

## XXIX. SUGGESTED GUIDELINES FOR IDENTIFICATION AND MANAGEMENT OF CONCUSSION & HEAD TRAUMA IN SPORTS

Head trauma is a common problem in sports, and it has the potential for serious complications if not managed correctly. Even what appears to be a brief “bell ringer” with no loss of consciousness has the real risk of catastrophic results in an athlete that is returned to action too soon. Both the medical literature and lay media frequently report on dangerous complications of concussion: post concussion syndrome, and second impact syndrome. There is also a rising concern regarding the number of concussions an athlete can sustain before causing damage to the brain. Scientific proof of this concern and its consequences are not available at this time.

At many athletic contests across the country, there is a lack of trained and knowledgeable individuals managing concussed athletes. Frequently, there is undue pressure from various sources (parents, player, and coach) to return a valuable athlete to action as quickly as possible. In addition, often athletes are unwilling to report headaches and other findings that he/she feels may be related to a concussion, because they fear this will prevent them from playing and be seen as “weak” by teammates and coaches.

The National Federation of State School Associations recommends that the WIAA distribute the following information to athletic directors in all of our member schools, so that persons making sideline decisions regarding athletes may benefit from the latest knowledge regarding concussion and head injury. We have outlined some guidelines and information below that may be helpful in establishing a protocol at your institution. Please remember, these are general guidelines and must not be used in place of the central role that a physician and licensed athletic trainer must play in protecting the health and safety of student athletes.

**Concussion** – a complex process affecting the brain induced by traumatic biomechanical forces. Several common features may be utilized in helping to define a concussion:

1. Concussion may be caused by either a direct blow to the head, face, or neck, or an indirect blow elsewhere on the body with forces transmitted to the head.
2. Concussion typically results in the rapid onset of short-lived impairment of neurologic functioning. This may resolve spontaneously.
3. Concussion may produce significant symptoms, but imaging studies (CAT scan) are normal; this is because concussion is a functional disturbance, not necessarily a structural injury to the brain.
4. Concussion results in a graded set of clinical symptoms. Loss of consciousness and amnesia (memory loss) may or may not be present, but if present they may not indicate anything about severity of the injury. Resolution of the symptoms will usually follow a typical course.
5. It is important to remember that young athletes still have a developing brain, and therefore may need a longer time to recover from a concussive injury than an adult athlete.

Athletes with a history of concussion should have a *yearly* Preparticipation Physical Exam. There should be a focus on their neurologic exam and specific questions to help truly assess concussion frequency and severity, as many athletes may not recognize concussions they may have had in the past. This history may “pre-identify” those athletes who will fit into the Complex Concussion category. It also gives the opportunity for a physician to educate the athlete & his/her family regarding the significance of concussion.

Recently, the old concussion grading scales (grade I-III) have been abandoned in favor of a new classification:

**Simple Concussion:** This is an injury that will progressively resolve without complication in less than 10 days. In such cases, limitation of activity while symptomatic is the only necessary intervention, and the athlete will typically resume sports without further problems. This is the most common form of concussion and can be appropriately managed by primary care physicians and licensed athletic trainers working under medical supervision. The cornerstone of management is rest until all symptoms resolve, and then a slow, progressive program of activity before return to sport.

**Complex Concussion:** These are cases where athletes suffer persistent symptoms (including recurrence of symptoms with exertion), specific signs (prolonged loss of consciousness >1 minute, amnesia), or prolonged cognitive impairment following the injury. This group should also include athletes who suffer multiple concussions over time or where repeated concussions occur with less impact force. This group

should be managed with the help of a physician specialist who has specific expertise in concussion, such as a sports medicine physician, a neurologist, or a neurosurgeon.

