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# Background to Concussion in Sport, Leisure, and Occupational Settings

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See also Policy on  
[Concussion in Sport, Leisure, and Occupational Settings](#)

## 1) How this Background to Policy Should be Situated:

This backgrounder is meant to complement CMA's recommendations in its policy on Concussion in Sport, Leisure, and Occupational Settings (2018).<sup>a</sup> It is meant to be informative on the issue(s) of traumatic brain injury (TBI) and concussions, and not act as a substitute for actual clinical practice or treatment guidelines.

## 2) How big is the issue?

Concussions are a serious public health concern both for minors and adults within sport, leisure, and occupational settings. Their reported occurrence is on the rise.<sup>1</sup> The body of knowledge regarding concussion is rapidly and constantly evolving; a dynamic that is unlikely to change in the foreseeable future. With the high volume of media coverage of concussion complications for prominent professional and amateur athletes, the public's attention and interest in concussions and head injuries continues to grow.

Whereas in the past concussion associated risks and injury were often minimized, and not factored into any analysis for a return-to-work or play, there is now a growing awareness to treat concussions and head injury as significant concerns to physical and mental health.

An issue that continues to negatively impact detection, reporting, and management of concussion and head injury is injury minimization. Individuals closely associated with a concussed individual (including coaches, co-workers, employers, or an injured individual themselves) may have an incentive, or experience personal and external pressures, to hide/downplay injury or

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<sup>a</sup> Together this background, and the target audience recommendations for Head Injury and Concussion, replace CMA's Head and Sport Injury policy (2011) and broadens the original sports-based focus to include leisure and occupational activities.

avoid medical assessment.<sup>2</sup> Injury minimization involves the attitude surrounding injury that is commonly expressed by the following examples: “shake or walk it off,” “it’s not that bad,” “you’ll be alright,” and “I’ll stick it out till the end of the game.” These ways of thinking perpetuate, and contribute to, toxic cultural dynamics within sporting, leisure, and work environments.

Even though the prevention and management of concussions and head injuries are now generally recognized as public health issues, many challenging dynamics persist for the Canadian health care system.<sup>3</sup> The potential implications of a missed, or poorly managed concussion, makes proper identification and management essential. Despite this, physicians, other health professionals and members of the public often fail to appreciate the full impact of experiencing a concussion.<sup>3,4</sup> With the increased awareness of concussion there has been a sharp associated rise in medical consultations for sport-related brain injuries in Canada;<sup>1</sup> sparking calls for greater system resources and research.<sup>5</sup>

Family physicians, whether in primary care settings or emergency departments, and those with added competencies in Sport and Exercise Medicine (SEM), are often the first medical professionals seen by a person who has sustained a concussion during a sport, leisure or occupational activity. In these cases, they are the first point of contact for proper management, advice, and education regarding that person’s gradual return to cognitive activities (e.g. school and work) and gradual return to physical activities (e.g. sport, exercise or work).<sup>5</sup> Yet, existing fee-for-service remuneration models for physicians don’t adequately account for the complex nature of concussion assessment and management.

The fast-paced developments in the field means that non-SEM clinicians struggle to maintain up-to-date knowledge regarding the detection and treatment of concussions.<sup>5</sup> These factors are further complicated by unclear scopes of practice within multi-professional groups involved in concussion management, and a general lack of available SEM specialists to refer patients with complex cases.<sup>5</sup>

### **3) Definitions & Injury Implications:**

Concussion, as a definition, is frequently associated with the term mild Traumatic Brain Injury (mTBI).<sup>6</sup> Taken separately, or apart, these terms are generally characterized as a rapidly changing, and generally temporary disturbance/decrease in cognitive brain function caused by a direct or indirect force to the head.<sup>b</sup> However, a concussion can occur with or without a direct blow to the head, face, jaw, neck, or chest.<sup>6</sup> Concussions can also be characterized by a movement that causes the head, brain, or neck to be either suddenly accelerated or decelerated.<sup>6</sup>

