

Introduction

Given the incidence and importance of head injury in the sport of lacrosse, US Lacrosse has developed guidelines for teams, clubs, and leagues to consider in the form of a Concussion Management Plan (CMP). These guidelines are not intended as a standard of care, and should not be interpreted as such. They are a guide based on current national and international research and consensus statements, and should be reviewed regularly to keep them current. Each CMP developed locally should be in consultation with a physician (MD/DO) trained in the evaluation and management of concussion as well as other involved healthcare providers in accordance with concussion management legislation in your state, and should be reviewed and updated annually. It is recommended that each team, club, and league develop a CMP and educate all parents, coaches, and athletes on the CMP's contents and require compliance. Gold Stick organizations are required to have a CMP in place and a copy available to all members.

Head injury, including concussion, continues to be a concern in youth sports. Concussions are among the 5 most frequent injuries for both boys and girls high school lacrosse. In the 2016-2017 school year, among boy's high school sports, lacrosse players experience the third highest rate of concussions (0.42 per 1000 athletic-exposures), with football having the highest rate (0.91 per 1000 athletic-exposures), and ice hockey having the second highest rate (.46 per 1000 athletic-exposures). In the 2016-2017 school year, among girl's high school sports, lacrosse has the second highest rate (0.38 per 1000 athletic-exposures), with soccer being highest (0.67 per 1000 athletic-exposure).

It is important to understand that no current helmet can prevent concussions. Current helmet standards are designed to reduce the risk of severe brain injury and skull fracture, not to prevent concussion. There are substantial efforts towards developing standards and helmets that can reduce the risk of concussions, but this remains a challenge. Additionally, there is no evidence that any helmet or headgear can be used to reduce the risk of a second concussion or modify recovery.

An athlete who exhibits signs, symptoms or behaviors suggestive of a concussion should be removed from practice or competition and not returned to play until evaluated by a health care professional with experience in the evaluation and management of concussions. Athletes diagnosed with or suspected of a concussion should not return to activity for the remainder of that day. Management and return to both academic/work and practice/play after concussion should be under the supervision of a physician or his/her designee. Organizations should review their state laws to determine which medical/healthcare professionals may provide clearance for return to activity. Medical clearance requirements should be included in the concussion management plan.

In addition, athletes should acknowledge that they understand the signs and symptoms of concussion, and accept the responsibility for reporting all of their injuries and illnesses to their coach, parents (if minors), and health care professionals if present, including signs and symptoms of concussion. Some states may require a form to be signed for this acknowledgment. Athletes and their parents should be presented with educational material on head injuries and concussions.

Concussion Management Plan Components

The plan should include, but is not limited to, the following:

- (a) A process that provides athletes, parents, coaches, and league administrators with educational information about concussions including; the signs and symptoms, mechanisms of injury, treatment, return to activity guidelines, and limitations of protective equipment. Athletes, parents, coaches, and league administrators should acknowledge that they have received information about the signs and symptoms of concussions and understand the importance of promptly reporting all signs and symptoms of concussion as well as all injuries and illnesses to their coach and their parents as well as to healthcare providers, if available. For larger leagues it might be helpful to designate an athlete safety coordinator to help implement and update the plan. The Concussion Recognition Tool developed by the International Concussion in Sport Group (CISG) Consensus Statement as well as the information developed by the Center for Disease Control (CDC) are useful resources.
- (b) A process that provides athletes, parents, coaches and league administrators with educational information about concussions including how academic and work activities might be affected and how to incorporate a “return to learn” strategy as a component of the return to sport progression.
- (c) A process that removes an athlete who exhibits signs, symptoms or behaviors suggestive of a concussion from athletic activities (e.g., competition, practice, conditioning sessions) and does not allow return to play until that athlete is evaluated and cleared (in writing) by a healthcare professional with experience in the evaluation and management of concussions and who is authorized to do so in the state in which they are practice.
- (d) A policy that precludes an athlete diagnosed with a concussion from returning to athletic activity (e.g., competition, practice, conditioning sessions) for at least the remainder of that calendar day.
- (e) A policy that provides a multi-step outline of the return-to-play and return to academic work protocol, how it will be managed and what players, coaches and parents should expect if there is a concussion diagnosis.

Typical Elements of a Concussion Management Plan

A Statement of Support and Requirement

The leadership should plainly state its support for the Concussion Management Plan, including strict adherence to the reporting, removal from play, and educational requirements. The plan should include a date to indicate the organization and its consulting medical professionals have reviewed the plan within the past twelve months.

An accepted Definition of a Concussion

Although many definitions of concussion exist, we find the one reference below from the 5th International Concussion in Sport Conference (2017), to be the most useful:

“Sport related concussion (SRC) is a traumatic brain injury induced by biomechanical forces. Several common features that may be utilized in clinically defining the nature of a concussive head injury include:

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

The clinical signs and symptoms cannot be explained by drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction, etc) or other comorbidities (e.g. psychological factors or coexisting medical conditions).

