

# Vernon Hills High School Concussion Management Protocol

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## Introduction

The purpose of this protocol is to clearly address the issue of concussion recognition and management at Vernon Hills High School. It shall discuss the definition of a concussion, the signs and symptoms of a concussion, how the VHHS Athletic Training staff will evaluate and classify concussions, concussion treatment, indications for physician referral, and return to play procedures. This protocol is derived from the most recent evidence-based medical practice as well as from the consensus and position statements from various professional medical associations. Furthermore, this protocol was produced in consultation with a concussion specialist; as well as it is approved by our team physician as a standing medical order.

## Definition of a Concussion

A concussion is a complex injury process affecting the brain which is caused by a direct or indirect traumatic force on the head and/or neck. This injury process typically results in the rapid onset of short-lived impairment of neurological function. However, these impairments are generally functional disturbances and not a structural injury as the impairments are caused by metabolic changes in the brain. These impairments result in a gradually improving set of clinical symptoms which are reported by the patient and observed by others.<sup>1</sup>

## Signs and Symptoms of Concussion

Recognition of the signs and symptoms of concussion is the crux of its diagnosis and management. A symptom is something that is reported by the patient; whereas a sign is something observed by coaches, parents, or medical staff. The signs and symptoms of concussion vary from person to person and incident to incident. A concussion should be suspected if **any one or more** of the following occur in conjunction with some sort of traumatic force to the head or neck<sup>1,2,3</sup>:

Symptoms Reported by Athlete	Signs Observed by Others
<ul style="list-style-type: none"> <li>• Headache</li> <li>• Nausea or vomiting</li> <li>• Dizziness</li> <li>• Blurred, double, or abnormal vision</li> <li>• Sensitivity to light and/or noise</li> <li>• Fatigue</li> <li>• Feeling “foggy” or “out of it”</li> <li>• Change in sleeping pattern</li> <li>• Concentration or memory issues</li> <li>• Confusion</li> </ul>	<ul style="list-style-type: none"> <li>• Person appears dazed or stunned</li> <li>• Disorientation to place and/or time</li> <li>• Can’t recall events before injury</li> <li>• Can’t recall events after injury</li> <li>• Loss of consciousness</li> <li>• Seizure activity</li> <li>• Unusual changes in personality or mood</li> <li>• Nystagmus (abnormal eye tracking)</li> </ul>

It should be stressed that one need not lose consciousness in order to incur a concussion; rather, loss of consciousness occurs in only about 10% of cases.<sup>2</sup> A direct blow to the head is also not necessary in order to get a concussion. The brain only needs to move within the cranium and collide with the walls of the skull. Therefore, an indirect force to the head like coming to a sudden stop by colliding with another person or object can cause the brain to move and create a concussion.

## Concussion Evaluation and Classification Algorithm

### Evaluation of Concussion

The evaluation of a concussion shall begin as soon as the medical staff makes contact with the athlete, whether that is on the field or on the sideline. A detailed history shall first be taken in order to determine mechanism of injury, orientation, memory integrity, and a symptom inventory. A medical examination will also be conducted so as to gather vital sign and neurological baselines. Once immediate life threats are ruled out and a concussion is suspected by virtue of findings listed in the "Signs and Symptoms of Concussion" section of this protocol, the staff shall utilize the SCAT2 assessment tool (located in Appendix C) to document findings.<sup>1</sup>

If the medical staff is not available to complete an evaluation of the athlete, the coaching staff should remove the athlete from competition. They should then contact the VHHS Athletic Training staff immediately to determine further care. As the situation dictates, the medical staff will take a history over the phone and provide the appropriate recommendations. Unless the staff directs that the athlete be taken to the hospital, the athlete shall report to the Athletic Training Office upon their return to campus for a more thorough medical evaluation.

