SHAPE America SOCIETY OF HEALTH AND PHYSICAL EDUCATORS®
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Guidance Document

Concussion: What SHAPE America Members Should Know

The majority of SHAPE America members teach K-12 physical education, promote physical activity and/or coach. It is important that members are committed to creating safe and healthy learning environments. One threat to children's health and safety during physical activity is concussion, a form of brain injury that can result from impact to the head or the body. For these reasons, SHAPE America recently formed a Concussion Task Force that has prepared this guidance document and other resources (see www.shapeamerica.org/standards/guidelines/Concussion).

Due to advances in brain research and studies on the prevalence of concussions, we have seen a steady increase in media coverage and public health campaigns related to concussion. Much of this recent attention has focused on youth sport, which is certainly appropriate. However, concussions can occur in any type of physical activity program including physical education, extra-curricular activity programs, recess, intramural sport, interscholastic sport, and community-based sport and physical activity programs.

Because so many SHAPE America members work with young people in these settings, it is important for them to have a basic understanding of concussion and to know the concussion policies in their local context. Regardless of the program, setting or physical activity, adults who lead programs for children take on the responsibility of ensuring students' health and safety. Based on current research and policy activity, SHAPE America recommends that its members familiarize themselves with the topic of concussion and, based on their local requirements, seek out further information or education commensurate with their roles and responsibilities.

The purposes of this resource is to:

1. Provide SHAPE America members with basic information about concussion, such as common signs and symptoms;
2. Explain the varied nature of concussion policies and the importance of becoming aware of local requirements (e.g., school, local school authority, state);
3. Describe common best practices related to concussion management;
4. Address the issue of concussion, specifically as it relates to the physical education setting; and
5. Point to additional resources related to concussion, including websites, SHAPE America articles and educational resources.

Understanding Concussion

A concussion is a type of brain injury resulting from a bump, blow or jolt to the head, or from a hit to the body that transmits significant force to the head. Either mechanism of injury can cause the brain to move rapidly back and forth, bounce around, or twist in the skull. This movement can stretch or damage brain cells and cause chemical changes in the brain.

Concussions affect people differently. Students who incur a concussion can experience symptoms that last anywhere from a few days to a few weeks. With a serious concussion, symptoms can last months or longer (McCrory et al., 2017). Research suggests that age plays a role in the recovery from concussion (Field, Collins & Lovell, 2003). Younger students tend to experience more prolonged symptoms than older students. Thus, it is important that schools have protocols in place for the benefit of their students and staff.

Concussion Symptoms. Although a concussion might seem to be an "invisible injury," it can affect a student in many ways physically, cognitively and emotionally and can cause sleep disturbance. See Table 1 for a list of common concussion symptoms.

Table 1. Common Concussion Symptoms

Physical	Cognitive	Emotional	Sleep
Headache	Feeling mentally foggy	Irritability	Trouble falling asleep
Dizziness	Feeling slowed down	Sadness	Sleeping more than usual
Balance difficulties	Difficulty concentrating	Nervousness	Sleeping less than usual
Nausea/vomiting	Difficulty remembering	More emotional than usual	Feeling drowsy
Fatigue	Difficulty focusing		Altered sleep schedule
Sensitivity to light			
Sensitivity to noise			
Visual Changes			

Concussion symptoms can affect a student's learning and schoolwork significantly. Physical symptoms might interfere with the student's ability to focus and concentrate. Cognitive symptoms can affect the student's ability to learn, memorize and process information, and keep track of assignments. Therefore, standard concussion treatment initially involves both physical and cognitive rest, followed by activities that do not exacerbate the symptoms.

Remember, too, that other factors can complicate concussion recognition. Concussion in a young child can go undetected because the child might not be able to articulate the symptoms he or she is experiencing, might want to keep playing, or might be unaware that the symptoms are important (Halstead & Walter, 2010).

