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## High School Student Concussion Recovery Program: Teacher Involvement in Student Academic Transitions to Classroom and to Sports

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*RUNNING HEAD:* High School Student Concussion Recovery Program

High School Student Concussion Recovery Program:

Teacher Involvement in Student Academic Transitions to Classroom and to Sports

Brittany Diego

**Abstract**

Many symptoms of concussions can substantially interfere with the cognitive abilities and skills students use in school. Although students may have similar symptoms they experience concussions differently. Students returning to the classroom from a concussion often have different needs and abilities.

Research shows that a formal, individualized protocol to treat suspected concussions, both academically and physically, is vital to the successful recovery of each student. Much research is available on concussions for professional athletes, specifically related to recovery and returning to their sport. However, there is little research about high school students regarding concussions. Concussion recovery programs for high school student athletes primarily concentrate on returning the athlete to the playing field and often do not include protocols reintegrating students back into academics (Williams, Welch, Parsons, McLeod, & Valovich, 2015).

Typically teachers are notified when their students are returning to school after recovering from a concussion. However, many times teachers are not trained to help their students successfully return to the academic program. The review of the literature supports the need for a formal process aiding teachers with academically reintegrating students into school following at home recovery from a concussion.

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Keywords: Concussion, academic protocol

High school students who play sports are at risk for sustaining concussions. Concussions account for 10-13% of all injuries among US high school athletes (Wasserman, Bazarian, Mapstone, Block, & van Wijngaarden, 2016). Overall, the impact of concussion-related impairment on student functioning can be significant. When a concussion occurs, students are out of school for a varying number of days that depends upon the severity of the head injury. By missing instruction, students are losing content, which can put them behind their classmates academically. Common signs and symptoms of concussions that students may experience can be physical, cognitive, or emotional and can significantly affect the skills students need to succeed in school. Concussed individuals experience somatic symptoms such as a headache and or dizziness, cognitive difficulties such as impaired concentration and or memory loss, sleep disturbance, and altered mood, especially depression. These concussion symptoms are associated with poor academic performance and can substantially impair a concussed students' ability to perform at their maximum academic potential (Bradley-Klug, Garofano, Lynn, DeLoatche, & Lam, 2015; Halstead, McAvoy, Devore, Carl, Lee, & Logan, 2013; Wasserman, et al., 2016). Learning depends on the student's ability to process information, taking it in, making new connections to already learned concepts, and then applying it to real life situations (Burns & Gianutsos, 1987).

The first step in concussion recovery is organized and implemented by the athletic trainer at the school site. The athletic trainer interacts with the athlete, families and the physician to focus on coordinating the student's initial physical recovery. The next step is returning students to school. Typically, when students who have experienced a concussion return to school, teachers are informed that the student is recovering from a concussion. However, teachers may

not receive information on ways to accommodate student academic needs. There is often no formal academic component to the concussion recovery program and little communication between the members of the academic team and the athletic trainer. This lack of communication results in a weak, inefficient academic re-entry for concussed students and does not support their recovery. Teachers are also not involved in the decision to return students back to active involvement in sports. That becomes a problem when students are returned to the playing field before they can catch up with their schoolwork. Teachers need to voice their observations in developing a transition plan to reintegrate students back to the classroom and their sport successfully. The study by Wasserman et al., (2016), makes the case that students who have sustained concussions during sports deal with academic dysfunction for a period of time after they return to school. The data from this study point to a need for concussion recovery guidelines that involve teachers, the people that work in close collaboration with the concussed athlete, as they recover from their concussion.

A concussion can also be referred to as a mild traumatic brain injury (TBI). A concussion is an alteration in brain function due to biomechanical forces affecting the brain that may or may not cause loss of consciousness (Eastman & Chang, 2015; Kelly & Rosenberg, 2001). A concussion may be caused either by a direct blow to the head, face, or neck or force applied to another part of the body that transmits that force to the head. There is also some evidence that concussion-like symptoms can result from an accumulation of sub-concussive hits, hard hits to the body that do not directly cause a concussion but can collectively cause changes in the mental ability of the brain. Abnormal rotation and movement of the brain within the skull cause the change in mental ability. A concussion typically results in the rapid onset of

