injury prevention

in Sport & Physical Activity in Ontario

What's the game plan?

March 2016

PLAY SAFE initiative.ca

Sunnybrook
RBC FIRST OFFICE FOR INJURY PREVENTION

Acknowledgements

This white paper was developed with support from the Ontario Trillium Foundation through its Province Wide funding stream. The major partners of the Play Safe Initiative provided additional support: the RBC First Office for Injury Prevention at Sunnybrook Health Sciences Centre, the Faculty of Health and Behavioural Sciences at Lakehead University, and the Dr. Tom Pashby Sports Safety Fund.

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Fondation Trillium de l'Ontario
An agency of the Government of Ontario
Un organisme du gouvernement de l'Ontario

DR. TOM PASHBY SPORTS SAFETY FUND

Suggested citation:
Forbes, S.L. (2015). Injury prevention in sport and physical activity in Ontario: What's the game plan? Toronto: ON

Table of Contents

Executive Summary

Injury in sport and physical activity is a significant public health issue in Canada, costing our health care system nearly **$1.5 billion in 2010 (Parachute, 2015)**. However, there is relatively little awareness of the magnitude of the problem outside of a few highly publicized cases of concussion among professional athletes. The rate of injury has been increasing at all ages yet public health policy and protocols around injury risk reduction and injury prevention remain limited and inconsistent across the country. Consequently, the vast majority of Canadians remain exposed to unnecessary risks of injury when they participate in sport and physical activity.

There is good reason for stakeholders in healthcare, public health, sport, education, and recreation to be concerned. In the past decade, Canadians of all ages have been suffering injuries in sport and recreation at an increasing rate. **Cost of injuries has increased approximately 120% between 2004 and 2010 (Parachute, 2015)*, and roughly 15% of Canadians suffered an injury serious enough to limit their normal activities**.**

The injury rate for young people ages 12 to 19 deserves particular attention as members of this group are injured at nearly twice the rate of other cohorts⁺. Males ages 12 to 19 are at the greatest risk of injury (30%), while females' risk of injury is about 23%. Evidence indicates that the injury rates for this cohort increased significantly between 2001 and 2010, especially for females whose rates jumped from 18% to 23% (Billette & Janz, 2011).

This paper is produced by Play Safe, an initiative developed by Sunnybrook Health Sciences Centre and Lakehead University in collaboration with sport, recreation health and education partners across Canada. Play Safe has a mission to reduce the overall burden of acute and chronic injuries in sport and recreation activities and to promote safe and healthy participation in physical activity across the lifespan.

Play Safe proposes that trends toward increased rates of injury can be turned around. To achieve this, Play Safe has identified several key issues and gaps in injury risk reduction and injury prevention must be addressed in Canada:

- **There is no nationally coordinated injury prevention strategy for sport and physical activity;**
- **There is no comprehensive national surveillance system for sport and physical activity injuries;**
- **Stakeholders have not agreed on a set of best practices; and,**
- **Injury prevention is not a key focus of the sport and physical activity realm.**
- **Play Safe maintains that evidence-based planning for injury prevention is essential. Specific tools are required to provide the kind of relevant data, information sharing, and user access needed to support such planning.**

The Play Safe Injury Tracker (PSIT), developed as part of Play Safe, is designed for this purpose. This web-based system collects injury data of various types across cohorts, provides access to communication tools to support discussion between stakeholders, reporting by designated officials, and facilitates delivery of information materials to educate communities of participants.

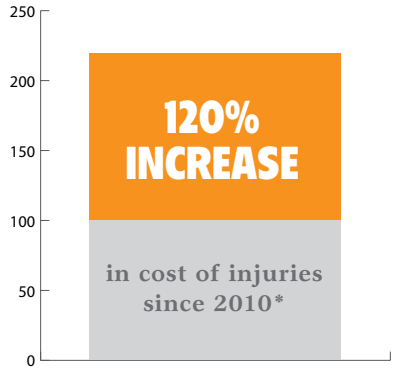
In working to reduce injury risk and prevent injuries, Play Safe recognizes three key points:

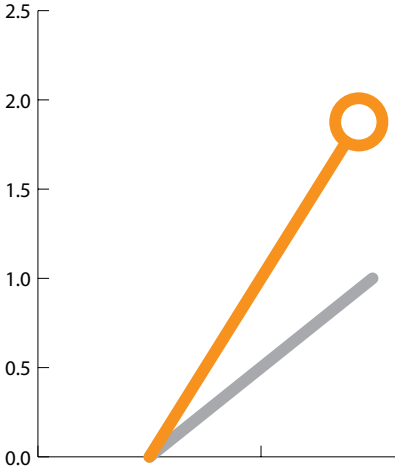
1. **One size does not fit all. Organizations vary in their ability to undertake new projects based on human, financial, and cultural factors. Solutions need to respect their unique circumstances.**
2. **It's better to prevent first. Preventing the first injury is more manageable and cost-effective than treating and managing subsequent injuries that not only affect an individual's return to play but also their activities of daily living.**
3. **Efforts must be participant-centred. Participation occurs concurrently in different "spheres," yet participants remain constant. For example, a single youth participant might be active in a community sport club, local recreation centre, and school sport program at the same time. As such, attention to each participant is critical to any successful injury prevention effort.**

Through new technologies and collaborative approaches, we now have the knowledge and capacity to change the incidence and severity of injury in sport, recreation, and physical activity in ways that we never had before. The time to act is now.

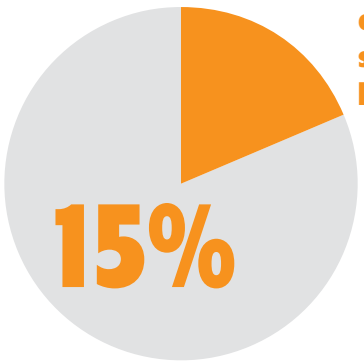
$1.5 Billion

Cost to Canadians caused by injury in sport and physical activity in 2010 (Parachute, 2015)





Young people aged 12-19 are nearly twice as likely to be injured+



of Canadians were seriously injured between 2004 - 2010**

Impact of Injuries Related to Sport and Physical Activity

Engagement in physical activity, whether it is recreation or through competitive sport, provides opportunities for Canadians to pursue and maintain a healthy lifestyle. However, this involvement also exposes participants to injury risk and potentially threatens the health and wellbeing of participants. Therefore, "safety is an essential corollary of our global effort to promote sports and physical activity" (Verhagen & van Mechelen, 2010 158).

