Safe Kids Canada recommends the renewal of federal product legislation to include a 'precautionary principle' and 'general safety requirement' for all products. This would bring the product legislation framework in line with consumer expectations for safe products on the market.

Evaluate products pre-market through a child safety lens. Products and standards should be designed using a precautionary approach that keeps child safety in mind. Producers, distributors, retailers and standards developers should have an onus to build safety into the design of products before they reach the market – and to take immediate corrective action when risks are identified with items already for sale.

Preventing burns

Burn injuries may be due to thermal (flame, scald, contact), electrical, or chemical causes. House fires are the main cause of fire- and burn-related deaths, but children are more likely to be hospitalized for burns related to contact with steam or hot liquids (scalds), including tap water. Few people realize that hot water or other liquids can burn as badly as fire.[82]

Children are particularly vulnerable to burns because their skin is thinner than adults' skin. A child's skin burns 4 times more quickly and deeply than an adult's at the same temperature.[83]

Serious burn injuries have long-term consequences for a child, often involving repeated skin grafts and up to 2 years wearing compression garments. Due to their rapid physical growth, children are particularly susceptible to scarring and contracting of the skin and underlying tissue as they heal. Many children are left with disfigurement, permanent physical disability, and emotional difficulties.[84]

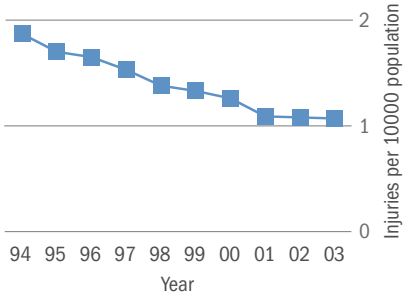
Key facts

- An estimated 40 children age 14 and under die from fires and other burns each year, while another 770 are hospitalized for serious injuries. The majority of deaths (75%) are due to smoke inhalation.
- Every year, Canadian children have an approximate 1 in 150,000 risk of dying and a 1 in 7,200 risk of being seriously injured in a fire- or burn-related incident.
- More than half (56%) of hospitalizations are caused by scald burns. Young children under the age of 5 suffer 83% of all scald injuries requiring hospital admission.
- Tap water causes 29% of scald burns requiring hospitalization.
- Other causes of hospitalization include fire and flame (34%) and contact burns from appliances such as fireplaces and woodstoves (7.5%).
- Children under age 5 have the highest risk for all types of burns. Nearly three-quarters (73%) of hospitalizations in this age range are for scald burns. Young children cannot understand the dangers of hot liquids and other burn hazards, and have slower reaction times than older children. Among older children, the leading causes of burn-related injuries are also scald burns for ages 5 to 9, and flame-related burns for ages 10 to 14.

Trends

Trends in death and hospitalization rates due to fire/burns among Canadian children aged 0-14 years, 1994-2003

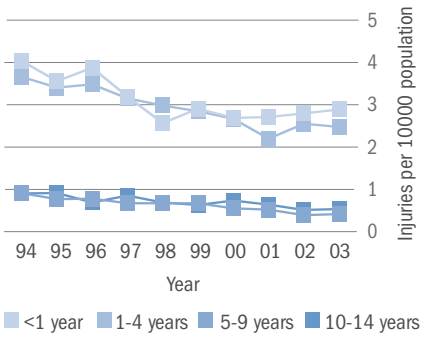
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Hospitalization and death rates have declined by 43% over the 10-year review period.

Trends in death and hospitalization rates due to fire/burns among Canadian children by age group, 1994-2003

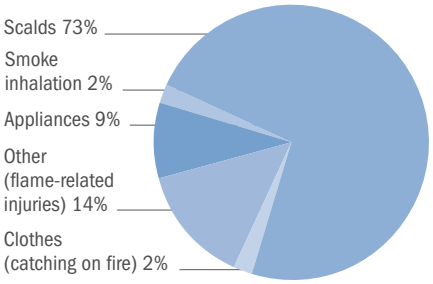
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Children under age 5 are at highest risk for all types of burns. They have not experienced as notable a decline as older children. The rates declined in children under age 1 by 28%; age 1 to 4 by 32%; age 5 to 9 by 54%; and age 10 to 14 by 41%. Since the predominant cause of burn injury for young children is scald burns, more public education is needed to raise awareness of the importance of reducing tap water temperature and keeping children away from hot liquids.

Cause of fire/burn related hospitalizations among Canadian children aged 0-4 years, 1994-2003

Source: Canadian Institute for Health Information



Nearly three-quarter of all burns to children under age 5 are caused by scald burns: hot liquids, hot tap water, or steam.

What works to prevent injury

Install smoke alarms on every level of the home and in each sleeping area. Smoke alarms save lives; there is a 3-fold increased risk of fire-related death in homes without smoke alarms.[85] Most children who died in residential fires were in homes without smoke alarms or without working smoke alarms.[86] Alarms should be tested every month and batteries changed annually. A better option may be hard-wired alarms, which do not require batteries.

Keep lighters and matches out of sight and out of reach. In 1997, children playing with matches and lighters started about 700 fires.[87] One American study showed that 10 years after the implementation of legislation for child-resistant lighters, there was a 58% reduction in fires started by lighters.[88]

Regulate products that increase the risk of fires and burns. In 1987, stringent national regulations were put in place under the Hazardous Products Act to ensure that children's sleepwear be flame resistant. Since these regulations, there have been no deaths or injuries.[89] In June 2005, Canada became the first country to institute "fire-safe" cigarette legislation. These cigarettes have a reduced likelihood of igniting upholstered furniture, mattresses, and bedding.[90] Other standards also exist to reduce the flammability of mattresses, bedding, and other textiles.

Reduce tap water temperature to 49°C (120°F). Tap water temperature in Canadian homes is typically 60°C (140°F), which can cause a third-degree burn on a child's sensitive skin in just 1 second.[91] These burns can happen when a child is in the bath or washing hands at the sink. Many severe tap water scalds occurred when children were supervised by an older sibling.[92] Tap water burns tend to be deep and cover a larger portion of the body.[93]

The risk of tap water burns can be significantly reduced by turning down gas or oil hot water heaters to 49°C (120°F).[94, 95] Electric heaters have a higher risk of water quality issues and should be kept at 60°C (140°F), but temperature control devices can be installed in the plumbing to make sure that water coming out of the tap is at 49°C (120°F).

Keep hot liquids away from children and make sure appliance cords and pot handles are out of reach. Children have been scalded by pulling kettles of hot water or pots of hot liquids or food onto themselves. These injuries can happen when a cord or handle is within reach.[96] Close supervision of young children in the kitchen is essential to prevent these and other burn injuries.