Concussions

Sport-related Concussions. Sport-related concussions within an athletic population of all ages have an incidence of 1.6-3.8 million per year (Langlois, Rutland-Brown & Wald, 2006). However, McCrea et al. (2003) said it is likely that more than half of all concussions are not reported to health care professionals, because concussions require self-reporting much of the time. Determining the incidence of concussion has an added challenge, as many athletes choose not to report their symptoms because of the restrictions from activity when diagnosed with a concussion. Challenges in determining incidence rates also arise because of changes to the definition of a sport-related concussion and the difficulty in establishing appropriate reporting procedures to coaches and health care professionals. Theye and Mueller (2004) stated that 20 percent of all head injuries (>300,000) are sport-related concussions. A recent study showed that visits to hospital and clinic emergency rooms for sport-related concussions rose by more than 200 percent from 1997-2007 (Schatz & Moser, 2011). The age group with the highest incidence of concussion who visit emergency rooms is adolescents ages 10-14, followed by those ages 15-19 (Meehan & Mannix, 2010).

The growth in concussion reporting is attributable to both an increase in sports participation and the progression in knowledge of the signs and symptoms of the condition (Register-Mihalik, et al., 2013). Another factor is the growth in awareness of concussions in the media, resulting in greater appreciation of concussion's severity by the healthcare community.

Best Practices in Concussion Management

When in Doubt, Sit Them Out. Before 2009, no states had legislation specific to sport-related concussion on the books. Today, all 50 states do (Potteiger & Wright, 2016). The most common guideline across these laws is the removal of the student from play when a concussion is suspected (Potteiger, Potteiger, Pitney & Wright, in press). Referred to commonly as "When in doubt, sit them out," this guideline mandates coaches and responsible adults to err on the side of caution. While only medical professionals can or should diagnose a concussion, a physical educator, coach or other responsible adult who recognizes any of the common signs or symptoms or has another reason to suspect that a student has been concussed should remove the student from play until he or she is assessed by a qualified person and cleared to resume play. Consult your local or state authority for more specific guidance.

Return to Play. One of the most common best practices found in legislation regarding concussion management is a return-to-play progression, also known as a graduated return-to-sport strategy. As displayed in Table 2, these guidelines prescribe a progression of increasingly strenuous activities as the student is able to manage and tolerate them (McCrory et al., 2017). Of course, this progression does not begin until the student has been cleared by a health care professional.

Table 2. Typical Return-to-Play Progression

Stage	Aim	Activity	Goal
1	Symptom-limited activity	Daily activities that do not provoke symptoms	Gradual reintroduction of school and/or work 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	More difficult 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
6	Return to sport	Normal game play	

Return to Learn. A best practice in concussion management that has gained increasing support in recent years is a graduated return-to-learn progression. Many of the signs and symptoms associated with concussion can affect a student's ability to participate in normal academic activities (e.g., focusing in class, completing homework, studying). While most states incorporate a return-to-play progression, few require a return-to-learn progression (Potteiger et al., in press). Still, this is a best practice because symptoms such as headaches, sensitivity to light and difficulty with concentration and memory can leave a student-athlete incapable of performing at his or her normal level. Using similar logic, a progressive return to normal learning activities makes sense. See Table 3 for a typical return-to-learn progression. It is important to find out whether your local or state authorities require such a progression or not. Remember, legislation represents minimum requirements. If such a progression is not required, it can still be added to local policies and protocols as a best practice.

Table 3. Typical Graduated Return-to-Learn Progression

Stage	Aim	Activity	Goal
1	Daily activities at home that do not give the child symptoms	Typical day-to-day activities (e.g., reading, texting, screen time) so long as the activity does not aggravate the symptoms; start with 5-15 minutes at a time and build gradually	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	Increase school activities gradually until student can tolerate a full day	Return to full academic activities and catch up on missed work

Multidisciplinary Teams. Many states specify that schools and/or local education authorities must form multidisciplinary concussion-management teams to set local policy and emergency action plans. With varying degrees of specificity, state legislation can include requirements or recommendations as to who should be included on such a team (Potteiger & Wright, 2016). Typically, represented groups include school staff and/or administration, family members, medical professionals and school personnel responsible for physical activity. See Table 4 for examples of typical members, but look to your own policies for specific requirements.

