



HOUSE OF COMMONS  
CHAMBRE DES COMMUNES  
CANADA

# **TACKLING THE PROBLEM HEAD-ON: SPORTS-RELATED CONCUSSIONS IN CANADA**

**Report of the Standing Committee on Health**  
Bill Casey, Chair

**Subcommittee on Sports-Related Concussions  
in Canada**  
Peter Fonseca, Chair



**JUNE 2019**  
**42<sup>nd</sup> PARLIAMENT, 1<sup>st</sup> SESSION**

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### **Reports from committee presented to the House of Commons**

Presenting a report to the House is the way a committee makes public its findings and recommendations on a particular topic. Substantive reports on a subject-matter study usually contain a synopsis of the testimony heard, the recommendations made by the committee, as well as the reasons for those recommendations.

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# **THE STANDING COMMITTEE ON HEALTH**

has the honour to present its

## **TWENTY-FOURTH REPORT**

Pursuant to its mandate under Standing Order 108(2), the Subcommittee has studied sports-related concussions in Canada and has agreed to report the following:



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## SUMMARY

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Concussions are a type of traumatic brain injury that can occur from a direct impact to the head or indirectly from an impact to the body that causes a jarring of the head. Such impacts can cause the brain to move and hit within the skull. The injury to the brain because of its collision with the skull can produce a range of symptoms including headache, nausea, confusion, memory loss, vision problems, irritability and depression. While a concussion can involve unconsciousness, not all do. Under proper supervision, most people recover within a few weeks. However, about 20% of people will suffer persistent concussion symptoms and require specialized care.

While concussions can happen to anyone at any time due to a fall or other accident, the risk of concussion is higher during sports. The risk is highest during high impact sports.

On 4 October 2018, the House of Commons Standing Committee on Health voted to establish the Subcommittee on Sports-related Concussions in Canada to study the issue of concussion in sport. The Subcommittee held 13 meetings between 31 October 2018 and 15 May 2019, heard from 42 witnesses and accepted 17 written submissions. Testimony provided the perspectives of athletes and their families, sports organizations, health care providers, researchers, injury prevention specialists and government.

The Subcommittee heard about efforts to increase awareness and training across Canada. It heard about the implementation of concussion protocols by many sports organizations. And, it heard of leading edge research occurring in universities across the country. However, the Subcommittee also heard that there is no definitive medical test to diagnose concussion and that, if not properly managed, a concussion can produce severe long-term consequences including both physical and mental health problems. Further, witnesses said that access to concussion care is inconsistent across Canada.

The Subcommittee learned that the federal government has supported several ongoing efforts to increase awareness and to develop, promote and disseminate best practices related to concussion in sport. The injury prevention organization Parachute and the Federal-Provincial/Territorial Working Group on Concussion in Sport have been central in these efforts. The Subcommittee applauds the efforts of all stakeholders and makes 13 recommendations that focus on:

- legislation to establish a Concussion Awareness Week;
- continued support for the Federal-Provincial/Territorial Working Group on Concussion in Sport and organizations working on the issue;
- creating a Concussion Research Expert Advisory Board and increasing funding for concussion research; and
- enhancing collaboration with the provinces and territories to ensure a pan-Canadian approach to sports-related concussion.

# LIST OF RECOMMENDATIONS

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*As a result of their deliberations committees may make recommendations which they include in their reports for the consideration of the House of Commons or the Government. Recommendations related to this study are listed below.*

## **Recommendation 1**

**That the Government of Canada work with the provinces and territories to establish Concussion Awareness Week to coincide with Rowan’s Law Day in Ontario in September. The purpose of Concussion Awareness Week will include, but not be limited to:**

- **Age-appropriate education and awareness programs in primary and secondary schools;**
- **Awareness campaigns for the general public;**
- **Promotion of certification and training programs for health professionals; and**
- **Update and review concussion protocols and relevant training for sports organizations. .... 57**

## **Recommendation 2**

**That the Government of Canada provide sufficient funding to organizations to carry out concussion-related activities during Concussion Awareness Week. .... 57**

## **Recommendation 3**

**That the Government of Canada provide sufficient funding to organizations for further development, promotion and implementation of concussion tools and resources. .... 57**

## **Recommendation 4**

**That the Government of Canada make federal funding for each national sports organization contingent on developing and implementing current sport-specific concussion policies and protocols. .... 57**

**Recommendation 5**

**That the Government of Canada establish a Concussion Research Expert Advisory Board, comprised of concussion researchers and experts from across Canada, with a mandate to conduct an inventory of ongoing concussion research, to identify gaps in concussion knowledge and to design a framework for concussion research..... 57**

**Recommendation 6**

**That the Government of Canada ensure that the Canadian Institutes of Health Research is an active participant in, and allocates funding to, research protocols that fall within the framework for concussion research. .... 57**

**Recommendation 7**

**That the Minister of Health emphasize to the provincial and territorial ministers responsible for health the issue of concussion care and the potential concerns regarding:**

- **Education, training and certification of regulated health care professionals;**
- **Access to interdisciplinary health care teams for persistent symptoms; and,**
- **Scope of practice of allied health care providers. .... 58**

**Recommendation 8**

**That the Minister of Health meet with representatives of the Canadian Concussion Collaborative to urge its members to develop and implement programs for continuing education pertaining to concussion care..... 58**

**Recommendation 9**

**That the Minister of Health direct the Public Health Agency of Canada, in its capacity as a member of the Pan-Canadian Joint Consortium for School Health, to urge the dissemination and implementation of concussion protocols in all school-based sports..... 58**

**Recommendation 10**

**That the minister responsible for sport continue to meet with the provincial and territorial ministers responsible for sport, physical activity and recreation to encourage and monitor the implementation of concussion policies across Canada. .... 58**

**Recommendation 11**

**That the Minister of Health and the minister responsible for sport continue to support the work of the Federal-Provincial/Territorial Working Group on Concussion in Sport and, to the extent possible, make their work and recommendations publicly available..... 58**

**Recommendation 12**

**That the Government of Canada, along with the provinces and territories, establish a common data collection system or process on concussions in sport, including leveraging any systems already in place, to ensure sharing of data in order to communicate concussion histories of individuals..... 58**

**Recommendations 13**

**That the Government of Canada work with the sport community to ensure a cultural shift on safety in sport, especially by focusing on prevention of concussions through rules of the game; training methods; and behaviours of participants, coaches, officials, administrators, medical support personnel and parents. .... 58**





# TACKLING THE PROBLEM HEAD-ON: SPORTS-RELATED CONCUSSIONS IN CANADA

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## INTRODUCTION

On 4 October 2018, the House of Commons Standing Committee on Health (Health Committee) adopted a motion to establish a Subcommittee on sport-related concussions in Canada (the Subcommittee) to undertake a study on the issue and to report back to the Health Committee in late spring 2019.<sup>1</sup>

This report represents the work of the Subcommittee between 31 October 2018 and 15 May 2019. Over the course of 11 meetings, it heard from 42 witnesses. The Subcommittee heard from athletes and their family members, sports organizations, health care professionals, researchers, injury prevention experts and other advocates. Written submissions were also received from 17 individuals and organizations.

This report provides the context for this study, offers a brief description of concussion, discusses the experiences of some amateur and professional athletes who have sustained concussions and describes some of the work done to date, internationally and in Canada in terms of developing and implementing best practices. The report goes on to summarize the roles and ongoing work of various stakeholders such as sports organizations, health care providers and researchers. Finally, this report provides the Subcommittee's observations and recommendations for addressing the issue of sports-related concussions in Canada.

## CONTEXT

The Subcommittee's first witness in this study was The Honourable Ken Dryden who discussed the role that sports organizations have played in sports-related concussions. Injuries in sports, including concussions, are not new. Sport safety equipment has been designed and has been improved over the years to reduce the number and severity of injuries. Helmets and mouthguards are promoted as a defence in many sports against traumatic brain injury (TBI), including concussion. Unfortunately, safety equipment may also be responsible for increasing the rate of concussion in many sports. Mr. Dryden explained that players are less cautious about injury when they feel protected by their

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1 House of Commons Standing Committee on Health (HESA), *Minutes of Proceedings*, 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 4 October 2018.



equipment. He noted in particular that layers of protective padding have allowed players to play more aggressively with the result that hockey has become faster and the hits have become harder. Another factor in hockey that has allowed players to be more aggressive is shorter shifts on the ice. He noted that players no longer conserve their energy for long shifts, but instead skate and check (hit) more aggressively than in the early days of the game.

Mr. Dryden told the Subcommittee that in hockey, as well as in most competitive sports, there is a pervasive culture of being “tough,” and of playing through injuries, and an environment where athletes are made to feel weak if they complain of an injury. Sports-related concussion is an especially difficult injury in this context. Unlike broken bones, dislocated joints, torn ligaments and black eyes, a concussion can be invisible both to the athlete as well as to sports officials and even to an untrained health care professional. There is no single medical test to conclusively diagnose concussion. A concussed athlete may show no outward sign of injury. A headache alone can be sufficient indication of a concussion. And a headache can also easily be dismissed as minor or inconsequential.

Mr. Dryden reminded the Subcommittee that we now know that, if ignored, a mild concussion can become worse. We also now know that suffering a second concussion before recovering from an earlier one can prove fatal. This situation is known as second impact syndrome.

Fortunately, concussion awareness has improved significantly over the last 20 years or so. One of the earliest guidelines in Canada for sports-related concussions was issued in 2000 by the Canadian Academy of Sport and Exercise Medicine. In fact, the Subcommittee was told by Mr. Dryden that awareness is not the issue – action is the issue. He stressed that sport culture that discourages taking action when an athlete is suspected of having a concussion must change.<sup>2</sup>

It was in this context that the Subcommittee undertook to study sports-related concussions in Canada to examine how to better prevent them and improve identification, treatment and outcomes of concussions.

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2 House of Commons, Subcommittee on Sports-related Concussions in Canada of the Standing Committee on Health (SCSC), *Evidence*, 1<sup>st</sup> Session, 42<sup>nd</sup> Parliament, 21 November 2018 (Hon. Ken Dryden, as an Individual).

## **A PRIMER ON CONCUSSIONS – WHAT ARE THEY AND WHAT IS THE CONCERN?<sup>3</sup>**

A concussion is a traumatic brain injury (TBI), and brain injuries result in neurological problems. Simply put, concussion is an injury to the brain that has been caused by a trauma that involves an impact to, or a jarring of, the head. Severity of the concussion is linked to the force of the trauma.

There is no medical test that can diagnose concussion. To date, imaging of the brain using X-ray, CT (computed tomography) or MRI (magnetic resonance imaging) technology is not effective and there is no identified biological marker in the blood or other fluid that indicates concussion. Diagnosis of concussion by a licensed health care professional is based on a description of the trauma that resulted in the suspected concussion and identification of the symptoms and visible signs of concussion.

When a concussion occurs, neurological function is usually impaired immediately or soon after the direct or indirect trauma to the brain. Occasionally, symptom onset can be delayed by hours. There is a broad range of symptoms associated with concussion and they can be categorized in a number of ways. With this in mind, common symptoms of concussion include any combination of:

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3 This overview of concussions is based on: Parachute, [“Canadian Guideline on Concussion in Sport,”](#) July 2017 and Paul McCrory et al., [“Consensus statement on concussion in sport – the 5<sup>th</sup> international conference on concussion in sport held in Berlin, October 2016,”](#) *British Journal of Sports Medicine*, Vol. 51, No. 11, 2018.



**Figure 1**

### **Physical symptoms**

- Headache
- Dizziness
- Nausea
- Balance problems
- Being tired, little energy
- Vision problems
- Sensitivity to light or sound

### **Cognitive symptoms**

- Not thinking clearly
- Difficulty reading or working on computers
- Difficulty learning

### **Emotional symptoms**

- Irritable
- Sad
- Anxious
- Sleep disturbances

### **Common visible signs of concussion**

- Slow to move or get up following impact
- Loss of consciousness
- Confusion or disorientation
- Difficulty responding to simple questions
- Difficulty walking
- Empty or blank stare
- Visible facial or head injury
- Grasping the head

There is no pharmacological treatment for concussion. Recovery from concussion involves initial rest for 1 or 2 days. Once symptoms have disappeared, patients resume activities gradually and progressively and, as long as symptoms don't reappear, most people recover within one to four weeks (up to two weeks for adults, up to four weeks for children). However, as many as 20% of people with concussions will exhibit persistent symptoms beyond that timeframe. Management of patients with persistent symptoms should be personalized based on individual symptoms and involve a range of licensed health care professionals including occupational therapists, sports therapists, physiotherapists, chiropractors and psychologists.

Concussions can happen to anyone, anywhere and at any time as a result of accidents and falls. Many concussions occur during recreational and organized sports, and among those concussions, contact sports and sports involving high speeds are responsible for the vast majority. This report focusses on sports-related concussions in Canada.

## **THE CONSEQUENCES OF CONCUSSION – STORIES FROM ATHLETES**

The Subcommittee heard from five young athletes who had experienced concussions while playing sports. Each athlete described the events that led up to their concussions and the consequences of the concussions, which are included below. Some of the athletes also shared their insights into systemic problems related to concussions in sport and made recommendations on how to better prevent or treat concussions in sport. These observations are included in later sections of this report. The Subcommittee's members were moved by the stories that these athletes and their families shared, and appreciated their desire to contribute to this study and help reduce the risks and challenges that other young athletes may face while playing the sports that they love.

### **Youth athletes**

#### **Matthew Chiarotto**

Matthew began playing hockey when he was five years old in non-contact leagues in Toronto. In October 2015, he was hit from behind during a game and suffered a concussion. His mother Kathy Leeder said that other parents, in an attempt to be helpful, offered potentially misleading advice on how to address the situation. Matthew spent six weeks not playing hockey before returning to the game. In January 2017, a player collided with Matthew in the final moments of "a dangerous game that should



have been stopped.”<sup>4</sup> He and his family recognized his symptoms as signs of a concussion. He was also unable to read, seeing written words as squiggles and dots. These symptoms lasted four weeks. After his second concussion, Matthew decided to stop playing hockey for the sake of his health.

After his first concussion, Matthew interviewed young players, coaches and professional athletes as part of a promotional campaign for a new concussion protocol for the Greater Toronto Hockey League and Holland Bloorview Kids Rehabilitation Hospital.<sup>5</sup>

### Carly Hodgins

Carly is a Grade 12 student who played for her high school’s basketball team. In Grade 10, while competing for a loose ball with an opposing player during a game, she fell to the floor and hit her head. Her coach had experience with concussions and knew that Carly had to be removed from the game and Carly was sent to hospital. Her mother, Sharra Hodgins, described Carly as being unable to walk or focus properly. She was advised by doctors to take two weeks off from school. After two weeks, her doctor referred her to a physiotherapist, who suggested that Carly could return to playing basketball. Carly, however, still did not feel well. After trying a number of other strategies to deal with the results of the concussion, she returned to school seven months later.

Following her concussion, Carly also experienced mental health issues, such as depression and anxiety. These issues continue to affect her. Sharra described feeling frustrated by the lack of understanding from some teachers, who did not fully appreciate the process of recovery from a concussion or the resulting mental health effects. When Carly did return to school, her school was accommodating and continues to make sure that she receives support as needed. Carly is scheduled to graduate this year from high school.<sup>6</sup>

### Ash Kolstad

Ash is a university student who sustained two concussions while playing hockey when he was 12 years old. Bodychecking was legal at his age level at the time. He described wanting to continue playing after he sustained a concussion but found that he physically

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4 SCSC, [Evidence](#), 28 November 2018, 1750 (Mr. Matthew Chiarotto, as an Individual).

