



A PARENT'S / GUARDIAN'S GUIDE TO CONCUSSION

National Federation of State High School Associations (NFHS)
Sports Medicine Advisory Committee (SMAC)

What is a concussion?

- A concussion is a traumatic brain injury that interferes with the normal function of the brain. Concussions were previously referred to as a “ding” or a “bell-ringer” but this undermines the seriousness of problem. Any suspected concussion must be taken very seriously. An athlete does not need to lose consciousness (be “knocked-out”) to suffer a concussion. In fact, less than 5% of concussed athletes suffer a loss of consciousness.

Concussion Facts

- Structural injuries, like torn ligaments and broken bones, can be seen on an x-ray or on scans like an MRI. On the other hand, a concussion is a disruption of how the brain works, or its function, and not in its structure. That is why CT scans and MRIs are of limited value. The injury affects the way the brain works, not how it looks.
- It is estimated that approximately 1.1 million to 1.9 million recreational concussions and sports related concussions occur annually in the United States in children 18 years of age or younger. In nine popular high school sports alone, well over 200,000 concussions are sustained by high school athletes each year. (Halstead ME, et.al.)
- Concussions can happen in any sport. While they are more common in sports that involve collisions, athletes in all sports are at risk for a concussion. When researchers looked at 14 different high school sports, they found that over two-thirds of concussions result from contact with another athlete and the second leading cause of concussion, is player-to-surface contact. This includes falling and hitting the ground.
- An athlete may report many physical, behavioral, and cognitive symptoms. Physical symptoms include headaches, nausea, vomiting, dizziness, and sleep changes. Some behavioral changes include irritability, anxiety, and depression. Cognitive symptoms are changes in the way we think and include feeling sluggish, hazy, or foggy, difficulty falling asleep or staying asleep, difficulty concentrating or memory problems, and confusion.
- Many symptoms appear immediately after the injury, while others may develop over the next several days. The symptoms can interfere with normal daily life in addition to difficulty with school, work, and social life.
- Concussion symptoms typically resolve within one week to one month. It is important to remember that each student athlete responds and recovers differently.
- Athletes should not return to sports or activities that will put them at risk for another head injury until the concussion has completely resolved. To do so puts them at risk for worsening and prolonged symptoms and a more severe injury. While rare, a repeat concussion can also result in severe swelling and bleeding in the brain. This condition can lead to death or permanent disability.

What should I do if I think my child has had a concussion?

If your child sustains a head injury, it is good to be aware of the signs and symptoms of a concussion. If you suspect an athlete has a concussion, the athlete must be immediately removed from activity. Do not allow the athlete to drive until symptoms have resolved. Continuing to participate in a contact or collision sport while experiencing concussion symptoms can lead to worsening of symptoms, increased risk for further injury and sometimes death.

Parents and coaches should not make the diagnosis of a concussion. Any athlete suspected of having a concussion should be evaluated by a medical professional trained in the diagnosis and management of concussions.

When in doubt, sit them out!

All athletes who sustain a concussion need to be evaluated by an appropriate health-care professional, who is experienced in concussion management. If your child's school has an athletic trainer (AT), please inform the AT of your concerns. You should also call your child's primary care provider and explain what has happened and follow the instructions you are given. Sometimes, an injury is more severe than it appears. If your child has persistent vomiting, a worsening headache, a seizure, or is acting differently, you should take your child to an emergency department for immediate attention.

What are the signs and symptoms of a concussion?

SIGNS OBSERVED BY PARENTS, ATHLETIC TRAINERS, FRIENDS, TEACHERS OR COACHES

- Dazed, vacant or stunned appearance.
- Confusion about assignment or position.
- Forgetfulness.
- Uncertainty of game, score, or opponent.
- Clumsy movements.
- Slow response to questions.
- Mood, behavior or personality changes.
- Can't recall events prior to or after hit or fall.

