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**INTERASSOCIATION CONSENSUS:**

# DIAGNOSIS AND MANAGEMENT OF SPORT-RELATED CONCUSSION BEST PRACTICES



# PURPOSE

The Second Safety in College Football Summit resulted in interassociation consensus recommendations for four paramount safety issues in collegiate athletics:

1. Independent medical care for college student-athletes.
2. Diagnosis and management of sport-related concussion.
3. Year-round football practice contact for college student-athletes.
4. Preventing catastrophic injury in college student-athletes.

This document addresses the diagnosis and management of sport-related concussion in the collegiate setting for all sports. The final recommendations in this document are the offspring of presentations and discussions on key items that address diagnosis and management of sport-related concussion. Following the presentations and discussions, endorsing organization representatives agreed on foundational statements that became the basis for a draft consensus paper that was reviewed further by relevant stakeholders and endorsing organizations. The final, endorsed best practices document for the diagnosis and management of sport-related concussion follows.

This document is divided into the following sections:

## **BACKGROUND**

This section provides an overview of the challenges of developing consensus best practices for the diagnosis and management of sport-related concussion.

## **DATA-DRIVEN DECISION MAKING**

This section provides an overview of emerging data relevant to guiding decision-making for diagnosing and managing sport-related concussion.

## **DIAGNOSIS AND MANAGEMENT OF SPORT-RELATED CONCUSSION BEST PRACTICES**

This section provides the final, endorsed recommendations of the medical organizations for diagnosis and management of sport-related concussion best practices.

## **REFERENCES**

This section provides the relevant references for this document.

## **APPENDICES**

This section lists the agenda, summit attendees and medical organizations that endorsed this document.



## BACKGROUND

There are more than 42 consensus-based definitions of concussion. The only evidence-based definition of concussion follows.<sup>1</sup>

Concussion is:

- a change in brain function,
- following a force to the head, which
- may be accompanied by temporary loss of consciousness, but is
- identified in awake individuals, with
- measures of neurologic and cognitive dysfunction.

Diagnosis and management of sport-related concussion is a clinical diagnosis based on the judgment of the athlete's health care providers.<sup>2-4</sup> The diagnosis and management of sport-related concussion is challenging for many reasons:<sup>5-11</sup>

- The physical and cognitive examinations are often normal, and additional tests such as brain computerized tomography, brain MRI, electroencephalogram and blood tests are also commonly normal. Comprehensive

neuropsychological tests may be a useful adjunctive tool supporting the diagnosis of sport-related concussion but the valid administration and interpretation of these tests is complex and requires appropriate training and/or supervisory oversight.<sup>12</sup>

- The clinical effects of sport-related concussion are often subtle and difficult to detect with existing sport-related concussion assessment tools.
- The symptoms of sport-related concussion are not specific to concussion and it is challenging to evaluate a student-athlete who presents non-specific symptoms that may be related to other conditions.
- Sport-related concussion may manifest with immediate or delayed-onset symptoms. Symptom manifestation can vary between individuals and in the same individual who has suffered a repeat concussion.
- Modifying factors and co-morbidities—such as attention deficit hyperactivity disorder, migraine and other headache disorders, learning disabilities and mood disorders — should be considered in making the diagnosis, providing a management

- plan and making both return-to-play and return-to-learn recommendations.
- “Signal detection” on clinical measures (e.g., cognitive and balance testing) often quickly diminishes in the acute setting of early recovery. Although cognitive function and balance assessed within 24 hours with various sideline tests (Standardized Assessment of Concussion and Balance Error Scoring System, respectively) have been shown to be useful in diagnosing concussion, these tests often normalize within a few days and cannot be used to make a definitive diagnosis.
  - Student-athletes may underreport symptoms and inflate their level of recovery in hopes of being rapidly cleared for return to competition.
  - Clinical assessment of sport-related concussion is a surrogate index of recovery and not a direct measure of brain structure and functional integrity after concussion.

To address many of the knowledge shortcomings in diagnosing and managing sport-related concussion, the NCAA and the Department of Defense partnered to develop the NCAA-DoD Grand Alliance,<sup>13</sup> which is comprised of the Concussion Assessment, Research and Education Consortium, also known as the CARE Consortium, and the Mind Matters Challenge. The Mind Matters Challenge is an educational and research challenge whose aim is to develop paradigms that will change the culture of concussion. The CARE Consortium is a prospective, clinical, longitudinal study whose aim is to answer the following scientific questions, for which there are currently no definitive answers:<sup>14-16</sup>

- What is the natural history of concussion, both short- and long-term?
- What functional domains are reliably impaired following concussion?
- Are specific functional domains more or less predictive of concussion recovery trajectory?
- Are all concussions the same?
  - ◊ Is there a difference that is sport-specific?
  - ◊ Is there a gender difference?
- What is the neurobiology of concussion?
- Are there critical biomechanical elements that predict concussion, prognosis and recovery?
- Is concussion the most meaningful metric to address?

