

# Current Literature Summary

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Sports-related concussion is a major public health concern in pediatric athletics. Many states are passing or considering legislation to reduce concussions and injuries secondary to concussion. Concussions among youth athletes are underreported, which may be due to a lack of knowledge of the signs and symptoms of concussion or proper concussion management. We will provide brief synopses of current research on concussion knowledge as well as management and discuss possible applications to athletic training education.

Bramley H, Kroft C, Polk D, Newberry T, Silvis M. Do youth hockey coaches allow players with a known concussion to participate in a game? *Clin Pediatr*. 2012;51(3):283-7.

Reviewed by Jennifer Doherty-Restrepo, Florida International University

Summary of research context and methods: Ice hockey is a popular sport with 550,000 and 345,000 registered players in Canada and the United States, respectively. The frequency of sports-related concussions is increasing among children and adolescents. Concussions account for approximately 15% of all injuries sustained by 9- to 16-year-old ice hockey players. Hockey is a high-risk sport for concussion; therefore, coaches need to be knowledgeable of the signs and symptoms of concussion and proper management.

These researchers conducted a cross-sectional survey including 7 case scenarios to determine the likelihood that youth hockey coaches would allow a hockey player with a known concussion to continue play. A total of 134 youth hockey coaches participating in a USA Hockey coaching certification clinic participated in this study (100% response rate). Using a rating scale ranging from 1 (never) to 5 (always), the hockey coaches responded to the 7 case scenarios as to whether or not they would allow continued participation of a concussed hockey player in a game situation. The scenarios varied relative to the severity of the concussion and the importance of the game. Data were analyzed with t tests or one-way ANOVA as appropriate.

Summary of research findings: Eighty percent or more of the hockey coaches in this study would never allow a player back

into a game after suffering a concussion. Variation in the hockey coaches' decisions was noted relative to concussion severity and importance of the game. When the scenario involved an athlete with a severe concussion, 99.0% of the hockey coaches would never allow the player to return to the game. When the scenario involved an athlete with a minor concussion, 83.8% of the hockey coaches would never allow a player to return to the game. The hockey coaches surveyed were more likely to allow a concussed athlete to continue playing in an important game, such as a championship game or a final high school game. Additionally, the younger the hockey coach, the more likely they were to consider allowing a concussed player to continue in the game. Coaches with any level (I-IV) of USA Hockey coaching certification were less likely to allow a player to return to the game if he/she sustained a minor concussion, or if he/she sustained a concussion and insisted that he/she was fine and wanted to return to play.

Implications for athletic training education/research: Allowing concussed athletes to participate in sport places the athlete at further of injury and contradicts current concussion management guidelines. Given the high risk for concussion in ice hockey, it is important for coaches to be aware that concussed athletes must be removed from activity and evaluated by an appropriate health care professional, such as an athletic trainer. The results of this study indicate that youth hockey coaches need additional education regarding concussion management. Such training could be accomplished during mandatory USA Hockey coaching clinics. Additionally, USA Hockey should consider requiring the presence of appropriate health care professionals, such as athletic trainers, at all league games as this would reduce the risk of a concussed athlete from returning to play. The athletic training profession has made significant contributions to increasing concussion

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awareness through research, education, and legislative efforts. Future studies should examine the effectiveness of these efforts as they relate to reducing the risk of concussions and return-to-play guidelines.

Bramley H, Patrick K, Lehman E, Silvis M. High school soccer players with concussion education are more likely to notify their coach of a suspected concussion. *Clin Pediatr*. 2012;51(4):332-6.

Reviewed by Charles A. Lascano, OrthoNow

Summary of research context and methods: Previously published studies have found that concussion symptoms are underreported. This underreporting has been linked to a lack of knowledge of the signs and symptoms and proper management of concussions as well as the risk-taking behavior of coaches and athletes. Soccer is a particularly high-risk activity for concussion; therefore, this study surveyed high school soccer players to determine if concussion education has an impact on concussion decision making during a game.

The researchers hypothesized that athletes who have received concussion education would be more likely to report concussion symptoms to their coach as compared to athletes who have not received concussion education. Surveys were mailed to 183 high school (9th thru 12th grade) soccer players participating in the Ohio Valley Athletic Conference and the Mid-Penn Conference Athletic League. Players were asked if they had ever received concussion education and were presented 3 scenarios regarding concussion and potential return-to-game decisions. Data were analyzed using analysis of variance, two-sample t tests, and  $\chi^2$ . McNemar's test for paired proportions was used to compare the percentage of positive responses to questions relating to informing a coach of a concussion.

