



**BRAIN INJURY  
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## **Adolescent Concussions—Management Guidelines for Schools**

*By Michael A. Lee, MD and Vito A. Perriello, Jr., MD*

Our knowledge of concussions has increased and our treatment has changed substantially in recent years based on new research. Some of the major changes include the awareness that “minor head injuries,” frequently called “bell-ringers or dings,” are in fact concussions; many relatively minor head injuries take longer to heal than previously believed; concussions can occur without loss of consciousness, vomiting or other symptoms. Often times, headache, dizziness, “fogginess,” poor attention span and unusual behavior are the signs of concussions. Another major change is the knowledge that thinking, “exercising the brain” and nearly all cognitive tasks have the same effect on prolonging concussion symptoms and slowing recovery as does physical exertion. Consequently, the management of even these minor head injuries has changed dramatically. Restricting mental exertion and physical exertion until asymptomatic and then gradually increasing each is the cornerstone of this treatment strategy.

Over the past several years increasingly larger numbers of adolescents are sustaining concussions. This may partially be due to our greater awareness. While caring for them, it has become evident that concussed individuals need modification of their school day in order to recover most expeditiously.

At the high school level, returning the student-athlete to school is generally the highest priority and the one that carries the lowest risk once symptoms have disappeared. The school nurse, guidance counselor, certified athletic trainer, athletic staff, psychologist and social worker should be made aware of the student-athlete’s injury and work as a team to coordinate these accommodations. This will ensure a smooth transition to this new activity plan during this difficult period. Attending school presents a major problem for student-athletes suffering from a concussion whether it is at the high school or college level. Teachers and professors often believe that the student-athletes are malingering and they can be less than sympathetic when student-athletes are excused from tests, or need extra time for tests and turning in papers. Team coaches often fail to understand the severity of the injury and may want their athlete, especially the star athlete on the team, to return to play before they are fully recovered. Coaches may be unsympathetic to the needs of the injured student-athlete and may be unaware of Second Impact Syndrome or more common risks of re-injury



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and prolonged recovery. The absence of visible signs of injury, such as a cast, brace or bandage, contributes to this misunderstanding by coaches and others.

Adolescents with concussions may want to attend school out of fear they will miss necessary work and get too far behind. They often want to socialize with their friends and continue to participate in their usual activities. If they have a part-time job they may also want to continue their usual work schedule. Since student-athletes with concussions seem to recover more rapidly with rest, we recommend that activities should be restricted for several days following the injury until they are headache free. Exercise, whether it is physical or mental, will usually increase their symptoms: headache, dizziness, nausea and lightheadedness. Most student-athletes will have difficulty with concentration, memory (both working and short term), and their processing speed—which negatively affects their school learning and performance. In turn, struggling to learn and perform "overuses" the brain at a time when it is working hard to recover, and can negatively affect recovery. As a result, the guidelines for return to school are listed below:

### **No School Initially.**

A concussed individual should not return to school until his/her headaches and other symptoms have cleared. At home, the student-athlete should rest. To minimize increased oxygen demands on the injured vulnerable brain cells, athletes should not participate in the following activities: reading, computer use, videogames, text messaging, physical exercise, hot tubs and socializing with friends. Attending movies may cause a marked increase in symptoms if the student-athlete experiences difficulty with light or noise.

When student-athletes are headache free, they can begin trying brief periods of reading or studying. If headaches or other symptoms return they should discontinue the activity and resume rest. They may return to school for gradually increasing periods of time when they can tolerate a couple of hours of thinking. Some student-athletes may require starting school later in the day in order to sleep longer. They should be driven to school to avoid noise on the bus or the exercise of walking to school. Student-athletes may attend classes unless they develop symptoms (usually a headache). If they become symptomatic, they should go to the nurse's office, lie down, and skip the next period. (Rest periods often may be necessary when student-athletes first return to school.) If symptoms occur again in the next period, after resting, they should return home. Math and chemistry classes may



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need to be avoided initially since they seem to cause more symptoms than other classes. If a student-athlete can only attend school part-time, noncore classes should be avoided in favor of core subjects (English, History, Science and Language).

### **School Nurse's Role**

After sustaining the concussion, and before the student-athlete returns to school, the nurse should receive a letter from the physician. The letter will describe the student-athlete's injury and the specific and necessary modifications to the school day. This letter will serve to notify all parties involved that the day must be modified and that the student-athlete is not malingering. The nurse will serve as a liaison between the teachers, athletic trainers and coaches to facilitate the changes. If no school nurse or athletic trainer is available, the student-athlete's guidance counselor should be the contact person for the physician.

### **Test Taking**

Most student-athletes are so symptomatic in the early post-injury phase they are unable to take tests. If they do attempt to take tests before they are recovered sufficiently, they may become dizzy and nauseous or manifest other post-concussion signs and symptoms that negatively affect their performance. If the student-athlete has taken any tests during the time he/she is recovering and received poor test scores, it is appropriate to ask that these grades be voided or discounted. SAT, ACT, AP, and GRE tests may need to be postponed and some student-athletes may need to obtain permission beforehand for extra time while taking these examinations. Final examinations may need to be delayed until school breaks, the next semester or during the summer. When student-athletes do return to school they may need to have untimed tests due to their decreased processing speed. Taking tests should be spaced out and limited to no more than one per day. Tests may need to be taken in a quiet place, free of distraction, since some post-concussion student-athletes have ADHD-like characteristics such as distractibility and difficulty with concentration. Unfortunately, there may be some student-athletes with prolonged symptoms who will need to miss an extended period of school during the recovery. Teachers should take this into account when assigning grades. Possible solutions for this problem include: exempting student-athletes from tests, especially if they have done well previously, or assigning grades for that period of time, based on their previous work.



