



## Duke Athletic Medicine

### Concussion Policy and Management Plan

#### Background:

A concussion is an injury to the brain which can cause immediate and prolonged deficits and, in extreme cases, death. Though there are over 42 working definitions of concussion, the 4<sup>th</sup> International Conference on Concussion in Sport defined concussion as follows:

Concussion is a brain injury and is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces. Several common features that incorporate clinical, pathologic and biomechanical injury constructs that may be utilized in defining the nature of a concussive head injury include:

1. Concussion may be caused either by a direct blow to the head, face, neck, or elsewhere on the body with an “impulsive” force transmitted to the head.
2. Concussion typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, symptoms and signs may evolve over a number of minutes to hours.
3. Concussion may result in neuropathological changes, but the acute clinical symptoms reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.
4. Concussion results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course. However, it is important to note that in some cases symptoms may be prolonged.

There are many different symptoms associated with concussion. A list of the most commonly reported and acknowledged signs and symptoms is located in the table below.

Signs and Symptoms of Concussion		
Physical <ul style="list-style-type: none"><li>• Headache</li><li>• Nausea</li><li>• Vomiting</li><li>• Balance problems</li><li>• Fatigue</li><li>• Sensitivity to light</li><li>• Numbness/tingling</li><li>• Dazed</li><li>• Stunned</li></ul>	Cognitive <ul style="list-style-type: none"><li>• Feeling mentally “Foggy”</li><li>• Feeling slowed down</li><li>• Difficulty concentrating</li><li>• Difficulty remembering</li><li>• Forgetful of recent information and conversations</li><li>• Confused about recent events</li><li>• Answers questions slowly</li></ul>	Emotional <ul style="list-style-type: none"><li>• Irritable</li><li>• Sad</li><li>• More emotional</li><li>• Nervous</li><li>• Drowsiness</li><li>• Sleeping more than usual</li><li>• Sleeping less than usual</li><li>• Difficulty falling asleep</li></ul>

Concussions are challenging injuries for student-athletes and healthcare professionals to manage; unlike other injuries the timeline for full recovery is usually difficult to predict. The majority of concussions will resolve in a relatively short time (7-10 days), though the recovery time frame may last longer with persistent symptoms in 10-15% of concussions. There are potential health risks associated with returning to sport before symptoms have subsided and brain healing has occurred. Proper management of concussions is vital to ensuring full and timely recovery and avoidance of prolonged issues. Current



literature suggests that initiating low level physical activity at a subthreshold of symptom onset may be beneficial in helping to progress recovery and resolution of symptoms. Returning an athlete to play prior to resolution of symptoms may also decrease reaction time and cognitive ability; theoretically this could increase the risk of another blow to the head or injury to other body parts.

### **Concussion Policy**

The Duke Athletic Medicine staff recognizes that concussions pose significant health risks to student-athletes. In order to uphold our mission of providing quality healthcare services and assure the well-being of each student-athlete (SA) a policy and management plan has been created to assist in the assessment and management of those student-athletes who present with concussion.

The following recommendations in this concussion policy and management plan are based on a review of current medical literature, including, but not limited to, statements by the NCAA Manual of Sports Medicine 2014-2015, 2012 Consensus Statement on Concussion in Sport from the 4<sup>th</sup> International Conference on Concussion in Sport, and the American Medical Society for Sports Medicine position statement: Concussion in Sport 2013. Please see references for a more complete list.

#### **Education:**

The first step in treating concussions is being able to identify one; thus education ensures the best chance for early concussion identification and activation of the concussion management plan.

1. Student-athlete education will occur on an annual basis prior to the beginning of athletic activities. Each SA will be given a copy of the *NCAA Concussion Fact Sheet for Student-Athletes*. Team discussions will be led by Duke Certified Athletic Trainers with each individual team and will include a review of the signs and symptoms of concussion, a review of risks of not reporting, and emergency contact information for sports medicine staff.