### **Some Signs and Symptoms of Concussion:**

Unaware of game period, opposition, or score of a game  
Confusion  
Memory loss/amnesia  
Loss of consciousness  
Headache  
Balance problems or dizziness  
Nausea or vomiting  
Feeling “stunned,” “dinged,” “foggy,” or “dazed”  
Visual problems (eg, seeing stars, double vision)  
Ringing in the ears  
Irritability or emotional changes  
Slow to answer questions or follow directions  
Vacant stare/Glassy eyed  
Slurred speech  
Inappropriate playing behavior (eg, running the wrong direction)  
Significantly decreasing playing ability  
Sensitivity to light and noise  
Trouble sleeping  
Poor concentration  
Poor memory

### **Concussion management**

Sideline evaluation of cognitive function is essential. This may be done using the Sideline Assessment of Concussion or “SAC Card” (see example included on page 63). It is important to recognize that these abbreviated tools are designed for rapid evaluation on the sidelines and are not meant to replace a thorough evaluation by medical personnel. Symptoms can worsen over time, so athletes must be reassessed throughout the contest or practice.

The appearance of symptoms may be delayed several hours, so it is imperative to speak with a family member of the athlete to educate them so the athlete will be watched closely and evaluated after the event. If a family member is not present, then the physician, athletic trainer, or coach is responsible for finding someone who will be able to assess the athlete after the event. Calling emergency services is always indicated if symptoms worsen. Cell phones are a must for athletics today! The athlete should have an appointment with their physician for follow-up.

Acute injury – when a player shows ANY signs or symptoms of concussion:

1. The player should not be allowed to return to play in that game or practice.
2. The player should not be left alone, and regular monitoring for deterioration is essential over the initial few hours after the injury.
3. The player should be medically evaluated following the injury prior to return to play.
4. Return to play must follow a medically supervised stepwise process.
5. A player should never return to play while symptomatic: **WHEN IN DOUBT, SIT THEM OUT!**

The return to play process for a simple concussion usually takes one week, unless the athlete has a return of symptoms. If symptoms arise during any of the steps in the return to play protocol, the athlete should stop and be evaluated by a physician. Usually, athletes are advanced one step every 24 hours.

1. Complete rest until the athlete is 100% symptom free.
2. The athlete may progress to light aerobic exercise (walking, stationary biking) without resistance training.
3. Sport-specific exercise can begin the next day (skating in hockey, running in soccer, etc).
4. The athlete may begin non-contact training drills, as well as light resistance training.
5. After medical clearance, the athlete may participate in full contact practice.
6. Game play.

In cases of recurrent and/or complex concussion, the rehabilitation will be more prolonged. These athletes should be managed by a physician with experience in dealing with concussions.

It is important for coaches and athletes to communicate with teachers, as a concussed athlete may require “cognitive rest.” This is essentially a limitation or special accommodations given for scholastic activities while symptomatic. Just like physical exertion, too much mental exertion may flare symptoms. This also includes potentially limiting television and video game time at home.

Any concussed athlete should NOT take any pain relief medications (even ibuprofen) during their return to play program, as these medications can modify concussion symptoms. Athletes on pain relievers should see a physician for final clearance. In addition, any athlete taking antidepressant medication should see a physician for final clearance, as these medications may also modify concussive symptoms. Any medications started in the recovery period to help reduce headache and post concussion syndrome symptoms need to be stopped prior to final clearance.

## **OTHER ISSUES**

**Prevention** – Athletes should wear protective equipment which fits correctly. Athletes should be taught proper techniques for their sport (for example, tackling in football). Rules should be closely followed and enforced by players, coaching staff, and officials.

**Education** – The ability to treat and reduce the effects of concussive injury after the event are minimal. Education of athletes, parents, coaches, sports medicine staff, and emergency service personnel is very important. Education should include the importance of:

1. Honest reporting of symptoms by the athlete
2. Assessment of those symptoms by a medical professional
3. Return to play protocols and decision making process

**Future considerations** – Computerized neuropsychological testing may be helpful with concussion assessment in the future. Special brain imaging (PET scans) may be emerging as a helpful imaging tool as well. However, at this time there is no evidence that they are helpful for diagnosing and managing concussion in the high school population. The Medical Advisory Board for the WIAA will discuss the changing field of concussion management and diagnosis every year, in order to keep the guidelines current.