Injury in sport and physical activity is not new. What is new is that reports of injuries have made their way out of the sports section and into the general sections of mainstream media. For example, media coverage of concussions to superstar athletes has not simply publicized injury in professional sport; it has slowly drawn attention to the fact that these injuries are happening in children's sport as well.

Medical research in the area of physical activity and sport-related injury is steadily improving. For instance, what we know today about brain injury and its treatment is very different from what we knew 5, 10, or 30 years ago. However, this should not make us complacent about injury in sport, and we should not see injury as a badge of honour for participating. Injury can create lifelong suffering, cause inactivity, and lead to debilitating medical conditions that tax our healthcare system and our personal lives.

There is a growing public sense that injuries in sport and physical activity can be better prevented, but there is uncertainty as to how to do it. It is also unclear who should be doing it.

Efforts to Understand and Prevent Injuries

On February 8, 2011, MP Glen Thibeault (NDP) introduced Bill 616 An Act Respecting a National Strategy to Reduce the Incidence of Serious Injury in Amateur Sport. In particular, the Bill specified "that a national strategy to reduce the incidence of injury in amateur sport be developed and implemented with a view to changing the existing attitudes of Canadians towards sport. The proposed legislation supported a community-based approach to injury reduction and called on the various sport and health domains to work toward "the establishment of a national medical surveillance program to properly track incidence rates and the associated economic costs of injuries in amateur sport" (Government of Canada, 2011).

Subsequent to Thibeault's efforts, the Federal Government announced in March 2011 that it would provide $5 million over two years to support injury prevention initiatives for Canadian children and youth. While this announcement was welcome news, the government's funding was narrow in focus as it was limited to initiatives for concussions, drowning, and fractures.

Trends in Injury Rates and Costs

Injuries related to sport and physical activity have serious implications for individual well-being, and they create significant repercussions for the Canadian health care system. Recent studies found that approximately 35% of injuries in Canada occur during participation in some form of physical activity (Billette & Janz, 2011). Additionally, injuries related to sport and physical activity cost the Canadian health care system approximately $187 million in direct and indirect costs (Parachute, 2015).

According to Parachute, this figure represents a decrease from a previous study. However, closer examination of the economic burden of injury in Canada reveals this figure to be misleading, as it only represents "sports" injuries associated with being struck by or against sports equipment. [1] As shown in Table 1, expanding our understanding of injuries related to sport and physical activity paints a different picture.

Table 1: Costs of Selected Incidence of Injury in Canada 2004 versus 2010[2]

Description	Direct Costs ($Millions)		Indirect Costs ($Millions)		Total Costs ($Millions)	
	2004	2010	2004	2010	2004	2010
Struck by/Against Sports Equipment	97	97	91	90	188	187
Falls – Skating, Skiing, Boards, Blades	216	295	182	221	398	516
Playgrounds	106	139	79	100	185	239
Diving	12	20	12	14	24	34
Pedal Cycle	242	293	201	213	443	506
Total	**673**	**884**	**565**	**638**	**1 238**	**1 482**

While the numbers for "sports" related injuries (e.g., contacting equipment such as a ball, stick, boards, or goal posts) remained fairly similar between 2004 and 2010, the broadening of categories to include injuries suffered during other forms of physical activity creates a very different picture. For example, costs of physical activity-related falls and playground injuries rose approximately 130% between 2004 and 2010. Similarly, the economic impact of diving injury increased by 137.5%, and pedal cycle rates grew by roughly 114%. Overall, the economic impact of sport and physical activity-related injuries increased by approximately 120% during the period identified.

1 Sports injuries identified in this report were limited to those related to being struck by (e.g., ball, stick) or striking sports equipment (e.g., hitting boards, goal posts).
2 Data derived from Smartrisk reports on the economic burden of injury from 2004 and 2010.

Table 2: Rates of Selected Incidence of Injury in Canada 2004 versus 2010

Description	ER/Other Visits		Hospitalizations		Permanent Partial Disabilities		Permanent Total Disabilities	
	2004	2010	2004	2010	2004	2010	2004	2010
Struck by/Against Sports Equipment	66 037	68 355	1 223	664	607	518	48	39
Falls – Skating, Skiing, Boards, Blades	66 945	64 957	3 680	4 189	1 286	1 384	98	106
Playgrounds	21 158	23 870	1 662	1 713	551	583	37	39
Diving	2 397	3 156	168	194	47	56	9	10
Pedal Cycle	61 424	59 815	4 608	4 112	1 316	1 240	423	113
Total	**21 7961**	**22 0153**	**11 341**	**10 872**	**3 807**	**3 745**	**615**	**307**

The numbers for the costs and rates of selected incidence of injury in Tables 1 and 2 are impressive enough to give pause for thought. However, these numbers still only offer a snapshot of the full economic impact. The report exclusively identifies hospital-reported injuries but does not account for all sports-related injuries. In addition, the figures do not account for doctor's visits, rehabilitation costs, and the spinoff expenses faced by provincial education systems who likely spend billions of dollars in extra economic costs resulting from these serious types of sports, recreation and physical activity injuries.

Impacts on Participation in Sport & Physical Activity

Injury or the risk of injury may also be a contributing factor in the decline of participation rates in sport and physical activity (Sport & Recreation, Victoria, 2013; Sport Canada, 2003).

For example, The Australian taskforce estimated that dropout rates in five major team sports[3] was approximately 4,500 participants per year and that this number could rise to about 8,000 year. One reasons cited for these rates was that injury "had been a significant contributing factor" (Sport & Recreation, 2013, p. 22).

Injuries, and the potential reduction in physical activity, present an increasing public health burden, not only in terms of realized costs but also in terms of long-term consequences (e.g., falls in seniors and chronic diseases). As the following figures illustrate, these consequences affect all age groups in the population, though males are represented more than females.

3 The five sports analyzed included Australian football, basketball, cricket, football (soccer), and netball.

"Injuries present an increasing public health burden, not only in terms of realized costs but also in terms of long-term consequences."

