Lane Tech High School Sports Medicine
Concussion Management Protocol

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Introduction

The purpose of this protocol is to clearly address the issue of concussion recognition and management here at Lane Tech High School (LTHS). It shall discuss the definition of a concussion, the signs and symptoms of a concussion, how the Sports Medicine 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

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.[1]

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 **anyone or more** of the following occur in conjunction with some sort of traumatic force to the head or neck [1,2,3]:

Symptoms Reported by Athlete	Signs Observed by Others
• Headache • Nausea or vomiting • Dizziness • Blurred, double, or abnormal vision • Sensitivity to light and/or noise • Fatigue • Feeling “foggy” or “out of it” • Change in sleeping pattern • Concentration or memory issues • Confusion	• Person appears dazed or stunned • Disorientation to place and/or time • Can’t recall events before injury • Can’t recall events after injury • Loss of consciousness • Seizure activity • Unusual changes in personality or mood • Nystagmus (abnormal eye tracking)

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.[2] 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

Baseline testing will be performed with the use on IMPACT test for all collision sports such as football, soccer and lacrosse. A modified SCAT3 with a BESS test will be performed on the non-contact athletes. The evaluation of a concussion shall begin as soon as the medical staff makes contact with the athlete, whether that is on the field, on the sideline or the athletic training room. 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 SCAT3 assessment tool (located in Appendix C) to document findings.[1]

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 Sports Medicine 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 Management Team

Athletic Trainer- Wojciech Buzun, ATC

Concussion Management Physician – Dr. Eliza Pierko MD

Concussion oversight team- Paul Schroeder, PT

Concussion Severity Classification

Based on the findings of the evaluation, the staff shall classify the severity of the concussion. As the grading system is no longer used each concussion is based on the athlete and his/her signs and symptoms.

Concussion Management and Treatment

Immediate Field Management

Concussions that have been classified as mild/ moderate 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. Based on Illinois State Law, any athlete who is suspected of having a concussion must be evaluated by a physician before returning to any activity or beginning BRAIN-G . Refer to the "Indications for Physician Referral" section of this protocol for an explanation of these indicators. If the athletic trainer does not suspect a concussion the athlete should be functionally tested before returning to play. If a concussion is suspected, the athlete is removed from

play until being evaluated by a physician. The coaching staff will be notified of player's status due to injury.

Concussions classified as sever or if the athlete losses consciousness 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 Emergency Action Plan. These patients shall be transported to the hospital via ambulance in order to receive further medical care and evaluation[4]. Coaching staff or parent of the athlete shall accompany the athlete to the hospital.

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.[1,2]

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 LTHS Sports Medicine staff encourages the athlete to consider staying 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 an academic environment too soon can be detrimental in the long-term. The student-athlete who sustains a head injury is encouraged by the Sports Medicine team to notify teachers via email or a phone call of their status upon their return to school. 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 mild 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.[2]

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 C.

Indications for Physician Referral

Any athlete who is suspected of sustaining a concussion will be referred to the physician for further evaluation. Patents will be notified of the situation. An instruction sheet will be sent with the athlete and the parents. It is highly recommended that the athlete not drive a car that day and be picked up or driven home by a relative or a person whom the parents approve. A physician letter will be sent home or emailed to the parents. A physician letter should be brought back to the athletic trainer to confirm treatment plan. 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 High School Sports Medicine 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 High School Sports Medicine staff will strongly advise that the athlete be seen that day by a physician or in an emergency department[2]:

- Loss of consciousness on the field
- Amnesia lasting longer than 15 minutes
- Deterioration of neurological function
- 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
- Any signs of skull or neck trauma
- Seizure activity
- Motor deficits subsequent to initial exam
- 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 1st 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 be seen by the physician and this is not a medical emergency unless symptoms worsen.

- 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 High School Sports Medicine staff that any mild to moderate 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 High School Sports Medicine 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[1,2].

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, a LTHS 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[1,2,3].

Severity	1st Concussion	2nd Concussion	3rd Concussion
Mild	1 week	2 weeks (asymptomatic for at least 1 week)	Termination of Season
moderate	2 weeks (asymptomatic for at least 1 week)	1 Month (asymptomatic for at least 1 week)	Termination of Season
severe	1 Month (asymptomatic for at least 1 week)	Termination of Season	

Return to Play Algorithm

At this time, Lane Tech High School is performing a baseline neuropsychological testing (i.e. ImPACT, CogState Sport) on campus for all athlete who participate in a contact sport. These tests are part of the gold standard of determining return to play. The sports medicine staff can arrange for fallow up testing to be done at the family's request when returning back to play. The SCAT3 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. Once the athletic trainer working in conjunction with the physician receives a specific diagnosis, preferred method of gradual return to participation the BRAIN-G RTP can be started. 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 SCAT3 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[1]:

Stage	Functional Exercise	Stage Objective
1. No Activity	Complete physical & mental rest	Recovery
2. B- Bike 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. R-Run Aerobic exercises	Running greater than 70% maximum heart rate	Increase heart rate without symptoms
4. A- Agility Sport-Specific exercise	Agility drills. No head impact Activity	Add movement without symptoms
5. I- "IN RED" Non-contact training drills	Progression to more complex training drills; may start progressive resistance training	Exercise, coordination, and cognitive load without symptoms
6. N- No Restrictions Full-contact practice	Following medical clearance, return to normal training activities	Restore athlete's confidence; coaching staff assesses functional skills
7. Return to play	Normal game play	

*Every athlete that is cleared by an MD must go through the return to play protocol before returning to full contact/non restricted play. A graded symptom checklist will be filled out each day prior to starting that days task. Also a concussion progress sheet will be initialed by the ATC with each step being completed.