For further information, please do not hesitate to discuss this with your local physicians and your school athletic trainer/sports medicine personnel. These guidelines were based on the following article: Summary and Agreement Statement of the Second International Conference on Concussion in Sport, Prague 2004 by McCrory P, et al. The Physician and Sportsmedicine Vol 13, Number 4, April 2005.

# XXX. SIDELINE ASSESSMENT OF CONCUSSION (SAC)

The Sideline Assessment of Concussion (SAC) card developed by McCrae, Kelly, et al, has been validated on hundreds of athletes. It incorporates those aspects of the evaluation that appear to be important. Their test has a reasonable, user-friendly system that utilizes tests that can easily be performed on the sideline. The scoring system may be used as a guideline to **help** with decision making, but should not be used as the only method to evaluate concussion. Please discuss the correct use of this card with your team physician and athletic trainer.

## SIDELINE ASSESSMENT for CONCUSSION

Name:

|                   |      |           |
|-------------------|------|-----------|
| Age:              | Sex: | Examiner: |
| Nature of Injury: |      |           |
| Date of Exam:     |      | Time:     |

| ORIENTATION             |   |    |
|-------------------------|---|----|
| Month:                  | 0 | 1  |
| Date:                   | 0 | 1  |
| Day of week:            | 0 | 1  |
| Year:                   | 0 | 1  |
| Time (within 1 hr):     | 0 | 1  |
| Orientation Total Score |   | /5 |

| IMMEDIATE MEMORY  |         |     |         |   |         |   |
|---|---------|-----|---------|---|---------|---|
| All 5 trials are completed regardless of score on trial 1 & 2; score equals sum scores all 5 trials |         |     |         |   |         |   |
| Item  | Trial 1 |     | Trial 2 |   | Trial 3 |   |
| Elbow   | 0       | 1   | 0       | 1   | 0       | 1 |
| Apple   | 0       | 1   | 0       | 1   | 0       | 1 |
| Coquet  | 0       | 1   | 0       | 1   | 0       | 1 |
| Saddle  | 0       | 1   | 0       | 1   | 0       | 1 |
| Ennoble   | 0       | 1   | 0       | 1   | 0       | 1 |
| Total Immediate Memory Total  |         | /15 |         | Note: Do not inform the subject that delayed recall will be tested. |         |   |

| NEUROLOGICAL SCREENING                                   |  |
|--|--|
| Recollection of injury (pre- or post-traumatic amnesia): |  |
| Strength:  |  |
| Sensation:   |  |
| Coordination:  |  |

| (OVER)   |             |     |
|--|-------------|-----|
| CONCENTRATION  |             |     |
| Digit Backwards: (If correct, go to the next string length; if incorrect, read trail 2. Stop after incorrect on both trails) |             |     |
| 4-9-5  | 6-2-9       | 0 1 |
| 3-8-1-4  | 3-2-7-9     | 0 1 |
| 6-2-9-7-1  | 1-5-2-8-6   | 0 1 |
| 7-1-8-4-6-2  | 5-3-9-1-4-8 | 0 1 |
| Months in Reverse order: (entire reverse sequence correct for 1 point)   |             |     |
| Dec-Nov-Oct-Sep-Aug-Jul-Jun-May-Apr-Mar-Feb-Jan  | 0           | 1   |

|                      |    |
|----------------------|----|
| Concentration score: | /5 |
|----------------------|----|

| EXERCUTIONAL MANEUVERS |           |           |              |
|------------------------|-----------|-----------|--------------|
| 5 jumping jacks        | 5 sit-ups | 5 pushups | 5 knee-lifts |

| DELAYED RECALL             |   |    |
|----------------------------|---|----|
| Elbow                      | 0 | 1  |
| Apple                      | 0 | 1  |
| Coquet                     | 0 | 1  |
| Saddle                     | 0 | 1  |
| Ennoble                    | 0 | 1  |
| Delayed recall Total score |   | /5 |

| Summary of Total Scores |     |
|-------------------------|-----|
| Orientation             | /5  |
| Immediate Memory        | /15 |
| Concentration           | /5  |
| Delayed Recall          | /5  |
| Overall Total Score     | /30 |

*[If score is below baseline, DO NOT RETURN TO PLAY]*

©Brain Injury Association, Inc., 1997  
McCrae, Kelly & Randolph

# XXXI. CONCUSSION INFORMATION CARD

This card is helpful for athletic trainers and physicians who evaluate an athlete in the days following a concussion. It should give information regarding symptoms that occurred immediately following the concussive event. More information like the mechanism of injury is helpful and can be written in.