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### **Papers, Projects and Homework**

Term papers and projects may need to be delayed and spaced out. Extensions for work should be given. Extra time for homework may be necessary. Preprinted class notes or copies of class notes are often helpful. Recordings may be helpful for student-athletes with reading difficulty due to their symptoms. Having someone read material to student-athletes may be of benefit. Some student-athletes may need tutors to help them with schoolwork, including test preparation and organization.

### **PHYSICAL ACCOMMODATIONS**

**Elevators**—Initially, student-athletes should not walk up stairs if there are elevators in the school. An elevator pass should be given unless the student-athlete becomes lightheaded or dizzy when riding the elevator.

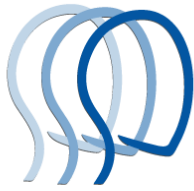
**Noise**—If noise is not well tolerated by these student-athletes they should be excused from music class. It is recommended they sit in a quiet spot during lunch (not in the noisy cafeteria) and should avoid assemblies, school dances or sports events. It may also be helpful for these student-athletes to leave class a few minutes early to go to the next class in order to avoid the noise in the hall. Construction noise at school may also increase symptoms.

**Light**—Student-athletes, especially those with injuries to the back of the head, can have difficulty with light. Bright fluorescent lights or watching movies in a dark room may cause or increase symptoms such as headaches. They may need to wear sunglasses in and out of school. If light is a problem, student-athletes may have difficulty driving at night due to the glare of headlights. Activities with strobe lights should be avoided.

**Preferential Seating**—Student-athletes who develop ADHD-type symptoms following their concussions are advised to sit in the front of classrooms and to sit away from windows and doors to avoid distractions.

### **Gym Class and School Sports Team**

Both should be avoided initially. Attending a team's practice or game can increase symptoms due to the noise, light and "rough-housing" with their friends. Student-athletes might sustain another head injury if they are inadvertently struck with a ball. As they recover, they may attend—but not participate in—practice and games as long as the symptoms do not increase.



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**Return-to-play**—An athlete is allowed to start an exercise program when they are not taking pain medication and are both symptom free and have normal neurocognitive test results (if available). They may walk the first day, jog the following day and run the third day (see guidelines from the last International Conference on Concussions in Prague). When the steps are completed without symptoms, they may practice sport specific drills with their team and then finally, full participation, including contact, is allowed. This is usually a five-day process. Some athletes who have missed many weeks of play may need to recondition before returning to sports.

### **Student-Athletes with Prolonged Absences**

Approximately 10% of student-athletes with concussions have symptoms lasting over a month and they are considered to have a Complex Concussion (the newest terminology) or what in the past was described as Post-concussion Syndrome. Some student-athletes may need to have a 504 plan adopted and some student-athletes who cannot tolerate the active school environment may require home tutoring. The guidance counselor may be asked to expedite some of these accommodations.

**Psychiatric Issues**—Some student-athletes may develop depression either as a result of the injury or because they are unable to attend school and participate in sports. They may become irritable and more emotional than usual. Support for this problem may be addressed by the psychologist, guidance counselor, or social worker on the school staff.

### **SUMMARY**

While many clinicians do not allow concussed individuals to return to physical exertion after sustaining a concussion, they are allowed to return to school with the admonition “if your symptoms increase you need to discontinue the activity.” This is difficult for most adolescents to follow once they are in school attending classes and socializing with their friends. To prevent worsening of symptoms and possible prolonged recovery in concussed individuals, both mental and physical exertion is not recommended during the early stages of recovery. We recommend a return to school once the symptoms have cleared. A summary of the recommendations in this article are outlined below.



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## **THE STUDENT-ATHLETE RETURN TO PLAY PROTOCOL**

### **Initial Treatment:**

- No physical activity should occur until the athlete's symptoms are gone
- Avoid mental (cognitive) exertion; school attendance, test taking, reading, studying, computers, videogames, and text messaging

(Note: The student-athlete may watch television, listen to books on tape or soft music for brief intervals as long as the symptoms do not increase.)

### **When no symptoms are present:**

Step 1. Advance by beginning short periods of reading, focusing, and abbreviated school attendance.

Step 2. Advance when a full day of school is tolerated, begin low impact activity such as walking, stationary bike, etc.

(Gradually increase the intensity and duration as tolerated)

Step 3. Advance to aerobic activity fundamental to the specific sport such as skating, running, etc.

Step 4. Advance to noncontact activity drills to the specific sport such as dribbling, batting, shooting.

Step 5. Advance to full contact in a practice setting (Note: The student athlete must remain asymptomatic to advance through the various levels or return-to-play as described above. If symptoms return, while exercising, the athlete should return to the previous activity after waiting a day).

If all the above is accomplished without any return of signs and symptoms, they may return to play following final clearance. Some athletes, especially if they had multiple previous concussions, should consider having a baseline computerized neuropsychological test performed because of the increased risk of concussion.

### **References:**

Aubry M, Cantu R, Dvorak J, et al: Summary and Agreement Statement of the 1<sup>st</sup> International Symposium on Concussion in sport, Vienna 2001 Clin J Sports Med 2002; 12:6–11.



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**HEADS UP CONCUSSION IN YOUTH SPORTS**

U.S Department of Health and Human Services

Centers for Disease Control and Prevention

[www.cdc.gov/injury](http://www.cdc.gov/injury)

[www.cdc.gov/ConcussioninYouthSports](http://www.cdc.gov/ConcussioninYouthSports)

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