- ◊ What is the neurobiology of repetitive head impact?
- Is there a disconnect between the clinical and the neurophysiological “return-to-play/return-to-learn” activities?
- What role can neuroimaging biomarkers, fluid biomarkers and genotype play in answering the neurobiological recovery questions?

The CARE Consortium is on track to study more than 25,000 student-athletes and 1,000 concussions. To date, the CARE Consortium is already the largest prospective, longitudinal, clinical concussion study ever conducted. This study and others are helping to drive concussion diagnosis and management from consensus-based to a more science-based paradigm, but data to date remain preliminary and incomplete.

In summary, the natural history of concussion remains poorly defined, diagnosis can be difficult, there are often few objective findings for diagnosis or physiological recovery that exist for clinical use, and there often remains a significant reliance on self-report of symptoms from the student-athlete.

The NCAA Concussion Policy and Legislation<sup>3,2,4,17</sup> mandates that institutions implement the following:<sup>17</sup>

1. An annual process that ensures student-athletes are educated about the signs and symptoms of concussion.
2. A process that ensures a student-athlete who exhibits signs, symptoms or behaviors consistent with a concussion shall be removed from athletics activities and evaluated by a medical staff member with experience in the evaluation and management of concussion.
3. A policy that precludes a student-athlete diagnosed with a concussion from returning to athletic activity for at least the remainder of that calendar day.
4. A policy that requires medical clearance for a student-athlete diagnosed with a concussion to return to athletics activity as determined by a physician or the physician’s designee.

As a result of the 2014 Safety in College Football Summit, “Interassociation Consensus: Diagnosis and Management of Sport-Related Concussion Guidelines”

was released.<sup>18</sup> This document subsequently became the basis for NCAA Autonomy Legislation<sup>3.2.4.17.1,19</sup> which adds the following requirements to the previously existing legislation:

- Concussion Safety Protocol. An institution shall submit its Concussion Safety Protocol to the Concussion Safety Protocol Committee by May 1 of each year. The protocol shall be consistent with the “Interassociation Consensus: Diagnosis and Management of Sport-Related Concussion Guidelines” and shall include:
  - a. Policies and procedures that meet the requirements of Constitution.<sup>3.2.4.17</sup>
  - b. Procedures for pre-participation baseline testing of each student-athlete.
  - c. Procedures for reducing exposure to head injuries.
  - d. Procedures for education about concussion, including a policy that addresses return-to-learn.
  - e. Procedures to ensure that proper and appropriate concussion management, consistent with best known practices and the “Interassociation Consensus: Diagnosis and Management of Sport-Related Concussion Guidelines,” is made available to any student-athlete who has suffered a concussion.
  - f. Procedures requiring that the process of identifying, removing from game or practice, and assessing a student-athlete for a possible concussion are reviewed annually.
  - g. A written certificate of compliance signed by the institution’s athletic director.





## DATA-DRIVEN DECISION MAKING

Emerging data from the historic NCAA-DoD CARE Consortium study, which is part of the larger NCAA-DoD Grand Alliance, are helping to shape a science-driven approach to addressing concussion and head impact exposure in sport.<sup>14-16</sup> In addition, many NCAA member schools have obtained important clinical and accelerometer data in football.<sup>20-24</sup> Such emerging data, coupled with available science, were presented and discussed at the Second Safety in College Football Summit. Following presentations and discussions, all attendees were invited to weigh in on “foundational statements” and updated sport-related concussion diagnosis and management guidelines. Foundational statements and recommendations were amended based on feedback, and when more than 80

percent consensus was reached among the participants, the statements and recommendations were then voted on by representatives of both medical and football endorsing organizations (see Appendix C for endorsing organizations). Only those statements and recommendations that were agreed upon by 100 percent of both endorsing organization representatives were then placed into this document for further review and final endorsement. The foundational statements follow, including a brief synopsis of the rationale that was agreed upon by the endorsing organization representatives. Of note, none of the foundational statements led to any substantive changes in the 2014 document “Interassociation Consensus: Diagnosis and Management of Sport-Related Concussion Guidelines.”

# FOUNDATIONAL STATEMENTS

## **Head accelerometers are currently unable to function as concussion detectors.**

One can envision a future in which head contact exposure data can be individualized for each athlete, and thus general contact guidelines that apply to an entire team would no longer be necessary. At this point in time, the science of accelerometers and accelerometer data coupled with clinical outcomes, are inadequate to provide such guidance.<sup>21-23</sup> Although accelerometers are improving in providing linear and rotational forces, all have limitations, ranging from inaccuracy in counting head impacts, measuring head acceleration, over-predicting rotational acceleration or inadequate field testing relative to dummy testing. Furthermore, there is no clear relationship between accelerometer measurements and clinical outcome.<sup>25-26</sup> Thus, general guidelines for football practice are still necessary until the science of accelerometers can provide individualized guidance.