Prevent access to hot appliances. Children need to be supervised closely when hot appliances (such as the stovetop, iron, or curling iron) are in use. Barriers should also be placed around the glass doors on gas fireplaces. Fireplace doors can reach temperatures of 245°C (473°F) in about 6 minutes, and take approximately 45 minutes to cool down after the fireplace has been shut off.[97]

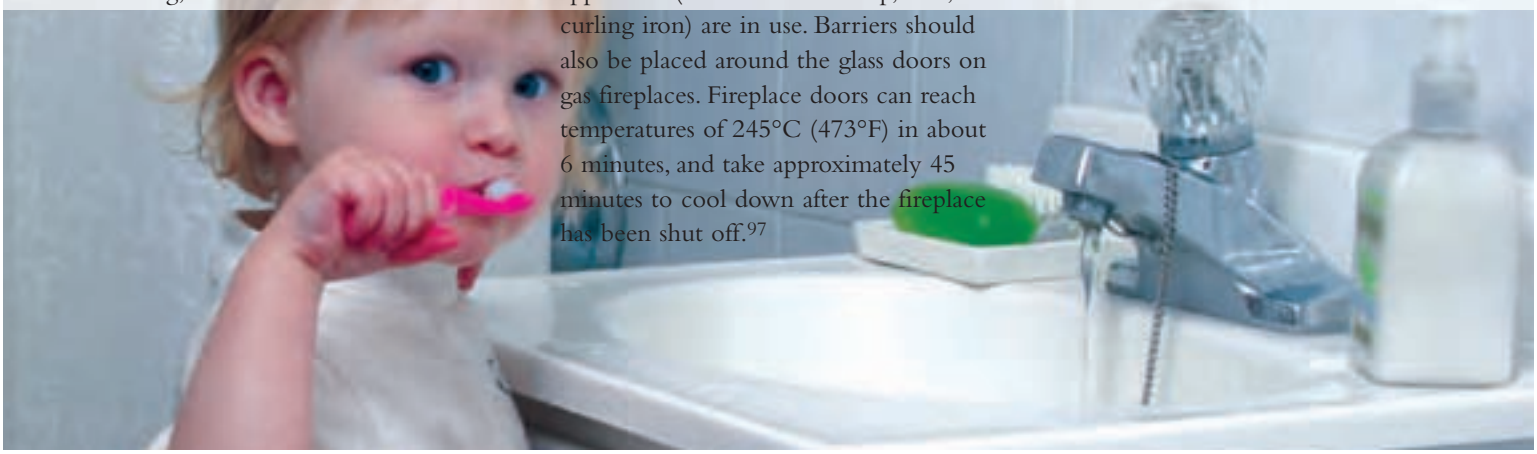
Call to action

Require smoke alarms in all Canadian homes. Current smoke alarm legislation varies by province and territory and sometimes by jurisdiction. Many do not require smoke alarms in every home (new and existing) or on each level and near sleeping areas.

Amend building and plumbing codes for residential buildings so that tap water does not exceed 49°C (120°F) at every tap.

Strengthen product standards to reduce the risk of fires and burns. Household products and their standards should be designed with the special risks to children in mind. The International Standards Organizations' (ISO) guides address safety and provide guidelines for their inclusion in standards. ISO guides 50 and 51 are particularly relevant examples. Improved safety standards should be complemented by education and enforcement. It is vital that existing regulations be enforced and strengthened over time, based on future research and injury data.

Increase public education about the risks of burns in the home. A 2001 Safe Kids Canada survey showed that 70% of parents were unaware that burns from hot liquids were a major risk to their children.[98] Legislation or product changes cannot protect children from all burns, particularly burns from hot drinks or other liquids.



Bicycle safety

Most serious injuries and deaths to child cyclists involve collisions with a motor vehicle. The most severe injuries are those involving the head and brain; even seemingly minor head injuries may cause permanent brain damage. Other serious injuries include broken bones, facial injuries and serious skin abrasions that require grafts.

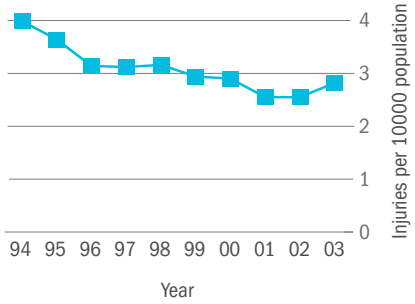
Key facts

- An estimated 20 children age 14 and under die every year in Canada because of a bicycle-related injury, and 1,800 are hospitalized for serious injuries.
- Each year, Canadian children have an approximate 1 in 333,000 risk of death and a 1 in 3,300 risk of serious injury in a bike-related incident every year.
- Head injuries are the leading cause of severe injury to children on bicycles. Traumatic brain injuries account for 29% of all cycling-related hospital admissions. A properly fitted helmet helps protect the head by absorbing the force from a crash or a fall, decreasing the risk of serious head injury by as much as 85% and brain injury by 88%.[99, 100] This means that 4 out of 5 head injuries could be prevented if every cyclist wore a helmet. There is a public perception that helmets may not provide protection in crashes that involve motor vehicles, but they have been proven effective in preventing head injury from all types of falls and crashes.[101, 102, 103]
- Cycling deaths nearly always involve a collision with a motor vehicle.
- Children are also at risk for injury from falling from the bike. Falls may result from human factors, such as taking an action that surpasses their physical ability, or from external factors such as swerving to avoid hitting an object like a car or tree.[104]
- The human skull is about 1 cm thick and can be shattered by an impact of only 7 to 10 km/h.[105] Young cyclists ride at speeds averaging 11 to 16 km/h.[106]
- Bicycle use, speed, and exposure to the roads vary considerably depending on parenting decisions and a child's age. Young children under age 5 generally ride tricycles and are not normally on the road. Some children ages 5 to 9 begin to ride on the road, but they do not have the judgment skills to do so safely without adult supervision. Children ages 10 to 14 begin to use bicycles as a form of transportation to school or other activities and as a result may be more exposed to traffic.

Trends

Trends in bicycle related hospitalization and death rates among Canadian children (0-14 years), 1994-2003

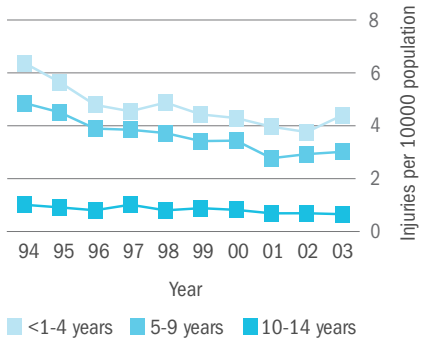
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Hospitalization and death rates declined by 29% during the 10-year period. This downward trend may be due in part to changes in helmet use and the introduction of helmet laws in 6 provinces over the last 10 years.

Trends in bicycle related hospitalizations and deaths among Canadian children by age group, 1994-2003

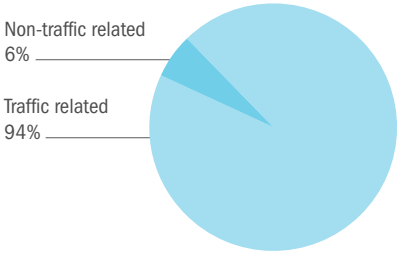
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Overall, bicycle related injury and death rates have dropped by approximately one-third in every age group (children ages 1 to 4 by 35%; ages 5 to 9 by 38%; and ages 10 to 14 by 31%). While injury rates have declined in children of all ages, children ages 10 to 14 are at highest risk. This may be due to their increased exposure to traffic, since they are often using their bicycles as transportation. It may also be due to lack of road skills.

Proportion of bicycle related deaths among Canadian children aged 0-14 years, 1994-2003

Source: Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



This chart vividly illustrates the risks involved for child cyclists when they ride in traffic and speaks to the importance of creating safer environments for cyclists.

What works to prevent injury

Wear a bike helmet. A helmet, properly fitted and worn correctly, can prevent up to 85% of head injuries.[107] Unfortunately, helmet use is still not the norm across Canada, particularly among older children. A 2002 survey by Safe Kids Canada showed that only 45% of children ages 11 to 14 said they wore bike helmets.[108] As they become more susceptible to peer pressure, older children begin to resist wearing helmets, citing reasons such as "My friends aren't wearing helmets" (38%).[109] Overconfidence also impacted helmet use, including reasons such as "I'm a good rider" (26%) and "I don't go very far" (34%).[110]

Increase the use of bike helmets through legislation and education. A cross-Canada study demonstrated that head injury rates among child and youth cyclists are about 25% lower in provinces with helmet legislation, compared to provinces without legislation.[111] Over the 4-year period studied, the study concluded that 687 hospitalizations for head injuries to child cyclists could have been prevented if every province and territory had bicycle helmet legislation. Currently only 6 provinces have helmet laws: Alberta, British Columbia, New Brunswick, Nova Scotia, Ontario, and Prince Edward Island.