## CONCUSSION INFORMATION CARD

### Concussion Defined

Concussions are injuries to the brain caused by physical trauma to the head or body. Concussions are characterized by immediate and transient post-traumatic impairment of neural function. This alteration of brain function can present as any number of signs and/or symptoms, such as those listed on the other side of this card. A person does NOT have to lose consciousness to have a concussion.

Every head injury should be taken seriously and each dealt with appropriately. No two are exactly alike. The effects of head injuries can be cumulative and recovery time from one to the next is frequently longer.

***“When in doubt, hold them out”***

### Return to Play Criteria

It is imperative that no athlete return to practice, games, weight lifting, or any other strenuous activity following a concussion. Athletes should be evaluated by a physician prior to their return to play. We recommend a gradual return to play for a simple concussion using the guidelines below:

1. Complete rest until the athlete is 100% symptom free.
2. The athlete may progress to light aerobic exercise (walking, stationary biking) without resistance training.
3. Sport-specific exercise can begin the next day (skating in hockey, running in soccer, etc).
4. The athlete may begin non-contact training drills as well as light resistance training.
5. After medical clearance, the athlete may participate in full contact practice.
6. Game play.

If symptoms return at any time during this progression, activities should immediately be stopped, and the athlete should contact their physician. Athletes must be able to comfortably complete a full practice before returning to play in games.

### General Recommendations

The recommendations on this card are in no way a substitute for the direct care of a licensed physician.

No aspirin, ibuprofen, or any other anti-inflammatory medication should be taken until 48 hours after the injury. Only clear liquids should be consumed for four hours after the injury and then the diet may be progressed as tolerated. No alcoholic beverages should be consumed.

## CONCUSSION INFORMATION CARD

\_\_\_\_\_ (name) has sustained a head injury on

\_\_\_\_\_ (date) at \_\_\_\_\_ (time & location)

Loss of consciousness?  YES  NO

Retrograde (events leading up to injury) amnesia?  YES  NO

Previous history of concussions?

YES If yes, when? \_\_\_\_\_  NO  UNCERTAIN

Headache?

NO  YES If yes, quantify severity at 5 minute intervals. \_\_\_/10 \_\_\_/10 \_\_\_/10

### SIGNS & SYMPTOMS PRESENT AT TIME OF EVALUATION:

(I = initial exam & F = final exam)

|                             |                              |                        |
|-----------------------------|------------------------------|------------------------|
| ___ Headache                | ___ Confusion                | ___ Nausea/vomiting    |
| ___ Drowsiness              | ___ Sensitive to light       | ___ Nervousness        |
| ___ Sensitive to noise      | ___ Feeling slowed down      | ___ Feeling like a fog |
| ___ Difficulty remembering  | ___ Difficulty concentrating | ___ Dizziness          |
| ___ Tinnitus                | ___ Blurred vision           | ___ Itching/skin rash  |
| ___ Numbness/tingling       | ___ Neck pain                | ___ Irritable          |
| ___ Burning feeling in feet | ___ Teeth hurting            | ___ Fatigue            |

The athlete should be observed for any of the above listed or following signs and symptoms immediately after the injury and for the next several days:

|                   |                |                        |                       |
|-------------------|----------------|------------------------|-----------------------|
| *Trouble sleeping | *Feeling tired | *Sleep more than usual | *Difficulty breathing |
| *Joint stiffness  | *Sadness       | *Balance problems      | *Slurred speech       |

The athlete should be transported to an emergency facility for any increase in intensity or frequency of the above listed conditions. The athlete's condition should be checked every hour for four hours, then every two hours for the next eight hours.