## **Head accelerometers can be utilized to assess group differences among types of football practices and competition.**

To date, the science of head accelerometers has been challenging because of poor reliability and accuracy. The HITS system, which is placed inside of a football helmet, is similarly challenged with reliability and accuracy data, but this system can provide group data in football players that is useful. Thus, although head accelerometers cannot provide individualized data that allows a personalized approach to head contact exposure, the science has advanced sufficiently to allow group differences among various positions (e.g., lineman, safety, quarterback) with regard to head contact exposure risk.<sup>24</sup> Such data can guide football coaches and the medical team in devising a head contact exposure reduction plan for various football positions. The hope is for such an approach to be applicable to other sports.

## **Data inform us that a substantial number of concussions occur in preseason.**

Emerging data point to the risk of preseason activities that focus on intense training for both conditioning and sport technique mastery.<sup>16,20</sup> Concussion risk is multi-faceted and is in large part mediated by repetitive contact/collision forces coupled with limited recovery time—such is the hallmark of intense preseason training. A brain that is primed from repetitive head impact may be more susceptible to developing a concussion than a brain that has not had such repetitive exposure.

## **Concussions are characterized by diverse symptoms and impairments in function that may result in different recovery trajectories.**

Although we do not have definitive data on the many ways concussion may manifest, emerging data demonstrate that we should not assume that all concussions are the same. It is true that concussion is a change in brain function with measures of neurologic and cognitive impairment, but the location(s) of change in brain function, the degree to which function is impaired, and other confounding variables may lead to diverse symptoms and impairments in function that result in different recovery trajectories. There are emerging data that guide us with regard to how concussion management may differ based on the manner in which concussion manifests.<sup>27</sup>

## **Post-concussion management should be based on a combination of emerging evidence, best practices, consensus statements and guidelines that have been established by the scientific community.**

The scientific understanding of concussion diagnosis and management remains in its infancy and is rapidly evolving. This means that practitioners have a daunting challenge in providing concussion management

that is up-to-date. Furthermore, “up-to-date” varies based on whether the emerging evidence is a scientific article, a consensus statement or some other type of guideline. One reason for this interassociation document update is to help address this management reality.

**Student-athletes may not recognize the symptoms of concussion at the time of injury, or may not recognize the importance of reporting concussion at the time of injury, both of which can lead to delayed reporting.**

A primary reason for the NCAA-DoD Mind Matters Challenge is that the culture of concussion needs to change, including how to recognize symptoms and how to understand the importance of prompt reporting of concussion symptoms.<sup>10,11,16</sup> Student-athletes may delay concussion reporting for various reasons, and as noted below, this is associated with a more prolonged recovery trajectory.

**When a student-athlete does not report symptoms for treatment at the time of injury, then return-to-play is prolonged.**

Emerging data from the NCAA-DoD CARE Consortium indicate that delayed concussion reporting results in about a two day longer return-to-play trajectory.<sup>16</sup> This is consistent with recently published data from a NCAA cross-sectional design study that revealed an almost five day longer return-to-play for athletes who had delayed reporting concussion.<sup>28</sup> We do not yet understand why this is so, but one explanation is that continued sport activity immediately following concussion exposes the already injured brain to worsened neuropathophysiological processes.<sup>28</sup> The implications are clear: delayed concussion reporting leads to delayed return to activity post-concussion.

**Emerging data inform us that a substantial percentage of athletes do not complete a graded exertional return-to-play protocol.**

CARE Consortium data to date reveal that 72 percent of athletes complete a graded exertion protocol, meaning that 28 percent do not.<sup>16</sup> Although no graded exertion protocols have been scientifically validated, the best consensus to date recommends that athletes undergo such a transition post-concussion prior to returning to full athletic activity. We do not yet know if failure to complete a graded exertion protocol is associated with adverse outcome, but we do believe that a graded exertion protocol makes sense for all athletes post-concussion.

*These foundational statements serve as filler material to the guidelines on the following page. The endorsing medical organizations do not believe that any emerging data necessitate a change in the guidelines as originally written in 2014. It is important to note that these guidelines remain “living, breathing” documents that may be updated as is appropriate with emerging science or consensus.*



# DIAGNOSIS AND MANAGEMENT OF SPORT-RELATED CONCUSSION BEST PRACTICES

The goals of developing best practices for the diagnosis and management of sport-related concussion are: (1) helping athletic health care providers to diagnose and manage sport-related concussion; (2) developing prevention strategies for sport-related concussions and repeat sport-related concussion; (3) promoting sport-related concussion injury resolution; (4) minimizing factors that contribute to prolonged or recurrent symptoms of sport-related concussion; and (5) preventing or minimizing complications of other co-morbidities that may accompany sport-related concussion (e.g., ADHD, migraine and other headache disorders, learning disabilities and mood disorders).