Public education, while important, can go only so far in raising awareness of the importance of helmets. Experience worldwide strongly suggests that education programs alone, even if broad and sustained, are effective in bringing helmet use to only about 50% of the population.[112, 113] Legislation, in conjunction with ongoing education and enforcement programs, is necessary to break the 50% barrier and make bike helmets an accepted social norm.

Keep children under age 10 off the road. Riding a bike near motor vehicles requires a complex set of skills that children develop slowly between ages 10 and 14.[114] They must be able to balance the bike, signal, and pay attention to vehicles at the same time. A child's brain cannot manage this combination of physical and mental skills before age 10, at the earliest. The ability to juggle these tasks around traffic may be a particular challenge for children in a high-risk situation.

Reduce traffic speeds. Slowing down motor vehicle traffic can increase safety for cyclists sharing the same roads.[115] An international review of traffic-calming measures (such as reduced speeds or speed bumps) found that road crashes of all kinds, including those with child and adult cyclists, declined by 15% overall and 25% on residential streets in particular.[116] When 20 cities in the United Kingdom established traffic calming zones at 40 km/h, child cyclist injuries declined by 48%.[117]

Call to action

Enact bike helmet legislation in all provinces and territories. Helmet legislation has proven to be an effective method to prevent head injuries. Safe Kids Canada calls on every province and territory to enact bike helmet legislation. Legislation should apply to all ages, not just children – this not only protects the entire population, but also ensures more usage by children because of the impact of adult role modelling. One study found that children were 100 times more likely to own and use a bicycle helmet if their parents used a bicycle helmet themselves.[118] Legislation may also help parents enforce bike helmet rules with their children. A 2002 survey by Safe Kids Canada showed that 79% of parents support bike helmet legislation for both parents and children.[119]

Educate the public about the importance of bike helmets through increased education and enforcement. Parents need to be educated about the protective value of helmets and informed that legislation exists (if it does) in their province or territory. The 2002 Safe Kids Canada study showed that the majority of parents did not know whether their province or territory had bike helmet legislation.[120] Provincial and territorial education campaigns in conjunction with enforcement programs (such as spot checks) can help to emphasize that laws exist and are considered important.

Create safer environments for cyclists. This most commonly means reducing traffic speed in communities through lower speed limits and traffic calming, but could also include the development of areas for recreational biking. Improving road safety requires a comprehensive approach that takes into account the road design in a community as well as the way vehicles, pedestrians, and cyclists use the streets.[121]

Pedestrian safety

Injuries to pedestrians are often severe. Although the majority of children survive being hit by a car, they are often left with long-term disabilities such as permanent damage related to head, organ, and bone injuries. Pedestrian injuries often have high economic and societal costs.[122]

Research shows that some of the highest risk factors for pedestrian injury include driver speed, risky child behaviour, lack of adult supervision, and crossing the street at a spot without traffic controls.[123, 124]

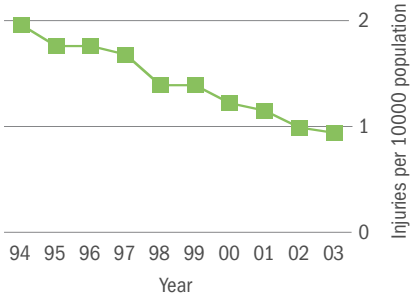
Key facts

- An estimated 56 child pedestrians age 14 and under die every year in Canada, and 780 are hospitalized with serious injuries.
- Each year, Canadian children have an approximate 1 in 104,600 risk of dying and a 1 in 7,600 risk of being seriously injured in a pedestrian incident.
- A child pedestrian is most likely to suffer injuries to the lower extremities (41%), a traumatic brain injury (29%) and injuries to the torso (13%).
- Approximately 70% of deaths and 50% of serious injuries to child pedestrians happen where there is no form of traffic control. This means the child may have been trying to cross the street in the middle of the block, walking out from between parked cars, or crossing at an intersection without a stop light.[125]
- Among children ages 5 to 9, pedestrian injuries are tied with motor vehicle injuries as the leading cause of injury-related death. However, children ages 10 to 14 have the highest incidence of pedestrian injuries, possibly due to risk-taking and inattention. Children under age 5 have the lowest number of pedestrian injuries; these can occur in a driveway or when a child enters the road from a driveway or between parked cars.
- At speeds less than 30 km/h, vehicles and pedestrians are able to co-exist with relative safety.[126,127] Lower traffic volume can also lead to reduced injuries.[128]

Trends

Trends in pedestrian death and hospitalization rates among Canadian children aged 0-14 years, 1994-2003

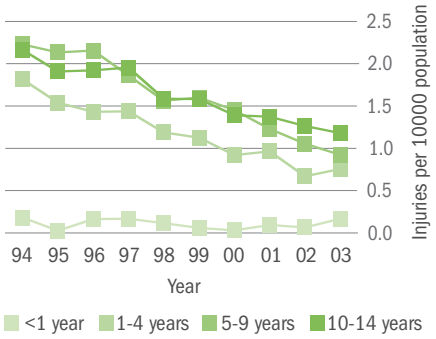
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Injury rates for all child pedestrians age 14 and under have dropped considerably in the 10-year review period. Pedestrian-related injuries to children have seen the most dramatic decline (52%) compared to each of the other causes of injury-related hospitalization and death. This may be due in part to efforts to improve pedestrian safety through measures such as reduced speed limits and traffic calming. It may also be due to a reduction in the number of children who are walking.

Trends in pedestrian death and hospitalization rates among Canadian children by age group, 1994-2003

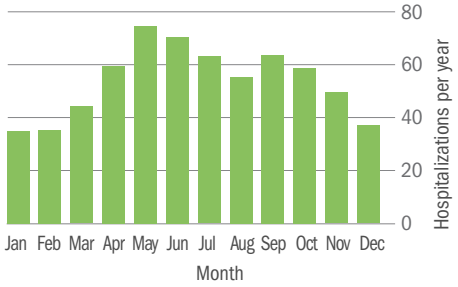
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



While all age groups remain at risk for pedestrian injuries, children age 10 to 14 have the highest incidence and the lowest rate of decline (children under age 5 declined by 58%; ages 5 to 9 by 59%; and children ages 10 to 14 by 45%). Children ages 10 to 14 are likely to be walking alone or with peers, and may not be paying sufficient attention to safety.

Pedestrian hospitalizations among Canadian children aged 0-14 years by month, 1994-2003

Source: Canadian Institute for Health Information



The incidence of child pedestrian injuries begins to climb in April, with a year-round peak in May when children are beginning to play outside more frequently. Another small peak occurs in September, which may be related to increased walking exposure due to the back-to-school season.

