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MISSISSIPPI STATE UNIVERSITY SPORTS MEDICINE CONCUSSION MANAGEMENT PLAN

OVERVIEW

In compliance with NCAA rules, Mississippi State University has instituted the following protocol for concussion management in student-athletes.

NCAA legislation states that institutions shall have a management plan on file such that a student-athlete who exhibits signs, symptoms or behaviors consistent with a concussion shall be removed from practice or competition and evaluated by an athletics healthcare provider with experience in the evaluation and management of concussion. Student-athletes that sustain a concussion outside of their sport will be managed in the same manner as those sustained during sport activity.

Student-athletes diagnosed with a concussion will not return to activity for the remainder of that day. Medical clearance will be determined by the team physician or their designee.

The student-athlete will be monitored for recurrence of symptoms both from physical exertion and also mental exertion, such as reading, texting, computer games, working on a computer, classroom work, or taking a test.

Neuropsychological testing has proven to be an effective tool in assessing neurocognitive changes following concussion and will serve as an important component of MSU's concussion management plan. However, neuropsychological tests will not be used as a standalone measure to diagnose the presence or absence of a concussion and will not be used in lieu of a comprehensive assessment by qualified healthcare providers.

Healthcare professionals will assume a concussion when unsure and waiting for final diagnosis. When in doubt, sit the athlete out.

CONCUSSION STATEMENT

As part of NCAA legislation, student-athletes must annually sign a statement in which they accept the responsibility for reporting their injuries and illnesses to MSU medical staff, including signs and symptoms of concussions. Student-athletes will be presented with educational material on concussions.

The statement can be found in Appendix A and has been approved by university counsel.

The signature of a parent or legal guardian of the student-athlete is required if he or she is a minor. In this case, a minor has been defined as anyone less than 18 years of age.

BEST PRACTICES FOR CONCUSSION MANAGEMENT

1. Require student-athletes to sign a statement (see Appendix A) in which student-athletes accept the responsibility for reporting their injuries and illnesses to MSU medical staff, including signs and symptoms of concussions. Student-athletes will be presented with educational material on concussions and access to the MSU Concussion Management Plan.

2. Have on file and annually update an emergency action plan for each athletics venue to respond to student-athlete catastrophic injuries and illnesses, including but not limited to concussions, heat illness, spine injury, cardiac arrest, respiratory distress (e.g. asthma), and sickle cell trait collapses.

3. MSU's healthcare plan includes equitable access to athletics healthcare providers and care for each NCAA sport.

a. Medical personnel with training in the diagnosis, treatment, and initial management of acute concussion will be present at all NCAA varsity competitions for basketball, football, pole vault, and soccer.

b. To be present means to be on site at the campus or arena of the competition. Medical personnel may be from either team, or may be independently contracted for the event.

c. Medical personnel with training in the diagnosis, treatment, and initial management of acute concussion must be available at all NCAA varsity practices for basketball, football, pole vault, and soccer.

d. To be available means that, at a minimum, medical personnel can be contacted at any time during practice via telephone, messaging, e-mail, beeper, or other immediate communication means. Further, the case can be discussed through such communication and immediate arrangements can be made for the student-athlete to be evaluated.

4. MSU medical staff will be empowered to have the unchallengeable authority to determine management and return-to-play of any ill or injured student-athlete, as he or she deems appropriate.

5. This concussion management plan will be team physician-directed and includes the following components:

a. Provide applicable NCAA concussion fact sheets or other applicable educational material annually to student-athletes, coaches, team physicians, athletic trainers, sport administrators, and the Director of Athletics. There will be annual acknowledgment that all parties have read and understand this material. Additionally, ensure coaches have acknowledged they understand their role within the concussion management plan. An educational session for coaches will be presented annually during a Compliance meeting.

b. MSU Athletics healthcare providers will practice within the standards as established for their professional practice (e.g., physician, certified athletic trainer, nurse practitioner, neurosurgeon).

c. Record a brain injury/ concussion history, symptom evaluation, baseline cognitive assessment, and baseline balance evaluation for each student-athlete prior to participation their initial year.

Team physicians have the ultimate authority to determine pre-participation clearance and/or the need for additional consultation or testing.

A new baseline will be taken for the student-athlete's third year in the program in high risk sports such as baseball, basketball, football, pole vault, soccer, and softball.

A new baseline may be considered at six months or beyond if a student-athlete sustains a significant concussion (especially those with complicated or multiple concussion history) or begins medication to treat ADHD or depression.

A neurocognitive evaluation and balance testing will be used post-injury after the student-athlete is asymptomatic and prior to returning to full speed drills. Additional tests will be continued at appropriate intervals. As requested by the team physician or certified athletic trainer, post injury neuropsychological test data will be interpreted by the team neurosurgeon and/or a neuropsychologist.

d. When a student-athlete shows any signs, symptoms or behaviors consistent with a concussion, at rest or with exertion, the athlete will be removed from practice or competition and evaluated by an athletics healthcare provider (ATC or team physician) with experience in the evaluation and management of concussion.

e. A student-athlete diagnosed with a concussion will be withheld from the competition or practice and not return to activity for the remainder of that day. Disposition decisions for more serious injuries such as cervical spine trauma, skull fracture, or intracranial bleed, will be made at the time of presentation.

f. MSU Athletics healthcare providers, who have the experience to diagnose and manage concussions, will conduct and document serial clinical evaluation inclusive of symptom inventory and/or evaluation of cognition and balance as directed by the team physicians and/or their designee.

g. The student-athlete will be evaluated by a team physician as outlined within this concussion management plan. Once asymptomatic and post-exertion assessments are within normal baseline limits, return-to-play will follow a medically supervised stepwise process.

h. Final authority for Return-to-Play will reside with the team physician or the physician's designee.

6. Document the incident, evaluation, continued management, and clearance of the student-athlete with a concussion.

7. Although sports currently have rules in place; athletics staff, student-athletes, and officials will continue to emphasize that purposeful or flagrant head or neck contact in any sport is not permitted and current rules of play will be strictly enforced.

8. Modifying factors and co-morbidities -- such as attention deficit hyperactivity disorder, migraine and other headache disorders, learning disabilities and mood disorders -- will be considered in making the diagnosis, in providing a management plan, and in making both return-to-play and return-to-learn recommendations.

9. Academic accommodations and cognitive rest will be considered after a concussion and done in cooperation with the Athletics Academics staff.

ROLES OF ATHLETICS HEALTHCARE STAFF

Team Physician and/or Team Neurosurgeon- Evaluation, return-to-play clearance, directs the overall concussion management plan

Certified Athletic Trainer- Evaluation and return-to-play clearance at the designation of the team physician

Nurse Practitioner- Evaluation and return-to-play clearance at the designation of the team physician

WHEN TO REFER

MSU team physicians have specified that student-athletes be referred when they present with the following signs and symptoms, and these signs and symptoms are not associated with other, previously diagnosed, medical conditions:

Headache, confusion, fogginess, blurred vision, dizziness, phonophobia, photophobia, difficulty concentrating, irritability, memory loss, exertional headache, nausea/vomiting, emotionality, nervousness/anxiety

POST-CONCUSSION MANAGEMENT

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

1. 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, cognitive assessment, and balance exam will be performed.

2. Assessment for skull fracture, intracranial bleed, and cervical spine trauma at time of injury and implementation of the emergency action plan, as warranted.

3. Implementation of the emergency action plan and transportation for further medical care if any of following signs and symptoms are present: Glasgow Coma score less than 13; prolonged period of loss of consciousness (longer than 1 minute); focal neurological deficit suggesting intracranial trauma; repetitive emesis; persistently diminished or worsening mental status or other neurological signs or symptoms; and potential spine injury.

4. Serial evaluation and monitoring for deterioration following injury will be ongoing and provided by either the team physician or their designee.

5. Upon discharge from medical care, both oral and written instructions (Appendix B) for home care will 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. 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.

These symptoms may represent, but are not limited to, post-concussion syndrome, sleep dysfunction, migraine or other headache disorders, co-morbid mood disorders such as anxiety and depression, or ocular or vestibular dysfunction.

An evaluation by a physician will be conducted for student-athletes with a prolonged recovery in order to consider these additional diagnoses and best management options. A diagnosis will be verified instead of assuming that the student-athlete has prolonged concussion symptoms.

Passive management, such as prolonged physical and cognitive rest, may be counter-productive in these scenarios.

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.

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). In scenarios of this nature, and with experienced clinicians in a highly select setting, the return-to-play protocol may be modified.

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.

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. In other words, 'rest' can sometimes lead to adverse outcomes if an accurate diagnosis based on neurological dysfunction is not made.

PROCESS FOR RETURN-TO-PLAY

When the symptom score returns to baseline with relative physical and cognitive rest, the student-athlete will begin a gradual return to play and proceed at a pace determined by symptomatology. A return to baseline includes symptom score, cognitive function, and balance or as otherwise directed by the team physician.

MSU team physicians have specified the following step-wise progression be used for return-to-play and this process will be supervised by a health care provider with expertise in concussion.

1. Relative physical and cognitive rest
2. Cognitive exertion/ no physical activity
3. Light aerobic exercise (such as walking, swimming, or riding a stationary bike)/ stationary cardiovascular activity/ no resistance training
4. Functional testing (mode, duration, and intensity-dependent exercise based upon sport)
5. Sport-specific exercise (no head impact)
6. Noncontact sport drills/ resumption of progressive resistance training
7. Full-contact practice/ unrestricted training
8. Return to competition

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 and/or their designee will be notified and the student-athlete will be returned to the previous level of activity once symptoms resolve.

Final determination of return-to-play ultimately resides with the team physician or a medically qualified physician designee.

RETURN TO ACADEMICS

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 a brain energy crisis.

Return-to-learn will be managed in a stepwise program that fits the needs of the individual, within the context of a multi-disciplinary team that may include physicians, athletic trainers, coaches, psychologists/ counselors, neuropsychologists, administrators, academic counselors and support (e.g. professors, instructors, deans, academic advisors, faculty athletics representative), and the MSU Office of Student Support Services and Disability Support Services representatives as warranted.

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.

PROCESS FOR RETURN-TO-LEARN

1. Relative physical and cognitive rest (minimizing potential cognitive stressors, such as school work, video games, reading, texting and watching television). Consideration will 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 will be individualized.
2. Gradual return to academics based on the absence of concussion symptoms following cognitive exposure.
    a. If the student-athlete cannot tolerate light cognitive activity, he or she should remain at home or in the residence hall.
    b. Once the student-athlete can tolerate cognitive activity without return of symptoms, he/she will gradually return to the classroom and studying as tolerated.

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 will be notified and the student-athlete's cognitive activity reassessed.

The extent of academic adjustments needed will be decided by a multi-disciplinary team that may include the team physician, athletic trainer, team athletic academic counselor, faculty athletics representative or other faculty representative, coach, individual teachers, neuropsychologist, college administrators, office of disability services representative, 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. Any modifications needed will be implemented with help from the student-athlete's point person, usually their athletic academic advisor.

For those student-athletes whose symptoms persist for longer than two weeks, academic adjustment or accommodations may be considered, such as a change in his or her class schedule and special arrangements for extended absences, tests, term papers, and projects. Other accommodations may be considered in coordination with Athletic Academics and/or the MSU Office of Student Support Services and Disability Support Services and in compliance with the Americans with Disabilities Act. Re-evaluation

by the team physician and members of the multi-disciplinary team will occur, as appropriate, in these cases of prolonged recovery.

A more difficult scenario occurs when the student-athlete experiences prolonged cognitive difficulties. In this case, considerations may 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.

The student-athlete may choose to disclose the documentation to the MSU Office of Student Support Services and Disability Support Services in order to seek long-term accommodations or academic adjustments. That office will verify if the impairment is limiting a major life activity per the Americans with Disabilities Act. Accommodations or academic adjustments may be considered in order to 'level the playing field' for the student-athlete with prolonged cognitive difficulties resulting from 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. In most cases, this will be the student-athlete's athletics academic advisor who will work closely with the student-athlete's athletic trainer.
- 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.

REDUCING EXPOSURE TO HEAD TRAUMA

While reducing head trauma is difficult to quantify, we recognize the importance of emphasizing ways to minimize head trauma exposure and will continue an ongoing evaluation of strategies to minimize/reduce exposure to trauma.

Minimizing head trauma exposure can be improved through:

- Adherence to the Inter-Association Consensus: Year-Round Football Practice Contact Recommendations
- Adherence to the Inter-Association Consensus: Independent Medical Care for College Student-Athletes Best Practices
- Reducing gratuitous contact during practice
- Taking a "safety first" approach to sport
- Taking the head out of contact
- Coaching and student-athlete education regarding safe play and proper techniques

APPENDICES

Appendix A- Statement
Appendix B- Home Instructions for Concussions
Appendix C- NCAA Fact Sheet for Student-Athletes
Appendix D- NCAA Fact Sheet for Coaches
Appendix E- NATA Position Statement
Appendix F- Sport Concussion Assessment Tool 5 (SCAT5)
Appendix G- Inter-Association Consensus: Year-Round Football Practice Contact Guidelines
Appendix H- Inter-Association Consensus: Independent Medical Care Guidelines

APPENDIX A- STATEMENT

MSU SPORTS MEDICINE
STUDENT-ATHLETE CONCUSSION STATEMENT
(To be signed annually)

☐ I understand that it is my responsibility to report all injuries and illnesses to my athletic trainer and/or team physician.

☐ I have read and understand the NCAA Concussion Fact Sheet.

After reading the NCAA Concussion Fact Sheet, I am aware of the following information:

_____ Initial — A concussion is a brain injury, which I am responsible for reporting to my physician or athletic trainer.

_____ Initial — A concussion can affect my ability to perform everyday activities and affect reaction time, balance, sleep, and classroom performance.

_____ Initial — You cannot see a concussion, but you might notice some of the symptoms right away. Other symptoms can show up hours or days after the injury.

_____ Initial — Common signs and symptoms of a concussion include:

- Amnesia
- Headache
- Nausea
- Sensitivity to light or noise
- Feeling unusually irritable
- Slowed reaction time
- Confusion
- Loss of consciousness
- Double or fuzzy vision
- Balance problems or dizziness
- Feeling sluggish, foggy, or groggy
- Concentration or memory problems

If I experience any of these signs or symptoms or in any way suspect I have suffered a concussion, I am responsible for reporting this to my team physician or athletic trainer.

_____ Initial — If I suspect a teammate has a concussion, I am responsible for reporting the injury to my team physician or athletic trainer.

_____ Initial — I will not return to play in a game or practice if I have received a blow to the head or body that results in concussion-related symptoms.

_____ Initial — Following a concussion, the brain needs time to heal. I understand I am much more likely to have a repeat concussion if I return to play before my symptoms resolve.