## Concussion Management Plan

Institutions should make their concussion management plan publicly available, either through printed material, their website, or both. Guideline components of a concussion management plan are:

1. *Education.* Institutions should provide applicable NCAA concussion fact sheets or other applicable educational material annually to student-athletes, coaches, team physicians, athletic trainers and athletics directors. There should be a signed acknowledgement that all parties have read and understand these concussion facts and their institution's concussion management plan.

2. *Pre-participation assessment.* A one-time, pre-participation baseline concussion assessment for all varsity student-athletes should include, but not necessarily be limited to:

- A brain injury/concussion history.
- Symptom evaluation.
- Cognitive assessment.
- Balance evaluation.

The team physician should determine pre-participation clearance and/or the need for additional consultation or testing.<sup>17</sup>

3. *Recognition and diagnosis of concussion.* All student-athletes who are experiencing signs, symptoms or behaviors consistent with a sport-related concussion, at rest or with exertion, must be removed from practice or competition and referred to an athletic trainer or team physician with experience in concussion management. A student-athlete's health care provider experienced in the diagnosis and management of concussion should conduct and document serial clinical evaluation inclusive of symptom inventory and evaluation of cognition and balance. A student-athlete diagnosed with sport-related concussion should not be allowed to return-to-play in the current game or practice and should be withheld from athletic activity for the remainder of the day. Disposition decisions for more serious injuries such as cervical spine trauma, skull fracture or intracranial bleed, should be made at the time of presentation.

4. *Post-concussion management.* The foundation of sport-related concussion management is initial physical and relative cognitive rest as part of an individualized treatment plan.<sup>2</sup> Initial management of sport-related concussion is based on individual serial clinical assessments, taking concussion history, modifying factors and specific needs of the student-athlete into consideration. Such management includes, but is not limited to:<sup>29</sup>

- Clinical evaluation at the time of injury. When the rapid assessment of concussion is necessary (e.g., during competition), symptom assessment, physical and neurological exam and balance exam should be performed. Brief concussion evaluation tools such as the Standardized Concussion Assessment Tool<sup>3</sup>, also known as SCAT3, which includes the Standardized Assessment of Concussion, provide standardized methods and can be compared to a baseline evaluation.
- Assessment for head and cervical spine injury at time of injury and implementation of the

emergency action plan, as warranted.

- Transportation to the nearest hospital if any of following signs and symptoms are present: Glasgow Coma score less than 13; prolonged period of loss of consciousness (longer than one minute); focal neurological deficit; repetitive emesis; persistently diminished or worsening mental status or other neurological signs or symptoms; and potential spine injury.
- Serial evaluation and monitoring for deterioration following injury. Upon discharge from medical care, both oral and written instructions for home care should be given to the student-athlete and to a responsible adult (e.g., parent or roommate) who should continue to monitor and supervise the student-athlete during the acute phase of sport-related concussion.

### **Return to activity**

Sport-related concussion is a challenging injury for student-athletes and, unlike other injuries, the timeline for return to full activity (including return-to-play and return-to-learn) is often difficult to project. The psychological response to injury is also unpredictable. Sometimes, student-athletes who are kept out of their sport for a prolonged period of time experience emotional distress related to being unable to participate in sport.<sup>30-31</sup> It is important that health care providers remain alert to the signs and symptoms of depression and other emotional responses to injury that can be particularly challenging following concussive injury.<sup>30-31</sup> A student-athlete's health care providers should verify the diagnosis instead of assuming that the student-athlete has prolonged concussion symptoms. These symptoms may represent post-concussion syndrome, sleep dysfunction, migraine or other headache disorders, or co-morbid mood disorders such as anxiety and depression.<sup>32</sup> Passive management, such as prolonged physical and cognitive rest, may be counter-productive in these scenarios.