What works to prevent injury

Reduce traffic speeds. At speeds greater than 30 to 40 km/h, both drivers and pedestrians may be more likely to make mistakes in judging the time required to stop or cross the street safely.[129] In addition, drivers are known to underestimate their speed.[130]

Reducing vehicle speed has proven to be effective in preventing crashes and reducing the severity of injuries.[131]

Even small reductions in vehicle speed can yield significant reductions in injury risk. It is estimated that a pedestrian struck by a car travelling at 50 km/hr is 8 times more likely to be killed than someone hit at 30 km/h.[132]

Ensure that children under age 9 cross the road with an adult or older youth who follows road safety rules. Children under age 9 do not have the ability to judge traffic safely. They are at risk due to factors that include an inability to determine how quickly a vehicle is moving, undeveloped peripheral vision, and a belief that drivers will see them and stop when required. They think that if they can see an adult driving toward them, the driver can see them and will stop. Research shows that adult accompaniment may reduce child pedestrian injuries.[133]

Teach children how to cross the street safely. Safety education can increase children's knowledge of safe road rules and improve road-crossing behaviour. However, the effects decrease over time, due to children's developmental immaturity. Safety education should be repeated at regular intervals and should start before the child reaches age 9.[134]

Call to action

Create safer environments for pedestrians by reducing speed in residential communities. Improving road safety requires a comprehensive approach of thorough planning, implementation, enforcement, and evaluation. Road safety strategies must take into account the road design in a community as well as the way vehicles, pedestrians, and cyclists use the streets. According to the World Health Organization, 5 interventions can help reduce speed in a community: set speed limits that are enforced; design roads according to function; install speed cameras or stationary enforcement; implement education and public information strategies; and use traffic calming measures, such as traffic circles and speed bumps.[135]

Speed bumps on residential streets have proven effective in substantially reducing child pedestrian injuries in North America.[136] An evaluation of an extensive program of speed bump installation in Oakland, California found that their use was associated with a reduced the risk to children of up to 60%. Children who lived in an area with no speed bumps were more than twice as likely to be hit by a car near their home compared to children living within 1 block of a speed bump.[137] However, traffic calming requires careful planning and evaluation to ensure that fixing a problem on one street does not cause it on another when some traffic seeks a new route.

Increase the walkability of communities. Recent research in the United States and Europe shows a link between communities that are conducive to walking and fewer pedestrian injuries.[138] These communities have environments that promote walking by making routes attractive (such as trees and trails) and safe (such as sidewalks and crosswalks).

Preventing poisoning

Medication is the leading cause of poisoning in children. Small amounts of some adult medication can be fatal to a child. Household cleaners and personal care products, such as mouthwash or nail polish, are other causes of poisoning.

Substances ingested by young children may have been improperly stored and are too accessible. In other instances, a product may have been taken out of its original container and the child did not know the product was harmful.

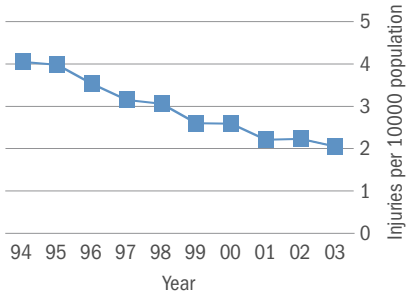
Key facts

- An estimated 7 children age 14 and under die every year in Canada from poisoning, and another 1,700 are hospitalized for serious injuries.
- Each year, Canadian children have an approximate 1 in 820,000 risk of dying and a 1 in 3,400 risk of being seriously injured as a result of poisoning.
- Medication is involved in 67% of all unintentional poisoning of children age 14 and under. Other causes include a wide range of products such as household cleaners, alcohol, plants, fertilizers, pesticides, paint thinner, and antifreeze.
- Among medications, iron pills are a leading cause of death for children. Iron supplements are commonly taken by women of childbearing age; parents need to take extra care to make sure these pills are stored out of reach.[139]
- Carbon monoxide poisoning, although rare, can cause coma or death.
- Nearly two-thirds (64%) of poisoning incidents occur in children age 1 to 4. This age group is at risk for poisoning in part because they are at a developmental stage of putting items in their mouths and exploring their environments.

Trends

Trends in poisoning death and hospitalization rates among Canadian children aged 0-14 years, 1994-2003

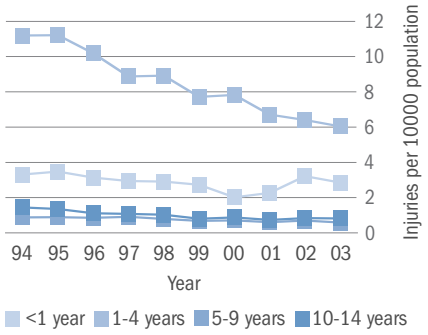
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Poisoning deaths and hospitalizations dropped by half (49%) over the 10-year review period. The size of this decline suggests that child-resistant packaging may be having an impact.

Trends in death and hospitalization rates among Canadian children by age group, 1994-2003

Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Although children ages 1 to 4 experienced the largest decline in death and hospitalization rates (46%), they remain at highest risk for poisoning. There were declines in older age groups as well (a 33% decline among ages 5 to 9, and 43% among ages 10 to 14), but none for poisoning of children under age 1.

What works to prevent injury

Keep all potential poisons in their original containers and locked out of reach. This includes keeping purses and other bags, including those of visitors, out of reach since they often contain medication.

Keep all medication in original child-resistant packaging. Child-resistant packaging is required by law for certain medications and significantly reduces the chance of poisoning.[140] However, research shows that a small percentage of children may still be able to open the medication container;[141] it must be kept locked up. It is also best to choose packaging that offers medication in small doses, such as blister packs. This may help to prevent a curious child from quickly ingesting too much medication, potentially reducing the severity of a poisoning.

It is important to note that warning stickers aimed at children are not effective. One study evaluating the use of colourful warning stickers on hazardous products found that these attracted children's attention.[142]

Install a carbon monoxide detector near sleeping areas. Carbon monoxide is an odourless gas produced by sources such as defective appliances, clothes dryers, furnaces, or exhaust fumes from cars in garages. Carbon monoxide detectors have been shown to be effective in preventing deaths due to carbon monoxide poisonings.[143] It is particularly important to have carbon monoxide detectors on all levels of a home, particularly near sleeping areas, and to ensure that fuel-burning appliances are in good working order.

Use a poison information centre for reliable information. Phone-in centres are effective in helping parents determine whether a child is at risk from a potential poisoning and needs to go to the hospital. The phone number for the local poison information centre should be kept by the phone.

Call to action

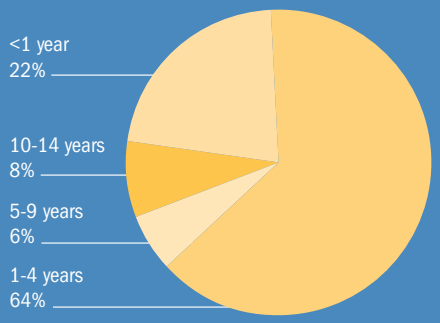
Increase cautionary labelling on high-risk medications and warn patients of their potential harm to children. Small amounts of certain medications, such as iron pills and heart medicine, can be fatal to children. Patients who are using these medications should be counselled about the importance of keeping them away from children, and the packaging should also have more prominent warning labels than currently exist.

Update building and fire codes to require carbon monoxide detectors in every home. Detectors offer valuable protection against carbon monoxide poisoning. They should be required in every home in Canada. New code requirements should be accompanied by education and enforcement campaigns.

Increase public education. The majority of substances ingested by children have been improperly stored and are too accessible. In some cases, a product has been taken out of its original container and the child did not know the product was harmful. Increased education to parents, in conjunction with improved product labelling and child-resistant packaging, is required to reduce poisoning risks to children.

Proportion of poisoning deaths and hospitalizations by age group (age adjusted rate per 10000 children) among Canadian children, 1994-2003

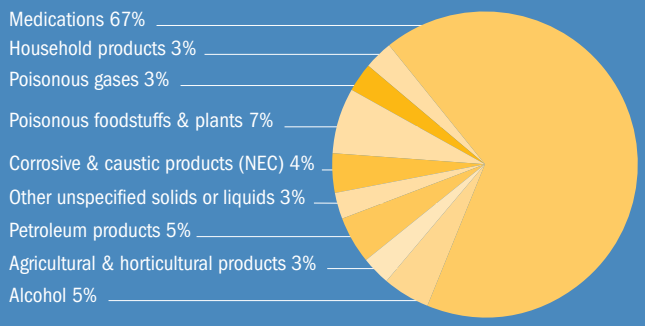
Sources: Canadian Institute for Health Information; Statistics Canada
[Deaths for 2003 were estimated from trends for the years 1994-2002]



Children under age 5 represent 86% of deaths and hospitalizations for unintentional poisonings.