Often the blow or movement that produces a concussion, or MTBI, can seem innocuous; with

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<sup>b</sup> Due to their similarities in technical definition, the terms “TBI,” “mTBI” and “head injury” are herein meant to be used interchangeably with “concussion.”

symptoms evolving, or not even appearing for up to 48 hours post injury. It is also important to note that loss of consciousness does not occur with most concussion injuries. Generally, for concussions, initial symptoms progressively resolve over the course of a few hours, but they may persist for up to 10-14 days in adults.<sup>6</sup> In children, this duration is often longer, with symptoms up to 4 weeks remaining within the norm of recovery, likely because children's brains are not yet fully developed.<sup>7</sup> There may also be some gender based differences in concussion symptoms and recovery times.<sup>8</sup>

Because of the evolving nature of such an injury, no single test or clinical assessment can definitively rule out a possible concussion in the immediate period following such a blow or injury.<sup>6</sup> Hence, following a suspected concussion generating incident, the rationale for: (1) immediate (and day long) removal from activity/play; (2) ongoing symptom observation for a number of hours; and (3) the need for prompt assessment by a physician (or licensed healthcare provider).<sup>6</sup> Athletes of both genders who seek care earlier in the injury process have a shorter recovery.<sup>8</sup>

It is important not to understate the potentially debilitating symptoms of concussion. Persistent symptoms are those that fall outside the normal range of recovery times. Generally speaking, the only predictor of a slower recovery are more severe symptoms in the initial few days post-injury.<sup>6</sup> Clinical recovery implies the gradual and progressive return to activities (including work, school, and sports) post injury that mirrors the decrease in symptoms and/or cognitive impairment. In a paediatric population seen in an emergency room setting, about 1 in 3 individuals, presented with concussion symptoms that persisted for 28 days or more.<sup>7</sup>

While an individual (especially a minor) is still experiencing symptoms from a concussion, their threshold for sustaining, and recovering from, a subsequent concussion injury is diminished. Accompanying this increased risk can be a heightened severity and persistence of symptoms should a subsequent injury occur.<sup>6</sup> These risks highlight the need for individually tailored concussion treatment plans that have graduated steps for returns to play, school, or work activities.<sup>6</sup> These plans require "buffer zones" whereby one can revert to a previous step if a setback occurs.

#### **4) Brain Injury and Concussion Statistics:**

As of 2015, all 50 U.S. states had passed laws to address traumatic brain injury (primarily geared towards the protection of minors in sport). Since 2016, the U.S. Centers for Disease Control and Prevention (CDC) have been advocating for a national concussion surveillance system. This followed a 2010 report that estimated that 2.5 million TBI's occurred in the U.S. on an annual basis.<sup>9</sup>

In July 2018 the Canadian Institute for Health Information released its "Heads Up" report that compared brain injury statistics in Ontario and Alberta over 5 years.<sup>10</sup> The report estimated that

some combined 17,000 sports related brain injuries had been seen in these provinces' hospital emergency departments in 2016-2017. This represents 26% of all reported sports related injuries for both provinces, but it doesn't account for unreported concussions in the context of a medical encounters. Owing to a lack of data, it is difficult to draw a clear picture of the state of head injury and concussion in Canada. Nor is it possible to estimate the precise costs associated with concussion injury in Canada; their costs however, are likely significant.

### **5) Recent International and Canadian Developments in Concussion:**

The International Conference on Concussion in Sport is held every 4 years, after which an updated statement is released (known as either the Consensus Statement on Concussion in Sport). The 5<sup>th</sup> edition was released in the spring of 2017 and continues to be the foremost international authority on the principles and understanding of concussion. The stated intention of the statement is to further develop the conceptual understanding of sport-related concussion (SRC) and is meant for physicians and healthcare providers caring for athletes at all levels of sport (recreational, elite, or professional). Key points addressed within the 5<sup>th</sup> edition include: recognize and remove from activity, multifaceted assessment, periods of rest and recovery, gradual return to cognitive and physical activities, rehabilitation, long term consequences of concussion, and preventative strategies in sport.<sup>6</sup>

In 2017 Canada's Ministers for Health and Sport were given a mandate to implement a pan-Canadian concussion strategy, and to raise awareness for parents, coaches, and athletes on concussion treatment.<sup>11</sup> In July 2017, with funding provided for by the Public Health Agency of Canada, Parachute Canada released its Canadian Guideline on Concussion in Sport.<sup>12</sup> It covers pre-season education and the recognition, medical diagnosis, and management of individuals (namely athletes) who sustain a suspected concussion.