### *Active, Targeted Treatment for Concussion*

Although initial treatment for concussion typically involves prescribed physical and cognitive rest, there is emerging evidence that active, targeted approaches for treating concussion may be more effective for

certain patients.<sup>27,33,34</sup> Prolonged rest may even lead to adverse effects, including social isolation, anxiety, low self-esteem, physical deconditioning and academic difficulties.<sup>35,36</sup> Given potential adverse effects from prolonged rest, coupled with the diverse symptoms and impairments in function that may result from concussion, treatment options may potentially include more active, targeted directed approaches in athletes that have specific symptoms and impairment. Specifically, some researchers have advocated for matching targeted treatments to an athlete's concussion clinical profiles (i.e., symptoms, impairment) such as vestibular, oculo-motor, cognitive, fatigue, migraine, cervicogenic and anxiety/mood.<sup>37,38</sup>

Scenarios that may warrant active, targeted treatment include:

- For athletes with prolonged symptoms and impairment, progressive aerobic exertion may be effective.<sup>39</sup> The type of aerobic activity may also be driven by symptoms. For example, an athlete with a vestibular clinical profile may experience exacerbated symptoms during treadmill running as a consequence of head/eye movements during this activity, but might do well on stationary cycling at the same intensity.
- There is growing evidence that vestibular therapies that target deficits in gaze stability, proprioception, vestibular ocular reflex, postural control and dynamic gait may be effective for athletes with this clinical profile.<sup>40,41</sup>
- Vision therapies that target deficits such as accommodative and convergence insufficiencies, impaired version eye movements and ocular misalignments may be effective for treating athletes with vision and ocular motor clinical profiles.<sup>42,43</sup>

It is important to note that the effects of targeted post-concussion treatments on the underlying pathophysiology of concussion are unknown. To date, there are no empirical data to inform the timing, intensity or type of treatment for patients with concussion. Additional empirical research on the efficacy of various treatments for concussion is warranted. Until then, the guidelines for targeted treatment can serve as an evolving framework for managing athletes.

## Return to play

Once a student-athlete has returned to his/her baseline, the return-to-play decision is based on a protocol of a stepwise increase in physical activity that includes both an incremental increase in physical demands and contact risk supervised by a physician or physician-designee.<sup>29</sup> Most return-to-play protocols are similar to those in the Consensus Statement on Concussion in Sport guidelines,<sup>4</sup> which outline a progressive increase in physical activity if the individual is at baseline before starting the protocol and remains at baseline throughout each step of the protocol. It is noteworthy that all return-to-play guidelines are consensus-based and have not been validated by evidence-based studies.<sup>3</sup> McCrea and colleagues<sup>44</sup> have reported that a symptom-free waiting period is not predictive of either clinical recovery or risk of a repeat concussion. Further, student-athletes have variable understanding of the importance of reporting possible concussion symptoms.<sup>10-11</sup> In summary, it should be recognized that current return-to-play guidelines are based on expert consensus.

As noted above, there is emerging evidence that focused exercise or recovery techniques may be utilized before full recovery has occurred. Given the paucity of scientific evidence regarding return-to-play and expert consensus documents that have been published, adherence to consensus guidelines is generally recommended. However, it is important to stress an individualized approach for return-to-play. Some student-athletes may have minimal concussive symptomatology with minimal symptom duration and no modifiers (conditions that may prolong recovery such as prior concussion, migraine, ADHD, depression/anxiety). Others may have specific vestibular or oculomotor symptoms that may warrant early active and targeted management. In scenarios of this nature, and with experienced clinicians in a highly select setting, the return-to-play protocol may be modified.<sup>45</sup> In contrast, if a student-athlete has a concussion history, increased symptom burden or duration, or has symptoms for three to four weeks with other concussion modifiers, then the return-to-play progression should proceed more cautiously and each stage may take more than a day.<sup>29</sup>

Distinctive neurological deficits, such as vestibular or oculo-motor dysfunction, should be specifically addressed to avoid prolonged return-to-play. For example, if a student-athlete suffers from vestibular dysfunction as a manifestation of sport-related concussion, and is unable to progress in the return-to-play protocol, it is important to address the specific vestibular dysfunction rather than to simply return the student-athlete to the previous level of return-to-play progression.<sup>27</sup> In other words, 'rest' can sometimes lead to adverse outcomes if an accurate diagnosis based on neurological dysfunction is not made. The guidelines presented herein serve as a general guide and are not meant to be prescriptive.

### *Stepwise progression*

The initial management of sport-related concussion is relative physical and cognitive rest. Athletes diagnosed with sport-related concussion must be removed from play and must not return to sport-related activity for at least one calendar day and are to be evaluated by a health care provider with expertise in sport-related concussion. Once a concussed student-athlete has returned to baseline level of symptoms, cognitive function and balance, then the return-to-play progression can be initiated, as follows in this general outline:

1. Light aerobic exercise such as walking, swimming or riding a stationary bike. No resistance training. If asymptomatic with light aerobic exercise, then;
2. Sport-specific activity with no head impact. If asymptomatic with sport-specific activity, then;
3. Non-contact sport drills and resumption of progressive resistance training. If asymptomatic with non-contact drills and resistance training, then;
4. Unrestricted training. If asymptomatic with unrestricted training, then;
5. Return-to-competition. Medical clearance will be determined by the team physician/physician designee, or athletic trainer in consultation with a team physician.