_____ Initial — I understand repeat concussions can cause permanent brain damage and even death.

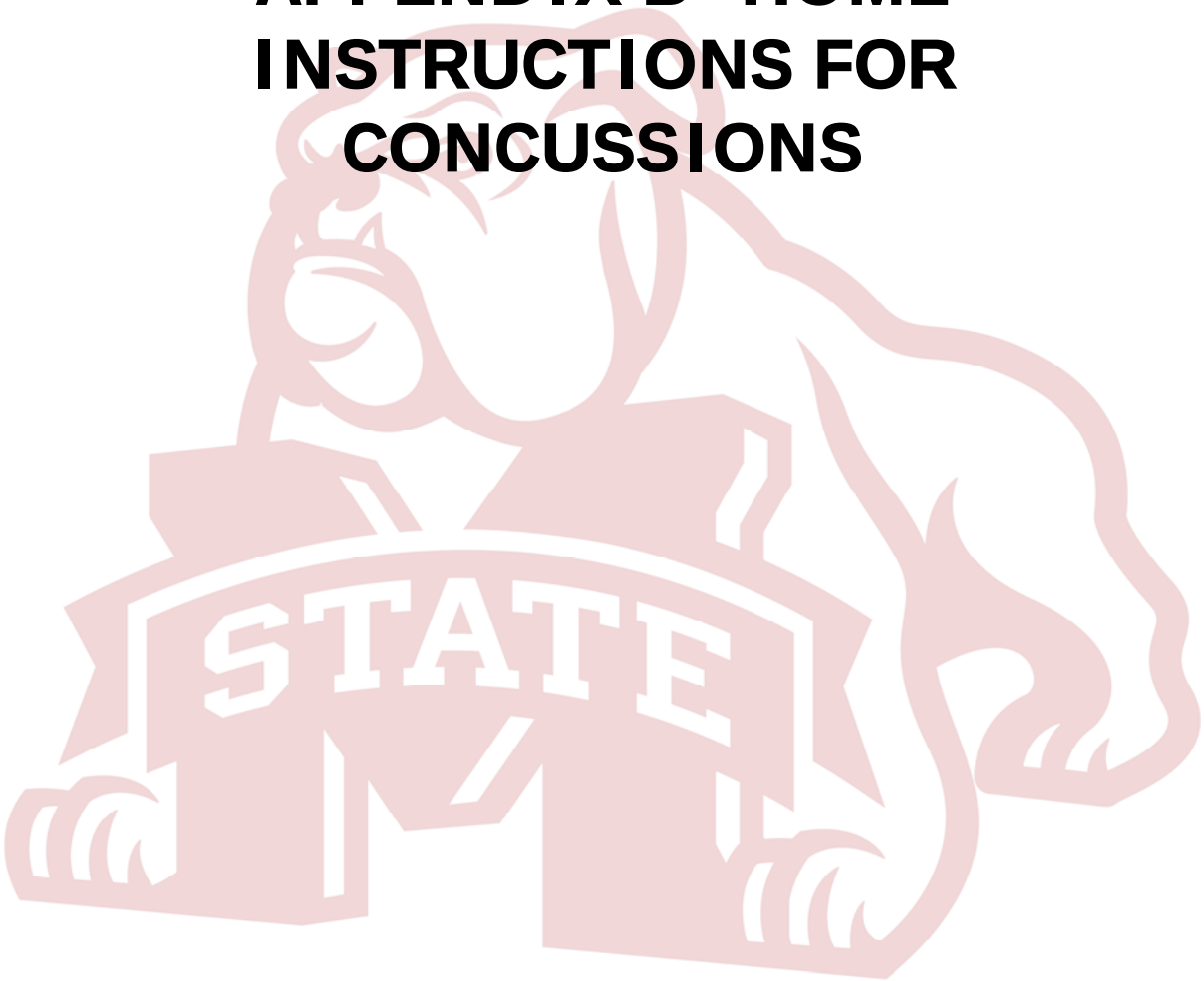
_____ PRINT NAME

_____ DATE

_____ SIGNATURE

_____ SIGNATURE OF PARENT OR GUARDIAN IF UNDER 18

APPENDIX B- HOME INSTRUCTIONS FOR CONCUSSIONS



MSU SPORTS MEDICINE
HOME INSTRUCTIONS FOR CONCUSSIONS

Name _____ Date _____

You have had a head injury and/or concussion and need to be watched closely for the next 24-48 hours.

It is ok to:
- Use Tylenol (acetaminophen)
- Use an ice pack on your head/neck for comfort
- Eat a light meal
- Go to sleep

There is no need to:
- Check eyes with a light
- Wake up every hour
- Stay in bed

DO NOT:
- Drink alcohol
- Drive a car
- Use aspirin, Aleve (naproxen sodium), Advil (ibuprofen), or other NSAID products
- Participate in any strenuous activity until cleared by your athletic trainer and/or team physician

Special Recommendations: _____
_____

Watch for any of the following problems and contact your athletic trainer immediately:
- Worsening headache
- Vomiting
- Decreased level of consciousness
- Dilated (enlarged) pupils
- Seizure
- Stumbling/ loss of balance
- Weakness in arms/ legs
- Increased irritability
- Increased confusion
- Neck pain
- Abnormal respiration, pulse, and/ or blood pressure
- Difficulty with facial expressions, numbness of the face, and/or decreased hearing, vision, or balance
- Increase in severity or number of symptoms

You need to be seen for a follow-up examination tomorrow at _____AM/PM at _____.

APPENDIX C- NCAA FACT SHEET FOR STUDENT-ATHLETES

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CONCUSSION SAFETY

WHAT STUDENT-ATHLETES NEED TO KNOW

What is a concussion?

A concussion is a type of traumatic brain injury. It follows a force to the head or body and leads to a change in brain function. It is not typically accompanied by loss of consciousness.

How can I keep myself safe?

1. Know the symptoms.

You may experience …

- Headache or head pressure
- Nausea
- Balance problems or dizziness
- Double or blurry vision
- Sensitivity to light or noise
- Feeling sluggish, hazy or foggy
- Confusion, concentration or memory problems

2. Speak up.

- If you think you have a concussion, stop playing and talk to your coach, athletic trainer or team physician immediately.

3. Take time to recover.

- Follow your team physician and athletic trainer's directions during concussion recovery. If left unmanaged, there may be serious consequences.
- Once you've recovered from a concussion, talk with your physician about the risks and benefits of continuing to participate in your sport.

How can I be a good teammate?

1. Know the symptoms.

You may notice that a teammate …

- Appears dazed or stunned
- Forgets an instruction
- Is confused about an assignment or position
- Is unsure of the game, score or opponent
- Appears less coordinated
- Answers questions slowly
- Loses consciousness

2. Encourage teammates to be safe.

- If you think one of your teammates has a concussion, tell your coach, athletic trainer or team physician immediately.
- Help create a culture of safety by encouraging your teammates to report any concussion symptoms.

3. Support your injured teammates.

- If one of your teammates has a concussion, let him or her know you and the team support playing it safe and following medical advice during recovery.
- Being unable to practice or join team activities can be isolating. Make sure your teammates know they're not alone.

No two concussions are the same. New symptoms can appear hours or days after the initial impact.
If you are unsure if you have a concussion, talk to your athletic trainer or team physician immediately.

What happens if I get a concussion and keep practicing or competing?

- Due to brain vulnerability after a concussion, an athlete may be more likely to suffer another concussion while symptomatic from the first one.
- In rare cases, repeat head trauma can result in brain swelling, permanent brain damage or even death.
- Continuing to play after a concussion increases the chance of sustaining other injuries too, not just concussion.
- Athletes with concussion have reduced concentration and slowed reaction time. This means that you won't be performing at your best.
- Athletes who delay reporting concussion take longer to recover fully.

What are the long-term effects of a concussion?

- We don't fully understand the long-term effects of a concussion, but ongoing studies raise concerns.
- Athletes who have had multiple concussions *may* have an increased risk of degenerative brain disease and cognitive and emotional difficulties later in life.

What do I need to know about repetitive head impacts?

- Repetitive head impacts mean that an individual has been exposed to repeated impact forces to the head. These forces may or may not meet the threshold of a concussion.
- Research is ongoing but emerging data suggest that repetitive head impact also may be harmful and place a student-athlete at an increased risk of neurological complications later in life.

Did you know?

- NCAA rules require that team physicians and athletic trainers manage your concussion and injury recovery independent of coaching staff, or other non-medical, influence.
- We're learning more about concussion every day. To find out more about the largest concussion study ever conducted, which is being led by the NCAA and U.S. Department of Defense, visit ncaa.org/concussion.

CONCUSSION TIMELINE

Baseline Testing
Balance, cognitive and neurological tests that help medical staff manage and diagnose a concussion.

Concussion
If you show signs of a concussion, NCAA rules require that you be removed from play and medically evaluated.

Recovery
Your school has a concussion management plan, and team physicians and athletic trainers are required to follow that plan during your recovery.

Return to Learn
Return to school should be done in a step-by-step progression in which adjustments are made as needed to manage your symptoms.

Return to Play
Return to play only happens after you have returned to your preconcussion baseline and you've gone through a step-by-step progression of increasing activity.

For more information, visit ncaa.org/concussion.

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APPENDIX D- NCAA FACT SHEET FOR COACHES

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CONCUSSION SAFETY

WHAT COACHES NEED TO KNOW

What is a concussion?

A concussion is a type of traumatic brain injury. It follows a force to the head or body and leads to a change in brain function. It is not typically accompanied by loss of consciousness.

How can I tell if an athlete has a concussion?

You may notice the athlete …

- Appears dazed or stunned
- Forgets an instruction
- Is confused about an assignment or position
- Is unsure of the game, score or opponent
- Appears less coordinated
- Answers questions slowly
- Loses consciousness

Note that no two concussions are the same. All possible concussions must be evaluated by an athletic trainer or team physician.

The athlete may tell you he or she is experiencing …

- A headache, head pressure or that he or she doesn't feel right following a blow to the head
- Nausea
- Balance problems or dizziness
- Double or blurry vision
- Sensitivity to light or noise
- Feeling sluggish, hazy or foggy
- Confusion, concentration or memory problems

What can I do to keep student-athletes safe?

	Preseason	In-Season	Time of Injury	Recovery
What can I do?	Create a culture in which concussion reporting is encouraged and promoted.	Know the signs and symptoms of concussions.	Remove athletes from play immediately if you think they have a concussion and refer them to the team physician or athletic trainer.	Follow the recovery and return-to-play protocol established by team physicians and athletic trainers.
Why does it matter?	Athletes who don't immediately seek care for a suspected concussion take longer to recover.	The more people who know what to look for in a concussed athlete, the more likely a concussion will be identified.	Early removal from play can mean a quicker recovery and help avoid serious consequences.	Team physicians and athletic trainers have the training to follow best practices related to the concussion recovery process.
Tips and strategies	Be present when your team physician or athletic trainer provides concussion education material to your team. Tell your team that this matters to you.	Check in with your team physician or athletic trainer if you want to learn more about concussion safety.	Provide positive reinforcement when an athlete reports a suspected concussion.	Tell athletes that decisions related to their return to play and health are entirely in the hands of the team physician and athletic trainer.

You play a powerful role in setting the tone for concussion safety on your team. Let your team know that you take concussion seriously and reporting the symptoms of a suspected concussion is an important part of your team's values.

What happens if an athlete gets a concussion and keeps practicing or competing?

- Due to brain vulnerability after a concussion, an athlete may be more likely to suffer another concussion while symptomatic from the first one.
- In rare cases, repeat head trauma can result in brain swelling, permanent brain damage or even death.
- Continuing to play after a concussion increases the chance of sustaining other injuries too, not just concussion.
- Athletes with a concussion have reduced concentration and slowed reaction time. This means they won't be performing at their best.
- Athletes who delay reporting concussion may take longer to recover fully.

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- Athletes who have had multiple concussions *may* have an increased risk of degenerative brain disease, and cognitive and emotional difficulties later in life.

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- Repetitive head impacts mean that an individual has been exposed to repeated impact forces to the head. These forces may or may not meet the threshold of a concussion.
- Research is ongoing but emerging data suggest that repetitive head impact also may be harmful and place a student-athlete at an increased risk of neurological complications later in life.

Did you know?

- Most contact or collision teams have at least one student-athlete diagnosed with a concussion every season.
- Your school has a concussion management plan, and team physicians and athletic trainers are expected to follow that plan during a student-athlete's recovery.
- NCAA rules require that team physicians and athletic trainers have the unchallengeable authority to make all medical management and return-to-play decisions for student-athletes.
- We're learning more about concussion every day. To find out more about the largest concussion study ever conducted, which is being led by the NCAA and U.S. Department of Defense, visit ncaa.org/concussion.

For more information, visit **ncaa.org/concussion**.

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APPENDIX E- NATA POSITION STATEMENT

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www.natajournals.org

National Athletic Trainers' Association Position Statement: Management of Sport Concussion

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Objective: To provide athletic trainers, physicians, and other health care professionals with best-practice guidelines for the management of sport-related concussions.

Background: An estimated 3.8 million concussions occur each year in the United States as a result of sport and physical activity. Athletic trainers are commonly the first medical providers available onsite to identify and evaluate these injuries.

Recommendations: The recommendations for concussion management provided here are based on the most current research and divided into sections on education and prevention, documentation and legal aspects, evaluation and return to play, and other considerations.

Key Words: mild traumatic brain injuries, pediatric concussions, education, assessment, evaluation, documentation

Despite a significant increase in research dedicated to identifying and managing sport-related concussion, it remains one of the most complex injuries sports medicine professionals face. Concussions occur from forces applied directly or indirectly to the skull that result in the rapid acceleration and deceleration of the brain. The sudden change in cerebral velocity elicits neuronal shearing, which produces changes in ionic balance[1] and metabolism.[2] When accompanied by clinical signs and symptoms, changes at the cellular level are commonly referred to as *mild traumatic brain injury*, or concussion. Concussions occur in males and females of all ages and in all sports, but are most common in contact and collision activities. Data collected from emergency department visits show a 62% increase (153 375 to 248 418) in nonfatal traumatic brain injuries between 2001 and 2009,[3] with as many as 3.8 million reported and unreported sport- and recreation-related concussions occurring each year in the United States.[4]

As licensed medical professionals, athletic trainers (ATs) receive comprehensive didactic and clinical training in concussion management. They are typically the first providers to identify and evaluate injured persons and are integral in the postinjury management and return-to-play (RTP) decision-making process. Without exception, ATs should be present at all organized sporting events at all levels of play and should work closely with a physician or designate who has specific training and experience in concussion management to develop and implement a concussion-management plan based on the recommendations outlined here.

An update to the initial 2004 National Athletic Trainers' Association position statement on the management of sport-related concussion,[5] this document contains recommendations on concussion management for practicing ATs based on the most recent scientific evidence. A review of the literature supporting these recommendations has also been included. The document covers the topics of "Education and Prevention," "Documentation and Legal Aspects," "Evaluation and RTP," and "Other Considerations."

Table 1. Strength of Recommendation Taxonomy (SORT)[a]

Strength of Recommendations	Definition
A	Recommendation based on consistent and good quality experimental evidence (morbidity, mortality, exercise and cognitive performance, physiologic responses)
B	Recommendation based on inconsistent or limited quality experimental evidence
C	Recommendation based on consensus; usual practice; opinion; disease-oriented evidence[b]; case series or studies of diagnosis, treatment, prevention, or screening; or extrapolations from quasi-experimental research

[a] Reprinted with permission from "Strength of Recommendation Taxonomy (SORT): A Patient-Centered Approach to Grading Evidence in the Medical Literature," February 1, 2004, American Family Physician. Copyright © 2004 American Academy of Family Physicians. All Rights Reserved.

[b] Patient-oriented evidence measures outcomes that matter to patients: morbidity, mortality, symptoms improvement, cost reduction, and quality of life. Disease-oriented evidence measures are intermediate, physiologic, or surrogate end points that may or may not reflect improvements in patient outcomes (eg, blood pressure, blood chemistry, physiologic function, pathologic findings).

INJURY DEFINITION

To best assemble the available concussion research and remain consistent with other medical groups, we sought to evaluate literature that defined *concussion* as a "trauma-induced alteration in mental status that may or may not involve loss of consciousness."[6] This definition was selected based on its broad application by medical organizations and widespread use within the literature from the time of the first National Athletic Trainers' Association position statement. We recognize the strength of the definition provided by the International Concussion in Sport Group and its subpoints as valid features that further define concussion.[7] In evaluating and writing this document, we also included research defining concussive injuries in these terms. Notably absent from the literature and consistent with previous recommendations were the terms "ding," "getting one's bell rung," "clearing the cobwebs," and other such phrases in reference to concussive injuries.[5] These colloquial terms are antiquated, minimize injury severity, and should not be used to refer to concussion or mild traumatic brain injury.