short-lived impairment of neurologic function that resolves spontaneously (Halstead & Walter, 2010). It is important to note that brain tissue is often not damaged by a concussion, but that the symptoms and effects of a concussion are caused by cellular dysfunction including a decrease in energy production and the inability to properly communicate with other cells. Approximately 80% of patients recover within three weeks. However, 20% of athletes take over three weeks to recover following a sport-related concussion. The differences in recovery between individuals may be due to risk factors associated with concussion. (Collins, et al., 2013; Bradley-Klug et al., 2015). Risk factors include a history of concussion, history of migraine headaches, a learning disability, attention-deficit hyperactivity disorder (ADHD), sex, and age (Collins, et al., 2013). According to Foley, Gregory and Solomon (2014) when compared to adults, children and adolescents appear to be more susceptible and slower to recover from a concussion possibly due to differences in brain tissue maturation (Bradley-Klug et al., 2015). Regardless of injury severity, children with TBI may have difficulties in retaining and retrieving newly learned information, and for children with severe TBI, memory deficits may worsen over time. Memory and concentration impairments are particularly handicapping in the classroom (Hawley, Ward, Magnay, & Mychalkiw, 2004). Deficits in memory and concentration interfere with the process of learning where students are required to intake, process and apply concepts. There is also evidence that having a prior concussion can prolong recovery (Covassin, Stearne, & Elbin, 2008). Behavioral signs that someone has suffered a concussion include showing signs of confusion, such as going in the wrong direction, difficulty with balance directly following impact, forgetting plays, slurred speech, slow response, or any change in typical behavior or personality (CIF, 2015). Boys are reported to have a lower rate of concussion than girls in

similar sports. However, the disparity in the number of concussions could be attributed to the fact that male athletes may be more reluctant to report their injuries. The low incidence of boys reporting concussions could be due to fear of not being allowed to play or pressure from teammates and coaches to return to the game (Halstead & Walter, 2010).

The need for a formal set of concussion management guidelines arose from the concerns of athletic trainers and physicians that often found themselves arguing with athletes, parents, and coaches when removing players from competition for their safety (Kelly & Rosenberg, 2001). In the past, if an athlete did not lose consciousness they were assumed to be okay. Loss of consciousness occurs in less than 10% of all concussions (Halstead & Walter, 2010). Given that a concussion is not a visible injury, and that students can appear physically healthy after a concussion, adults may expect that young athletes can function normally. In the absence of a physical injury, teachers and schools administrators may not understand that injured students experience many cognitive, emotional, and physical deficits due to the symptoms of their concussion and may need academic adjustments to help them during recovery. Although a concussion can have direct effects on a young athlete's ability to learn, there is also evidence that injured students trying to learn may worsen symptom and prolong the time needed for recovery (Baker et al., 2015; Halstead et al., 2013). Skills students employ while learning, using cognitive brain function, can add stress to the already injured brain. Too much cognitive activity too soon can cause an increase in the severity of concussion symptoms (Halstead et. al, 2013). In addition to a formal set of concussion management guidelines to return students to the field, there also needs to be a formal protocol to reintegrate students back to the classroom.

"The goal during concussion recovery is to avoid overexerting the brain to the level of worsening or reproducing symptoms. Determining the appropriate balance between how much cognitive exertion and rest is needed is the hallmark of the management plan during cognitive recovery" (Halstead et al., 2013, p. 949). Exacerbation of symptoms due to cognitive exertion is of specific concern for educators, as it is expected that students exhibit a significant amount of cognitive effort when engaged in learning (Bradley-Klug et al., 2015). Re-introducing cognitive activities in small doses is imperative for the healing process because it allows the brain time to recover (Williams et al., 2015). Ultimately, the goal is to keep disruptions in the student's life to a minimum. Even though they may still be experiencing symptoms, students need to return to school and their routines as soon as possible. As students recover, stimulation can be increased gradually, in terms of minutes. As soon as students can tolerate 30-45 minutes of stimulation without re-triggering concussion symptoms, they are ready to try to attend school.

Patients who returned to school performed better on each domain of imPACT testing and reported fewer post-concussion symptoms compared to those that did not return to school (Eastman & Chang, 2015, Majerske et al., 2008). Returning to school should be a top priority for children and adolescents experiencing concussion even more so than return to sport. The primary occupation of childhood is that of a student. Therefore, it is critical for children to get back into the classroom with appropriate modifications (DeMatteo, et al., 2015). Research concerning how a concussion can affect the learning and academics of students is limited. The lack of research makes it challenging to develop appropriate and useful guidelines to return the students to the classroom (Halstead et al., 2013).

Increasing evidence that children and adolescents benefit from a controlled, gradual return to learn approach, rather than an attempt to go back to a full load immediately. Gradually re-integrating students to the classroom resulted in symptom abatement (Baker, Leddy, Darling, Rieger, Mashtare, Sharma, & Willer, 2014; Bradley-Klug et al., 2015; Halstead, 2013; Master et al., 2012). If left on their own, patients often pursue a too rapid return-to-learn with a steep ramp up of return to cognitive activity, which often results in the exacerbation of concussion symptoms that had previously been improving. Re-triggering symptoms prolongs a students' recovery and return to full activity (Master et al., 2012). Many post-concussion student athletes are unable to resume that level of sustained cognitive activity after injury and cognitive rest; they require time to gradually return to the degree of stamina necessary to participate in a full day of school (Bradley-Klug et al., 2015; Master et al., 2012).