At any point, if the student-athlete becomes symptomatic (i.e., more symptomatic than baseline), or scores on clinical/cognitive measures decline, the team physi-

cian should be notified and the student-athlete should be returned to the previous level of activity. Final determination of return-to-play ultimately resides with the team physician/physician designee.

### **Return to academics**

Return to academics (return-to-learn) is a parallel concept to return-to-play,<sup>46-48</sup> but has received less scientific evaluation. Return-to-learn guidelines assume that both physical and cognitive activities require brain energy utilization, and that after a sport-related concussion, brain energy may not be available for physical and cognitive exertion because of the brain energy crisis.<sup>49</sup> Return-to-learn should be managed in a stepwise program that fits the needs of the individual, within the context of a multi-disciplinary team that includes physicians, athletic trainers, coaches, psychologists/counselors, neuropsychologists, administrators as well as academic (e.g. professors, deans, academic advisors) and office of disability services representatives. The return-to-learn recommendations outlined below are based on expert consensus. Like return-to-play, it is difficult to provide prescriptive recommendations for return-to-learn. The student-athlete may appear physically normal but may be unable to perform as expected due to concussive symptomatology.

#### *Stepwise progression*

As with return-to-play, the first step of return-to-learn is relative physical and cognitive rest. Relative cognitive rest involves minimizing potential cognitive stressors, such as school work, video games, reading, texting and watching television. Data from small studies suggest a beneficial effect of cognitive rest on concussion recovery.<sup>48</sup> For the college student-athlete, consideration should be given to avoiding the classroom for at least the same day as the sport-related concussion. The period of time needed to avoid class or homework should be individualized. The gradual return to academics should be based on the absence of concussion symptoms following cognitive exposure. The consensus to date includes:<sup>47,48</sup>

1. If the student-athlete cannot tolerate light cognitive activity, he or she should remain at home or in the residence hall.

2. Once the student-athlete can tolerate cognitive activity without return of symptoms, he/she should return to the classroom, often in graduated increments.

At any point, if the student-athlete becomes symptomatic (i.e., more symptomatic than baseline), or scores on clinical/cognitive measures decline, the team physician should be notified and the student-athlete's cognitive activity reassessed.

The extent of academic adjustments needed should be decided by a multi-disciplinary team that may include the team physician, athletic trainer, faculty athletics representative or other faculty representative, coach, individual teachers, neuropsychologist and psychologist/counselor. The level of multi-disciplinary involvement will vary on a case-by-case basis. The majority of student-athletes who are concussed will not need a detailed return-to-learn program because full recovery typically occurs within two weeks. For the student-athlete whose academic schedule requires some minor modification in the first one to two weeks following a sport-related concussion, adjustments can often be made without requiring meaningful curriculum or testing alterations.

For those student-athletes whose symptoms persist for longer than two weeks, there are differing ways to access academic adjustment or accommodations. The student-athlete may need a change in his or her class schedule; special arrangements may be required for extended absences, tests, term papers and projects. Many institutions offer "provisional or temporary" accommodations for individuals who have impairments that are short-term in nature – six months or less (such as a broken arm or concussion). Such accommodations are often accessed through the disability services office.

A more difficult scenario occurs when the student-athlete experiences prolonged cognitive difficulties. In this case, considerations should include neuropsychological evaluation to: (a) determine the nature and severity of cognitive impairment, and (b) identify the extent to which psychological issues may be present and may be

interacting with the cognitive processes. Institutions can develop a detailed academic plan that specifies the support services available for that student-athlete. The student-athlete can also choose to disclose the documentation to the disability office in order to seek long-term accommodations or academic adjustments. The disability office will verify if the impairment is limiting a major life activity per the Americans with Disabilities Act. Accommodations or academic adjustments are often provided in order to “level the playing field” for the student-athlete with prolonged cognitive difficulties resulting from a concussion. A detailed academic plan coupled with accommodations can provide the needed support for a student-athlete as he or she returns to learning after a concussion.

The successful implementation of return-to-learn depends on several variables:

- Recognition that concussion symptoms vary widely among student-athletes, and even within the same individual who may be suffering a repeat concussion.
- Identification of a point person or case manager for the student-athlete who can navigate the dual obligations of academics and athletics.
- Identification of co-morbid conditions that may impair recovery, such as migraine or other headache conditions, attention-deficit hyperactivity disorder, anxiety and depression or other mood disorders.
- Identification of campus resources that can help assure that student-athletes are provided their full rights during this transition period.

Campus resources vary, and may include the following:

- Learning specialists. Many college campuses have certified learning specialists who have specialized knowledge of medical conditions such as concussion

and post-concussion syndrome. They usually work directly with the disability office.