RECOMMENDATIONS FOR CLINICAL PRACTICE

Education and Prevention

The clinical practice recommendations for each topic have been graded based on the Strength of Recommendation Taxonomy (SORT; Table 1).[8]

1. The AT should use, and educate others in using, the proper terminology of concussion and mild traumatic brain injury as opposed to such colloquial terms as "ding" and "bell ringer."[9] *Strength of Recommendation: B*
2. The AT should work with the appropriate administrators to ensure that parents and coaches are educated on the following aspects of concussion: prevention, mechanism, recognition and referral, appropriate return to participation, physical and cognitive restrictions for concussed athletes, and ramifications of improper concussion management.[10–12] *Strength of Recommendation: B*
3. The AT should be aware of and document potential modifying factors that could delay the RTP, and patients should be educated on the implications of these conditions as they affect recovery (Table 2).[7] *Strength of Recommendation: C*
4. The AT should work to educate coaches, athletes, and parents about the limitations of protective equipment for concussion prevention. *Strength of Recommendation: C*
5. As part of educational efforts, ATs, athletes, coaches, and parents should read all warning labels associated with protective equipment. *Strength of Recommendation: C*

Documentation and Legal Aspects

6. The AT should be aware of any and all relevant governing bodies (eg, state, athletic conference) and their policies and procedures regarding concussion management. *Strength of Recommendation: C*
7. The AT should document the athlete's (and when appropriate, the parent's) understanding of concussive signs and symptoms and his or her responsibility to report a concussion. *Strength of Recommendation: C*
8. The AT should communicate the status of concussed athletes to the managing physician on a regular basis. *Strength of Recommendation: C*
9. The AT should ensure proper documentation of the concussion evaluation, management, treatment, return-to-

Table 2. Factors That May Modify the Risk of Concussion and Duration of Recovery[7]

Risk	Modifiers
Symptoms	Number
	Duration (>10 d)
	Severity
Signs	Prolonged loss of consciousness (>1 min), amnesia
Sequelae	Concussive convulsions
Temporal	Frequency: repeated concussions over time
	Time: injuries close together in time
	Recency: recent concussion or traumatic brain injury
Threshold	Repeated concussions occurring with progressively less impact, force, or slower recovery after each successive event
Age	Child or adolescent (<18 y)
Comorbidities and premorbidities	Migraine, depressions, or other mental health disorders; attention-deficit hyperactivity disorder; learning disabilities; sleep disorders
Medication	Psychoactive drugs, anticoagulants
Behavior	Dangerous style of play
Sport	High-risk activity, contact or collision sport, high sporting level

participation progression, and physician communications. *Strength of Recommendation: C*

Evaluation and RTP

10. Athletes at high risk of concussion (eg, those in contact or collision sports) should undergo baseline examinations before the competitive season.[5,13,14] *Strength of Recommendation: B*
11. A new baseline examination should be completed annually for adolescent athletes, those with a recent concussion, and, when feasible, all athletes.[15–17] *Strength of Recommendation: B*
12. The baseline examination should consist of a clinical history (including any symptoms), physical and neurologic evaluations, measures of motor control (eg, balance), and neurocognitive function.[5,7,18–20] *Strength of Recommendation: B*
13. The baseline and postinjury examinations should be administered in similar environments that maximize the patient's abilities, and all baseline examinations should be reviewed for suboptimal performance.[21] *Strength of Recommendation: C*
14. Any athlete suspected of sustaining a concussion should be immediately removed from participation and evaluated by a physician or designate (eg, AT). *Strength of Recommendation: C*
15. The concussion diagnosis is made through the clinical evaluation and supported by assessment tools.[19] *Strength of Recommendation: B*
16. When the rapid assessment of concussion is necessary (eg, during competition), a brief concussion-evaluation tool (eg, Standardized Assessment of Concussion [SAC][20,22,23]) should be used in conjunction with a motor-control evaluation and symptom assessment to support the physical and neurologic clinical evaluation. *Strength of Recommendation: B*
17. Once a concussion diagnosis has been made, the patient should undergo a daily focused examination to monitor the course of recovery. *Strength of Recommendation: C*
18. During the acute postconcussion recovery stage, daily testing of neurocognitive function and motor control is typically not needed until the patient is asymptomatic.[24] *Strength of Recommendation: C*
19. A concussed athlete should not be returned to athletic participation on the day of injury.[9] *Strength of Recommendation: C*
20. No concussed athlete should return to physical activity without being evaluated and cleared by a physician or designate (eg, AT) specifically trained and experienced in concussion evaluation and management. *Strength of Recommendation: C*
21. Young athletes with a past medical history that includes multiple concussions, a developmental disorder (eg, learning disabilities, attention-deficit hyperactivity disorder), or a psychiatric disorder (eg, anxiety, depression) may benefit from referral to a neuropsychologist to administer and interpret neurocognitive assessments and determine readiness to return to scholastic and athletic activities.[7,25] *Strength of Recommendation: C*
22. A physical-exertion progression should begin only after the concussed athlete demonstrates a normal clinical examination, the resolution of concussion-related symptoms, and a return to preinjury scores on tests of motor control and neurocognitive function.[7,26] *Strength of Recommendation: C*
23. Concussed athletes who do not show a typical progressive return to normal functioning after injury may benefit from other treatments or therapies. *Strength of Recommendation: C*
24. Concussion-grading scales should not be used to manage the injury. Instead, each patient should be evaluated and treated on an individual basis.[7,9] *Strength of Recommendation: B*
25. After the injury has resolved, the concussion may be retrospectively graded for the purpose of medical record documentation. *Strength of Recommendation: C*

Other Considerations

Equipment.

26. The AT should enforce the standard use of certified helmets while educating athletes, coaches, and parents that although such helmets help to prevent catastrophic head injuries (eg, skull fractures), they do not significantly reduce the risk of concussions.[7,27–29] *Strength of Recommendation: B*
27. Helmet use in high-velocity sports (eg, alpine sports,[30–32] cycling[33–35]) has been shown to protect against traumatic head and facial injury. *Strength of Recommendation: A*
28. Consistent evidence to support the use of mouthguards for concussion mitigation is not available. However, substantial evidence demonstrates that a properly fitted mouthguard reduces dental injuries.[29] *Strength of Recommendation: B*
29. Research on the effectiveness of headgear in soccer players to reduce concussion is limited. The use of headgear is neither encouraged nor discouraged at this time. *Strength of Recommendation: C*

Pediatric Concussion.

30. When working with children and adolescents, ATs should be aware that recovery may take longer than in adults and require a more prolonged RTP progression.[7,36,37] *Strength of Recommendation: B*
31. Age-appropriate, validated concussion-assessment tools should be used in younger populations.[7,25] *Strength of Recommendation: C*
32. Assessment of postconcussion symptoms in pediatric patients should include age-validated, standardized symptom scales and the formal input of a parent, teacher, or responsible adult.[38–40] *Strength of Recommendation: B*
33. Pediatric athletes are undergoing continual brain and cognitive development and likely need more frequent updates to baseline assessments.[16,41] *Strength of Recommendation: B*
34. Athletic trainers should work with school administrators and teachers to include appropriate academic accommodations in the concussion-management plan.[7,39,42] *Strength of Recommendation: C*

Home Care.

35. The AT and physician should agree on a standard concussion home-instruction form (eg, Appendix A) that is consistently used for all concussed patients, and a copy should be maintained in the medical record. Both oral and written instructions for home care should be given to the

concussed athlete and to a responsible adult (eg, parent or roommate) who will observe and supervise the patient during the acute phase of the concussion.[5,43] *Strength of Recommendation: C*

36. After a concussion diagnosis, the patient should be instructed to avoid medications other than acetaminophen. All current medications should be reviewed by the physician. [5,44,45] *Strength of Recommendation: C*
37. After a concussion diagnosis, the patient should be instructed to avoid ingesting alcohol, illicit drugs, or other substances that might interfere with cognitive function and neurologic recovery.[5] *Strength of Recommendation: C*
38. After the initial monitoring period, rest is currently the best practice for concussion recovery. As such, there is typically no need to wake the patient during the night unless instructed by a physician.[5] *Strength of Recommendation: C*
39. During the acute stage of injury, the patient should be instructed to avoid any physical or mental exertion that exacerbates symptoms.[5,7,28,39,42] *Strength of Recommendation: C*
40. In addition to exclusion from physical activity related to team activities, concussed student-athletes should be excused from any activity requiring physical exertion (eg, physical education classes). *Strength of Recommendation: C*
41. School administrators, counselors, and instructors should be made aware of the patient's injury with a recommendation for academic accommodation during the recovery period.[7,28,39,42] *Strength of Recommendation: C*
42. A patient with a concussion should be instructed to eat a well-balanced diet that is nutritious in quality and quantity and should drink fluids to stay hydrated.[5] *Strength of Recommendation: C*

Multiple Concussions.

43. For an athlete with a concussion history, the AT should adopt a more conservative RTP strategy.[7,46,47] *Strength of Recommendation: B*
44. Referral to a physician or designate with concussion training and experience should be considered when an athlete with a history of multiple concussions sustains concussions with lessening forces, demonstrates increasing severity with each injury, or demonstrates objective or subjective changes in baseline brain function. *Strength of Recommendation: C*
45. The AT should recognize the potential for second-impact syndrome in young patients who sustain a second trauma to the brain prior to complete resolution of the first injury.[1,48–50] *Strength of Recommendation: C*
46. The AT should be aware of the potential for long-term consequences of multiple subconcussive and concussive impacts.[51–53] *Strength of Recommendation: C*

SUPPORTING LITERATURE REVIEW

Education and Prevention

When athletes, parents, coaches, administrators, and others discuss concussive injuries, they should use the appropriate medical terminology: *concussion* or *mild traumatic brain injury*. Use of such colloquial terms as "ding," "bell ringer," and "getting your bell rung" has a connotation that mitigates injury severity and should thus be avoided. For example, a noted decline in neurocognitive ability at 36 hours after injury was reported in patients labeled as "dinged" whose symptoms appeared to resolve within 15 minutes.[9] This finding demonstrates a more serious effect of what was initially considered a minor injury.

Before the competitive season, the AT should review all concussion policies and procedures that outline injury definition, signs and symptoms, and the institution's policy on concussion management (see "Documentation and Legal Aspects" below regarding how state laws and organizational body regulations may influence institutional concussion policy). In many instances, the AT has access to the most up-to-date information on concussion diagnosis and management. This information should be disseminated to all of those involved in athlete health care as rapidly as possible and in an appropriate manner. These individuals include but are not limited to coaches, athletes, parents, administrators, and other medical professionals. In addition to these documents, agencies have developed educational information specific to coaches, athletes, and parents that has been shown to effectively educate the target audience.[54–56]

Athletes themselves have demonstrated limited knowledge regarding concussion symptoms; more than 50% of high school athletes[57] and 70% of collegiate athletes[58] did not report concussions sustained during football. One reason for nonreporting was that athletes were not aware of the signs and symptoms of concussion. Another study[59] of high school rugby players demonstrated more knowledge of concussion signs and symptoms (61%); however, the athletes had limited knowledge of postinjury concussion-management guidelines. For example, 25% of the athletes believed loss of consciousness was required for the injury to be considered a concussion.[59] Educational methods are effective in increasing athletes' awareness of concussion symptoms. Goodman et al[60] found that exposure to a concussion-symptom video game improved symptom identification among youth ice hockey players.[60] Similarly, Bramley et al[61] noted that high school soccer players who received concussion education were more likely to report concussion symptoms to their coach.

Researchers[57] have documented athletes' lack of willingness to report concussions to medical personnel, so parents of youth athletes should also be educated to recognize signs and symptoms of concussion. Parents (or guardians) typically have the most contact with young athletes and so are well positioned to report atypical behavior, but many parents are not properly educated on the topic of concussion.[62] Sullivan et al[63] reported that parents of male high school rugby athletes were knowledgeable about the signs and symptoms (83%) and the risks associated with continuing to play while injured (96%), yet only half were aware of the appropriate RTP guidelines after injury.

Even in the presence of an AT, coaches have the responsibility for recognizing the signs and symptoms of concussion in athletes. Several studies, however, have shown that coaches have limited knowledge and many misconceptions related to concussions. In a survey of youth sports coaches, 45% of respondents believed a concussion

did not require immediate removal from a game or practice, and only 62% could correctly identify proper postconcussion management.[10] In another investigation,[64] high school coaches demonstrated greater overall knowledge of sport concussion (84%); they knew the most about injury recognition (92%) and the least about injury management (79%). Concussion-specific training is effective in improving injury knowledge: those attending a coaching education program[10] or a coaches' workshop[64] scored higher than nonattendees on their respective surveys. Sarmiento et al[11] reported that 34% of high school coaches using the Centers for Disease Control and Prevention's "Heads Up" tool kit for concussion improved their concussion knowledge; specifically, they gained knowledge related to injury signs and symptoms. The coaches also noted that the tool kit changed their attitudes and behaviors related to concussion.[11] Similarly, a short (15–20 minute), interactive, online, concussion-education program aimed at youth sports coaches resulted in improvements in symptom knowledge, general knowledge, injury misconceptions, self-efficacy, and behavioral intention.[12] Collectively, these findings suggest that a brief training session on sport-concussion signs, symptoms, and injury management targeted at coaching staff can improve injury recognition. This type of training may ultimately benefit the AT by encouraging coaches to help identify concussed athletes and follow treatment plans.

After a concussive event, the AT should also educate the patient and any additional stakeholders (eg, parents and administrators) about the typical injury recovery. Although injury severity and a precise time to recover cannot be predicted immediately after injury, most concussed athletes return to their preinjury level of functioning within 2 weeks.[65] However, several factors, including specific symptom patterns,[7,66] age, and sex,[67] may influence injury recovery and delay the return to participation (Table 2). Informing the patient about expected outcomes after injury may reduce anxiety about the injury and associated symptoms.[7,68]

Documentation and Legal Aspects

Certified ATs, team physicians, and other health care providers responsible for the management of patients with sport-related concussion should be aware of potential liabilities involved with delivering medical coverage and making RTP decisions for patients. Concussion management has medical and legal implications, and the threat of lawsuits is increasing for sports medicine professionals. Previous lawsuits against ATs and team physicians have addressed the premature clearing of patients and, surprisingly, withholding patients from play after concussion.[69–73] Therefore, it is imperative for clinicians to manage these injuries in a systematic manner, using objective assessments, while documenting their daily findings. Certain legal principles are common to the laws of each state, but material differences exist in the decisions of the higher courts for each state and in state statutes.[74] It is, however, the responsibility of the AT to follow the best-practice guidelines, recommendations, and practice limitations adopted by their respective work setting or oversight organization (eg, National Federation of State High School Associations, National Collegiate Athletic Association, National Football League) and the best practices for licensed ATs established, in part, by the position statements of the National Athletic Trainers' Association. In addition, ATs working in states with concussion-management legislation are bound to follow those laws in the event of a discrepancy with organizational guidelines or position statements.

To avoid litigation, ATs should understand the general elements of negligence and malpractice that typically govern claims for injury or death caused by improper treatment. A *tort* is a private wrong or injury suffered by a person as the result of another person's conduct. The law gives injured persons the right to be compensated through the recovery of damages. Torts may be intentional, meaning that the person intended to act, or unintentional, in that the person did not mentally intend to cause harm. A tort is committed when an AT fails to act as an ordinary and reasonably prudent person under similar circumstances and causes injury to another person.[74,75]

Negligence is an unintentional tort. Negligence law was founded on the principle that those who are harmed as the result of others' carelessness or failure to properly carry out responsibilities must be compensated. The person who was harmed has the burden of proving that the 4 legal elements of negligence are satisfied: a *duty of care* was owed as a result of a relationship that existed between the parties; the defendant *breached the duty* owed to the injured party; the breach of the duty is proved to be the *cause of the harm* to the plaintiff; and *actual harm*, not just the potential for harm, must have occurred. All 4 elements of negligence must be proven in order for the plaintiff to be compensated by the defendant for damages.[75,76]

Athletic trainers employed to treat and manage athletic injuries such as concussion owe a duty of reasonable care to their patients and have been the target of lawsuits alleging failures to meet the standard of care after sport-related injury, especially concussion. Allegations against ATs in cases of negligence after concussion most often include improper evaluation and testing of the patient, improper documentation, misunderstood communications with the patient, and a lack of education of the patient or the patient's family.[77] For ATs to minimize the risk of becoming defendants and to better defend themselves should a case be filed, they must understand the standard of care for managing specific injuries based on the most recent scientific literature. The *standard of care* in athletic training is defined as a person's "legal duty to provide health care services consistent with what other health care practitioners of the same training, education, and credentialing would provide under the circumstances."[78] Athletic trainers can learn how the standard of care is applied to legal cases by examining specific cases and the firsthand experiences of those who have defended ATs during the litigation process.[77]

The athletic training profession must identify and adopt standard practice limitations and guidelines to establish the standard of care for managing concussions and other brain injuries. Ambiguity and the lack of a clear standard make it easier for plaintiffs' lawyers to construct theories of liability for lawsuits against ATs, alleging they breached the standard of care after a suspected concussion.[77] Lawsuits against ATs often involve the evaluation or testing of the patient (or lack thereof), documentation of an

injury, communications with the patient or with a physician about a patient, and education of the patient.

In a 2008 California case, an AT was found liable for failing to properly and promptly evaluate a patient who apparently had sustained a concussion only to later pass out, fall, and suffer a variety of physical injuries as a result of the AT's alleged failures.[79] The court ordered the defendants to pay substantial damages to the injured patient. In another case, a University of Tennessee football player recovered hundreds of thousands of dollars when an AT allegedly failed to promptly report a patient's initial and ongoing symptoms to a physician. The patient subsequently sustained an acute subdural hematoma in connection with an injury incurred 1 month later.[80] In another case, a high school football player alleged that his AT failed to properly evaluate him or take seriously his reported headaches and dizziness after a concussion and then prematurely returned him to play, which allegedly caused the patient to suffer second-impact syndrome after a second concussion 2 weeks later.[81] In this case, although the jury awarded no damages to the injured player, the cost to the defendants was 3 years of litigation, substantial legal fees and expenses, and a month-long, stressful, high-profile trial.