Table 4. Typical Representation on Multidisciplinary Teams

School Concussion Oversight Team	Family Team	Medical Team	School Physical Activity Team
Teacher School counselor School psychologist Social worker School nurse School administrator	Student Parents or guardians Peers Teammates Family and friends	Emergency department Primary care physician Neurologist Concussion specialist Neuropsychologist Athletic trainer School nurse Physical therapist Occupational therapist	School nurse Athletic trainer Physical educator Coach Playground or recess coordinator

For an example, see Illinois Public Act 099-0245: Youth Sports Concussion Safety Act.

Concussion Education. Most state concussion laws include some requirements related to concussion education (Potteiger & Wright, 2016). These vary widely in terms of specificity. Some prescribe a certain number of hours of concussion education that must be renewed periodically (e.g., every two years). Some specify who must satisfy these requirements (e.g., coaches) and some provide examples of approved sources of education. While concussion education is logical and important, such requirements take different forms and often are ambiguous. It is important to research state and local policies to understand minimal requirements (Potteiger et al., in press). Remember, though, that these are only minimums. Even if your state does not require concussion training, you might want to be proactive and at least meet the local standards. For example, a given state may not require concussion education for coaches in private schools even though understanding concussion is just as important for their professional practice as for their peers who are coaching in public schools.

State Legislation and Policy

While much attention is focused on concussions that occur during sport participation, school personnel regularly manage and interact with students who suffer concussions outside of sports. Therefore, it is imperative that all members of the school staff understand the process for integrating a student back into the classroom and physical activity once the students is cleared by a physician (Potteiger & Wright, 2016).

The increasing prevalence of concussions diagnosed in youth sports has resulted in a proliferation of public policy aimed at protecting young athletes from catastrophic injury. Just 10 years ago, no such public policy existed. Today, all 50 states have some form of legislation regarding sport-related concussions (Potteiger et al., in press). Because such policies vary widely, all school personnel should know their state and local concussion policies (Roetert & Richardson, 2014; Schmies, 2014). One often can find information on such policies through each state's official governmental website.

Removal from Play. As of June 2017, 48 states required that students suspected of sustaining a concussion be removed from play for the remainder of the day, or 24 hours. Arizona and South Carolina allowed such athletes to return to play the same day if cleared by a health care professional. The consensus from the Berlin Guidelines (McCrory et al., 2017) is for a graduated return-to-play strategy, typically lasting five days. Two states, California and New Mexico, mandated longer periods of time for returning to play as of June 2017.

Medical Clearance. As of June 2017, all states required medical clearance before a student may return to play. Physical educators should learn which kinds of health care professionals are legally allowed within their states to provide clearance for athletes returning to play. Note that some states specify that such clearance is to be written, while many states do not.

Education Requirements. As of June 2017, all states required some type of concussion awareness or education although many of the requirements are ambiguous as to who should receive such education and how often. Concussion-education requirements for students, parents, coaches, health care professionals, physical educators and referees vary from state to state. It is important for physical educators to learn and follow their state and school policy regarding concussion education.

Schools Affected by State Concussion Legislation. As of June 2017, about a quarter of state concussion laws applied to only public high schools, another quarter applied to public middle and high schools, and half applied to all school-age children (K-12). Only about 20 percent of state concussion laws applied to private and charter schools as of June 2017.

Return to Learn Requirements. As of June 2017, 12 states either had enacted original legislation or amended existing law to include language regarding return-to-learn policy.

Implications for Physical Education

Much of the research and policy activity related to concussion has focused on youth sport. In this context, the roles and responsibilities of coaches are often specified. Coaches' knowledge and attitudes about concussion have been studied extensively, as have those of other stakeholders often involved in concussion management, including physicians, athletic trainers and school nurses. Although the issue of concussion carries many implications for physical education teachers, this group is under-studied in the research literature and rarely is identified in legislation as a key stakeholder group.

Competitive sport is an environment in which the risk of concussion is higher than in other forms of activity, but the same is true of physical education (Potteiger & Wright, 2016). Across grade levels, the more physically active students are, the higher their potential risk of concussion. Students can fall, collide with each other, be hit with thrown objects, or crash into fixed objects (e.g., a goal post). Such risks are inherent in being active. However, by managing behavior, rules and facilities effectively, physical education teachers can minimize such risks. It is important, though, that they are prepared to recognize incidents, signs and symptoms that might indicate a concussion. Whether in the gymnasium, on a playing field, or in another environment, the physical education teacher could easily be the responsible adult who must decide to pull a student from activity and send him or her to be assessed and, possibly, treated.