SYMPTOMS REPORTED BY ATHLETE

- Headache or "pressure" in head.
- Neck pain
- Balance problems or dizziness
- Nausea
- Double or blurry vision
- Sensitivity to light or noise
- Feeling sluggish, hazy, or mentally foggy
- Concentration or memory problems
- Confusion
- "Not feeling right" or "feeling down"

How can a concussion affect schoolwork?

Following a concussion, many students have difficulty in school due to difficulties with short-term memory, concentration, and organization.

In many cases after the injury, it is best to decrease the athlete's class load early in the recovery phase. This may include staying home from school for no more than 1 or 2 days, followed by academic adjustments (such as a reduced class schedule, extended time to complete assignments, printed notes, delayed testing, etc.), until the athlete has fully recovered. Decreasing the stress on the brain and not allowing the athlete to push through symptoms will shorten the recovery time and ensure total resolution of symptoms. The academic adjustments are best managed by a school concussion team. Speak with the school guidance counselor, school nurse, or athletic trainer to help with this process.

Return-to-Learn (RTL)

Facilitating return-to-learn is a vital part of the recovery process for student athletes. The return-to-learn process should be individualized and include a plan for return to the classroom / studying as tolerated. The majority of athletes of all ages have a full return-to-learn with no additional academic support by 10 days. Return-to-learn participation after sport-related concussion follows a graduated stepwise strategy as outlined in **Table 1**: Return-to-learn (RTL) strategy:

Step	Mental activity	Activity at each step	Goal
1	Daily activities that do not result in more than a mild exacerbation* of symptoms related to the current concussion	Typical activities during the day (eg, reading) while minimising screen time. Start with 5–15 min at a time and increase gradually.	Gradual return to typical activities
2	School activities	Homework, reading or other cognitive activities outside of the classroom.	Increase tolerance to cognitive work
3	Return to school part time	Gradual introduction of schoolwork. May need to start with a partial school day or with greater access to rest breaks during the day.	Increase academic activities
4	Return to school full time	Gradually progress in school activities until a full day can be tolerated without more than mild* symptom exacerbation.	Return to full academic activities and catch up on missed work

Following an initial period of relative rest (24–48 hours following an injury at Step 1), athletes can begin a gradual and incremental increase in their cognitive load. Progression through the strategy for students should be slowed when there is more than a mild and brief symptom exacerbation.

*Mild and brief exacerbation of symptoms is defined as an increase of no more than 2 points on a 0–10 point scale (with 0 representing no symptoms and 10 the worst symptoms imaginable) for less than an hour when compared with the baseline value reported prior to cognitive activity.

Patricios JS, et.al.

When can an athlete return to sport following a concussion?

After suffering a concussion, or if you suspect an athlete has a concussion, **no athlete should EVER return to sport or practice on that same day.**

Return-to-Sport (RTS)

Athletes should be allowed to engage in activities of daily living (including walking) immediately following injury, even during the initial period of 24-48 hours of relative rest. Athletes may begin Step 1 (i.e., symptom-limited activity) within 24 hours of injury, with progression through each subsequent step typically taking a minimum of 24 hours. Progression through the later Return-to-Sport strategy (Steps 4-6) should be monitored by a health care provider. Return-to-sport participation after sport-related concussion follows a graduated stepwise strategy, as outlined in **Table 2**:

Table 2 Return-to-sport (RTS) strategy—each step typically takes a minimum of 24 hours

