CANADIAN SPORT FOR LIFE

PHYSICAL LITERACY

PLAY SAFE:

Physical Literacy and Injury Prevention Guide for Leaders

Introduction

Safety is a best practice. The tools in this guide will enable your organization to establish best practices reducing the risk of injury in your programming, and they may also improve the overall experience of your participants. Participants who are prepared, educated, trained, well-equipped, and follow the rules will be better able to avoid injury, participate with confidence, and maintain their participation long term. Building safe and healthy participation will enrich everyone's experience as they enjoy the benefits of physical activity.

This Guide

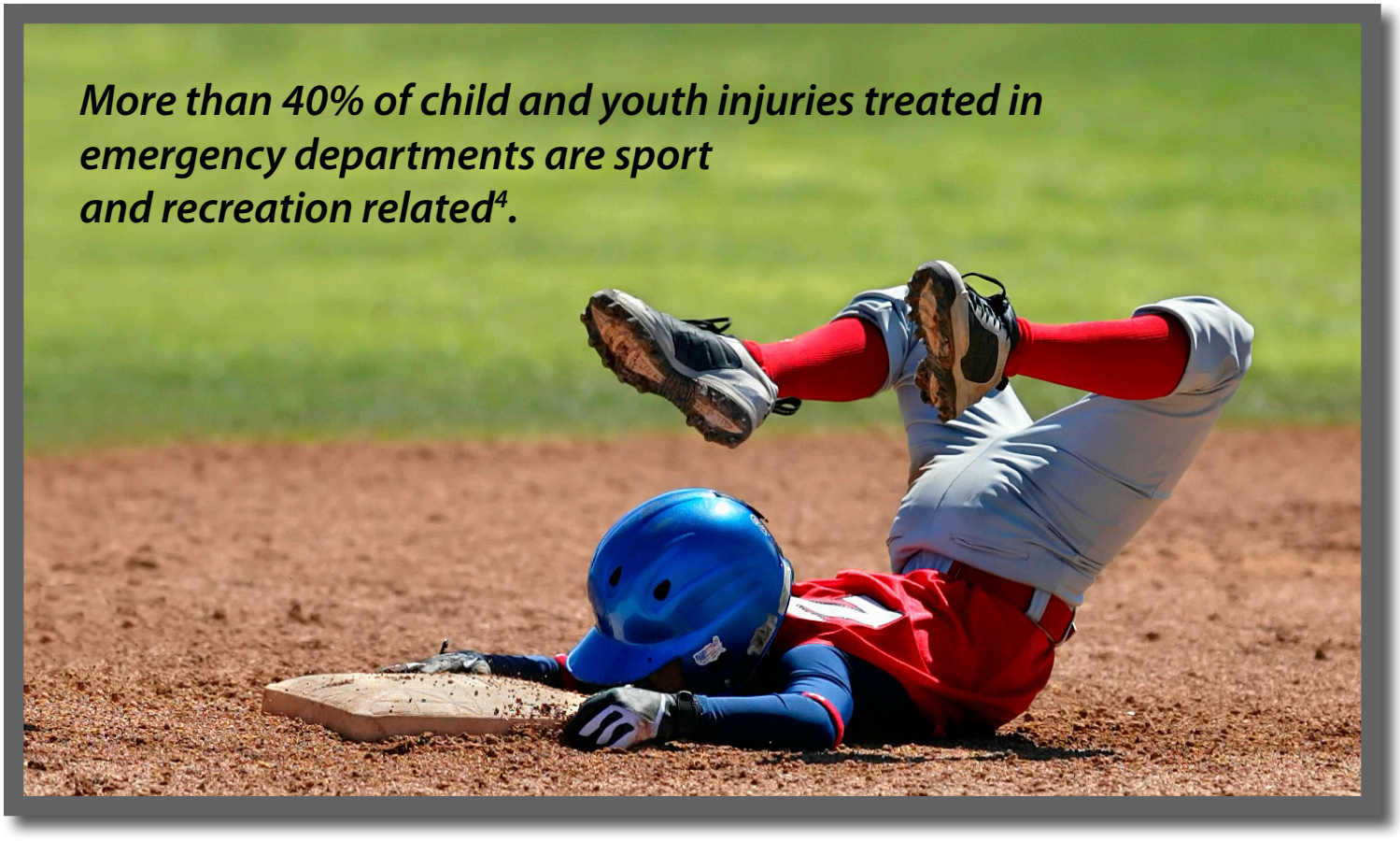
This guide is intended to introduce the coach, parent, volunteer, administrator, leader, or official to the basic concepts of injury risk reduction in sport and physical activity through the use of injury prevention and risk management tools and practices. While these practices are well established in areas such as public health and workplace safety, they have not been fully adopted within sport, recreation and physical activity settings. As such, organizations have the opportunity to learn from these evidence-based practices and apply them to their delivery of sport, recreation and physical activity programs in Canada.