5 SCSC, [Evidence](#), 28 November 2018 (Mr. Matthew Chiarotto and Ms. Kathy Leeder, as Individuals).

6 SCSC, [Evidence](#), 21 November 2018 (Ms. Carly Hodgins and Ms. Sharra Hodgins, as Individuals).

was not able to complete another shift. He followed the existing return-to-play protocol and quickly rejoined his team. Three weeks after he had returned to playing, he was checked from behind and sustained another concussion. Ash described having symptoms that included being sensitive to sound and light, severe dizziness, and difficulty balancing. Headaches and difficulty concentrating resulted in him missing a year of school. He also described having his symptoms met with skepticism and negativity from former teammates, their parents and coaches. He continues to experience anxiety, depression and “a throbbing headache that hasn’t stopped for the past nine years.”<sup>7</sup>

### Rachel Lord

During high school, Rachel played community-organized soccer and trained with a high-performance soccer academy. When she was 16 years old, she headed a goalie kick at close range during a practice and fell to the ground. She did not lose consciousness and her coach told her to continue playing. For the next week, she continued to attend school and near-daily soccer practices despite experiencing dizziness, headaches and vomiting. Rachel described being told by her family doctor and emergency room doctors to either rest and take pain medication or to simply return to school and sports. She continued to have trouble having conversations and reading, and spent most of the following weeks in bed. A teammate’s family eventually suggested that Rachel see a sports physician, who diagnosed her with a concussion and whiplash.

Rachel attended a concussion clinic regularly for about six months. Over this time, her symptoms improved, but she described feeling frustrated with the slow and uneven rate of recovery. Her father, Chris Lord, said he found navigating the information on how to best support Rachel during her recovery to be a challenge. She currently attends university and continues to require accommodations, such as receiving exams in large font text and doing testing in quiet private rooms in which she can control the brightness of the lights. She wonders if her symptoms would be as severe or long-lasting if she had been prevented from playing immediately after her concussion happened.<sup>8</sup>

### Carter Phair

Carter was a hockey goaltender who played in Junior A and Major Junior leagues in western Canada. His mother, Anne Phair, stated that Carter has been diagnosed with a concussion

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7 SCSC, *Evidence*, 28 November 2018, 1800 (Mr. Ash Kolstad, as an Individual).

8 SCSC, *Evidence*, 21 November 2018 (Ms. Rachel Lord and Mr. Chris Lord, as Individuals).



at least six times. The severity of symptoms varied greatly among the concussions. She also wonders about the number of concussions he has had that have not been diagnosed. Carter's first and second diagnosed concussions occurred after a puck hit his mask during a game. Anne expressed concern about the appropriateness of the masks he wore, as they either did not fit properly, or otherwise offered inadequate protection.

Carter and his mother attributed his most recent concussions to opposing players illegally hitting him with an intent to injure: "When Carter was cleared to play again, the word was out: hit him in the head and he'll miss a couple of weeks."<sup>9</sup> After one concussion, Carter was unable to exercise for four months and required new glasses to read as a result of changes to his vision. Along with persistent headaches, he also had trouble concentrating and sleeping, which meant he was unable to pursue his other interests and hobbies. His subsequent season ended when a player kned him in the head.<sup>10</sup>

In addition to the physical symptoms and events experienced by the young athletes, all of them described the challenges related to their social lives caused by their concussions. Being unable to participate in a wide number of activities while recovering from concussion meant that many felt cut off from their friends both inside and outside school. Moreover, each athlete's team and sport community represented a significant part of their social circle. When each athlete decided to stop playing their sport, or to change to a less intensive version of it, they described losing a connection to a community to which they had belonged for much of their life. Sharra Hodgins said that after leaving a sport because of a concussion, "You have to recreate your whole identity when you're no longer that athlete. That has probably been [Carly's] biggest struggle."<sup>11</sup>

## Professional Athletes

The Subcommittee also heard from former professional athletes who contextualized their advocacy work and their recommendations to the committee in their own experiences with concussion.

Prior to his work with the Concussion Legacy Foundation, Dr. Chris Nowinski was a university football player and WWE wrestler. He described being kicked in the head during a WWE match which resulted in him losing consciousness. He developed a sleep disorder and continues to have regular headaches and cannot exercise without

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9 SCSC, *Evidence*, 28 November 2018, 1735 (Ms. Anne Phair, an an Individual).

10 SCSC, *Evidence*, 28 November 2018, (Mr. Carter Phair and Ms. Anne Phair, as Individuals).

11 SCSC, *Evidence*, 21 November 2018, 1950 (Ms. Sharra Hodgins, as an Individual).

experiencing nausea. He reported having no diagnosed concussions, but when a doctor later asked him the number of times he had experienced the symptoms of concussion after a hit to the head, he said, “I started laughing, because it happened so often I just never called it a concussion and never told anybody about it. I have vivid memories of the sky going from blue to orange in football games, but it wouldn't last so long that I would have to actually pull myself out.”<sup>12</sup>

Eric Lindros, a former National Hockey League (NHL) player, identified several instances in which he had received a hit to the head during his time as an NHL player. He described regaining consciousness after one hit in a dressing room and believing he played for a different team. He told the subcommittee that his concussions meant that he didn't think or play as quickly as he once did, which in turn caused anger and depression.<sup>13</sup>

## **A GROWING AWARENESS OF CONCUSSION – CURRENT STATE OF BEST PRACTICES**

### **A. International Consensus Statement on Concussion in Sport**

Since 2001, several international sports organizations have convened five international conferences on the issue of concussion in sport that have resulted in consensus statements on how to respond to sports-related concussion. Most recently, the 5<sup>th</sup> International Conference on Concussion in Sport was held in Berlin, Germany in October 2016 and was attended by multiple participants with expertise in concussion from countries around the world. The conference led to the 5<sup>th</sup> Consensus Statement on Concussion in Sport published in March 2017 – the Berlin Consensus Statement.<sup>14</sup>

The Berlin Consensus Statement is the result of systematic reviews of the latest published evidence and represents the state of knowledge related to concussion in sport. The authors acknowledge the need for ongoing revision of the consensus statement as new knowledge develops and the next consensus conference is expected by late 2020. The document provides guidance on concussion recognition, when to remove an athlete from play, the need for further medical assessment, concussion management with rest and rehabilitation, how to assess recovery, special considerations for children and youth athletes, and concussion risk reduction.

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12 SCSC, *Evidence*, 6 February 2019, 1850 (Dr. Chris Nowinski, Chief Executive Officer, Concussion Legacy Foundation).

13 SCSC, *Evidence*, 6 February 2019, 1810 (Eric Lindros) and 1840 (Mr. Eric Lindros, as an Individual).

14 McCrory et al. (2017)



## B. *Canadian Guideline on Concussion in Sport*

Parachute is a Canadian non-governmental organization launched in 2012 whose mission is to prevent serious injuries. Through Parachute’s Concussion Expert Advisory Committee, the organization develops and promotes a variety of evidence-based documents and tools with a view to reduce the number, severity and repercussions from sports and non-sports-related concussions in Canada. Membership of Parachute’s Concussion Expert Advisory Committee includes some members of the international Concussion in Sport Group as well as contributors to the Federal-Provincial/Territorial Working Group on Concussion in Sport, which was established in 2015 by the Public Health Agency of Canada (PHAC) and the Department of Canadian Heritage’s Sport Canada.

In July 2017, and with funding from PHAC, Parachute issued the *Canadian Guideline on Concussion in Sport* (the Concussion Guideline),<sup>15</sup> based upon the Berlin Consensus Statement. The purpose of the Concussion Guideline is to provide all stakeholders

“ [The Concussion Guideline] should be in the hands of every family, every coach, every referee.”

Dr. Charles Tator

involved in school and non-school based sports activity with evidence-based information regarding the appropriate attention, care and management for all athletes who have a suspected concussion before they can safely return to their sport. Dr. Charles Tator of the Canadian Concussion Centre told the Subcommittee that he believes “[the Concussion Guideline] should be in the hands of every family, every coach, every referee.”<sup>16</sup>

The Concussion Guideline provides seven recommendations with respect to a protocol to follow for the prevention, recognition and management of sports-related concussion. As well, it provides the tools necessary to implement the recommendations. An overview of the Concussion Guideline is provided below.

15 Parachute, *Canadian Guideline on Concussion in Sport*, July 2017.

16 SCSC, *Evidence*, 20 February 2019, 1925 (Dr. Charles Tator, Director, Canadian Concussion Centre, University Health Network, Toronto Western Hospital).

## 1. Education before the Season Starts

The Concussion Guideline emphasizes the need to increase awareness and educate all stakeholders on the issue of concussion in sport. Stakeholders include athletes, parents/guardians, teachers, coaches, officials, trainers and licensed healthcare professionals. With the help of the *Pre-Season Concussion Education Sheet*, the Concussion Guideline recommends that stakeholders be made aware of what a concussion is, how it is caused and what signs and symptoms can be expected.

In addition, stakeholders should be instructed on the actions to be taken when a concussion is suspected and what the expectations are for recovery, including returning to school and to sport. Stakeholders should be made aware of all policies and protocols that are specific to their sport. The Concussion Guideline recommends that all stakeholders undertake this education regularly, prior to the beginning of every sport season.

## 2. Recognition of Head Injury

It is not uncommon for a sports venue to be without access to a licensed healthcare professional. As such, the Concussion Guideline provides a tool, called the *Concussion Recognition Tool – 5<sup>th</sup> Edition* (CRT5), to assist all stakeholders in identifying potential head injuries when an athlete exhibits visual signs of a head injury or who complain of concussion symptoms after having sustained an impact to the head, face, neck or body.

First, the CRT5 serves to help identify serious head and spine injuries that are considered *Red Flags* for which an ambulance should be called to transfer the athlete to hospital for an Emergency Medical Assessment. Next, the CRT5 lists the observable signs and symptoms of a concussion and suggests a simple memory assessment to conduct on the athlete who has a suspected concussion. Finally, the CRT5 states that an athlete with a suspected concussion should not be left alone, or allowed to leave the area on their own, consume alcohol or drugs, or drive. Rather, the athlete should be removed from play and be required to submit to a medical assessment prior to returning.

## 3. Onsite Medical Assessment

The type of onsite assessment that should be performed depends on the results of the application of the Concussion Recognition Tool described in step 2 above and whether there are licensed healthcare professionals on site.



## Emergency Medical Assessment

Emergency medical services should be called when an athlete loses consciousness and when a more severe head and neck injury is suspected. Equipment should not be removed from the athlete and the injured player must not be left alone or moved until an ambulance has arrived and paramedics can perform their assessment.

## Sideline Medical Assessment

An athlete with a suspected concussion should be removed from play and taken to a quiet area. Where there is a licensed healthcare professional on site, a medical assessment should be carried out using the *Sport Concussion Assessment Tool 5<sup>th</sup> Edition* (SCAT5) for athletes 13 years of age and older or the Child SCAT5 for athletes 12 years old and under. Any youth athlete suspected of having a concussion must not return to the sport. Rather, the youth athlete should be referred for a medical assessment. If a youth athlete is no longer suspected of having a concussion, he or she may return to the sport but should be monitored in case concussion symptoms start to appear.

In the case of an adult athlete who is affiliated with a national team and who has a suspected concussion, a certified medical professional assigned to the team may determine from the SCAT5 that no concussion has been sustained. In that case, and following discussions with coaching staff, the athlete may return to the sport and be monitored for concussion symptoms. The athlete should be removed from the sport if symptoms develop and referred for additional medical assessment.

In the case that no licensed healthcare professional is available, the athlete should be referred for medical assessment and must obtain medical clearance before returning to the sport.

## 4. Medical Assessment

An athlete suspected of having a concussion should undergo a comprehensive medical assessment by a licensed healthcare professional. The assessment can rule out more serious injuries and conditions and provide a diagnosis of concussion based on clinical history, physical examination and diagnostic testing that may be indicated, such as Computed Tomography (CT) imaging. In Canada, the healthcare professionals trained to diagnose concussion are nurse practitioners and medical doctors who specialize in pediatrics, family medicine, sports medicine, emergency medicine, internal medicine, rehabilitation, neurology and neurosurgery. In rural and remote areas of Canada where there is limited or no access to physicians or nurse practitioners, another licensed

healthcare professional, such as a nurse, can perform this role, in communication with a nurse practitioner or physician.

An athlete who has undergone a medical assessment should be issued a *Medical Assessment Letter* that will state that the athlete has, or has not, been diagnosed with a concussion. Where no concussion has been diagnosed, the athlete can return to all activities without restriction. Where a concussion has been diagnosed, concussion management steps should be followed. Complete rest for 24-48 hours following injury is recommended to allow symptoms to subside before the individual progresses to return-to-school and return-to-sport strategies.

## 5. Management of Concussion

An athlete who has been diagnosed with a concussion will be advised, directly as well as in a *Medical Assessment Letter*, that he or she cannot return to any activities that pose a risk of further concussion until all symptoms have resolved and clearance has been received from a medical doctor or nurse practitioner. It is the responsibility of the athlete or their caregiver to provide the *Medical Assessment Letter* to school, employment and sporting officials who need to be informed of their absence or who are responsible for reporting and monitoring concussion.

Management of the concussion proceeds through stepwise integration of school or work activities and return to sport, in the strategies described below.

### Return-to-School Strategy

A student athlete should follow a four-stage return-to-school process. The rate at which a student progresses through the steps will depend on the severity of symptoms. A student should return to the previous step of the process if symptoms worsen or if new symptoms appear. The four stages are:

1. Remain at home, rest and undertake activities such as reading and texting, in short five- to 15-minute intervals and slowly increase the duration of the activities.
2. Remain at home and begin some school activities such as homework and other cognitive activities.
3. Attend school part-time with a gradual increase in the amount of schoolwork.
4. Return to full-time school gradually.



## **Sport Specific Return-to-Sport Strategy**

Once a student athlete has begun to gradually re-introduce school activities, and after a minimum of 24-48 hours of rest, he or she can follow a Return-to-Sport Strategy that is tailored for their specific sport. Any worsening of symptoms or appearance of new symptoms requires returning to the previous stage. A student athlete should return to full-time school activities before proceeding to the last two stages of the Sport Specific Return-to-Sport Strategy. Currently, the six stages of this strategy are:

1. Return gradually to school/work with activities that do not provoke symptoms.
2. Participate in light aerobic exercise such as walking or cycling to increase heart rate.
3. Engage in moderate sport-specific aerobic exercise such as running, which adds more movement but does not increase the risk of head impact.
4. Introduce non-contact training drills and resistance exercises.
5. Participate in full contact practices, once given medical clearance.
6. Return to regular game participation.

## **6. Multidisciplinary Care for Persistent Symptoms**

Some athletes will experience persistent concussion symptoms, which are symptoms that last longer than four weeks in youth or two weeks in adults. The Concussion Guideline recommends that an athlete with persistent symptoms should be referred to a multidisciplinary concussion clinic for continued care and management tailored to the athlete's specific symptoms and needs. These clinics provide expertise in a variety of disciplines including sports medicine, neuropsychology, physiotherapy, occupational therapy, neurology, neurosurgery and rehabilitation medicine. Referral to a physician with specific training and experience in concussion management may be suitable where there is no multidisciplinary concussion clinic available.