Step	Exercise strategy	Activity at each step	Goal
1	Symptom-limited activity	Daily activities that do not exacerbate symptoms (eg, walking).	Gradual reintroduction of work/school
2	Aerobic exercise 2A—Light (up to approximately 55% maxHR) then 2B—Moderate (up to approximately 70% maxHR)	Stationary cycling or walking at slow to medium pace. May start light resistance training that does not result in more than mild and brief exacerbation* of concussion symptoms.	Increase heart rate
3	Individual sport-specific exercise Note: If sport-specific training involves any risk of inadvertent head impact, medical clearance should occur prior to Step 3	Sport-specific training away from the team environment (eg, running, change of direction and/or individual training drills away from the team environment). No activities at risk of head impact.	Add movement, change of direction
Steps 4–6 should begin after the resolution of any symptoms, abnormalities in cognitive function and any other clinical findings related to the current concussion, including with and after physical exertion.			
4	Non-contact training drills	Exercise to high intensity including more challenging training drills (eg, passing drills, multiplayer training) can integrate into a team environment.	Resume usual intensity of exercise, coordination and increased thinking
5	Full contact practice	Participate in normal training activities.	Restore confidence and assess functional skills by coaching staff
6	Return to sport	Normal game play.	

*Mild and brief exacerbation of symptoms (ie, an increase of no more than 2 points on a 0–10 point scale for less than an hour when compared with the baseline value reported prior to physical activity). Athletes may begin Step 1 (ie, symptom-limited activity) within 24 hours of injury, with progression through each subsequent step typically taking a minimum of 24 hours. If more than mild exacerbation of symptoms (ie, more than 2 points on a 0–10 scale) occurs during Steps 1–3, the athlete should stop and attempt to exercise the next day. Athletes experiencing concussion-related symptoms during Steps 4–6 should return to Step 3 to establish full resolution of symptoms with exertion before engaging in at-risk activities. Written determination of readiness to RTS should be provided by an HCP before unrestricted RTS as directed by local laws and/or sporting regulations.

HCP, healthcare professional; maxHR, predicted maximal heart rate according to age (ie, 220-age).

Patricios JS, et.al.

Progression through the strategy is symptom limited (ie, no more than a mild and brief exacerbation of current symptoms related to the current concussion) and its course may vary across individuals based on tolerance and symptom resolution. Further, while the return-to-learn and return-to-sport strategies can occur in parallel, student-athletes should complete full return-to-learn before unrestricted return-to-sport.

Concerns over athletes returning to sport too quickly led lawmakers in all 50 states and the District of Columbia to pass laws stating that **no player shall return to sport or practice the day of a concussion, and the athlete must be cleared by an appropriate health-care professional before being allowed to return to sport in either games or practices.** Many of these laws require players, parents and coaches to receive education on the dangers of concussion in addition to recognizing the signs and symptoms of concussion.

What can I do?

- Both you and your child should learn to recognize the “Signs and Symptoms” of concussion as listed above.
- Encourage your child to tell the medical and/or coaching staff if any of these signs and symptoms appear after a blow to the head or body.
- Emphasize to administrators, coaches, physicians, athletic trainers, teachers and other parents your concerns and expectations about concussion and safe play.
- Encourage your child to tell the medical and coaching staff if there is suspicion that a teammate has suffered a concussion.
- Ask teachers to monitor any decrease in grades or changes in behavior in students that could indicate a concussion.
- Report concussions that occurred during the school year to appropriate school staff. This will help in monitoring injured athletes as they move to the next season’s sports.

Click here for more information about returning to school after a concussion:

http://www.cdc.gov/headsup/basics/return_to_school.html

Other Frequently Asked Questions:

Why is it so important that athletes not return to sport until they have completely recovered from a concussion?

Students that return to sport too soon may worsen concussion symptoms, prolong the recovery time, and they also risk catastrophic consequences if they suffer another head injury. These consequences are preventable if each athlete is allowed time to recover from their concussion including completing the stepwise return-to-sport protocol. No athlete should return to sport or other at-risk activity when signs or symptoms of concussion are present and recovery is ongoing.

Is a CT scan or MRI needed to diagnose a concussion?

No! The diagnosis of a concussion is based upon the athlete's history of the injury and an appropriate health-care professional's physical examination and testing. CT and MRI scans are rarely needed following a concussion since this is a functional injury and not a structural one. However, they are helpful in identifying life-threatening head and brain injuries such as skull fractures, bleeding or swelling.

What is the best treatment to help my child recover quickly from a concussion?

