THE FACT OF THE MATTER
Evidence-based practices in traumatic brain injury
TBI Research Brief No. 14
April '13
A Publication of the Center on Brain Injury Research and Training ~ University of Oregon

Sports Concussion in Youth

Overview

A concussion is a mild brain injury and should be taken seriously. The Centers for Disease Control and Prevention (CDC) estimate that between 1.6–3.8 million sports-related brain injuries occur each year in the United States. The majority of these are concussions. Of the reported brain injuries, approximately 65% occur in children aged 5–18 years. Children are more vulnerable to brain injury and are at greater risk for increased injury severity and prolonged recovery.

Most concussions occur without a loss of consciousness, but they may result in a wide range of symptoms, including physical signs (headaches, nausea/vomiting, balance problems, dizziness, light sensitivity, slurred speech, blurry/double vision), emotional changes (irritability, depression), cognitive impairment (difficulty thinking clearly or concentrating), and sleep disturbances (frequent awakening, insomnia). Fortunately, most athletes recover within a week or two from a concussion, but some have symptoms that can linger for weeks or even months.

It is important to put the risk of youth sports concussion into perspective: Most youth who sustain a concussion recover within 2–3 weeks. The CDC estimates that the likelihood of death or severe injury from sports-related TBI is far lower than TBI-related death or injury from other events, such as a car crash or pedestrian–motor vehicle collision.

Does the research support the existence of second impact syndrome (SIS)?

The fear of SIS—an extremely rare condition in which a catastrophic brain injury occurs when an athlete sustains a second concussion before completely recovering from a first—has driven the push for return to play guidelines. To date, very little evidence supports the existence of SIS.

Debate among researchers suggests that the devastating outcomes may result from factors not directly linked to a second impact, such as an individual's genetic susceptibility. The idea that an athlete can be protected from severe injury by simply eliminating the risk of a second concussion is potentially misleading. Those in a position of caring for young athletes need to be knowledgeable about the potential risks related to any concussion, recognize signs of increased or delayed symptoms, and seek immediate medical attention when needed.

What are the long-term effects of concussions?

Studies suggest a link between concussions and long-term cognitive dysfunction in professional athletes. Evidence in youth and collegiate athletes is inconclusive—large-scale studies are needed to clearly define the long-term risks related to concussion in youth athletes.

Four Steps in Concussion Management in Youth

Recognize	Remove	Recover	Return
Recognize the concussion—refer to symptoms list above.	Remove the concussed athlete from play.	Provide academic adjustments to allow for gradual return to learning without symptom exacerbation. Monitor for signs of worsening or prolonged symptoms and refer for medical evaluation.	Once symptom free, return to play following best-practice RTP guidelines.

Return to learn guidelines

The return to academics should involve careful monitoring of cognitive effort followed by a gradual increase in activity. In some cases, cognitive rest—limited access to computers, video games, cell phones, TV, texting—might be appropriate. However, strict cognitive rest applied to everyone, including those who might otherwise recover fine on their own, can sometimes prolong problems and potentially delay recovery.

A more nuanced approach is to permit any cognitive activity that doesn't worsen symptoms. The return to academics process should be monitored to control for cognitive overload. Students recovering from concussion will benefit from academic adjustments (e.g., reduced assignments) and flexible schedules (e.g., rest breaks). Returning to a normal work load too soon can prolong symptoms and slow recovery time.

Return to play (RTP) guidelines

The return-to-play protocol endorsed by the International Symposia on Concussion in Sport (Zurich Consensus Statement) requires an athlete to complete a series of steps involving increased physical exertion before returning to normal game play. This return-to-play protocol calls for: (a) complete rest until asymptomatic; (b) light aerobic exercise such as walking; (c) sport-specific training, such as running in soccer; (d) training drills without contact between players; (e) training drills with full contact if medically cleared; and (f) normal game play. There should be a minimum of 24 hours between each step to assess for any concussion symptoms. Because current evidence suggests that high school athletes take longer to recover than collegiate or pro, it is recommended that RTP in youth athletes be more conservative than in older players.

State-level concussion legislation

Currently, 44 states and the District of Columbia had passed laws addressing youth concussion. State laws vary, but key components include education for student athletes and their parents, criteria to remove concussed athletes from play, restrictions on return-to-play, and training for coaches. To date there is only limited data on the effects of these laws. Surveys indicate that the laws have increased awareness, but schools struggle to implement best practice standards.

Where can I find more information?