In August of 2017 the CCC released a document titled "4 Characteristics of a Good Concussion Clinic." Its criteria include: (1) having a medical doctor with experience in treating concussions; (2) licensed health care professionals working to provide complementary expertise and who work with the medical doctor to design/implement a personalized treatment plan; (3) adherence to the most up-to-date standards of care; and (4) adherence to the Berlin Consensus Statement with regards to tools, testing, and recommendations made to patients (which do not recommend routine baseline neurocognitive testing).<sup>13</sup>

Also, in August 2017, the College of Family Physicians of Canada and the Canadian Academy of Sport and Exercise Medicine released a joint statement that emphasized the need to develop public health strategies to address the issue of concussions.<sup>14</sup> The statement's aim was to highlight that public policy should reflect the fact that concussion prevention, detection and management occur prior to, as well as after, initial medical intervention.

In March 2018, the province of Ontario's Bill 193 – named Rowan's Law in memory of 17-year-old Rowan Stringer who died from rugby injuries in 2013 – came into effect. It requires "sports

organizations,” including post-secondary institutions, to implement removal-from-play, and return-to-sport protocols for amateur sport athletes who have sustained – or who are suspected of having sustained – a concussion. It also establishes a concussion code of conduct. Since then, other provinces have taken steps to investigate the implementation of either regulation, or legislation, with regards to reducing concussions in amateur sports.

Recent developments in clinical research for indicators<sup>15</sup> on (m)TBI indicate that in the coming years, rapid point of care diagnostics (RPCD) may become available tools used in the detection of head injuries. Their eventual emergence will pose interesting challenges for how and when to incorporate them into various sport, leisure, and occupational settings. A balance will clearly be needed that responsibly weighs the emerging scientific knowledge and ethical understanding of concussions, the availability of public resources, and the health of injured individuals. Early prominent examples of RPCD include biological sampling (blood, saliva, etc.), and technological scanning devices and applications.

## 6) Three Pressing Areas of Concern for Concussion:

First, despite the breakneck speed of development of knowledge in the field of concussion and head injury there is a great deal of consensus (both among academic and clinical experts) that research on concussions and head/brain injury continues to require significant public investment. Second, Canada continues to lack a nationally integrated injury surveillance system based on unified indicators. Such a system is key to informing prevention and education strategies as well as fostering a better understanding of the attributable costs associated with concussion for all Canadians. Finally, given the gap between the significant spike in reported concussion injuries, the burden of injury to those suffering from a concussion, and the continuous evolution of the understanding of concussions, there is a clear need for governments to invest resources. This to ensure the medical profession’s general proficiency in concussion detection and management.

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<sup>1</sup> Zemek R, Grool A, Rodriguez D, et al. Annual and Seasonal Trends in Ambulatory Visits for Pediatric Concussion in Ontario between 2003 and 2013. *J Pediatr*, 2017, 181: 222-8.

<sup>2</sup> Delaney J, Caron J, Correa J, et al. Why Professional Football Players Choose not to Reveal their Concussion Symptoms During a Practice or Game. *Clin J Sport Med*, 2018, 28(1): 1-12.

<sup>3</sup> Dickson J. *Canadians Know Little About the Dangers of Concussions, Federal Survey Suggests*. The Globe and Mail, 2018, July 12<sup>th</sup>. Available: <https://www.theglobeandmail.com/sports/article-canadians-know-little-about-the-dangers-of-concussions-federal-survey/> (accessed 2018 Jul 31).

