The University of North Carolina at Chapel Hill
Sport Concussion Policy

Developed by the Matthew A. Gfeller Sport-Related Traumatic Brain Injury Research Center
and Campus Health Services Division of Sports Medicine

The University of North Carolina at Chapel Hill has been recognized as a leading institution for the evaluation and treatment of sport-related concussions. This is due in part to the long-standing collaborations between UNC Campus Health Services' team physicians and certified athletic trainers, and clinical researchers at the Matthew A. Gfeller Sport-Related Traumatic Brain Injury Research Center (hereinafter referred to as "Gfeller Center"). Our *concussion policy* and *concussion management protocol* have been developed over the past several years, and are derived from the most recent literature on sport-related concussion.

Our clinical research conducted at UNC-Chapel Hill's Gfeller Center, and corroborated by others, has shown that an athlete's balance and/or cognitive functioning are often depressed following a concussion – even in the absence of self-reported symptoms. It has been demonstrated that it typically takes anywhere from 3 to 10 days for an athlete to return to their normal state following a concussion. However, in some cases athletes can experience post-concussion syndrome in which the symptoms last beyond 3 weeks.

The UNC Sports Medicine staff utilizes a three-fold approach when determining an athlete's readiness to return to play following a concussion. In the event of a suspected concussion, the *concussion management protocol* requires the evaluation of the athlete's symptoms, neurocognitive function, and balance, which provide the sports medicine staff with the objective information necessary to return the athlete to play safely. The findings of these post-injury assessments are then compared to pre-season baseline assessments, conducted on all student-athletes participating in contact sports during their first year. Any athlete sustaining a concussion during a season is also re-baseline tested prior to the start of the following season. Athletes from the following UNC varsity teams are preseason baseline tested: baseball, basketball (men and women), cheerleading, field hockey (women), football, gymnastics, lacrosse (men and women), soccer (men and women), softball, swimming & diving (platform divers only), track and field (pole vaulters only), wrestling, and any other varsity student-athletes as deemed necessary by the team physicians (i.e. previous history of concussion).

The following *concussion policy* and *concussion management protocol* have been adopted by UNC Sports Medicine and are to be followed by all teams for managing athletes suspected of sustaining a concussion. The clinical research team in the Matthew Gfeller Center will evaluate only athletes under the direct medical care of UNC team physicians.

UNC Concussion Policy

1) All UNC student-athletes must read the NCAA Concussion Fact Sheet and sign the attached *student athlete statement* acknowledging that:

a. They have read and understand the *NCAA Concussion Fact Sheet*
b. They accept the responsibility for reporting their injuries and illnesses to the institutional medical staff, including signs and symptoms of concussions.

2) All UNC coaches (head coaches and assistant coaches) must read and sign the attached *coaches statement* acknowledging that they:

a. Have read and understand the *NCAA Concussion Fact Sheet*
b. Will encourage their athletes to report any suspected injuries and illnesses to the institutional medical staff, including signs and symptoms of concussions; and that they accept the responsibility for referring any athlete to the medical staff suspected of sustaining a concussion.
c. Have read and understand the *UNC Concussion Management Protocol*

3) All UNC team physicians (primary care), athletic trainers, graduate assistant athletic trainers, and undergraduate athletic training students, must read and sign the attached *medical provider statement* acknowledging that they:

a. Will provide athletes with the *NCAA Concussion Fact Sheet* and encourage their athletes to report any suspected injuries and illnesses to the institutional medical staff, including signs and symptoms of concussions.
b. Have read, understand, and will follow the *UNC Concussion Management Protocol*

4) The head athletic trainer for each team will coordinate the distribution, educational session, signing, and collection of the necessary documents. The head athletic trainer will turn the signed documents into Campus Health Services Sports Medicine where they will be kept in the student-athlete's medical file. This session may be done in conjunction with the team's annual compliance meetings.

5) The Senior Associate Athletic Director and Director of Sports Medicine will coordinate the signing of the aforementioned documents on an annual basis for the medical personnel and coaches. The Department of Athletics and Division of Sports Medicine at Campus Health Services will keep the signed documents, along with the established UNC Concussion Policy, on file. A copy of the *UNC Concussion Policy* will also be distributed through the Policies and Procedures manuals for each of the athletic training facilities and coaches' staff manual.

6) The Director of Sports Medicine will coordinate an annual meeting each May to review and update the Concussion Policy with the medical staff. Any changes to the policy will be effective immediately, and posted to the UNC Campus Health Services network ("J") drive.

UNC Concussion Management Protocol

Concussions and other brain injuries can be serious and potentially life threatening injuries in sports. Research indicates that these injuries can also have serious consequences later in life if not managed properly. In an effort to combat this injury the following concussion management protocol will be used for UNC student-athletes suspected of sustaining a concussion.