Part 1

Injury Prevention in Canada

Injury is the leading cause of death for children and young adults. It is among the leading causes of hospitalization for children, young adults and seniors, and it is a major cause of disability in Canada[1]. The annual cost of injuries to Canadians is estimated at $19.8 billion[2]. This includes the direct costs of health care, as well as the indirect costs related to reduced productivity due to hospitalization, disability and premature death[3]. More than 40% of child and youth injuries treated in emergency departments are sport and recreation related[4]. Despite this massive cost, we struggle to understand the injury process and change this outcome.

Sport and physical activity involve some degree of risk. Risk is not necessarily a bad thing or something we want to always avoid. We take risks every day walking across the street, driving to work or trying something new. Often these risks are calculated. We weigh the pros and cons, and we prepare to face the uncertainty of risk by taking a course to learn a new skill or purchasing insurance. Still, risk can have serious consequences like injury or death. Building a culture of safety and injury prevention in sport, recreation and physical activity programming requires a widespread agreement that injuries are predictable and preventable.



Injury Prevention Tools

The following tools show how injury occurs, where interventions can reduce the number and severity of injury, and how those interventions can be designed and evaluated for effectiveness.

- **The "Haddon Matrix" describes the process of injury and identifies opportunities for intervention.**
- **The "Three Es" prescribe the strategies to be used at these points of intervention.**

Understanding these two elements will help in different ways. First, they will provide anyone involved in sport and physical activity programming with a base level of understanding and a common language for injury prevention. Second, they will help to identify what has been successful in sport and physical activity to date, and what has not been. These elements are not exhaustive, but they provide a glimpse of the possibilities of injury risk reduction.

Using the Haddon Matrix to Understand Injury in Sport and Physical Activity

As you develop a strategy to reduce or eliminate an injury risk, it is important to understand the process that leads to injury and the potential opportunities to intervene. The Haddon Matrix is a framework that provides 12 opportunities to intervene in the injury process, the most important of which is during the pre-injury phase. Sport and physical activity organizations can apply the matrix to see where and/or when they can minimize injury risk in their programs.

The following is an example of an organization using the Haddon Matrix to understand the factors related to ACL injuries in soccer players.

			Environment	
	Host	Agent	Physical	Socio-economic
Phases	The person at risk of injury	Is energy that is transmitted to the host	The characteristics of the setting in which the injury event takes place	The social and legal norms and practices in the culture and organization
Pre-Injury *Stopping the injury event from occurring by acting on its causes*	• Structured warm-up programs that focus on stretching, strengthening, improving balance and movements prior to sport participation • Basic skills should be mastered before moving to more complex skills • Participants understand playing rules	• Proper fitting shoes and clothing • Use of relevant and correct size of tools and equipment • Limit physical contact during practice	• Favorable weather conditions • Well maintained and safe playing fields e.g., absence of potholes	• Where possible have athletic trainer during practice and game • Optimum preparation and practice • Strict supervision during the game and practice
Injury *An attempt to prevent an injury or reduce the severity when an event actually occurs by designing and implementing protective mechanisms*	• Limit activity to individual ability • Strict adherence to rules and regulations	• Use of personal protective equipments such as knee pads and braces	• Hospital nearby with specialty in trauma care/sport injuries	• Emergency response system ready such as phone, ambulance, and first aid kit
Post-Injury *An attempt to reduce the severity of injury or disability immediately after an event considering short and long-term timeframes*	• General physical health of the injured person • Provide prompt and appropriate first aid	• Use of first aid kit	• Availability of immediate trauma care • Availability of rehabilitation facility • Prompt ACL reconstruction	• Sport-injury rehabilitation program • Family and social support