## XXXII. REDUCING BRAIN & SPINAL INJURIES IN FOOTBALL

Brain and spinal injuries in football have been dramatically reduced since the rules were changed in 1976 to prohibit butt blocking, face tackling, spearing, and any other technique in which the helmet and face-mask purposely receive the brunt of the initial impact. There are still a small number of football players (and fewer in other sports) that become paralyzed, but the lesson to keep the head and face out of blocking and tackling remains.

Generally, close to 5% of ALL injuries experienced by participants in athletics are concussions (see following sections for signs and symptoms). No concussion should be dismissed as minor until a thorough evaluation is performed. No athlete sustaining a concussion should be allowed to return to play that game or practice. The task is to be certain that the athlete no longer has any symptoms at rest and with exertion before returning to play. Returning to play too soon may be associated with prolonged concussion symptoms, post concussion syndrome, and "second impact syndrome," all of which are serious for the athlete.

Several suggestions for reducing brain and spinal injuries:

1. Preseason history and physical exams for all participants. These should help identify athletes with a history of previous head injury, concussion, and spinal injury. If the physician has questions regarding the athlete's readiness to participate, the athlete should not be allowed to play.
2. If it is not possible to have sports medicine personnel (athletic trainer or physician) at all games or practices, then emergency measures must be provided. The entire coaching staff should be organized with an emergency action plan, and each person should know what they should do in case of a brain or spinal injury during a game and practice. Prevention of further injury is the main objective.
  - a. The WIAA Medical Advisory Committee recommends it is desirable that a physician should be present at all games, and a Licensed Athletic Trainer be present at all games and practices. If it is not possible for a physician and/or trainer to be present at all games and practice sessions, then emergency measure must be provided, and the Emergency Action Plan should be well rehearsed.
  - b. The emergency action plan should be reviewed and rehearsed at least on a yearly basis.
  - c. ***A cell phone should be readily available at all times.***
3. Athletes must be given proper conditioning exercises which will strengthen their neck muscles in order for them to be able to hold their heads firmly erect when making contact. Strong neck muscles may help prevent neck and head injuries.
4. Coaches should drill the athletes in the proper execution of the fundamentals of football skills, particularly blocking and tackling. ***KEEP THE HEAD OUT OF FOOTBALL.***
5. Coaches and officials should discourage players from using their heads as battering rams. The rules prohibiting spearing should be enforced in practice and games. The players should be taught to respect the helmet as a protective device and that the helmet should not be used as a weapon.
6. All coaches, trainers, and equipment staff should take special care to see that the player's equipment is properly fitted, particularly the helmet.
7. Strict enforcement of the rules of the game by both coaches and officials will help reduce serious injuries.
8. Coaches should educate their athletes about concussion and the importance of reporting any and all symptoms. This should be done yearly. Many of the symptoms cannot be seen by a person (such as headache), but are very important. When a player has experienced or shows signs of possible brain injury (headache, visual disturbances, dizziness, confusion, memory loss, etc), he/she should receive immediate medical attention and not be allowed to return to play without permission from the proper medical authorities.
9. Both athletes and their parents should be warned of the risks of injuries.
10. Coaches should not be hired if they do not have the training and experience needed to teach the skills of the sport and to properly train and develop the athletes for competition.

Based on original article by Mueller, FO and Cantu, RC:

[http://www.nfhs.org/web/2003/11/sports\\_medicine\\_reducing\\_brain\\_and\\_spinal\\_injuries\\_in\\_football\\_.aspx](http://www.nfhs.org/web/2003/11/sports_medicine_reducing_brain_and_spinal_injuries_in_football_.aspx)

### XXXIII. SECOND IMPACT SYNDROME

Second Impact Syndrome, a condition in which there is rapid brain swelling and herniation following a second head injury is more of a concern today than ever before. According to medical literature, this syndrome occurs when an athlete sustains a head injury and continues to play despite persisting symptoms.

This athlete receives another injury before the initial symptoms resolve, which triggers the catastrophic results of Second Impact Syndrome.

While dealing with head injuries, physicians, trainers, coaches, and emergency personnel should not remove headgear while stabilizing the athlete's neck. In situations with respiratory distress (like Second Impact Syndrome), the facemask or faceshield should be removed, without removing the helmet, to secure the airway. If there is no way to remove the facemask, the helmet must then be very carefully removed to secure the airway.