## **7. Return to Sport**

An athlete who has undergone a medical assessment and been determined not to have sustained a concussion and an athlete with a concussion who has successfully completed

the return-to-school/work and sport strategies, can reintegrate into full sport activities, including full contact sports. An athlete who has fully recovered from a concussion requires a *Medical Clearance Letter* from a medical doctor or nurse practitioner responsible for evaluating the athlete's recovery. In rural and remote areas, a nurse may undertake this responsibility. An athlete must be removed from the sport if he or she experiences any concussion-like symptoms and undergo a follow-up medical assessment. If an athlete sustains another concussion, the entire Concussion Guideline should be reimplemented.

Parachute's concussion guideline is publicly available and is actively promoted by Parachute to all stakeholders. The Subcommittee was told that it has been adopted by over 40 national sports organizations as well as some provincial organizations and schools.<sup>17</sup>

### ***C. Sport-Related Concussion Guidelines for Canadian National and National Development High-Performance Athletes***

In 2018, the Canadian Olympic and Paralympic Sport Institute Network (COPSI Network) issued concussion guidelines for high performance athletes. The COPSI Network guidelines, entitled *Sport-related Concussion Guidelines for Canadian National and National Development High-Performance Athletes*, stipulate that all high-risk Olympic winter and summer National Sports Organizations must have a concussion policy and protocol in place and further recommends that lower risk sports do likewise. The guidelines recommend: a range of pre-season baseline clinical assessments; recognition and removal of an athlete from the sport for a suspected concussion; assessment and management of concussion, including return-to-play protocols and identification of persistent symptoms. As well, the guidelines recommend that a COPSI Network team-certified athletic therapist, physiotherapist, chiropractor or physician be onsite during all practices, training sessions and competitions. Finally, the document notes that the policies and protocols developed by sports organizations will have to be sport-specific.<sup>18</sup>

## **INJURIES ON THE FIELD – THE ROLE OF SPORTS ORGANIZATIONS**

Concussions can happen to anyone under all sorts of circumstances, not just in sports. But the risk of concussion is higher during sporting activities than everyday routine activities. And the risk is higher for some sports than it is for others. Sport increases the risk of many types of injuries, but most people would agree that the benefits of sport

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17 SCSC, *Evidence*, 30 January 2019, 1840 (Ms. Pamela Fuselli, Vice-President, Knowledge Transfer and Stakeholder Relations, Parachute).

18 Canadian Olympic and Paralympic Sport Institute Network, "[Sport-related Concussion Guidelines for Canadian National and National Development High-Performance Athletes](#)," 2018.



outweigh its risks. The Subcommittee members believe that it is only prudent, while encouraging Canadians to get out and participate in their sport of choice, to take the steps necessary to mitigate those risks.

Concussion poses a unique challenge when it comes to addressing sports-related injuries. Broken bones, torn ligaments and open wounds are easily identified, treatments are well established, and the healing processes are well defined. Concussion can be an invisible injury in which the symptoms can be ignored or hidden from others. Awareness, however, has been increasing about the seriousness of concussion.

Sports organizations represent the stakeholders at ground zero for sports-related concussions. Witnesses representing these organizations told this Subcommittee that concussion awareness has increased considerably in recent years. For example, while Mr. Paul Hunter of Rugby Canada acknowledged, “We didn’t know what a concussion was 12 years ago”<sup>19</sup> the Subcommittee also heard about the significant amount of work that has been done by sports organizations in recent years, which has brought about substantial change with respect to concussion prevention and management.

## Concussion Protocols

As explained above, Parachute developed the 2017 *Canadian Guideline on Concussion in Sport* (the Concussion Guideline) which is consistent with the international Berlin Consensus Statement. The Concussion Guideline is intended for use by the individuals and groups involved in all school-based and non-school-based sporting activities. In fact, the Subcommittee was told that “[A]lthough there are sports that may have a higher prevalence of concussions, no sport precludes the risk of concussion—there’s not one that does.”<sup>20</sup> In other words, all sports organizations need to implement concussion policies. In this regard, Parachute works to promote the uptake of the Concussion Guideline by sports organizations across Canada.<sup>21</sup> As well, the Subcommittee was made aware of Parachute’s Concussion Protocol Harmonization Project.<sup>22</sup> Parachute describes the project as one in which national sports organizations work with Parachute to develop “evidence-based

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19 SCSC, *Evidence*, 30 January 2019, 1810 (Mr. Paul Hunter, Director, National Rugby Development, Rugby Canada).

20 SCSC, *Evidence*, 30 January, 1740 (Mr. Peter Niedre, Director, Education Partnerships, Coaching Association of Canada).

21 SCSC, *Evidence*, 30 January 2019, 1840, (Ms. Pamela Fuselli, Vice-President, Knowledge Transfer and Stakeholder Relations, Parachute).

22 SCSC, *Evidence*, 26 February 2019, 1845 (Dr. Shannon Bauman, Medical Director, Lead Physician, Concussion North).

concussion protocols that are harmonized with [the] *Canadian Guideline on Concussion in Sport*, yet tailored to meet the specific needs of each sport.”<sup>23</sup>

According to Parachute, over 40 national sports organizations have implemented concussion protocols since 2017 when the Concussion Guideline was published.<sup>24</sup> As discussed below, the Subcommittee heard from representatives of Rugby Canada, Hockey Canada and Canada Soccer who talked about the concussion protocols that have been implemented by those organizations. The Canadian Equestrian Federation has implemented a concussion protocol that includes a rule change that flouts the tradition of getting right back on the horse. It now requires a rider who has fallen to sit out until medical clearance has been issued.<sup>25</sup>

The Subcommittee heard that organizations representing professional and elite athletes have also been active in this regard. Mr Gary Bettman, Commissioner of the National Hockey League (NHL),<sup>26</sup> Mr. Randy Ambrosie, Commissioner of the Canadian Football League (CFL)<sup>27</sup> and Dr. Robert McCormack, the Chief Medical Officer for the Canadian Olympic Committee<sup>28</sup> all revealed that concussion protocols have been implemented by their respective organizations. The Subcommittee learned that the CFL<sup>29</sup> and NHL<sup>30</sup> concussion protocols include the use of spotters during all games. The role of the spotter is to identify players who may have sustained a concussion and should be removed from the game for assessment.

“ [A]lthough there are sports that may have a higher prevalence of concussions, no sport precludes the risk of concussion—there's not one that does.”

Mr. Peter Niedre

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23 Parachute, *Concussion Protocol Harmonization Project*.

24 SCSC, *Evidence*, 30 January 2019, 1840 (Ms. Pamela Fuselli, Vice-President, Knowledge Transfer and Stakeholder Relations, Parachute).

25 SCSC, *Evidence*, 20 February 2019, 1805 (Dr. Elizabeth Hobden, President-elect, Canadian Academy of Sport and Exercise Medicine).

26 SCSC, *Evidence*, 1 May 2019, 1600 (Mr. Gary Bettman, Commissioner, National Hockey League).

27 SCSC, *Evidence*, 3 April 2019, 1700 (Mr. Randy Ambrosie, Commissioner, Canadian Football League).

28 SCSC, *Evidence*, 3 April 2019, 1830 (Dr. Robert McCormack, Chief Medical Officer, Canadian Olympic Committee).

29 Ibid., 1700 (Mr. Randy Ambrosie, Commissioner, Canadian Football League).

30 SCSC, *Evidence*, 1 May 2019, 1600 (Mr. Gary Bettman, Commission, National Hockey League).



The Subcommittee notes the optimism expressed by several witnesses regarding the fast pace at which change regarding concussion prevention and management is occurring in the sporting world. Dr. Kevin Gordon from Canada Soccer stated, “The concussion landscape is changing very rapidly in Canada.... No longer is there the variable patchwork of protocols for some sports at national levels.”<sup>31</sup>

## Awareness and Training

Concussion experts dedicated considerable time and energy into producing Parachute’s concussion guideline. Considerable effort and resources have been expended to promote the Concussion Guideline as well as other tools and resources available from Parachute. In order to ensure a national approach to addressing sports-related concussion however,

“ The concussion landscape is changing very rapidly in Canada.... No longer is there the variable patchwork of protocols for some sports at national levels.”

Dr. Kevin Gordon

there needs to be an assurance that protocols, tools and resources are being applied universally on the ground. The Subcommittee heard from a number of witnesses who spoke about the concussion awareness and training that is being implemented.

The Coaching Association of Canada (CAC) works to raise the skills and stature of coaches across Canada. It provides training, enhances skills, promotes ethics and builds competence through the National Coaching Certification Program. Mr.

Peter Niedre, who directs CAC’s Education Partnerships program, informed the Subcommittee that the CAC developed an e-learning module called “Making Headway in Sport” in 2013 in partnership with Parachute and several concussion experts. It was revised in 2017 following the 2016 International Conference on Concussion in Sport held in Berlin and it is aligned with Parachute’s concussion guideline. As well, CAC works with the national sports organizations to create sport-specific e-modules. The Making Headway program educates coaches on concussion in the areas of prevention, detection and recovery. Mr. Niedre stated that, “Education is the number one tool for enabling behaviour change in our coaches.” He highlighted the success of CAC’s program by revealing that

31 SCSC, *Evidence*, 3 April 2019, 1825 (Dr. Kevin Gordon, Member, Sports Medicine Committee, Canada Soccer).

52,000 coaches had taken the course since 2013, and the number of participants has increased by 87% since 2015.<sup>32</sup>

Mr. Paul Hunter informed the Subcommittee that World Rugby is one of the five groups involved in creating and organizing the International Conferences on Concussion in Sport, the most recent of which produced the Berlin Consensus Statement. Under the leadership of World Rugby and in partnership with Parachute and its harmonization project for sport-specific concussion guidelines and tools, Rugby Canada has implemented rugby-specific concussion guidelines. Members learned that Rugby Canada and its 10 provincial chapters require that all coaches and referees complete two online modules each year: “Rugby Ready” and “Concussion Management for the General Public.” Rugby Ready is a training module that addresses player welfare with respect to the five specific types of contact in rugby, that is, when concussion risk is highest. Concussion Management for the General Public is offered through World Rugby and is for any audience, but it educates coaches and referees on recognizing the signs and symptoms of concussion and on the requirement to remove a player from the game if there is any suspicion of concussion. As well, Rugby Canada promotes a free concussion management app developed by World Rugby. The app provides a description of concussion and includes instructions on concussion recognition, management and return to play. All of these resources are consistent with the Berlin Consensus Statement and the tools and resources available from Parachute.<sup>33</sup>

“Education is the number one tool for enabling behaviour change in our coaches.”

Mr. Peter Niedre

Dr. Mark Aubry, who is Chief Medical Officer with Hockey Canada, informed the Subcommittee that the organization has had a player safety program for many years. It includes an online educational platform for coaches, trainers, parents and administrators called Respect for Sport, which addresses concussion awareness among several other issues. He also indicated that players are routinely offered education and skills development in the interest of player safety.<sup>34</sup>

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32 SCSC, *Evidence*, 30 January 2019, 1740 (Mr. Peter Niedre, Director, Education Partnerships, Coaching Association of Canada).

33 SCSC, *Evidence*, 30 January 2019 (Mr. Paul Hunter, Director, National Rugby Development, Rugby Canada).

34 SCSC, *Evidence*, 26 February 2019, 1850 (Dr. Mark Aubry, Chief Medical Officer, Hockey Canada).



Dr. Gordon of Canada Soccer indicated that the organization adopted its first concussion guideline in 2016 and began to use Parachute’s concussion guideline shortly after it was issued in 2017. He emphasized that the issue of concussion has garnered tremendous attention in recent years and that has brought about a surge in awareness. He noted in particular that concussion awareness among youth has grown significantly and that youth athletes are very sensitive to recognizing the signs and symptoms of concussion.<sup>35</sup>

## Prevention

Sports will always be associated with some level of risk for concussion, however there are steps that can be taken to reduce that risk. Concussion prevention measures are usually sport-specific and must be researched, developed and implemented at the sport level. The Subcommittee heard from several witnesses that, despite the increasing amount and types of concussion research that is being done, many questions remain to be answered. Specifically, effective diagnostic tests and improved treatments are not

“Let’s draw a line in the sand. Let’s fix what we can now. Let’s stop creating this by letting kids get hit on the head, for years, while their brains are developing.”

Dr. Chris Nowinski

available today. Accordingly, Dr. Chris Nowinski from the Concussion Legacy Foundation stressed the importance of implementing prevention strategies. He stated, “Let’s draw a line in the sand. Let’s fix what we can now. Let’s stop creating this by letting kids get hit on the head, for years, while their brains are developing.”<sup>36</sup>

The Subcommittee heard about several evidence-based rule changes that sports organizations have implemented in recent years in order to reduce the number of concussions sustained by athletes. Modifying rules of the game

related to body contact is a primary preventative measure. CFL Commissioner Randy Ambrosie described his organization’s work with Football Canada to implement safer blocking and tackling techniques and to train and certify amateur football coaches to teach the techniques to young football players. Football Canada will be restricting

35 SCSC, *Evidence*, 3 April 2019, 1855 (Dr. Kevin Gordon, Member, Sports Medicine Committee, Canada Soccer).

36 SCSC, *Evidence*, 6 February 2019, 1945 (Dr. Chris Nowinski, Chief Executive Officer, Concussion Legacy Foundation).

12-player tackle football to players older than 12 years of age by 2022.<sup>37</sup> He also listed several changes that have been put into place by the CFL to make the game safer. These changes include:

- eliminating body contact during practices;
- allowing more rest periods between games;
- requiring an injury spotter to monitor all games;
- implementing mandatory education on concussion for all players and posting the signs and symptoms of concussion in CFL locker rooms;
- implementing a new rule that prohibits hitting a quarterback above the shoulders or below the knees; and
- introducing baseline testing (discussed later in this section).

NHL Commissioner Bettman emphasized that the league has implemented Rule 48 (Illegal Check to the Head), which prohibits hits to an opponent's head in which the main point of contact is the head and the hit is avoidable. He stated that the rule has resulted in a demonstrable reduction in concussions resulting from head contact.<sup>38</sup>

Members were told about collaborations between sports organizations and researchers for conducting research aimed at determining the changes that can be implemented in various sports to reduce the risk of concussion. While the outcomes of these collaborations are further described in the section on research, they include a new rule in 2013 by Hockey Canada to prohibit bodychecking by players 12 years of age and younger and a move by Volleyball Canada to eliminate a practice drill that included running under the net which was associated with 15% of the concussions in that sport.

Hockey Canada noted that it changed regulations in 2011 to prohibit all head contact and implemented a range of penalties depending on the circumstances of each hit.<sup>39</sup> Rugby Canada explained that it has also implemented a zero-tolerance rule against all hits to the head and that sanctions become more severe with repetitive breaches of the

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37 SCSC, *Evidence*, 3 April 2019, 1705 (Mr. Randy Ambrosie, Commissioner, Canadian Football League).