* CDC: Heads Up Online Training Course

  http://www.cdc.gov/concussion/headsup/online_training.html

* Brain 101: School-wide Concussion Management

  http://brain101.orcasinc.com/

* SCORE: Safe Concussion Outcome Recovery & Education Program

  http://www.childrensnational.org/score/

References

Gilchrist, J., Thomas, K.E., Xu, L., McGuire, L.C., & Coronado, V.G. (2011). Nonfatal sports and recreation related traumatic brain injuries among children and adolescents treated in emergency departments in the United States, 2001–2009. *Morbidity and Mortality Weekly Report, 60*(39), 1337–1342.

Harmon, K.G., Drezner, J., Gammons, M., Guskiewicz, K., Halstead, M., . . . Roberts, W. (2013). American Medical Society for Sports Medicine Position Statement: Concussion in Sport. *Clinical Journal of Sport Medicine, 23*(1), 1-18.

Hartonian, I., & Giza, C. (2012) It's not just kid's play: Evidence-based Concussion Management. *Brain Injury Professional, 9*(4), 18-20.

Langlois, J.A., Rutland-Brown, W., & Wald, M.M. (2006). The epidemiology and impact of traumatic brain injury: a brief overview. *J Head Trauma Rehabil, 21*(5), 375–378.

McCrory, P., Davis, G., & Makdissi, M. (2012). Second impact syndrome or cerebral swelling after sporting head injury. *Current Sports Medicine Reports, 11*(1), 21-23.

McCrory, P., Meeuwisse, W. H., Aubry, M., Cantu, B., Dvořák, J., Echemendia, R. J., . . . Turner, M. (2013). Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012. *British Journal of Sports Medicine, 47*(5), 250-258.

Master, C.L., Gioia, G.A., Leddy, J.J., & Grady, M.F. (2012). Importance of 'return-to-learn' in pediatric and adolescent concussion. *Pediatric Annals, 41*(9), 1-6.

Weinstein, E., Turner, M., Kuzma, B.B., & Feuer, H. (2013). Second impact syndrome in football: new imaging and insights into a rare and devastating condition. *Journal of Neurosurgery Pediatrics, 11*(3), 331-334.

ACCOMMODATIONS SUGGESTIONS

As a professional educator, there is much you can do to help your students recover from concussions and help their brains to heal. Symptoms of concussion may impede information processing speed and the ability to handle a full load of work. You can provide accommodations for these ***temporary learning disabilities***.

The **mental effort** to prepare for and then take tests may worsen symptoms.	❑ Postpone or stagger tests. Avoid doubling up on tests. Provide shortened tests or extend time to take tests. ❑ Modify assignments and homework. Limit the number of problems, questions or pages to read. Emotional pressure can increase symptoms. ❑ Concussed students will often exhibit temporary learning difficulties similar to those associated with ADHD (see below). ❑ Modify assignments—Select the most important concepts. Deliver instructions in smaller "chunks." ❑ Excuse from (or un-weight) specific tests and assignments. Remove or adjust large projects during the first critical three weeks. ❑ Allow more time to complete tests.
Some students with symptoms of concussion exhibit the same characteristics as seen in ADHD.	❑ Use a reader or recorded books for assignments and testing. A buddy might be used to read assignments aloud. ❑ Provide written instructions for homework. ❑ Provide pre-printed class notes or allow other students to share their notes. ❑ Allow the use of a tape recorder. ❑ Use a smaller, quieter exam room or use a quiet part of the classroom. ❑ Move the student to a seat in front of the class. Seat away from windows, doors other distracters. ❑ Allow for a temporary tutor to assist in organizing and planning work. Allow another student to help access school resources.
Physical exertion may increase symptoms.	❑ Excuse from sports, PE, weight-lifting, cheer, band. ❑ Reduce backpack weight by keeping textbooks in the classroom.
Students report that one of the scariest things they experience after concussion is **changes in mood**.	❑ Allow time to visit the school counselor, nurse or psychologist. ❑ Assign a buddy to help talk to the student, listen and calm the student when upset. ❑ Make arrangements to provide the student with a quiet supervised place to go to regain composure. ❑ Let students know that this is one of the symptoms of concussion.
Some students are sensitive to light and/or noise after a concussion.	❑ Permit sunglasses or caps with visors indoors. ❑ Permit ear protectors (not music). ❑ Provide a quiet alternative place to eat. Cafeterias are loud and bright. ❑ Allow extra hall passing time or allow student to leave early to the next class to avoid hallway chaos. ❑ Turn down lights in one area of the classroom.

Adapted from
Oregon Concussion and Management Program (OCAMP) and
Slocum Sports Concussion Program