Unintentional poisoning hospitalizations among Canadian children aged 0-14 years by cause, 1994-2003

Source: Canadian Institute for Health Information



More than two-thirds (67%) of poisoning incidents are related to medication. This illustrates the importance of keeping medication out of reach and locked away.

Preventing falls

Falls are main reason children are hospitalized. Children fall at home, at school, during sports, and due to a variety of other causes, although the data on falls does not specify these locations. Approximately 37% of childhood injury hospital admissions are attributed to falls, but this does not capture the full impact: falls related to playground equipment and bicycles are captured in other chapters of this report.

Falls from chairs and beds or down stairs and steps cause nearly one-quarter (23%) of all (non-playground) fall-related hospital admissions to children age 14 and under. Almost half (45%) of these falls involve serious injuries to the head and neck. Head injuries can leave a child with permanent brain damage. This can take many forms, from speech problems and learning difficulties to memory loss and mood swings. Many of these effects can last a lifetime.[144, 145]

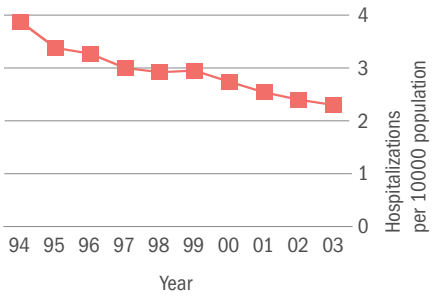
Key facts

- An estimated 1,700 children age 14 and under are hospitalized every year in Canada for a fall related to chairs, beds, stairs, and steps.
- Each year, Canadian children have an approximate 1 in 3,400 risk of serious injury due to a fall from a chair, bed, stair, or step.
- Babies fall off beds or from cribs while playing, sleeping, or trying to get out of them. One study showed that an adult bed was involved in one-third of cases where a baby fell from a bed.[146]
- Children can fall from adult chairs, high chairs, car seats, and bouncy chairs. Falls from bouncy chairs or car seats can happen when they are placed on an elevated surface such as a kitchen counter.[147] Parents may not realize that a small amount of motion by the baby could rock the seat onto the floor. The seat can also be knocked down unintentionally.
- The majority (68%) of children hospitalized due to falls from beds or chairs are under age 5. Another 25% of these children are ages 5 to 9, and 7% are ages 10 to 14.
- In falls involving stairs and steps, 63% of children injured were under age 5, 23% were ages 5 to 9, and 14% to ages 10 to 14. Older children tend to fall down stairs or steps when they are in a hurry.[148]
- Serious fall injuries are 3 to 5 times more frequent among children who have fallen down stairs in baby walkers, compared to other types of falls.[149] A fall down the stairs in a baby walker is twice as likely to cause a serious head injury. Baby walkers with wheels have been banned in Canada.
- Although falls from windows are rare and not captured in the data, they can cause devastating injuries and death.[150] These incidents usually happen when a child reaches an open window by climbing onto furniture. Children under age 5 are particularly vulnerable to these falls because they like to climb and explore, but do not have a sense of danger. There is a dangerous misconception that window screens are a safety barrier, while in fact they may not hold a child's weight.
- A child's developmental stage plays a key role in the risk of falls; for example, a baby whose diapers are changed on her parents' bed may roll over for the first time during a change, putting her at risk for a fall.

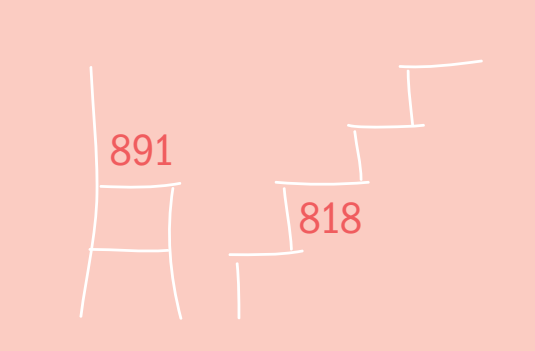
Trends

Trends in hospitalization rates due to falls from beds, chairs, stairs and steps among Canadian children aged 0-14 years, 1994-2003

Source: Canadian Institute for Health Information



The decline during the 10-year period was 40%.
(Death rates are not available.)



A sizeable number of children are hospitalized every year for serious injuries related to falls from beds, chairs, stairs, and steps.

What works to prevent injury

Supervise closely and use proven safety products. Research shows that a combination of products and supervision is required to keep children safe. Although childproofing a house may help protect a child from injury, no study has been able to prove that products alone guarantee child safety for children under age 5.[151]

Parents need to know their child's developmental stages and make adjustments accordingly to the home. For example, properly installed safety gates may help keep babies and toddlers off stairs before they can manage them, but parents need to be aware of how their child is growing and changing. Once a child can climb over the safety gate, it needs to come down or he could be at greater risk of falling down the stairs. In addition, there are a number of safety measures that have not been systematically evaluated but provide reasonable measures to prevent injury, such as using safety straps in a baby's high chair, keeping a hand on baby during diaper changes to prevent him from rolling onto the floor, and keeping car seats and bouncy chairs on the floor.

Avoid baby walkers with wheels. Baby walkers were banned in Canada in 2004, but this dangerous product remains popular and is often passed down through families and friends. A Safe Kids Canada survey in 2003 showed that nearly one-third (32%) of Canadian parents were using or had recently used a baby walker.[152] Baby walkers increase the risk of serious injury if the child falls down the stairs.[153] Children can move quickly in a walker, more quickly than parents can respond to stop them. One study found that more than two-thirds of babies in walkers were being supervised at the time of the injury.[154]

Call to action

Maintain and continue to enforce the national ban on baby walkers. The federal government's 2004 ban on baby walkers has been challenged by importers. Based on available evidence and injury trends, Safe Kids Canada recommends that no walkers with wheels should be used.

Place warning labels on car seats and bouncy chairs to let parents know the dangers of putting these products on elevated surfaces. When an infant car seat is used outside of a vehicle, the centre of gravity of the car seat and baby is raised, making the seat top-heavy and unstable. The baby's movement can cause the car seat to tip over. Both car seats and bouncy chairs should be kept on the floor.

Change building codes to ensure that windows on the second storey and higher have a proven mechanism to prevent falls. In the meantime, municipalities should implement legislation requiring fall protection in all rental dwellings. In 1976, New York City implemented a bylaw that requires rental property owners to install window guards if children under age 11 are living in the building. Within 2 years, the number of children falling out of windows dropped by 50%, and deaths by 35%. The bylaw was accompanied by education and enforcement programs.[155]

Playground safety

Parents and caregivers often assume that injuries are a natural and unavoidable consequence of play. Yet playground injuries can be serious, ranging from broken bones to head and spinal injuries largely from falls. Deaths are rare and almost always caused by strangulation.