A ***concussion*** occurs when there is a direct or indirect insult to the brain. As a result, transient impairment of mental functions such as memory, balance/equilibrium, vision may occur. It is important to recognize that many sport-related concussions *do not* result in loss of consciousness and, therefore, all suspected head injuries should be taken seriously. Coaches and fellow teammates can be helpful in identifying those who may potentially have a concussion, because a concussed athlete may not be aware of their condition or potentially be trying to hide the injury to stay in the game or practice.

1) Concussion management begins with ***pre-season baseline testing.*** Every new (first-year or transfer) varsity student-athlete in these sports—baseball, basketball (men and women), cheerleading, field hockey (women), football, gymnastics, lacrosse (men and women), soccer (men and women), softball, swimming & diving (platform divers only), track and field (pole vaulters only), and wrestling—must receive a pre-season baseline assessment for concussion involving a graded symptom checklist (GSC), Standard Assessment of Concussion (SAC), Balance Error Scoring System (BESS), computerized neuropsychological test (CNS Vital Signs) and computerized posturography/balance test (NeuroCom SOT). These data should be kept on file at the Gfeller Sport-Related TBI Research Center (located in the Stallings-Evans Sports Medicine Center), unless otherwise specified below.

a. The respective team's athletic trainers will conduct the GSC, SAC, and BESS assessments for all new athletes.
b. The Gfeller Center staff will conduct an additional Graded Symptom Checklist, CNS Vital Signs (neurocognitive testing), and NeuroCom SOT (balance). In the event of a suspected concussion, the student-athlete will be re-assessed and compared to pre-season baseline measures according to the outlined protocol below.
c. The respective team's athletic trainers will keep a copy of baseline GSC, SAC, and BESS scores on file so they can have easy access for away contests and tournaments. The Gfeller center staff will retain all GSC, CNS Vital Signs, and NeuroCom SOT data within their facility.

2) An athlete suspected of sustaining a concussion will be evaluated by the team's athletic trainer using the Standardized Assessment of Concussion (SAC), Balance Error Scoring System (BESS), and Graded Symptom Checklist (GSC). Should the team physician not be present, the athletic trainer will notify the team physician as soon as possible to develop an evaluation and treatment plan. Ideally, an assessment of symptoms will be performed at the time of the injury and then serially thereafter (i.e. 2-3 hours post-injury, 24 hours, 48 hours, etc). The presence or absence of symptoms will dictate the inclusion of additional neurocognitive and balance testing.

3) Any student-athlete diagnosed with a concussion **shall not return** to activity for the remainder of that day. The team physician, or combination of team physician and athletic trainers, involved with the athlete's concussion management will determine medical clearance.

4) ***The team athletic trainer should notify the Gfeller Center of any concussion sustained within 24 hours of the injury***. The athletic trainer, following consultation with the team physician, should contact the Gfeller Center (concussion@listserv.unc.edu) to schedule an appointment after the athlete is *symptom free*, as determined by the GSC. Call the primary contacts first, followed by secondary contacts. Testing usually takes about an hour to complete, and athletes should expect to be there the entire time.

5) If requested by the team physician or athletic trainer (typically for the purpose of evaluating whether an athlete should return to class, reschedule exams, etc), testing may be conducted while the athlete is still symptomatic. Performing this testing while the athlete is symptomatic may worsen and protract the athlete's symptoms.

6) If the athlete has not returned to normal functioning compared to baseline scores upon laboratory testing, another appointment will be scheduled at a time deemed appropriate by the team physician, athletic trainer, and Gfeller Center staff. In the rare event that an athlete does not have baseline scores, age- and sport-matched normative percentile scores will be used for comparison to post-injury scores.

7) The team physician and/or team certified athletic trainer will be notified as soon as possible of the test results. The Gfeller Center staff will verbally communicate all results to the team physician and certified athletic trainer within a ***reasonable*** time frame, and aim to submit a written report of our evaluation within 24-48 hours for patient files.

8) The following assessment and return to play plan will be used for all concussions:

Concussion Assessment:

NO ATHLETE SUSPECTED OF HAVING A CONCUSSION IS PERMITTED TO RETURN TO PLAY THE SAME DAY, AND ***NO*** ATHLETE IS PERMITTED TO RETURN TO PLAY WHILE SYMPTOMATIC FOLLOWING A CONCUSSION.