- Office of disability services. Most campuses have a disability office that is responsible for verifying each student’s impairment under the Americans with Disabilities Act Amendments Act. Sometimes there is a separate disability office and ADA office. In this case the first resource is the campus disability office. Concussion and mild traumatic brain injury are covered under ADA.

It is advisable for the concussed student-athlete’s medical team to identify an academic point person and to be certain this academician is interwoven into the medical management plan. Because return-to-learn is often under-managed and under-recognized, there should also be broad discussions of this important paradigm with athletics departments across the country, engaging organizations such as the National Association of Academic Advisors for Athletics, the American College Personnel Association, NASPA, Student Affairs Administrators in Higher Education, the Coalition on Intercollegiate Athletics, National Athletic Trainers Association, College Athletic Trainers Society, American Medical Society for Sports Medicine and other allied organizations. Student-athletes are more likely to return successfully to full classroom activity in the setting of a proactive and well-integrated management plan.



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# APPENDIX A

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## AGENDA

National Collegiate Athletic Association  
Safety in College Football Summit

Orlando, Florida

February 10-11, 2016

### DAY 1

#### 1. Welcome and summit overview. (Scott Anderson and Brian Hainline)

#### 2. Topic 1: Sensor and clinical data regarding football practice and head exposure.

- a. Campus research. (Stefan Duma, Thomas Druzgal, Jacob Marucci, Jason Mihalik)
- b. Big 12 research. (Scott Anderson, Allen Hardin)
- c. Roundtable discussion and report out.
- d. Referendum: Year-round football practice contact.

#### 3. Topic 2: Catastrophic injury in football.

- a. Traumatic. (Kevin Guskiewicz)
- b. Non-traumatic. (Scott Anderson, Doug Casa)
- c. Roundtable discussion and report out.
- d. Referendum: Action plan for mitigating catastrophic injury in football.

#### 4. Topic 3: Diagnosis and management of sport-related concussion guidelines.

- a. Guidelines overview. (Brian Hainline, Scott Anderson).
- b. Concussion diagnosis and management update: New data from CARE Consortium. (Steven Broglio, Thomas McAllister, Michael McCrea)
- c. Re-examining concussion treatment: Agreements from the TEAM meeting? (Anthony Kontos)
- d. Roundtable discussion and report out.
- e. Referendum: Diagnosis and management of sport-related concussion.

### DAY 2

#### 1. Opening remarks. (Scott Anderson and Brian Hainline)

#### 2. Topic 4: Independent medical care. (Scott Anderson and Brian Hainline)

- a. Roundtable discussion and report out.
- b. Referendum: Independent medical care.

#### 3. Topic 5: Interassociation consensus statements.

- a. Year-round football practice contact.
- b. Catastrophic injury in football.
- c. Diagnosis and management of sport-related concussion.
- d. Independent medical care.

#### 4. Closing remarks.

## SAFETY IN COLLEGE FOOTBALL SUMMIT PARTICIPANTS

**Jeff Allen**, Head Athletic Trainer, University of Alabama (attending on behalf of Nick Saban)

**Scott Anderson**, College Athletics Trainers Society, University of Oklahoma

**Doug Aukerman**, Pacific 12 Conference

**Julian Bailes**, MD, Congress of Neurological Surgeons, American Association of Neurological Surgeons

**Stevie Baker-Watson**, Director of Athletics, DePauw University

**Brad Bankston**, Commissioner, Old Dominion Athletic Conference

**Karl Benson**, Commissioner, Sun Belt Conference

**Bob Boerigter**, Commissioner, Mid-America Intercollegiate Athletics Association

**Bob Bowlsby**, Commissioner, Big 12, Chair, Football Oversight Committee

**Matthew Breiding**, Centers for Disease Control and Prevention

**Steve Broglio**, MD, Principal Investigator CARE Consortium, University of Michigan

**William Bynum**, President, Mississippi Valley State University

**Jeff Bytomski**, DO, American Osteopathic Academy of Sports Medicine

**Carolyn Campbell-McGovern**, Ivy League

**Doug Casa**, Ph.D., Consortium Director, Division on Exertional Injury, National Center for Catastrophic Sport Injury; Chief Executive Officer, Korey Stringer Institute; Director, Athletic Training Education, University of Connecticut