Haddon Matrix in Practice: Dr. Tom Pashby, an ophthalmologist and sports safety activist, helped develop the face mask and visor and introduce the helmet into the Canadian Hockey League. Face masks for hockey players were introduced in 1971 and soon became mandatory in amateur leagues[5]. Eye injuries in hockey have steadily declined since that time. In 1980, Hockey Canada was the first league to make face protection certified by the Canadian Standard Association (CSA), a mandatory requirement for all of its registered players[6]. Prior to the introduction of the face mask in hockey, eye injuries were identified as a cause of vision loss and impairment. Dr. Pashby applied the logic of the matrix: preventing the puck or stick (agent) from striking the face and ocular region (host) would reduce the incidence of injuries. Mandatory rules (social environment) now support the use of protective equipment.

The Three Es - Education, Engineering and Enforcement

The Three Es - Education, Engineering and Enforcement - were developed by Sue Barker in 1973[7] . Where the Haddon Matrix helps to identify when and where interventions can be applied, the Three Es help us to develop specific strategies for each intervention.

The following table summarizes the necessary criteria for each element:

Criteria for Effective Use of Injury Prevention Strategies[8]

Education	Engineering	Enforcement
Audience must: • Be exposed to the appropriate information • Understand and believe the information • Have resources and skills to take action on the information • Derive benefit (or perceive benefit) from taking action • Be reinforced to maintain the change over time • Evaluated for effective learning	Modification must be: • Effective and reliable • Compatible with the environment • Result in products that dominate the marketplace • Acceptable to the public • Easily understood by the public • Properly used by the public • Evaluated for effectiveness	Law or regulation must (be): • Widely known and understood by the public • Acceptable to the public • High probability (or perceived probability) of enforcement • Punishment is (or is perceived to be) swift and severe. • Evaluated for effectiveness

Mandatory protective equipment is a common example of an intervention in sport (Engineering). However, equipment alone cannot fully prevent injury if players are not shown how to wear it properly (Education), officials do not enforce its use (Enforcement), or its design is not adequate (Engineering). A breakdown in the application of any one of the Three Es will limit the success of equipment as an intervention. Therefore, any effective injury prevention intervention must include all three of the Three Es.

Evaluation

Proper evaluation criteria must be included in the Education, Engineering and Enforcement interventions in order to provide evidence of their effectiveness. This highlights an important theme in injury prevention – it needs to be evidence-based. However, it can be difficult to gather evidence in sport and physical activity. MacKay and Liller (2009) suggest most research in the area of sports and recreational injury "has been descriptive, with too few studies examining prevention strategies in any rigorous manner[9]." In other words, safety practices within the sport system have not been measured in detail to determine if they provide the safety they are intended to.

Evaluation Proves the Point

In recent years, we have seen some contention around interventions like mouthguards and eye protection in various sports. Decision makers, with best intentions, may feel that something must be done about a particular injury and adopt a new practice or piece of equipment without formal evaluation. This lack of rigour (validity) raises questions about the decision-making process. With a better understanding of the value of developing and utilizing evidence-based practices, organizations can make decisions not only with best intentions but also with best facts to guide them.

Who is Ready for Change?

Injury prevention relies heavily on understanding why and how people and organizations do the things they do. Often injury prevention relies on changing habits because risky behaviours are perpetuated by habits both at the individual and organization levels. These habits can be subconscious and continue without anyone noticing.