<sup>4</sup> Zemek R, Eady K, Moreau K, et al. Knowledge of Paediatric Concussion Among Front-Line Primary Care Providers. *Paediatr Child Health*, 2014, 19(9): 475-480.

<sup>5</sup> College of Family Physicians of Canada & Canadian Academy of Sport and Exercise. Joint Position Statement - The Role of Family Physicians and Physicians with Added Competencies in Sport and Exercise Medicine in a Public Health Approach to Concussions. 2017. Available: [http://www.cfpc.ca/uploadedFiles/Resources/Resource\\_Items/Health\\_Professionals/Joint%20Position%20statement\\_concussion\\_CFPC-CASEM-FINAL.pdf](http://www.cfpc.ca/uploadedFiles/Resources/Resource_Items/Health_Professionals/Joint%20Position%20statement_concussion_CFPC-CASEM-FINAL.pdf) (accessed 2018 Jul 31).

<sup>6</sup> McCrory P, Meeuwisse W, Dvorak J, et al. Consensus Statement on Concussion in Sport - the 5th International Conference on Concussion in Sport Held in Berlin. *Br J Sports Med*, 2017, 51: 838-847.

<sup>7</sup> Zemek R, Barrowman N, Freedman S, et al. Clinical Risk Score for Persistent Post-Concussion Symptoms Among Children with Acute Concussion in the ED. *JAMA*, 2016, 315(10): 1014-1025.

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- <sup>8</sup> Bauman S, Ray M, & Joseph P. Gender differences in clinical presentation and recovery of sports-related concussion. *Br J Sports Med*, 2017, 7(51), A35.
- <sup>9</sup> Gibson T, Herring S, Kutcher J, et al. Analyzing the Effect of State Legislation on Health Care Utilization for Children with Concussion. *JAMA Pediatrics*, 2015, 169(2): 163-168.
- <sup>10</sup> Canadian Institute for Health Information (CIHI). *How Many ER Visits for Sport-Related Brain Injuries Receive a Concussion Diagnosis?* Ottawa: CIHI; 2016. Available: <https://www.cihi.ca/en/heads-up-on-sport-related-brain-injuries-0> (accessed 2018 Jul, 31).
- <sup>11</sup> Office of the Prime Minister of Canada. *Mandate Letter, Minister of Sport & Persons with Disabilities*. Ottawa: Office of the Prime Minister of Canada; 2017. Available: <https://pm.gc.ca/eng/minister-sport-and-persons-disabilities-mandate-letter-october-4-2017> (accessed 2018 July, 31).
- <sup>12</sup> Parachute Canada. *Canadian Guideline on Concussion in Sport*. Toronto: Parachute Canada; 2017. Available: <http://www.parachutecanada.org/injury-topics/item/canadian-guideline-on-concussion-in-sport> (accessed 2018 Jul 31).
- <sup>13</sup> Canadian Concussion Collaborative. *Canadian Concussion Collaborative Identifies Characteristics of a Good Concussion Clinic*. Ottawa: Canadian Concussion Collaborative; 2017. Available: <https://cces.ca/news/canadian-concussion-collaborative-identifies-characteristics-good-concussion-clinics> (accessed 2018 Jul 31).
- <sup>14</sup> The College of Family Physicians of Canada, Canadian Academy of Sport and Exercise Medicine. *Joint Position statement - The Role of Family Physicians and physicians with Added Competencies in Sport and Exercise Medicine in a Public Health Approach to Concussions*. Ottawa: The College of Family Physicians of Canada and The Canadian Academy of Sport and Exercise Medicine 2017 August. Available: [https://www.cfpc.ca/uploadedFiles/Resources/Resource\\_Items/Health\\_Professionals/Joint%20Position%20statement\\_concussion\\_CFPC-CASEM-FINAL.pdf](https://www.cfpc.ca/uploadedFiles/Resources/Resource_Items/Health_Professionals/Joint%20Position%20statement_concussion_CFPC-CASEM-FINAL.pdf) (accessed 2018 Aug 28).
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