38 SCSC, *Evidence*, 1 May 2019, 1610 (Mr. Gary Bettman, Commissioner, National Hockey League).

39 SCSC, *Evidence*, 26 February 2019, 1850 (Dr. Mark Aubry, Chief Medical Officer, Hockey Canada).



rule and can include off-the-field consequences in addition to game-time penalties.<sup>40</sup> Dr. Gordon of Canada Soccer indicated that preventative measures in soccer are in their infancy. He cited two measures that have been taken to date in that game; requirement for anchored, as opposed to free-standing, goalposts as well as a prohibition on over-inflated soccer balls.<sup>41</sup>

All sports stakeholders are supportive of rule changes that aim to reduce the risk of concussion and recognize that more needs to be done in this regard. The Subcommittee notes however that there must be follow-up research to ensure that the changes have had the desired effect of reducing the rate of concussion. Ideally, those rule changes should not inadvertently diminish the allure of the sport and make it less engaging for the athletes. Dr. Nowinski suggested that player skills could be enhanced by restrictions on player contact. He noted that in the United States hits to the head are now prohibited in lacrosse and that “skills, rather than the violence” are now emphasized in that game.<sup>42</sup>

Some witnesses argued that further rule changes are required in some sports. Dr. Nowinski suggested banning all forms of tackling in football for players under 14 years of age out of concern for the cumulative effects of hits to the head, particularly while children’s brains are developing. He argued that from a health perspective, “it’s absurd that we encourage kids to run into each other.”<sup>43</sup>

He also suggested banning headers from soccer for players under 14 years of age, in part because of the risk of players’ heads colliding.<sup>44</sup> Ken Dryden challenged sports organizations, particularly hockey organizations, to consider rule changes that could help

“ This is your job, your responsibility.... You, as sports decision-makers, are not only the custodians of your game, but, first and foremost, you are the custodians of the welfare of those who play your game”

Hon. Ken Dryden

40 SCSC, *Evidence*, 30 January 2019, 1745 (Mr. Paul Hunter, Director, National Rugby Development, Rugby Canada).

41 SCSC, *Evidence*, 3 April 2019, 1825 (Dr. Kevin Gordon, Member, Sports Medicine Committee, Canada Soccer).

42 SCSC, *Evidence*, 6 February 2019, 1940 (Dr. Chris Nowinski, Chief Executive Officer, Concussion Legacy Foundation).

43 *Ibid.*, 1925.

44 *Ibid.*, 1915.

to prevent concussions. He said, “This is your job, your responsibility.... You, as sports decision-makers, are not only the custodians of your game, but, first and foremost, you are the custodians of the welfare of those who play your game.”<sup>45</sup>

## Sport Culture

Several witnesses spoke of sport culture in both amateur and professional contexts and the roll it has played in sports-related concussions. As Mr. Dryden noted at the study’s outset, “Players will play injured. They love to play injured. That’s part of the challenge of playing. It’s like another opponent, and you’re trying to defeat that opponent as well.”<sup>46</sup> Mr. Kolstad, one of the athletes who testified, told the subcommittee that he had tried to “play through it” after sustaining a concussion.<sup>47</sup> The invisible nature of concussion enables this tendency and it is understandable how concussions go undetected by parents and game officials.

However, it is one challenge to educate players, parents and game officials about the need to be alert to concussion, for players to speak up if the suspect they have sustained one, for parents and game officials to insist

that a potentially concussed player be removed from the game. It is a different challenge altogether to change a toxic culture where intentional injury to players is used as a strategy. In this respect, the Subcommittee heard that in some high-contact sports, hockey for example, there may be targeted hitting of players.<sup>48</sup>

Another way in which sport culture could be modified is the intensity expected of athletes over the course of the year. All athletes, from young children participating in

“ Players will play injured. They love to play injured. That’s part of the challenge of playing. It’s like another opponent, and you’re trying to defeat that opponent as well.”

Hon. Ken Dryden

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45 SCSC, *Evidence*, 21 November 2018, 1810 (Hon. Ken Dryden, as an Individual).

46 Ibid., 1815.

47 SCSC, *Evidence*, 28 November 2018, 1810 (Mr. Ash Kolstad, as an Individual).

48 SCSC, *Evidence*, 28 November 2018, 1740 (Ms. Anne Phair, as an Individual).



recreational sports to adults participating at elite and professional levels, need breaks from time to time. Providing these breaks can be a challenge as youth sports often provide opportunities for, and may even have expectation of, year-round participation. Mr. Lindros noted, “Everyone needs a break.”<sup>49</sup> He stated that research has indicated that children and youth, whose bodies and brains are developing, benefit from taking time off from sports during the year.

Although change is difficult, and the Subcommittee agrees that sport culture changes slowly, it notes the positive attitudes expressed by representatives of national sports organizations in making changes in this regard. However, several witnesses emphasized that youth athletes look to and are influenced by professional athletes and said that change in sport culture at the professional sporting level is needed. While Commissioner Bettman suggested that sport culture has been evolving in hockey with respect to a declining frequency of fights, the Subcommittee notes that the element of profit in the professional sports may be a barrier to the change in sport culture. Commissioner Bettman acknowledged that the NHL has an influence on young hockey players, however, he emphasized the need to preserve the essential physical nature as a core element of professional hockey.<sup>50</sup>

## Baseline Testing

Baseline testing refers to the practice of conducting a variety of clinical neuropsychological assessments of athletes prior to the start of the athletic season. The baseline results can be compared to the results of the same assessments conducted after an impact during play. Parachute’s concussion guideline does not discuss baseline testing for athletes, but the organization issued a statement on the subject in November 2018 because it felt the practice was being promoted as a scientifically sound tool in concussion management. Parachute’s statement acknowledges that baseline testing research is ongoing and that its position could change pending new evidence. However, Parachute states that baseline testing is not required in order to provide post-injury care and it currently does not recommend mandatory pre-season baseline testing of either youth or adult athletes.<sup>51</sup> Similarly, the Berlin Consensus Statement states, “Baseline testing may be useful, but is not necessary for interpreting post-injury scores.”<sup>52</sup>

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49 SCSC, *Evidence*, 6 February 2019, 1835 (Mr. Eric Lindros, as an Individual).

50 SCSC, *Evidence*, 1 May 2019, 1610 (Mr. Gary Bettman, Commissioner, National Hockey League).

51 Parachute, “[Statement on Concussion Baseline Testing in Canada](#),” November 2018.

52 McCrory et al. (2017), p. 840.

However, baseline testing may be beneficial for professional and elite athletes. The Subcommittee was told that, in 1977, the NHL was the first professional sports organization to implement baseline testing as part of its concussion protocol.<sup>53</sup> As well, the CFL has introduced mandatory baseline testing for all players at the beginning of each football season. The results from the testing are used to compare an athlete's functioning following a potential concussion and to monitor recovery.<sup>54</sup> Dr. McCormack of the Canadian Olympic Committee also indicated that baseline testing is routinely performed for elite high-risk athletes and that it can be useful for interpreting injury. He also explained that, "We can do this because we have a network of experts that have been involved in sports medicine and the interpretation and results of these tests takes training and experience."<sup>55</sup> The Subcommittee heard of recent research suggesting that baseline testing for athletes in high-impact sports may be helpful to design preventive coaching practices.<sup>56</sup> Finally, the Subcommittee learned that Complete Concussion Management Inc., a network of multidisciplinary health care practitioners, endorses baseline testing, stating that it may help to minimize the risk of athletes returning prematurely to their sport.<sup>57</sup>

Dr. Gordon of Canada Soccer provided some additional insight into Parachute's position on routine baseline testing. He indicated that the results of a baseline assessment for any youth will change once or twice annually because they are constantly growing and developing. To be useful, he told the Subcommittee, baseline testing would have to be done more frequently than just during the pre-season and would add substantial cost to a sport's operations. He also asked, in the event a child failed a baseline assessment, what would the appropriate action be?<sup>58</sup> Dr. McCormack added that "done in isolation, without appropriate interpretation, [baseline testing] is not helpful and can actually cause challenges."<sup>59</sup> Importantly, Dr. McCormack explained, "The reason we do these enhanced things with [elite] athletes is that they're in the middle of playoffs, or the Olympics are coming up and it's once every four years or once in a lifetime for them. We're trying to see how quickly we can get them back and when it is safe. However, when we're talking about a child's brain, we don't need neuropsychological tests to

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53 SCSC, [Evidence](#), 1 May 2019, 1600 (Mr. Gary Bettman, Commission, National Hockey League).

54 SCSC, [Evidence](#), 3 April 2019, 1700 (Mr. Randy Ambrosie, Commissioner, Canadian Football League).

55 SCSC, [Evidence](#), 3 April 2019, 1820 (Dr. Robert McCormack, Chief Medical Officer, Canadian Olympic Committee).

56 Allen Anthony Champagne, written submission.

57 Complete Concussion Management Inc., written submission.

58 SCSC, [Evidence](#), 3 April 2019, 1845 (Dr. Kevin Gordon, Sports Medicine Committee, Canadian Soccer Association).

59 SCSC, [Evidence](#), 3 April 2019, 1835 (Dr. Robert McCormack, Medical Director, Canadian Olympic Committee).



assess them, because we shouldn't be pushing the envelope to get them back to high-risk situations."<sup>60</sup>

## Protective Equipment

Many witnesses sought to dispel the myth that protective equipment is effective at preventing concussion. Currently, no evidence exists that shows that helmets can prevent concussion in sports such as rugby or hockey. Helmets are effective at preventing other

“ Sure, they're wearing all this equipment, but you can still give them a concussion. You kind of lose that sense of the responsibility to take care of your body and other people's bodies.”

Ms. Sandhya Mylabathula

types of injuries, such as catastrophic traumatic brain injuries, skull fractures and subdural hematoma, while face masks prevent eye injuries.<sup>61</sup> However, when helmets are poorly fitted, or are not designed for an athlete's sport or level of play, they may not always offer adequate protection, as was the case for the young athlete Carter Phair.<sup>62</sup>

As Ms. Swapna Mylabathula, a medical and graduate student at the University of Toronto conducting concussion research, explained, a helmet can protect a person's head from a hit in three ways: by absorbing the force, by spreading the force over a greater

period of time, and by spreading the force over a greater area. Based on current evidence, she said, no helmet material can absorb enough force, or spread the force over a long enough period of time, to effectively prevent concussions. Current helmets often are effective at spreading a force over a greater area, which is very good at preventing skull fractures, but not at preventing more diffuse injuries, such as concussions.<sup>63</sup> As a result, players wearing helmets remain at risk of concussion even if they believe they are protected.

60 Ibid., 1855.

61 SCSC, *Evidence*, 10 April 2019, 1715 (Dr. Patrick Bishop, volunteer, CSA Group).

62 SCSC, *Evidence*, 28 November 2018, 1825 (Ms. Anne Phair, as an Individual).

63 SCSC, *Evidence*, 1 April 2019, 1810 (Ms. Swapna Mylabathula, MD/PhD Candidate, University of Toronto, as an Individual).

Other types of equipment have also not been shown to prevent concussions. Dr. Patrick Bishop, who is the chair of the CSA Group (formerly the Canadian Standards Association) technical committee on equipment for ice hockey said, “Mouthguards are good for protecting the teeth. Other than that, they don't do much.”<sup>64</sup> Mr. Gordon Stringer, the father of Rowan Stringer who died as a result of sport-related concussions, described mouthguards, headbands, and other new pieces of equipment that are purported to prevent concussions as “quackery.”<sup>65</sup>

Dr. Kathryn Schneider, a concussion researcher at the University of Calgary, emphasized the need for scientific studies to validate the value of protective equipment and that equipment was just one of several potential avenues for preventing concussions.<sup>66</sup>

Additionally, some witnesses raised concerns about risks caused by additional protective equipment. Mr. Hunter of Rugby Canada warned of the possibility that “people will manipulate equipment and use it more as a weapon.”<sup>67</sup> Ms. Sandhya Mylabathula, a graduate student at the University of Toronto who conducts concussion research, spoke of “the gladiator effect,” which can lead athletes who wear protective equipment to feel as though they and other players are, to some degree, invincible. She said, “Sure, they're wearing all this equipment, but you can still give them a concussion. You kind of lose that sense of the responsibility to take care of your body and other people's bodies.”<sup>68</sup> In this regard, NHL Commission Bettman noted that the league has been reducing the size of, and modifying the material used in, shoulder and elbow padding.<sup>69</sup>

Former NHL players Ken Dryden and Eric Lindros both expressed their doubts as to whether protective equipment can contribute to concussion prevention in their sport.<sup>70</sup>

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64 SCSC, [Evidence](#), 10 April 2019, 1750 (Dr. Patrick Bishop, volunteer, CSA Group).

65 SCSC, [Evidence](#), 1 April 2019, 1930 (Mr. Gordon Stringer, as an Individual).

66 SCSC, [Evidence](#), 26 February 2019, 1810 (Dr. Kathryn Schneider, Assistant Professor, Integrated Concussion Research Program, University of Calgary).

67 SCSC, [Evidence](#), 30 January 2019, 1750 (Mr. Paul Hunter, Director, National Rugby Development, Rugby Canada).

68 SCSC, [Evidence](#), 1 April 2019, 1820 (Ms. Sandhya Mylabathula, PhD Candidate, University of Toronto, as an Individual).

69 SCSC, [Evidence](#), 1 May 2019, 1700 (Mr. Gary Bettman, Commissioner, National Hockey League).

70 SCSC, [Evidence](#), 21 November 2018, 1900 (Hon. Ken Dryden), [Evidence](#), 6 February 2019, 1805 (Eric Lindros).



## MANAGEMENT OF SPORTS-RELATED CONCUSSION – THE ROLE OF HEALTH CARE PROFESSIONALS

### Where to Seek Medical Care

The Subcommittee heard from several health care professionals who provide concussion care. They all spoke with confidence as to the level of training that is available to providers and the level of knowledge that is expected of them. However, the Subcommittee noted that some of the stories told by youth athletes stood in contrast to this testimony. Carly Hodgins and Rachel Lord, for example, described similar

“ I never thought I was going to get better. I was taking medications that weren’t helping, and it seemed like none of my doctors and the other health professionals I was seeing knew why my symptoms weren’t going away.”

Mr. Ash Kolstad

experiences in which their concussions were appropriately diagnosed, however the young athletes were simply told to take it easy for a few days or weeks and they would be fine. They were not encouraged to seek follow-up care to determine whether their symptoms had resolved, and neither of them was warned about the possibility of persistent symptoms. Initially, the potential seriousness of concussion was also downplayed to Matthew Chiarotto. Carter Phair’s mother Anne informed the Subcommittee that she had difficulty locating a physician with the proper training and that she was able to locate only five specialists, all requiring substantial travel for Carter. This is of particular concern as the

Subcommittee learned that travelling significant distances to access health care can exacerbate concussion symptoms, which makes it important that treatment be available close to home.<sup>71</sup> Ash Kolstad described a trial and error approach to treating the mental health challenges that were brought on by his concussion. He summed up the frustration expressed by the young athletes when he said, “I never thought I was going to get better. I was taking medications that weren’t helping, and it seemed like none of

71 SCSC, *Evidence*, 20 February 2019, 1735 (Dr. Elizabeth Hobden, President-elect, Canadian Academy of Sport and Exercise Medicine).

my doctors and the other health professionals I was seeing knew why my symptoms weren't going away."<sup>72</sup>

Despite the discouraging experiences described by the youth athletes, the Subcommittee heard of initiatives and collaborations that appear to be bringing about substantial change in the health care field.

As outlined above, the Berlin Consensus Statement resulted from the expert review by the international Concussion in Sport Group (CISG) of 60,000 published articles on sports-related concussion and reflected the current state of knowledge in 2016. This consensus statement is the 5<sup>th</sup> iteration since 2001 and the next international conference is scheduled for 2020 in Paris.

Parachute has developed, through its Concussion Expert Advisory Committee and based upon the Berlin Consensus Statement, several concussion tools and resources reflecting current best practices for use by the full range of stakeholders, including health care professionals. These documents and resources were cited frequently by the health care professionals who appeared during the study. In fact, several of those witnesses were and remain participants in CISG and Parachute's concussion work.