Summary of research findings: A total of 60 high school soccer players completed the survey resulting in a response rate of 32.6%. Overall, 72% of players with a history of concussion education indicated they would always notify their coach or athletic trainer of a concussion as compared to 36% with no education. There was a statistically significant association between indicating concussion education and telling a coach about a concussion during a championship game. A lower percentage of athletes indicated they would inform their coach of a concussion when participating in a championship game as compared to a regular season game (88% vs 97%); however, this difference was not statistically significant.

Implications for athletic training education/research: Although there are several limitations to this study (eg, low response rate, potential difference between responders and non-responders, data collected in only 2 regions of the country) these data suggest that concussion education for high school athletes may facilitate recognition and management of concussions and reduce further injury following a concussion. Education is likely a critical component of early concussion identification, which is only diagnosed after an athlete reports symptoms. Athletic trainers are uniquely positioned to provide initial and on-going concussion education for athletes as well as coaches and parents. Although, additional studies should be conducted to verify the results of this study, this is a good pilot study that examines the importance of concussion education for the athletes.

Valovich McLeod TC, Bay C, Lam KC, Chhabra A. Representative baseline values on the Sport Concussion Assessment Tool 2 (SCAT2) in adolescent athletes vary by gender, grade, and concussion history. *Am J Sports Med*. 2012;40(4):927-933.

Reviewed by David Ahouse, Florida International University

Summary of research context and methods: Sports-related concussions account for approximately 9% of all high school athletic injuries. The initial sideline assessment is critical to assure no long-term cognitive deficits occur as a result of the concussion and return-to-play is properly managed. To improve and standardize the initial sideline assessment, the Sport Concussion Assessment Tool 2 (SCAT2) was developed at the 3rd International Consensus Conference on Concussion. Representative baseline data for the SCAT2 has not been established on adolescent athletes.

In this descriptive epidemiology study, 1134 interscholastic athletes (872 males: age,  $15.7 \pm 1.3$  yrs, grade  $10.2 \pm 2.9$ ; 262 females:  $15.6$  yrs  $\pm 1.1$  yrs, grade  $10.1 \pm 1.0$ ) who were cleared to participate in contact sports during their preparticipation physical for the fall season completed a short questionnaire on their history of concussions and were administered the SCAT2. Data were collected using a station approach as part of a larger baseline concussion protocol. The purpose of this study was to determine representative baseline SCAT2 measures for adolescent athletes as well as assessing whether gender, grade, and self-reported concussion history affect baseline scores.

Summary of research findings: There was a significant difference between the total SCAT2 scores by gender. Male athletes scored significantly lower than female athletes. Analysis showed that the male athletes scored lower on both the Standardized Assessment of Concussion (SAC) and Balance Error Scoring System (BESS) components of the SCAT2 compared to female athletes. There was a significant difference between the total SCAT2 scores by grade. Athletes in 11th, and 12th grades scored significantly higher than those in 9th grade. Analysis showed that 9th graders scored lower on both the SAC and BESS components of the SCAT2 compared to 10th, 11th and 12th graders. Athletes with at least one self-reported concussion had significantly lower total SCAT2 scores compared to those who did not report a history of concussion.

Implications for athletic training education/research: Based on the results of this study, preparticipation SCAT2 baseline measures should be established on an individual basis for adolescent athletes because relying on a perfect baseline score of 100 points would not be accurate. Variables such as grade, gender, and previous history of concussion significantly impact baseline SCAT2 total scores. Given the influence of these extraneous variables, baseline SCAT2 scores may change on an annual basis. This potential variability in baseline SCAT2 scores is clinically relevant in return-to-play decisions made by athletic trainers and other health care professionals. A post-injury SCAT2 score maybe higher than an individual adolescent athlete's baseline score but if that baseline score is not established annually, it may be lower than a current baseline score. Hence, the possibility of obtaining a false negative result could allow an adolescent athlete to return-to-play prematurely. Further research is warranted in this area to advance concussion prevention and management protocols.