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## Introduction

The Canadian Injury Prevention Curriculum (CIPC) was first introduced in 2004 by the Canadian Collaborating Centres for Injury Prevention (CCCIP), supported by funding from Health Canada. This curriculum was developed in response to the need for training and certification in injury prevention, considering the growing awareness regarding the burden of injury in Canada. A one-day workshop run in Alberta titled Injury Prevention 101 was the foundation for the CIPC. Injury Prevention 101 provided practitioners with the knowledge and skills necessary to develop and evaluate injury prevention programs. The CCCIP recognized that this type of strategy used across Canada could help establish a stronger network of injury prevention practitioners, encourage a more scientific, evidence-based approach to the selection of intervention strategies, and ensure adequate dissemination and evaluation of programs.

The field of injury prevention has grown significantly in Canada over the past 60 years. The number of practitioners trained with the CIPC is nearing 1500 and through collaboration within this growing network, it became evident that there is a need for a resource dedicated to injury prevention in Canada. Through feedback from the network, it was important that this resource reflect the Canadian experience. Further, it would address the realities of prevention within a Canadian social and political context, as well as the diverse geography and populations including Canada's distinct Aboriginal population. Participants of the CIPC also identified the need for a resource to support their learning and practice of injury prevention. Due to Canada's size, there was also the need to create an accessible resource for injury prevention practitioners and other professionals across an extremely large geographical area; therefore, the most appropriate and cost effect format for this resource would be on-line.

Sixty-one authors from across Canada, representing a range of disciplines, were invited to provide a comprehensive overview of each of the areas of injury prevention highlighted in this resource. The resulting synthesis covers important facets of injury prevention research, policy and programming, all of which encompass the art and science of injury prevention.

A multi-disciplinary editorial committee with representatives from across Canada provided on-going direction and guidance to the development of the resource. Funding support came from the CCCIP and the Public Health Agency of Canada and overall management and coordination of the resource was provided by Parachute.

This resource is organized into an introduction and four sections.

**Section 1** provides an overview and describes the need for an injury prevention resource within the broader public health context in Canada. In this introductory section, the successes and challenges in the field of injury prevention in Canada will be discussed, the relationship between unintentional and intentional injury will be presented, and the burden of injury in Canada will be described.

**Section 2** covers the Canadian Good Practice Model, which is a model that describes how to identify community injury issues, address priority issues, and develop, implement and evaluate injury prevention programs. Case studies are used throughout this section to illustrate the use of the Model.

## Jason's Story\*

### Why is Jason in the hospital?

*Because he has a bad infection in his leg.*



### But why does he have an infection?

*Because he has a cut on his leg and it got infected.*

### But why does he have a cut on his leg?

*Because he was playing on a poorly maintained playground next to his apartment building and there was some sharp broken edges there that he fell on.*

### But why was he playing on a playground with old, broken equipment?

*Because his neighbourhood is kind of run down. A lot of kids play there and there is no one to supervise them.*

### But why does he live in that neighbourhood?

*Because his parents can't afford a nicer place to live.*

### But why can't his parents afford a nicer place to live?

*Because his Dad is unemployed and his Mom is sick.*

### But why is his Dad unemployed?

*Because he doesn't have much education and he can't find a job.*

### But why...?

\* Toward a Healthy Future: Second Report on the Health of Canadians. Retrieved from: <http://www.phac-aspc.gc.ca/ph-sp/determinants/index-eng.php> on July 15, 2015

**Section 3** describes the influence of the determinants of health on injury, and the mechanisms of injury.

**Section 4** focuses on specific injury topics written by leading Canadian experts. These experts provide brief overviews of each injury topic and highlight the current state of evidence regarding interventions wherever possible. These overviews are meant to be a starting point to understanding specific injury issues, and are not meant to be used as the only source of evidence.

Due to the magnitude of the injury issue and its effect on the health status of a population, injury prevention is now largely defined as a public health issue. However, public health is only one piece of the injury prevention puzzle and there are diverse approaches to addressing this important health issue (see Jason's Story). The goal of this resource is to prepare many individuals with a basic understanding of the field of injury prevention. The CCCIP and the authors who have contributed to this first injury prevention resource in Canada believe that by creating a 'critical mass' of knowledgeable practitioners we will leverage resources to build a sustainable infrastructure for injury prevention in Canada.





# 1.1

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## The Journey To Date: The Canadian Context

### Introduction

Injury is a major public health issue in Canada as it is the leading cause of death for Canadians between the ages of one and 44 years.<sup>1</sup> Canada has some unique challenges when it comes to injury prevention. Injury rates are four to five times higher in Canada's First Nations and Inuit populations, compared to rest of the country. It is a vast country with some sparsely populated, underdeveloped regions, and concentrations of highly urban areas with dense populations. This diverse geography presents a unique challenge to the development and delivery of injury prevention programs.

### Early Beginnings of Injury Prevention in Canada

While the field of injury prevention was introduced as early as 1913<sup>2</sup> it has only been over the last 60 years that injury prevention efforts have been somewhat coordinated and systematic in Canada. Initially, injury prevention activities in Canada were focused on children and adolescents. The 'Accident Prevention Committee' by the Canadian Paediatric Society was established during the 1960s and the 1<sup>st</sup> national conference on childhood injuries was held in 1981. The release of the first edition of the Health of Canada's Children by the Canadian Institute of Child Health in 1989 profiled injuries as a major cause of death and hospitalization and led to development of the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) which was the first injury surveillance system in Canada. The CHIRPP was launched by Health Canada in 1990, and continues to document the number,

types, and circumstances of injuries mainly in children, presenting to the emergency rooms at select hospitals across Canada.

## Interest Grows Provincially and Nationally

The late 1980s and early 1990s was an active time in the development of injury-related programs, resources and collective action to prevent injury across Canada. Several foundational injury prevention national organizations were established such as Safe Kids Canada, SMARTRISK, ThinkFirst Canada, Safe Communities Canada and the Canadian Agricultural Safety Association. Provincial organizations established during this time were the Saskatchewan Prevention Institute (previously known as The Saskatchewan Institute on Prevention of Handicaps), Injuries Manitoba – Preventing Adolescent and Child Trauma (IMPACT) and Alberta’s Injury Prevention Centre (IPC). The award winning HEROES, a multi-media injury prevention program for adolescents developed by the IPC, captured attention and acted as a catalyst for school-based injury prevention action in Alberta and across the country. In May, 1991 Canadian injury control experts met in Edmonton to develop injury control objectives for Canada for the Year 2000. This was the first time that experts working across injury types and ages, came together to work on common goals. The number one recommendation that emerged from this meeting was that injury be recognized as a major cause of death and disability by the Government of Canada, and that a national strategy of injury prevention was required. While no national strategy emerged to support the achievement of the injury control objectives for Canada, pockets of activity action to support injury prevention began within the federal government.

These activities were bolstered by Canada’s response in 1992 to the United Nations Convention on the Rights of Child passed in 1989. The Convention recognizes the importance of improving the living conditions of children in every country and the role of international cooperation in assisting developing countries with this endeavour. At the forefront of Canada’s response was the launch of the Brighter Futures program for children that is a multi-departmental initiative to address the well-being of children, particularly young children at risk and their families. Injury prevention activities are a cornerstone of the program. The Family and Child Health Unit at Health Canada was able to use Brighter Futures funding to develop foundational injury prevention resources including a directory of programs and researchers across Canada and a review of legislation pertaining to the prevention of unintentional childhood injury. They also hosted several meetings of key injury prevention leaders across the provinces and nationally to share best practices and methods to develop and implement provincial injury prevention strategies. The Medical Services Branch, now the First Nations and Inuit Health Branch, funded the development of resources and workshops across Canada to address the injury issues in these populations. As motor vehicle collisions were (and in many places continue to be) the leading cause of injury death, in 1996 the collective provincial and territorial Ministries of Transportation and Transport

Canada released a vision document with the goal of making Canada's roads the safest in the world. This document spearheaded initiatives in each province and territory related to the prevention of motor vehicle collisions.