The Subcommittee heard about the Canadian Concussion Collaborative (CCC), which is a coalition of several health care organizations. Created in 2011, the CCC was originally co-led by the Canadian Academy of Sport and Exercise Medicine (CASEM) and the Canadian Medical Association (CMA) and included eight additional medical organizations as well as the Canadian Centre for Ethics in Sport and Parachute's predecessor Think First.<sup>73</sup>

CCC's initial mandate was to address a growing need for information for physicians on the recognition, treatment and management of concussion. Today, CCC's membership has expanded to 16 professional health care organizations and Parachute, and is chaired by CASEM.<sup>74</sup> CCC's mission has expanded to include being a resource for information for

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72 SCSC, *Evidence*, 28 November 2018, 1800 (Mr. Ash Kolstad, as an Individual).

73 Sport Information Resource Centre (SIRC), SIRCuit, *Canadian Concussion Collaborative – Sharing Tools and Resources for Concussion Education and Management in Canada*, 27 June 2017.

74 The members of CCC are: The Canadian Academy for Sport and Exercise Medicine, the Canadian Association of Emergency Physicians, the Canadian Association of Occupational Therapists, the Canadian Athletic Therapists Association, the Canadian Centre for Ethics in Sport, the Canadian Chiropractic Association, the Canadian Medical Association, the Canadian Neurosurgical Society, the Canadian Paediatric Society, the Canadian Physiotherapy Association, the Canadian Psychological Association, the College of Family Physicians of Canada, the National Emergency Nurses Association, the Ontario Medical Association – Sport Medicine Section, the Ontario Neurotrauma Foundation, the Royal College of Chiropractic Sports Sciences (Canada) and Parachute.



all Canadians in addition to improving education about concussions for physicians and implementing best practices for the prevention and management of concussions.<sup>75</sup>

The CCC produced documents and resources prior to the publication of Parachute’s concussion guideline in 2017. It provided guidance on the characteristics of a good concussion clinic, key messages from the 2017 5th International Consensus Statement on Concussion in Sport and proposed a strategy for implementing policies and protocols for sports-related concussion.<sup>76</sup>

Parachute, through its Concussion Expert Advisory Committee, has developed the Concussion Guideline which includes best practices for stakeholders, including health care professionals, which are discussed below. Member organizations of the CCC, in turn, promote the uptake of the recommended best practices to their respective memberships.

“Parachute is sharing the latest and best information through the concussion awareness training tool for medical professionals, a free, online accredited training course that ensures information gets into the hands of experts. The potential implications of missed or poorly managed concussions makes proper assessment and management essential.”

Ms. Pamela Fuselli

## Awareness and Training for Health Care Providers

Pam Fuselli of Parachute informed the Subcommittee that the organization has developed an online concussion awareness training tool for health care professionals housed at the University of British Columbia’s Faculty of Medicine Continuing Professional Development. She told the Subcommittee, “Parachute is sharing the latest and best information through the concussion awareness training tool for medical professionals, a free, online accredited training course that ensures information gets into

75 Sport Information Resource Centre (SIRC), SIRCuit, [Canadian Concussion Collaborative – Sharing Tools and Resources for Concussion Education and Management in Canada](#), 27 June 2017.

76 CASEM, Canadian Concussion Collaborative, [CCC Publications and Tools](#).

the hands of experts. The potential implications of missed or poorly managed concussions makes proper assessment and management essential.”<sup>77</sup> Dr. Shannon Bauman, Medical Director of Concussion North and one of the developers of the online platform, specified that it is designed for family physicians, pediatricians as well as medical students.<sup>78</sup> As well, members heard about a massive open online course in concussion, developed by Université Laval, that includes several modules and is offered in both official languages.<sup>79</sup> The non-credited course is described as being helpful not only to health professionals, but also to parents, coaches, teachers, and school and sports leaders.<sup>80</sup> Dr. Kathryn Schneider, of the Integrated Concussion Research Program at the University of Calgary, informed the committee that over 4,000 people had registered for the course.<sup>81</sup>

## Assessment and Diagnosis of Concussion

According to the Berlin Consensus Statement, sports-related concussion is “among the most complex injuries in sports medicine to diagnose, assess and manage.”<sup>82</sup> Members were told by several witnesses that there is no single test that can definitively provide a diagnosis of concussion. For example, Dr. Roger Zemek stated that, “There is no blood test, no saliva test, no picture test or even no eye-tracking, pupil size or balance test. None exists yet that on its own can objectively diagnose concussion.”<sup>83</sup> Rather, diagnosis of concussion requires a comprehensive assessment to first rule out more serious traumatic brain injury, spinal injury and other neurological injury, followed by an assessment of the signs and symptoms of concussion as listed earlier in this report.

The Concussion Guideline provides two tools for this assessment, the SCAT5 for people older than 13 years and the Child SCAT5 for children aged 5 to 12 years. These are the Sport Concussion Assessment Tools developed pursuant to the 5<sup>th</sup> International

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77 SCSC, *Evidence*, 30 January 2019, 1840 (Ms. Pamela Fuselli, Vice-President, Knowledge Transfer and Stakeholder Relations, Parachute).

78 SCSC, *Evidence*, 26 February 2019 1855 (Dr. Shannon Bauman, Medical Director, Lead Physician, Concussion North).

79 SCSC, *Evidence*, 20 February 2019, 1800 (Dr. Pierre Frémont, Chair of the Sport and Exercise Medicine Committee, College of Family Physicians of Canada).

80 University of Calgary, Faculty of Kinesiology, [Online Course on Concussion](#).

81 SCSC, *Evidence*, 26 February 2019, 1735 (Dr. Kathryn Schneider, Assistant Professor, Integrated Concussion Research Program, University of Calgary).

82 McCrory et al. (2017) p.839.

83 SCSC, *Evidence*, 30 January 2019, 1855 (Dr. Roger Zemek, Director, Clinical Research, Children’s Hospital of Eastern Ontario).



Conference on Concussion in Sport that produced the Berlin Consensus Statement and reflect current best practice for the diagnosis of concussion.

The medical assessment and diagnosis of concussion can be conducted only by qualified licensed health care professionals with the proper training and expertise. The Concussion Guideline notes that only nurse practitioners and physicians practicing pediatrics, family medicine, sports medicine, emergency medicine, internal medicine and rehabilitative medicine, as well as neurologists and neurosurgeons have the

necessary licensed training and expertise to diagnose concussion.

The Concussion Guideline also notes that nurses who have access to one of these professionals (for example, by phone or teleconference), may also assess and diagnose concussion in rural and regions of Canada.<sup>84</sup> While there is a range of health care professions that have a role to play in concussion care and management, the Subcommittee was told that family physicians, emergency physicians and sports medicine specialists are most frequently the health care providers who are consulted for assessment and diagnosis.<sup>85</sup>

“ There is no blood test, no saliva test, no picture test or even no eye-tracking, pupil size or balance test. None exists yet that on its own can objectively diagnose concussion.”

Dr. Roger Zemek

The Subcommittee was told that assessments can take upwards of an hour to perform. Assessment of children, particularly very young children, can be particularly challenging as the assessment relies on the ability of the patient to recognize cognitive issues and communicate their complaints.<sup>86</sup>

As awareness about concussions has increased over the years, so too has the number of diagnoses. There was no testimony offered to the Subcommittee suggesting that the rate of concussions is increasing. Rather, the Subcommittee was told that people are becoming aware of the seriousness of concussion and are seeking medical attention

84 Parachute, *Canadian Guideline on Concussion in Sport*, July 2017, p.16.

85 SCSC, *Evidence*, 26 February 2019, 1905 (Dr. Shannon Bauman, Medical Director, Lead Physician, Concussion North).

86 Canadian Paediatric Society, written submission, p.1.

when one is suspected. As an example, Dr. Roger Zemek from the Children’s Hospital of Eastern Ontario indicated that the number of physician office or emergency room pediatric visits for concussion-related complaints has quadrupled in Ontario since 2010.<sup>87</sup> However, despite the estimate of Dr. Charles Tator from the Canadian Concussion Centre that there are 200,000 concussions annually in Canada,<sup>88</sup> witnesses agreed that there is no mechanism for reporting the number of diagnosed concussions in Canada and no active surveillance of them.

## Management of Concussion

The Concussion Guideline indicates that concussion management should be under the supervision of a physician or nurse practitioner with the involvement of allied health care providers as needed to optimize outcomes. It also provides general guidance on return-to-school and return-to-sport strategies. With respect to specific medical practice guidelines, the Subcommittee was told that the Ontario Neurotrauma Foundation has developed the first comprehensive guidelines for diagnosing and managing pediatric concussion.<sup>89</sup> Individual versions of the guidelines are available for different health care professions as well as for parents and caregivers, and for schools and community groups. Guidelines for adult concussion care as well post-concussive care are also available from the Ontario Neurotrauma Foundation.<sup>90</sup> Dr. Shawn Marshall of the University of Ottawa Brain and Mind Research Institute indicated that these practice guidelines have been published nationally and internationally as standardized practice for concussion care.<sup>91</sup>

Unfortunately, these practice guidelines may not be reaching all the health care providers who need them. Members were told by Doctors of BC, formerly the British Columbia Medical Association, that physicians have insufficient knowledge and training in concussion assessment and management and that there are insufficient resources and capacity to address this situation. Further, they were told that physicians often lack the time to dedicate sufficient attention to assessment and care of these patients, not to mention the time required to fill out the letters related to medical assessment and medical clearance for athletes.<sup>92</sup>

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87 Dr. Roger Zemek, written submission.

88 SCSC, *Evidence*, 20 February 2019, 1855 (Dr. Charles Tator, Director, Canadian Concussion Centre – University Health Network).

89 SCSC, *Evidence*, 30 January 2019, 1835 (Dr. Roger Zemek, Director, Clinical Research, Children’s Hospital of Eastern Ontario).

90 Ontario Neurotrauma Foundation, *Documents*.

91 SCSC, *Evidence*, 20 February 2019, 1900 (Dr. Shawn Marshall, Division Head, Physical Medicine and Rehabilitation, University of Ottawa Brain and Mind Research Institute).

92 Doctors of BC, written submission.



Health care providers testified that most concussions will resolve in the short term with proper rest and a slow return to daily activities including school, work, play and sports. For adults, the short term is about two weeks, whereas the recovery period is up to four weeks for children. More specifically, Dr. Zemek explained that most children recover, with proper management, within one or two weeks, similar to adults. However, teenage girls can take up to four weeks to recover from concussion.<sup>93</sup> Ms. Dorothyann Curran, a research associate at the Ottawa Hospital's Centre for Rehabilitation Research and Development, indicated that this gender disparity extends into adulthood.<sup>94</sup> Dr. Shawn Marshall noted that, in his concussion clinic, 70% of concussion patients with persistent symptoms are women.<sup>95</sup> The Subcommittee was told that the 80-90% of adult cases<sup>96</sup> and 70% of pediatric concussions<sup>97</sup> that resolve in the short term can be managed by a sports medicine or family physician, or pediatrician.

The Subcommittee heard that individuals who have sustained a concussion and whose symptoms have not resolved in the short term may benefit from treatment by physician-led teams of health care providers from a range of professions. The Concussion Guideline describes multidisciplinary concussion care as including specially trained physiotherapists, psychologists, neuropsychologists, occupational therapists, etc. Although not a physician-led model, the Subcommittee heard from Dr. Cameron Marshall about Complete Concussion Management Inc., which is a network of clinics that offer the services of a range of allied health care providers, such as chiropractors and physiotherapists, that can help to relieve some concussion symptoms such as headache or balance issues. While the Subcommittee was told that there are some examples of these physician-led multidisciplinary concussion clinics, witnesses, such as Dr. Bauman of the specialized clinic called Concussion North, urged the creation of regional, physician-led, multi-disciplinary concussion clinics.<sup>98</sup>

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93 SCSC, *Evidence*, 30 January 2019, 1920 (Dr. Roger Zemek, Director, Clinical Research, Children's Hospital of Eastern Ontario).

94 SCSC, *Evidence*, 20 February 2019, 1935 (Ms. Dorothyann Curran, research associate, The Ottawa Hospital, Centre for Rehabilitation Research and Development).

95 SCSC, *Evidence*, 20 February 2019, 1940 (Dr. Shawn Marshall, , Division Head, Physical Medicine and Rehabilitation, University of Ottawa Brain & Mind Research Institute).

96 SCSC, *Evidence*, 20 February 2019, 1735 (Dr. Elizabeth Hobden, President-elect, Canadian Academy of Sport and Exercise Medicine).

97 SCSC, *Evidence*, 30 January 2019, 1920 (Dr. Roger Zemek, Director, Clinical Research, Children's Hospital of Eastern Ontario).

98 SCSC, *Evidence*, 26 February 2019, 1910 (Dr. Shannon Bauman, Medical Director, Lead Physician, Concussion North).

Dr. Michael Ellis, medical director of the Pan Am Concussion Clinic in Winnipeg, cautioned the Subcommittee that without focussed efforts to uphold high standards for concussion clinics, “some allied healthcare professionals may choose not to support the Canadian [Concussion] Guideline and lead local community sport organizations to develop protocols that direct patients to private clinics that do not have on-site access to professionals who are licensed to provide a comprehensive medical assessment.” He cited a recent study that found that only 40% of concussion clinics in Canada advertise that they have access to on-site physicians. He also noted that offering private certification courses, which is an unregulated practice, are being promoted to allied health care providers. Finally, Dr. Ellis emphasized the importance of including essential concussion management services within provincial and territorial health insurance programs.<sup>99</sup>

It is apparent to the Subcommittee that there is considerable expertise among Canada’s health care professionals and that there is guidance on best practices in concussion diagnosis and management. The challenge for health care providers is in the dissemination and the uptake and implementation of those best practices by all health care providers.

## THE NEED FOR ANSWERS – THE ROLE OF RESEARCHERS

### Canada is a World Leader in Concussion Research

The Subcommittee was told that Canada is a world leader in concussion research. As noted by Dr. Roger Zemek of the Children’s Hospital of Eastern Ontario, Canada is punching above its weight when it comes to concussion research, and that, “Canada is a world leader in concussion research. Of the 10 most-cited universities across the world with regard to concussion, Canada is home to four... We truly are groundbreaking”<sup>100</sup> It should also be noted that of the 36 experts who authored the Berlin Consensus Statement, seven are Canadian, four of whom appeared before the Subcommittee. The Subcommittee was told that alongside the increase in general awareness of concussion that has occurred over the past 15 years, research into concussion has risen considerably as well. While 18,000 published articles were reviewed for the first adult concussion guidelines produced by the Ontario Neurotrauma Foundation in 2012, that number had risen to 38,000 by 2018 for the third edition of the adult guidelines.<sup>101</sup>

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99 Dr. Michael Ellis, written submission.

100 SCSC, *Evidence*, 30 January 2019, 1835 (Dr. Roger Zemek, Director, Clinical Research, Children’s Hospital of Eastern Ontario).

101 SCSC, *Evidence*, 20 February 2019, 1905 (Ms. Dorothyann Curran, research associate, The Ottawa Hospital, Centre for Rehabilitation Research and Development).



On the issue of collaboration among researchers, witnesses offered different viewpoints. While Mr. Lindros stated emphatically that collaboration is lacking and that this hinders research advancement, Dr. Nowinski of the Concussion Legacy Foundation stated that working from different perspectives can be beneficial and that it is not necessary to have all scientists working in collaboration.<sup>102</sup> Dr. Kathryn Schneider of the Integrated Concussion Research Program at the University of Calgary as well as Dr. Shawn Marshall spoke of the emphasis on collaboration in concussion research. Dr. Schneider stated, “The research success and impact at the University of Calgary is also a testament to our strong and sustained clinical, community, industry, education and sport partnerships; national and international collaboration; and our robust training and education programs for the generation of researchers in concussion.”<sup>103</sup> Similarly, Dr. Marshall from the University of Ottawa’s Brain and Mind Research Institute told the Subcommittee, “The truth is that you have a lot of great researchers in this country who have actually come together.”<sup>104</sup>

“Canada is a world leader in concussion research. Of the 10 most-cited universities across the world with regard to concussion, Canada is home to four.... We truly are groundbreaking.”