SAs will sign a copy of Student-Athlete Concussion Statement which acknowledges that they:

- a. Received, read, and understood the *NCAA Concussion Fact Sheet for Student-Athletes*
- b. Accept the responsibility of reporting their injuries and illnesses to Duke medical staff immediately, including concussion

Signed documents will be kept in the athlete's medical file with his or her respective team's athletic trainer. A copy will also be filed in the Duke University Athletic Association compliance office.

2. Coach education will occur on an annual basis at the beginning of each academic year or athletic season, whichever comes first. Each coach (head and assistant) will receive a copy of the *NCAA Concussion Fact Sheet for Coaches* and will also receive an electronic copy of the Duke Concussion Policy and Management Plan.



Each coach will sign the Coaches' Concussion Statement which acknowledges that they:

- a. Have read and understood the *NCAA Concussion Fact Sheet for Coaches*
- b. Will encourage their athletes to report signs and symptoms of any injury, including concussions
- c. Accept responsibility for referring athletes whom they may suspect of having a concussion to the medical staff
- d. Are educated regarding safe play and proper technique, and will encourage a "safety first" approach to sport
- e. Acknowledge that the Duke Athletic Medicine Staff has autonomous authority on return-to-play decisions
- f. Have read and understand  
d the Duke Concussion Policy and Management Plan

The Executive Director of Sports Medicine, or designated staff member, is responsible for the delivery of all signed documents to the Duke University Athletic Association Compliance offices where they will be kept in appropriate files.

3. All DUAA athletic trainers and team physicians must read and sign the Medical Provider Statement on an annual basis stating that they:
  - a. Will provide the above listed fact sheets to student-athletes and coaches and will encourage their SA's to report any suspected injuries and illnesses to the Athletic Medicine staff, including signs and symptoms of concussion.
  - b. Have read, understood, and will follow the Duke Concussion Protocol and Management Plan

The Executive Director of Sports Medicine, or designated staff member, is responsible for the collection of the signed documents, which will be maintained in their staff files and in the Duke University Athletic Association Compliance office.

4. The Athletic Director will receive annually an electronic or hard copy of the *NCAA Concussion Fact Sheet for Coaches* as well as an electronic or hard copy of the Duke Concussion Policy and Management Plan. The Athletic Director will sign or e-mail a statement acknowledging that he has read and understood the Duke Concussion Policy and Management Plan to the DUAA Compliance office.

#### **Pre-Participation Assessment:**

All first-year Duke SA's, freshmen and transfers, will complete baseline testing as part of the pre-participation physical exams prior to clearance to participate in athletically related activities. Some of these tests may be repeated annually or every other year, as directed by Neuropsychology. The following tests and specific procedures will be conducted or coordinated by each team's athletic trainer.

- Symptom assessment and SAC



- The Sway Balance system
  - Using the Baseline Score Card, the team athletic trainer will record baseline scores for student-athletes' balance, symptom score, and reaction time.
  - Each team will complete this baseline testing
  - 3 tests are required to establish a baseline to assure a 95% confidence interval of accuracy
    - 1 "event" tests
    - 2 "baseline" tests
  - Baseline scores will be kept on file where appropriate to facilitate comparison as needed
  - **Re-Tests:** Retesting shall be completed on anyone who had a concussion AND/OR a lower extremity injury since their last baseline at the beginning of the school year.
- King-Devick
  - Using the Baseline Score Card, the team's athletic trainer will complete baseline testing using the King-Devick score card
  - Each team will complete this baseline testing
  - Baseline scores will be kept on file where appropriate to facilitate comparison as needed
- Duke Athlete Cognitive Tracking (ACT) program
  - Administered by a trained technician overseen by a board-certified clinical neuropsychologist
  - Baseline testing is established on all sports
    - Collision and contact sports will be repeated annually, or as established by neuropsychologist
    - Limited contact sports will complete testing as a freshman, and as established by neuropsychology in future years.
    - This testing includes a recording of a current symptom score and the patient's concussion history.
  - If a concussion is diagnosed, the test that is used for clearance will become the SA's new baseline unless otherwise determined by neuropsychologist.
- Clearance to Participate
  - The ultimate pre-participation clearance will be determined by the team physician; this will occur during the pre-participation physical exam.

