

Literature Review

The topic of body checking in minor hockey generally leads to passionate debate and a multitude of varied opinions and thoughts. Recent increased attention to the incidence and severity of concussion injuries, just one of the types of injury that may occur when playing a collision sport such as hockey, has generated a number of well designed and peer reviewed studies that are helping to provide insight into injury risks in sport. Review of scientific literature is necessary to move the discussion beyond individual opinion or experience. Scientific evidence also helps to provide a broader view of the topic and aid in addressing specific questions and possibly dispelling some long-held, pre-conceived notions that have long been held when it comes to thinking about hockey injuries and body checking.

National Context

Hockey Canada has undergone several revisions and changes to its policy with respect to the appropriate age to introduce body checking in minor hockey. Currently, body checking is not permitted in Pee Wee level hockey in Quebec with body checking introduced at Bantam age. In Ontario, the Ontario Minor Hockey Association and the Ontario Hockey Federation have established that “for the 2011-2012 season, body checking is removed from all age divisions of House league and House league select hockey” (OMHA, 2011). It was stated that the impetus for this change was to “make the game safer, more enjoyable, and thus keep kids involved in the sport longer” (Lee, 2011). Various jurisdictions in the province of British Columbia have also removed body checking from their recreational (or “C”) leagues. In addition, the Pacific Coast Amateur Hockey Association has recently put forth a resolution for discussion at the BC Hockey’s June annual meeting that would eliminate body checking at the Pee Wee A level. “Concerns about hockey injuries, in particular head injuries and concussions” prompted this proposal (PCAHA, 2012). Finally, Hockey USA voted to remove body checking from game situations at the Pee Wee level starting the 2011-2012 season, but supports the teaching of body checking in practices at this age level. The approach of USA Hockey is more in line with the American Academy of Pediatrics recommendation that body checking in hockey be limited to players 15 years of age or older (American Academy of Pediatrics, 2000).

Link between Body Checking and Injury

For the purposes of this sub-committee, it was necessary to first establish the role of body checking in hockey injuries in minor hockey players. In reviewing a variety of studies, it is clear that **legal body checking is the single most consistent risk factor for injury to minor hockey players** (Johnson, 2011; Emery & Hagel et al., 2010; McPherson, Rothman & Howard, 2006; Willer et al., 2005, American Academy of Pediatrics, 2000). Estimates from a variety of articles indicate that **body checking is associated with between 45-86% of injuries in minor hockey** (Willer et al., 2005).

It is important to understand that it is body checking itself, rather than the age and size of the player (i.e., Pee Wee age and above in Alberta), that is the mechanism accounting for the bulk of injuries (McPherson, Rothman & Howard, 2006; Hagel & Marko, et. al.,

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2006; American Academy of Pediatrics, 2000). To illustrate this, well designed studies have compared players of the same age and level of play who play in leagues with differing policies related to body checking. In Quebec, body checking is not allowed in Pee Wee minor hockey, whereas in Alberta, body checking is allowed at the Pee Wee level. One such study demonstrated more than a **3 fold increased rate of injury for the Alberta Pee Wee minor hockey players when compared with their Quebec counterparts** in age and skill (Emery & Kang et al., 2010).

Other combined estimates (of up to 10 different studies) of increased rate of injury in body checking leagues versus non-body checking leagues demonstrate a combined risk ratio of 2.45 (Emery & Hagel et al., 2010, Warsh et al., 2009). In other words, **there are 245% more injuries in body checking leagues than non-body checking leagues**. In addition, it has also been shown that in leagues that allow body checking at the Pee Wee level, there is a 2 fold increase in injuries related to “intentional contact” or other contacts between players that would qualify for penalty calls (elbowing, slashing, tripping, cross checking, and roughing) when compared to leagues that do not allow body checking (Emery & Kang et al., 2010). It appears that allowing body checking at this level leads to a more aggressive style of play, the consequences of which may be additional injuries, even injuries not related to body checking per se. **Clearly body checking increases the rate of injuries (McPherson, Rothman & Howard, 2006), both directly and indirectly, in minor hockey players.**

It has been posited that learning to body check at a younger age might somehow protect players from injuries related to body checking at older ages. The literature, however, does not support this (McPherson, Rothman & Howard, 2006). A further comparison between Bantam minor hockey players from Quebec (no previous body checking experience) and Alberta (2 years of body checking experience) revealed a similar rate of injury in both groups in their first year of Bantam (Emery and Kang et al., 2011; McLaughlin, 2011). In addition, the rates of injury for the Bantam players in Quebec were similar to those of the Alberta players in their first year of body checking, suggesting that **regardless of when body checking is introduced there will be a spike in injuries sustained**. In a breakdown of injuries sustained, there was no difference between the groups in terms of concussions, severe injury or severe concussions. Contrary to common misconceptions, **introducing body checking at an older age (Bantam) when players are larger, faster, and size discrepancies may be greater does not result in significantly increased rates of injury nor does it result in more severe injury.**

