April 2014

COLORADO DEPARTMENT OF EDUCATION

CONCUSSION MANAGEMENT GUIDELINES

Acknowledgements

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CDE also thanks the many school district representatives who have met monthly in the Concussion Action Teams meetings, providing hands-on advice and input on the implementation of concussion management within school districts.

This document can be viewed for free on the Colorado Department of Education website:
http://www.cde.state.co.us/HealthAndWellness/BrainInjury.htm

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Preface

In the United States legislation addressing youth concussion has been enacted in all 50 states and the District of Columbia, according to Education Week. The majority of traumatic brain injuries (TBI) occur in youth between the ages of 5 and 18. This age group is at an increased risk of experiencing a TBI and prolonged recovery (Gilchrist, Thomas, Xu, McGuire, & Corondo, 2011). In an effort to address this issue, Governor John Hickenlooper signed Senate Bill 11-040, also known as "The Jake Snakenberg Youth Concussion Act," into law on March 29, 2011. This law went into effect in Colorado on January 1, 2012.

The Colorado Department of Education developed "Concussion Management Guidelines" to educate school districts on S.B. 11-040 and to provide guidance to superintendents as they work to implement concussion management guidelines within their districts. These guidelines were originally published in January 2012. They were updated in April 2014 to reflect current literature.

Section 1: Introduction

What is a Concussion?

Concussions have historically been affiliated with sports and considered "just a bump on the head" or a "ding." They have often been referred to as the "silent epidemic." The Centers for Disease Control (CDC) estimate that approximately 1.6 to 3.8 million sports and recreational concussions occur each year (Langolis, Rutland-Brown & Thomas, 2006). This excludes the numerous children who sustain concussions from non-sports activities, such as motor vehicle accidents, falls and assaults.

In the past, a concussion was often compared to a "bruise" or a "bleed" in the brain. In actuality, a concussion is believed to be a disruption of ionic channels of the brain cells (Barkhoudarian, Hovda, & Giza, 2011). The CDC defines a concussion as "a type of traumatic brain injury, or TBI, caused by a bump, blow, or jolt to the head that can change the way your brain normally works. Concussions can also occur from a fall or a blow to the body that causes the head and brain to move quickly back and forth" (CDC, 2014). A concussion cannot be seen on a computed tomography (CT) scan or on a magnetic resonance imaging (MRI) scan because it is a microscopic injury that occurs on a cellular level. A CT or MRI scan may be completed to rule out a more serious brain injury such as intracranial bleeding, contusion, lesions etc. (Johnston, Prito, Chankowsky, et al., 2001; Harmon, Drezner, Gammons, et al., 2013).

A concussion is often referred to as a functional problem which means it can affect the way a person feels, thinks, experiences emotion and level of sleep/energy. When the doctor tells a parent that the CT scan or the MRI was normal, it does not mean that there was not a concussion. If there was a mechanism of injury (jolt to the head or body) followed by a sign and/or symptom then it is likely that the student sustained a concussion (refer to page 7 for a list of signs and symptoms).

One of the most dramatic signs of a concussion is loss of consciousness (LOC). Once believed necessary to make the diagnosis of concussion, research now shows that only 10 percent of concussions involve a loss of consciousness (Delaney, Lacroix, Leclerc & Johnston, 2002). Research has also shown that LOC does not predict a "bad" outcome (Collins, Iverson, Lovell, McKeag, Norwig, & Maroon. 2003). In fact, no doctor can predict the outcome of a concussion at the time of the injury. The majority of concussions resolve well without complication. A few concussions take 1 week to recover, most concussions take between 1 to 3 weeks to recover, and some concussions take months to years to heal. It is estimated that 80 to 90 percent of concussions resolve without long-term effects in about 1 to 3 weeks (Collins, Lovell, Iverson, Ide & Maroon, 2006). All the experts in the area of concussion agree that while recovering from a concussion, the student is extremely vulnerable and at high risk for further injury to the brain (Shrey, Griesback, & Giza, 2011). Experts are also concerned that once a student sustains one concussion, they are at 3 to 6 times higher risk of sustaining another concussion, sometimes with less force and often with a more difficult recovery (Guskiewicz, Weaver, Padua, & Garrett, 2000).