Signs and Symptoms of a Concussion

Those suggested by the Centers for Disease Control (2017?) in their lacrosse specific Heads Up materials:

Signs Observed by Others

- Appears dazed or stunned
- Is confused about assignment or position
- Forgets an instruction
- Is unsure of game, score or opponent
- Moves clumsily
- Answers questions slowly
- Loses consciousness (even briefly)
- Shows mood, behavior or personality changes
- Can't recall events prior to hit or fall
- Can't recall events after hit or fall

Symptoms Reported by Athlete

- Headache or “pressure” in head
- Nausea or vomiting
- Balance problems or dizziness
- Double or blurry vision
- Sensitivity to light or noise
- Feeling sluggish, hazy, foggy, or groggy
- Concentration or memory problems
- Confusion
- Does not “feel right” or is “feeling down

Preseason Education

Parents, athletes, and coaches should receive preseason concussion education. The education program should include information regarding the signs and symptoms, mechanisms of injury, treatment, return to activity and school guidelines, and limitations of protective equipment in preventing SRC. Coaches should register and complete the NFHS/CDC Concussion in Sports online program. (<http://www.cdc.gov/concussion/headsup/training/>) Parents and athletes, as part of their preseason meeting, should be informed about the CMP, including all of the elements as well as local resources. US Lacrosse/CDC Heads Up Lacrosse materials can be used to support this effort (http://www.cdc.gov/concussion/HeadsUp/sports_specific.html). The recent international Concussion in Sport Consensus Statement (McCrory 2017) also present a “graduated return to sport strategy” and “graduated return to school strategy” that can be used as guidelines. (See Tables 1 & 2 below)

Preseason Baseline Testing

Athletes should undergo pre-participation baseline evaluation, if available. This ideally includes a baseline physical examination as well as a review of the athlete’s history of prior injuries, co-existing medical issues (e.g. history of migraines, learning disabilities, mental health issues, as well as a baseline evaluation of symptoms, cognitive and neurologic function including balance). Though not essential, it may be useful to include more sophisticated neuropsychological testing but only if these tests are performed in a supervised, controlled setting along with post injury interpretation by those experienced in interpreting neuropsychological tests. This information should be managed by the athlete’s healthcare provider so that it is available for appropriate post injury evaluation, should it be necessary.

Evaluation

An athlete exhibiting signs and symptoms of a concussion should be removed from play immediately and evaluated by a healthcare provider with experience in concussion assessment and management. A brief standardized screening tool; assessing symptoms, cognitive and neurologic function including balance (e.g. SCAT5 or childSCAT5) should be used by the healthcare provider. Any athlete who is diagnosed with a concussion shall not return to activity for the remainder of that day and be referred to a physician. Assessment of the athlete will be conducted at time intervals as determined by his or her physician or healthcare provider. The athlete will not be allowed to return to activity until cleared by an appropriate healthcare provider as defined by individual state legislation.

Referral to Emergency Department

Each club, team, or league should have an Emergency Action Plan (EAP) in place for each of the play and practice venues, each of which incorporates the CMP. Teams or clubs traveling to new venues should obtain and review in advance the site specific EAP from the host. Should an athlete experience deterioration of level of consciousness, decreasing neurologic function,

and/or exhibit signs and symptoms associated with a severe head or neck injury, consideration for a more serious brain injury such as intracranial hemorrhage, skull fracture, or cervical spine compromise should be considered, and the EAP should be activated.

Return to Physical Activity

Athletes diagnosed with a concussion should rest both physically and cognitively for an initial period of 24- 48 hours, and should not return to contact sport activities until they are back to their baseline level of symptoms, cognitive function and balance. After an initial period of rest, the athlete may resume low level activities that do not aggravate their symptoms and a graduated return to sport strategy can be followed under the guidance of a healthcare professional. The athlete should gradually increase their level of exertion and risk for contact and be followed for the development of any new symptoms or complications. Written documentation from the healthcare provider should be maintained by the league administrator or designated athlete safety coordinator for the return to sport progression. The return to sport strategy from the CISG is provided in Table 1.

The return to play progression is individualized, incorporating the athlete’s medical history related to the specific injury (e.g. the nature, burden and duration of symptoms, prior concussion history, history of migraines, learning disabilities, depression/anxiety) as well as how the athlete responds to each step of the progression. There is no cookbook approach and no definitive timeline for return-to-play

Table 1 Graduated return-to-sport (RTS) strategy

Stage	Aim	Activity	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, eg, 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 sport	Normal game play	

NOTE: An initial period of 24–48 hours of both relative physical rest and cognitive rest is recommended before beginning the RTS progression. There should be at least 24 hours (or longer) for each step of the progression. If any symptoms worsen during exercise, 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). If symptoms are persistent (eg, more than 10–14 days in adults or more than 1 month in children), the athlete should be referred to a healthcare professional who is an expert in the management of concussion.

Return to School

Student-Athletes who sustain a concussion should receive the necessary support from their school for classes, exams, and schoolwork that may be affected as a result of a sustaining concussion and post-concussive symptoms. Parents and their healthcare provider should inform their child’s school requesting appropriate support. Types of academic support could include extended time on tests, reduced workload, limited homework time, decreased computer use, testing in a distraction free environment. The return to school strategy from the CISG is provided in Table 2.

US Lacrosse Concussion Management Plan Guidelines for U-19 Programs
Do not use after 12/01/2018



Stage	Aim	Activity	Goal of each step
1	Daily activities at home that do not give the child symptoms	Typical activities of the child during the day as long as they do not increase symptoms (eg, reading, texting, screen time). Start with 5–15 min 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 schoolwork. 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