The late 1990s saw the release of the first report on the economic burden of unintentional injury in Canada and again called for the government of Canada to develop a national injury prevention strategy. This call for a national strategy was echoed in an issue paper developed by the Federal/Provincial/Territorial Advisory Committee on Population Health, Public Health Working Group, Sub-



Committee on Injury Prevention and Control Working Group on public health. While this group was disbanded after completing the paper, their efforts resulted in the creation of the Secretariat for Injury Prevention and Control at Health Canada. The mandate of the Secretariat was to provide national leadership and coordination through building infrastructure and capacity to address injury. Even though the Secretariat was short-lived due to shifts in the political landscape, it did provide a backdrop that brought injury prevention organizations together.

## The Canadian Collaborating Centres for Injury Prevention

The Canadian Collaborating Centres for Injury Prevention (CCCIP) was established in 1999 following a meeting partially funded by the Family and Child Health Unit at Health Canada. The mandate of the CCCIP was to promote collaboration among injury prevention centres and organizations across Canada and address common issues such as funding and how to move injury prevention forward. The CCCIP has become a facilitator of action and a leader in the field of injury prevention. Its members work collaboratively to improve injury prevention policies, programs and surveillance and to translate research into practice. Furthermore, the CCCIP developed and continues to deliver the Canadian Injury Prevention Curriculum that builds professional capacity across the country in order to further action on reducing preventable injuries. Several other injury prevention curricula for specific issues (e.g. seniors falls) or age groups (e.g. children) have been developed based on this initial curriculum.

## Provincial and National Initiatives

**Knowledge sharing.** The first national conference, the Canadian Conference on Injury Prevention and Control in October of 2000, and the Sixth World Conference on Injury Prevention and Control in May of 2002, *Injuries, Suicide and violence: Building Knowledge, Policies and Practices to Promote a Safer World* were watershed events for the injury prevention community in Canada. The national conference brought Canadian stakeholders from many sectors together to create an injury prevention community across Canada. The world conference provided the opportunity for this community to showcase its work internationally. The national conferences remain a focal point for the injury prevention community in Canada for knowledge exchange.

**Strategies.** The beginning of the 21st century saw a great deal of momentum in the field of injury prevention in Canada with most provinces and territories producing a discussion document or a strategy related to injury prevention. Canada's first national strategy on injury prevention was released in 2003, titled *Ending Canada's Invisible Epidemic*, which again made the call for federal government leadership on the issue. Sustained efforts at the provincial and territorial levels in terms of gaining government support for injury prevention has been variable across Canada.

**Research.** One of the criticisms of much of the early injury prevention efforts was the lack of evidence related to effective interventions. In response, the Canadian Injury Research Network was formed in 2000. This consortium of researchers, practitioners, clinicians and policy makers continue to work to advance inter-sectorial, inter-disciplinary and cross cutting injury prevention research. Their report, *A Research Agenda for Injury Prevention and Control for Canada, March 2002* laid the early groundwork for Canadian researchers. Also at this time, the Canadian Institutes of Health Research (CIHR) was formed and several Institutes led a strategic initiative entitled, *Listening for Direction on Injury Prevention*. This initiative was the first attempt by CIHR to address the multi-disciplinary nature of injury control and to identify strategic research and knowledge translation priorities. This process provided the basis for funding opportunities for new research such as the Child and Youth Indicators for Injury Prevention, the Saskatchewan Farm Injury Cohort Study and the Risk of Injury associated with Body Checking among Pediatric Ice Hockey Players. In 2009, CIHR awarded \$10,294,425 to seven Strategic Team grants in Applied Injury Research, which has enabled injury researchers to conduct significant research in a number of priority injury areas.

**First Nations.** Canada has a substantial Indigenous population and continues to be active in addressing the injury issues specific to Indigenous communities. This has been done through the Brighter Futures initiative since 1992 and other activities such as the development of an injury curriculum specific to this population, knowledge-sharing conferences and the creation of a national working group to guide a coordinated injury prevention strategy.

## The Way Forward

Injury prevention in Canada has a strong foundation and a vibrant future. In 2012 came the amalgamation of four national organizations – Safe Communities Canada, Safe Kids Canada, SMARTRISK, and ThinkFirst Canada – into Parachute, which is a national voice for injury prevention in Canada. There has been tremendous growth in the number of people and organizations focused on injury prevention in the community, but also in the knowledge-base of Canadian research and evidence-informed practice. Canada has made some progress in decreasing the burden of injury over the past twenty years; decreasing the overall injury mortality rate from 47.3 to 40.5 per 100,000 population from 1990 to 2010. More specifically, Canada has also seen substantial declines in both motor vehicle related death rate from 13.2 to 6.4 per 100,000 and the suicide rate from 12.4 to 10.9 per 100,000 over the same time period. Despite this progress, the injury rate associated with falls and unintentional poisonings continue to rise, increasing from 4.5 to 8.2 per 100,000 and from 2.1 to 4.3 per 100,000 respectively.<sup>3</sup> As a result, injury remains one of the largest public health issues that Canada faces and is a major burden to the healthcare system.

## References

1. Statistics Canada. (n.d.) Tables 102-0521 to 102-0540. Canada, annual. CANSIM (database).
2. Hanson, D. W., Finch, C. F., Allegrante, J. P., & Sleet, D. (2012). Closing the gap between injury prevention research and community safety promotion practice: revisiting the public health model. *Public health reports*, 147-155.
3. Public Health Agency of Canada. (2014). Analysis of Statistics Canada mortality data, 1990-2010.





# 1.2

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## Bridging the Gap Between the Prevention of Intentional and Unintentional Injuries

### Introduction

The field of injury prevention related to both unintentional (UI) and intentional injuries (II) has developed over the last 30 years in Canada. Although the networks related to these two injury classifications have developed concurrently, the expertise has been developed almost as two distinct fields and there has been little sharing of knowledge. At first glance, it is difficult to envision what domestic violence and highway injuries have in common. However, there is much expertise to be shared between unintentional and intentional injury prevention networks. The purpose of this chapter is to present an overview describing the benefits of collaboration, and proposes a frame of reference to facilitate greater cooperation between networks.

### Preventing Unintentional and Intentional Injuries: Frames of Reference and Historical Perspective

The conceptual basis of the injury prevention approach stems, in large part, from the work conducted by four researchers: Hugh De Haven, John Gordon, James J. Gibson and William Haddon Junior.<sup>1</sup> The most renowned of the four is undoubtedly William Haddon (see Chapter 2.3.2 Identifying Risk and Protective Factors), who is considered by many as the father of modern methods of injury prevention and control. This conceptual basis includes a

definition of the injuries (see frame) and suggests tools to better understand the injuries and determine strategies for control.<sup>2</sup>

Haddon's framework has guided the development of many intervention programs around the world, mainly with regard to UI, firstly in the field of road safety and then in other areas of human activity such as sports and leisure, work or activities of daily living. Canada is no exception to this trend. As such, a network of experts in UI prevention (e.g. the Canadian Collaborating Centres for Injury Prevention) was developed and initiatives in the field of research or interventions were undertaken.

At the same time, in the field of II, the main initiatives were developed as part of violence or suicide prevention programs. These programs were conducted by networks of experts and stakeholders (sociologists, psychologists, social workers, etc.) with relatively few connections with those from the unintentional injury prevention network. The initiatives focused mainly on domestic violence or violence among loved ones including child abuse (youth protection laws) and intimate partner violence (policies, action plans, etc.). Also, other initiatives focusing on crime prevention emerged, including the National Crime Prevention Centre and the National Crime Prevention Strategy (Public Safety Canada). Suicide prevention organizations were also created on a Canadian scale (Canadian Association for Suicide Prevention) as well as in every region of the country. Those initiatives were developed according to the conceptual bases from the various disciplines involved, with no apparent connections to the injury prevention model.