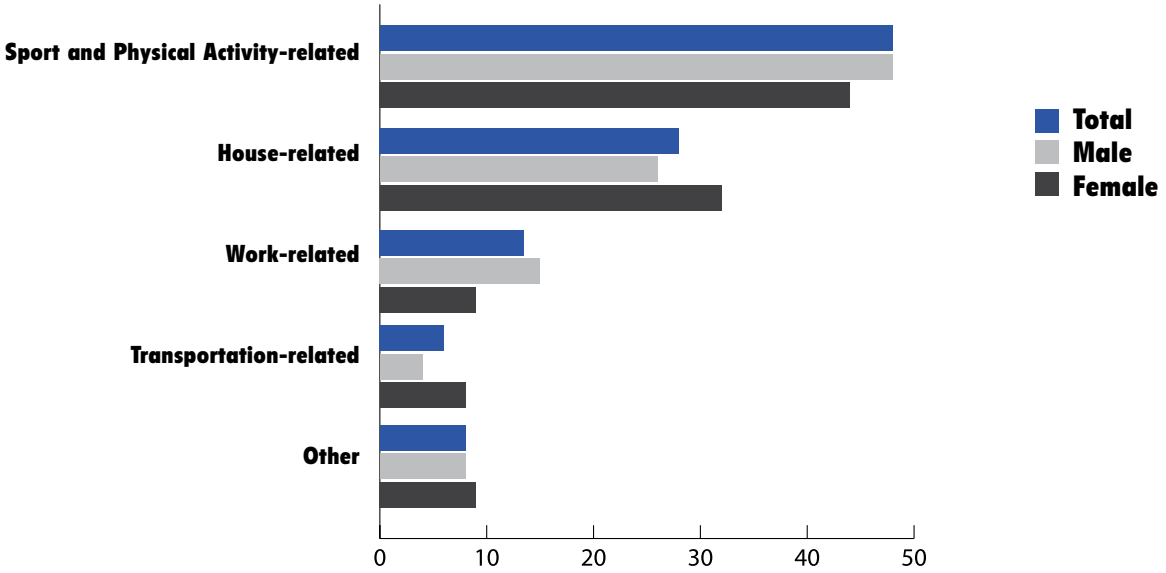


Figure 1: Percentage and type of activity related to serious injury by gender, population aged 12 and over, 2009-2010 (adapted from Billette & Janz, 2011)

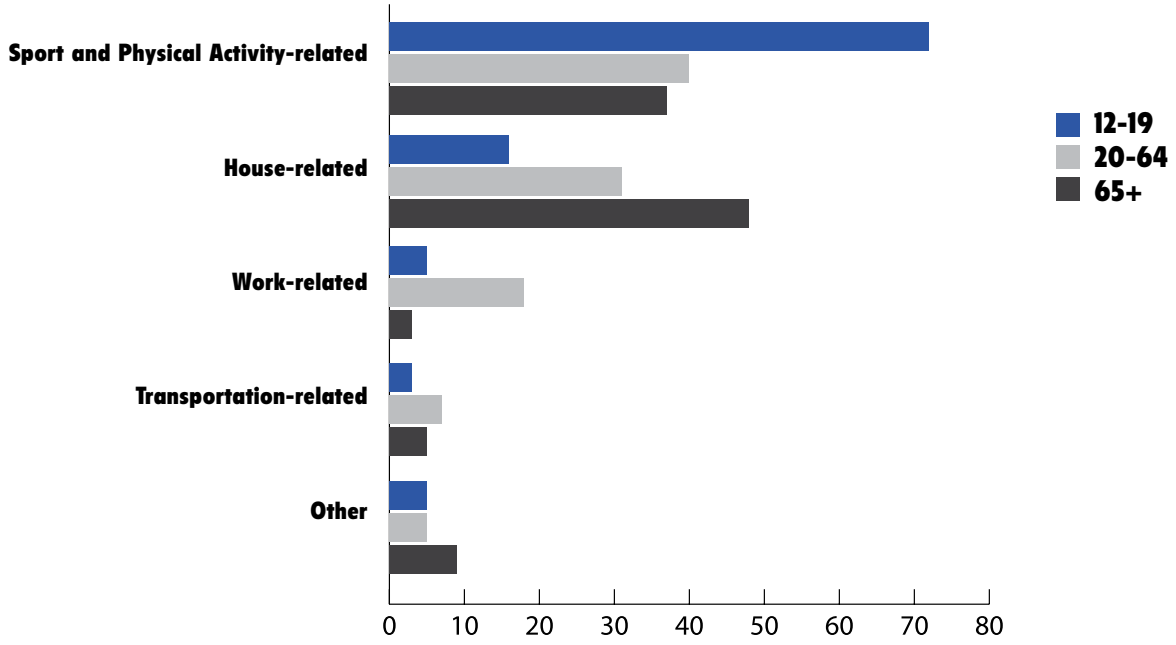


Figure 2: Percentage and type of activity related to serious injury by cohort, population aged 12 and over, 2009-2010 (adapted from Billette & Janz, 2011)

A more expansive system of data collection is required to accurately gauge the full economic costs shouldered by our health and education systems as a direct result of serious sport, recreation and physical activity related injuries. Additionally, a more holistic and detail-oriented data collection system would provide better information and evidence for injury prevention initiatives. Chalmers argued that "injury prevention is 'not yet part of the game' for most sports" and this is certainly the case in Canada
(Chalmers, 2002).

Developing a National Injury Prevention Strategy for Sport and Physical Activity

Groups, such as health care and injury prevention practitioners, sports and recreation leaders, as well as educators, have discussed the potential development of a national injury prevention strategy to minimize the burden of injury in Canada (Banfield, et al. submitted). Ideally, the proposed injury prevention strategy would include six key components (Yanchar et al., 2012; SmartRisk, 2005):

1. **National leadership from the federal government**
2. **Policy development and analysis**
3. **Relevant research**
4. **An effective injury surveillance system**
5. **Public education and awareness**
6. **A national fund for evidence-based injury prevention programs in communities across Canada**

Despite the calls for a national strategy for nearly a decade, no such strategy has been implemented. Instead, provinces have introduced their own injury prevention strategies with varying priorities, goals and definitions, which in turn has resulted in disorganized and inefficient efforts to reduce injury. As a result, Canada is lagging behind countries such as Australia and the United States who have a national strategy in place in the field of injury prevention.

