Concussions

National Federation of State High School Associations

CUMULATIVE EFFECTS OF REPEATED CONCUSSIONS

A three-year, follow-up study shows that athletes having a previous history of at least one concussion are at an increased risk for further concussions. As the number of concussions increase, so do the risk for future injuries (Guskiewicz et al, 2003). It has also been shown that repeated concussions have been linked to longer recovery periods. Highlighting the importance of making sure athletes are symptom free prior to returning to competition from a previous MHI, research has shown that 1 in 15 athletes with a concussion have recurring concussions within 7-10 days from the first concussion. Because of these findings and the potential for complications resulting from MHIs, it is recommended that athletes sustaining more than one concussion should be referred for follow-up evaluation and assessment to determine any residual effects that might preclude participation in contact or collision sports. Cases of individuals suffering permanent brain damage from multiple concussions have been reported but no consensus on how many concussions are too many or what leads to that permanent damage.

MEDICAL CLEARANCE TO RETURN TO PARTICIPATION AFTER HEAD INJURY

There is unanimous agreement within the medical community that NO athlete who has signs and symptoms of post concussion should be returned to action. There is also unanimity that there is increased risk of significant damage from a concussion for a period of time after a preceding concussion and from cumulative damage of multiple head injuries. The more concussions an individual has, the greater is the risk of having additional concussions. The exact period of increased vulnerability or the number of concussions that is "too many" has not been determined. Traditionally, physicians have advised athletes not to return to action until they have been free of symptoms for a minimum of a week. (McCrea et al, 2003). Now, rather that discuss a length of time to be free of symptoms, guidelines suggest using the gradual return-to-play protocol shown above while monitoring the athlete for symptoms. This could be longer or shorter than a week. Research, utilizing some of the testing instruments mentioned above, is now revealing subtle residual effects of concussion not found by traditional evaluation. These identifiable deficits frequently persist after the obvious signs of concussion are gone and appear to have relevance to whether an athlete can return to action with relative safety.

Source: National Federation of State High School Associations
Sports Medicine Handbook—Fourth Edition
Endorsed by the RI Interscholastic League Sports Medicine Advisory Comm.

CONCUSSIONS

School & Youth Programs
Concussion Act
Title 16-91

Findings of fact—The Rhode Island General Assembly hereby finds and declares:

(1) Concussions are one of the most commonly reported injuries in children and adolescents who participate in sports and recreational activities. A concussion is cause by a blow or motion to the head or body that causes the brain to move rapidly inside the skull. The risk of catastrophic injuries or death is significant when a concussion or head injury is not properly evaluated and managed.

(2) Concussions are a type of brain injury that can range from mild to severe and can disrupt the way the brain normally works. Concussions can occur in any organized or unorganized sport or recreational activity and can result from a fall or from players colliding with each other, the ground, or with obstacles. Concussions occur with or without loss of consciousness, but the vast majority occurs without loss of consciousness.

(3) Continuing to play with a concussion or symptoms of a head injury leaves the young athlete especially vulnerable to greater injury and even death. The general assembly also recognizes that, despite having generally recognized return to play standards for concussion and head injury, some affected youth athletes are prematurely returned to play resulting in actual or potential physical injury or death to youth athletes in the State of Rhode Island.

(4) Concussions can occur in any sport or recreational activity. All coaches, parents, and athletes shall be advised of the signs and symptoms of concussions as well as the protocol for treatment.

In response to these findings schools are required to educate and inform parents and athletes and of the Nature & Risk of concussions and head injury including issues related to the continuation of play after a suspected concussion or head injury. Furthermore, an athlete who is suspected of sustaining a concussion or head injury in a practice or game shall be removed from competition. In addition, the athlete may not return to play until he/she is evaluated by a licensed physician and until the athlete receives written clearance to return to play from that licensed physician.

This information sheet must be reviewed, signed by all athletes and their parents and/or guardian and returned to the school at the beginning of each sport season and prior to the youth's return to practice or competition.

The law also requires the following:

- **Any athlete who is suspected of sustaining a concussion or head injury during practice or a game shall be removed from practice or game.**
- **Any athlete who is suspected of sustaining a concussion or head injury may not return to play until he/she is evaluated by a licensed physician and receives written clearance to return to play by that licensed physician.**

For more information please visit the RIIL website (www.riil.org)

Parent/Guardian _____

Athlete _____

Sport _____

School _____

I have reviewed the contents of this pamphlet with my son/daughter.

_____ Parent Signature

_____ Athlete Signature

Date Signed _____

Complications Associated with Concussions

POST-CONCUSSION SYNDROME

Following a concussion, athletes may suffer a number of lingering symptoms for varying lengths of time. Below are listed some of the more common symptoms that may last for weeks or months. Again, no athlete with any symptom related to head injury should even begin the return-to-play protocol.