### Injuries

*Injuries are defined as **bodily harm resulting from a sudden transfer of energy that exceeds the human body's capacity for resistance. The energy transferred is most often mechanical (e.g., fracture), but it may also be thermal (e.g., burn), electrical (e.g., electrocution), chemical (e.g., intoxication) or radiant (e.g., sunburn). Note that injuries can also be the result of a sudden loss of energy or vital element (e.g., chilblain, drowning, strangulation)***<sup>3</sup>

Under the injury prevention framework, violence (against others and self-inflicted) is considered part of intentional injury, specifically intentional injuries (II). The World Health Organization issued the World Report on Violence and Health<sup>4</sup> that suggested a frame of reference including a definition of violence, a typology and an ecological model to understand and intervene (see Chapter 4.6 Violence). Compared to the definition of an injury, the definition of violence proposed by the WHO goes beyond a simple transfer of energy or the loss of a vital element because it recognizes that violence can also be the result of a threat or an abuse of power. Moreover, that definition includes consequences that exceed simple bodily harm and includes psychological or moral harm, maltreatment or deprivation. Finally, contrary to injuries that are generally recognized as the result of a

sudden event\*, violence may be the result of repeated acts. In fact, some forms of violence, such as abuse, are not the result of an isolated act but rather of a dynamic between aggressor and a victim that takes place over a more or less long period of time. That is also the case with bullying, which is the result of repeated acts towards the same individual because that phenomenon reflects a behavioural pattern, not only an isolated incident.<sup>6</sup>

In summary, the presentation of energy as the cause of injury has certainly helped to better understand injuries as a result of a common etiology, modulated by predictable factors similar to other health problems such as cancer, cardiovascular disease, and infectious disease. However, the Haddon model (see Chapter 2.3.2 Identifying Risk and Protective Factors) is a very medical model that may have suited public health workers, but not necessarily those in the field of social sciences and behavioural sciences involved in the prevention of violence and suicide. Therefore, those in the fields of UI and II are coming from very different conceptual frames of reference.

## Violence and Injury Prevention: Bridging the Gap Between the Two Models

Despite the differences in the violence and injury prevention approaches, there are many benefits of bridging the gap between the two fields. Those reasons are particularly related to the many connections that exist between the problem of UI and that of II specifically; similar consequences, an unspecific boundary between UI and II, common associated factors and control and preventive measures impacting both UI and II.

**Similar consequences.** Both UI and II can result in similar bodily harm for victims, such as lacerations, fractures, burns, oxygen deprivation or death.<sup>7,8</sup> Also, they are likely to result in significant psychological consequences identified as post-traumatic stress.<sup>9</sup>

**Unspecific boundaries.** The boundary between what is intentional and what is unintentional is often very arbitrary or even uncertain. The classification of an injury based on what is unintentional or intentional poses some difficulties. Firstly, what society considers a violent act may vary from one region to the next and rests on a judgment modulated, among other things, by the social norm<sup>†</sup>. For example, in boxing, the winner is often designated as the one who succeeds in intentionally inflicting injury onto his opponent (often a concussion) or prevents him from getting back up. However, that type of injury is generally classified as unintentional because the rules of the game are respected. The same

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\* Of course, bodily harm can be produced by repetitive motions. That type of phenomenon is not generally included in the field of injury prevention.

† Societal norms are socially shared rules or models of behaviour based on common values and involving pressure to adopt a given behaviour on penalty of reprobation from the society or reference group.<sup>32</sup>

dilemma is encountered when injuries occur in other contact sports such as hockey where body checking is allowed and even encouraged.

Secondly, even when there is consensus and a clear definition of what is intentional or unintentional, it is often very difficult to determine with certainty into which category to place an event. For example, in an Australian study<sup>10</sup>, which analyzed motor vehicle collisions involving a single occupant, the authors emphasized the difficulty of clearly distinguishing an “accident” from a suicide. Schaechter et al. (2003) in a review of deaths by firearms among children in Miami-Dade County (USA), concluded that unintentional deaths by firearm are significantly under-reported due to problems associated with classification criteria.<sup>11</sup> Finally, when looking at deaths by intoxication in Canada, the proportion of indeterminate cases with regard to intent is 20%.<sup>12</sup> This illustrates the difficulty of injury classification with regards to intent.<sup>13,14</sup>

**Common associated factors.** When analyzing the factors associated<sup>‡</sup> with UI and II, many are common to both including, alcohol, firearms and toxic products.

It has long been established that alcohol consumption is associated with many UI<sup>18</sup>, from drownings<sup>15</sup> to traffic injuries.<sup>16,17,18</sup> Alcohol consumption is also associated with various forms of violence<sup>18</sup> and more specifically, violence among youth, intimate partner violence, sexual assault and suicide.<sup>4</sup> The presence of firearms in the home increases the risk of homicide by almost 3 times<sup>19</sup> and the risk of suicide by almost 5 times<sup>20</sup> for members of the home and the risk of injury by accidental discharge.<sup>21</sup> The same can be said for the presence of toxic products or medications associated with suicides<sup>22</sup> and UI, particularly among children from 0 to 4 years of age.<sup>23</sup>



**Control and preventive measures impacting both UI and II.** Many interventions can impact both UI and II. That is particularly true for measures aimed at reducing access to firearms<sup>24</sup> alcohol abuse<sup>18</sup>, and interventions with parents aimed at developing safe, stable and healthy relationships with their children. Interventions directed at parents based on home visits by nurses in the pre and post-natal period, have been recognized as being effective in reducing both the risks of various forms of violence<sup>25,26</sup> and the occurrence of UI at home among children.<sup>25</sup>

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‡ A factor is said to be associated when there is a statistical association between a factor and the occurrence of an event. One cannot necessarily conclude that it is a causal factor.

Taking action to protect oneself from violence (II) or its consequences can sometimes result in an increased risk of UI. For example, some organizations will recommend that citizens obtain a firearm to protect themselves against violence. This can introduce an increased risk of unintentional injuries into the home.<sup>24</sup> Also, some people may choose to be relocated from “dangerous” downtown areas to the suburbs because of fear of crime and violence. This can result in increased urban sprawl with negative consequences in terms of road safety related to the increased number of vehicles on the road. Finally, a tax decrease on alcohol may be recommended to counter illegal trafficking<sup>27</sup> and the violence that may be associated with it. Such a decision would likely result in higher consumption and an increase in unintentional injuries associated with impaired driving.<sup>18</sup>

These examples clearly show that some interventions may have effects on both UI and II, which either can be beneficial for both, or detrimental to one or the other. It then becomes important to consider all of the possible effects of an intervention on both UI and II.

## Safety, An Integrating Framework

Activities to prevent and control UI and II are conducted by a variety of sectors including transportation, public safety, health, the municipalities, etc. They require diversified expertise from health sciences, humanities, engineering, etc. All of these experts use different intervention models, which, as discussed above, do not facilitate an exchange of expertise and teamwork. However, they all have a common goal; that of ensuring personal safety, which is a fundamental need for human beings. As such, it would be useful to share a framework to promote of synergy between the various sectors and areas of expertise that all can identify with.

### Safety

“Safety is a state in which the dangers and conditions that could cause physical, psychological or material harm are controlled in a manner to preserve the health and well-being of individuals and the community. It is an essential resource of daily life that permits an individual and the community to achieve its goals”<sup>28</sup>

In Québec, a frame of reference was developed a few years ago that proposes a definition of safety that encompasses the issues associated with both UI and II.<sup>28</sup> It recognizes the two dimensions of safety that are important to consider, i.e. the subjective dimension (for example, the fear of crime) and the objective dimension (for example, homicides in a community). Moreover, the framework suggests the presence of at least four conditions for ensuring the population is safe. Those conditions are:

- ❖ A climate of cohesion and social peace and equity protecting the rights and freedoms on the family, local, national and international level;
- ❖ The prevention and control of injuries and other consequences or harm caused by accidents;
- ❖ The respect of values and physical, material or psychological integrity of persons;
- ❖ Access to effective means of prevention, control and rehabilitation to ensure the presence of the first three conditions.”<sup>28</sup>

Finally, the framework proposes a definition of the promotion of safety (see box) that echoes the definition of the promotion of health in the Ottawa Charter<sup>29</sup>. Two approaches help promote the safety of a population: the approach via the problem and the setting-oriented approach. The approach via the problem consists of searching for specific solutions to one or more problems taken individually. In the second approach, “motivator [...] is no longer the solution to a specific problem, but rather the improvement of the level of safety of a group”.<sup>30</sup> It calls on a structured procedure for planning various activities with the community, involving several phases including the mobilization of key players, the determination of a diagnosis of safety of the environment that integrates the issues associated with UI and II. The development of a resulting action plan is the final step.