Another possible allegation in the cases against ATs involves the lack of documentation in managing a sport-related concussion. For several years, ATs have been advised to document "all pertinent information" surrounding concussions.[5] The documentation of information surrounding the evaluation and management of any suspected concussion should include but not be limited to (1) mechanism of injury; (2) initial signs and symptoms; (3) state of consciousness; (4) findings of the physical and neurologic examinations, symptoms, neurocognitive function, and motor control (noting any deficits compared with baseline); (5) instructions given to the patient or parent (or both); (6) recommendations provided by the physician; (7) graduated RTP progression, including dates and specific activities; and (8) relevant information on the patient's history of prior concussion and associated recovery pattern(s). Though lengthy, this level of detail can help prevent a premature return to participation, catastrophic brain injury such as second-impact syndrome, and legal liability. The expression "if it's not written, it didn't happen" is often used in legal situations. The question in these cases sometimes becomes whether certain information is or is not "pertinent." For example, at some point during a concussed athlete's RTP progression, he or she will begin performing graduated exertional exercises (see "Evaluation and RTP" below). Daily documentation of the details surrounding this progression will help to avoid potential litigation in the event that the recovery or return to participation does not proceed as expected. For example, the dates on which the testing was performed, the witnesses to the testing, the actual maneuvers the patient performed, and the patient's description of any symptoms during or after activity should be documented. The value of this documentation may not be realized for some time, as legal trials generally occur years after the alleged improper conduct, when it is unlikely that anyone can accurately recall the details if they were not recorded at the time.

At the time of writing, all 50 states have enacted concussion laws. Nearly all of these laws include the components of (1) educating athletes, parents, and coaches; (2) instituting a concussion policy and emergency action plan; (3) removing the athlete from practice or play at the time of the suspected concussion; and (4) having a health care provider with training in concussion management perform medical evaluation and RTP clearance. The AT must know the laws of the state and recognize that failure to warn or educate the athlete can be the basis for another possible allegation. One simple way to educate athletes about the dangers of concussion and continuing to play while still symptomatic is to require them to read and sign a standard acknowledgment form indicating that they understand the signs and symptoms of concussion and their responsibility to report a concussion (Appendix B). Some legal experts even suggest that athletes should sign an acknowledgment that they understand the warning a manufacturer has placed on a helmet. For example, some football helmets carry warnings such as this:

> Contact in football may result in concussion/brain injury, which no helmet can prevent. Symptoms include loss of consciousness or memory, dizziness, headache, nausea, or confusion. If you have symptoms, immediately stop and report them to your coach, [athletic] trainer, and parents. Do not return to a game or contact until all symptoms are gone and you receive medical clearance. Ignoring this warning may lead to another and more serious or fatal brain injury. No helmet system can protect you from serious brain and/or neck injuries, including paralysis or death. To avoid these risks, do not engage in the sport of football. (Reprinted with permission of Schutt Sports.)

In catastrophic cases where such an acknowledgment of understanding has not been secured by the AT, a "failure to warn" claim almost certainly will be made against the AT, especially when the plaintiff alleges that the patient never recovered from an earlier injury. Thus, before each season, at a minimum, the AT should require that each athlete read a concussion fact sheet, read the aforementioned warning on the helmet, and sign an acknowledgment that he or she read and understood both. Not only do these acknowledgments serve as a possible defense to a failure-to-warn claim, but under certain circumstances, they may also be used to establish that the patient is legally responsible for his or her own injuries (if, for example, the athlete reports symptoms to teammates but withholds the information from team personnel and continues to play). When a defendant asserts and can show that the plaintiff's injuries are a result of the plaintiff's own negligence, the defendant may prevail on a theory of contributory negligence or comparative negligence, which could bar the plaintiff from recovering any damages whatsoever.

The more education the AT provides to the patient (and parents of a patient who is a minor) concerning the risks of RTP before a complete recovery after a concussion (eg, the risk of playing while still symptomatic), the greater the likelihood of success the AT will have in defending against a failure-to-warn or failure-to-educate claim. More importantly, enhanced education to athletes should translate into more informed participants, which should lead to fewer catastrophic injuries.[77] Finally, it is imperative that practicing ATs understand their individual state laws on concussion management because some states have made

Table 3. Suggested Domains of the Clinical History and Examination for Concussion Management

Domain	Features or Examples	How to Assess?[a]
Previous concussions	Date(s) and circumstances; presence and duration of loss of consciousness, amnesia, and symptoms with each injury	Preparticipation examination
Concussion-related personal history	Mood disorder, learning disability, attention-deficit hyperactivity disorder, epilepsy or seizures, sleep apnea, skull fracture, migraine headaches	Preparticipation examination
Family history	Mood disorder, learning disability, attention-deficit hyperactivity disorder, dementia (eg, Alzheimer disease), migraine headaches, complications from concussions	Preparticipation examination
Symptoms	Current and recurrent	Symptom checklist or scale
Mental status	Level of consciousness, attention and concentration, orientation, memory	Standardized Assessment of Concussion
Eye examination	Eye movements with smooth pursuit (cranial nerves III, IV, VI), nystagmus (VIII), pupillary reflex (CN II, III)	Clinical examination
Muscle strength	Strength evaluation of deltoids, biceps, triceps, wrist and finger flexors and extensors[b]; pronator drift	Clinical examination
Motor control	Balance assessment	Balance Error Scoring System
Cognitive function	Reaction time, working memory, delayed recall	Neurocognitive testing

[a] Assessment tools are indicated where available.
[b] Notable deficits may be associated with nerve root injury or concussion.

provisions for ATs to clear a concussed athlete to RTP. However, a physician with specific training and experience in concussion management should still be involved in the comprehensive approach to concussion management outlined in this position statement. A concussion-management policy outlining the roles and responsibilities of each member of the sports medicine team should be adopted.

Evaluation and RTP

Approach to Concussion Evaluation. The clinical presentation of concussion varies considerably both between individuals and between injuries in 1 individual. Additionally, the degree of brain dysfunction manifested by concussion often produces signs and symptoms that fall within the range of normal experiences in the population (eg, dehydration, fatigue, anxiety). For these reasons, a concussion-assessment model that uses objective baseline testing and careful postinjury testing is recommended. Although all athletes should ideally undergo a preseason baseline assessment, at a minimum, athletes who are at a high risk of concussion based on their sport[67,82] should be included in any baseline testing program. Furthermore, athletes with a significant concussion history or other relevant comorbidity, such as attention-deficit hyperactivity disorder, should be considered for testing on an individual basis.

The intent of baseline testing is to aid the clinician in the postinjury management process by providing data that represent an athlete's brain function in an uninjured state. Objective baseline and postinjury information can be highly sensitive to concussive injuries,[19] but the concussion diagnosis is made by clinically evaluating the injured athlete. In this way, postinjury retesting should not be considered a diagnostic tool for concussion, nor should it be used as a sole determinant of when it is safe to return to participation; rather, it is a supplement to support the clinical examination. These data are then best used as part of a comprehensive concussion- management approach that is communicated to the directing physician and other members of the sports medicine team with concussion training and experience.

Baseline Testing. The baseline evaluation of an athlete for the purpose of concussion management should include a documented neurologic history with symptoms and physical examination (Table 3). Baseline testing should also involve the objective evaluation of multiple spheres of brain function and, at minimum, assess neurocognitive performance and motor control. Obtaining premorbid self-report symptoms is also recommended for comparison with postinjury symptom presentations and for improved interpretation of other test data. Additionally, medication use should be carefully documented and made available for postinjury review.

Numerous testing methods are available for concussion management. When selecting specific tests and procedures for the concussion-assessment and concussion-management protocol, the AT should consult with members of the sports medicine team regarding the best tools for the clinical setting and secure written approval from the administration. When selecting specific assessment tools, the AT must also be aware of the limitations and requirements of the particular baseline test being considered. For example, the reliability of computer-based cognitive tests varies with the test-retest interval,[83–87] and additional costs may be incurred to interpret test results.[88,89]

Once the tests are selected, care should be taken to provide each athlete with an environment that is designed to maximize test performance and be easily reproduced in the postinjury setting. Large-group administration of baseline tests is discouraged; small-group administration is preferable. Having a sufficient number of proctors and using standardized procedures are important.[21] The AT should avoid conducting tests at unusual times of the day to ensure that athletes are reasonably rested and not physically or mentally fatigued after a practice or workout. Whenever possible, athletes should not undergo baseline testing when they are ill or injured in a manner that could influence test results. Lastly, if appropriate resources are available, the AT should conduct annual baseline tests on athletes. This is most crucial in adolescents, whose brains are continuing to develop,[15–17] and in those who have sustained a concussion since their previous test.

Self-Report Symptom Assessment. Collecting subjective symptom information from a patient is a dynamic and complex process. Using symptom checklists (ie, *yes*/*no*) or scales (ie, graded and summed responses)

that assess symptom duration or severity (or both) in a standardized manner[90] is recommended. In general, symptom reports provide good sensitivity to concussive injuries,[19,20] but the degree to which symptom reports can be a useful part of the neurologic history and examination in concussion management is potentially minimized by their limitations. Because of the nature and physical demands of athletics, an evaluation of concussion-related symptoms can yield low specificity compared with the reference standard of clinician-diagnosed concussion. That is, concussion-like symptoms are also commonly reported in athletes who are dehydrated[91] and those who have performed strenuous activity[92]; the presence of these symptoms does not mean the athlete will demonstrate balance or neurocognitive impairments.[93] In addition, for a variety of reasons, athletes may be motivated to underreport symptoms so they can continue activity after injury.[57]

Numerous concussion inventories are available for clinical use, including the Head Injury Scale,[94] Graded Symptom Checklist,[5] Concussion Symptom Inventory,[7,95] and Sport Concussion Assessment Tool 3 (SCAT-3).[7] The AT should choose a symptom-evaluation protocol that best suits his or her clinical practice and be consistent in its administration.

Motor Control. The diffuse effects of concussive injuries on brain function can often lead to deficits in motor control. Changes in motor control after injury have been documented in several areas, including gait,[96,97] postural control,[65,98–100] and hand movement[101]. As such, the assessment of 1 or more motor-control systems can provide useful information for concussion diagnosis and management. Perhaps the most common concussion-assessment tool is the evaluation of postural control. Overall balance deficits after injury have been attributed to failure to integrate sensory information arising from the vestibular and visual components of the balance mechanism.[98–100] The Sensory Organization Test, although used successfully to quantify changes to the balance mechanism,[19,102] is limited by cost and portability. In the initial days of injury, the Balance Error Scoring System (BESS) demonstrates similar injury sensitivity,[20,65] is highly portable, and can be administered with minimal cost and training. As with other concussion-assessment tools, the AT should select the tools that best suit the clinical setting, be trained in their proper administration,[103,104] understand their limitations,[105–110] and use consistent methods in baseline and postinjury evaluations.

Mental-Status Testing. A change in mental status is the hallmark of concussion,[6] yet concussed athletes rarely present with easily identifiable signs of injury. In fact, loss of consciousness is present in fewer than 10% of patients and posttraumatic amnesia in 25% of patients.[46] In the absence of easily identifiable signs after concussion, an objective measure of mental status can significantly aid the AT in making the sideline diagnosis. Traditional questions of mental status involving questions of orientation about time (eg, what time is it?), location (eg, where are we?), and the person (eg, when is your birthday?) are ineffective in the sporting environment.[111] The SAC was developed as a brief mental-status screening tool and is recommended for sideline use when comprehensive neurocognitive testing (see the next section) is not available or applicable. The SAC is a 5-minute test that evaluates the domains of orientation, immediate memory, concentration, and delayed recall.[23] As a stand-alone measure used immediately after concussion, the SAC is highly sensitive to injury; its sensitivity is further increased when used with a symptom inventory and motor-control test.[20] Sensitivity of the SAC to concussion declines 24 hours after injury; thus, use of the test to evaluate cognitive functioning is not recommended beyond this point.[20]

Neurocognitive Testing. Neurocognitive testing has historically been viewed as the cornerstone of the concussion-assessment process,[112] yet when used in isolation, this technique does not provide clinically adequate sensitivity to concussion.[19,20,113] Therefore, neurocognitive testing should never be used in isolation but rather in conjunction with symptom and motor-control assessments to support the clinical examination. Historically, pencil-and-paper tests, such as the Digit Span, Controlled Oral Word Association Test, and Hopkins Verbal Learning tests, have been used to evaluate concussive injuries. Several computer-based platforms are now available, including the Automated Neuropsychological Assessment Metrics (ANAM), Cogstate Axon, Concussion Vital Signs, Headminder Concussion Resolution Index (CRI), and Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT). The testing protocol should evaluate those domains known to be affected by concussion: information processing, planning memory, and switching mental set.[112] Similar to other assessment methods, neurocognitive testing has limitations,[114] and the AT should become familiar with the benefits and limitations of the testing methods selected.[19,113,115,116]

Regardless of the instrumentation, the emphasis should be on maximizing performance on the baseline and postinjury assessments. The test should be explained to the athlete before the assessment begins, and a distraction-free testing environment should be provided.[21] After the baseline assessment, test scores should be reviewed using the manufacturer's validity criteria to ensure that the athletes gave maximal effort; those demonstrating suboptimal effort should retake the test.[117] Once an athlete is injured, the AT and medical staff should limit the number of tests to time points that are critical to injury management to avoid performance improvements resulting from practice effects.[118,119] Also, although some tests provide automated pass or fail scoring, these outputs may not accurately reflect the patient's injury status and are not recommended for clinical use.[86] A neuropsychologist or physician with specific concussion training should interpret the postinjury data.[89]

Diagnosing Concussion. Concussion diagnosis in the athletic environment can be difficult given the pressures and time restrictions of competition. Some sports allow for unlimited injury- evaluation time, but others do not. Regardless of the time allotment, the AT and the medical staff should never feel pressured to complete a concussion assessment. At the time of suspected injury, the initial evaluation should assess acute trauma. If the athlete is unable to leave the field under his or her own power, the AT should perform a primary survey, including evaluation of airway, breathing, and circulation (ie, the ABCs). Whether the patient is conscious or not, the AT should suspect and, if possible, rule out a cervical spine injury and other more severe injuries. Once no life-threatening injuries are

determined to be present, the concussion examination should begin.

Any athlete suspected of having a concussion should immediately be removed from participation and a systematic injury evaluation conducted. The intent of the concussion examination is to establish if the athlete should be removed from further participation. Regardless of the assessment measures used as part of the concussion-management protocol, the concussion diagnosis is made after a thorough clinical examination (Table 3). The clinical examination should include an injury history (including symptoms), observation of the patient, palpation for more severe orthopaedic or neurologic injury, and special tests for mental status and motor control (described earlier).[120,121] Brief assessments that rely on the patient's response to such simple questions such "Are you OK?" or "Can you go?" are not supported and should not be used. The concussion assessment conducted by the AT should be implemented in a consistent fashion as part of a comprehensive neurologic evaluation. When a physician is not readily available, the AT should be more conservative when interpreting the clinical-examination results and making the injury diagnosis.

Transport to a medical facility for a concussion is not typically required but may be necessary if the patient is unconscious for a prolonged period of time (>1 minute), shows declining mental status during or after the injury evaluation, or demonstrates signs and symptoms of an injury more severe than a concussion. For a patient who is transported, the attending physician may recommend imaging to rule out injuries more severe than concussion, but computed tomography and magnetic resonance imaging add little to the concussion-evaluation process.[7] Although other diagnostic techniques, such as functional magnetic resonance imaging,[122] diffusion tensor imaging, magnetic resonance spectroscopy,[2,123] serum biomarkers,[124] and biomechanical techniques[125,126] may be helpful in identifying and diagnosing concussion, their exclusive use as diagnostic tools has not been validated.

Postinjury Management. Once an athlete has been diagnosed with a concussion, he or she should be removed from the sport and not allowed to return to physical activity until cleared by a physician or designate, no sooner than the next day. The patient should not be left unattended on the sideline, and mental status should be regularly monitored. A notable decline in mental status may reflect more severe trauma and indicate that transport to a medical facility is necessary. In most instances, however, the patient can be sent home with appropriate postinjury instructions (see the "Home Care" section).