Once the BRAIN-G RTP is completed the athlete will have to be seen again by the same physician and be cleared for a full return to participation. The only exception is that if the referring physician is Concussion Management team member and entitles the athletic trainer to clear the athlete once they completed the RTP and are within the baseline scores.

Return to Learn

Suggested Four Stage Progression through Return-to-Learn and Return-to-Play Protocols

Stage 1: No school attendance, emphasize cognitive and physical rest

- Characteristics
  - Severe symptoms at rest
  - Abnormal ImPACT results
  - Symptoms may include but are not limited to:
    - Headache, dizziness, nausea, sensitivity to noise or light
- No tests, quizzes, or homework
- Students may be sensitive to light and noise
- Students may complain of intense and continuous/frequent headaches
- Students may not be able to read for more than 10 minutes without an increase in symptoms
- Provide student with copies of class notes (teacher or student generated)

Progress to stage 2 when:
- Decreased sensitivity to light or noise
- Decreased intensity and frequency of headaches
- Ability to do light reading for 10 minutes without increased symptoms

*If the student remains in Stage 1 longer than 2 weeks it is recommended that he/she be placed on the Student Support Team, in order to discuss impact on school performance
*Students who remain in Stage 1 for more than one week must be evaluated by a physician in order to continue academic modifications.

It is important that once the student has returned to school that they report to the Athletic Trainer or School Nurse daily in order to monitor symptoms as well as to determine progression to the next stage within the Return-to-Learn protocol.

Stage 2: Option for modified daily class schedule

- Characteristics
    - Mild symptoms at rest, increasing with physical and mental activity
    - Abnormal ImPACT scores
- May reduce length of school day as symptoms warrant
- Option: Reduce weight of backpack or provide second set of textbooks: arranged by counselor
- Option: Obtain a “five minute pass” from the School Nurse in order to avoid noisy, crowded hallways between class periods: arranged by School Nurse
- Wear sunglasses when viewing Smart Boards, as needed
- No tests, quizzes, or homework • Provide student with copies of class notes (teacher or student generated)
- Excused from physical education classes and/or sports activities
- Report daily to Athletic Trainer or School Nurse

Progress to stage 3 when:
- Each of the student’s classes have been attended at least once
- School activity does not increase symptoms
- Overall symptoms continue to decrease

Stage 3: Full day of school

- Characteristics
    - o Symptom-free at rest
    - o Mild to moderate symptoms with mental and physical activity
    - o Abnormal ImPACT results
- No tests, quizzes, or homework
- Provide student with copies of class notes (teacher or student generated)
- Option: Reduce weight of pack back or provide second set of textbooks: arranged by counselor
- Option: Obtain a “five minute pass” from the School Nurse in order to avoid noisy, crowded hallways between class periods: arranged by School Nurse
- Excused from physical education classes and/or sports activities
- Report daily to Athletic Trainer or School Nurse

Progress to stage 4 when:

- Symptom-free with mental and physical activity
    - o Student should report any return of symptoms with mental or physical activity
- ImPACT scores have normalized and/or symptoms have resolved completely
    - o The ImPACT Test is a computerized neurocognitive test which, along with a variety of other tests, is used to help determine neurocognitive function
    - o ImPACT testing will be used to help monitor the recovery process for student-athletes, when appropriate
- Completion of clinical exam conducted by the appropriate healthcare professional

***If the student is not able to progress past stage 3 after an extended period of time, where it is unlikely the student will be able to make up required work, the Student Support Team will discuss with the student and their parents, possible class withdrawal, class load modification, and/or Section 504 plan**

Stage 4: Full academic load and Return-to-Play protocol

- Resumption of current academic responsibilities once ImPACT scores have normalized and/or symptoms have resolved completely as determined by the appropriate healthcare professional
- In cooperation with guidance counselor and teachers, create plan for possible modification and the gradual completion of missed tests, quizzes, and homework
- Teacher has the discretion to apply “mastery learning” criteria for their subject matter
- It is recommended that the student does not take more than one test per day
- Students are not required to makeup missed Physical Education classes due to a concussion
- Gradual resumption of physical activity
- Students will return to Physical Education classes and follow the Return-to-Play protocol under the direction of the School Nurse and/or Athletic Trainer o GBS athletes will follow the Return-to-Play protocol found below under the direction of the Athletic Trainer
- Report daily to Athletic Trainer or School Nurse Recommended Follow-Up Students are encouraged to meet with counselor regularly to discuss progress, grades, and status of make-up work. The student is encouraged to meet with the counselor, Athletic Trainer, School Nurse, or physician to review any recurring symptoms, disrupted sleep habits, or emotional concerns.

Certification and Endorsement

This protocol has been complied to conform to the most recent evidence-based medical practice and the standards as set forth by my profession. The directives contained therein will be adhered to by myself or any other athletic trainer acting on my 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.

WojciechBuzun, ATC
Head Athletic Trainer

Dr. Eliza Pierko, MD

Paul Shroeder, PT

Appendix A-References

1. McCrory P, Meeuwisse W, Johnston K, et al. "Consensus Statement on Concussion in Sport: The 3rd 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- Return To Participation: BRAIN-G Principle

Appendix C- Concussion Information Sheet

Appendix D- SCAT3 Evaluation

Appendix E- Graded Symptom Checklist

Appendix F- Letter to Physician

Appendix G- Concussion Progress Sheet