This frame of reference has been used successfully in Québec on several occasions, particularly to build tools<sup>31</sup> within a safety promotion and crime prevention program and to support the interventions planned within a program to prevent UI and violence in school yards (see case study).

### Safety promotion

“The promotion of safety is a process that individuals, communities, governments and other organizations, including private businesses and non-governmental organizations (NGO) apply on a local, national and international level to develop and maintain safety. That process is comprised of all of the efforts made to modify the structures, the environment (physical, social, technological, political, economic and organizational) and the attitudes and behaviours related to safety.”<sup>28</sup>

## Conclusion

Many gaps can be bridged between the prevention of UI and II. Better synergy between the two networks would help better leverage the expertise and experience acquired. It would

also provide opportunities to form a larger critical mass devoted to injury prevention and more solid bases to justify the investments required. The promotion of safety can, as such, be proposed as a driving force to promote the collaboration among those who work in this field.

## Case Study

### Promoting physical activity and safety in school yards in Quebec

The schoolyard is an important space for children. They spend many hours a day there, in the morning, at lunch, during recesses or at the end of the day. It is a place where children learn to socialize with their peers, and where they can participate in a variety of free play or organized activity. However, the most recent statistics indicate that half of children are inactive during recesses. Moreover, it has been shown that visits to a doctor or nurse for unintentional injuries among children five to twelve years is related to physical activity in school yards. Finally, schoolyards are places where children feel less safe as a result of different forms of violence (verbal, physical, bullying, intimidation, etc.).

Faced with this evidence, public health officials in the Québec region (National Capital region), in collaboration with academics, deemed it important to intervene to promote safe physical activity and the adoption of healthy behaviours by children in the schoolyard. An offer of service was developed with these goals in mind to implement in schools. This offer was based on a global vision for schoolyards that places an emphasis on safety, and likewise considers the issue of intentional and unintentional injury. It targets primarily the arrangement, organization and supervision of schoolyards, and proposes a process, tools (i.e., the guide to my schoolyard: a nice place; the guide for playgrounds and play structures), training sessions and accompanying information. The process involves stakeholders from academic settings, healthcare and parents, and will involve three successive steps.

The first step presents the vision, proposed implementation plan, tools and supplementary information to schools leaders. At this point, a discussion is initiated to understand concerns and specific needs relating to the schoolyard. The second step consists of creating a “school yard” committee, and determining a diagnosis for the schoolyard. This committee is composed of different kinds of school officials (i.e., special education teachers, physical education teachers, teachers, security services and principals/directors). Depending on specific issues, parents and municipal representatives may be asked to participate. The diagnosis is formulated by committee members through data from reported incidents, complaints made, and direct observation. The third step consists of establishing a certain number of priority actions and proposing an action plan that can be completed during the school year, with the ultimate intention of ensuring physical activity and safety for children.

Many schools in Québec region (National Capital region) have benefitted from this approach. For example, School PM (not actual name of school) welcomes 300 students at the primary level. After offering services in the region, the school management initiated a process to create a schoolyard that was safer and more suitable for physical activity. During the three steps planned for the process, the diagnosis demonstrated a problem with the enclosure and supervision of students during lunch hour, non-optimal usage of the schoolyard, the occurrence of injuries linked to usage of play equipment, hostile behaviours between certain students, as well as unwelcome visitors at lunch hour. In light of this diagnosis, an action plan was developed for the school year. This plan comprised several action items relating to community mobilization (i.e., maintaining a schoolyard committee to ensure the implementation of the action plan), to the organization of the schoolyard (i.e., developing programming for activities midday, developing and promoting a sketch demarcating different play areas by age and activity type), to schoolyard planning (i.e., increasing the absorptive capacity of surfaces under the play structures), to the supervision and boundaries offered to students for their protection (i.e., recruiting and training young leaders, better identification for staff, developing and communicating a code of ethics to respect the schoolyard, surveillance plan to avoid the presence of unwanted visitors).

The schools that have tried this process better understand the importance of having a global vision for their schoolyard. They are equally conscientious of the importance of community mobilization and the importance of the connections that exist between the arrangement, organization and supervision of the schoolyard. The schools that have initiated the process also have a better understanding of the security requirements for playgrounds and play structures. Additionally, these schools more often analyze incident reports, put surveillance strategies in place and adopt clear procedures in case of injuries, conflict or the presence of unwanted visitors. Other positive outcomes observed included: a decrease in the number of interventions to manage incidences of violence between children, and the optimization of management of materials during playtime. Finally, it appears that community mobilization and shared leadership by several parties promotes sustainability.

## References

1. Waller J. A. (1989). Injury Control in Perspective. *American Journal of Public Health*, Vol. 79(3): 272-273.
2. Haddon W. & Baker S. P. (1981). Injury control. in Clark D., MacMahon, B., rédacteurs. *Preventive and community medicine*, Little, Brown and Company, 109-140.
3. Lavoie, M., Maurice, P. & Rainville, M., Prévention des traumatismes : une approche pour améliorer la sécurité des populations. *Dans Trousse média en prévention des traumatismes*, [<http://www.inspq.qc.ca/prevention-traumatismes/une-approche-pour-ameliorer-la-securite-des-populations>], pages consultées le 9 juillet 2014.

4. Krug, E. G, Dahlberg, L. L., Mercy, J. A., Zwi, A. & Lozano-Ascencio, R. (eds.) (2002). World report on violence and health. Geneva, World Health Organization, 360 [[http://whqlibdoc.who.int/publications/2002/9241545615\\_eng.pdf?ua=1](http://whqlibdoc.who.int/publications/2002/9241545615_eng.pdf?ua=1)].
5. World Health Organization (2002). World report on violence and health: summary. Geneva, 54, [[http://www.who.int/violence\\_injury\\_prevention/violence/world\\_report/en/summary\\_en.pdf](http://www.who.int/violence_injury_prevention/violence/world_report/en/summary_en.pdf)].
6. Hinduja, S. & Patchin, J. W. (2010). Bullying, Cyberbullying, and Suicide. *Archives of Suicide Research*, 14: 206–221.
7. Wathen, N. (2012). Health Impacts of Violent Victimization on Women and their Children. Research and Statistics Division, Department of Justice Canada, 34 [[http://www.justice.gc.ca/eng/rp-pr/cj-jp/fv-vf/rr12\\_12/rr12\\_12.pdf](http://www.justice.gc.ca/eng/rp-pr/cj-jp/fv-vf/rr12_12/rr12_12.pdf)].
8. Ministry of Health Promotion (2010). Prevention of Injury. Guidance Document. Province of Ontario, 128 [<http://www.mhp.gov.on.ca/en/healthy-communities/public-health/guidance-docs/PreventionofInjury.PDF>].
9. Difede, J., Olden, M. et Cukor, J. (2014). Evidence-Based Treatment of Post-Traumatic Stress Disorder. *Annual Review of Medicine*, 65: 319-332.
10. Austin, A. E., van den Heuvel, C. & Byard, R. (2013). Suicide and fatal single occupant motor vehicle collisions. *Australian Journal of Forensic Sciences*, 45(1): 43-48.
11. Schaechter, J., Duran, I., De Marchena, J., Lemard, G. & Villar, M. E. (2003). Are “Accidental” Gun Deaths as Rare as They Seem? A Comparison of Medical Examiner Manner of Death Coding With an Intent-Based Classification Approach. *Pediatrics*, 111 (4), April: 741-744.
12. Statistics Canada. Table 102-0540, Deaths, by cause, Chapter XX: External causes of morbidity and mortality (V01 to Y89), age group and sex, Canada. Date modified 2014-01-28, Accessed July 11, 2014 [<http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=1020540&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid>].
13. Bohnert, A. S. B., McCarthy, J. F., Ignacio, R.V., Ilgen, M. A., Eisenberg, A., Frederic C. & Blow, F. C. (2013). Misclassification of suicide deaths: Examining the psychiatric history of overdose decedents. *Injury Prevention*, 19: 326–330.
14. Donaldson, A. E., Larsen, G. Y., Fullerton-Gleason, L. & Olson, L. M. (2006). Classifying undetermined poisoning deaths. *Injury Prevention*, 12: 338–343.
15. Trépanier, J. P., Sergerie, D. & Blais, É. (2006). Avis de santé publique sur la sécurité dans les piscines résidentielles et publiques au Québec. Institut national de santé publique du Québec, 103, [<http://www.inspq.qc.ca/pdf/publications/554-AvisPiscinesPubliques.pdf>].
16. Krüger, H.P. & Vollrath, M. (2004). The alcohol-related risk in Germany: procedure, methods and results. *Accident Analysis and Prevention*, 36: 125-133. Étude citée dans Blais, É. & Maurice, P.