For example, a runner's gait and a golfer's swing are behaviours driven by habit. As any coach or instructor knows, when an athlete or participant has learned a skill with poor execution, it can be very difficult to change that pattern of execution. As a result, the individual may be more susceptible to repetitive strain or acute injury, or they may not be able to advance to the next level because of their limited skills. If sport and physical activity providers can teach better skill development at the beginning of a participant's experience, this should result in better skill execution and decreased susceptibility to injury.

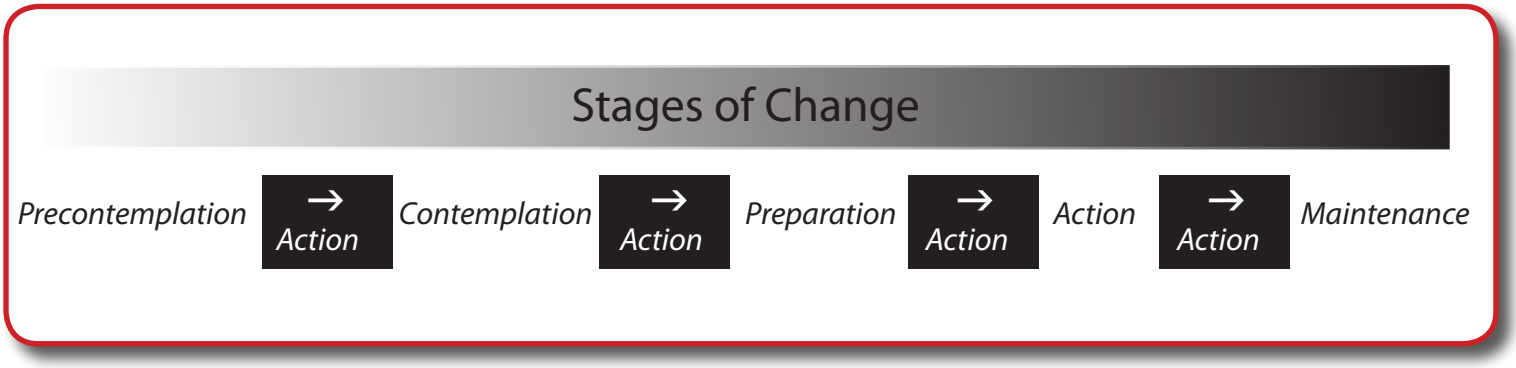
Similarly, changing the habits of culture, policy and process within an organization can reduce the likelihood of injury. Precisely how to change the habits of individuals and organizations is a topic too complex for this guide. However, it must be understood that the process takes time.

Change is Not Linear

With organizations and individuals, behaviour change is a dynamic process; changes happen in steps and stages over time[10]. As well, change does not always begin at step one and move fluidly through successive steps; people may progress from one step, regress, and then progress again until the behaviour change is attained. People will also enter the change process at different stages, and they may not all move from one stage to the next at the same pace.

This is an important feature of injury prevention planning. Change requires action to move people and organizations.

The following is an illustration of the stages of change according to the Transtheoretical Model (TM):



Part 2

Injury Risk Reduction in Sport and Physical Activity

"But we have insurance…"

When all other risk management steps fail, insurance is a tool used to protect an organization from financial loss and/or to indemnify a member for potential injuries in a sanctioned event. In the sport environment this usually means that a participant will pay a premium upon registration that provides insurance protection should a player cause injury to a Third Party or sustain serious personal injury while participating in their sport.

Having insurance is very important, but it is not an effective tool for reducing injury risk in the organization's activities, just as buying car insurance does not automatically reduce the risk of a collision and/or injury. Habits and practices have to change.

Time and Effort is Needed

Sport, recreation and physical activity organizations need to commit time and effort to entrench injury risk reduction processes in their programming. One may ask how this can be done, when so many organizations are already stretched to their limit for resources. Two things to consider:

1. The process to identify and reduce injury risk is relatively simple (outlined in this guide).
2. Sport, recreation and physical activity organizations can also save time and energy by learning from successful injury risk reduction efforts in other environments.