Types of Injuries associated with Body Checking

It is important to be clear on the types of injuries sustained by minor hockey players who are exposed to body checking. In the study comparing Pee Wee aged players in Quebec (non-body checking) and Alberta (body checking), the **Alberta players were at a 3 fold greater risk for all types of injuries measured including overall injury, concussion (less than 10 days lost), severe injury (7 or more days lost due to injury) and severe concussion (10 or more days lost due to injury)**. The greatest difference in injury rates between the provinces related to fractures and concussions. This same pattern of type of injury was also noted in a study comparing Ontario (body checking league) to Quebec (non body checking league) players, with head injuries and

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fractures more common in body checking leagues (McPherson, Rothman & Howard, 2006). In other words, **there are significantly more fractures and concussions sustained by minor hockey players exposed to body checking at the Pee Wee level when compared to those who are not exposed** (McPherson, Rothman & Howard, 2006). A combined estimate of the increased risk of severe injury (defined as fractures, concussions, injury requiring hospitalization or emergency medical attention) related to body checking was 1.7 (ranging from 1.2-11.7) (Emery and Hagel et al. 2010). **Body checking is a major source of serious injury in hockey players** (Johnson, 2011).

Given the clear association between body checking and concussions, further research was done in this area. Concussions are a relatively frequent childhood injury in Canada. The Canadian Pediatric Society indicates that sport related head injuries account for approximately 18.2% of all serious head injuries in children under 10 years of age; 53.4% in 10-14 year olds, and 42.9% in 15-19 year olds, with the majority of sport-related head injuries occurring in individuals under the age of 20 years (Canadian Pediatric Society, 2006). Despite these numbers there is still strong speculation that many sport-related concussions are overlooked due to under-reporting by young athletes (Johnson, 2011) and insufficient education by the adults supervising their play (coaches, parents).

With respect to particular types of injuries, research indicates that **young athletes' brains are more susceptible to concussion (Stuart, 2011, Aubrey, 2010), and that injured pediatric brains respond less well to healing and may be more vulnerable to diffuse injury (Kirkwood, 2006).** In addition, **previous concussion is a significant risk factor for future concussion and such athletes that have sustained a concussion are 3-6 times more likely to suffer a further concussion** (Johnson, 2011; Barlow, 2011; Emery and Kang 2011, Canadian Pediatric Society, 2006, Kirkwood et al., 2005). There is also evidence that **multiple concussions can have a cumulative, detrimental effect on the brain leading to the potential of long term damage** (Cusimano, 2011; Johnson, 2011; Stuart, 2011; Aubry, 2010). Many physicians are advising athletes who sustain 3 or more concussions in one sport to discontinue participation in that sport or modify their play such that their risk is reduced (flag football versus tackle football, non-body checking hockey versus body checking hockey).

Return-to-Play

The decision to return an athlete to play following a concussion is a complex decision that should be made by a professional with the appropriate training. To make this decision, it is essential to have a clear, objective record of player symptoms (McCrory, 2009). Ideally, a current symptom profile is compared to a baseline profile for that athlete. In addition, the incidence of under reporting of symptoms is speculated to be high for many reasons and therefore, relying on self-reports may not be an effective way to make the decision to return to play with confidence (Johnson, 2011; Halstead & Walter, 2010; Canadian Pediatric Society, 2006). Various instruments are available for baseline assessments with young athletes (Sport Concussion Assessment Tool – 2nd edition, SCAT-2; ImPACT), although the validity and reliability of these instruments in many cases is still being evaluated in younger children. Although the Zurich guidelines indicate that using the SCAT-2 down to the age of 10 is supported (McCrory, 2009),

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validation of the tool with this age group has not been established. In addition, cost, timing, frequency, and the education of administrators to ensure valid and reliable assessments are also factors to be considered. Current research through the Alberta Children's Hospital and the University of Calgary is examining the question of appropriate tools for younger athletes. Professionals involved in this research are willing to consult with Hockey Calgary regarding the practice of baseline testing.