Dr. Roger Zemek

## Research Programs and Discoveries

Several witnesses offered statistics, percentages and proportions on concussion numbers, symptoms, recovery, gender disparity, etc. However, these figures are not derived from national reported cases and outcomes. Rather, they are the result of research conducted within smaller groups.

In terms of the number of concussions sustained by Canadians each year, the Subcommittee heard that this could range between 200,000, according to Dr. Tator from

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102 SCSC, *Evidence*, 6 February 2019, 1850 (Mr. Eric Lindros and Dr. Chris Nowinski).

103 SCSC, *Evidence*, 26 February 2019, 1735 (Dr. Kathryn Schneider, Assistant Professor, Integrated Concussion Research Program, University of Calgary).

104 SCSC, *Evidence*, 20 February 2019, 1925 (Dr. Shawn Marshall, Division Head, Physical Medicine and Rehabilitation, University of Ottawa Brain and Mind Research Institute).

the Canadian Concussion Centre, to 250,000, according to Dr. Schneider, a researcher at the University of Calgary. However, only a small proportion of individuals, as few as one in four, who suspect that they have sustained a concussion seek medical attention and receive a diagnosis of concussion.<sup>105</sup> As Swapna Mylabathula noted, “it’s an invisible injury and there are lots of reasons why people don’t report it, it’s very under-reported and under-recognized.”<sup>106</sup> The Public Health Agency of Canada (PHAC) indicates that 46,000 concussions were diagnosed in 2016-2017 by hospital emergency departments.<sup>107</sup> Additional diagnoses would be made through family physicians, sports medicine specialists and possibly other allied health care professionals, but there is no mechanism in place for capturing these numbers.

Dr. Zemek of the Children’s Hospital of Eastern Ontario revealed that his research has shown a four-fold increase in the number of concussion-related emergency department

“ [I]t’s an invisible injury and there are lots of reasons why people don’t report it.”

Ms. Swapna Mylabathula

and physician office visits among children in Ontario over the last decade, most significantly among adolescents. Information collected from Ontario and Alberta by the Canadian Institute for Health Information indicates that emergency department visits for sports-related brain injuries has increased 28% over the last five years.<sup>108</sup> Research has also shown that between 10% and 20% of

adults with concussion suffer persistent symptoms beyond two weeks and as much as 30% of children with concussion have persistent symptoms beyond one month. This effect is called persistent post-concussive syndrome, or PPCS. Dr. Zemek’s research has also shown a plateauing effect with respect to recovery. That is, that while 30% of children are still symptomatic after one month, that number goes down to only 20% after three months.

Dr. Zemek described some of the predictive factors for PPCS that his research has revealed. First, gender appears to have a role. He noted that teenage girls recover more slowly from concussion than do boys. As well, children who return to physical activity

105 SCSC, *Evidence*, 3 April 2019, 1850 (Dr. Kevin Gordon, Member, Sports Medicine Committee, Canada Soccer).

106 SCSC, *Evidence*, 1 April 2019, 1815 (Ms. Swapna Mylabathula, MD/PhD Candidate, University of Toronto, as an Individual).

107 Public Health Agency of Canada, *Concussion in Sport (infographic)*.

108 Canadian Institute for Health Information, *Heads-up on sport-related brain injuries*.



too slowly appear to be more susceptible to PPCS than children who return to early activity. He described the “Goldilocks balance” of finding the right amount and timing of physical activity. Finally, Dr. Zemek discussed the troubling observation from his research that even among children who have seemingly recovered from concussion, their quality of life at school is significantly negatively affected.<sup>109</sup> This observation may be connected to the fact that brain tissue may still show signs of injury after clinical symptoms have resolved, suggesting that athletes may be returning to their sport prematurely.<sup>110</sup>

The Subcommittee was told about research looking into a possible link between concussion, or more specifically repeated concussions, and chronic traumatic encephalopathy (CTE) and other long-term consequences including cognitive issues, behavioural changes and mood disorders. Dr. Chris Nowinski, who co-founded Boston University’s CTE Center, which includes a brain bank, discussed some of the results obtained from studying the donated brains of individuals who had sustained concussions during their lives. He explained that CTE is a neurodegenerative condition with symptoms similar to dementia, although it can only be definitively diagnosed after death. Results from the donated brains of 111 National Football League players showed that 110 were suffering from CTE but the proportion falls to 6 of 26 high school football players. Although the sample sizes vary among age groups and the numbers need to be substantiated, the data suggests that the longer an athlete plays and sustains hits to the head, the higher are the chances of developing CTE. Dr. Nowinski also stated that 20% of the CTE brains were from athletes with no history of diagnosed concussion, but with significant numbers of known hits to the head.<sup>111</sup>

The Canadian Concussion Centre has recently launched a brain bank at the Krembil Neuroscience Centre at Toronto Western Hospital which accepts donated brains of athletes and the public who have sustained multiple concussions. Its director, Dr. Tator, noted that CTE has been found in only one third of the bank’s 45 brains. He also explained that CTE brains have deposits of a characteristic protein called phosphorylated Tau and indicated that current research is attempting to develop an effective imaging technique that can identify this substance in patients suffering from repeated concussion and symptoms of neurodegenerative disease.<sup>112</sup> Neither the U.S. or

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109 SCSC, *Evidence*, 30 January 2019, 1840 (Dr. Roger Zemek, Director, Clinical Research, Children’s Hospital of Eastern Ontario).

110 Alexander Raucher, written submission.

111 SCSC, *Evidence*, 6 February 2019, 1855 (Dr. Chris Nowinski, Chief Executive Officer, Concussion Legacy Foundation).

112 SCSC, *Evidence*, 20 February 2019, 1915 (Dr. Charles Tator, Director, Canadian Concussion Centre – University Health Network, Toronto Western Hospital).

Canadian brain banks has received many female brains. There are only 10 female brains among the 700 collected by the Boston CTE Center and just one among the 45 at the Kembil Neuroscience Centre brain bank. Both Dr. Nowinski and Dr. Tator acknowledged that more female brain tissue must be acquired for analysis.

The Brain and Mind Institute's Dr. Shawn Marshall talked about ongoing research into identifying biomarkers of concussions, which would greatly simplify its diagnosis and could also serve to determine when someone has truly recovered from a concussion. He mentioned one candidate that has been identified called SB100 which is evident in severe cases of concussion, but is not easy to detect in mild concussions. As well, Dr. Marshall revealed that there are experimental imaging techniques being explored for use as potential definitive diagnostic tests for concussion.<sup>113</sup> He also pointed out that the Canadian Institutes of Health Research have provided funding to Dr. Angela Colantonio at the University of Toronto's Acquired Brain Injury Research Lab to study the gender differences that have been observed in concussion susceptibility and recovery.<sup>114</sup>

Dr. Schneider noted that concussion research by the Integrated Concussion Research Program addresses the spectrum of concussion injury, prevention, diagnosis, prognosis, mechanism of injury and rehabilitation. She described a recent national research program that involves 25 researchers at 10 Canadian universities collaborating with sports organizations, educators and multidisciplinary clinical teams and is funded by the National Football League. The research is called Surveillance in High School to Reduce Concussions and their Consequences, or SHRED, and involves 6,000 students who participate in high-risk sports in 60 schools across five provinces who will be followed for three years. The research aims to gather information across the spectrum from prevention to management of concussion.

“ We have a lot of people who do a lot of leading-edge work and who all work together across the country very collaboratively.”

Dr. Kathryn Schneider

Dr. Schneider highlighted the prevention research that has been done which has brought about real change in amateur hockey and volleyball rules. Research provided the

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113 SCSC, *Evidence*, 20 February 2019, 1920 (Dr. Shawn Marshall, Division Head, Physical Medicine and Rehabilitation, University of Ottawa Brain & Mind Research Institute).

114 *Ibid*, 1940



evidence to prompt a policy change regarding bodychecking in hockey. In 2013, Hockey Canada implemented a new rule to prohibit bodychecking in the peewee age group (11 and 12-year olds) and younger. This change has resulted in a 70% reduction in the risk of concussion, or about 4,800 fewer concussions across Canada. With respect to volleyball, Dr. Schneider explained that their research had revealed that 15% of concussions in that sport were happening during warm-up drills that required the players to run under the net to chase the ball they had just sent across the court. Because of this research, Volleyball Canada recently implemented a rule change which prohibits this drill from including running under the net.

Further, Dr. Schneider indicated that research into biomarkers, robotics and neuroimaging is ongoing with a view to developing a definitive diagnostic test. As well, research into determining factors that can predict which patients are likely to have persistent symptoms currently involves multidisciplinary teams. She noted that her research group has developed various animal and human models for studying mechanisms of injury that she hopes will help to define how concussion happens and provide avenues of research to improve recovery. On the issue of rehabilitation, the Subcommittee was told that Dr. Schneider's research has shown that treatment focussing on the neck and on balance improves recovery and the likelihood of obtaining medical clearance to return to sport within eight weeks, when compared to patients who have not received that treatment.<sup>115</sup>

Finally, Dr. Schneider talked about the unique level of collaboration that exists among Canadian concussion researchers. She said, "We have a lot of people who do a lot of leading edge work and who all work together across the country very collaboratively."<sup>116</sup> In this context, she mentioned the Canadian Traumatic Brain Injury Research Consortium. The consortium was created in 2015 with funding from the Canadian Institutes of Health Research and the Ontario Neurotrauma Foundation to enhance collaboration amongst scientists working to develop prevention strategies and to improve the care of patients with traumatic brain injury.<sup>117</sup>

Dr. Shannon Bauman, who, in addition to leading the concussion clinic Concussion North, is also involved with Parachute, the international consensus conference, the Canadian Concussion Collaborative and the Ontario Neurotrauma Foundation, conducts research as well. Her research focuses on the interdisciplinary team model of concussion

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115 SCSC, *Evidence*, 26 February 2019 (Dr. Kathryn Schneider, Assistant Professor, Integrated Concussion Research Program, University of Calgary).

116 Ibid, 1805.

117 Canadian Traumatic Brain Injury Consortium, *History and Vision of the CTRC*.

management, factors relating to prolonged recovery from concussion as well as the gender differences that have been mentioned by some witnesses.<sup>118</sup> Canada Soccer's Dr. Gordon commented that one of the most active areas of concussion research is examining why girls and women are more at risk for sustaining a concussion as well as suffering more persistent symptoms from concussion than boys and men are.<sup>119</sup>

Ms. Curran, from Ottawa's Centre for Rehabilitation Research and Development, listed some additional issues about concussion that are also being researched, including why only some hits to the head result in concussion and whether recovery time from concussion can be shortened.<sup>120</sup> Mr. Kolstad, the young athlete who now conducts concussion research, indicated that he is determining whether a ban on bodychecking in hockey results in a change in offensive performance and whether prior concussion has an effect on an athlete sensory motor skills.<sup>121</sup>

## Unanswered Questions – Research Gaps and Future Direction

In addition to the ongoing research listed above that aims to find a multitude of answers about concussion, the Subcommittee heard of additional research gaps that should be filled. Ms. Curran suggested that research should be conducted on the rate of persistent post-concussive symptoms as it is higher than originally thought, as well as on the use of virtual reality technology in the assessment and treatment of concussion.

Dr. Zemek noted that he would like to see research into pharmaceutical treatments for concussion symptoms including headache, dizziness and the mental health consequences of concussion such as irritability and depression. He also emphasized that research is needed into purported therapies that are being offered but are not evidence-based.<sup>122</sup>

The Subcommittee was also told that more research needs to be done on the physical and molecular changes that occur in the brain following concussion. Dr. Pierre Frémont, representing the College of Family Physicians of Canada, described that animal models of concussion have revealed that "There is a metabolic storm in the brain. There is a problem

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118 SCSC, [Evidence](#), 26 February 2019 (Dr. Shannon Bauman, Medical Director, Lead Physician, Concussion North).

119 SCSC, [Evidence](#), 3 April 2019, 1905 (Dr. Kevin Gordon, Member, Sports Medicine Committee, Canada Soccer)

120 SCSC, [Evidence](#), 20 February 2019, 1905 (Ms. Dorothyann Curran, research associate, The Ottawa Hospital, Centre for Rehabilitation Research and Development).

121 SCSC, [Evidence](#), 28 November 2018, 1815 (Mr. Ash Kolstad, as an Individual).

122 SCSC, [Evidence](#), 30 January 2019, 1900 (Dr. Roger Zemek, Director, Clinical Research, Children's Hospital of Eastern Ontario).



with the flow of ions in and out of the neurons. There's no focal anatomical bleeding or disruption, but there is disruption at the cellular level and there is a metabolic storm. There is high energy consumption at that point.”<sup>123</sup> He stated that research is needed to better understand what is happening in the brain following concussion and this will lead to new interventions, as well as potentially diagnostic imaging.

The issue of whether baseline testing should be performed on athletes before they participate in a sport is not yet resolved and should be further studied. While Parachute does not recommend baseline testing in the Concussion Guideline as a general rule, the Subcommittee heard that it may be appropriate in some instances, including athletes in sports at high risk for concussion and elite athletes. Additional research in this area could help to define which athletes, or which sports, can benefit from baseline testing. Research could also help to develop variations of baseline testing that are more appropriate to specific sports and athletes.

The Subcommittee was concerned to hear that the federal government may not be investing adequately in concussion research and that much of the research described in the report has relied on non-governmental sources. In this regard Dr. Tator submitted that, “concussion research has been almost disregarded by many governmental research agencies.”<sup>124</sup> Finally, it was noted by Dr. Nowinski that it is difficult to specify exactly which areas of research should be pursued. He suggested that a group comprised of concussion experts would best be suited to identify such areas and create a “research roadmap” which would provide a framework for future research programs.<sup>125</sup>

## LEARNING FROM TRAGEDY – ROWAN’S LAW

Throughout the course of the study, Subcommittee members were told that Ontario is the only province with legislation that specifically addresses concussion – *Rowan’s Law*. Sadly, *Rowan’s Law* is rooted in the tragic death of Rowan Stringer, a 17-year-old high school student who loved to play rugby. On a fateful day in May 2013, Rowan, captain of her high school rugby team, was determined to play a match, despite silently suffering symptoms of two earlier hits to the head during games the previous week. Mr. Gordon Stringer, Rowan’s father, told the Subcommittee that Rowan suspected that she had a concussion. In her final game, Rowan was hit after being passed the ball. She fell, briefly

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123 SCSC, *Evidence*, 20 February 2019, 1815 (Dr. Pierre Frémont, Chair of the Sport and Exercise Medicine Committee, College of Family Physicians of Canada).

124 Dr. Charles Tator, written submission.

125 SCSC, *Evidence*, 6 February 2019, 1925 (Dr. Chris Nowinski, Chief Executive Officer, Concussion Legacy Foundation).

sat up, then fell back unconscious. Rowan was rushed to hospital where doctors tried to reduce brain swelling, however, Rowan died four days later. Rowan had succumbed to second impact syndrome, a known fatal complication that can happen when someone sustains a concussion while still suffering the symptoms of an earlier one.