It also is important for physical education teachers to remain aware of and involved in concussion-management planning (Roetert & Richardson, 2014; Schmies, 2014). Even if a student's concussion occurs outside of physical education, the physical education teacher must be alerted when a return-to-play progression has been put in place. For example, if a student is in the early stages of a progression and has not yet been cleared for intense physical activity in the student's sport, the physical education teacher must know that so that he or she does not subject the student to activities and exercises that are inappropriate or unsafe.

Needs Assessment. For the reasons explained above, physical education teachers should know enough about concussions to prevent them whenever possible, to recognize common signs and symptoms, to comply with local policy requirements, and to contribute to concussion-management plans. To inform the creation of this guidance document and other resources to meet these critical needs, SHAPE America recently endorsed a needs-assessment survey, which the Concussion Task Force developed and executed. This survey was administered electronically and included in-service physical education teachers from 48 states and the District of Columbia (n = 404). The survey assessed practitioners' knowledge of and attitudes toward concussion, their awareness of concussion policy and legislation, and the kinds of resources they desire. Although the results of this survey are still being prepared for publication, we do include selected results here related to the resources that practitioners desire.

Survey participants were asked to consider what resources they would view as helpful to their professional learning related to concussion management. The number and percentage of respondents viewing each resource as helpful is presented in Table 5. Strategies identified as being the most helpful tended to be web-based and included a checklist to reduce the incidence

of concussion in physical education, a designated resource page on the website, and links to general concussion information and resources. Strategies identified as being the least helpful included sessions at a national convention, a position statement, and sessions at state or regional conferences. Based on this feedback, the first priority of the Task Force has been the creation of web-based information and resources (see www.shapeamerica.org/standards/guidelines/Concussion).

Table 5. Number and Percentage of Participants Viewing Various Resources as Helpful (*N* = 404)

Resource	Number	Percentage
1. A checklist to reduce risk of concussion in physical education	291	72.0
2. A designated resource page on the website	287	71.0
3. Links to general concussion information/resources	261	64.6
4. A guidance document	228	56.4
5. A document containing responses to frequently asked questions	225	55.7
6. An educational online webinar	214	53.0
7. Scenarios/case studies of how to respond to suspected concussions	188	46.5
8. A summary of risk/incidence in different sports	169	41.8
9. In-person sessions at state/regional conventions	152	37.6
10. A position statement	113	28.0
11. In-person sessions at the national convention	106	26.2

Note. Number = number of participants agreeing that the strategy would be helpful; Percentage = the percentage of respondents agreeing that the strategy would be helpful.

SHAPE America Recommendations

Get Educated. Although few state concussion laws specify roles and responsibilities for physical education teachers, SHAPE America encourages state officials to take a proactive approach in recognizing that physical education teachers can play a key role in student concussion prevention and management. For example, concussion education guidelines that are in place for coaches are also appropriate for physical education teachers. In fact, preliminary findings from the survey described above indicate that physical education teachers who do coach have significantly more knowledge related to concussion than physical education teachers who do not coach. This likely is tied to another preliminary finding indicating that physical education teachers who do coach are significantly more likely than physical education teachers who do not coach to report being required to satisfy concussion-education requirements. Whether they coach or not, physical education teachers at all grade levels should have at least a minimal understanding and awareness of concussion to ensure a healthy and safe learning environment for their students.

Join the Team. While few states specify that physical education teachers should serve on multi-disciplinary concussion-management teams, it is in everyone's best interest that they do. Many might be included as part of their coaching role already. Still, it is in the best interest of physical education teachers, students, school administrators and others for the physical education teacher to have a seat at the concussion-management team table. Physical education teachers should make that clear to their administrators and/or local concussion task force leaders. For an example of a proactive approach to including physical education teachers in concussion-management plans, see the New York State Department of Education's *Guidelines for Concussion Management in the School Setting*, which specify roles, responsibilities and education requirements for district physical education directors and physical education teachers that parallel those of athletic directors and coaches, respectively.

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