### Concussion Severity Classification

Based on the findings of the evaluation, the staff shall classify the grade or severity of the concussion according to the standards of the American Academy of Neurology. There is considerable debate in the sports medicine community as to which classification system to use. Unfortunately, there is no consensus on system utilization as no single system is empirically proven nor fits every individual every time. It also needs to be stressed that these classifications are primarily for initial management and they have not been positively correlated with recovery time. The VHHS Athletic Training staff is utilizing the AAN scale as it is one of the more conservative systems and it is relatively simple to utilize. The AAN classification is as follows<sup>2,3</sup>:

Grade 1 (Mild)	Grade 2 (Moderate)	Grade 3 (Severe)
<ul style="list-style-type: none"> <li>• Transient confusion</li> <li>• Symptoms last &lt;15 mins</li> <li>• No loss of consciousness</li> </ul>	<ul style="list-style-type: none"> <li>• Transient confusion</li> <li>• Symptoms last &gt;15 mins</li> <li>• No loss of consciousness</li> </ul>	Any loss of consciousness

## Concussion Management and Treatment

### Immediate Field Management

Concussions that have been classified as a grade 1 or 2 will disqualify that athlete from return to play that day. They shall continue to be monitored by the medical staff through the rest of the event. The athlete's family will be notified of the situation. The indications for referral to a physician or emergency department will be discussed with family at this time. Refer to the "Indications for Physician Referral" section of this protocol for an explanation of these indicators.

Concussions classified as a grade 3 shall be treated as a medical emergency. A high index of suspicion shall be upheld in these patients. Upon arrival to the patient's side, the cervical spine should be immobilized, assure airway patency, address any immediate life threats, and EMS should be activated per the VHHS Emergency Action Plan. These patients shall be transported to the hospital via ambulance

in order to receive further medical care and evaluation<sup>4</sup>. The order of adults that shall accompany the athlete to the hospital is also indicated in the VHHS EAP.

## Concussion Treatment

At this time, there is no pharmacological or therapeutic modality that exists to treat concussions. The only treatment available is to get plenty of sleep, keep hydrated, and to maintain a healthy, balanced diet. It should be stressed that the patient should not take any pain medication like acetaminophen (Tylenol) or ibuprofen (Advil, Motrin, etc) without consulting a physician. These medications can mask symptoms of a more serious head injury in the first 24-48 hours. Additionally, they may make other post-concussion symptoms seem to disappear before they are legitimately resolved.<sup>1,2</sup>

As per school policy, if a student is suspected of having a concussion, their parents will be contacted and they shall be sent home for observation. The patient shall remain off campus until their symptoms resolve or at minimum that evening, whichever is the longer time frame. The VHHS Athletic Training staff encourages families to consider keeping their child home for at least 1 school day in order to promote mental rest. While it may put them behind in the short-term, returning to a rigorous academic environment too soon can be detrimental in the long-term. The student's brain may not be able to operate at its highest capacity in terms of processing speed, memory formation, and memory recall. Additionally, the cognitive load can potentially slow recovery. A simple analogy to consider is thinking on a concussion is like trying to run on freshly sprained ankle.

In the past, people were told to awaken someone with a concussion every 2 hours through the night. This practice has gone by the wayside as it has been determined to be generally unnecessary (especially with grade 1 concussions) and disrupts the sleep that is so important to recovery. The patient should be awakened at certain intervals during the night only if it is specifically recommended by an athletic trainer or ordered by a physician.<sup>2</sup>

All patients shall be sent home with a head injury home care instructions sheet. The sheet summaries this section to the parents as well as provides information for monitoring the patient. The sheet is included in this protocol, and it can be located in Appendix B.

## Indications for Physician Referral

Ultimately, the decision to seek physician evaluation for a concussion rests solely with the parent or legal guardian. The only exception to this statement is the management of a severe concussion, where the staff shall act upon the principle of implied consent. The VHHS Athletic Training staff, otherwise, can only guide the parent or guardian with recommendations based on reported symptoms, physical findings, and patient history. The staff shall make a recommendation of either immediate or delayed referral.

### Immediate Referral Indications

The following are evaluation findings that upon which the VHHS Athletic Training staff will strongly advise that the athlete be seen that day by a physician or in an emergency department<sup>2</sup>:

- Loss of consciousness on the field
- Amnesia lasting longer than 15 minutes
- Deterioration of neurological function
- Any signs of skull or neck trauma
- Seizure activity
- Motor deficits subsequent to initial exam

- Decreasing level of consciousness
- Decrease or irregularity in respirations
- Decrease or irregularity in pulse
- Increase in blood pressure
- Unequal, dilated, or unreactive pupils
- Cranial nerve deficits
- Vomiting
- Sensory deficits subsequent to initial exam
- Balance deficits subsequent to initial exam
- New cranial nerve deficits
- Worsening post-concussion symptoms
- Appearance of symptoms not in 1<sup>st</sup> exam
- Still symptomatic at the end of the game
- Unusual personality or mood changes