A coroner's inquest was ordered and in May 2015 the coroner's report containing 49 jury recommendations was released. The first recommendation was that Ontario should adopt an Act, to be known as Rowan's Law. That recommendation also stated that the new law should establish a standard of practice for concussion management and that the Act should recognize four criteria to protect children and youth: provide education for athletes, coaches and parents; remove athletes with suspected concussion from play; require medical clearance before athletes return to play, and; ensure return-to-learn and return-to-play strategies are in place and are followed.<sup>126</sup>

In response, the Rowan's Law Advisory Committee was established to determine the way forward for implementing the recommendation of the coroner's report. On 17 September 2017, it issued its report entitled *Creating Rowan's Law*. The report enumerated 21 action items within the themes of legislation, surveillance, prevention, detection and management.<sup>127</sup>

The Government of Ontario passed *Rowan's Law* in March 2018. The legislation calls for sports organizations to implement mandatory concussion awareness resources and requires the organizations to ensure that athletes, parents and coaches and other sports officials are familiar with them. As well, the legislation requires implementation of a "Concussion Code of Conduct" for amateur competitive sports organizations. *Rowan's Law* also amended the *Education Act* to enable the Minister of Education to establish concussion policies, guidelines and regulations, and require public school boards and private schools to follow them.<sup>128</sup> Mr. Stringer noted that Concussion Codes of Conduct are not yet implemented, but that the government had initiated the process and that he continues to work with officials to implement the remainder of the action items.<sup>129</sup>

No other provinces or territories have followed Ontario's lead to date with respect to concussion legislation. However, the Subcommittee was told by Dr. Tator that other

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126 Ministry of Community Safety and Correctional Services, Office of the Chief Coroner, OCC Inquest-Stringer 2015, "[Verdict of Coroner's Jury](#)," 3 June 2015.

127 "[Creating Rowan's Law – Report of the Rowan's Law Advisory Committee](#)," September 2017.

128 [Rowan's Law](#) (Concussion Safety), 2018, S.O. 2018 Chapter 1.

129 SCSC, [Evidence](#), 1 April 2019, 1850 (Mr. Gordon Stringer, as an Individual).



provinces are moving in the right direction.<sup>130</sup> Mr. Niedre from the Coaching Association of Canada informed the Subcommittee that Quebec has implemented a return to play protocol.<sup>131</sup> The Subcommittee was told by other witnesses that Manitoba has moved in the same direction as Ontario. For example, Ms. Fuselli from Parachute informed the Subcommittee that Sport Manitoba requires provincial sports organizations to develop

and implement concussion strategies and protocols, based on Parachute's concussion guideline.<sup>132</sup>

“ The school system, to me, is the way we really inform. In Ontario, we have Rowan's Law Day. The idea was to take an hour and a half once a year and really go through what concussion is and what to look for. Let's look for it within. Let's look for it in our friends, and in the people we're going to be competitive against. Let's make sure we're all safe.”

Mr. Eric Lindros

*Rowan's Law* also established the last Wednesday in September as Rowan's Law Day, which is intended to raise awareness of concussion. Mr. Lindros explained to the Subcommittee that the intent was to use Rowan's Law Day to educate school-aged children about concussion and the serious health consequences that can result. He said, “The school system, to me, is the way we really inform. In Ontario, we have Rowan's Law Day. The idea was to take an hour and a half once a year and really go through what concussion is and what to look for. Let's look for it within. Let's look for it in our friends, and in the people we're going to be competitive against. Let's make sure we're all safe.”<sup>133</sup>

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- 130 SCSC, [Evidence](#), 20 February 2019, 1900 (Dr. Charles Tator, Director, Canadian Concussion Centre – University Health Network, Toronto Western Hospital).
- 131 SCSC, [Evidence](#), 30 January 2019, 1740 (Mr. Peter Niedre, Director of Education Partnerships, Coaching Association of Canada).
- 132 SCSC, [Evidence](#), 30 January 2019, 1915 (Ms. Pamela Fuselli, Vice-President, Knowledge Transfer and Stakeholder Relations, Parachute)
- 133 SCSC, [Evidence](#), 6 February 2019, 1755 (Mr. Eric Lindros, as an Individual).

Sandhya and Swapna Mylabathula, students at the University of Toronto who conduct concussion research, encouraged the implementation of a Concussion Awareness Week. They suggested that a concussion awareness week could be used by all governments to start a national conversation, raise awareness of concussion and promote education tools.<sup>134</sup> Mr. Stringer endorsed this idea and suggested that it could be during the week of the last Wednesday in September to overlap with Rowan’s Law Day.<sup>135</sup>

The Subcommittee was told that legislation similar to *Rowan’s Law* should be implemented across Canada. Mr. Stringer told the Subcommittee that Ontario has created a template for other jurisdictions. He said that all action items should be pursued by the provinces and territories, starting with legislation like Rowan’s Law but moving beyond that to address surveillance, prevention, detection and management. While Mr. Jocelyn East of the Federal-Provincial/Territorial Working Group on Concussion in Sport noted the potential of legislation pertaining to concussion in sport, he described it as one tool that is available, but that should be relied upon only if jurisdictions are not voluntarily working in that direction.<sup>136</sup>

Finally, Mr. Stringer spoke of the gaps in medical care that currently encourage a “cottage industry” of people claiming expertise in concussion care who may not be providing evidence-based services and treatments.<sup>137</sup> Dr. Tator emphasized that every province should enact concussion legislation that applies to both school-based and non-school-based sports.<sup>138</sup>

## **SPORTS-RELATED CONCUSSIONS AS A PUBLIC HEALTH CONCERN – RECOMMENDATIONS TO THE FEDERAL GOVERNMENT**

Over the course of these meetings, witnesses informed the Subcommittee of the considerable amount of expertise that exists in this country and of the substantial amount of work that has been accomplished with respect to increasing awareness and establishing and implementing best practices on the issue of sports-related concussions in Canada. The federal government has been playing a role in these efforts.

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134 SCSC, *Evidence*, 1 April 2019, 1750, 1830 (Swapna Mylabathula, Sandhya Mylabathula).

135 SCSC, *Evidence*, 1 April 2019, 1850 (Mr. Gordon Stringer, as an Individual).

136 SCSC, *Evidence*, 10 April 2019, 1750 (Mr. Jocelyn East, co-Chair, Federal-Provincial/Territorial Working Group on Concussion in Sport).

137 SCSC, *Evidence*, 1 April 2019, 1850 (Mr. Gordon Stringer, as an Individual).

138 SCSC, *Evidence*, 20 February 2019, 1925 (Dr. Charles Tator, Director, Canadian Concussion Centre – University Health Network, Toronto Western Hospital).



In 2015 the Federal-Provincial/Territorial Sport Committee convened a workshop to discuss whether governments could play a role in sports-related concussion. The workshop invited input from sport, health and governmental stakeholders. They concluded that all levels of government can play a role in delivering consistent messaging, resources and tools about sports-related concussions. The result was the creation of the Federal-Provincial/Territorial Working Group on Concussion in Sport (the Working Group) with the support of Sport Canada and PHAC. Membership of the Working Group includes stakeholders from sports and education organizations, health care sector and government. The Working Group's goal is to approach sports-related concussions as a public health issue, to support the harmonization of tools and resources and to help ensure that Canadians know how to use them.

Since its creation, the Working Group has submitted 16 recommendations to the provincial and territorial ministers responsible for sport. Mr. Jocelyn East, a co-Chair of the Working Group, informed the Subcommittee that all 16 recommendations have been accepted by all provinces and territories. Perhaps most importantly, he noted, was an agreement to develop a pan-Canadian harmonized approach on the issue to include five components: awareness, prevention, detection, management and surveillance.<sup>139</sup>

Mr. East emphasized however, that a harmonized approach does not imply an identical approach across all jurisdictions. Rather, that jurisdictions are distinct and must have the freedom to develop their own strategy.<sup>140</sup> Finally, the Subcommittee was told that between now and 2021 the Working Group's efforts will focus on the implementation of these recommendations as well as on the development of further recommendations with particular emphasis on prevention efforts.<sup>141</sup>

The Subcommittee was told that the Working Group's deliberations have resulted in several initiatives across Canada. Mr. Greg Guenther, the Working Group's second co-Chair, revealed that provinces and territories have created concussion working groups within their own jurisdictions to help deliver messaging and tools and share best practices with the sports and education communities. He also noted the creation of a national campaign called *We Are Headstrong* that has been created and implemented by the Sport Information Resource Centre (SIRC).<sup>142</sup> SIRC "shares credible and evidence-

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139 SCSC, [Evidence](#), 10 April 2019, 1720 (Mr. Jocelyn East, co-Chair, Federal-Provincial/Territorial Working Group on Concussion in Sport).

140 *Ibid.*, 1750.

141 *Ibid.*, 1720.

142 SCSC, [Evidence](#), 10 April 2019, 1725 (Mr. Greg Guenther, co-Chair, Federal-Provincial/Territorial Working Group on Concussion in Sport).

based knowledge” with stakeholders in Canada’s sports community.<sup>143</sup> The *We are Headstrong* campaign, funded by PHAC and Sport Canada,<sup>144</sup> promotes The Four Rs: Recognize (the signs of concussion), Remove (the athlete from the sport), Refer (the athlete to a licensed health care provider) and Return (the athlete to school and sport based on medical advice).<sup>145</sup> The Subcommittee was told that the campaign was designed to align with messaging in Parachute’s concussion guidelines and the efforts of the Working Group.<sup>146</sup>

Mr. Andrew Campbell representing Sport Canada noted that many of the national sports organizations that receive federal funds have voluntarily implemented concussion protocols, but that Sport Canada is considering requiring them to do so in order to qualify for federal funds.<sup>147</sup> He also highlighted federal budget 2019, which included \$30 million over five years for national sports organizations to make their sports safer. He suggested that accountability, in terms of concussion safety, could be tied to receiving those funds.<sup>148</sup>

Mr. Campbell also indicated that there has been outreach by Sport Canada to the education sector. In this regard, Sport Canada is collaborating with the Pan-Canadian Joint Consortium for School Health (JCSH),<sup>149</sup> which is a member of the Working Group, to facilitate the dissemination of harmonized concussion materials to the school sport system. The PHAC is the federal contact for JCSH. Sport Canada also made a presentation to the Conference of the Council of Ministers of Education in 2017 on the sports-related concussion management work that has been accomplished.<sup>150</sup>

The federal government, through PHAC, recognizes that sports-related concussion is a public health issue because of the “frequency of occurrence, as well as potential short

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143 Sport Information Resource Centre (SIRC), [About SIRC](#).

144 SIRC, “[Concussion Campaign Makes Sport Safer for Canadians](#),” 8 June 2018.

145 SIRC, [Concussion resources](#).

146 SCSC, [Evidence](#), 10 April 2019, 1840 (Mr. Andrew Campbell, Assistant Deputy Minister, Department of Canadian Heritage, major events and commemorations).

147 *Ibid.*, 1850.

148 *Ibid.*, 1910.

149 The [Pan-Canadian Joint Consortium for School Health](#) is a federal-provincial/territorial organization that brings together the health and education sectors from across the country with the goal of optimizing the health and wellness of children and youth in the school setting.

150 *Ibid.*, 1840.



and long-term consequences.”<sup>151</sup> As a public health issue, PHAC has a role to play within the pan-Canadian approach described by the Working Group. In addition to maintaining its leadership role in promoting the benefits of an active lifestyle, the Subcommittee was told that PHAC can contribute to the surveillance of concussions, help to increase awareness of the injury and continue to invest in the development and dissemination of resources and tools related to sports-related concussion.<sup>152</sup>

In terms of investing in concussion resources and tools, Parachute, as described earlier, has been a primary contributor. In 2016, the federal government allocated \$1.4 million to PHAC for the development of harmonized concussion guidelines in collaboration with the provinces and territories. The Subcommittee was told that Parachute received financial support from PHAC for the development of these tools, including the Concussion Guideline issued in July 2017 and the mobile app for athletes, parents and educators called Concussion Ed for accessing a variety of concussion resources.<sup>153</sup> Parachute has also developed return-to-school and return-to-sports strategies and concussion guides for specific stakeholders; athletes, parents and caregivers, teachers, and coaches and trainers.<sup>154</sup> The Subcommittee learned that Parachute is currently working with Indigenous leaders to adapt these resources and tools for First Nations, Métis and Inuit youth.<sup>155</sup> Further, Parachute provides links to additional resources specific to schools, sports organizations and health professionals.<sup>156</sup>

PHAC has also supported the development of the SCHOOLfirst handbook by Holland Bloorview Kids Rehabilitation Hospital and mobile app developed by P.A.C.E. Concussion.<sup>157</sup> The SCHOOLfirst handbook is a resource for teachers to support students suffering from and recovering from concussion.<sup>158</sup> The Progressive Activation and Concussion Education mobile app provides step-by-step instructions for youth, parents

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151 SCSC, [Evidence](#), 10 April 2019, 1850 (Ms. Gerry Gallagher, Executive Director, Centre for Chronic Disease Prevention and Health Equity, Health Promotion and Chronic Disease Prevention Branch, Public Health Agency of Canada).

152 Ibid.

153 Ibid.

154 Parachute, [Concussion](#).

155 Dr. Michael Ellis, written submission.

156 Parachute, [Concussion](#).

157 SCSC, [Evidence](#), 10 April 2019, 1855 (Ms. Gerry Gallagher, Executive Director, Centre for Chronic Disease Prevention and Health Equity, Health Promotion and Chronic Disease Prevention Branch, Public Health Agency of Canada).

158 Holland Bloorview Kids Rehabilitation Hospital, [SCHOOLfirst](#).

and coaches on concussion identification and management.<sup>159</sup> PHAC promotes the use of the concussion tools developed by Parachute and other stakeholders.<sup>160</sup>

In her testimony, Ms. Fuselli of Parachute emphasized that organization's role as a "bridge." She noted, "Parachute acts as a bridge between research and policy-makers, the public, professionals and industry, translating research into key messages, tools, strategies and policies— basically, who needs to know what, how, where and when."<sup>161</sup> She further explained how Parachute turns evidence-based information into language that is appropriate for different audiences whether it be for policy or messaging.<sup>162</sup>

In terms of surveillance of sports-related concussions, the Subcommittee was told that this is an ongoing issue for study by the Working Group.<sup>163</sup> Mr. Campbell testified that the provincial/territorial ministers responsible for sport, physical activity and recreation have asked Sport Canada and PHAC to explore whether existing systems can be enhanced to accommodate concussion surveillance. While he acknowledged that there may be a role for sports organizations in concussion surveillance, he cited lack of capacity and the nature of collecting personal health data

“ Parachute acts as a bridge between research and policy-makers, the public, professionals and industry, translating research into key messages, tools, strategies and policies—basically, who needs to know what, how, where and when.”

Ms. Pamela Fuselli

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159 SCSC, *Evidence*, 10 April 2019, 1855 (Ms. Gerry Gallagher, Executive Director, Centre for Chronic Disease Prevention and Health Equity, Health Promotion and Chronic Disease Prevention Branch, Public Health Agency of Canada).

160 Government of Canada, *Concussion in Sport*.

161 SCSC, *Evidence*, 30 January 2019, 1840 (Ms. Pamela Fuselli, Vice-President, Knowledge Transfer and Stakeholder Relations, Parachute).

162 *Ibid.*, 1850.