Once the concussion diagnosis has been made, a focused examination of the patient should be conducted daily to ensure a normal course of recovery. The magnitude of impact[127,128] or postinjury decrements relative to preinjury testing should not be interpreted as a measure of injury severity or a predictor of how long the patient should be withheld from sport.[129] Indeed, although the concept of grading injury severity based on such factors as the presence or absence of consciousness, symptom duration, and mental status has previously been supported,[5] this is no longer the case. Each patient and each injury should be treated uniquely, focusing on cessation of symptoms and restoration of motor control, and neurocognitive test results should revert to preinjury levels before an RTP progression is implemented.

During the acute recovery period, the patient should be instructed to avoid physical activity (eg, workouts, conditioning, physical education) and limit cognitive activity (eg, academic work, video games, computer use) so as to not exacerbate concussion symptoms. Physical activity during the acute phase can have a detrimental effect on recovery,[130] but the effect of cognitive stress on concussion recovery is less clear. As such, limiting cognitive activities to avoid worsening concussion symptoms is favored over complete isolation of the patient, which may result in the exacerbation of concussion-like symptoms unrelated to the injury.[131]

Once the patient no longer reports concussion-related symptoms and the clinical examination is normal, then objective assessments should be repeated and compared with baseline performance. The patient's reports of concussion-related symptoms are used as the primary measure to advance to the next stage in postconcussion management, so careful attention should be paid to steady resolution over time. In most instances, patients who no longer report concussion-related symptoms demonstrate preinjury performance levels on cognitive and motor control tests, but up to 40% of asymptomatic patients have continued cognitive declines.[118,119] Therefore, the return-to-activity decision-making process should not begin until the patient no longer reports concussion-related symptoms, has a normal clinical examination, and performs at or above preinjury levels on measures of neurocognitive function and motor control. Although the duration of recovery demonstrated by individual patients on neurocognitive and motor-control tests varies, young adult males typically return to preinjury levels of functioning within 2 weeks.[65] Female patients and younger patients may suffer from postinjury declines for 14 days or longer.[36,132] Those reporting dizziness at the time of injury may have a protracted recovery,[66] and those suffering from concussion symptoms beyond 30 days may be diagnosed with postconcussive syndrome.[133] Some evidence suggests that normative data can be used for postinjury evaluations when baseline testing is not available.[13] This scenario, however, is not ideal, and a more conservative injury-management strategy is warranted in these instances. During the recovery process, the AT should maintain regular contact with the directing physician to track the recovery and ensure that appropriate medical care is provided if recovery does not proceed normally.

Return-to-Play Decision Making

After an athlete is diagnosed with a concussion, the RTP progression should not start until he or she no longer reports concussion-related symptoms, has a normal clinical examination, and performs at or above preinjury levels of functioning on all objective concussion assessments. The exertion progression should follow the pattern outlined in Table 4; the typical time frame consists of 24 hours between levels.[7] However, if activity at any stage results in a return of symptoms or a decline in test performance,[134] then the activity should be immediately halted and restarted 24 hours later. The RTP timing is case dependent, but most patients diagnosed with a concussion can expect to be

Table 4. Return-to-Play Progression

Stage[a]	Physical Activity
1	No activity
2	Light exercise: <70% age-predicted maximal heart rate
3	Sport-specific activities without the threat of contact from others
4	Noncontact training involving others, resistance training
5	Unrestricted training
6	Return to play

[a] Stages should be separated by at least 24 hours.[7]

withheld from competition for at least 1 week. The AT can lengthen the sequence if symptoms return during recovery or the patient has other comorbidities that may affect recovery. The directing physician can shorten the timeline when appropriate. Regardless, no patient diagnosed with concussion should return to physical activity on the day of injury. An extended RTP progression may be necessary if the patient is held out for an extended amount of time and requires reconditioning for sport participation.

Other Considerations

Equipment. It would seem natural that preventing concussion would include the appropriate use of protective equipment or other mechanisms. However, the literature to date does not support equipment as a means of concussion prevention. In a 2009 systematic review, Benson et al[29] evaluated 51 studies of protective equipment (helmets, headgear, mouthguards, face shields) to determine if any form of protective equipment was useful in preventing sport-related concussion. Their results suggest that helmet use can reduce the risk of more serious head (eg, skull fracture) and brain (eg, subdural hematoma) injuries in recreational sports such as skiing, snowboarding, and bicycling. Yet the ability of these devices to prevent concussion was inconclusive.[29] The authors also assessed the use of mouthguards and face shields and found no strong evidence to suggest that either device decreases concussion risk.[29] Nonetheless, some published evidence in ice hockey indicates that, compared with a half-face shield, a full face shield offers a better fit and protection that may decrease the time lost from competition after a concussion.[29]

More specifically, no differences were noted in the incidence of concussion between American football players[135,136] or Australian rules footballers[137] wearing custom or noncustom mouthguards. No differences in concussion incidence were seen in rugby,[138,139] ice hockey,[140] or basketball[141] players who did or did not wear mouthguards. In addition, researchers[142] found no differences in neurocognitive impairment at the day-3 follow-up between athletes who reported wearing or not wearing a mouthguard at the time of concussion.

The use of protective headgear to decrease the risk of concussion in rugby is inconclusive. One group[143] found a decrease in the risk of concussion among English premier rugby athletes who wore headgear; however, in 3 studies[139,144,145] of youth or college rugby athletes, no association was noted between wearing headgear and decreased risk of concussion. Studies of headgear use in soccer have largely been laboratory based and focused on biomechanical variables.[146–148] In 1 investigation,[149] a small decrease in self-reported concussions was demonstrated in youth athletes wearing soccer headgear, but these results have not been replicated.

Pediatric Concussion. Sport-related concussion is a significant concern in the pediatric population. Data from the National Electronic Injury Surveillance System (NEISS) estimated that concussions in 8- to 19-year-olds resulted in more than 500 000 visits to the emergency department, with close to half (252 807 visits) resulting from a sport-related mechanism.[150] Sport-related concussions –accounted for 58% of all emergency department visits in children (8–13 years old) and 46% of all concussions in adolescents (14–19 years old).[150] Similarly, data from the National Hospital Ambulatory Medical Care Survey[43] showed 144 000 emergency department visits for concussion in youth and adolescents (0–19 years old) over a 5-year period (2002–2006). Sport-related concussion was the most common mechanism, accounting for 30% of all concussions in persons between 5 and 19 years old.[45] In high school athletes, Powell and Barber-Foss[151] reported that AT-diagnosed concussions accounted for 5.5% of all sports injuries. More recently, data from High School Reporting Information Online (RIO) indicated that concussions in interscholastic athletes were responsible for 8.9% of all athletic injuries[67] and that the overall concussion incidence rate according to RIO was 0.23 concussions per 1000 athlete exposures, with a game rate of 0.53 and a practice rate of 0.11 per 1000 athlete exposures.

Structural brain development occurs during childhood and adolescence with increased brain volume and connectivity, as reflected by increased white matter volume, which is apparent on magnetic resonance imaging.[152,153] Younger athletes may be more vulnerable to concussion because of this structural immaturity, coupled with less myelination, thinner frontal and temporal bones, a greater head-to-body ratio, and weaker neck musculature.[154–157] Furthermore, functional brain immaturity is present through early adulthood; the brain continues to mature in areas responsible for cognitive processing, such as attention and concentration, learning and memory, reasoning, and executive function.[16,158] Thus, neurocognitive performance would be expected to change at least until the age of 20 years, requiring baseline levels of cognitive performance to be reassessed periodically, so that they can be compared with postinjury results.

The susceptibility of a child or adolescent to prolonged recovery after concussion may result from the fact that the developing functions of the immature brain are more vulnerable than established functions. Some have also postulated that injury to the brain might interfere with the complex biological processes needed for brain development.[1,159–162] Concussed high school players took longer to recover from memory dysfunction than did concussed college players.[36] Prolonged neurocognitive recovery has also been reported in other studies of high school athletes.[163,164] Additionally, high school athletes with a history of 2 or more concussions demonstrated poorer cognitive recovery.[163] However, to date, little evidence is available regarding postconcussion recovery in patients younger than high school age.

A primary concern of premature RTP among pediatric athletes is diffuse cerebral swelling with delayed catastrophic deterioration, commonly referred to as *second-*

impact syndrome or *malignant cerebral edema*. The presence of second-impact syndrome has been debated,[165,166] but in rare circumstances, cerebral swelling or edema can occur after injury to an immature brain.[162,167,168] Although there may be controversy regarding the need for a second insult to cause the cerebral swelling, there is agreement that this diffuse cerebral swelling occurs more often in patients with immature brains.

The 2012 Zurich consensus statement on management of concussion in sport[7] and the 2010 American Academy of Pediatrics' clinical report on sport-related concussion in children and adolescents[169] recommended a multifaceted approach to concussion management in pediatric athletes. Yet, some special concerns are relevant to younger athletes. When assessing a concussed child or adolescent, it is important to obtain input from not only the patient but also from parents, health care providers, and teachers, as they may have additional information about the patient's preinjury and postinjury behavior that can be useful in the clinical evaluation and management plan.[38]

Assessing the patient's symptoms is advocated as a key aspect of concussion management. Numerous symptom checklists and scales have been developed for use in athletic populations,[170] and children and adolescents can reliably report concussion-related symptoms.[171–173] However, the Zurich consensus panel[7] suggested that children younger than 10 years may report concussion symptoms differently from adults; therefore, age-appropriate symptom checklists may be needed to track symptoms after a suspected concussion. In light of this, the Health and Behavior Inventory –Child Version,[174] was developed by the National Institutes of Health–National Institute of Neurological Disorders and Stroke to evaluate younger persons. The use of concussion-symptom scales is more appropriate for adolescents (ages 13–22 years) than for children (ages 5–12 years), and research has addressed validity as opposed to reliability.[38] The addition of reliable and valid parental reports of postconcussion symptoms is an important adjunct to the report of the child or adolescent. However, in high school athletes, neurocognitive deficits may exist despite the resolution of self-report symptoms,[36] suggesting that self-report symptoms should not be the only means of assessment.

Assessment of motor control and neurocognitive function is also important and may be useful in pediatric athletes.[16,164,175] The method and timing of baseline assessments in children and adolescents require careful consideration because of the cognitive and neuromuscular maturation that occurs during this time.[176–179] Hunt and Ferrara[16] found that neurocognitive test scores differed between 9th- and 10th-grade students. Therefore, they recommended at least 2 baseline tests for high school athletes: the first as an incoming freshman and the second before sophomore year. A similar trend was noted with the Sport Concussion Assessment Tool-2 (SCAT-2): scores among 9th graders were lower than those among 11th and 12th graders.[180] Lastly, improvements in neurocognitive performance were seen between the ages of 9 and 15 years, suggesting that baseline testing should be done every 6 months, or at least annually, until the age of 15.[176] Although a person's own baseline measurements are the best values for postinjury comparisons, repeated baseline assessments may not be feasible because of administration time, cost, and effort. In these cases, using age-matched norms to supplement the clinical examination plus the patient's self-report and parental report of symptoms may be more cost effective.[13]

Despite the challenges of obtaining baseline neurocognitive or balance assessments in this younger age group, having baseline and postinjury neurocognitive scores can be valuable for managing potential school-related difficulties, such as focusing attention, learning and retaining new information, and managing multiple academic learning demands. The results of specific domain tests (eg, working memory, concentration, new learning and memory retention, and processing speed) can be useful in working with teachers and guidance counselors to develop strategies for successful academic outcomes. For example, temporary accommodations, including the use of written instructions, shorter assignments, and extended time for assignments, might be considered for students recovering from concussion.

Home Care. After a concussion diagnosis, a comprehensive medical management plan should be implemented that follows the institution's concussion policy and includes communication among all those involved. This plan should include the family (ie, patient and parents), school personnel (ie, teachers, administrators, counselors, coaches), school medical personnel (ie, AT, school nurse), and community referral sources (ie, team physician, other health care referral sources). Communication among all these groups is essential for appropriate management of a concussed athlete.

The home care plan should include frequent follow-up assessments and continued monitoring of concussion signs and symptoms.[5,7] Patients and their parents or roommates should be provided with a list of signs and symptoms that would indicate a deteriorating condition and warrant immediate referral to the emergency department (Table 5). The patient, or a responsible person, should also be provided with a concussion instruction form (Appendix A) and instructed to follow up with the AT the next day he or she is at school.

Medications and Diet. Limited evidence suggests that any medication is beneficial in accelerating the concussion-recovery process. All current medications should be reviewed by the physician, and concussed patients should avoid taking medications containing aspirin or nonsteroidal anti-inflammatory drugs. These medications are known to decrease platelet function and may increase intracranial bleeding, mask the severity and duration of symptoms, and possibly lead to a more severe injury. Acetaminophen may be used sparingly to ease headaches after concussion. During the acute stage of injury, the patient should avoid ingesting other substances that can affect central nervous system function, including alcohol and narcotics, and should be instructed to eat a well-balanced, nutritious diet.

During the subacute stage of recovery, the physician may prescribe medications to reduce specific symptoms, such as headache, sleep disturbances, or anxiety, or to improve symptom resolution.[7,45] Additionally, medication may be prescribed if the symptoms are affecting broader aspects of the person's life such that the potential benefit of the medication is greater than the possible risks.[45] Pharmacologic management of sport-related concussion should be directed only by those physicians with experience treating

Table 5. Observable Red-Flag Items That Warrant Immediate Referral to the Emergency Department via Emergency Medical Transport

Decreasing level of consciousness
Increasing confusion
Increasing irritability
Loss of or fluctuating level of consciousness
Numbness in the arms or legs
Pupils becoming unequal in size
Repeated vomiting
Seizures
Slurred speech or inability to speak
Inability to recognize people or places
Worsening headache

concussive injuries who are able to justify the benefit-to-risk ratio. One important consideration with respect to postconcussion medication use is that the patient should be asymptomatic when *not* on the medication before beginning an RTP progression.[7]

Rest. A concussed patient who returns home after the sport event should be monitored by a responsible adult and should have a good night's rest. In general, the patient does not need to be awakened during the night unless he or she experienced loss of consciousness, prolonged periods of amnesia, or significant symptoms before going to bed.[5] Should the AT or physician prescribe nighttime waking, the responsible adult should be provided with instructions on when to wake the patient and what to observe during periods of waking.

During the acute recovery period, physical rest and cognitive rest are indicated while the patient is symptomatic.[7,28,39,42] While symptomatic, the patient should avoid physical exertion, including physical education classes and recreational activities. Activities of daily living that do not exacerbate symptoms may be beneficial to the patient's recovery and should be allowed.[130] When mental activities exacerbate symptoms, cognitive rest, including temporary academic accommodations (see the next paragraph), should be part of the concussion-management plan.[7,28,39,42] Alterations in the amount of cognitive and physical rest should be made on an individual basis as the patient's symptom reports and adjunct assessment scores (ie, cognitive test scores) change during recovery.