National Strategies in Australia and the United States

Australia's national injury prevention strategy was presented in 2001 and has focused on preventing injuries in areas such as sport and recreation, work, and transport (National Public Health Partnership, 2001). The most recent national injury prevention strategy, The National Injury and Safety Promotion Plan: 2004-2014, provides a decade-long plan. It aims to create a positive safety culture and safe environment through increased collaboration between government and health agencies, evidenced-based planning of programs through quality data collection and analysis, and advocacy (NPHP, 2004). The Australian plan identifies sport and recreation as a key target area. It emphasizes establishing safe recreational facilities, safety promotion planning, and increased collaboration with sporting organizations (NPHP, 2004).
Similarly, the United States introduced a National Action Plan for Child Injury Prevention in 2012 which emphasizes the need for improvement in data surveillance, research, communication, education and training, health systems, and injury prevention policy (Centers for Disease Control and Prevention, 2012). Again, the action plan specifically prioritizes injury reduction in sport and recreation by developing effective policies such as introducing uniform requirements for protective sporting equipment (CDC, 2012).

Research Supporting Injury Prevention

In the United States, important research efforts are also being made to better understand injury risks and effective prevention. The Center for Injury Research and Policy (CIRP) of the Nationwide Children's Hospital (NCH) has focused their research since 1999 on reducing pediatric injuries, and CIRP has quickly become the international leader in pediatric research. The center focuses on preventing injuries in a variety of sports including baseball, basketball, cheerleading, and winter sports by understanding the epidemiology, biomechanics, and rehabilitation of these sports, and by increasing understanding of prevention measures (NCH, 2012a).

Evidence-based programs and tools created by CIRP include the Safe Play Area for Ross County Kids (SPARK) project and RIOTM: Reporting Information Online (NCH, 2012a). The SPARK program tries to prevent injuries in playgrounds by providing prevention tips, educating the community, and renovating playgrounds to improve safety. RIOTM is a data collection tool that allows researchers to conduct injury surveillance research (NCH, 2012b; NCH, 2012c). To date, RIOTM has successfully been used in surveillance studies that have looked at injuries among summer camp staff members and campers, high school sports-related injuries, and women's professional football related injuries (NCH, 2012c).

Importantly, the research conducted with CIRP has led to the creation of effective new public policy in injury risk reduction. One of the policy innovations stemming from CIRP's work has been the youth helmet ordinance where children under the age of 18 must wear a helmet when participating in wheeled sports or face a $25 fine (NCH, 2012d).

Canadian Efforts Towards a National Strategy

In contrast to the United States and Australia, Canada does not have a comprehensive national injury prevention plan, and there has been no significant emphasis placed on reducing injury in sport and recreation. The Ontario's Injury Prevention Strategy does suggest limiting risk of injury through increased collaboration with sport and recreation providers, creation of safer venues, and increased support of community programs that try to limit sport and recreation-related injuries (Ministry of Health Promotion, 2007). However, there have been minimal strides towards successfully implementing this strategy to date. Current injury prevention programs for sport and physical activity do exist in Canadian sport and recreation, but they are limited in scope. Some of these include the ThinkFirst Smart Hockey Program, Stopconcussions.com, and Snowsmart.

The Smart Hockey Program is designed to prevent brain and spinal injuries – primarily concussions – by providing information on the role of equipment and the playing environment in injury prevention (ThinkFirst, 2011). A "concussion toolkit" is also available that provides stakeholders with return to play guidelines, discusses how legislation pertaining to head safety is enforced, and educates athletes, parents, health professionals, and coaches on their responsibilities when dealing with concussions. While the program is hockey-specific, the toolkit is believed to be applicable to other sports such as baseball and soccer (Parachute, 2013a).

Stopconcussions.com pursues a similar goal. The organization describes itself as:

... a concussion / neurotrauma educational and awareness platform for all sports, to address the growing trend of concussions in sports. It is an educational portal that players, parents, coaches, and officials can visit to seek information regarding concussions, with the goal of becoming more aware and ultimately safer individuals in their respective sports. (http://www.stopconcussions.com/the-steps/)

Stopconcussions.com states that the organization intends to create sport-specific programs to help change the mindset of each sport in relation to concussions while not changing the "game" itself. Snowsmart is an awareness campaign regarding potential risks on ski slopes. Designed to educate skiers and snowboarders about injury prevention in their sports, Snowsmart focuses on three (3) key factors: avoiding collisions, maintaining control, and excessive speed. Overall the program is meant to provide participants with knowledge related to "smarter risks" in snow sports (Parachute, 2013b).

Noble Intentions, but Limited Scope

While the Canadian programs described above have noble intentions, their injury prevention initiatives are primarily focused on head injuries that occur in winter sports. There are few programs targeting the diversity of injuries found in a variety of sports and physical activity, regardless of season.

Additionally, there is no comprehensive surveillance system to collect data on sport and recreational injuries either in Ontario or elsewhere in Canada. The Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) exists, but only collects injury data from those individuals who seek treatment at a specific hospital. The data is further limited by the fact that CHIRPP is currently only available to 10 children hospitals and four general hospitals nationwide (Public Health Agency of Canada, 2009).

Additionally, the idea of "healthy risk" in sports, recreation, and physical activities needs to be considered. Many injuries incurred in various forms of play and physical activities require little to no medical treatment (Public Health Agency of Canada, 2009; Sahai, et al. 2005; Belechri, et al., 2001). The significance of preventing such "minor" injuries has prompted considerable debate and divided the prevention field into two fundamental camps: Those who want to prevent all injuries, and those who see injuries as an "inevitable" part of participation in sports, recreation, physical activity (Brussoni, et al., 2012; Molcho & Pickett, 2011). The former group argues that the consequences of injuries cannot be predicted, so it is best to prevent all injuries (Pless, 2012; Rivara, 2011). The latter see injury as a key component of a healthy, active lifestyle (Brussoni, et al., 2012; Molcho & Pickett, 2011).

Furthermore, as shown in the tables presented above, categorization and interpretation of existing information presents a potentially misleading picture regarding the scope of sport and physical activity related injuries in Canada. As a result, a clear need exists for an innovative and comprehensive approach to addressing the issue of injury prevention.