**Bob Casmus**, CSMAS, Catawba College

**Scott Caulfield**, National Strength & Conditioning Association

**Randy Cohen**, National Athletic Trainers' Association

**Bob Colgate**, National Federation of State High School Associations

**Dawn Comstock**, Associate Professor, University of Colorado, Denver

**Julie Cromer Peoples**, Senior Woman Administrator, University of Arkansas Fayetteville

**Kevin Crutchfield**, MD, American Academy of Neurology

**Ty Dennis**, Division II Student-Athlete Advisory Committee, Minnesota State University, Mankato

**Jon Divine**, MD, President, American Medical Society for Sports Medicine

**Tom Dompier**, Ph.D., President, Datalys

**Jason Druzgal**, MD, Neuroradiologist, University of Virginia

**Stefan Duma**, Ph.D., Director, School of Biomedical Engineering and Sciences, Virginia Polytechnic University

**Ruben Echemendia**, Ph.D., President, Sports Neuropsychology Society

**Brent Feland**, MD, Collegiate Strength & Conditioning Coaches' Association

**Scott Gines**, Director of Athletics, Texas A&M University-Kingsville

**Kevin Guskiewicz**, Ph.D., University of North Carolina, Chapel Hill

**Allen Hardin**, Senior Associate Athletics Director, University of Texas

**Steven Hatchell**, President, National Football Foundation

**Bill Heinz**, Chair, Sports Medicine Advisory Committee, NFHS

**Jamie Hixson**, Associate Commissioner, Mountain West Conference

**Peter Indelicato**, American Orthopaedic Society for Sports Medicine

**Nick Inzerello**, Senior Director, Football Development, USA Football

**Jay Jacobs**, SVPC, Auburn University

**Chris Jones**, Division I Football Oversight Committee (proxy), University of Richmond

**Kerry Kenny**, Assistant Commissioner, Public Affairs, Big Ten Conference

**Zachary Kerr**, Director, Datalys



**Anthony Kontos**, Ph.D., Assistant Research Director, Sports Medicine Concussion Program, University of Pittsburgh Medical Center

**William Lawler**, Southeastern Conference

**Josephine Lee**, Board Member, College Athletics Trainers Society

**Donald Lowe**, Board Member, College Athletics Trainers Society

**Jack Marucci**, Louisiana State University

**Thomas McAllister**, MD, Principal Investigator, CARE Consortium

**Michael McCrea**, Ph.D., Principal Investigator, CARE Consortium

**William Meehan**, MD, American Academy of Pediatrics

**Jason Mihalik**, Ph.D., University of North Carolina, Chapel Hill

**Bob Murphy**, Board Member, College Athletics Trainers Society

**Bob Nielson**, Chair, NCAA Rules Committee

**Scott Oliaro**, Board Member, College Athletics Trainers Society

**Kene Orjioke**, Division I Student-Athlete Advisory Committee (SAAC), University of California, Los Angeles

**Steve Pachman**, JD, Montgomery McCracken

**Sourav Poddar**, MD, American College of Sports Medicine

**Kayla Porter**, Division III Student-Athlete Advisory Committee, Frostburg State University

**Rogers Redding**, Secretary Rules Editor, NCAA Football Rules Committee

**Yvette Rooks**, Board Member, College Athletics Trainers Society

**Eric Rozen**, Board Member, College Athletics Trainers Society

**Scott Sailor**, President, National Athletic Trainers' Association

**Jon Steinbrecher**, Commissioner, Mid-American Conference

**Ken Stephens**, National Operating Committee on Standards for Athletic Equipment

**Edward Stewart**, Senior Associate Commissioner, Big 12 Conference

**Michael Strickland**, Senior Associate Commissioner, Atlantic Coast Conference

**Grant Teaff**, Executive Director, American Football Coaches Association

**Buddy Teevens**, Coach, Dartmouth University

**James Tucker**, MD, Board Member, College Athletics Trainers Society

**Steve Walz**, Associate Director of Athletics, University of South Florida

**Alfred White**, Senior Associate Commissioner, Conference USA

## STAFF PARTICIPANTS

**Brian Burnsed**, Associate Director, Communications

**Dawn Buth**, Associate Director, Sport Science Institute

**Cassie Folck**, Coordinator, Sport Science Institute

**Brian Hainline**, Chief Medical Officer, NCAA

**Kathleen McNeely**, Chief Financial Officer, NCAA

**Terrie Meyer**, Executive Assistant, Sport Science Institute

**John Parsons**, Director, Sport Science Institute

**Chris Radford**, Associate Director, Public & Media Relations

**Stephanie Quigg**, Director, Academic & Membership Affairs

## ENDORISING MEDICAL ORGANIZATIONS

American Association of Neurological Surgeons  
American College of Sports Medicine  
American Medical Society for Sports Medicine  
American Orthopaedic Society for Sports Medicine  
American Osteopathic Academy of Sports Medicine  
College Athletic Trainers' Society  
Collegiate Strength and Conditioning Coaches Association  
Competitive Safeguards and Medical Aspects of Sports  
Congress of Neurological Surgeons  
Korey Stringer Institute  
National Athletic Trainers' Association  
National Operating Committee on Standards for Athletic Equipment  
National Strength and Conditioning Association  
Sports Neuropsychology Society