The concept of cognitive rest was initially presented in the Prague consensus document[181] and was reiterated in the Zurich consensus statement[7] and the American Academy of Pediatrics Clinical Report.[169] *Cognitive rest* refers to limiting academic and cognitive stressors in activities of daily living and school activities while the patient recovers from the concussion. Cognitive rest is part of a spectrum that ranges from very limited cognitive activity (ie, absent from school) to full cognitive activity (ie, full school attendance). The goal of cognitive rest is to keep the brain from engaging in mental challenges that will increase symptoms during the postconcussion stage.[7,42,179] Most concussed patients require some amount of cognitive rest to ensure resolution of symptoms and recovery from the concussion. The type and amount of cognitive rest are individualized but may take the form of limiting mental exertion, including reading, writing, mathematical computation, and computer work. Limiting social activities requiring concentrated cognitive activity should also be considered, such as watching television, text messaging, playing video games, and listening to loud music. Communication among the medical providers, parents and patient, and school personnel (such as the school nurse, counselors, administrators, and teachers) is crucial to providing temporary accommodations that allow cognitive rest.[42] To date, however, little empirical evidence supports the utility and efficacy of cognitive rest on recovery outcomes after concussion. Moderate levels of supervised exertion (eg, participating in school and light physical activity) during recovery were associated with better visual memory and reaction time outcomes and may be beneficial to recovery.[130]

Multiple Concussions. Similar to other types of injuries, the best predictor of subsequent concussion is a history of at least 1 concussion. Among collegiate football players, patients who self-reported 3 or more concussions were 3.5 times more likely to sustain a subsequent injury than players with no concussion history, whereas those with 2 concussions were 2.8 times more likely.[46] An increased risk for subsequent concussions in high school athletes with a history of concussion has also been reported. In a prospective investigation,[182] football players with a concussion history were nearly 3 times more likely to sustain another injury, whereas nonfootball players were 1.2 times more likely. Therefore, current recommendations[7,47] suggest that modifying factors, including repeated concussions over time, multiple concussions within a short time frame, sustaining concussions with lessening force, or increasing severity of injury, should result in a more conservative management approach. Proper management of a concussion will reduce the risk of a repeat injury.[183]

Second-Impact Syndrome. A primary concern of premature RTP by pediatric athletes is second-impact syndrome, or malignant cerebral edema, which occurs after a second impact while the patient is still symptomatic from a previous injury to the head or body. The condition is characterized by diffuse cerebral swelling with catastrophic deterioration.[1,48–50]

Long-Term Consequences. The relationship between concussion and long-term cognitive health is not clear. A number of cross-sectional investigations[184–186] have shown no chronic changes in neurocognitive functioning after concussion in a young adult population. Others, however, have shown changes to neurocognitive functioning,[187,188] brain function,[189–191] neuroelectrical activity,[192–195] and motor control.[196,197] Yet none of these authors reported an association between the declines and clinical impairment. Results of surveys[51–53,198] of former professional athletes, however, have suggested the potential for cumulative concussive and subconcussive impacts over an athlete's playing career to be associated with late-life cognitive impairment, depression, and chronic traumatic encephalopathy. Indeed, retired professional football players with a self-reported history of 3 or more concussions were 3 times more likely and those with a history of 1 or 2 concussions were 1.5 times more likely to be diagnosed with depression than their peers who did not report concussions.[51] Similarly, a preliminary report[52] has associated retired professional football players who sustained 3 or more concussions with mild cognitive impairment and self-reported significant memory impairments. Others[53,199,200] have speculated that exposure

to concussive and subconcussive impacts may lead to chronic traumatic encephalopathy, a progressive neurodegenerative disorder that results in a buildup of tau proteins in the brain. In large part, persons reporting clinical impairments thought to be associated with concussion are former professional athletes with a uniquely high level of exposure to contact and collision sports that may have been moderated by a number of other intrinsic (eg, genetic profile) and extrinsic (eg, lifestyle) factors.[201] In addition, longitudinal research that can directly associate concussive and subconcussive impacts with cognitive health, while controlling for normal age-related declines and other factors, has not been completed. As such, the relationship among concussion, subconcussive impacts, and long-term brain health is not clear. These studies are viewed as preliminary; additional research is needed to adequately address this association.

SUMMARY

This document is intended to provide clinical ATs with best-practice guidelines for concussion management based on recommendations derived from the most recent research. The best approach to concussion management involves the entire sports medicine team. The AT should spearhead the development of a detailed written plan outlining the concussion-management strategy and share it with administrators and coaches. The plan should include a baseline evaluation of athletes, including a neurologic history with symptoms and physical examination and objective measures of neurocognitive performance and motor control. Once the concussion diagnosis has been made, the patient should be immediately removed from further participation for at least 24 hours. Follow-up testing, using the same protocol as the baseline examination, can aid in determining when to start the return to physical activity after the patient is cleared by a physician or designate. Lastly, although most concussions resolve in a relatively short time frame, patients who are young, who have had multiple concussions, or who have premorbid factors may require additional attention. The AT should be familiar with these concerns, as well as the potential for long-term consequences, and account for them in the concussion-management plan.

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Appendix A. Sample Postconcussion Home Care Instructions

I believe that _____ sustained a concussion on _____.

To make sure he or she recovers, please follow the following important recommendations:

1. _____ must report to the athletic training facility on _____ at _____ for a follow-up evaluation.

2. If any of the problems below develop before the follow-up visit, please call _____ at _____ or contact the local emergency medical system or your family physician.

- Decreasing level of consciousness
- Increasing confusion
- Increasing irritability
- Loss of or fluctuating level of consciousness
- Numbness in the arms or legs
- Pupils becoming unequal in size
- Repeated vomiting
- Seizures
- Slurred speech or inability to speak
- Inability to recognize people or places
- Worsening headache

Otherwise, you can follow the instructions outlined below.

It is OK to

- Use acetaminophen (Tylenol) for headaches
- Use ice pack on head and neck as needed for comfort
- Eat a carbohydrate-rich diet
- Go to sleep
- Rest (no strenuous activity or sports)

There is NO need to

- Check eyes with flashlight
- Wake up frequently (unless otherwise instructed)
- Test reflexes
- Stay in bed

Do NOT

- Drink alcohol
- Drive a car or operate machinery
- Engage in physical activity (eg, exercise, weight lifting, physical education, sport participation) that makes symptoms worse
- Engage in mental activity (eg, school, job, homework, computer games) that makes symptoms worse

Other recommendations:

Recommendations provided to: _____

Please feel free to contact me if you have any questions. I can be reached at _____.

Please follow up in the athletic training facility on _____ (date).

Recommendations provided by: _____

Signature: _____ Date: _____

Appendix B. Sample Information for Patients, Parents, and Legal Custodians About Concussion

What is a concussion? A concussion is an injury to the brain caused by a direct or indirect blow to the head. It results in your brain not working as it should. The concussion may or may not cause you to black out or pass out. It can happen from a fall, a hit to the head, or a hit to the body that causes your head and your brain to move quickly back and forth.

How do I know if I have a concussion? There are many signs and symptoms that you may have after a concussion. A concussion can affect your thinking, the way your body feels, your mood, or your sleep. Here is what to look for the following symptoms:

Thinking	Physical	Emotional/ Mood	Sleep
• Difficulty thinking clearly • Taking longer to figure things out • Difficulty concentrating • Difficulty remembering new information	• Headache • Fuzzy or blurry vision • Feeling sick to your stomach/queasy • Vomiting/throwing up • Dizziness • Balance problems • Sensitivity to noise or light	• Irritability-things bother you more easily • Sadness • Being more moody • Feeling nervous or worried • Crying more	• Sleeping more than usual • Sleeping less than usual • Trouble falling asleep • Feeling tired

Table is adapted from the Centers for Disease Control and Prevention (http://www.cdc.gov/concussion/).

What should I do if I think I have a concussion? If you are having any of the signs or symptoms listed above, you should tell your parents, coach, athletic trainer, or school nurse, so you can get the help you need. If a parent notices these symptoms, he or she should inform the school nurse or athletic trainer.

When should I be particularly concerned? If you have a headache that gets worse over time, you are unable to control your body, you throw up repeatedly or feel more and more sick to your stomach, or your words are coming out funny or slurred, let an adult such as your parent, coach, or teacher know right away, so you can get the help you need before things get any worse.

What are some of the problems that may affect me after a concussion? You may have trouble in some of your classes at school or even with activities at home. If you continue to play or return to play too early after a concussion, you may have long-term trouble remembering things or paying attention, headaches may last a long time, or personality changes can occur. Once you have a concussion, you are more likely to have another concussion.

How do I know when it's OK to return to physical activity and my sport after a concussion? After telling your coach, your parents, and any available medical personnel that you think you have a concussion, you will probably be seen by a doctor trained in helping people with concussions. Your school and your parents can help you decide who is best to treat you and help to make the decision on when you should return to activity, play, and practice. Your school has a policy in place on how to treat concussions. You should not return to play or practice on the same day as your suspected concussion occurred.

You should not begin the return-to-play progression until all symptoms are gone, both at rest and during and after activity. Symptoms indicate that your brain has not yet recovered from the concussion and needs more rest.

Concussion Information Sheet for the Patient and Parent or Legal Custodian

**If there is anything on this sheet that you do not understand, please ask an adult to explain or read it to you.*

Patient Name:

_____

This form must be completed for each patient, even if there are multiple patients in the household.

Parent or Legal Custodian Name(s):

_____

□ We have read the "Patient and Parent or Legal Custodian Concussion Information Sheet.
If true, please check box.

After reading the information sheet, I am aware of the following information:

Patient Initials		Parent or Legal Custodian Initials
	A concussion is a brain injury, which should be reported to my parents, my coach(es), or a medical professional if one is available.	
	A concussion can affect the ability to perform everyday activities such as the ability to think, balance, and perform in the classroom.	
	A concussion cannot be "seen." Some symptoms might be present right away. Other symptoms can show up hours or days after an injury.	
	I will tell my parents, my coach, or a medical professional about my injuries and illnesses.	Not applicable
	If I think a teammate has a concussion, I should tell my coach(es), parents, or a medical professional.	Not applicable
	I will not return to play in a game or practice if a hit to my head or body causes any concussion-related symptoms.	Not applicable
	I will/my child will need written permission from a medical professional trained in concussion management to return to play or practice after a concussion.	
	According to the latest data, most concussions take days or weeks to get better. A concussion may not go away right away. I realize that resolution from this injury is a process and may require more than 1 medical evaluation.	
	I realize that emergency department or urgent care physicians will not provide clearance if the patient is seen right away after the injury.	
	After a concussion, the brain needs time to heal. I understand that I am/my child is much more likely to have another concussion or more serious brain injury if return to play or practice occurs before concussion symptoms go away.	
	Sometimes, repeat concussions can cause serious and long-lasting problems.	
	I have read and understand the concussion symptoms on the Concussion Information Sheet.	

_____ _____

Signature of Patient Date

_____ _____

Signature of Parent or Legal Custodian Date

APPENDIX F- SCAT5

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SCAT5©

SPORT CONCUSSION ASSESSMENT TOOL — 5TH EDITION

DEVELOPED BY THE CONCUSSION IN SPORT GROUP

FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by

Patient details

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of Injury: _____ Time: _____

WHAT IS THE SCAT5?

The SCAT5 is a standardized tool for evaluating concussions designed for use by physicians and licensed healthcare professionals[1]. The SCAT5 cannot be performed correctly in less than 10 minutes.

If you are not a physician or licensed healthcare professional, please use the Concussion Recognition Tool 5 (CRT5). The SCAT5 is to be used for evaluating athletes aged 13 years and older. For children aged 12 years or younger, please use the Child SCAT5.

Preseason SCAT5 baseline testing can be useful for interpreting post-injury test scores, but is not required for that purpose.Detailed instructions for use of the SCAT5 are provided on page 7. Please read through these instructions carefully before testing the athlete. Brief verbal instructions for each test are given in italics. The only equipment required for the tester is a watch or timer.

Recognise and Remove

A head impact by either a direct blow or indirect transmission of force can be associated with a serious and potentially fatal brain injury. If there are significant concerns, including any of the red flags listed in Box 1, then activation of emergency procedures and urgent transport to the nearest hospital should be arranged.

Key points

- Any athlete with suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration. No athlete diagnosed with concussion should be returned to play on the day of injury.
- If an athlete is suspected of having a concussion and medical personnel are not immediately available, the athlete should be referred to a medical facility for urgent assessment.
- Athletes with suspected concussion should not drink alcohol, use recreational drugs and should not drive a motor vehicle until cleared to do so by a medical professional.
- Concussion signs and symptoms evolve over time and it is important to consider repeat evaluation in the assessment of concussion.
- The diagnosis of a concussion is a clinical judgment, made by a medical professional. The SCAT5 should NOT be used by itself to make, or exclude, the diagnosis of concussion. An athlete may have a concussion even if their SCAT5 is "normal".

Remember:

- The basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Do not attempt to move the athlete (other than that required for airway management) unless trained to do so.
- Assessment for a spinal cord injury is a critical part of the initial on-field assessment.
- Do not remove a helmet or any other equipment unless trained to do so safely.

1

IMMEDIATE OR ON-FIELD ASSESSMENT

The following elements should be assessed for all athletes who are suspected of having a concussion prior to proceeding to the neurocognitive assessment and ideally should be done on-field after the first first aid / emergency care priorities are completed.

If any of the "Red Flags" or observable signs are noted after a direct or indirect blow to the head, the athlete should be immediately and safely removed from participation and evaluated by a physician or licensed healthcare professional.

Consideration of transportation to a medical facility should be at the discretion of the physician or licensed healthcare professional.

The GCS is important as a standard measure for all patients and can be done serially if necessary in the event of deterioration in conscious state. The Maddocks questions and cervical spine exam are critical steps of the immediate assessment; however, these do not need to be done serially.

STEP 1: RED FLAGS

RED FLAGS:

- **Neck pain or tenderness**
- **Double vision**
- **Weakness or tingling/ burning in arms or legs**
- **Severe or increasing headache**
- **Seizure or convulsion**
- **Loss of consciousness**
- **Deteriorating conscious state**
- **Vomiting**
- **Increasingly restless, agitated or combative**

STEP 2: OBSERVABLE SIGNS

Witnessed ☐ Observed on Video ☐

Lying motionless on the playing surface	Y	N
Balance / gait difficulties / motor incoordination: stumbling, slow / laboured movements	Y	N
Disorientation or confusion, or an inability to respond appropriately to questions	Y	N
Blank or vacant look	Y	N
Facial injury after head trauma	Y	N

STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS[2]

"I am going to ask you a few questions, please listen carefully and give your best effort. First, tell me what happened?"

Mark Y for correct answer / N for incorrect

What venue are we at today?	Y	N
Which half is it now?	Y	N
Who scored last in this match?	Y	N
What team did you play last week / game?	Y	N
Did your team win the last game?	Y	N

Note: Appropriate sport-specific questions may be substituted.

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

STEP 4: EXAMINATION GLASGOW COMA SCALE (GCS)[3]

Time of assessment			
Date of assessment			
Best eye response (E)			
No eye opening	1	1	1
Eye opening in response to pain	2	2	2
Eye opening to speech	3	3	3
Eyes opening spontaneously	4	4	4
Best verbal response (V)			
No verbal response	1	1	1
Incomprehensible sounds	2	2	2
Inappropriate words	3	3	3
Confused	4	4	4
Oriented	5	5	5
Best motor response (M)			
No motor response	1	1	1
Extension to pain	2	2	2
Abnormal flexion to pain	3	3	3
Flexion / Withdrawal to pain	4	4	4
Localizes to pain	5	5	5
Obeys commands	6	6	6
Glasgow Coma score (E + V + M)			

CERVICAL SPINE ASSESSMENT

Does the athlete report that their neck is pain free at rest?	Y	N
If there is NO neck pain at rest, does the athlete have a full range of ACTIVE pain free movement?	Y	N
Is the limb strength and sensation normal?	Y	N

In a patient who is not lucid or fully conscious, a cervical spine injury should be assumed until proven otherwise.

OFFICE OR OFF-FIELD ASSESSMENT

Please note that the neurocognitive assessment should be done in a distraction-free environment with the athlete in a resting state.

STEP 1: ATHLETE BACKGROUND

Sport / team / school: _____

Date / time of injury: _____

Years of education completed: _____

Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

How many diagnosed concussions has the athlete had in the past?: _____

When was the most recent concussion?: _____

How long was the recovery (time to being cleared to play) from the most recent concussion?: _____ (days)

Has the athlete ever been:

Hospitalized for a head injury?	Yes	No
Diagnosed / treated for headache disorder or migraines?	Yes	No
Diagnosed with a learning disability / dyslexia?	Yes	No
Diagnosed with ADD / ADHD?	Yes	No
Diagnosed with depression, anxiety or other psychiatric disorder?	Yes	No

Current medications? If yes, please list:

_____

_____

_____

_____

_____

_____

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

2

STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

Please Check: ☐ **Baseline** ☐ **Post-Injury**

Please hand the form to the athlete

	none	mild		moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6

Total number of symptoms:	of 22
Symptom severity score:	of 132
Do your symptoms get worse with physical activity?	Y N
Do your symptoms get worse with mental activity?	Y N
If 100% is feeling perfectly normal, what percent of normal do you feel?	

If not 100%, why?

_____

_____

_____

Please hand form back to examiner

3

STEP 3: COGNITIVE SCREENING

Standardised Assessment of Concussion (SAC)[4]

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

ORIENTATION

What month is it?	0	1
What is the date today?	0	1
What is the day of the week?	0	1
What year is it?	0	1
What time is it right now? (within 1 hour)	0	1
Orientation score		of 5

IMMEDIATE MEMORY

The Immediate Memory component can be completed using the traditional 5-word per trial list or optionally using 10-words per trial to minimise any ceiling effect. All 3 trials must be administered irrespective of the number correct on the first trial. Administer at the rate of one word per second.

Please choose EITHER the 5 or 10 word list groups and circle the specific word list chosen for this test.