Skill Development

The relationship between body checking and hockey player skill development is not yet clear. Some view body checking as simply one more skill necessary to play hockey. It can be argued that although body checking may indeed be a hockey skill, it is not essential given the numbers of individuals who play non-body checking hockey in Canada (many adult recreation leagues, girls/women's hockey, players under Pee Wee age, some Pee Wee level players) and the USA. Few minor hockey players will require the skill of body checking to earn a living professionally or further their education.

Others take the view that the implementation of body checking can negatively impact player development at certain ages. Hockey USA has removed body checking from game situations at the Pee Wee level due to both its impact on player skill development and injury data. Their recommendations include teaching the skill of body checking in practice during the Pee Wee age span but not allowing its use in games until the Bantam age level (McLaughlin, 2011). The rationale for this is that the rate of injuries in practice is much less than in game situations (Stuart, 2011; Emery & Hagel, 2010; Willer, 2005). They also comment that 80% of Hockey USA is already non checking so this change will not be revolutionary (McLaughlin, 2011). It has also been shown that there is no difference in the rate of injuries in practice in jurisdictions that allow body checking versus those that do not (Emery & Kang, 2010). In other words, **practice seems to be a relatively safe location to introduce the skill of body checking to young hockey players**. Other elements of the skill development argument are that in their anticipation of either giving or receiving a body check in hockey, young players are having difficulty splitting their attention between body checking and other hockey related skills (Stuart, 2011), limiting their puck possession time, causing them to forget about the puck, stunting their skill development and reducing their on-ice creativity (Grillo, 2011; DeGregorio, 2011). The Hockey USA model of Long Term Athlete Development indicates that the Pee Wee age level is a prime time for developing hockey skills and that this is compromised by the introduction of body checking in games at that age (McLaughlin, 2011). Hockey USA also comments on the emphasis of body contact in hockey at all levels to encourage players to play with their heads up and to establish the precursor skills to a well delivered or received body check such as positioning, angling, and rubbing (DeGregorio, 2011; Leaf, 2011; Rausch, 2011). A change in attitude around delivering "hits" versus body checks is also needed to encourage players not to lose sight of the game of hockey in their efforts to add body checking to their inventory of hockey skills (Leaf, 2011; Rausch, 2011, Tabrum, 2011).

Federal Landscape

The significance and severity of injuries in sport is not lost on federal officials across North America. Recently, the Public Health Agency of Canada's "Active and Safe" program announced that it is supporting a joint project of ThinkFirst Canada, the Canadian Centre for Ethics in Sport, the Coaching Association of Canada, and Hockey Canada to help coaches, trainers, parents, and athletes recognize and prevent serious brain injuries. Minister of State for Amateur Sport Bal Gosal noted that an estimated 90 per cent of severe brain injuries are preventable if parents, coaches and the players themselves knew more about the risks. The Public Health Agency of Canada is investing 1.5 million dollars for the prevention of head injuries in team sport for young Canadians. (January 2012; http://www.phac-aspc.gc.ca/media/nr-rp/2012/2012_0119-fs-fi-eng.php). In addition, congressional hearings have been held in the United States in regards to the subject of the cumulative and long lasting effects of sport-related concussions. Epidemiological research has highlighted the association between sport-related concussions and immediate and long term cognitive impairments, making this a clear public health concern (Science Daily, 2010).

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Additional Resources Reviewed or Presentations attended

1. Presentation by Dr. Carolyn Emery to the Body checking sub-committee November 24, 2011
2. Stop Concussions presentation by Kerry Goulet, December 4, 2011. Sponsored by Tuxedo Source for Sports.
3. Concussion Symposium, Canada Olympic Park - Dec 7, 2011
Dr. K. Brett, Team Physician, Calgary Flames
Dr. K. Barlow, Neurologist, Alberta Children's Hospital

Useful Websites

www.thinkfirst.ca Their aim is to prevent brain and spinal cord injury through education aimed at healthy behaviours of children and youth

www.stopconcussions.com This site is an online concussion/neurotrauma educational and awareness hub for all sports, to address the growing trend of concussions in sports (Keith Primeau and Kerry Goulet).

www.playitcoolhockey.com Play it cool is a unique intervention program aimed at reducing injuries in minor hockey by helping coaches teaching the game with safety in mind and by raising awareness around concussion and spinal injuries (Keith Primeau)

www.biac-aclc.ca The mandate of this site is to improve the quality of life for all Canadians affected by acquired brain injury and promote it's prevention

www.cdc.gov/concussion This site provides up to date medical facts on concussions.

www.sportslegacy.org This site was founded to solve this concussion crisis in sports and the military through medical research, treatment, and education & prevention.

www.momsteam.com This site is a resource of sport information for parents