How We Can Do Things Differently: Play Safe

An opportunity exists, in fact, to create a comprehensive approach to injury risk reduction and injury prevention in Ontario and Canada. It involves changing the injury paradigm of sport and recreation by increasing collaboration between all partners and building social and technological capacity. This is the purpose behind Play Safe.

As noted above, sport and physical activity related injuries represent a substantial economic cost for the Canadian healthcare system. However, even though we know more today than ever before about injury prevention, injury continues to be the leading killer of all Canadians under the age of 45 year (Public Health Agency of Canada, 2013). This points to the need for a more concerted effort to prevent injuries by applying the approaches that have been shown to work.

Previous injury prevention initiatives effective in reducing risk factors include product designs, risk labels, hazardous workplace equipment, playground redesign, and speed and seatbelt legislation. The tools used to affect these changes commonly include the five E's of injury prevention (Tator, 2012):

- **Epidemiology, including injury surveillance**
- **Environment and product design or modification**
- **Enforcement of legislation and policies**
- **Education and awareness campaigns for key audiences**
- **Evaluation of intervention strategies**

The five E's encompass all domains relevant to injury risk reduction, and the same approach can be equally effective in reducing risk and preventing injury in sport and physical activity.

Using Data to Drive Effective Interventions

As with previous public health and safety initiatives, prevention of injury in sport and physical activity requires a thoughtful approach grounded in evidence and research. Strategies to identify and change injury risk factors—whether at the individual, community, or society level—will be inadequate if they do not include robust data collection and analysis to drive the evaluation of interventions, identification of trends, and support ongoing research to inform program development and decision making (policy and/or legislation).

As Driscoll and colleagues noted (2004), relevant, accurate, and reliable data are needed to understand and improve injury prevention programs. However, there has been no widely accepted, consistently referenced system for reporting, analyzing, and evaluating unintentional injuries within many contexts (e.g., falls, recreational activities, and organized sport).

The lack of such a reporting mechanism led to the development of a key component of Play Safe. The Play Safe Injury Tracker (PSIT) is a web-based, user-friendly, and highly accessible data collection tool that allows users to collect and analyze data that can support research and enhance the development of consistent resources, programs, education, and policy in injury risk reduction. This program allows researchers to generate sport/activity specific reports, thereby providing organizations with relevant information.To date, PSIT has been used effectively for collecting data at the 2013 Ontario Summer Games and the 2014 International Children's Games.

"Strategies to identify and change injury risk factors will be inadequate if they do not include robust data collection and analysis."

How the Play Safe Approach Works

The five E's and the PSIT are key elements of the Play Safe approach to injury risk reduction. Overall, the work of Play Safe is predicated on three key objectives:

1. Connection

Any initiative that attempts to bridge beyond sport into recreation, education, and health requires an alternative to the "top-down" approach. Play Safe provides the platform for interested individuals and organizations to come together as a collaborative "community" using the Constellation Model (Surman, 2006) to leverage existing relationships and build new synergies.

2. Capacity

In order to address the challenges of injury prevention effectively, it is important to develop and sustain capacity. In this context, capacity refers to the community of sport and recreation volunteers, leaders, officials, teachers, participants, and healthcare providers through education, research, empowerment, training, and mobilizing of resources to support injury prevention (Poland, 2000).

Capacity is a critical component of Play Safe's work as it seeks to help organizations and associations to develop self-reliance by leveraging existing and developing systemic skills and assets (e.g., communication, leadership, advocacy, technology) to sustain on-going activities. In order to shift the injury paradigm within the sport and recreation environments, Play Safe believes the following elements of capacity need attention:

Social Capacity

As stakeholders work together to identify assets (facilitators) and gaps (barriers) within the sport, recreation, and physical activity communities, we need to develop and enhance our networks. Strong networks will facilitate the development of effective interventions and a strong framework to support healthy and safe activities.

Additionally, the environments in which various sport, recreation, and physical activities take place in environments supported by people and the policies that govern them. Building social capacity within this context speaks to the level of awareness, education, comprehension, and skill of the decision makers, frontline staff, and volunteers to support healthy and safe environments for physical activity through program and policy.

Social capacity also refers to participants' level of awareness and understanding so they are able to make informed choices about activity involvement. PSI seeks to understand the present environments, classify accelerators that contribute to injury risk, and begin to identify interventions or intervention needs to mitigate risk.

Technological Capacity

As we work to mobilize information across geographical and organizational boundaries, technology can be used to reduce or eliminate the constraints on information flow. To this end, Play Safe seeks to use technology to improve the exchange of information across regions and networks of communities.

For example, we know that surveillance systems exist within our present healthcare system to track things like chronic and acute disease. As well, most sports, recreation, and physical activity organizations currently track some injury data in order to comply with insurance requirements. However, we have lacked a surveillance system to provide a global perspective on injury across different sport and physical activity environments, or "spheres."

For instance, how do we compare the injuries in a basketball summer camp to the injuries in basketball league or the injuries in high school basketball? Until the development of the PSIT, we were unable to make such comparisons. PSIT has provided the capacity to help the injury prevention community to develop a comprehensive full picture of injuries in specific sports across the different domains, and this, in turn, can assist in the development and enhancement of effective injury prevention programs. PSIT can also help to measure the effectiveness of various interventions within the different spheres.

The PSIT concept evolved from work generously supported by the Ontario Neurotrauma Foundation and the Canadian/American Spinal Research Organization's Play It Cool Program. PSIT has been used to capture data at the 2012 Ontario Summer Games and the 2014 International Children's Games, and it continues to be used across Ontario to track injury-related data from a variety of sports including boxing, soccer, basketball, and lacrosse. As a web-based system, PSIT has become an accepted platform among various partners that enables them to collaborate and establish uniform definitions and problem specific approaches to data collection. It also allows them to compare high-risk behaviours, efficacy of training methods, and appropriateness of injury prevention equipment. PSIT was designed with consideration of the strengths of existing injury surveillance systems.