It is difficult to understand the complexities of a concussion since it can be sustained without visible damage on a CT/ MRI scan. It cannot be seen, therefore, is it really there? And if it is, how do we know if we are making it better and how do we know when it is healed? Understanding the mechanism behind a concussion helps most students, parents, coaches, and educators better appreciate the complexities of the recovery.

A concussion occurs when chemicals found within the brain cells become disrupted and unbalanced. As a result, potassium flows out of the brain cell and calcium flows into the brain cell. The overall result is inefficiency of the brain cell to properly deliver the much needed nutrients (especially glucose) to the brain (Giza & Hovda, 2001). The brain needs glucose to function. A person's ability to engage in just about any type of physical and/or mental activity can be hindered due to molecular changes.

Immediately after a concussion, the brain cells may be so dysregulated that even delivering enough fuel to sit up in a chair or to keep eyes open may place too much demand on the brain. When the brain is asked to do more than it can tolerate, it can either "flare a symptom" or symptoms may be exacerbated (McAvoy, 2012a; Sady, Vaughan, & Gioia, 2011). This theory helps explain why even the simplest of tasks may be too much to ask of a person immediately after a concussion. It is not uncommon in the first 24 to 72 hours of an injury that all a person can manage to do is sleep. Following in line with the theory of cellular inefficiency, it stands to reason that the "treatment" for a concussion is physical and cognitive rest (McCrory, et al., 2013).

Cells within the brain naturally and quickly begin to re-regulate. Within days of the concussion, a person can begin attempting more activities of daily living. A student may return to school as symptoms decrease and become less intense symptoms (Halstead et al., 2013). The channels in the brain cells tend to re-regulate themselves with rest over a period of 1 to 3 weeks. How easily an individual flares a symptom when trying to engage in activities becomes the best measure of how well the brain cells are re-regulating themselves (McAvoy, 2012a).

Take Home Point:

The reporting and monitoring of symptoms after a concussion and throughout the recovery is absolutely essential. Symptoms, in essence, become our "lab tests" for how the concussion is resolving.

Concussion Symptoms:

It is important to note that symptoms fall into four domains. All symptoms are important and the presence of any symptom must be taken seriously.

Physical (How a person feels physically)	**Cognitive** (How a person thinks)
• Headache • Neck pain/pressure • Blurred vision • Dizziness • Poor balance • Ringing in the ears • Seeing stars • Vacant stare/glassy eyed • Nausea • Vomiting • Numbness/tingling • Sensitivity to light • Sensitivity to noise • Disorientation	• Feeling in a "fog" • Feeling "slowed down" • Difficulty remembering • Difficulty concentrating • Slowed speech • Easily confused
Emotional (How a person feels emotionally)	**Sleep/ Energy** (How a person experiences energy and sleep)
• Inappropriate feelings • Personality changes • Nervousness/anxiety • Feeling more emotional • Irritability • Sadness • Lack of motivation	• Fatigue • Drowsiness • Excess sleep • Trouble falling asleep • Sleeping less than usual

Prevention:

A concussion is considered a traumatic brain injury. The only true antidote for brain injury is prevention. It is impossible to prevent all brain injuries as they occur from accidents even in the most careful of situations. Being an active participant in sports and engaging in physical activity inherently places student-athletes at higher risk for injury. However, before focusing primarily on identification and treatment of a concussion, this section is intended to remind school districts:

Before a brain injury occurs, make sure you maximize your chances of prevention

- Conduct periodic safety reviews on common play/sporting areas
- Provide appropriate and adequate staffing for sporting events and recess
- Provide appropriate access to protective gear (helmets, mouth guards)
- Provide appropriate fitting of protective gear
- Design guidelines and enforcement of appropriate and fair rules and techniques

Section 2: Concussion Policies and Legislation in the State of Colorado

Colorado Concussion Policies- Colorado High School Activities Association (CHSSA) Bylaws:

January 2010, voted into effect Bylaw #1790.21:

> "If at any time during participation, a student-athlete is removed from participation due to head trauma, the student-athlete must obtain a written release from a licensed practitioner before participating again. A school or school district may impose stricter standards."

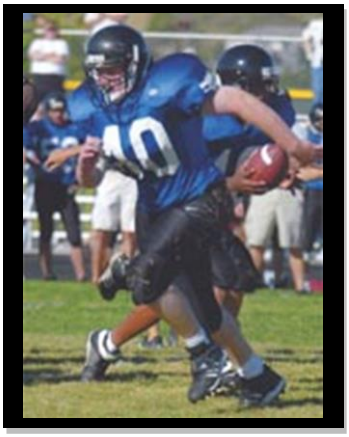
April 2010, voted into effect Bylaw # 1620.5:

> "All athletic coaches must annually complete one of the following: The online NFHS Concussion Course or a school organized sports medicine review that includes a head trauma/concussion component and emergency evacuation procedures."