The first step in recovering from a concussion is relative rest. Rest is essential to help the brain heal. Athletes with a concussion need rest from physical and mental activities that require concentration and attention as these activities may worsen symptoms and delay recovery. Exposure to loud noises, bright lights, computers, video games, television and phones all may worsen the symptoms of concussion. Athletes typically require 24-48 hours of *relative rest*, which include activities of daily living and reduced screen time. Individuals can return to light-intensity physical activity, such as walking that does not more than mildly exacerbate symptoms, during the initial 24-48 hours following a concussion. After the initial 24-48 hours begin gradually increasing mental and physical activity as tolerated. Early aerobic exercise can help speed recovery.

There are no medications to treat concussions, but an appropriate health-care professional may prescribe medications and therapies to treat symptoms of a concussion, such as headache, dizziness, sleep changes, etc. Some athletes may require rehabilitation, such as physical, occupational, vestibular, ocular or speech/cognitive therapy. Others may require treatment for mood and behavior changes. All of these interventions are done on a personalized basis.

How long do the symptoms of a concussion usually last?

Typically, athletes can expect a minimum of 1 week to complete the full rehabilitation strategy; however, unrestricted return-to-sport can take up to 1 month following a sports related concussion, with an estimated average of 20 days. Progression through the strategy is symptom limited (ie, no more than a mild and brief exacerbation of current symptoms related to the current concussion) and its course may vary across individuals based on tolerance and symptom resolution. Further, while the return-to-learn and return-to-sport strategies can occur in parallel, student-athletes should complete full return-to-learn before unrestricted return-to-sport.

How many concussions can an athlete have before we should consider retiring from playing sports?

There is no "magic number" of concussions that determine when an athlete should give up playing sports that put one at high risk for a concussion. The circumstances that surround each individual injury, such as how the injury occurred as well as the number and duration of symptoms following the concussion, are very important.

These circumstances must be individually considered when assessing an athlete’s risk for potential long-term consequences and potentially more serious brain injuries. The decision to “retire” from sports is a decision best reached after a complete evaluation by your child’s primary care provider and consultation with an appropriate health-care professional who specializes in treating concussions.

We cannot eliminate all of the risk of concussion from sports. However, we can take what we learn from science to reduce the chance for injury and set policy to ensure that students with a concussion get the care they need.

Everyone involved in high school sports plays an active role in educating others about concussion and other serious brain injuries. Please check out the Resource section on the Sports Medicine page of the NFHS Website for more information on how you can take an active role and get involved in keeping students safe, healthy and active.

Some of this information has been adapted from the CDC’s “Heads Up: Concussion in High School Sports” materials by the NFHS’s Sports Medicine Advisory Committee. Please go to [www.cdc.gov/ncipc/tbi/Coaches Tool Kit.htm](http://www.cdc.gov/ncipc/tbi/Coaches_Tool_Kit.htm) for more information.

References:

1. Halstead ME, Walter KD, Moffatt K; COUNCIL ON SPORTS MEDICINE AND FITNESS. [Sport-Related Concussion in Children and Adolescents](#). *Pediatrics*. 2018 Dec;142(6). pii: e20183074. doi: 10.1542/peds.2018-3074. Epub 2018 Nov 12.
2. Patricios JS, Schneider KJ, Dvorak J, Ahmed OH, Blauwet C, Cantu RC, Davis GA, Echemendia RJ, Makdissi M, McNamee M, Broglio S, Emery CA, Feddermann-Demont N, Fuller GW, Giza CC, Guskiewicz KM, Hainline B, Iverson GL, Kutcher JS, Leddy JJ, Maddocks D, Manley G, McCrea M, Purcell LK, Putukian M, Sato H, Tuominen MP, Turner M, Yeates KO, Herring SA, Meeuwisse W. Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport-Amsterdam, October 2022. *Br J Sports Med*. 2023 Jun;57(11):695-711. doi: 10.1136/bjsports-2023-106898. PMID: 37316210.

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