Playground injuries can be prevented by using equipment that meets current safety standards, by ensuring there is a deep, soft surface under the equipment,[156] and by actively supervising children at play.[157]

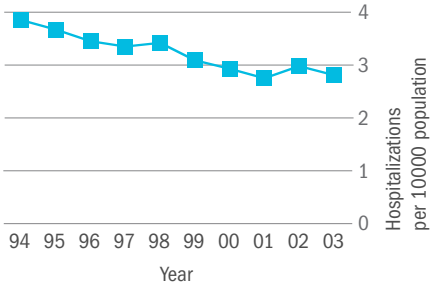
Key facts

- An estimated 2,500 children age 14 or under are hospitalized every year in Canada for serious injuries from playground falls.
- Each year, Canadian children have an approximate 1 in 2,300 risk of being seriously injured on the playground from a fall.
- Approximately 14% of children are hospitalized for head injuries; 81% for broken bones in other parts of the body; and the remainder (5%) for injuries such as dislocations and open wounds.
- Playground injuries most often occur in summer (43%), followed by fall (27%), spring (24%), and winter (6%).
- Playgrounds often have equipment designed for different age groups. Children under age 5 should be kept off equipment higher than 5 feet (1.5 m) and should be actively supervised when they are climbing or using swings. Falls from heights greater than 5 feet (1.5 m) double the risk of severe injury for children of all ages.[158]
- Young children under age 5 are often injured because they are still developing their balancing and climbing skills, putting them at increased risk for falls.
- Older children ages 5 to 9 may be injured because they like to challenge themselves on equipment, such as jumping off the top of slides or using equipment in other ways for which it was not designed. Injuries are much less common in older children, since they use playgrounds infrequently.

Trends

Trends in rates of hospitalization due to playground falls among Canadian children aged 0-14 years, 1994-2003

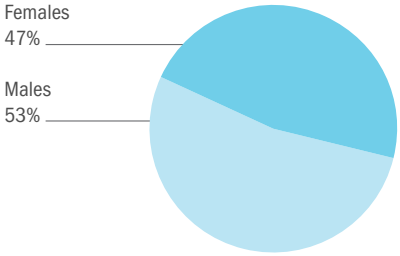
Source: Canadian Institute for Health Information



The overall decline in hospitalization rates over the 10-year period was 27%.

Proportion of playground fall related hospitalization rates among Canadian children aged 0-14 years by gender, 1994-2003

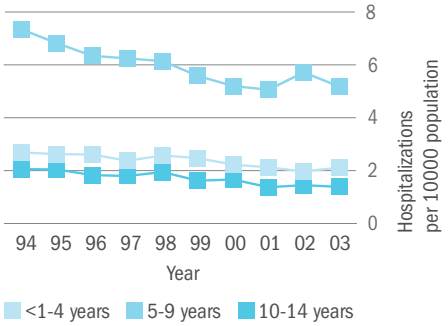
Source: Canadian Institute for Health Information



Although boys are considerably more likely to suffer injuries of any type as compared to girls (63% male vs 37% female; see chart, page 7), this does not appear to be the case with playground injuries.

Trends in rates of hospitalization due to playground falls among Canadian children by age group, 1994-2003

Source: Canadian Institute for Health Information



Children ages 5 to 9 have the highest risk of playground injuries. This age group may have the most exposure to playgrounds, both in their communities and at school. Children ages 5 to 9 also like to test their limits, which can put them at greater risk for injury. The rates declined in children under age 5 by 21%; among children ages 5 to 9 by 29%; and in children ages 10 to 14 by 33%.

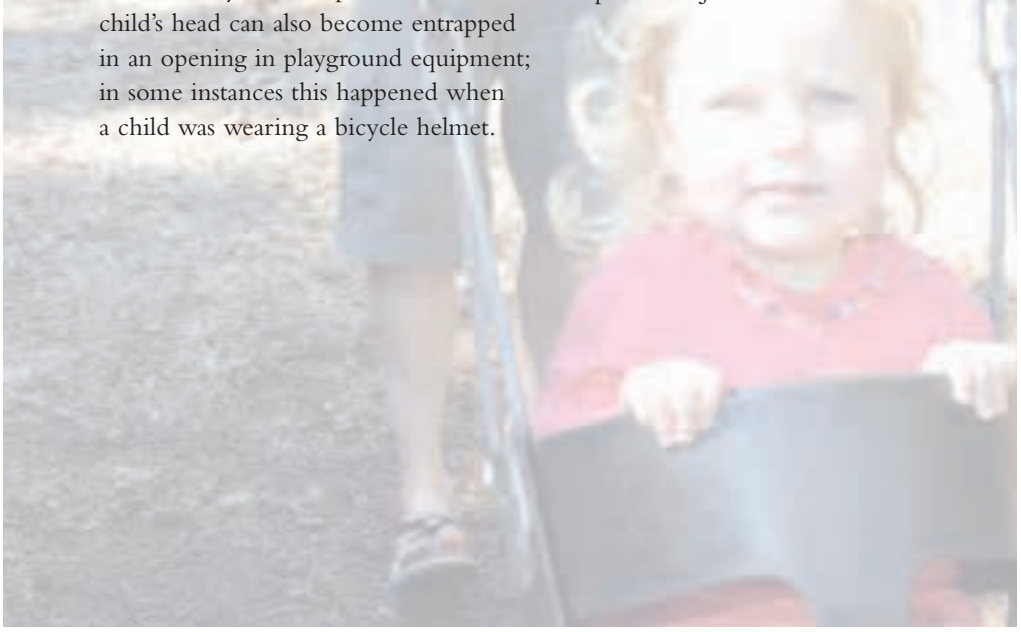
What works to prevent injury

Improve playgrounds to meet current Canadian safety standards. The Canadian Standards Association (CSA) developed the nationally recognized standard for children's play spaces and equipment. This standard specifies numerous design and maintenance criteria to reduce the risk and severity of injury, such as hand rails and barriers and a deep, soft surface under equipment. Appropriate surfacing can reduce the severity of the injury compared to a fall on a harder surface.[159, 160] Recent research by The Hospital for Sick Children showed that school playgrounds in Toronto that had been upgraded to the CSA standard had a 49% decrease in injuries compared to schools whose playground equipment had not been upgraded. The researchers concluded that an estimated 520 injuries may have been prevented during the 4-year study period.[161]

Remove strangulation hazards at the playground. Although deaths at playgrounds are rare, between 1992 and 1995 approximately 2 children died every year, each resulting from strangulation or choking.[162] This can happen when drawstrings, scarves, or skipping ropes become entangled in playground equipment, usually at the top of slides. A child's head can also become entrapped in an opening in playground equipment; in some instances this happened when a child was wearing a bicycle helmet. Children should remove helmets before they play on the equipment. The risk of strangulation can be reduced by using neck warmers instead of scarves, teaching children to keep skipping ropes and other cords off of equipment, and removing drawstrings from jackets and sweatshirts. A national voluntary standard asks Canadian manufacturers not to make clothing with drawstrings, but these items remain available.

Supervise closely. Active supervision – a combination of watching, listening, and staying close – reduces the chance of children's risk-taking behaviour at the playground.[163] Risky behaviour can also be reduced through efforts to teach school-aged children how to assess risk and to play safely on the equipment.[164]

Improve the safety of home playgrounds. Research has shown that backyard play equipment accounts for about 20% of all playground injuries.[165] Children ages 1 to 4 are more likely to get hurt at home than older children.[166] Climbers, swings and slides are involved in the majority of all home playground injuries.[167] Ensuring that home equipment has a deep, soft surface underneath may help to prevent injuries.[168]



Call to action

Maintain and enhance injury prevention criteria within the CSA standard. For example, there is continuing research into equipment heights and the necessary type and depth of surfacing required to prevent serious injuries.

Build and maintain new playgrounds according to the CSA standard. It is essential that playground designers and operators comply with the most current CSA standard when designing, installing, and maintaining playgrounds at schools, daycares, and community parks. This requires ongoing education about the standard for architects, manufacturers, installers, playground operators, and the public.