- **Baseline testing: conducted on each athlete upon entering as a first-year student, transfer, or for those athletes sustaining a concussion the previous season (re-baseline);**
- **Time of Injury: clinical evaluation & symptom checklist;**
- **1-3 hrs post-injury: symptom checklist; referral if necessary;**
- **Next Day: follow-up clinical evaluation & symptom checklist;**
- **Follow-up evaluations daily to track symptom recovery;**
- **Once athlete becomes *asymptomatic for 24 hours*:**
  1. Determine where athlete is relative to baseline on the following measures.
     a. Symptom Assessment (Graded Symptom Checklist)
     b. Mental Status Assessment (Standardized Assessment of Concussion)

c. Neuropsychological Assessment (CNS Vital Signs)
d. Balance Assessment (Balance Error Scoring System & NeuroCom SOT)

2. If the measures (a-d) listed above are at least 95% of baseline scores and the athlete remains asymptomatic for **1 additional day** following these tests, the physician can instruct the athletic trainer to begin a *5-step graduated exertional return to play (RTP) protocol* (see below) with the athlete and to assess for increasing signs and symptoms. Symptoms should be reassessed immediately following all exertional activities.
Note: We recognize there are situations where altering this timeline may be warranted. For instance, if an athlete has already been asymptomatic for 24 hours and remains asymptomatic during this period even after a full return to classroom activities, the team physician may begin the graduated exertional return to play on the same day the athlete achieves 95% of their baseline scores.

3. If the athlete remains asymptomatic on the day following the first step(s) of the *graduated exertional RTP protocol*, the athlete will be reassessed using the measures above (#1), and continue with the next step(s) on the *graduated exertional RTP protocol*.

4. All scores on the aforementioned assessments or exertional activities below will be recorded in the athlete's medical record by the team's athletic trainer.

IF AT ANY POINT DURING THIS PROCESS THE ATHLETE BECOMES SYMPTOMATIC, THE ATHLETE SHOULD BE RE-ASSESSED DAILY UNTIL ASYMPTOMATIC. ONCE ASYMPTOMATIC, THE ATHLETE SHOULD THEN FOLLOW STEPS 1-4 ABOVE.

5-Step Graduated Exertional Return to Play Protocol

This exertional protocol allows a gradual increase in volume and intensity during the return to play process. The athlete is monitored for any concussion-like signs/symptoms during and after each exertional activity. The following steps are not ALL to be performed on the same day. In some cases, steps 1, 2, or 3 (or even 4) may be completed on the same day, but typically will occur over multiple days. Steps 4 and 5 will each be performed on separate and subsequent days:
Exertion Step 1: 20 minute stationary bike ride (10-14 MPH)
Exertion Step 2: Interval bike ride: 30 sec sprint (18-20 MPH/10-14 MPH)/30 sec recovery x 10; and bodyweight circuit: Squats/Push Ups/Sit-ups x 20 sec x 3
Exertion Step 3: 60 yard shuttle run x 10 (40 sec rest); and plyometric workout: 10 yard bounding/10 medicine ball throws/10 vertical jumps x 3; and non-contact, sports-specific drills for approximately 15 minutes
Exertion Step 4: Limited, controlled return to non-contact practice and monitoring for symptoms
Exertion Step 5: Full sport participation in a practice

No athlete can return to full activity or competitions until they are asymptomatic in limited, controlled, and full-contact activities, and cleared by the team physician.

Special Considerations for Air Travel Following Concussion

Anecdotal experience suggests that increased cabin air pressures associated with air travel may exacerbate the severity of an athlete's concussion symptoms in some few cases, and serve to negatively prolong his or her recovery following brain injury. If there is any indication of cerebral bleeding, it is recommended that an athlete not be permitted to return home by air travel until such time as cerebral bleeding is ruled out by advanced diagnostics (e.g. neuroimaging). Evidence regarding concussion and air travel is not conclusive and travel arrangements will be determined by a physician based on clinical evaluation of the athlete.

Matthew A. Gfeller Sport-Related TBI Research Center – 919-962-0409

The team athletic trainer should email concussion@listserv.unc.edu to notify the clinical research team in the Matthew Gfeller Center of any concussion. All in the Matthew Gfeller Center will receive this single email. One of our team members will assume the role of primary contact for the duration of the patient's care. All subsequent correspondence should be directed to that individual.