- Impaired attention
- Concentration and memory deficits
- Dizziness
- Tinnitus (ringing in the ears)
- Prolonged or recurring headaches (especially with exertion)*
- Fatigue
- Irritability
- Visual problems
- Neurasthenia, weakness or numbness

*Often high school athletes may return to sport prematurely because the headache can mistakenly be seen as a common ailment. However, recent research has shown that athletes with residual headaches even a week post concussion do poorly on specialized tests such as reaction time and memory (Collins et al, 2003). It is imperative that even a seemingly non-significant headache not be dismissed as a common ailment prior to returning to sports.

SECOND-IMPACT SYNDROME

Second-impact syndrome is a rare event, which poses a significant concern for athletes who return too soon after suffering a previous concussion. Second-impact syndrome occurs when a second concussion occurs before a previous concussion has completely healed even if both of the injuries were very mild. Second-impact syndrome is characterized by an autoregulatory dysfunction that causes rapid and fatal brain swelling, and can result in death in as little as two to five minutes (McCrory, 1998). It is particularly important to note that **virtually all of the second-impact syndrome cases that have been reported have occurred in adolescent athletes.** The signs of second-impact syndrome are as follows:

- Previous history of concussion
- Visual, motor or sensory changes
- Difficulty with memory and/or thought process
- Collapse into coma
- Neurological abnormalities in strength, range of motion or sensory feelings.

Concussions

More on Concussions

SIGNIFICANCE

The initial recognition and management of concussions are particularly important in high school athletes in preventing two potential complications associated with concussions in this age group: post-concussion syndrome and second-impact syndrome. Younger athletes may be at increased risk of cerebral swelling after a mild head injury with greater vulnerability for post-concussion symptoms for a longer period of time. Proper management should minimize the risk for these catastrophic results.

RECOGNITION OF CONCUSSIONS

Severity

The severity or seriousness of a concussion is primarily based on how long the symptoms last. The number and severity of symptoms may have some correlation but no specific symptoms are more likely to help determine severity. Restricting mental and physical activity immediately after the concussion seems to correlate with a quicker return to play.

Signs and Symptoms of Concussions

Coaches, administrators, officials (See Table 10 below) parents and athletes need to be aware of the observable signs and reported symptoms of a concussion.

Table 10. Signs and Symptoms of Concussions

Signs observed by medical staff	Symptoms reported by athlete
Player appears dazed	Headache
Player has vacant facial expression	Nausea
Confusion about assignment	Balance problems or dizziness
Athlete forgets plays	Double or fuzzy vision
Disorientation to game, score, opposing team	Sensitivity to light or noise
Inappropriate emotional reaction (laughing, crying)	Feeling slowed down
Player displays incoordination or clumsiness	Feeling "foggy" or "not sharp"
Player is slow to answer questions	Change in sleep pattern
Loss of consciousness	Concentration or memory problems
Repeating the same questions or comments over and over again	Irritability
	Sadness
	Feeling more emotional

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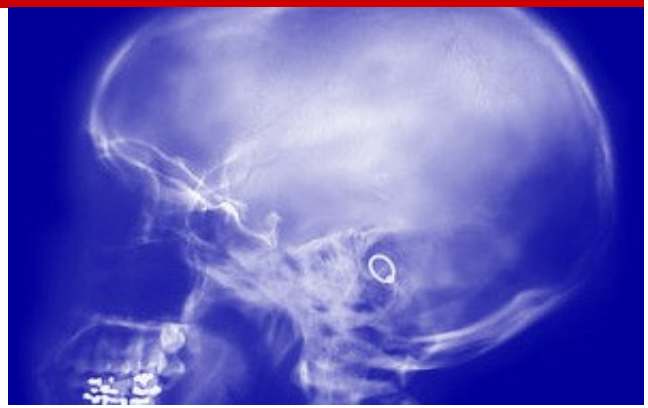

- Even though most concussions are mild, all concussions are potentially serious and may result in complications that range from prolonged brain damage to death if not managed properly.
- An athlete who has a head injury should not return to play without evaluation by medical personnel.
- Do not allow any athlete to return to participation if he/she has any symptoms.
- If an apparent head injury occurs, even if uncertainty exists about the severity of the injury and whether a true concussion occurred, that athlete should not return to action until medical clearance is obtained.
- Even a seemingly minor head injury, often referred to as "a ding" or "bell ringer," is now considered a true concussion and must be managed as such to avoid potential long-term consequences.
- Neither loss of consciousness, vomiting or amnesia is necessary for a head injury to be considered a concussion.