I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order. For Trials 2 & 3: I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before.

List	Alternate 5 word lists					Score (of 5) Trial 1	Trial 2	Trial 3
A	Finger	Penny	Blanket	Lemon	Insect			
B	Candle	Paper	Sugar	Sandwich	Wagon			
C	Baby	Monkey	Perfume	Sunset	Iron			
D	Elbow	Apple	Carpet	Saddle	Bubble			
E	Jacket	Arrow	Pepper	Cotton	Movie			
F	Dollar	Honey	Mirror	Saddle	Anchor			
					Immediate Memory Score			of 15
					Time that last trial was completed			

List	Alternate 10 word lists					Score (of 10) Trial 1	Trial 2	Trial 3
G	Finger Candle	Penny Paper	Blanket Sugar	Lemon Sandwich	Insect Wagon			
H	Baby Elbow	Monkey Apple	Perfume Carpet	Sunset Saddle	Iron Bubble			
I	Jacket Dollar	Arrow Honey	Pepper Mirror	Cotton Saddle	Movie Anchor			
					Immediate Memory Score			of 30
					Time that last trial was completed			

CONCENTRATION

DIGITS BACKWARDS

Please circle the Digit list chosen (A, B, C, D, E, F). Administer at the rate of one digit per second reading DOWN the selected column.

I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7.

Concentration Number Lists (circle one)					
List A	List B	List C			
4-9-3	5-2-6	1-4-2	Y	N	0
6-2-9	4-1-5	6-5-8	Y	N	1
3-8-1-4	1-7-9-5	6-8-3-1	Y	N	0
3-2-7-9	4-9-6-8	3-4-8-1	Y	N	1
6-2-9-7-1	4-8-5-2-7	4-9-1-5-3	Y	N	0
1-5-2-8-6	6-1-8-4-3	6-8-2-5-1	Y	N	1
7-1-8-4-6-2	8-3-1-9-6-4	3-7-6-5-1-9	Y	N	0
5-3-9-1-4-8	7-2-4-8-5-6	9-2-6-5-1-4	Y	N	1
List D	List E	List F			
7-8-2	3-8-2	2-7-1	Y	N	0
9-2-6	5-1-8	4-7-9	Y	N	1
4-1-8-3	2-7-9-3	1-6-8-3	Y	N	0
9-7-2-3	2-1-6-9	3-9-2-4	Y	N	1
1-7-9-2-6	4-1-8-6-9	2-4-7-5-8	Y	N	0
4-1-7-5-2	9-4-1-7-5	8-3-9-6-4	Y	N	1
2-6-4-8-1-7	6-9-7-3-8-2	5-8-6-2-4-9	Y	N	0
8-4-1-9-3-5	4-2-7-9-3-8	3-1-7-8-2-6	Y	N	1
		Digits Score:			of 4

MONTHS IN REVERSE ORDER

Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November. Go ahead.

Dec - Nov - Oct - Sept - Aug - Jul - Jun - May - Apr - Mar - Feb - Jan	0 1
Months Score	of 1
Concentration Total Score (Digits + Months)	of 5

4

STEP 4: NEUROLOGICAL SCREEN

See the instruction sheet (page 7) for details of test administration and scoring of the tests.

Can the patient read aloud (e.g. symptom check-list) and follow instructions without difficulty?	Y	N
Does the patient have a full range of pain-free PASSIVE cervical spine movement?	Y	N
Without moving their head or neck, can the patient look side-to-side and up-and-down without double vision?	Y	N
Can the patient perform the finger nose coordination test normally?	Y	N
Can the patient perform tandem gait normally?	Y	N

BALANCE EXAMINATION

Modified Balance Error Scoring System (mBESS) testing[5]

Which foot was tested (i.e. which is the non-dominant foot) ☐ Left ☐ Right

Testing surface (hard floor, field, etc.) _____

Footwear (shoes, barefoot, braces, tape, etc.) _____

Condition	Errors
Double leg stance	of 10
Single leg stance (non-dominant foot)	of 10
Tandem stance (non-dominant foot at the back)	of 10
Total Errors	of 30

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

5

STEP 5: DELAYED RECALL:

The delayed recall should be performed after 5 minutes have elapsed since the end of the Immediate Recall section. Score 1 pt. for each correct response.

Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order.

Time Started

Please record each word correctly recalled. Total score equals number of words recalled.

_____

_____

_____

Total number of words recalled accurately: of 5 or of 10

6

STEP 6: DECISION

Domain	Date & time of assessment:		
Symptom number (of 22)			
Symptom severity score (of 132)			
Orientation (of 5)			
Immediate memory	of 15 of 30	of 15 of 30	of 15 of 30
Concentration (of 5)			
Neuro exam	Normal Abnormal	Normal Abnormal	Normal Abnormal
Balance errors (of 30)			
Delayed Recall	of 5 of 10	of 5 of 10	of 5 of 10

Date and time of injury: _____

If the athlete is known to you prior to their injury, are they different from their usual self?
☐ **Yes** ☐ **No** ☐ **Unsure** ☐ **Not Applicable**
(If different, describe why in the clinical notes section)

Concussion Diagnosed?
☐ **Yes** ☐ **No** ☐ **Unsure** ☐ **Not Applicable**

If re-testing, has the athlete improved?
☐ **Yes** ☐ **No** ☐ **Unsure** ☐ **Not Applicable**

I am a physician or licensed healthcare professional and I have personally administered or supervised the administration of this SCAT5.

Signature: _____

Name: _____

Title: _____

Registration number (if applicable): _____

Date: _____

SCORING ON THE SCAT5 SHOULD NOT BE USED AS A STAND-ALONE METHOD TO DIAGNOSE CONCUSSION, MEASURE RECOVERY OR MAKE DECISIONS ABOUT AN ATHLETE'S READINESS TO RETURN TO COMPETITION AFTER CONCUSSION.

CLINICAL NOTES:

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

CONCUSSION INJURY ADVICE

(To be given to the person monitoring the concussed athlete)

This patient has received an injury to the head. A careful medical examination has been carried out and no sign of any serious complications has been found. Recovery time is variable across individuals and the patient will need monitoring for a further period by a responsible adult. Your treating physician will provide guidance as to this timeframe.

If you notice any change in behaviour, vomiting, worsening headache, double vision or excessive drowsiness, please telephone your doctor or the nearest hospital emergency department immediately.

Other important points:

Initial rest: Limit physical activity to routine daily activities (avoid exercise, training, sports) and limit activities such as school, work, and screen time to a level that does not worsen symptoms.

1) Avoid alcohol

2) Avoid prescription or non-prescription drugs without medical supervision. Specifically:

   a) Avoid sleeping tablets

   b) Do not use aspirin, anti-inflammatory medication or stronger pain medications such as narcotics

3) Do not drive until cleared by a healthcare professional.

4) Return to play/sport requires clearance by a healthcare professional.

Clinic phone number: _____

Patient's name: _____

Date / time of injury: _____

Date / time of medical review: _____

Healthcare Provider: _____

Contact details or stamp

INSTRUCTIONS

Words in *Italics* throughout the SCAT5 are the instructions given to the athlete by the clinician

Symptom Scale

The time frame for symptoms should be based on the type of test being administered. At baseline it is advantageous to assess how an athlete "typically" feels whereas during the acute/post-acute stage it is best to ask how the athlete feels at the time of testing.

The symptom scale should be completed by the athlete, not by the examiner. In situations where the symptom scale is being completed after exercise, it should be done in a resting state, generally by approximating his/her resting heart rate.

For total number of symptoms, maximum possible is 22 except immediately post injury, if sleep item is omitted, which then creates a maximum of 21.

For Symptom severity score, add all scores in table, maximum possible is 22 x 6 = 132, except immediately post injury if sleep item is omitted, which then creates a maximum of 21x6=126.

Immediate Memory

The Immediate Memory component can be completed using the traditional 5-word per trial list or, optionally, using 10-words per trial. The literature suggests that the Immediate Memory has a notable ceiling effect when a 5-word list is used. In settings where this ceiling is prominent, the examiner may wish to make the task more difficult by incorporating two 5–word groups for a total of 10 words per trial. In this case, the maximum score per trial is 10 with a total trial maximum of 30.

Choose one of the word lists (either 5 or 10). Then perform 3 trials of immediate memory using this list.

Complete all 3 trials regardless of score on previous trials.

"I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order." The words must be read at a rate of one word per second.

Trials 2 & 3 MUST be completed regardless of score on trial 1 & 2.

Trials 2 & 3:

"I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before."

Score 1 pt. for each correct response. Total score equals sum across all 3 trials. Do NOT inform the athlete that delayed recall will be tested.

Concentration

Digits backward

Choose one column of digits from lists A, B, C, D, E or F and administer those digits as follows:

Say: *"I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7."*

Begin with first 3 digit string.

If correct, circle "Y" for correct and go to next string length. If incorrect, circle "N" for the first string length and read trial 2 in the same string length. One point possible for each string length. Stop after incorrect on both trials (2 N's) in a string length. The digits should be read at the rate of one per second.

Months in reverse order

"Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November ... Go ahead"

1 pt. for entire sequence correct

Delayed Recall

The delayed recall should be performed after 5 minutes have elapsed since the end of the Immediate Recall section.

"Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order."

Score 1 pt. for each correct response

Modified Balance Error Scoring System (mBESS)[5] testing

This balance testing is based on a modified version of the Balance Error Scoring System (BESS)[5]. A timing device is required for this testing.

Each of 20-second trial/stance is scored by counting the number of errors. The examiner will begin counting errors only after the athlete has assumed the proper start position. The modified BESS is calculated by adding one error point for each error during the three 20-second tests. The maximum number of errors for any single condition is 10. If the athlete commits multiple errors simultaneously, only one error is recorded but the athlete should quickly return to the testing position, and counting should resume once the athlete is set. Athletes that are unable to maintain the testing procedure for a minimum of five seconds at the start are assigned the highest possible score, ten, for that testing condition.

OPTION: For further assessment, the same 3 stances can be performed on a surface of medium density foam (e.g., approximately 50cm x 40cm x 6cm).

Balance testing – types of errors

1. Hands lifted off iliac crest
2. Opening eyes
3. Step, stumble, or fall
4. Moving hip into > 30 degrees abduction
5. Lifting forefoot or heel
6. Remaining out of test position > 5 sec

"I am now going to test your balance. Please take your shoes off (if applicable), roll up your pant legs above ankle (if applicable), and remove any ankle taping (if applicable). This test will consist of three twenty second tests with different stances."

(a) Double leg stance:

"The first stance is standing with your feet together with your hands on your hips and with your eyes closed. You should try to maintain stability in that position for 20 seconds. I will be counting the number of times you move out of this position. I will start timing when you are set and have closed your eyes."

(b) Single leg stance:

"If you were to kick a ball, which foot would you use? [This will be the dominant foot] *Now stand on your non-dominant foot. The dominant leg should be held in approximately 30 degrees of hip flexion and 45 degrees of knee flexion. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."*

(c) Tandem stance:

"Now stand heel-to-toe with your non-dominant foot in back. Your weight should be evenly distributed across both feet. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."

Tandem Gait

Participants are instructed to stand with their feet together behind a starting line (the test is best done with footwear removed). Then, they walk in a forward direction as quickly and as accurately as possible along a 38mm wide (sports tape), 3 metre line with an alternate foot heel-to-toe gait ensuring that they approximate their heel and toe on each step. Once they cross the end of the 3m line, they turn 180 degrees and return to the starting point using the same gait. Athletes fail the test if they step off the line, have a separation between their heel and toe, or if they touch or grab the examiner or an object.

Finger to Nose

"I am going to test your coordination now. Please sit comfortably on the chair with your eyes open and your arm (either right or left) outstretched (shoulder flexed to 90 degrees and elbow and fingers extended), pointing in front of you. When I give a start signal, I would like you to perform five successive finger to nose repetitions using your index finger to touch the tip of the nose, and then return to the starting position, as quickly and as accurately as possible."

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CONCUSSION INFORMATION

Any athlete suspected of having a concussion should be removed from play and seek medical evaluation.

Signs to watch for

Problems could arise over the first 24-48 hours. The athlete should not be left alone and must go to a hospital at once if they experience:

- Worsening headache
- Drowsiness or inability to be awakened
- Inability to recognize people or places
- Repeated vomiting
- Unusual behaviour or confusion or irritable
- Seizures (arms and legs jerk uncontrollably)
- Weakness or numbness in arms or legs
- Unsteadiness on their feet.
- Slurred speech

Consult your physician or licensed healthcare professional after a suspected concussion. Remember, it is better to be safe.

Rest & Rehabilitation

After a concussion, the athlete should have physical rest and relative cognitive rest for a few days to allow their symptoms to improve. In most cases, after no more than a few days of rest, the athlete should gradually increase their daily activity level as long as their symptoms do not worsen. Once the athlete is able to complete their usual daily activities without concussion-related symptoms, the second step of the return to play/sport progression can be started. The athlete should not return to play/sport until their concussion-related symptoms have resolved and the athlete has successfully returned to full school/learning activities.

When returning to play/sport, the athlete should follow a stepwise, **medically managed exercise progression, with increasing amounts of exercise.** For example:

Graduated Return to Sport Strategy

Exercise step	Functional exercise at each step	Goal of each step
1. Symptom-limited activity	Daily activities that do not provoke symptoms.	Gradual reintroduction of work/school activities.
2. Light aerobic exercise	Walking or stationary cycling at slow to medium pace. No resistance training.	Increase heart rate.
3. Sport-specific exercise	Running or skating drills. No head impact activities.	Add movement.
4. Non-contact training drills	Harder training drills, e.g., passing drills. May start progressive resistance training.	Exercise, coordination, and increased thinking.
5. Full contact practice	Following medical clearance, participate in normal training activities.	Restore confidence and assess functional skills by coaching staff.
6. Return to play/sport	Normal game play.	

In this example, it would be typical to have 24 hours (or longer) for each step of the progression. If any symptoms worsen while exercising, the athlete should go back to the previous step. Resistance training should be added only in the later stages (Stage 3 or 4 at the earliest).

Written clearance should be provided by a healthcare professional before return to play/sport as directed by local laws and regulations.

Graduated Return to School Strategy

Concussion may affect the ability to learn at school. The athlete may need to miss a few days of school after a concussion. When going back to school, some athletes may need to go back gradually and may need to have some changes made to their schedule so that concussion symptoms do not get worse. If a particular activity makes symptoms worse, then the athlete should stop that activity and rest until symptoms get better. To make sure that the athlete can get back to school without problems, it is important that the healthcare provider, parents, caregivers and teachers talk to each other so that everyone knows what the plan is for the athlete to go back to school.

Note: If mental activity does not cause any symptoms, the athlete may be able to skip step 2 and return to school part-time before doing school activities at home first.

Mental Activity	Activity at each step	Goal of each step
1. Daily activities that do not give the athlete symptoms	Typical activities that the athlete does during the day as long as they do not increase symptoms (e.g. reading, texting, screen time). Start with 5-15 minutes at a time and gradually build up.	Gradual return to typical activities.
2. School activities	Homework, reading or other cognitive activities outside of the classroom.	Increase tolerance to cognitive work.
3. Return to school part-time	Gradual introduction of school-work. May need to start with a partial school day or with increased breaks during the day.	Increase academic activities.
4. Return to school full-time	Gradually progress school activities until a full day can be tolerated.	Return to full academic activities and catch up on missed work.

If the athlete continues to have symptoms with mental activity, some other accomodations that can help with return to school may include:

- Starting school later, only going for half days, or going only to certain classes
- More time to finish assignments/tests
- Quiet room to finish assignments/tests
- Not going to noisy areas like the cafeteria, assembly halls, sporting events, music class, shop class, etc.
- Taking lots of breaks during class, homework, tests
- No more than one exam/day
- Shorter assignments
- Repetition/memory cues
- Use of a student helper/tutor
- Reassurance from teachers that the child will be supported while getting better

The athlete should not go back to sports until they are back to school/learning, without symptoms getting significantly worse and no longer needing any changes to their schedule.

APPENDIX G- INTER-ASSOCIATION CONSENSUS: YEAR-ROUND FOOTBALL PRACTICE CONTACT GUIDELINES

INTER-ASSOCIATION CONSENSUS: YEAR-ROUND FOOTBALL PRACTICE CONTACT GUIDELINES

September 2014

PURPOSE

The Safety in College Football Summit (see appendix) resulted in inter-association consensus guidelines for three paramount safety issues in collegiate athletics:

1. Independent medical care in the collegiate setting;
2. Concussion diagnosis and management; and
3. Football practice contact.