Please use concussion@listserv.unc.edu for initial contact. For emergencies:

Ashley Littleton	Office: 919-962-0409 e-mail: alittlet@email.unc.edu	Cell: 443-983-8854
Missy Fraser	Office: 919-962-0409 e-mail: TBD	Cell: 361-846-0255
Rob Lynall	Office: 919-962-0409 e-mail: TBD	Cell: 309-339-2261
Jason Mihalik	Office: 919-962-2573 e-mail: jmihalik@email.unc.edu	Cell: 919-619-2625
Kevin Guskiewicz	Office: 919-962-5175 e-mail: gus@email.unc.edu	Cell: 919-306-5843

Matthew Gfeller
Sport-Related TBI Research Center
The University of North Carolina at Chapel Hill

Home Care Plan

Adapted from:
Acute Concussion Evaluation Care Plan (Gerard Gioia, PhD and Micky Collins PhD, available at: http://www.cdc.gov/concussion/headsup/)
and the National Athletic Trainers' Association position statement: management of sport-related concussion
(Guskiewicz KM, Bruce SL, Cantu RC et al.; *J Athl Train* 2004:39(3):280-297)

Instructions:

Rest is the key. You should not participate in any high risk activities (e.g., sports, physical education (LFIT/PHYA), riding a bike, etc.), if you still have any of the symptoms below. It is important to limit activities that require a lot of thinking or concentration (homework, job-related activities), as this can also make your symptoms worse. If you no longer have any symptoms and believe that your concentration and thinking are back to normal, you can slowly and carefully return to your daily activities. Listen to the instructions of your team physician and athletic trainer about returning to daily activities.

Today the following symptoms are present (circle or check):

Physical		**Thinking**	**Emotional**	**Sleep**
Headaches	Sensitivity to light	Feeling mentally foggy	Irritability	Drowsiness
Nausea	Sensitivity to noise	Problems concentrating	Sadness	Sleeping more than usual
Fatigue	Numbness/Tingling	Problems remembering	Feeling more emotional	Sleeping less than usual
Visual Problems	Vomiting	Feeling more slowed down	Nervousness	Trouble falling asleep
Balance Problems	Dizziness			

RED FLAGS: Call your athletic trainer, or go to the emergency room if you suddenly experience any of the following:

Headaches that worsen	Look very drowsy, can't be awakened	Can't recognize people or places	Unusual behavior change
Seizures	Repeated vomiting	Increasing confusion	Increasing irritability
Neck pain	Slurred speech	Weakness or numbness in arms or legs	Loss of consciousness

Returning to Daily Activities:

1. Sleep
    a. Get lots of rest. Be sure to get enough sleep at night- no late nights.
    b. Keep the same bedtime weekdays and weekends.
    c. Take daytime naps or rest breaks when you feel tired or fatigued.
2. Physical Activity, School and Work
    a. Limit physical activity, because it can make symptoms worse. Physical activity includes most LFIT/PHYA activities, sports practices, weight-training, running, exercising, heavy lifting, etc.
    b. Limit activities that require a lot of thinking or concentration, because these can also make symptoms worse. These activities include homework, class-work, job-related activities, using computers or even playing videogames.
    c. As symptoms decrease, you may begin to gradually return to your daily activities. If symptoms worsen or return, lessen your activities, and then try again to increase your activities gradually.
3. Nutrition
    a. Drink lots of fluids and eat carbohydrates or protein to maintain appropriate blood sugar levels.
    b. Do NOT drink any alcohol or eat spicy foods.
4. Medications
    a. Do not take any pain medication, unless you are instructed to do so, by your team physician or athletic trainer.
    b. You may use ice on your head/neck for comfort/pain control as needed.
5. During recovery, it is normal to feel frustrated and sad when you do not feel right and you can't be as active as usual.
6. Driving
    a. You should not drive until you are instructed by your team physician or athletic trainer that you are able to drive safely.

7. Repeated evaluation of your symptoms is recommended to help guide recovery. Keep track of how the symptoms circled above change throughout the day and increase/decrease with certain activities. You can use the attached graded symptom checklist throughout

Specific Recommendations:

Recommendations provided by: _____ Date: _____ Time: _____

Please feel free to contact me, if you have any questions. Please contact me immediately if you notice any of the "Red Flags" listed on the front of this sheet. I can be reached at: _____

Signature: _____ Date: _____

Concussion Graded Symptom Checklist (GSC)

Grade symptoms 0-6

Instructions: The GSC should be used not only for the initial evaluation, but for each subsequent follow-up assessment until all signs and symptoms have cleared at rest and during physical exertion. Grade or score the severity of each symptom from 0-6, where 0=not present, 1=mild, 3=moderate and 6=most severe.

Symptom **Date:** **Time:**									
Symptom									
Blurred vision									
Dizziness									
Drowsiness									
Excess sleep									
Fatigue									
Feel "in a fog"									
Feel "slowed down"									
Headache									
Inappropriate emotions									
Irritability									
Memory problems									
Nausea									
Nervousness									
Poor balance/coordination									
Poor concentration									
Ringing in ears									
Sadness									
Sensitivity to light									
Sensitivity to noise									
Sleep disturbance									

Daily Physical and Cognitive Activities: