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## HEAD INJURY AND SPORT

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Recent high profile incidents of concussions in professional hockey have led to increasing concern about this injury and its health consequences. Concussion, which is the most frequent form of Traumatic Brain Injury (TBI), is a disturbance in brain function caused by a direct or indirect force to the head. Professional and amateur sports that involve contact or collision, such as hockey, soccer, football, rugby and basketball, are among the most common sports in which concussion occurs.<sup>1</sup> However, it is important to note that a concussion can occur in any activity where a blow to the head, face or jaw, or other force to the head occurs.

Although concussion has had a significant impact on the health of Canadians and their families over many years, it has received relatively little attention from the general population or athletes. According to the Canadian Institute for Health Information, sports and recreational activities were the third leading cause of TBI admissions in Canadian hospitals in 2003-2004.<sup>2</sup> In the United States, the Center for Disease Control and Prevention estimates that 1.6 to 3.8 million concussions occur in sports and recreational activities annually.<sup>3</sup>

Physicians have a critical role in advocating for the prevention of head injuries. The Canadian Medical Association (CMA) and many other medical organizations have taken positions that support advocacy; calling for the mandatory use of facial protection and helmets in hockey, and the use of protective headgear for cyclists, equestrians, downhill skiers and snowboarders. The CMA has also strongly advocated the ban of sports in which the main objective is to injure opponents.

It is important to note that while the use of protective gear such as helmets and mouth guards may decrease the risk of head injuries such as lacerations or fracture, their efficacy in concussion prevention should not be overestimated. More research is needed in this area.

### **Public Education and Awareness**

The failure to recognize and report concussions could be the result of a lack of knowledge among athletes, coaches, trainers, and parents regarding the signs and symptoms of concussion.<sup>4</sup> There also appears to be some reluctance to report a concussion because the athlete is either unaware of the seriousness of the injury or fears that he/she

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will be removed from play.<sup>5</sup> Children and youth may not be cognitively mature enough to recognize or describe the signs and symptoms they are experiencing.

Cultural and social attitudes associated with sports may prevent the seriousness of the injury from being recognized. Because concussion is invisible, it may not be considered a 'real' injury. This attitude is further compounded by the language used to describe head trauma; "bell ringer", "dinger" or "seeing stars" are all examples of language that downplays the gravity of the injury. In addition, some competitive players are taught from a young age that pain is weakness and that injuries are an unavoidable "rite of passage".<sup>6</sup>

#### **Recommendations:**

- 1. The Canadian Medical Association recommends that coaches, trainers and sports therapists receive nationally standardized and certified education about the signs and symptoms, potential long-term consequences, and appropriate steps for managing sport-related concussions.**
- 2. The Canadian Medical Association works with the Provincial/Territorial Medical Associations and other national medical organizations to encourage sporting organizations to improve training and education, and to raise awareness on the potential consequences of concussion.**
- 3. The Canadian Medical Association recommends that parents who enroll their children in contact/collision sports be provided with information on the signs and symptoms of concussion.**

- 4. The Canadian Medical Association recommends that students involved in sports and physical education programs should be taught the specific signs and symptoms of concussion with emphasis on the potential serious consequences of ignoring concussion symptoms.**

#### **The Physician**

The majority of concussions that physicians will see are sport or activity related. A concussion can occur without a direct blow to the head: a blow to the chest or back that causes the head to be rapidly accelerated or decelerated may also result in a concussion. Any athlete with a suspected concussion should be immediately removed from play until he/she is evaluated by a physician experienced with diagnosis and treatment of concussion.

SCAT2 (Sport Concussion Assessment Tool 2) is a recognized assessment tool that was developed by a group of international experts at the 3<sup>rd</sup> International Symposium on Concussion in Sport held in Zurich, Switzerland in November 2008. It can be used on the field or in the office setting with athletes 10 years and older, and represents a standardized method of evaluating injured athletes for concussion.<sup>7</sup>

The Canadian Paediatric Society has published guidelines on sport-related concussion management in younger children. CPS recommends a more conservative approach for children than for adults.<sup>8</sup>

Physicians are in an excellent position to educate and encourage athletes, parents, coaches, trainers and therapists about ways to recognize the injury, and to reduce the risk of concussion.

## Recommendations:

- 5. The Canadian Medical Association recommends that any athlete with a suspected concussion be immediately removed from play until he/she is evaluated by a physician to confirm the diagnosis and to institute an appropriate assessment and provision of follow-up care with a physician experienced in concussion management.**
- 6. The Canadian Medical Association work with the Canadian Academy of Sport and Exercise Medicine on the development of a Continuing Medical Education module on concussions for family physicians and specialists.**
- 7. Physicians discourage participation in sports in which intentional trauma to the head and body is the objective of the sport.**

## Return to Play Guidelines

Any athlete with a suspected concussion should be immediately removed from play.<sup>9</sup> Return to play should only be considered once the patient is asymptomatic, cognitive function has returned to normal and after receiving medical clearance upon completion of a graduated-exertion return to play protocol.

While an athlete is still experiencing symptoms from a concussion, their threshold for sustaining another concussion is much lower. As a result, an otherwise innocuous fall or contact may result in another concussion with a longer and more symptomatic period of recovery. In extreme cases, athletes suffering a second blow to the head while recovering from an initial

concussion have been reported to suffer catastrophic consequences referred to as “Second Impact Syndrome”. Although this syndrome is still under investigation, it is thought to occur when a symptomatic athlete receives a second head trauma that triggers rapid brain swelling which can lead to death.<sup>10,11</sup>

Normal activities, including sport participation, should be resumed in a stepwise process. A detailed stepwise process is included in the *Zurich Consensus Statement on Concussion in Sport*.<sup>12</sup> Physicians should consult the Canadian Paediatric Society guidelines for return to play recommendations for children and youth.

## Recommendations:

- 8. The Canadian Medical Association recommends that a physician knowledgeable in concussion management determine when the athlete can return to sport.**
- 9. The Canadian Medical Association recommends further research on both the incidence of sport-related concussions in children and appropriate management protocols, in order to ascertain the effects of concussion in children and determine the most appropriate return to play guidelines for children.**

## Surveillance and Monitoring

Although there is a great deal of consensus on both the definition and treatment protocols for concussion, there are few strategies to monitor the overall incidence of these injuries and their long-term effects. The CMA recognizes that the current surveillance “system” for injuries is insufficient.

## Recommendation:

**10. The Canadian Medical Association recommends that current surveillance tools, such as the Canadian Hospitals Injury Reporting and Prevention Program, coroners' databases, Canadian Agricultural Injury Reports and mortality databases be supplemented and coordinated in such a way that it is possible to have a national sports injury surveillance system to collect and analyze timely and complete information about sports-related head injuries.**

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<sup>1</sup> ThinkFirst-SportSmart Concussion Education and Awareness Committee. New Concussion Management Guidelines: Concussion Question and Answer Document for Physicians. May 2010. Available at [http://thinkfirst.ca/programs/concussion\\_resources.aspx](http://thinkfirst.ca/programs/concussion_resources.aspx)

<sup>2</sup> Canadian Institute for Health Information. Head Injuries in Canada: A Decade of Change (1994-1995 to 2003-2004). Available at [http://secure.cihi.ca/cihiweb/products/ntr\\_head\\_injuries\\_2006\\_e.pdf](http://secure.cihi.ca/cihiweb/products/ntr_head_injuries_2006_e.pdf)

<sup>3</sup> Daneshvar Daniel H., Nowinski Christopher J., McKee Ann C., Cantu Robert C. The Epidemiology of Sport-Related Concussion. *Clinical Sports Medicine* 30 (2011) 1-17.

<sup>4</sup> Echlin, Paul Sean, Johnson, Andrew M., Riverin, Suzanne, Tator, Charles H., Cantu, Robert C., Cusimano, Michael D., Taunton, Jack E., Upshur, Ross E.G., Skopelja, Elaine N. A Prospective Study of Concussion Education in 2 Junior Ice Hockey Teams: Implications for Sports Concussion Education. *Neurosurgical Focus*, Volume 29, November 2010.

<sup>5</sup> Echlin, Paul Sean. Concussion Education, Identification, and Treatment within a Prospective Study of Physician-Observed Junior Ice Hockey Concussions: Social Contact of this Scientific Intervention. *Neurosurgical Focus*, Volume 29, November 2010.

<sup>6</sup> Echlin, Paul Sean. Concussion Education, Identification, and Treatment within a Prospective Study of Physician-Observed Junior Ice Hockey Concussions: Social Contact of this Scientific Intervention. *Neurosurgical Focus*, Volume 29, November 2010.

<sup>7</sup> Sport Concussion Assessment Tool 2 (SCAT2), Appendix 1 to the Consensus Statement on Concussion in Sport developed at the 3rd International Conference on Concussion in Sport in Zurich, November 2008. Available at [http://bjsm.bmj.com/content/43/Suppl\\_1/i76.full](http://bjsm.bmj.com/content/43/Suppl_1/i76.full)

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<sup>8</sup> Canadian Paediatric Society. Identification and Management of Children with Sport-Related Concussion 2006. Available at <http://www.cps.ca/english/statements/HAL/HAL06-01.htm>

<sup>9</sup> McCrory P., Meeuwisse W., Johnston K., Dvorak J., Aubry M., Molloy M., Cantu R. The Consensus Statement on Concussion in Sport developed at the 3rd International Conference on Concussion in Sport in Zurich, November 2008. Available at [http://bjsm.bmj.com/content/43/Suppl\\_1/i76.full](http://bjsm.bmj.com/content/43/Suppl_1/i76.full)

<sup>10</sup> Heck John, Rosa, Robert. Evaluating Mild Head Injuries: Incorporating the Standard Assessment of Concussion. Available at [http://www.sirc.ca/online\\_resources/freebies/head\\_injuries.cfm](http://www.sirc.ca/online_resources/freebies/head_injuries.cfm)

<sup>11</sup> Echlin, Paul Sean. Concussion Education, Identification, and Treatment within a Prospective Study of Physician-Observed Junior Ice Hockey Concussions: Social Contact of this Scientific Intervention. *Neurosurgical Focus*, Volume 29, November 2010.

<sup>12</sup> McCrory P., Meeuwisse W., Johnston K., Dvorak J., Aubry M., Molloy M., Cantu R. The Consensus Statement on Concussion in Sport developed at the 3rd International Conference on Concussion in Sport in Zurich, November 2008. Available at [http://bjsm.bmj.com/content/43/Suppl\\_1/i76.full](http://bjsm.bmj.com/content/43/Suppl_1/i76.full)