Upgrade existing playgrounds by addressing serious hazards first. Playground operators – municipalities, schools and daycares – should upgrade playgrounds to meet the CSA standard and ensure that they are regularly inspected and maintained. Communities and schools often struggle to improve existing playgrounds within limited budgets; in these cases, Safe Kids Canada recommends a focus on addressing the most serious hazards first, such as upgrading surfacing to meet impact criteria, improving hand rails and barriers to prevent falls, and eliminating entrapment (strangulation) hazards. Research has shown that these measures can be effective in reducing injuries.[169]

Increase real-world research on playground safety. How do children actually use the equipment? How do environmental conditions impact playground safety? Research should include investigating safer equipment design, improving surfacing materials, standardizing measurement techniques for inspection, developing backyard play equipment standards, developing strategies to enhance compliance with standards, evaluating the impact of supervision, and reviewing the effectiveness of safety signage at the playground. More research is needed in each of these areas to help develop improved safety standards and recommendations for parents and caregivers.

All-terrain vehicle and snowmobile safety

Key facts

- Between 1994 and 2000, an average of 400 Canadian children age 14 and under were hospitalized each year with serious injuries due to an all-terrain vehicle (ATV)-related incident.
- Each year, Canadian children have an approximate 1 in 14,500 risk of being hospitalized for an ATV-related injury.
- Between 1994 and 2000, an average of 145 Canadian children age 14 and under were hospitalized each year with serious injuries due to a snowmobile-related incident.
- Each year, Canadian children have a 1 in 40,400 risk of being hospitalized for a snowmobile-related injury.

What works to prevent injury

Keep children under age 16 off of ATVs and snowmobiles. These are motorized vehicles that require adult skills and judgment. Children lack the knowledge, physical development, cognitive and motor skills to operate them safely.[170]

The increasing incidence and severity of injuries from these vehicles has become unacceptable. Safe Kids Canada believes no one should operate an ATV or snowmobile until legal driving age. In addition, children should never ride as passengers, most ATVs are designed for single riders. Safe Kids Canada recognizes that in some remote areas, ATVs are the only means of transportation. In these areas, safe, workable solutions to transportation should be a priority.

Call to action

Enact harmonized ATV and snowmobile legislation in every province and territory to restrict use to those age 16 and older. Safe Kids Canada supports the Canadian Paediatric Society's position that legislation be developed to prohibit anyone under age 16 from operating an ATV or snowmobile, regardless of the size of its power or engine.[171, 172] Smaller "child-sized" ATVs and snowmobiles are still vehicles that can be difficult for children or youth to control.

School bus safety

Key facts

- Approximately 3 Canadian children are killed and 31 are injured each year as pedestrians hit by a school bus.[173] The greatest risk of death related to school buses is when children are outside, not inside, the bus.
- An average of 250 children age 14 or under are hospitalized every year in Canada due to injuries suffered when riding in a school bus. Although the number of incidents varies considerably from year to year, an average of 1 child dies as a school bus passenger every 2-3 years.[174]
- One percent (1%) of all road collisions involve buses, including school buses.[175]
- School buses are designed to protect passengers with a system called compartmentalization, meaning that children will be confined within a padded compartment in the bus in the event of a crash. The compartment includes several key safety features: the seats are positioned close together to form the confined area, the seats have high backs that are designed to bend and absorb energy during a crash and the seats are anchored strongly into the vehicle.

What works to prevent injury

Teach school bus safety to children. In particular, parents should remind children to stay away from the three danger zones – the front, back, and sides of the bus – by at least 3 m (10 feet).[176]

Encourage the adoption of school patroller programs in schools. Older elementary school students can help school bus drivers and other adults in maintaining safety, particularly when students enter and exit the bus.

Call to action

Invest in research related to the installation of the Universal Anchorage System in school buses for use with car seats. Children under the age of about 4 ½ years and weighing less than 40 pounds (18 kg), may be better protected when transported in an appropriate car seat while on a school bus. A pilot study is needed to test the safety and performance of car seats on school buses, taking into account collision variables (such as performance in rollover crashes), as well as practical use considerations (such as loading and unloading passengers).

Evaluate additional measures to protect child pedestrians near school buses. Safe Kids Canada supports research to evaluate the benefit of equipping all school buses with pedestrian safety devices such as video cameras or sensors. Consideration should also be given to loading and backing alarms and an external loudspeaker system that enables the driver to communicate with children outside the bus.

Rail safety

Key facts

- Although the actual number of cases varies from year to year, an average of 2 Canadian children age 14 and under are killed every year and 7 are seriously injured when hit by a train. Although these incidents are rare, they can be devastating, leaving a child with serious head injuries, crushed limbs, and amputations.
- Children are most often injured because they are crossing the tracks at a place other than a designated crossing.[177] They can be struck by trains while walking on or beside tracks or when climbing on moving rail cars. Sometimes children are hit after a train has passed and they think the coast is clear, but a second train travelling in the same or opposite direction hits them.
- Children may believe that if they see a train approaching, the engineer will be able to see them and stop. But trains cannot stop quickly – a train travelling 100 km/h can take up to the length of 14 football fields to come to a full stop.[178]

What works to prevent injury

Teach rail crossing safety:

- Cross only at a railway crossing. A crossing has a sign, gates, lights, and/or bells.
- Stop and look both ways before crossing. Once the train has passed, always check in both directions for a second train coming.
- Always walk a bike across the tracks.
- Never try to cross if a train is coming. If a train is going by, stand at least 10 large steps back from the tracks.

Call to action

Establish safe and separate trails under tracks or pedestrian overpasses to reduce the need to cross railway tracks. Urban growth increasingly places new housing and other services, such as shopping centres and schools, into areas where railway tracks exist. Urban planning should consider intervention models that enhance pedestrian safety by altering the environment. For example, communities could provide a highly visible, designated and controlled pedestrian crossing and install fencing to limit access to trains and railway tracks.

Photo source: CN

Scooter, skateboard, in-line skate safety

Key facts

- Hospitalization and death data are not coded individually by activity for scooters, skateboards, and in-line skates. However, according to data collected in emergency departments of 15 Canadian hospitals, in-line skating contributed to approximately 800 emergency department visits in 1998,[179] skateboarding injuries led to about 650 emergency department visits in 2000,[180] and scooter-related injuries led to 275 emergency department visits in a nine-month period in 2000-2001.[181] All data are for children age 14 and under.
- Head injuries are often the most serious type of injury for these wheeled activities, but broken bones are the most common.[182] When scooter riders, skateboarders, or in-line skaters fall, they typically try to cushion the fall with their arms and hands. A fracture to the forearm is the most common injury in all three activities, followed by a wrist fracture in scooters and in-line skating and ankle sprains among skateboarders.
- Children suffer injuries during these wheeled activities because of a combination of factors that most commonly includes inexperience, loss of control, lack of traffic safety skills, high speed, and the tendency to attempt stunts and difficult manoeuvres. Inexperience is a particularly critical factor; most injuries occur within the first few months of using a scooter, skateboard, or in-line skates.[183]
- Children are most likely to be injured when they lose control of the equipment and fall, as opposed to colliding with or being struck by another object.
- Travelling at high speeds significantly reduces a child's ability to react to unsafe situations.[184]
- Keeping children away from traffic is an important way to reduce the number of collisions and severity of injury.[185] However, preliminary research shows that children are also frequently injured at skate parks, possibly due to the design of equipment or children's willingness to take more risks in these environments.[186] More research is needed to assess whether skate parks provide an environment that will lead to reductions in injury.

What works to prevent injury

Wear a helmet approved for the activity. A bike helmet is suitable for riding a scooter and in-line skating, but skateboarders need a skateboarding helmet that protects the back of the head.

Use protective gear. Children on scooters should wear elbow and kneepads. Skateboarders and in-line skaters should wear wrist guards as well as elbow and kneepads.

Keep children on wheels off the road.

Call to action

Increase education and enforcement of the use of protective gear such as helmets.