CHSAA By-laws have only been able to oversee and govern activities in *public and private* high school settings in the state of Colorado. Member and associate member schools are required to accept the CHSAA Constitution and Bylaws as the minimum standards. (CHSAA, 2013b).

State of Colorado Legislation:

The field of concussion identification and management is changing every day. The state of Colorado has taken great strides in 2010 and 2011 to make sure that student-athletes are kept safe on the fields, stadiums and courts. On January 14, 2011, Senate Bill 11-040, also known as "The Jake Snakenberg Youth Concussion Act", was proposed. This legislation swiftly passed through the Senate and the House and was signed into law by Governor Hickenlooper on March 29, 2011. Senate Bill 11-040 went into effect on January 1, 2012.



Senate Bill 11-040 was named after freshman football player Jake Snakenberg from Grandview High School who died of Second Impact Syndrome (SIS). In the fall of 2004, Jake Snakenberg likely sustained a concussion in a game the week prior, however, he did not fully understand that he experienced a concussion and did not report his symptoms. One week later, Jake took a typical hit in a game, collapsed on the field and never regained consciousness. Jake passed away from "Second Impact Syndrome" on September 19, 2004.

Click here to view Senate Bill 11-040

What does this mean for school districts in Colorado?

The trend of national legislation, state legislation, the CHSAA Bylaws, and S.B. 11-040 promote these three basic tenets:

1) Education of concussion identification
2) Removal from play for suspected concussion
3) Return to play under medical supervision

The Colorado Department of Education (CDE) supports but does not oversee S.B. 11-040. CDE does not mandate certain practices for concussion training and management; however, CDE has a responsibility to ensure that school districts understand the requirements of the law, as it pertains to student-athletes ages 11 through 18 years.

CHSAA guidelines will continue to govern concussion education/management for all high school activities. The S.B. 11-040 guidelines are farther reaching than CHSAA. Colorado school districts are encouraged to be familiar with both the CHSAA guidelines and the S.B. 11-040 guidelines. In addition, a school district may choose to expand on the guidelines outlined by CHSAA or in S.B. 11-040. The following pages highlight how school districts can expand on the three tenets listed above by utilizing best practices.

EDUCATION

Required by Senate Bill 11-040

(This is only an excerpt of the Senate Bill that went into effect on January 1, 2012)

(1)(a) Each public and private middle school, junior high school, and high school shall require each coach of a youth athletic activity that involves interscholastic play to complete an annual concussion recognition education course.

(b) Each private club or public recreation facility and each athletic league that sponsors youth athletic activities shall require each volunteer coach for a youth athletic activity and each coach with whom the club, facility, or league directly contracts with, formally engages, or employs who coaches a youth athletic activity to complete an annual concussion recognition education course.

(2) (a) The concussion recognition education course required by subsection (1) of this section shall include the following:

(I) Information on how to recognize the signs and symptoms of a concussion.

(II) The necessity of obtaining proper medical attention for a person suspected of having a concussion.

(III) Information on the nature and risk of concussions, including the danger of continuing to play after sustaining a concussion and the proper method of allowing a youth athlete who has sustained a concussion to return to athletic activity.

Best Practice Guidelines for Education

(These are not required by S.B. 11-040 but should be considered)

In addition to education of concussion identification as determined in S.B. 11-040:

- Education to all school staff, not limited to coaches, who supervise students at play: elementary school staff, playground supervisors, office staff, before and after school programs, physical education teachers, school nurses, teachers and related services.

In addition to training on "identification" of concussion as determined in S.B. 11-040:

Training to all staff on both "identification" and "management" of a concussion. Management would include but is not limited to:

- The school staff's role as members of a multi-disciplinary concussion management team
- The school staff's role in reducing cognitive and academic demands during the recovery from concussion

On-line training can be found at:

NFHS→ www.nfhslearn.com/
Brain101→ http://brain101.orcasinc.com/
CDC→ www.cdc.gov/concussion/

Other trainings may be requested or available through the Brain Injury Alliance of Colorado (BIAC), Colorado Department of Education (CDE), and Colorado High School Activities Association (CHSAA).