163 SCSC, *Evidence*, 26 February 2019, 1925 (Mr. Todd Jackson, Director, Insurance and Risk Management, Hockey Canada).



as barriers to that sector.<sup>164</sup> The Subcommittee was told that national sports organizations become aware of concussions that occur during their sport only if an insurance claim is made, although provincial sports organizations may have additional data.<sup>165</sup> Further complicating the issue of concussion surveillance is that diagnosis can be obtained through emergency departments, walk-in clinics, family physicians and athletic therapists while treatment can include an even broader range of health care providers. For example, statistics available from the Canadian Institute for Health Information relate only to emergency department visits.<sup>166</sup>

With respect to awareness of sports-related concussions, the Subcommittee heard throughout this study that awareness has increased dramatically in the last 10-15 years. Public opinion research by PHAC, however, indicates that there is still work to be done. PHAC's Ms. Gallagher stated that there are "significant knowledge and awareness gaps about concussion among parents, coaches, teachers as well as health care professionals."<sup>167</sup> Results of a second round of public opinion research by PHAC on the views of youth with respect to concussion awareness, knowledge and access to resources are expected in the coming months.<sup>168</sup>

This Subcommittee applauds the extensive amount of work that has been done on the issue of concussion in the areas of research, policy and guideline development as well as outreach to all stakeholders to share best practices. It understands that work on a pan-Canadian approach on sports-related concussion is ongoing and it makes the following recommendations for consideration as this work progresses.

### **Recommendation 1**

**That the Government of Canada work with the provinces and territories to establish Concussion Awareness Week to coincide with Rowan's Law Day in Ontario in September. The purpose of Concussion Awareness Week will include, but not be limited to:**

- **Age-appropriate education and awareness programs in primary and secondary schools;**

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164 SCSC, *Evidence*, 10 April 2019, 1845 (Mr. Andrew Campbell, Assistant Deputy Minister, Department of Canadian Heritage, major events and commemorations).

165 SCSC, *Evidence*, 30 January 2019, 1820 (Mr. Paul Hunter, Director, National Rugby Development, Rugby Canada).

166 Canadian Institute for Health Information, *Heads-up on sport-related brain injuries*.

167 SCSC, *Evidence*, 10 April 2019, 1855 (Ms. Gerry Gallagher, Executive Director, Centre for Chronic Disease Prevention and Health Equity, Health Promotion and Chronic Disease Prevention Branch, Public Health Agency of Canada).

168 Ibid.

- **Awareness campaigns for the general public;**
- **Promotion of certification and training programs for health professionals; and**
- **Update and review concussion protocols and relevant training for sports organizations.**

#### **Recommendation 2**

**That the Government of Canada provide sufficient funding to organizations to carry out concussion-related activities during Concussion Awareness Week.**

#### **Recommendation 3**

**That the Government of Canada provide sufficient funding to organizations for further development, promotion and implementation of concussion tools and resources.**

#### **Recommendation 4**

**That the Government of Canada make federal funding for each national sports organization contingent on developing and implementing current sport-specific concussion policies and protocols.**

#### **Recommendation 5**

**That the Government of Canada establish a Concussion Research Expert Advisory Board, comprised of concussion researchers and experts from across Canada, with a mandate to conduct an inventory of ongoing concussion research, to identify gaps in concussion knowledge and to design a framework for concussion research.**

#### **Recommendation 6**

**That the Government of Canada ensure that the Canadian Institutes of Health Research is an active participant in, and allocates funding to, research protocols that fall within the framework for concussion research.**

#### **Recommendation 7**

**That the Minister of Health emphasize to the provincial and territorial ministers responsible for health the issue of concussion care and the potential concerns regarding:**

- **Education, training and certification of regulated health care professionals;**



- **Access to interdisciplinary health care teams for persistent symptoms; and,**
- **Scope of practice of allied health care providers.**

#### **Recommendation 8**

**That the Minister of Health meet with representatives of the Canadian Concussion Collaborative to urge its members to develop and implement programs for continuing education pertaining to concussion care.**

#### **Recommendation 9**

**That the Minister of Health direct the Public Health Agency of Canada, in its capacity as a member of the Pan-Canadian Joint Consortium for School Health, to urge the dissemination and implementation of concussion protocols in all school-based sports.**

#### **Recommendation 10**

**That the minister responsible for sport continue to meet with the provincial and territorial ministers responsible for sport, physical activity and recreation to encourage and monitor the implementation of concussion policies across Canada.**

#### **Recommendation 11**

**That the Minister of Health and the minister responsible for sport continue to support the work of the Federal-Provincial/Territorial Working Group on Concussion in Sport and, to the extent possible, make their work and recommendations publicly available.**

#### **Recommendation 12**

**That the Government of Canada, along with the provinces and territories, establish a common data collection system or process on concussions in sport, including leveraging any systems already in place, to ensure sharing of data in order to communicate concussion histories of individuals.**

#### **Recommendations 13**

**That the Government of Canada work with the sport community to ensure a cultural shift on safety in sport, especially by focusing on prevention of concussions through rules of the game; training methods; and behaviours of participants, coaches, officials, administrators, medical support personnel and parents.**

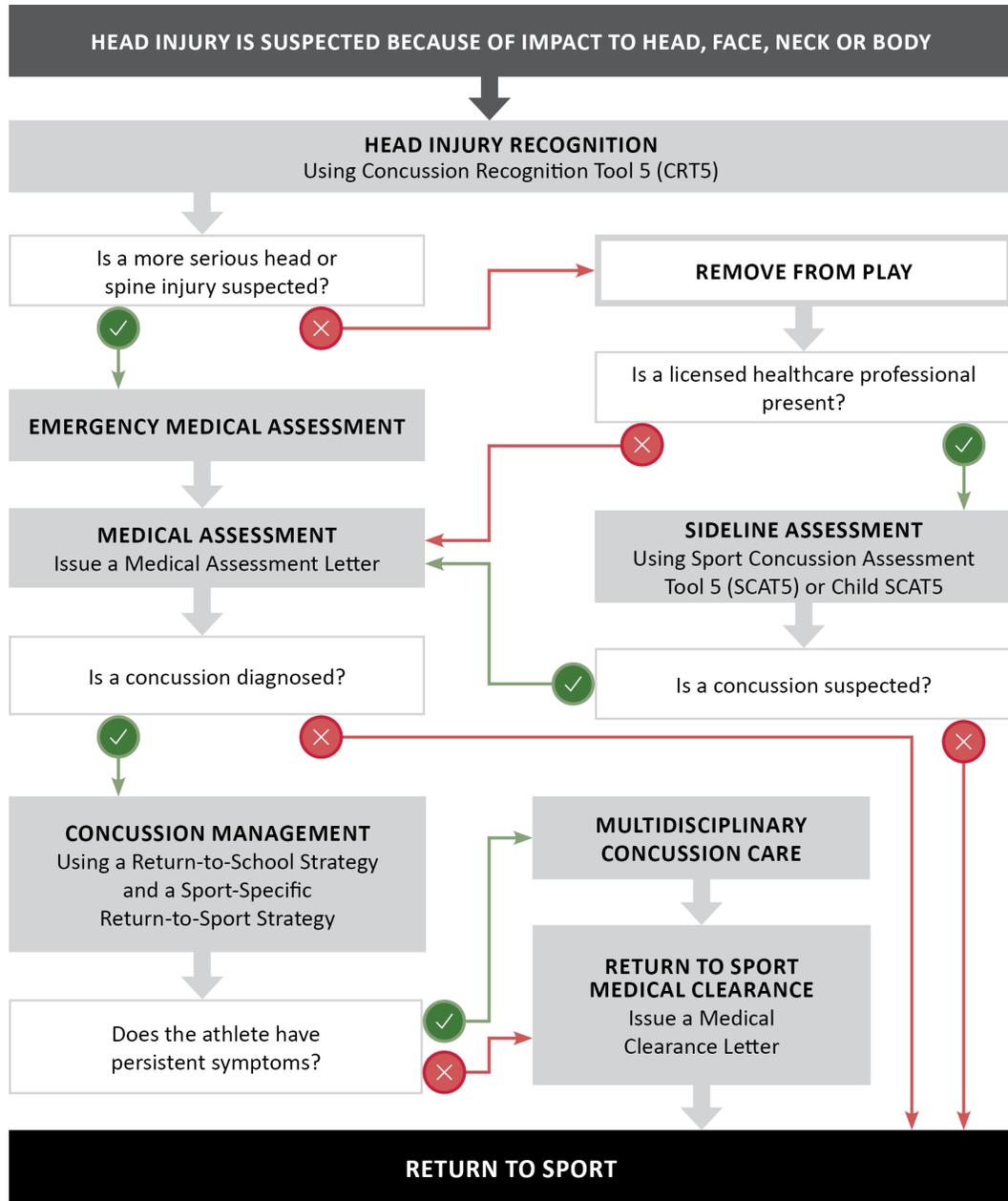
## CONCLUSION

This study has revealed that there has been a considerable surge in awareness of sports-related concussions in recent years thanks to the dedication of many stakeholders in sports, health care and research. Parachute, an injury prevention organization, has worked closely with experts in these fields and has developed several evidence-based resources and tools to improve the assessment, diagnosis and management of concussion. Sports organizations and researchers have worked together to develop and implement strategies, including rule changes for some sports. The Federal-Provincial/Territorial Working Group on Concussion in Sport has provided constructive recommendations to provincial and territorial governments across Canada for implementing a harmonized, pan-Canadian approach to sports-related concussions.

The Subcommittee notes that Sport Canada and the Public Health Agency of Canada have provided funding for these activities, but more can be done. The recommendations in this report urge the federal government to maintain focus on this issue until a truly harmonized pan-Canadian approach to sports-related concussions has been implemented. By reducing the chance of concussion and improving the management of concussion, the Subcommittee believes that sports can be made safer.



# APPENDIX A: FLOWCHART OF THE *CANADIAN GUIDELINE ON CONCUSSION IN SPORT*



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Source: Prepared by the Library of Parliament from the *Canadian Guideline on Concussion in Sport*, Parachute, 2017



## APPENDIX B LIST OF WITNESSES

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The following table lists the witnesses who appeared before the Committee at its meetings related to this report. Transcripts of all public meetings related to this report are available on the Committee’s [webpage for this study](#).

Organizations and Individuals	Date	Meeting
<b>As individuals</b>	2018/11/21	2
Hon. Ken Dryden, Former Member of Parliament, Author		
Carly Hodgins		
Sharra Hodgins		
Chris Lord		
Rachel Lord		
<b>As individuals</b>	2018/11/28	3
Matthew Chiarotto		
Ash Kolstad		
Kathy Leeder		
Carter Phair		
Anne Phair		
<b>Children's Hospital of Eastern Ontario</b>	2019/01/30	4
Roger Zemek, Director, Clinical Research		
<b>Coaching Association of Canada</b>	2019/01/30	4
Peter Niedre, Director of Education Partnerships		
<b>Parachute Canada</b>	2019/01/30	4
Pamela Fuselli, Vice-President Knowledge Transfer and Stakeholder Relations		
<b>Rugby Canada</b>	2019/01/30	4
Paul Hunter, Director of National Rugby Development		
<b>As an individual</b>	2019/02/06	5
Eric Lindros		

<b>Organizations and Individuals</b>	<b>Date</b>	<b>Meeting</b>
<b>Concussion Legacy Foundation</b> Chris Nowinski, Chief Executive Officer	2019/02/06	5
<b>Canadian Academy of Sport and Exercise Medicine</b> Elisabeth Hobden, President Elect	2019/02/20	6
<b>Canadian Concussion Centre - University Health Network, Toronto Western Hospital</b> Charles Tator, Director	2019/02/20	6
<b>Centre for Rehabilitation Research and Development</b> Dorothyann Curran, Research Associate The Ottawa Hospital	2019/02/20	6
<b>College of Family Physicians of Canada</b> Pierre Frémont, Chair of the Sport and Exercise Medicine Committee	2019/02/20	6
<b>University of Ottawa Brain &amp; Mind Research Institute</b> Shawn Marshall, Division Head Physical Medicine and Rehabilitation	2019/02/20	6
<b>As an individual</b> Kathryn Schneider, Assistant Professor Integrated Concussion Research Program, University of Calgary	2019/02/26	7
<b>Complete Concussion Management Inc.</b> Dr. Cameron Marshall, Founder and President	2019/02/26	7
<b>Concussion North</b> Dr. Shannon Bauman, Medical Director, Lead Physician	2019/02/26	7
<b>Hockey Canada</b> Dr. Mark Aubry, Chief Medical Officer Todd Jackson, Director Insurance and Risk Management	2019/02/26	7

<b>Organizations and Individuals</b>	<b>Date</b>	<b>Meeting</b>
<b>As individuals</b>	2019/04/01	8
Sandhya Mylabathula, Ph.D. Candidate University of Toronto		
Swapna Mylabathula, MD/Ph.D. Candidate University of Toronto		
Gordon Stringer		
<b>Canadian Football League</b>	2019/04/03	9
Randy Ambrosie, Commissioner		
Stephen J. Shamie, General Counsel		
<b>Canadian Olympic Committee</b>	2019/04/03	9
Robert McCormack, Medical Director		
<b>Canadian Soccer Association</b>	2019/04/03	9
Kevin Gordon Sports Medicine Committee		
<b>Canadian Standards Association</b>	2019/04/10	10
Nancy Bestic, Director Health and Safety Standards		
Patrick Bishop, Volunteer		
<b>Department of Canadian Heritage</b>	2019/04/10	10
Andrew Campbell, Assistant Deputy Minister, Canada 150 Sport, Major Events and Commemorations		
<b>Federal-Provincial-Territorial Concussion Working Group</b>	2019/04/10	10
Jocelyn East, Co-Chair		
Greg Guenther, Co-Chair		
<b>Public Health Agency of Canada</b>	2019/04/10	10
Gerry Gallagher, Executive Director Centre for Chronic Disease Prevention and Health Equity, Health Promotion and Chronic Disease Prevention Branch		
Andrew MacKenzie, Director, Behaviours, Environments and Lifespan Division, Centre for Surveillance and Applied Research, Health Promotion and Chronic Disease Prevention Branch		
<b>National Hockey League</b>	2019/05/01	11
Gary Bettman, Commissioner		
Bill Daly, Deputy Commissioner		



## APPENDIX C LIST OF BRIEFS

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The following is an alphabetical list of organizations and individuals who submitted briefs to the Committee related to this report. For more information, please consult the Committee's [webpage for this study](#).

### **Athletics and Recreation Committee**

**Canadian Academy of Sport and Exercise Medicine**

**Canadian Chiropractic Association**

**Canadian Chiropractic Guideline Initiative**

**Canadian Medical Association**

**Canadian Memorial Chiropractic College**

**Canadian Paediatric Society**

**Centre for Rehabilitation Research and Development**

**Champagne, Allen Anthony**

**College of Family Physicians of Canada**

**Complete Concussion Management Inc.**

**Dontigny, Léon**

**Ellis, Michael**

**Federal-Provincial-Territorial Concussion Working Group**

**Health Wellness Industries**

**Hoshizaki, Thomas Blaine**

**Hoshizaki, Warren**

**Karton, Clara**

**Kazemi, Dr. Mohsen**

**McKenna, Gregory S.**

**Mylabathula, Sandhya**

**Mylabathula, Swapna**

**National Hockey League**

**Rauscher, Alexander**

**Regina Minor Football**

**Robidoux, Michael A.**

**Royal College of Chiropractic Sports Sciences**

**Sport Physiotherapy Canada**

**Stefanovic, Deb**

**Stefanovic, Zeljko**

**Tator, Charles**

**University of Ottawa Brain & Mind Research Institute**

## REQUEST FOR GOVERNMENT RESPONSE

Pursuant to Standing Order 109, the Committee requests that the government table a comprehensive response to this Report.

A copy of the relevant *Minutes of Proceedings* of the Committee ([Meeting No. 148](#)) is tabled and a copy of the relevant *Minutes of Proceedings* of the Subcommittee on Sports-Related Concussions in Canada ([Meetings Nos. 2 to 13](#)) is tabled.

Respectfully submitted,

Bill Casey  
Chair