Increase research into the effectiveness of the use and design of alternative environments for recreation, including skate parks. There is a perception that skate parks are safer than other locations; however, one study showed that a large number of injuries still occurred at the skate park even though skateboarders were wearing safety equipment. This may be due to an increased sense of competition and participation in riskier manoeuvres in a skate park environment.[187]

Report methodology

Data sources

Data for this analysis were provided from two sources; 10 years of hospitalization data were provided by the Canadian Institute for Health Information (CIHI), nine years of death data as well as all corresponding annually population estimates were accessed from Statistics Canada.

Injury hospitalization data from CIHI were provided from the following databases:

- Discharge Abstract Database (DAD), ICD9, 1994-2003. *All of Canada excluding Quebec and Manitoba (outside Winnipeg).*
- Discharge Abstract Database (DAD), ICD10, 2001-2003. *All of Canada excluding Quebec and Manitoba (outside Winnipeg).*
- Hospital Morbidity Database (HMDB), 1994, 2000-2003. *Quebec and Manitoba (outside Winnipeg)*

Death data were accessed from Statistics Canada:

- Causes of Death Database, 1994-2002. *All of Canada.*

  (Note: only 9 years of data were available to the most recent years – 2002 – were available at the time the report was completed.)

Population Estimates were accessed from Statistics Canada:

- Census data, 1991, 1996, 2001. *All of Canada.*

Report purpose

The purpose of this report is to review trends related to unintentional injury suffered by Canadian children as part of the 10-year anniversary of the Safe Kids Week program. In the report, children are defined as being age 14 or under. Unintentional injury is defined as the unforeseen or chance result of hurt or damage from a voluntary act resulting in acute exposure to energy that exceeds human tolerance.

External cause codes: International Classification of Disease

Where injury trends are observed for overall hospitalization and death trends (pages 4 to 7), analysis was based on data for all unintentional injuries. Where injury trends were analysed for external cause, Safe Kids Canada selected the top causes of injury based on burden. As well, some causes were included due to their importance to Canadian child injury prevention efforts between 1994 and 2003.

Injuries are classified according to categories developed by the World Health Organization's (WHO) International Classification of Diseases (ICD) coding system. From 1994 to 2002, all injuries in Canada were coded according to ICD 9 classifications. Since 2001, some hospitals in Canada began coding with ICD 10 however, the updated system has been adopted sporadically in different provinces and territories.

Data extrapolation

This report does not suggest causation in relation to these injury trends. Data were analysed for the 1994 to 2003 time period as these were the most current years of data available. Unfortunately, all data were not available to complete this report based on a 10-year timeframe. Correspondingly, some data extrapolation was necessary.

Summary of Extrapolated Data

I. Deaths data, 2003

Deaths data for 2003 were not available. All deaths for this year were extrapolated based on the trends observed using linear regression for the years 1994-2002. The formulas for data extrapolation are available on request.

II. Injury hospitalization data for Quebec and Manitoba (outside Winnipeg), 1995-1999

Data were available for fiscal years 1994 and 2000-2003. Injury hospitalization counts for these available years were plotted using Microsoft Excel for each of the various breakdowns (all unintentional injury, age groups, gender, main causes). A regression trend line was then implemented and the resulting formula used to estimate injury hospitalizations for years 1995-1999. The equations and the measure of prediction accuracy (R^2) are available on request.

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Report methodology

Unintentional external injury codes

External cause	ICD-9	ICD-10
Cycling	E810-E819(.6), E800-E807(.3); E820-E825(.6); E826.1,.9; E827-E829(.1)	V10-V18, V19(.0-.6,.8,.9)
Cycling – traffic	E810-E819(.6)	V12-V14(.3-.9),V19(.4-.6)
Cycling – other	E800-E807(.3); E820-E825(.6); E826.1, .9; E827-E829(.1)	V10-V11, V12-V14(.0-.2), V15-V18, V19(.0-.3,.8,.9)
Pedestrian	E810-E819(.7), E800-E807(.2), E820-E825(.7), E826-E829(.0)	V1, V2-V4(.0,.1,.9), V5, V6, V9(.0-.3,.9)
Pedestrian – traffic	E810-E819(.7)	V2-V4(.1,.9), V09.2
Pedestrian – other	E800-E807(.2), E820-E825(.7), E826-E829(.0)	V1, V2-V4(.0), V5, V6, V9(.0,.1,.3,.9)
Motor Vehicle Occupant	E810-E819(.0,.1)	V30-V79(.4-.9), V83-V86(.0-.3)
Drowning/submersion	E830.0-.9, E832.0-.9, E910.0-.9	W65-W74
Bathtub	E910.4	W65, W66
Swimming pool	E910.8	W67, W68
Poisoning	E850.0-E869.9	X40-X49
Medications	E850.0-E858.9	X40-X44
Alcohol	E860	
Household products	E861	
Petroleum products	E862	
Agricultural and horticultural products	E863	
Corrosive and caustic substances	E864	
Poisonous foodstuffs and plants	E865	
Other unspecified solids and liquids	E866	
Poisonous gases	E867-869	
Fire/burn	E890.0-E899, E924(.0-.9)	X00-X19
Scalding	E924.0	X11-X13
Hot tap water	-	X11
Fumes	E890-892 (.1, .2)	-
Hot appliances	E924.8	X15, X16
Clothing ignition	E893	-
Bed clothes ignition	E898.0	-
Falls		E880.0-E886.9, E888 W00-W19
Bed or chair	E884.2	W06, W07
Playground equipment	E884.0	W09
Stairs and steps	E880.9	W10
Suffocation	E911-E913.9	W75-W84
Inhalation of food	E911	W79, W78
Inhalation of other object	E912	W 80
Accidental mechanical suffocation	E913	W75, W76, W77, W81, W83, W84

Source: International Collaborative Effort (ICE) on Injury Statistics. External Cause of Injury Mortality Matrix.

Injury diagnosis codes: Body region of injury (ICD-9 cases only)

Body region	ICD-9
Traumatic brain injury	800-801(.9), 803-804(.9), 850-854,
	995(.55), 950(.1-.3)
Other head and neck	802, 807 (.5-.6), 830, 848(.0-.2)
	870-874, 900, 910, 918, 920, 921
	925.1, 925.2, 940, 941(.0-.99), 947(.0),
	950(.0,.9), 951, 953.0, 954.0, 957.0,
	959(.01, .09)
Spinal cord	806(.0-.9), 952(.0-.9)
Vertebral column injury	805(.0-.9), 839(.0-.59), 847(.0-.4)
Torso	807(.0-.4), 808, 809
	839(.61-.79), 846, 847.9, 848(.3-.4)
	860-867, 875-879(.7)
	901-902(.5), 902(.81-.82)
	911, 922(.0-.9), 926(.0-.9), 942(.0-.99)
	953(.1-.3), 953(.5), 954(.1)
	954(.8-.9), 959.1
Upper extremity	810-818, 831-834, 840-842
	880-884, 885-887(.7)
	903, 912-915, 923(.0-.9)
	927(.0-.9), 943(.0-.99), 944
	953(.4), 955, 959(.2-.5)
Lower extremity	820-827, 835-838
	843-845(.1), 890-894
	895-897(.7), 904(.0-.8)
	916, 917, 924(.0-.25)
	928(.0-.9), 945 (.0-.99)
	959(.6-.7)
Unclassifiable by site/Multiple site	819, 828, 829, 839(.8-.9), 848(.8-.9)
	869, 879(.8-.9), 905-909
	919, 924(.8-.9), 929, 930-939
	946, 947(.1-.2, .8-.9), 948, 949
	953(.8-.9), 956, 957(,1, .8, .9)
	958, 959 (.8-.9), 960-989
	990-994, 995(.50-.54, .59, .80-.85)

Source: The Barrell Injury Diagnosis Matrix

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