Given its comprehensive scope, PSIT provides invaluable support to researchers who study the cause, burden, and prevention of injuries across the lifespan. The field of injury risk reduction and injury prevention needs comprehensive research that explores not only the causal mechanisms and epidemiological characteristics of injury, but also:

- **The influence of social, economic, and physical inputs**
- **The role of personal health practices and risk taking behaviours**
- **Individual capacity and coping skills**
- **Health services**
- **Human biology**
- **Early childhood development**

PSIT provides stakeholders and researchers meaningful and detailed data demonstrating that all of these different factors contribute to injury. Consistent with similar systems of injury surveillance, PSIT:

- **Provides useful information to determine the importance of injury as a public health problem;**
- **Enables researchers to determine the magnitude of injury morbidity, mortality and disability;**
- **Provides reports of prevalence of injury-related risk behaviours within designated cohorts to community-based stakeholders;**
- **Provides valuable information to support injury prevention priorities by identifying mechanisms of causation, risk factors, at-risk individual, geographic location, or temporal issues;**
- **Helps researchers to evaluate the efficacy of prevention programs or control measures, and helps to identify new and emerging injury hazards;**
- **Promotes and evaluates policy changes;**
- **Facilitates the development of injury research (Smartrisk, 2009).**

More importantly, as part of Play Safe, PSIT also assists in the following activities:

- **Provides useful data back to user groups and community-based organizations for the purpose of supporting injury reduction strategies within their activities;**
- **Development and sharing of consistent resources to educate and inform stakeholders including (but not limited to) administrators, coaches, trainers, officials, recreation leaders, teachers, healthcare practitioners and participants;**
- **Cross-promotes practices that demonstrate effective reduction of injury;**
- **Engages sport, recreation, education and health sector in collaborative research;**
- **Creates cross-sectoral dialogue about injury and injury reduction;**

Play Safe Mobile App

Another important technological component is the Play Safe App. This iOS smartphone-based application is designed to help individuals to identify and manage their injury risks when participating in sports and/or physical activities at home, school, or in the community.

Key features of the Play Safe App include:

- **Injury Tracker – maintains a record of individual injuries, causal factors, and diagnoses;**
- **Symptom Checker – allows user to record mental and physical symptoms with the calendar feature;**
- **Hospital Finder – automatically locates nearest hospital using the devices mapping service;**
- **Allows user to identify a "Near Miss" and help others avoid and resolve the risk;**
- **Fully integrated with the Play safe Initiative website, and thereby allows quick access to educational and other resources.**

3. Change

Play Safe's third key objective is change creation. One of Play Safe's most difficult challenges is shifting the injury paradigm in sport, recreation, and physical activities by putting "prevention" back into the equation. Play Safe aims to achieve this paradigm change through several key strategies including:

- **Development and deployment of PSIT to capture and assimilate injury data;**
- **Social and environmental change;**
- **Awareness raising and education;**
- **Behaviour change to decrease injury incidence and severity.**

All of these strategies are intended to improve healthy sport and recreation activity outcomes.

(Coggin & Bennet, 2006)

Bridging the Disconnect

Until the adoption of the Canadian Sport for Life (CS4L) model, there was little interaction between sport, recreation, education, and health in Canada. This historical disconnect has contributed to the current environment in which we find no reliable and consistent injury data to measure.

The CS4L paradigm shift fundamentally alters the delivery of physical activity in each of these spheres. It creates an intentional relationship that better serves the Canadian population while supporting government objectives around high performance sport and healthy population outcomes. Through the CS4L model, sport and recreation become partners in public health through physical activity. Together, they work to support new policy initiatives to reduce healthcare crises like obesity and obesity-related chronic disease.

Within this framework, sport and recreation injury becomes a significant public health matter. When people are injured in one activity, such as their sport or recreational pursuit, the consequences spill into other areas of their lives such as school or work. These consequences affect the larger community and not just the individual. For these reasons, Play Safe aims to change the way the health, recreation, sport and education sectors engage with each other on the injury problem. However, changing the injury paradigm in sport, recreation, and physical activity will not be achieved overnight.

Understanding Change

Part of Play Safe's work is to understand how change happens. In the area of injury risk reduction and injury prevention, many positive strides have been made through specific initiatives to date. These include:

Play Safe Community Leader Workshop (June 2015)

This session introduced leaders in sport and recreation organizations to the fundamentals of injury prevention and the role it plays in sport and recreation programs and activities. Participants were provided with new knowledge and skills for implementing injury prevention practices in their organizations. This session was delivered as part of the Atlantic Collaborative on Injury Prevention 2015 Conference.

The Play Safe Symposium (February 2015)

The theme of this event was "Change, Challenge, and Opportunity." Individuals working in, or with an interest in, injury prevention in sport, recreation and physical activity where given access to oral presentations, posters, and other resources useful for application in a variety of environments. The resulting videos and summary report can be accessed here: www.playsafeinitiative.ca/outcomes

Development of a Concussion Policy (2014)

Developing a Concussion Policy: Information for Recreation and Sport Leaders & Organizations" was produced in collaboration with a number of Canadian organizations from health, education, recreation, and sport and is based on the CDC's **Get a Heads Up on Concussion in Sports: Policies Information for Parents, Coaches, and School & Sports Professionals**. This free resource is available for organizations to download and share as they embark on the process of developing appropriate concussion policies.

Place Safe: Physical Literacy and Injury Prevention Guide for Leaders (2013)

The tools in this guide enable organizations to establish best practices for reducing the risk of injury in their programming. These practices may also improve the overall experience of their participants. The guide is intended to introduce the coach, parent, volunteer, administrator, leader, or official to the basic concepts of injury risk reduction in sport and physical activity through the use of injury prevention and risk management tools and practices. While these practices are well established in areas such as public health and workplace safety, they have not been fully adopted within sport and physical activity. As such, sport and physical activity groups have the opportunity to learn from these evidence-based practices and apply them to their delivery of sport and physical activity programs in Canada. This guide was developed in partnership with Canadian Sport for Life as part of the Safe and Active Grant from Public Health Agency of Canada.

Single Sport and Multi-Sport Event Data Collection (2012 - present)

An early version of PSIT was tested at the 2012 Ontario Summer Games, hosted by the City of Toronto and Toronto Sport Council. This event welcomed approximately 2400 athletes across 26 different sport events at 28 venues spread over 250KM. Using PSIT, event medical organizers were able to utilize injury data in real-time. PSIT was used subsequently at the 2013 Windsor-Essex International Children's Games. Similar to the 2012 Ontario Summer Games, this event hosted multiple sporting events at various locations. The application of mobile and cloud technology has been proven effective in capturing useful and timely information that can impact elements of sport and recreation such as program planning, policy development, decision making and evaluation.