A properly implemented risk management guideline for organizations can help to maintain or possibly reduce insurance costs.

With a bit of direction, together with some evidence-based tools and common sense, staff and/or volunteers can become proficient in identifying and reducing injury risk in their programming.

A Mandate to Prevent Injury

There must be a starting place to create a culture shift to reduce the risk of injury. It can be prompted by risk concerns leading to a new organization policy or other directive from a governing body. Some questions to ask:

- What is your organization's injury prevention policy? (See Appendix 1).
- Is it included in your organization's orientation for all staff and volunteers?
- Does your organization have an internal mechanism to capture injury details and share them in a way that helps to identify trends?
- Does your organization have a committee that oversees injury data and analysis, and provides directives to management?
- Who is ultimately responsible for injury in your organization?
- Is there a sponsor or champion of injury prevention in your organization?
- Are frontline leaders in your organization informed about injury prevention policies or practices?
- Is there enough expertise within your organization to lead injury prevention efforts?
- Do people within your organization believe that injury is a problem?
- Does your organization have an injury prevention training or education program for participants and/or leaders?
- Is there a relationship between your organization and the facility in which your activities take place?

How to Implement Injury Prevention through Risk Management

The following pages show you how to:

1. Use basic risk management principles to identify and understand injury risk within your organization's activities.
2. Develop strategies to reduce or eliminate identified risks.
3. Monitor and evaluate your organization's current and future safety practices for effectiveness on an on-going basis.

Note: You can position your organization for success in reducing injury risk by collecting data on injuries within your activities. You can also gain insights by examining the safety practices of other organizations similar to yours. Using real data and best practices, your organization will be able to respond with informed opinions based on evidence and experience as injury risks change over time.

Physical Activity Injury Reduction (PAIR) Tool

The following is a version of the generally accepted risk management process adapted for a sport and physical activity audience. This process is designed to identify, understand, counter and measure injury and injury risk.

1. What if?
- Define the injury risks (see Appendix 2)
- Understand injury process (Haddon Matrix – see Appendix 3)
- Prioritize

2. How to?
- Define points of intervention
- Develop options to reduce risk based on the 3 Es
- Build measurement plan
- Implement best intervention

3. Does it work?
- Measure intervention impact
- Analyze results
- Continue to monitor and evaluate regularly

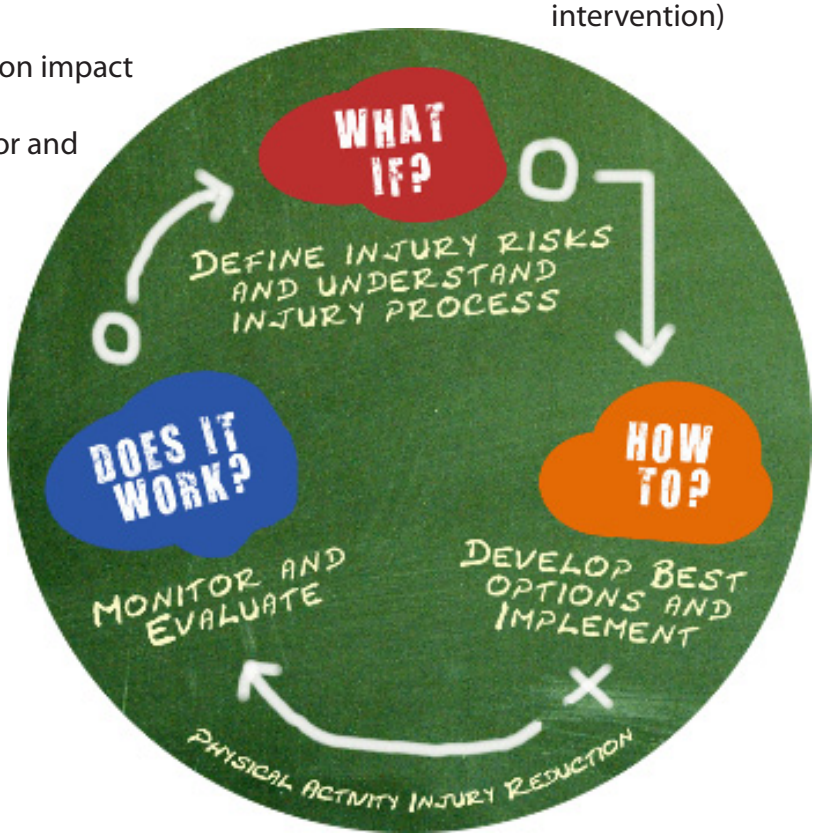
Step One: What If?