### **Recognition and Diagnosis of Concussion Protocol:**

Personnel trained in recognition/evaluation, diagnosis, and treatment of concussions will be on site for all NCAA varsity competitions in contact/collision sports: basketball, field hockey, football, lacrosse, pole vault, soccer, wrestling.

In any circumstance where concussion or head injury is suspected the SA will be immediately removed from participation; he or she will be evaluated by an athletic trainer and if present, a physician. A



physical exam for more serious injuries such as cervical spine trauma, skull fracture, or intracranial bleed will occur concurrently. The initial evaluation should include:

1. Inquiry about symptoms and an on-field mental status evaluation in addition to focused neurological exam
  - a. Sway assessment with iPhone App
  - b. King-Devick
  - c. Clearance of cranial nerves and vestibular screen
  - d. Glasgow Coma Scale (GSC)
2. If concussive symptoms are present or the SA fails any part of the exam, the Concussion Management Plan is activated.
3. If it is determined that the SA **does not** show signs of a concussion at time of evaluation the opportunity to go through exertional testing will be given for consideration of same day return to play. Exertional testing will include a stepwise progression of the following: general aerobic activities (jogging, skipping, biking etc.), more intense efforts (sprinting, breakdowns, etc.) and, lastly, sport specific activities.
  - a. If the SA denies symptoms of concussion during and/or following these activities he or she may return to participation. Observation and evaluation should be carried out by a medical professional through the remainder of activity. If any symptoms should return, the SA is assumed to have a concussion and is removed from activity, activating the Concussion Management Plan.
  - b. If the SA has return of symptoms at any point during play, it is assumed that a concussion injury is present and he or she is removed from activity for the day and activation of Concussion Management Plan occurs

### **Concussion Management Plan**

#### **Post-Concussion Management:**

- No SA suspected of having a concussion is permitted to return to play on the same day, and no SA is permitted to return to play while symptomatic following a concussion.
- SA should be observed for warning signs of deteriorating condition including, but not limited to: persistent nausea/vomiting, focal neurologic changes, declining level of consciousness, seizure, witnessed prolonged loss of consciousness, Glasgow Coma Scale <13, or signs of spine injury. If this occurs, the medical professional should activate the EAP and EMS response to arrange for immediate further medical care.
- Following initial on field assessment the team athletic trainer will perform further in-office evaluation if deemed necessary which may include:
  - a. Symptom Assessment
  - b. Mental Status Assessment
- The team athletic trainer should notify the team physician within 24 hours of injury to coordinate follow-up assessment and care.



- Each student athlete will be sent home with a take home concussion statement that will be signed by the athlete and his or her team's athletic trainer, which contains guidelines for management of his or her condition as well as instructions for care.
  - a. A copy of this document will be provided to another responsible adult: a parent, roommate, teammate, etc.
- During the initial recovery period, the SA should adhere to relative cognitive and physical rest.
  - a. SA should not participate in any in-classroom work or homework on day of injury
  - b. SA should remain at home/dorm if he or she cannot tolerate light cognitive activity
- Recent studies have shown benefit to early return to low level physical activity, should physical activity not aggravate symptoms it is permitted for light cardio activity to be initiated on a limited basis. This activity should be monitored closely. This plan of action will be assessed on a case by case basis and is only be done upon recommendation by the team physician.
- The team academic coordinator should be notified by SA's athletic trainer of the possibility for the need of academic accommodations. These accommodations can be assessed and modified as indicated based on recovery and symptomology.
- Follow-up evaluations occur daily with the team athletic trainer to track symptom recovery. May use follow up Symptoms Score form to track daily symptoms.

#### **Return to Learn**

- It is important that the SA is not completely isolated during recovery; he or she may do mental activity as tolerated such as watching TV, texting, or talking on the phone, etc. This should be encouraged to be kept to a minimum.
- Once the athlete begins to improve and does not have return of symptoms with mental activity he or she may begin the step-wise progress for Return-to-Learn Protocol; an example of this protocol can be found in the table below, and each program will fit the individual needs of the SA.
- The return-to-learn progression will be monitored and guided by the team's athletic trainer and academic coordinator, as well as the team physician.