Play Safe Healthcare Network (2012)

This enterprise emerged from the 2012 Ontario Summer Games where more than 120 professional healthcare volunteers provided injury response, injury assessment, and injury prevention services to the young athletes involved in the event. The network was designed to support the Summer Games and encourage more opportunities for organizations to collaborate with healthcare professionals. In the network's virtual space, organizations can post opportunities for healthcare professionals to volunteer at community events, tournaments, provincial games, and other sport/recreation events.

The Constellation Model: Getting the Work Done

Utilizing a constellation model (Surman, 2006), Play Safe's work reflects the diversity and scale of sport, recreation, and physical activity in Ontario. A complete list of the current Play Safe network partners can be found at:

www.playsafeinitiative.ca/network.html

Collaboration: The Play Safe Difference

As a result of the work done by Play Safe and its partners, the province of Ontario serves as a model for others who are working in sport and physical activity related injury prevention. This initiative demonstrates the collaborative power of a multi-organizational/multi-sectoral effort by building a comprehensive and effective participant-centred injury surveillance and prevention strategy that crosses the boundaries of sport, recreation, health, and education. (In fact, this collaborative approach need not only apply to injury prevention; it can also provide a starting place for many other non-injury issues). Furthermore, this collaboration has led to the most significant contribution from Play Safe's work, the development of the Play Safe Injury Tracker (PSIT). This system will set a new standard in the area of injury risk reduction and injury prevention for data capture and exchange in Ontario and beyond.

Play Safe: Moving Forward – Becoming Play Safe Certified

Play Safe Certified is a program for service delivery organizations, such as sport leagues, recreation organizations, and schools to demonstrate meeting accreditation guidelines developed from informed practices and designed for reducing injury incidence and severity. This program represents the minimum standard needed to address the challenges and opportunities related to the emergence of injury prevention as a key organizational activity. This move reflects activities seen in other areas of sports, such as coach and official certification. The development of the Play Safe Certified program will be based on areas and scope of practice related to sport and physical activity-related injury prevention. (Selig, et al., 2011).
The initial steps involve the development of the accreditation criteria in collaboration with injury prevention stakeholders. This would include evaluating existing accreditation criteria; identifying and documenting gaps, as well as emerging scopes of practice; developing new accreditation criteria; piloting the new accreditation; reviewing and revising feedback; and, developing support mechanisms and programs to facilitate organizations becoming Play Safe Certified.

This program is intended to be provided at no cost to organizations and is designed to help build organization capacity with respect to injury prevention. A Play Safe Certified organization can share this accomplishment with their community and help parents make informed choices about where their children play.

Conclusions & Recommendations

Injury in sport and physical activity is not new. What is new is the startling increase in the incidences of these injuries in recent years. In Canada, such injuries are no longer primarily the domain of professional sports. Serious injuries, including concussion, are now happening with greater frequency in children's sport as well.

Injury in sport should not be a de facto cost of participation at any level of sport and physical activity. Injuries can create lifelong suffering and lead to debilitating medical conditions that tax our healthcare system as well as our personal lives. In light of increased awareness around the social and monetary costs of injury, there is a growing public sense that more can be done to prevent injuries in sport and physical activity, but uncertainty exists as to how to do this. It is also unclear who should be doing it.

Play Safe maintains that the first step is to create a comprehensive system of injury surveillance and information delivery that is readily accessible and widely accepted by governing bodies and participant communities in sport, recreation, and physical activity. This needs to be the starting place to make a difference to injury prevention in Ontario and Canada. While there are presently several discipline-specific tools and insurance based injury reporting strategies in place, a comprehensive system is still non-existent.

Planning for injury prevention is also essential, and planning should be evidence-based. Specific tools are required to provide the kind of relevant data, information sharing, and user access that is needed to support evidence-based planning. In short, the tools should deliver the following:

- **Evidence to support policy development and implementation,**
- **Communication between stakeholders at all levels of the planning process.**
- **Access to information that is comprehensible across the community of system users.**

The PSIT, developed as part of Play Safe, is designed to meet each of these requirements. Using a web-based approach, the system collects injury data of various types across cohorts, provides access to communication tools to support discussion between stakeholders and reporting by designated officials, and facilitates delivery of information materials to educate communities of participants.

Importantly, the system content components are developed according to user input, so each sport or physical activity community can contribute to the ongoing evolution of the system. This also means that each user community can generate an injury prevention strategy that is unique to their sphere of activity while also drawing on useful commonalities across user communities.

In addition to the three key objectives identified above, Play Safe recognizes three key assumptions:

- **One size does not fit all. Organizations vary in their ability to undertake new projects based on human, financial, and cultural factors. Solutions need to respect their unique circumstances.**
- **It's better to prevent first. Preventing the first injury is more manageable and cost-effective than treating and managing subsequent injuries that affect not only return to play but also activities of daily living.**
- **Efforts must be participant-centred. Participation occurs concurrently in different "spheres", yet participants remain constant. As such, attention to each participant is critical to any successful injury prevention effort.**

Through new technologies and collaborative approaches, we now have the knowledge and capacity to change the incidence and severity of injury in sport, recreation, and physical activity in ways that we never had before. The time to act is now.

References

Andrew, N., Wolfe, R., Cameron, P., Richardson, M., Page, R., Bucknill, A., & Gabbe, B. (2014). The impact of sport and active recreation injuries on physical activity levels at 12 months post-injury. Scandinavian Journal of Medicine & Science In Sports, 24(2), 377-385.

Banfield, J., Tanenbaum, B., Forbes, S.L., Montelpare, W., & Livingston, L.A. (submitted). Play Safe™ symposium: A consensus statement on change, challenge, and opportunity in injury prevention. Injury Prevention.

Belechri, M.; Petridou, E.; Kedikoglou, S.; Trichopoulos, D. (2001). Sports injuries among children in six European Union countries. European Journal of Epidemiology, , 17, 1005–1012.

Billette, J. M., & Janz, T. (2011). Injuries in Canada: Insights from the Canadian Community Healthy Survey. Statistics Canada.

Brussoni, M., Olsen, L.L., & Pike, I.(2012). Sleet, D. Risky play and children's safety: Balancing priorities for optimal child development. International Journal of Environmental Research and Public Health, 9, 3134–3138.