- (2010). Réduction de la limite d'alcool permise dans le sang pour la conduite d'un véhicule automobile. Avis scientifique. Institut national de santé publique du Québec, 68.
17. Brault, M., Dussault, C., Bouchard, J. & Lemire, A-M. (2004). Le rôle de l'alcool et des autres drogues dans les accidents mortels de la route au Québec : résultats finaux. Québec QC : Société de l'assurance automobile du Québec, 9, [<http://www.saaq.gouv.qc.ca/rdsr/sites/files/32002004.pdf>].
  18. Meier, P., Brennan, A., O'Reilly, D., Purshouse, R. & Taylor, K. (2008). Independent Review of the Effects of Alcohol Pricing and Promotion. Part A: Systematic Reviews. SCHARR, University of Sheffield, 243, [[https://www.shef.ac.uk/polopoly\\_fs/1.95617!/file/PartA.pdf](https://www.shef.ac.uk/polopoly_fs/1.95617!/file/PartA.pdf)].
  19. Kellermann, A. L., Rivara, F. P., Rushforth, N. B., Banton, J. G., Reay, D.T., Francisco, J. T., Locci, A. B., Prodzinski, J., Hackman, B. B. & Somes, G. (1993). Gun Ownership as a Risk Factor for Homicide in the Home. *New Engl J Med*, 329 (15): 1084-1091.
  20. Kellerman, A. L., Rivara, F. P., Somes, G., Reay, D. T., Francisco, J., Banton, J. G., Prodzinski, J., Fogner, C. & Hackman, B. B. (1992). Suicide in the home in relation to gun ownership. *New Eng J Med*, 327 (7): 470.
  21. Frappier, J. Y., Leonard, K. A. & Sacks D. (2005). Youth and firearms in Canada. Canadian Paediatric Society, Adolescent Health Committee, *Paediatr Child Health* 10(8):473-7. [<http://www.cps.ca/en/documents/position/youth-and-firearms>].
  22. Sarchiapone, M., Mandelli, L., Iosue, M., Andrisano, C. & Roy, A. (2011). Controlling Access to Suicide Means. *International Journal of Environmental Research and Public Health*, 8: 4550-4562.
  23. Yanchar, N. L., Warda, L. J. & Fuselli, P., (2013). Child and youth injury prevention: A public health approach. Position paper. Canadian Paediatric Society, 8, [<http://www.cps.ca/documents/position/child-and-youth-injury-prevention>].
  24. Narang, P., Paladugu, A., Manda, S. R., Smock, W., Gosnay, C. & Lippman, S. (2010). *Southern Medical Journal*, 103(2), February: 151-153. Public Safety Canada, [<http://www.publicsafety.gc.ca/cnt/cntrng-crm/crm-prvntn/ntnl-crm-prvntn-cntr-eng.aspx>].
  25. Blueprints for Healthy Youth Development, Nurse-family partnership, model program, [en ligne] [<http://www.blueprintsprograms.com/factSheet.php?pid=972a67c48192728a34979d9a35164c1295401b71>].
  26. World Health Organization (2009). Preventing violence through the development of safe, stable and nurturing relationships between children and their parents and caregivers. In *Violence Prevention: The Evidence*, World Health Organization, 18 [[http://apps.who.int/iris/bitstream/10665/44179/1/9789241598507\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/44179/1/9789241598507_eng.pdf)].
  27. Mäkelä, P. & Österberg, E. (2009). Weakening of one more alcohol control pillar: A review of the effects of the alcohol tax cuts in Finland in 2004. *Addiction*, April, 104(4): 554-563.

28. Maurice, P., Lavoie, M., Levaque Charron, R., Chapdelaine, A., Bélanger-Bonneau, H., Svanström, L. et coll. (1998). *Safety and Safety Promotion: Conceptual and Operational Aspects*. Québec: Québec WHO Collaborating Centre for Safety Promotion and Injury Prevention [[http://www.inspq.qc.ca/pdf/publications/150\\_SecurityPromotion.pdf](http://www.inspq.qc.ca/pdf/publications/150_SecurityPromotion.pdf)].
29. World Health Organization (1986). *Ottawa charter for health promotion* [<http://www.phac-aspc.gc.ca/ph-sp/docs/charter-chartre/pdf/charter.pdf>].
30. Maurice, P., Lavoie, M., Chapdelaine, A & Bélanger-Bonneau, H. (1997). *Safety and Safety Promotion: Conceptual and Operational Aspects*. *Chronic Diseases in Canada*, vol. 18, no 4, p. 179-186. [[http://www.phac-aspc.gc.ca/publicat/cdic-mcc/18-4/f\\_f.html](http://www.phac-aspc.gc.ca/publicat/cdic-mcc/18-4/f_f.html)]
31. Bouchard, L. M., Maurice, P. & Rainville M. (2011). *Safety diagnosis tool Kit for local communities. Safety Diagnosis Handbook*. Coll. *Safety Diagnosis Handbook*. Institut national de santé publique du Québec, 65 [[http://www.inspq.qc.ca/pdf/publications/1436\\_ManuelAccompProcessusDetermDiagnostic\\_VA.pdf](http://www.inspq.qc.ca/pdf/publications/1436_ManuelAccompProcessusDetermDiagnostic_VA.pdf)].
32. Baril, G. & Paquette, M. C. (2012). *Les normes sociales et l'alimentation. Analyse des écrits scientifiques*. Institut national de santé publique du Québec, 30, [[http://www.inspq.qc.ca/pdf/publications/1486\\_NormesSocialesAliment\\_AnalyEcritsScient.pdf](http://www.inspq.qc.ca/pdf/publications/1486_NormesSocialesAliment_AnalyEcritsScient.pdf)].





# 1.3

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## The Burden of Injury

### Introduction

It may be a surprise to some to learn that the leading cause of death for Canadians during the first three decades of life is not disease, but rather injuries. In 2011, almost 15,000 deaths in Canada were attributed to injuries as a result of motor vehicle collisions, falls, drug overdoses, and drowning, among other causes.<sup>1</sup> Injury is defined as the physical damage that results when the human body is suddenly or briefly subjected to intolerable levels of energy.<sup>2</sup> The injury may be a bodily lesion resulting from acute energy exposure in amounts that exceed the threshold of physiological tolerance, or it may be an impairment of function resulting from a lack of one or more vital elements (i.e. air, water, warmth), as in drowning, suffocation or hypothermia. The time between the exposure to the energy and the appearance of the injury is short. Examples of energy that can cause injury are mechanical or kinetic energy (e.g. falls, motor vehicle crashes, assaults); thermal energy (e.g. burns, scalds); electrical energy (e.g. electrocution, lightning); chemical energy (corrosive agent, poisoning); and, radiation (sunlight, radioactive material). Injuries are often further described as being unintentional or intentional based on the presumed intent. Unintentional injuries include motor vehicle crashes, falls, and burns, whereas injuries considered as intentional include those caused by self-harm, violence, and war. It is important to note, however, that simple categorization is difficult, as the intent of the injury is not always clear. For example, an infant who suffers an inflicted head trauma as a result of being shaken while crying will mostly likely be categorized as an intentional injury. However, in most cases of this nature,

there was typically no intent, on the part of the person who shook the child, to cause injury. Rather, the intent was to calm the crying.