### **Delayed Referral Indications**

This is the type of physician referral that is most likely to be recommended. Delayed referral means that the family can wait to see if any of the following indicators arise in the following days before seeking a physician's care<sup>2</sup>:

- Appearance of any of the indicators listed in the immediate referral section
- Post-concussion symptoms worsen or do not improve over time
- Increase in the number of post-concussion symptoms reported
- Post-concussion symptoms begin to interfere with the athlete's daily activities (i.e. sleep disturbances, trouble in school)

It shall be the position of the VHHS Athletic Training staff that any grade 2 concussion should be seen by a physician in the following days. Additionally, a physician shall always be consulted in the determination of ending a season as directed by the standards in the subsequent section "Return to Play Criteria."

Any appearance of immediate referral indicators in the days after the incident means that the athlete should be taken to the nearest emergency department. However, the other delayed referral indicators do not necessarily require emergent evaluation. Family physicians are certainly an option for referral, but they may or may not be very experienced in the management of concussions. The VHHS Athletic Training staff can help arrange evaluation with the clinicians of the Midwest Center for Concussion Care so as to provide access to local and high quality specialists.

VHHS is in the unique position of having a great deal of families with physicians and other highly qualified medical professionals as parents or relatives. The VHHS Athletic Training staff strenuously insists that any individual referred to a physician for a concussion evaluation should be seen by an independent physician. This position is intended to help protect all parties from ethical conflicts of interest.

### **Return to Play Criteria**

As discussed in the "Concussion Treatment" section of this protocol, the only existing treatment is rest. Concussions take time to heal, and returning to play too soon can either seriously hamper recovery or even prove dangerous for the athlete. Two concussions too close together, especially in young athletes, can result in the conditions called Post-Concussion Syndrome and Second Impact Syndrome. Post-Concussion Syndrome is when symptoms of a concussion continue to linger outside of the normal recovery window, usually in the presence of exertion, and may impact daily living. Although it is a rare complication, Second Impact Syndrome causes rapid swelling of the brain that is most often fatal<sup>1,2</sup>.

## Disqualification Timetable

It is with these considerations in mind that the athlete can only return to play once certain milestones and indicators are met. As mentioned in the "Immediate Field Management" section, an VHHS athlete ***will never*** be returned to practice or competition that day if a concussion is suspected. The athlete will remain disqualified from competition as indicated in the following table. These timetables are general standards and will be adjusted as necessary based on symptoms and/or if ordered by a physician<sup>1,2,3</sup>.

Severity	1 <sup>st</sup> Concussion	2 <sup>nd</sup> Concussion	3 <sup>rd</sup> Concussion
<b>Grade 1 (mild)</b>	1 week	2 weeks (asymptomatic for at least 1 week)	Termination of Season
<b>Grade 2 (moderate)</b>	2 weeks (asymptomatic for at least 1 week)	1 Month (asymptomatic for at least 1 week)	Termination of Season
<b>Grade 3 (severe)</b>	1 Month (asymptomatic for at least 1 week)	Termination of Season	

## Return to Play Algorithm

At this time, VHHS does not have neuropsychological testing (i.e. ImPACT, CogState Sport) on campus. These tests are part of the gold standard of determining return to play. The sports medicine staff can arrange to have these tests done at the family's request. The SCAT2 assessment tool will otherwise be utilized to help track the patient's recovery during the appropriate aforementioned disqualification period. The first assessment will be done on the first day the athlete is back on campus. Follow-up tests will be completed in 3 day intervals so as to help prevent memorization of the word lists. Once the athlete is asymptomatic at rest, they shall be allowed to progressively work back to competition. There is a step-wise manner in which they must progress, and at least a 24 hour period must elapse before moving to the next stage. The athlete may not move on to the next stage unless they demonstrate acceptable ability at the current stage. Any recurrence of symptoms means that the sequence must be restarted. The SCAT2 assessment shall be done before and after the first inclusion of exertion in the return to play progression in order to check for subtle symptom recurrence. The stages of progression are as follows<sup>1</sup>:

Stage	Functional Exercise	Stage Objective
1. No Activity	Complete physical & mental rest	Recovery
2. Light Aerobic exercise	Walking, swimming, stationary bike @ <70% of max heart rate; No resistance training	Increase heart rate and test exertion in a controlled environment
3. Sport-Specific exercise	Running, shooting, or hitting drills	Add movement with exertion
4. Non-contact training drills	Progression to more complex training drills; may start progressive resistance training	Exercise, coordination, and cognitive load
5. Full-contact practice	Following medical clearance, return to normal training activities	Restore athlete's confidence; coaching staff assesses functional skills
6. Return to play	Normal game play	

## Certification and Endorsement

This protocol has been compiled to conform to the most recent evidence-based medical practice and the standards as set forth by the Athletic Training profession. The directives contained therein will be adhered to by us or any other athletic trainer acting on our behalf. Any deviation for this protocol shall occur only upon written orders by a physician. This protocol will undergo an annual review, and it shall be revised as needed.

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Kirsten Rous MS, ATC  
Athletic Trainer, VHHS

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Joseph Payawal, ATC  
Athletic Trainer, VHHS

We have reviewed this document, and I find it to be reasonable and medically sound. This standing medical order is to be used as the VHHS concussion recognition and management protocol. This order is to be followed by all licensed athletic trainers and athletic training students serving at VHHS. Deviation from this order can only be made with a written physician's order.

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Dr. Roger Chams, MD  
VHHS Team Physician

## Appendix A- References

1. McCrory P, Meeuwisse W, Johnston K, et al. "Consensus Statement on Concussion in Sport: The 3<sup>rd</sup> International Conference on Concussion in Sport Held in Zurich, November 2008." *Journal of Athletic Training*. 2009;44(4):434-448.
2. Guskiewicz KM, Bruce SL, Cantu RC, et al. "National Athletic Trainers' Association Position Statement: Management of Sport-Related Concussion." *Journal of Athletic Training*. 2004;39(3):280-297.
3. Cantu RC. "Posttraumatic Retrograde and Anterograde Amnesia: Pathophysiology and Implications in Grading and Safe Return to Play." *Journal of Athletic Training*. 2001;36(3):244-248.
4. Holtsford S. "Head Trauma." *2009-2010 Southern Fox Valley EMS System Standard Operating Procedures*. July 2009:41.

**Appendix B- Home Care Instruction Sheet**

# VERNON HILLS HIGH SCHOOL ATHLETIC TRAINING

## Head Injury Home Care Instructions

Dear \_\_\_\_\_,

Your son/daughter injured their head during \_\_\_\_\_. A careful medical evaluation has been completed and no signs of serious complications were found. However, your child did demonstrate signs and symptoms suggestive of a concussion. VHHS policy requires that your child remain off campus for the evening or until they are symptom-free, whichever is the longer period of time. It is expected that recovery should be rapid, but your child should be monitored for a period by a responsible adult. More serious brain injuries have symptoms that may not reveal themselves until hours or even a day after the initial incident. You should take your son/daughter to the emergency room immediately if any of the following occur:

- Loss of consciousness
- Seizures
- Worsening headache
- Vomiting
- Abnormal personality changes
- Loss of coordination
- Weakness in any extremity
- Vision disturbances
- Unequal pupil size
- Unusual confusion or forgetfulness
- Abnormally drowsy or difficult to awaken

In order to ensure the most rapid recovery for your child, they need to get plenty of rest (both physical and mental), stay hydrated, and eat a healthy, balanced diet. They should not take any pain or anti-inflammatory medications without consulting a physician. These medications may mask some of the above listed symptoms. Additionally, there is no need to wake your child ever few hours during the night unless directed to do so by a physician. This practice can disrupt the much needed sleep required for recovery. Families should consider keeping their child home from school for at least 1 day to also promote mental rest.

Please remind your son/daughter to check-in with the athletic trainer during office hours on the day of their return. They will require a follow-up medical evaluation in order to track their recovery as well as allow for the safest return to competition. Your child will be evaluated and allowed to return to activity in a progressive manner as laid out in the *Vernon Hills High School Concussion Management Protocol*. This protocol is available for review in the VHHS Athletic Training website, which can be found by following the link on the VHHS Athletics webpage (<http://vhscougars.org/athletics>).

Please feel free to contact me at any time should you have any questions or concerns.

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Certified Athletic Trainer

Date

Cell Phone Number

**Appendix C- Sports Concussion Assessment Tool 2 (SCAT2) Form**