Centers for Disease Control and Prevention. (2012). National action plan for child injuryprevention: an agenda to prevent injuries and promote the safety of children and adolescents in the United States . Retrieved from http://www.cdc.gov/safechild/pdf/National_Action_Plan_for_Child_Injury_Prevention.pdf
Chalmers, D. J. (2002). Injury prevention in sport: not yet part of the game?Injury Prevention, 8 (suppl 4), iv22-iv25.

Coggan, C., & Bennett, S. (2006). Community-based injury prevention programs. In Carlson Gielen, A., Sleet, D.A., DiClemente, R.J. (Eds). Injury and Violence Prevention, Behavioral Science Theories, Methods, and Applications (pp. 347-358). San Francisco, CA: Jossey-Bass.

Driscoll, T., Harrison, J., & Langley, J. (2004). Injury surveillance. In: McClure, R., Stevenson, M., & McEvoy, S., The Scientific Basis of Injury Prevention and Control (pp. 87-109). Melbourne, IP Communications.

Government of Canada (2011). Available from: Bill C-319: An Act respecting a national strategy to reduce the incidence of serious injury in amateur sporthttp://www.parl.gc.ca/content/hoc/Bills/412/Private/C-319/C-319_1/C-319_1.PDF

Hagel, B. E., & Yanchar, N. L. (2013). Bicycle helmet use in Canada: The need for legislation to reduce the risk of head injury. Paediatrics & Child Health,18(9), 1.

Ministry of Health Promotion. (2007). Ontario's injury prevention strategy. Retrieved from http://www.mhp.gov.on.ca/en/prevention/injury-prevention/strategy.pdf

Molcho, M. & Pickett, W. (2011). Some thoughts about "acceptable" and "non-acceptable" childhood injuries. Injury Prevention, 17, 147–148.

National Public Health Partnership (NPHP). (2004). The national injury prevention and safety promotion plan: 2004-2014. http://www.nphp.gov.au/publications/sipp/nipspp.pdf

National Public Health Partnership (NPHP). (2001). National injury prevention plan: priorities for 2001-2003. Retrieved from http://www.nphp.gov.au/publications/sipp/prev_plan.pdf

Nationwide Children's Hospital (NCH). (2012a). Center for injury research and policy. Retrieved from http://www.nationwidechildrens.org/injury-research-and-policy

Nationwide Children's Hospital (NCH). (2012b). RIOTM: reporting information online. Retrieved from http://www.nationwidechildrens.org/cirp-rio

Nationwide Children's Hospital (NCH). (2012c). Safe play areas for Ross County kids (SPARK) program. Retrieved from http://www.nationwidechildrens.org/cirp-spark-program

Nationwide Children's Hospital (NCH). (2012d). Columbus youth helmet ordinance. Retrieved from http://www.nationwidechildrens.org/cirp-columbus-youth-helmet-ordinance

Parachute. (2015). The Cost of Injury in Canada. Parachute: Toronto, ON

Parachute. (2013a, February 28). Concussion toolkit. Retrieved from http://www.parachutecanada.org/active-and-safe

Parachute. (2013b, February 15). Overview of SNOWSMART. Retrieved from http://www.parachutecanada.org/programs/topic/C52

Pless, I.B. (2012). On preventing all injuries. Injury Prevention, 18, 285–286.

Poland, B.D. (2000). Social capital, social cohesion, community capacity, and comminute empowerment: Variations on a theme? In B.D. Poland, L.W. Green, & I. Rootman (Eds.), Settings in health promotion: Linking theory and practice (pp. 301-307). Thousand Oaks, CA: Sage.

Public Health Agency of Canada. (2009). Canadian hospitals injury reporting and prevention program (CHIRPP). Retrieved from http://www.phac-aspc.gc.ca/injury-bles/chirpp/

Public Health Agency of Canada. (2013). Table: Leading Causes of Death, Canada, 2008, males and females combined, counts (age-specific death rate per 100,000). Ottawa, ON.

Rivara, F. (2011). Counterpoint: minor injuries may not be all that minor. Injury Prevention, 17, 149–150.

Sahai, V.S., Ward, M.S., Zmijowskyj, T. & Rowe, B.H. (2005). Quantifying the iceberg effect for injury: using comprehensive community health data. Canadian Journal of Public Health, 96, 328–332.

Selig, S., Coombes, J. S., Otago, L., Pascoe, D., Raymond, J., Torode, M., & Groeller, H. (2011). The development of an accreditation scheme for accredited exercise physiologists. Focus on health professional education, 13(2), 89-112.

SmartRisk. (2005). Ending Canada's invisible epidemic: A strategy for injury prevention. Toronto: Insurance Bureau of Canada.

Sport Canada (2003). Fact Sheet: Reconnecting Government with Youth Survey. Retrieved from http://www.pch.gc.ca/progs/sc/info-fact/youth_e.cfm

Sport and Recreation Victoria (2013). Sports Injury Prevention Taskforce: Final report. Melbourne, Australia: Sport and Recreation Victoria,Department of Transport, Planning and Local Infrastructure. Retrieved from http://www.sport.vic.gov.au/sites/default/files/Sports_injury_prevention_taskforce_report.pdf

Sorock, G.S., Smith, G.S., Reeve, G.R., Dement, J., Stout, N., Layne, L., & Pastula, S.T., (1997). Three Perspectives on Work-Related Injury Surveillance Systems. American Journal of Industrial Medicine 32:116–128.

Stop Concussions Foundation (2015). About us. Retrieved from http://www.stopconcussions.com/the-steps/

Surman, T. (2006). Constellation collaboration: a model for multi-organizational partnership. Centre for Social Innovation. Retrieved from http://s.socialinnovation.ca/files/Constellation%20Model%20Description%20June%209'06.pdf

Tator, C. H. (2012). Sport concussion education and prevention. Journal of Clinical Sport Psychology, 6:293-301.

ThinkFirst. (2011). ThinkFirst smart hockey. Retrieved from http://www.thinkfirst.ca/programs/hockey.aspx

Yanchar, N.L., Warda, L.J., & Fuselli, P. (2012). Child and youth injury prevention: A public health approach. Journal of Pediatric and Child Health, 17(9). Retrieved from http://www.cps.ca/documents/position/child-and-youth-injury-prevention

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