Understand Injury in Your Activities

The first step is to identify the general injury risks within your organization. Afterwards, you will drill down to specific details and characteristics of the injury process. Begin by asking one question: Is there the potential that someone can be injured in our activities?

- Define injury in your organization (risk assessment):
    * Classify types (concussion, fracture, laceration, soft-tissue, contusion, etc)
    * Severity (how bad)
    * Probability (how often)

- Understand process:
    * How injury occurs (improper skill, rule infraction, contact with other participant, equipment, play structure, conditions)
    * Haddon Matrix (points of process and intervention)



Identify Potential Hazards

Prioritize injury reduction planning according to applicable legislation, standards or best practices, available organization resources.

When you participate in an activity with great frequency, you can easily overlook some of the associated hazards. Here are some ways you can identify the important ones:

- Look at and analyze the organization's injury records – are there common injuries?
- Walk around your environment and look at what could potentially cause harm.
- Ask your volunteers or participants what they think. They may have noticed things that are not immediately obvious to you.
- Offer a way for "near misses" to be reported (by phone, email or website).
- Invite someone not intimately familiar with your activity to observe the potential opportunities for injury risk.
- Remember to think about long-term risks to health, like overuse injuries.

Assessing injury risk is as much art as it is science. Using a matrix like the one below will help your organization to prioritize the injury risks and determine how to proceed.

Impact	Injury Risk Management Actions		
Severe	Considerable management required	Must manage and monitor risks	Extensive management essential
Moderate	Risks may be worth accepting with monitoring	Management effort worthwhile	Management effort required
Minor	Accepted risks	Accept but monitor risks	Manage and monitor risks
	Low	Medium	High
	Likelihood		

Step Two: How To?

Having identified the risks, you now have to decide what to do about them. Follow these steps to develop options to reduce or eliminate injury risks:

- Ask the question – what can we do to make sure injuries do not happen as often or are not as severe?
- Define points of intervention.
- Develop options to reduce risk based on Haddon Matrix and the 3 Es - education, engineering (equipment, facilities, programming) and enforcement (rules, regulations and policies).
- Build a measurement plan (i.e. observation, injury data collection, surveys, focus groups).
- Select and implement the best intervention.

As you go through this process, look at what your organization is already doing. Think about what controls you have in place and how the organization is structured. Consider the following:

- Can we eliminate the risk altogether?
- If not, how can we control the risks so that harm is unlikely? (Use the Haddon Matrix for this activity.)

There are laws in place that expect an organization to make reasonable efforts to reduce and eliminate a known risk.

The easiest way to know if what your organization is doing is reasonable is to compare what you are doing with good practice of similar organizations, colleagues and members.

Selecting the Best Option

You now have an understanding of the risks involved in the activities within your organization and a number of options to offset them. Given the organization's resources and capacity and the best practices of other similar organizations, what is the best option to reduce the injury risk? Create a small team of staff and/or volunteers to select the best option. Consider the following:

- Try to engage outside expertise to select options.
- If you are reviewing relevant scientific literature, be critical.
- Make sure the decision makers in your organization have an understanding of the evidence (facts) behind the decision.

Step Three: Does it Work?