As symptoms become tolerable, enough for students to concentrate for 30-45 minutes, they may return to school with the use of supplemental academic adjustments (Halstead et. al, 2013). The challenge of the academic team is to find a balance between the need for students to attend school and the cognitive and emotional demands placed on them. The right balance can be achieved with the appropriate adjustments for the school requirements that have the potential for increasing symptoms (Halstead et al., 2013). Current post-concussion recommendations for academic adjustments include shortened school days, tutoring, a note taker or printed note sets, reductions in academic workloads, extended time for completion of assignments and tests, limited homework, no more than one quiz/test per day, and avoiding loud areas (CIF, 20116; Wasserman et al., 2016). To benefit from instruction in the classroom setting, students need to both attend school and have the cognitive ability to retain and apply knowledge (Bradley-Klug et

al., 2015). When students return to school, they need adjustments to avoid re-triggering concussion symptoms. Students may be able to tolerate certain academic subjects or classes better than others. Limiting assignments in, or exposure to, classes that exacerbate symptoms allows for a smooth re-entry. Teachers may make additional academic adjustments to help students succeed. Students should start with half days at school. When a half-day of school is tolerated without triggering concussion symptoms, a progression from a full day at school with maximal supports to a full day with no supports should be followed; each reduction in supports representing its own step (Bradley-Klug, 2015). Teachers and those on the academic team should reassess progress at weekly intervals to determine the effectiveness and continued need for adjustments (Halstead et al., 2013). As their concussion symptoms improve, students can gradually increase their cognitive and social activities as tolerated (Halstead et al., 2013). Teachers can begin assigning more work, or the students can try attending a social event.

While they are at school, concussed students can benefit from academic adjustments (AA). The type of academic adjustments put in place should depend on the type and severity of concussion symptoms, specific teaching styles used by a teacher in the classroom, and pattern of the symptoms (Halstead et. al, 2013). Standard accommodations include a quiet location to use as needed for cognitive rest. A rest period is typical every two hours or so during the school day. It is important that any nonessential schoolwork is excused because concussions are a brain injury (Master et. al, 2012). Additional time and extended due dates are needed for all essential assignments and projects. Tutoring and extra help may also be necessary. Preprinted class notes may be an important supplement to taking notes in class. Providing students with additional time may be part of the plan as part of their preparation for taking tests, only when students can

tolerate a full day school and full normal workloads (Master, et. al, 2012). In extreme cases, when a letter from a physician is insufficient to secure academic accommodations, a formal 504 plan or individualized education plan (IEP) may be needed. (Master et. al, 2012). According to the Individuals with Disabilities Act, after three weeks with concussion symptoms, students are eligible for a formal 504 plan to guarantee accommodations.

A critical component that encompasses all of the steps within a return to learning protocol is communication. Given the impact concussion has on student's social, physical, behavioral, and emotional functioning, numerous stakeholders (e.g., athletic trainer, medical doctor, school psychologist, counselor, or teacher) are likely to be involved. Therefore, it is important that all colleagues share information to best support the student and ensure that the student's needs are being met (Bradley-Klug, et al., 2015). Many researchers recommend a team of individuals to help the concussed student return to school as smoothly as possible. In the early phases of a concussion, the school academic team must coordinate the return of the student to class and help to facilitate the appropriate level of academic adjustments necessary to reduce or eliminate symptoms (Halstead et al., 2013). As soon as the AT identifies a concussion injury, key members of the school staff including the guidance counselor and teachers should be notified. The notification typically indicates that the student may temporarily need assistance, as described above, with managing symptoms and academic demands. The school academic team should include as many of the following as possible: teachers, counselors, athletic trainer, school nurse, administrators and the school psychologist. A point person on the team should be identified to coordinate all team members (Bradley-Klug et al., 2015).

An individualized academic component to high school concussion recovery programs to gradually reintroduce students back to learning is needed as each student exhibits different combinations of concussion symptoms. A teenager's main job is to be a student. To be successful in school, students are required to use many cognitive, physical, and emotional skills that are affected by the symptoms of a concussion. Students need help navigating the many different parts of their re-entry to school such as how much school to attend, which work or tests to make up first, and who to go to if they are having issues as their brain recovers. A formal protocol prevents parents, coaches and the athletes themselves from doing too much too soon, which could exacerbate or re-trigger concussion symptoms. A formal protocol establishes a line of communication between the athletic and academic areas of a student's life. This communication would allow the academic concussion recovery protocol to be individualized and based upon the symptoms being experienced by the student.

Involving teachers in developing an academic component to a concussion recovery program is important as determined by Diego (2017) in a study where academic staff assisted in curricular design of a concussion recovery program. They are the ones that work most closely with the students as they recover. They can closely observe which academic accommodations are working and whether they need to be adjusted. All of the teachers who participated in the study were excited to be involved in helping their students during their recovery and wanted to do what was best for the student. Participants also felt that the academic concussion protocols would improve the concussion recovery program, while smoothly re-integrating students back to the classroom. Teachers felt that these protocols would positively involve them in their students recovery and would help students and staff work together during the transition.

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