Injury events should not be considered 'accidents' or 'inevitable' as the vast majority of injury events are both predictable and preventable. Based upon this understanding, public health research, policy and programs in recent decades have aimed to shift traditional understanding of injury events towards a view that injuries can be prevented. This effort has led to the development and implementation of numerous prevention strategies, policies and programs, and to significant reductions in injury morbidity and mortality in Canada over the past 20 years. While those in injury prevention and public health can be proud, it is still the case that thousands of Canadians die each year from injury. Thousands more survive and are left with the physical, emotional, social, and financial burdens as a result of injuries.

This chapter will provide an introduction to the epidemiology of injury in Canada and focus on the social and economic burden that injury places on individuals, families, communities, and the nation as a whole.

## Injuries in Perspective - The Global Burden of Injuries

According to World Health Organization estimates, over 5.14 million deaths were due to injuries in 2012 - a figure equivalent to almost 1 out of every 10 deaths globally.<sup>3</sup> To put this in perspective, the number of deaths due to injuries in 2012 was greater than those due to tuberculosis, HIV-AIDS, and malaria combined (3.08 million).<sup>3</sup> Although injuries can affect people of all ages, races, and income levels, a disproportionate number of injuries are sustained by those in lower income countries. When categorized by World Bank Income regions, injuries accounted for over 10% of deaths in low-income nations compared to 6% in high-income countries.<sup>4</sup> When based on gender, 2 out of every 3 injuries worldwide are sustained by males.

**Unintentional injuries.** In 2012, unintentional injuries accounted for the majority of injury-related deaths (72%), with road traffic injuries being the leading cause of injury death (1.25 million) worldwide.<sup>3</sup> In 2012, road-traffic related injuries were the ninth leading cause of death world-wide, increasing from twelfth overall in 2000.<sup>3</sup> With this growth, it is projected that by 2030, road-traffic injuries will be the fifth leading cause of death worldwide.<sup>6</sup> Other leading causes of unintentional injury include, in order, falls, drowning, exposure to fire and hot substance, and poisonings.

**Intentional injuries.** Injuries from self-harm are the fifteenth leading cause of death worldwide, resulting in over 800,000 deaths in 2012.<sup>3</sup> Notably, 1 out of every 4 injury related deaths in high income nations result from suicide, whereas suicide accounts for less than 1 out of every 10 injury-related deaths in low income countries.<sup>4</sup> However, it should be noted that for a number of reasons (e.g. lack of resources, lack of central record keeping, stigma) it is more difficult to gather accurate mortality data in lower income countries, particularly about suicide. International comparisons, should therefore, be viewed with caution.

Intentional injuries also include those due to interpersonal violence, collective violence, and legal intervention. In 2012, over 26,000 deaths occurred due to war and conflict in low-income nations whereas only 2,300 occurred in high-income nations.<sup>4</sup>

Table 1

### Deaths by Specific Injuries Globally, 2012 World Health Organization Estimates<sup>4</sup>

Cause of Death	No. of Deaths (000's)	% of All Deaths	% of All Injury Related Deaths
<b>All Causes</b>	<b>55,859</b>	<b>100</b>	--
<b>All Injuries</b>	<b>5,144</b>	<b>9.2</b>	<b>100</b>
<b>All Unintentional</b>	<b>3,716</b>	<b>6.7</b>	<b>72</b>
Road Injury	1,255	2.2	24
Falls	693	1.2	13
Drowning	372	0.7	7.2
Fire, Heat, Hot Substances	268	0.5	5.2
Poisonings	193	0.3	3.8
Other Unintentional Injuries	932	1.7	18
<b>All Intentional</b>	<b>1,428</b>	<b>2.6</b>	<b>28</b>
Self-harm	804	1.4	16
Interpersonal Violence	505	0.9	9.8
Collective Violence & Legal Intervention	119	0.2	2.3

## Injuries In Canada - Patterns & Prevalence

From the age of 1 to 34, more Canadians die as a result of injuries than from any other cause (Figure 1).<sup>1</sup> In 2011, the leading causes of death for individuals aged 1 to 34 years were, in order, unintentional injuries, suicide, cancer, homicide, heart disease, influenza and pneumonia, cerebrovascular disease (stroke), diabetes, and chronic lower respiratory disease (CLRD).<sup>1</sup> Seventy-four percent of deaths in this age group were due to unintentional and inflicted injuries, compared to 21% due to heart disease and cancer combined.<sup>1</sup> When considering all age groups, 6.2% of all deaths in Canada were the result of injuries, with males accounting for over 63% of all injury-related deaths in 2011.<sup>1,3</sup> However, statistics on injury mortality, though tragic, provide only a small proportion of the true magnitude of the

burden of injury in Canada. In the two-year period, 2009 to 2010, injuries were among the leading causes of hospitalizations across all age groups with over 230,000 Canadians hospitalized as a result of injury related causes.<sup>6</sup>

Figure 1

### Ten leading causes of death for Canadians aged 1-34 years in 2011<sup>1</sup>



\*Other: influenza and pneumonia, cerebrovascular disease (stroke), diabetes, chronic lower respiratory disease (CLRD).

**Unintentional injuries.** The vast majority of the injuries that occur in Canada are unintentional. According to recent Canadian data for injury deaths in 2011, the leading causes of unintentional injury mortality were falls (4,198), road traffic collisions (2,351), and poisonings (1,634).<sup>7</sup> In 2011, road-traffic related deaths accounted for 20% of all unintentional injuries, 15% of all injury-related deaths, and were the leading cause of death for young Canadians ages 1 – 19.<sup>7</sup> At the other end of the age spectrum, almost 50% of all injury-related deaths among adults aged 65 years or older resulted from falls.<sup>7</sup>

**Intentional injuries.** The leading causes of intentional injury death in Canada are suicide and homicide, with 1 out of 4 intentional injury-related deaths being the result of suicide. In 2011, 3,726 Canadians died as a result of suicide<sup>7</sup>, while 521 Canadians died as a result of homicide.<sup>7</sup> Almost 80% of all suicide and homicide deaths occurred among Canadian adults aged 20 – 64 years.<sup>7</sup>

Table 2

### Leading causes of injury death in Canada, 2008, both sexes, by age group<sup>6</sup>

Age Group (years)	Leading Cause of Injury Death
Infants (< 1)	Suffocation
1 - 19	Road traffic collisions
20 - 64	Suicide
65+	Falls