Sports medicine and emergency response personnel that cover sporting events must understand the symptoms of this syndrome and be prepared to initiate appropriate emergency treatment, including CPR. Second Impact Syndrome has a mortality rate of 50% and a morbidity rate of nearly 100%. It is of the utmost importance to deny participation of an athlete who sustains a head injury until all symptoms have cleared, and never let an athlete with a concussion return to play the same day. Prevention of the syndrome is truly the only way to eliminate it.

### XXXIV. FOOTBALL HELMET INSPECTION LIST

#### 1. Weekly Football Helmet Inspection Checklist

Coaches, Trainer or Faculty Equipment Manager (Compare this checklist to the manufacturer's guidelines)

#### **Players don helmet and buckle chinstrap**

Trained Professional(s) Check:

- a. Chinstrap cup centered on the chin, anchoring straps flat and taut, passing under the facemask. Chinstrap buckles with teeth facing up. Straps not loose, stretched or broken. Replace as needed. Snaps in good repair.
- b. Bottom of forehead padding – one inch above the eyebrow. Adjust padding or air in the bladder.
- c. Helmet ear openings aligned approximately with ear canals. Adjust padding or air in the bladder.
- d. Facemask three widths from tip of nose. Check facemask for chipped paint, loose attachments, movement, denting or flattening. Repair attachments, replace dented or chipped masks as needed.
- e. Rear padding covers the bony prominence of the skull. Adjust padding or air in bladder.
- f. Front to back torsion – forehead skin should wrinkle. Helmet should NOT slide forward and down on the nose or backwards on to the neck. Adjust chinstrap, padding or air in bladder.
- g. Side torsion – grasp face mask with both hands and attempt to rotate sideways. Forehead and skin near jaw pads should wrinkle. Player's nose should remain between the anchoring screws that hold the facemask in place on the forehead. Adjust padding, chinstrap or air in bladder.
- h. Examine shell for cracks; examine mounting rivets, screws, velcro and snaps for breakage, distortion or looseness. Replace as needed.
- i. Replace damaged or worn forehead, rear skull and jaw pads.

#### 2. Daily Football Helmet Inspection Checklist

Players

Check Your Helmet Before Each Usage As Follows:

- a. Check foam padding for proper placement and any deterioration.

- b. Check for cracks in vinyl/rubber covering of air, foam, liquid padded helmets.
- c. Check that protective system or foam padding has not been altered or removed.
- d. Check for proper inflation of air helmets. Follow manufacturer guidelines. Air pressure adjustments are to be made by coaches, trainer or faculty equipment manager.
- e. Check all rivets, screws, Velcro and snaps to assure they are properly fastened and holding protective parts.

*IF ANY OF THE ABOVE INSPECTIONS INDICATE NEED FOR REPAIR AND/OR REPLACEMENT, NOTIFY A COACH OR FACULTY EQUIPMENT MANAGER.*

AS A PLAYER, THIS IS YOUR RESPONSIBILITY!!!!

## **NEVER WEAR A DAMAGED HELMET**

Guidelines of the National Operating Committee on Safety of Athletic Equipment and American Equipment Managers Association

**CAUTION:** Only paints, waxes, decals, or cleaning agents approved by the manufacturer are to be used on any helmet. It is possible to get a severe or delayed reaction by using unauthorized materials, which could permanently damage the helmet shell and affect its safety performance.

8/95

## **XXXV. UNCONSCIOUS ATHLETE RETURN TO COMPETITION FORM**

This form may be used by schools. Letters from treating physicians should also be accepted.

|   |                     |
|---|---------------------|
| <b>Unconscious Athlete<br/>Return to Competition</b>  |                     |
| <i>I have examined the student athlete named below and have cleared him/her to return to competition.</i> |                     |
| Athlete Name _____  |                     |
| School _____  | Date/<br>Time _____ |
| Physician<br>Signature _____  |                     |
| Official _____  |                     |
| Host<br>School _____  | Event: _____        |
| Contest<br>Manager _____  |                     |