<b>Return-to-Learn Protocol</b>
Gradual reintroduction of cognitive activity (5-15' increments)
↓
Homework at Home (20-30' increments)
↓
School re-entry (partial day and homework)
↓
Full Day of school
↓
Resumption of full cognitive workload

- If SA has prolonged or worsening symptoms, or is having academic challenges, a multi-disciplinary team will be assembled for more prolonged return-to-learn situations. This general plan, which will be specific to each SA, is available under Complex Return-to-Learn Management.



### Return to Play:

- Once the SA becomes asymptomatic and has completed the return to learn protocol, they will be assessed by the team physician for consideration of clearance for the return to play (RTP) protocol. The athlete may see the team physician at any point during his or her recovery as deemed necessary by the team athletic trainer.
  1. Determine where athlete is relative to the baseline measure on the following:
    - a. Symptom Assessment and SAC
    - b. Vestibular-Ocular testing
    - c. SWAY testing
    - d. King-Devick
    - e. ACT testing
  2. If the measures a-e are similar to baseline scores, the team physician can instruct the athletic trainer to begin a 6-step graduated exertional RTP protocol with the SA (see below).
    - a. Symptom scores should be assessed following each step of the protocol.
    - b. If at any point the SA becomes symptomatic the progression will be stopped. The SA will then be assessed each day until asymptomatic again, at which time the exertional protocol will be restarted at the step which had previously been completed without return of symptoms.
    - c. No more than two steps can be completed on the same day and should be separated by a period of time at least six hours. Steps four, five, and six may not be completed on the same day.
  3. During return to play progression, but prior to full return to activities (Contact), ACT testing will be repeated. In order to expedite the RTP care in a timely fashion, verbal feedback will be provided from the Clinical neuropsychologist. A brief written note will be forwarded to the team physician and ATC for documentation. The ATC will consider, and inform and discuss with the team physician, any results raising concern about cognition, to help determine progression into full return to play and learning activities.
- All scores on the aforementioned assessments or exertional activities will be maintained by the team's athletic trainer in the SA's medical file, with exception of ACT scores, which are kept with Neuropsychology.
- No athlete may return to full activity or competitions until he or she is asymptomatic in limited, controlled, and full contact activities, AND cleared by the team physician.

Graduated Return to Play Protocol
1. Light Aerobic Exercise
↓
2. Moderate Aerobic/Interval exercise/Lifting
↓
3. Sport Specific Activity (non-contact)
↓
4. Limited, Controlled return to practice
↓
5. Full Practice (Contact)
↓
6. Participation in Competition





- A final clearance appointment is to be made with the team physician to document full clearance to return to play and closure of the case. This appointment is to be made within 7 days of full return to participation as a final check on tolerating return to play and resolution of concussion.

### **Annual Review**

The process of identifying, removing from game or practice, and assessing a student-athlete for a possible concussion will be reviewed annually by a committee appointed by the Executive Director of Sports Medicine.

### **Prolonged Recovery and Medical Disqualification:**

An SA with a prolonged recovery time will be evaluated by a physician to consider additional diagnosis and best management options. Additional diagnosis or compounding factors include, but are not limited to, post-concussion syndrome, sleep dysfunction, migraine or other headache disorders, depression, mood disorders, ocular or vestibular dysfunction, etc. The proper referrals will be coordinated through the Duke Athletic Medicine staff.

Medical disqualification of a SA will be determined on a case by case basis. Prolonged recovery, ACT scores falling below expectation, and subjective symptoms or cognitive changes per the SA will be considered when determining medical disqualification. This decision would be made after consulting and gathering information from the student-athlete, family, athletic trainer, team physician, neuropsychology, and any other consultation deemed necessary.

### **Complex Return-to-Learn Management**

In cases where an SA has difficulties returning to cognitive activity, a multi-disciplinary team will be assembled to help navigate care. Re-evaluation by the team physician and other members of this team will occur repeatedly as needed.