Figure 2

**Injury Deaths by Cause in Canada, all ages and both sexes in 2011<sup>7</sup>**

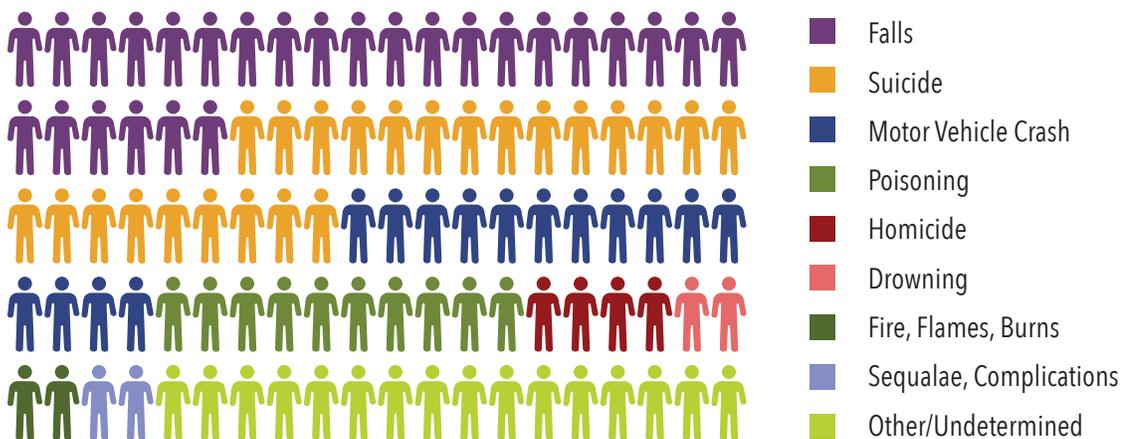
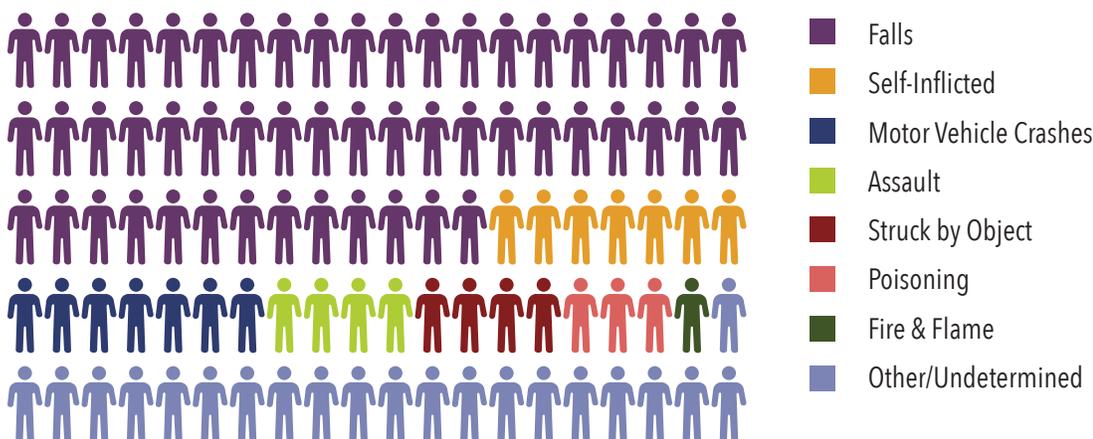


Figure 3

**Injury Hospitalizations by Cause in Canada, all ages and both sexes from 2009/10<sup>8</sup>**



**The Burden of Injuries in Canada**

According to a 2015 report by Parachute Canada, injuries in Canada in 2010 resulted in over 15,000 deaths, 231,000 hospitalizations, nearly 3,500,000 emergency department visits, and over 60,000 Canadians left with some form of permanent disability.<sup>9</sup> This is equivalent to, 43 Canadians dying each day as a result of injuries and at least 7 Canadians permanently disabled every hour.<sup>9</sup> Of the deaths that occur due to injury, many of them occur among the young, arguably during their most productive years. Potential years of life lost (PYLL) is an estimate of the average years a person or group would have lived had they not died prematurely, calculated using an average life expectancy of 75 years. In 2010, the overall PYLL for Canada due to injuries was 1337 years,<sup>9</sup> far greater than for all other causes of death. The burden of injuries in Canada is a significant public health concern. Each year,

thousands of Canadians lose their lives and many more are left with partial or permanent disabilities due to injuries. Individuals, families, communities, and the nation as a whole are left with the social, emotional and financial, burdens of injuries, the vast majority of which are entirely preventable.

## The Economic Burden of Injuries

**The National Economic Burden.** In 2010, the total cost of injuries in Canada amounted to \$26.8 billion.<sup>9</sup> Direct health care costs of injury were \$15.9 billion whereas indirect costs such as reduced productivity, disability, and premature death amounted to \$10.9 billion.<sup>9</sup> The national per capita costs averaged \$788, ranging from \$1059 in Saskatchewan to \$715 in Quebec. The national per capita cost that injury exerted on the health care system was \$467, ranging from \$390 in Ontario to \$579 in Nova Scotia (see Table 3). The majority of the economic burden of injuries in Canada is a result of unintentional injuries, accounting for 82.5% of total costs in 2010.<sup>9</sup> The costliest causes of injury in 2010 were falls (\$8.7 billion), transport incidents (\$4.3 billion), and suicide/self-harm (\$3 billion).<sup>9</sup>

Table 3  
Cost of injury per capita by province in Canada, 2010<sup>9</sup>

Jurisdiction	Economic cost (per capita)	Health care costs (per capita)
Alberta	\$1,083	\$553
British Columbia	\$816	\$495
Manitoba	\$958	\$554
New Brunswick	\$924	\$531
Newfoundland and Labrador	\$749	\$477
Nova Scotia	\$877	\$605
Ontario	\$693	\$405
Prince Edward Island	\$772	\$526
Quebec	\$746	\$470
Saskatchewan	\$1,108	\$602
Canada	\$820	\$486

**The Financial Burden of Childhood Injuries.** For children ages 1 to 14, injuries are the leading cause of death, with close to 300 children killed and 21,000 hospitalized every year.<sup>1</sup> The leading causes of injury death for children are motor vehicle collisions, drowning, poisonings, and falls, most of which are preventable. Though injuries affect those of all ages, children are particularly vulnerable as their bodies undergo rapid developmental changes and are relatively weaker compared to the adult body, further increasing their susceptibility to injuries.

Families of children hospitalized by injury or disease, are often faced with immediate financial strains, and often include travel costs, parking fees, and the cost of meals. In a 2004 Australian study on the financial burden to parents of hospitalized children, the average cost for both meals and parking totaled to almost \$200 Canadian dollars a week.<sup>10</sup> In addition, other costly medical procedures not covered by health insurance can have a significant toll on parents and families, especially for those in lower-income categories.

**The Economic Burden of Injuries on the Workforce.** As the cost of living rises in cities across the nation, Canadians face the ever-increasing need to work in order to sustain themselves or their families, and increasingly, this includes two income families as the norm. With such a large responsibility, injuries among workers or their families can have major financial repercussions. When a spouse, child, or parent is injured or ill, employment Acts in Canada and the US allow workers unpaid leave to care for a family member.<sup>11</sup> While leaves from work to care for injured family members is a positive workplace benefit, the majority of surveyed workers indicated that they could not afford to leave work for an extended time to care for family members and potentially reduce their earnings.<sup>12</sup>

When injuries occur on the job, their effects often have major personal and national economic consequences. According to recent statistics from the Labour Department of Canada, 1 out of every 46 workers covered by a compensation plan was injured severely enough to miss at least one day of work in 2008.<sup>13</sup> A 2001 American study on occupational injuries, found that worker's compensation benefits only replaced between 32 – 42% of a 10-year losses before taxes.<sup>14</sup> With such losses, injuries can lead many workers to borrow money, move or sell their homes, and deplete savings to sustain themselves or their family. As a whole, the direct cost of occupational injuries and fatalities to the Canadian economy totaled to approximately \$9.7 billion in 2008.<sup>13</sup>

## The Social Burden of Injuries

**The Social Burden of Injuries to Children & Families.** Although bumps and bruises are an everyday part of growing up as a child, more serious and life-threatening injuries can not only place burden on a child's physical health, but also affect the social and psychological life

of a child and their family. Every day, almost 60 children are hospitalized as a result of injuries that are largely preventable.<sup>8</sup> Whether they are at a hospital or at home, injuries often impact the primary occupation of children in Canada – attending school. In a recent report on injuries among young Canadians by the Canadian Institutes of Health Research<sup>15</sup> some 1 in 4 students missed at least one day of school due to an injury, while 6 – 10% of students missed 5 or more days in 2010. Parents and teachers encourage students to remain at home when sick or injured, but students are often very concerned about missing school even for short periods of time. This added stress, in addition to their time away from school, may affect a child's emotional wellbeing, peer relationships, and future academic performance.<sup>16,17</sup>

When a parent is injured, the psychological effects can often also affect the health of their children. In a recent 2014 American study<sup>18</sup> on the psychological health of parents and children from injuries, injured parents showed decreases in quality of life and higher levels of depression compared to parents not injured. Even more concerning was the finding that when both parent and child are injured, the child is more likely to develop post-traumatic stress disorder (PTSD) symptoms.<sup>18</sup> Siblings of sick and injured children are also often subject to a great deal of stress from changes in family behaviour and structure, which can lead many to feel resentment or jealousy towards the injured child that receives more parental attention.<sup>19,20</sup>