After choosing an intervention, you need to see if it works. Develop a measurement process to accompany the intervention option, so your organization can monitor and evaluate the impacts of the intervention. This includes any impact it has on the known injury and related injury risks, as well as injury risks that were perhaps not previously considered.

Consider the following:

- How do you know for sure that the intervention was successful in reducing the injury risk?
- Did it have any unexpected impacts on other injury risks?

Review Regularly

Your monitoring and evaluation plan ensures your organization has a process to reconsider changes based on evidence gathered. Few organizations stay the same. Sooner or later, there will be new equipment, rules, policies and procedures that could lead to new injury risks. It makes sense therefore to review what the organization is doing on an ongoing basis. At minimum, there must be an annual review. Look at your organization's activities and think about whether there have been any changes.

- Are improvements still needed?
- Have stakeholders spotted a problem?
- Has the organization learned anything from injuries or near misses?

Make sure your risk assessment stays up-to-date using the Physical Activity Injury Reduction (PAIR) Tool.

- **When you are a staff member or volunteer in charge of youth activities, it's easy to forget to review your risk assessment until something has gone wrong and it's too late.**
- **Whenever there is a significant change in policy, programming or equipment, don't wait.**
- **Check your risk assessment and change it where necessary.**
- **If possible, it is best to consider the injury risks when you're planning your change, so you have more flexibility and can plan for monitoring.**

Part 3

Moving Forward

This introductory guide provides basic concepts of injury risk reduction for sport, recreation and physical activity organizations. It is intended to be a primer for a much larger experience in which organizations and individuals begin to shift collective thinking about injury in sport and physical activity from "accidental" to preventable.

Central to this conceptual shift is building an evidence base of injury data and evaluated injury reduction strategies. This will require consistent, reliable injury data collection and extensive research to evaluate current practices to understand their impact on injury risk.

As new policies, programs, equipment and laws emerge, your organization will need to monitor their efforts to ensure safety is not compromised. Safety is a best practice and injury risk reduction is a self-priming process. It never suggests the goal has been accomplished but rather inspires continuous improvement. This work, when shared with the community, will help contribute to a collective understanding that safety is a commonplace and predictable day-to-day practice at every level within sport, recreation and physical activity programming.

APPENDIX 1

INJURY PREVENTION POLICY

This is the statement, general policy and arrangements for:	
Overall and final responsibility for injury risk reduction is that of:	
Day-to-day responsibility for ensuring this policy is put into practice is delegated to:	

Statement of General Policy	Responsibility of (Name / Position)	Action / Arrangements
To reduce the incidence and severity of injuries and provide adequate control of injury risks arising from participation in our sanctioned activities.		
To provide adequate training and ensure volunteers are competent to identify and report injury risks.		
To collect and analyze injury data and produce helpful reports back to members.		
To engage and consult regularly with member organizations, leaders and other stakeholders on day-to-day safety concerns.		
To maintain safe and healthy playing conditions.		

APPENDIX 2

RISK ASSESSMENT

Organization name:	

What are the injury risks?	Who might be harmed and how?	What are you doing already to minimize the injury risk?	What can be done in addition to minimize the injury risk?	Action by whom?	Action by when?	Done
		Education Engineering Enforcement	Education Engineering Enforcement			
		Education Engineering Enforcement	Education Engineering Enforcement			
		Education Engineering Enforcement	Education Engineering Enforcement			

Organizations with 100 or more participants must complete this assessment and provide it to their regional, provincial or national designate. It is important to gather information for this form from various sources such as parents, coaches, leaders, participants, officials and other volunteers and staff.

APPENDIX 3

HADDON MATRIX: REDUCE INJURY RISK IN SPORT AND PHYSICAL ACTIVITY

Phases	Human	Vehicle/Equipment	Physical Environment	Socio-economic Environment
Pre-Injury Phase				
Injury Phase				
Post-Injury Phase				

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Resources

For additional reading and resources, please visit the Canadian Sport for Life website:

http://canadiansportforlife.ca/active-and-safe-physical-literacy-and-injury-prevention

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