RECOGNITION

A concussion, by definition, means "to shake violently." A blow to the head that causes the brain to shake inside the skull and result in EVEN A BRIEF AND MILD alteration in brain function is considered a concussion. Although no obvious signs or symptoms may show up immediately, listed below are some of the symptoms that may suggest a concussion has occurred. Any of these

- Headache
- Dazed and vacant expression ("foggy")
- Confusion
- Difficulty with balance and coordination skills
- Difficulty with concentration, memory and organizational skills
- Nausea and/or vomiting
- Amnesia
- Slurred and/or inappropriate speech
- Repeating the same questions or comments
- Apparent loss of consciousness
- Moves slowly and/or clumsily
- Unsure of game, score or opponent
- Forgets play responsibilities
- Double vision or blurred vision
- Increased sensitivity to light or noise
- Sleep difficulties
- Increased irritability
- Hypersensitivity to light and noise
- Abnormal vision, hearing, smell and/or taste
- Excessive fatigue
- Abnormal sleep patterns
- Ringing in the ears
- Numbness and tingling
- Emotional problems, especially sadness and depression

Returning the Athlete to Participation

The International Conference on Concussion at Vienna (2001) and Prague (2004), have significantly changed the thinking of proper management of head injuries in athletes. Some of the conclusions are highlighted below:

- The grading systems for concussions previously utilized are no longer considered useful in determining how serious an injury may be or in determining when an athlete can safely return to play. No symptom(s) or signs (including loss of consciousness or amnesia) accurately predict the severity of the injury or help decide when an athlete can return to play.
- New guidelines recommend monitoring the course of the symptoms and beginning a gradual return-to-play protocol when all symptoms have cleared. (See Table 8—Sideline Decision-making and Table 9—Return-to-play below)
- There are now objective, validated methods of evaluating brain function in athletes to help physicians determine with greater confidence when an athlete does seem to be clear of symptoms and can start through the graduated return-to-play regimen. These include questionnaires, various pencil-and-paper tests, balance tests, neurological and memory tasks, and computerized tests. Recognizing that athletes, with the mentality of "playing through the pain," are not always totally candid about admitting symptoms, guidelines now recommend the use of these more objective methods to evaluate how an athlete's brain is functioning. Tests requiring little cost like Sideline Assessment of Concussion (SAC), Sideline Concussion Checklist (SCC), and Sport Concussion Assessment Tool (SCAT) have been shown to be helpful. Newer computerized neuro-psychological screening like impact, CRI and Sentinel have also been shown to be helpful for physicians making return-to-play decisions.
- Guidelines further suggest that athletes playing high-risk or collision sports or with a history of previous concussions, should have these tests administered prior to the season to serve as a baseline in case an injury does occur.
- Mental exertion appears to worsen and prolong concussion symptoms to the same degree as physical exertion. Therefore, the concept of "cognitive rest" should be adhered to in concussion management. This may involve a limited class schedule for several days following a concussion, or rescheduling tests. More severely concussed athletes may require more detailed and long-lasting special accommodations.
- A requirement to begin the return-to-play protocol is that the athlete must have no symptoms. Then, gradual increase in mental activity as tolerated will be followed by a similar gradual return to full physical activity. If symptoms recur, then the athlete must regress to a previous level of performance . (See Tables 8 and 9 below)

Table 8. Sideline Decision-making

Sideline Decision-making	Medical Clearance RTP Protocol
1. No athlete should return to play (RTP) after head injury even if clear in 15 minutes without medical clearance. 2. Any athlete removed from play for a head injury must have appropriate medical clearance before practice or competition may resume. 3. Close observation of athlete should continue for a few hours. 4. After medical clearance, RTP should follow a stepwise protocol with provisions for delayed RTP based on return of any signs or symptoms.	1. No exertional activity until asymptomatic. 2. When the athlete appears clear, begin low-impact activity such as walking, stationary bike, etc. 3. Initiate aerobic activity fundamental to specific sport such as skating, running, etc. 4. Begin non-contact skill drills specific to sport such as dribbling, ground balls, batting, etc. 5. Then full contact in practice setting. 6. If athlete remains without symptoms, he or she may return to play.
A. Athlete must remain asymptomatic to progress to the next level. **B. If symptoms recur, athlete must return to previous level.** C. **Medical check should occur before contact**.	

Table 9. Return-to-play

Return-to-play Medical Clearance Protocol
No mental or physical activity should occur until athlete's symptoms are gone. Avoid physical exertion but also avoid studying, school attendance, test taking, video games, computer use and TV until clear.
When clear, begin with short periods of reading, focusing and an abbreviated school day as tolerated.
When tolerating full day of school attendance, begin low-impact activity such as walking, stationary bike, etc. Gradually increase intensity and duration as tolerated.
Advance to aerobic activity fundamental to specific sport such as skating, running, etc.
Advance to non-contact skill drills sports specific such as dribbling, batting, shooting.
Full contact in practice setting.
If accomplishes all the above without return of signs and symptoms, may return to play following final clearance. Some athletes, especially if multiple previous concussions, should consider having a base-line computerized neuropsychological test performed because of the increased risk of concussions in those with previous ones.