**The Psychological Burden of Injuries.** Aside from declines in physical health, injuries can often lead to significant changes in the mental and psychological health of an individual, post-injury. One of the most common psychological ailments suffered by many post-injury is post-traumatic stress disorder (PTSD).<sup>21</sup> Post-traumatic stress disorder (PTSD) can be defined as a state of anxiety characterized by the persistent re-experience of traumatic events through dreams, hallucinations, and flashbacks that can lead to feelings of extreme fear, anxiety, and helplessness.<sup>22</sup> Serious injuries involving death or the threat of death to oneself or others can possibly elicit PTSD. PTSD symptoms can be short lived (acute), long term (chronic), or even not appear until months after the traumatic injury, but all forms of PTSD play a large role in an individual's life after their injury. In a 2008 US study of traumatic injury hospitalization with over 2,700 participants, 20% of patients displayed PTSD symptoms a year following their injury.<sup>23</sup> However, research has also shown that strong social support from family and peers is a strong protective factor against PTSD and other common psychological conditions, such as depression.<sup>24,25</sup>

## KEY POINTS

- ❖ Injuries can be classified as unintentional (falls, drowning, etc.) or intentional (suicide, violence, etc.) based on the presumed intent
- ❖ The vast majority of injuries are unintentional, predictable, and preventable
- ❖ Globally, approximately 1 out of every 10 deaths are a result of injuries
- ❖ Globally, 2 out of 3 injuries are sustained by males
- ❖ For the first 3 decades of life, more Canadians die from injuries than any other cause
- ❖ Leading causes of unintentional injury in Canada are falls, motor vehicle collisions, and poisonings
- ❖ Leading causes of intentional injury in Canada are suicide and homicide, with 1 out of every 4 injury-related deaths being a result of suicide
- ❖ In 2010, injuries result in over 15,000 deaths, 231,000 hospitalizations, and nearly 3,500,000 emergency department visits in Canada.
- ❖ In 2010, the national cost of injuries in Canada amounted to \$26.8 billion
- ❖ Families of injured children are often under large financial burdens with unexpected costs of hospitalization, therapy and rehabilitation.
- ❖ The Compassionate Care Act allows workers unpaid leave to care for sick or injured family
- ❖ Occupational injuries can have major financial burdens as injured workers may resort to borrow money, sell or move homes, and deplete savings.
- ❖ Every day, over 60 children are hospitalized as a result of injuries
- ❖ 1 out of every 4 students will miss at least one day of school due to injuries
- ❖ Parents, children, and siblings may all be under large amounts of stress as a result of injuries and changes in family structure and behaviour
- ❖ Traumatic injuries can lead some to develop post traumatic stress disorder (PTSD), anxiety disorder, depression, or other psychological ailments

## References

1. Statistics Canada. Table 102-0561 - Leading causes of death, total population, by age group and sex, Canada, annual, CANSIM (database). (accessed: 2014-08-22)
2. Holder, Y., M. Peden, E. Krug, J. Lund, J. Gururaj, and O. Kobusingye, eds. 2001. *Injury Surveillance Guidelines*. Geneva: WHO.
3. World Health Organization. Table – Disease and injury regional mortality estimates, 2000 – 2012, WHO regions. Retrieved from: [http://www.who.int/healthinfo/global\\_burden\\_disease/estimates/en/index1.html](http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html)
4. World Health Organization. Table – Disease and injury regional mortality estimates, 2000 – 2012, World Bank income groups. Retrieved from: [http://www.who.int/healthinfo/global\\_burden\\_disease/estimates/en/index1.html](http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html)
5. Norton, R. & Kobusingye, O. (2013). Injuries. *The New England Journal of Medicine*, 368: 1723 – 1730. DOI: 10.1056/NEJMra1109343
6. Public Health Agency of Canada. (2013). Table: Leading Causes of Hospitalizations, Canada, 2008, males and females combined, counts (age-specific hospitalization rate per 100,000). Ottawa, ON.
7. Public Health Agency of Canada. (2013). Table: Leading Causes of Injury Death, Canada, 2008, counts (age-specific death rate per 100,000). Ottawa, ON.
8. Public Health Agency of Canada. (2013). Table: Leading Causes of Injury Hospitalizations, Canada, 2008, counts (age-specific hospitalization rate per 100,000). Ottawa, ON.
9. Parachute: *The Cost of Injury in Canada*. Parachute, Toronto, 2015.
10. Shields, L. & Tanner, A. (2004). Costs of meals and parking for parents of hospitalised children in Australia. *Pediatric Nursing*, 16(6): 14 – 18.
11. Department of Labour, Canada. Pamphlet LT-172-08-10, Compassionate Care Leave, Labour Standards. Retrieved from: [http://www.labour.gc.ca/eng/standards\\_equity/st/pubs\\_st/compassionate.shtml](http://www.labour.gc.ca/eng/standards_equity/st/pubs_st/compassionate.shtml)
12. Cantor, D. et al. (2001). Balancing the needs of families and employers: the family and medical leave surveys, 2000 update. Westat: Rockville, MD. Retrieved at: <http://www.dol.gov/whd/fmla/toc.pdf>
13. Gilks, J. & Logan, R. (2010). Occupational injuries and diseases in Canada, 1996 – 2008, Injury rates and cost to the economy. Labour Program, Human Resources and Skills Development Canada. Retrieved from: [http://www.labour.gc.ca/eng/health\\_safety/pubs\\_hs/oidc.shtml](http://www.labour.gc.ca/eng/health_safety/pubs_hs/oidc.shtml)
14. Reville, R. T., Boden, L. I., Biddle, J. & Marsdesich, C. (2001). New Mexico worker's compensation permanent partial disability and return-to-work: an evaluation. Santa Monica, CA: RAND.

15. Davison, C.M., Russell, K., Piedt, S., Pike, I., Pickett, W. and the CIHR Team in Child and Youth Injury Prevention. (2013). *Injury among young Canadians: A national study of contextual determinants*. CIHR Team in Child and Youth Injury Prevention: Vancouver, BC.
16. Bessell, A.G. (2001). Children surviving cancer: Psychosocial adjustment, quality of life, and school experiences. *Exceptional Children*, 67(3), 345 – 359.
17. Gottfried, M.A. (2011). The detrimental effects of missing school: Evidence from urban siblings. *American Journal of Education*, 117(2), 147 – 182.
18. Rivara, F.P., McCarty, C.A., Shandro, J., Wang, J. & Zatzick, D. (2014). Parental Injury and Psychological Health of Children, *Pediatrics*, 134, e88 – 97. DOI: 10.1542/peds.2013-3273
19. Carnevale, F.A. (1999). Striving to recapture our previous life: the experience of families with critically ill children. *Official Journal of the Canadian Association of Critical Care*, 10(1), 64 – 71.
20. Rivara, J.B. (1994). Family functioning following pediatric traumatic brain injury. *Pediatric Annals*, 23, 38 – 43.
21. O'Donnell, M. L., Creamer, M., & Pattison, P. (2004). Posttraumatic stress disorder and depression following trauma: Understanding comorbidity. *The American Journal of Psychiatry*, 161, 1390 – 1396.
22. Gerrig, R. & Zimbardo, P.G. (2002). *Psychology and Life* (16ed). Allyn and Bacon: Boston, MA.
23. Zatzick, D., Jurkovich, G.J, Rivara, F.P., Wang, J., Fan, M.Y., Joesch, J. & Mackenzie, E. (2008). A national US study of posttraumatic stress disorder, depression, and work and functional outcomes after hospitalization for traumatic injury. *Annals of Surgery*, 248(3), 79 – 87.
24. Brewin, C.R., Andrews, B., Valentine, J.D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, 68(5), 980 – 986.
25. Hart, T., Hoffman, J.M., Pretz, C. et al. (2012). A longitudinal study of major and minor depression following traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, 93(8), 1343 – 1349.