This document addresses year-round football practice contact.

BACKGROUND

Enhancing a culture of safety in collegiate sport is foundational. Football is an aggressive, rugged, contact sport,1 yet the rules clearly state that there is no place for maneuvers deliberately designed to inflict injury on another player.[1] Historically, rules changes and behavior modification have reduced catastrophic injury and death. Enforcement of these rules is critical for improving player safety.[2] Despite sound data on reducing catastrophic football injuries, there are limited data that provide a strong foothold for decreasing injury risk by reducing contact in football practice.[3-8] Regardless of such scientific shortcomings, there is a growing consensus that we must analyze existing data in a consensus-based manner to develop guidelines that promote safety. “Safe” football means “good” football.

NCAA regulations currently do not address inseason, full-contact practices. The Ivy League and Pac-12 Conference have limited inseason, full-contact practices to two per week and have established policies for full-contact practices in spring and preseason practices through their Football Practice Standards and Football Practice Policy, respectively. Neither address full-pad practice that does not involve live contact practice, as defined below. Both conferences cite safety concerns as the primary rationale for reducing full-contact practices; neither conference has published or announced data analysis based on their new policies. In keeping with the intent of both conferences and other football organizations, the rationale for defining and reducing live contact practice is to improve safety, including possibly decreasing student-athlete exposure for concussion and sub-concussive impacts. Reduced frequency of live contact practice may also allow even more time for teaching of proper tackling technique.

The biomechanical threshold (acceleration/deceleration/rotation) at which sport-related concussion occurs is unknown. Likewise, there are no conclusive data for understanding the short- or long-term clinical impact of sub-concussive impacts. However, there are emerging data that football players are more frequently diagnosed with sport-related concussion on days with increased frequency and higher magnitude of head impact (greater than 100g linear acceleration).[9-11]

Traditionally, the literature addressing differing levels of contact in football practice correlated with the protective equipment (uniform) worn. This means that full-pad practice correlated with full-contact and both half-pad (shell) and helmet-only practice correlated with less contact. However, coaches, administrators and athletics health care providers who helped to shape these guidelines have noted that contact during football practice is not determined primarily by the uniform, but rather by whether the intent of practice is centered on live contact versus teaching and conditioning. There are limited data that address this issue, and such data do not differentiate whether the intent of the practice is live tackling or teaching/conditioning. Within these limitations, non-published data from a single institution reveal the following:[10]

- The total number of non-concussive head impacts sustained in helmets-only and full-pad practices is higher than those sustained in games/scrimmages.
- Mild- and moderate-intensity head impacts occur at an essentially equal rate during full-pad and half-pad practices when the intent of practice is not noted.
- Severe-intensity head impacts are much more likely to occur during a game, followed by full-pad practices and half-pad practices.
- There is a 14-fold increase in concussive impacts in full-pad practices when compared to half-pad or helmets-only practices.
- Offensive linemen and defensive linemen experience more head impacts during both full-pad and half-pad practices relative to all other positions.

The guidelines below are based on: expert consensus from the two day summit referenced above; comments and recommendations from a broad constituency of the organizations listed; and internal NCAA staff members. Importantly, the emphasis is on limiting contact, regardless of whether the student-athlete is in full-pad, half-pad, or is participating in a helmet-only

practice. Equally importantly, the principles of sound and safe conditioning are an essential aspect of all practice and competition exposures.

These guidelines must be differentiated from legislation. For each section below that addresses a particular part of the football calendar, any legislation for that calendar period is referenced. As these guidelines are based on consensus and limited science, they are best viewed as a "living, breathing" document that will be updated, as we have with other health and safety guidelines, based on emerging science or sound observations that result from application of these guidelines. The intent is to reduce injury risk, but we must also be attentive to unintended consequences of shifting a practice paradigm based on consensus. For example, football preseason must prepare the student-athlete for the rigors of an aggressive, contact, rugged sport. Without adequate preparation, which includes live tackling, the student-athlete could be at risk of unforeseen injury during the inseason because of inadequate preparation. We plan to reanalyze these football practice contact guidelines at least annually. Additionally, we recognize that NCAA input for these guidelines came primarily from Division I Football Bowl Subdivision schools. Although we believe the guidelines can also be utilized for football programs in all NCAA divisions, we will be more inclusive in the development of future football contact practice guidelines.

DEFINITIONS

Live contact practice: Any practice that involves live tackling to the ground and/or full-speed blocking. Live contact practice may occur in full-pad or half-pad (also known as "shell," in which the player wears shoulder pads and shorts, with or without thigh pads). Live contact does not include: (1) "thud" sessions, or (2) drills that involve "wrapping up;" in these scenarios players are not taken to the ground and contact is not aggressive in nature. Live contact practices are to be conducted in a manner consistent with existing rules that prohibit targeting to the head or neck area with the helmet, forearm, elbow, or shoulder, or the initiation of contact with the helmet.

Full-pad practice: Full-pad practice may or may not involve live contact. Full-pad practices that do not involve live contact are intended to provide preparation for a game that is played in a full uniform, with an emphasis on technique and conditioning versus impact.

Legislation versus guidelines: There exists relevant NCAA legislation for the following:

1. Preseason practice
   a. DI FBS/FCS – NCAA Bylaws 17.9.2.3 and 17.9.2.4
   b. DII – NCAA Bylaws 17.9.2.2 and 17.9.2.3
   c. DIII – NCAA Bylaws 17.9.2.2 and 17.9.2.3
2. Inseason practice: No current NCAA legislation addresses contact during inseason practices.
3. Postseason practice: No current NCAA legislation addresses contact during postseason practices.
4. Bowl practice: No current NCAA legislation addresses contact during bowl practice.
5. Spring practice:
   a. DI FBS/FCS – NCAA Bylaw 17.9.6.4
   b. DII – NCAA Bylaw 17.9.8
   c. DIII – NCAA Bylaw 17.9.6 – not referenced to as spring practice, but allows five (5) week period outside playing season.

The guidelines that follow do not represent legislation or rules. As noted in the appendix, the intent of providing consensus guidelines in year one of the inaugural Safety in College Football Summit is to provide consensus-based guidance that will be evaluated "real-time" as a "living and breathing" document that will become solidified over time through evidence-based observations and experience.

Preseason practice guidelines: For days in which institutions schedule a two-a-day practice, live contact practices are only allowed in one practice. A maximum four (4) live contact practices may occur in a given week, and a maximum of 12 total may occur in preseason. Only three practices (scrimmages) would allow for live contact in greater than 50 percent of the practice schedule.

Inseason practice guidelines: Inseason is defined as the period between six (6) days prior to the first regular-season game and the final regular-season game or conference championship game (for participating institutions). There may be no more than two (2) live contact practices per week.

Postseason guidelines: (FCS/DII/DIII) There may be no more than two (2) live contact practices per week.

Bowl practice guidelines: (FBS) There may be no more than two (2) live contact practices per week.

Spring practice guidelines: Of the 15 allowable sessions that may occur during the spring practice season, eight (8) practices may involve live contact; three (3) of these live contact practices may include

greater than 50 percent live contact (scrimmages). Live contact practices are limited to two (2) in a given week and may not occur on consecutive days.

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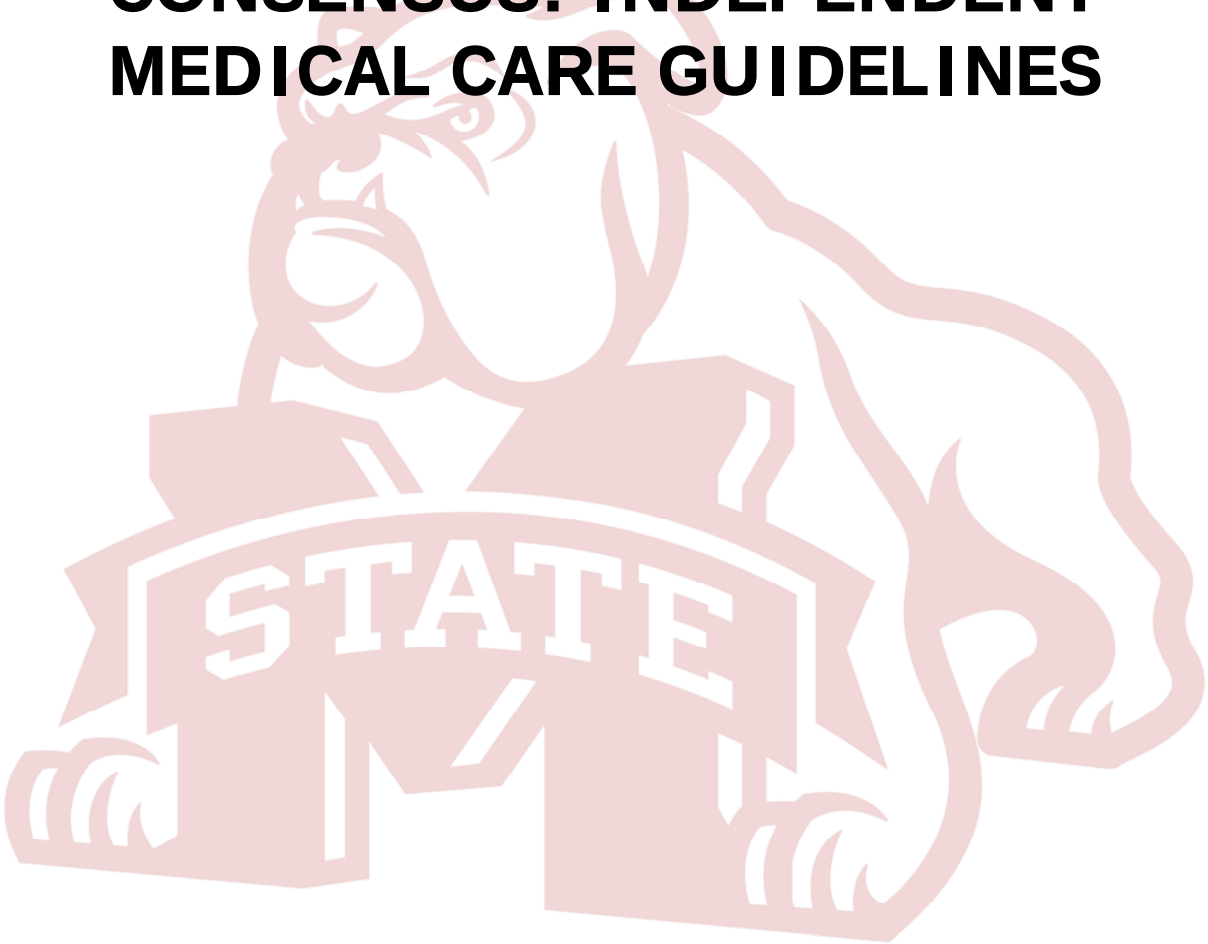
ENDORSEMENTS

This Inter-Association Consensus: Year-Round Football Practice Contact Guidelines, has been endorsed by:

- American Academy of Neurology
- American College of Sports Medicine
- American Association of Neurological Surgeons
- American Football Coaches Association
- American Medical Society for Sports Medicine
- American Osteopathic Academy for Sports Medicine
- College Athletic Trainers' Society
- Congress of Neurological Surgeons
- Football Championship Subdivision Executive Committee
- National Association of Collegiate Directors of Athletics
- National Athletic Trainers' Association
- National Football Foundation
- NCAA Concussion Task Force
- Sports Neuropsychological Society

APPENDIX H- INTER-ASSOCIATION CONSENSUS: INDEPENDENT MEDICAL CARE GUIDELINES



INTER-ASSOCIATION CONSENSUS: INDEPENDENT MEDICAL CARE GUIDELINES

September 2014

PURPOSE

The Safety in College Football Summit resulted in inter-association consensus guidelines for three paramount safety issues in collegiate athletics:

1. Independent medical care in the collegiate setting;
2. Concussion diagnosis and management; and
3. Football practice contact.

This document addresses independent medical care for college student-athletes in all sports.

BACKGROUND

Diagnosis, management, and return to play determinations for the college student-athlete are the responsibility of the institution's athletic trainer (working under the supervision of a physician) and the team physician. Even though some have cited a potential tension between health and safety in athletics,[1,2] collegiate athletics endeavor to conduct programs in a manner designed to address the physical well-being of college student-athletes (i.e., to balance health and performance).[3,4] In the interest of the health and welfare of collegiate student-athletes, a student-athlete's health care providers must have clear authority for student-athlete care. The foundational approach for independent medical care is to assume an "athlete-centered care" approach, which is similar to the more general "patient-centered care," which refers to the delivery of health care services that are focused only on the individual patient's needs and concerns.[5] The following 10 guiding principles, listed in the Inter-Association Consensus Statement on Best Practices for Sports Medicine Management for Secondary Schools and Colleges,[5] are paraphrased below to provide an example of policies that can be adopted that help to assure independent, objective medical care for college student-athletes:

1. The physical and psychosocial welfare of the individual student-athlete should always be the highest priority of the athletic trainer and the team physician.
2. Any program that delivers athletic training services to student-athletes should always have a designated medical director.
3. Sports medicine physicians and athletic trainers should always practice in a manner that integrates the best current research evidence within the preferences and values of each student-athlete.
4. The clinical responsibilities of an athletic trainer should always be performed in a manner that is consistent with the written or verbal instructions of a physician or standing orders and clinical management protocols that have been approved by a program's designated medical director.
5. Decisions that affect the current or future health status of a student-athlete who has an injury or illness should only be made by a properly credentialed health professional (e.g., a physician or an athletic trainer who has a physician's authorization to make the decision).
6. In every case that a physician has granted an athletic trainer the discretion to make decisions relating to an individual student-athlete's injury management or sports participation status, all aspects of the care process and changes in the student-athlete's disposition should be thoroughly documented.
7. Coaches must not be allowed to impose demands that are inconsistent with guidelines and recommendations established by sports medicine and athletic training professional organizations.
8. An athletic trainer's role delineation and employment status should be determined through a formal administrative role for a physician who provides medical direction.
9. An athletic trainer's professional qualifications and performance evaluations must not be primarily judged by administrative personnel who lack health care expertise, particularly in the context of hiring, promotion, and termination decisions.
10. Member institutions should adopt an administrative structure for delivery of integrated sports medicine and athletic training services to minimize the potential for any conflicts of interest that could adversely affect the health and well-being of student-athletes.

Team physician authority becomes the linchpin for independent medical care of student-athletes. Six preeminent sports physicians associations agree with respect to "… athletic trainers and other members of the athletic care network report to the team physician on medical issues."[6] Consensus aside, a medical-legal authority is a matter of law in 48 states that require athletic trainers to report to a physician in their medical practice. The NCAA Sports Medicine Handbook's Guideline 1B opens with a charge to athletics and institutional leadership to "create an administrative system where athletics health care professionals –

team physicians and athletic trainers – are able to make medical decisions with only the best interests of student-athletes at the forefront."[7] Multiple models exist for collegiate sports medicine. Athletic health care professionals commonly work for the athletics department, student health services, private medical practice, or a combination thereof. Irrespective of model, the answer for the college student-athlete is established independence for appointed athletics health care providers.[8]

GUIDELINES

Institutional medical line of authority should be established independently of a coach, and in the sole interest of student-athlete health and welfare. Medical line of authority should be transparent and evident in athletics departments, and organizational structure should establish collaborative interactions with the medical director and primary athletics health care providers (defined as all institutional team physicians and athletic trainers) so that the safety, excellence and wellness of student-athletes are evident in all aspects of athletics and are student-athlete centered.

Institutions should, at a minimum, designate a licensed physician (M.D. or D.O.) to serve as medical director, and that medical director should oversee the medical tasks of all primary athletics health care providers. Institutions should consider a board certified physician, if available. The medical director may also serve as team physician. All athletic trainers should be directed and supervised for medical tasks by a team physician and/or the medical director. The medical director and primary athletics health care providers should be empowered with unchallengeable autonomous authority to determine medical management and return-to-play decisions of student-athletes.

ENDORSEMENTS

This Consensus Best Practice, Independent Medical Care for College Student-Athletes, has been endorsed by:

- American Academy of Neurology
- American College of Sports Medicine
- American Association of Neurological Surgeons
- American Medical Society for Sports Medicine
- American Osteopathic Academy for Sports Medicine
- College Athletic Trainers' Society
- Congress of Neurological Surgeons
- National Athletic Trainers' Association
- NCAA Concussion Task Force
- Sports Neuropsychological Society

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