1. SA reports to athletic trainer/team physician that symptoms are increasing with cognitive activity or the presence of cognitive difficulty with difficulty concentrating, recalling information, or through return to learn or return to physical activity progressions.
2. The Duke Athletics Academic Services/team Academic Coordinator is made aware of the situation through the team's athletic trainer.

ACADEMIC SERVICES	
Brad Berndt	M Golf
Heather Ryan	Football, W Basketball
Kelly Preussner	W Lacrosse, W Soccer, W Tennis, Cross Country, Track and Field
Jeremiah Walker	Football, M Tennis
Brad Amersbach	Baseball, M Lacrosse, Swim/Dive, wrestling
Marcus Aprahamian	Fencing, Field Hockey, Softball, Rowing





Tony Belt	Football, Volleyball
Jacqueline Davis	Football, M Soccer
Kenny King	M Basketball, W Golf

3. The team's academic coordinator may contact the SA's dean, academic advisor, course instructors and administrators as needed.
4. All accommodations will be made in compliance with the ADAAA specifications by communication with Duke Student Disabilities Access office.
5. If requested, the team physician or athletic trainer may provide a note confirming the presence of concussion and prolonged symptoms to those involved in the education of the affected SA.
6. On a case by case basis it will be determined if referral to any of the following is needed by the team physician:
  - a. Psychologist/counselor (CAPS or off site referral)
    - i. Dr. Shawn Zeplin, Duke Athletics Clinical Psychologist
    - ii. CAPS appointment line: 919-660-1000
  - b. Clinical neuropsychologist
    - i. Dr. Deborah Attix
  - c. Physical therapy
    - i. Brett Aefsky, Ciara Burgi, Zachary Christopherson, Kerry Mullenix, Nicholas Potter
7. If symptoms persist and further academic accommodation and management is needed, the Duke Student Disabilities Access Office will be contacted.
8. In cases where more assistance may be needed when the physical and mental health as well as future action of a SA is a concern, a report can be filed through the Duke Office of Student Affairs through the Duke Reach program. <http://studentaffairs.duke.edu/dukereach1>

### **Reducing Exposure to Head Trauma**

Encouraging a culture of safety in sport is a fundamental part of reducing potential exposure to head trauma. Although there is a considerable amount of inherent risk in all athletics, not just football, it is the responsibility of those individuals teaching technique and formatting practices to emphasize a culture which minimizes head trauma exposure by reducing gratuitous contact during practice.

The NCAA provides some bylaws and general guidelines in regard to restricting contact at football practice but does not specifically address other sports. In football, adherence to the *Inter-Association Consensus: Year-Round Football Practice Guidelines* (<http://www.ncaa.org/health-and-safety/football-practice-guidelines>) is an important step in reducing exposure to head trauma. It is important for coaches and athletic trainers to be familiar with and adhere to these guidelines. Even though there are no specific concussion risk based rules in place for other sports, there have been a number of rule changes over recent years to help reduce risks in sports other than football. It is up to the coaching staff to encourage following these rules, to teach proper and safe technique, and to promote an environment of a "safety first" approach to sport.



## References

1. National Collegiate Athletic Association. *2014-2015 NCAA Sports Medicine Handbook*
2. Harmon KG, Drezner JA, Gammons M, et al. American Medical Society for Sports Medicine Position Statement: Concussion in Sport. *Br J Sports Med* 2013; 47: 15-26
3. McCrory P, et al. Consensus Statement on Concussion in Sport: the 4<sup>th</sup> International Conference on Concussion in Sport held in Zurich. *Br J Sports Med* 2013; 47:250-258
4. Broglio SP, Cantu RC, Gioia GA, et al. National Athletic Trainers' Association Position Statement: Management of Sport Concussion. *J Athl Train* 2014; 49(2):245-265
5. Courson R, Goldenber M, Adams K, et al. Inter-Association Consensus Statement on Best Practices for Sports Medicine Management for Secondary Schools and Colleges. *J Athl Train* 2014; 49(1):128-137