REMOVAL FROM PLAY FOR A "SUSPECTED" CONCUSSION

Required by Senate Bill 11-040

(This is only an excerpt of the Senate Bill that went into effect on January 1, 2012)

(3) If a coach who is required to complete concussion recognition education pursuant to subsection (1) of this section suspects that a youth athlete has sustained a concussion following an observed or suspected blow to the head or body in a game, competition, or practice, the coach shall immediately remove the athlete from the game, competition, or practice.

Best Practice for Removal from Play

(These guidelines are not required by S.B. 11-040 but should be considered)

In addition to immediate removal from play for 11 through 18 year-old athletes as outlined in S.B. 11-040 (see above):

- Removal of any student who sustains a concussions, not limited to students between the ages of 11 through 18 years old.
- Removal of any student who sustains a concussion in any setting (e.g. on the playground, in the classroom, etc.) not limited to athletic endeavors.

In addition to immediate removal from (athletic) play, when a concussion is observed or suspected as outlined in S.B. 11-040: The student should be removed from any and all types of physical activity during the recovery, including but not limited to removal from PE classes, dance classes, physical play at recess and school organized sports.

If a school comes upon information from an outside source (reported to the school from the student, a parent, primary care provider, an emergency department) that a student (of any age) has sustained a concussion (e.g. motor vehicle or biking accident, fall, ski/snowboarding), the same principle of removal from all physical activity at the school should apply. This includes not only removal from PE classes, dance classes and recess but also removal from all school-organized sports, even though the injury did not happen at school.

RETURN TO PLAY (RTP)

Required by Senate Bill 11-040

(This is only an excerpt of the Senate Bill that went into effect on January 1, 2012)

(4) (a) If a youth athlete is removed from play pursuant to subsection (3) of this section and the signs and symptoms cannot be readily explained by a condition other than concussion, the school coach or private or public recreational facility's designated personnel shall notify the athlete's parent or legal guardian and shall not permit the youth athlete to return to play or participate in any supervised team activities involving physical exertion, including games, competitions, or practices, until he or she is evaluated by a health care provider and receives written clearance to return to play from the health care provider. The health care provider evaluating a youth athlete suspected of having a concussion or brain injury may be a volunteer.

"Health care provider" means:

doctor of medicine, licensed nurse practitioner, doctor of osteopathic medicine, licensed physician assistant, licensed doctor of psychology with training in neuropsychology or concussion evaluation and management.

(b) Notwithstanding the provisions of paragraph (a) of this subsection (4), a doctor of chiropractic with training and specialization in concussion evaluation and management may evaluate and provide clearance to return to play for an athlete who is part of the United States Olympic training program.

(C) After a concussed athlete has been evaluated and received clearance to return to play from a health care provider, an organization or association of which a school or school district is a member, a private or public school, a private club, a public recreation facility, or an athletic league may allow a registered athletic trainer with specific knowledge of the athlete's condition to manage the athlete's graduated RTP.

Best Practice for Return to Play (RTP)

(These guidelines are not required by S.B. 11-040 but should be considered)

S.B. 11-040 does not speak to the school district's role in this section. Best practice suggests that school districts create a multi-disciplinary team approach to concussion management including:

- A seamless system of communication between school professionals, medical professionals and the family. Information must flow smoothly from within the school to outside the school so that the return to play (RTP) decisions can be made safely. Appropriate releases of information will be necessary for school districts to speak with a health care professional outside of the school system.

- A seamless system of communication among school professionals. Information must flow smoothly between the school athletic departments and the school academic departments to ensure appropriate physical and academic adjustments during the recovery.

Best practice suggests that a school create a concussion management system that is adequate and consistent for any student, elementary through high school, who has sustained a concussion regardless of the setting or mechanism.

Best practice also recommends that a school district create a system in which a student may receive further assessment and intervention, if the concussion does not resolve in a reasonable amount of time. This may include formal accommodations and/or modifications of curriculum. Refer to page 21.

Section 3: Implications on Learning

The previous section illustrated that best practices suggests that schools support students through both physical and academic adjustments during the recovery process. As you read about supporting a student academically keep in mind that during this recovery time best practice indicates that the student should not be engaged in physical activity to reduce risk of another injury.

If a school team has information of a medical condition that will affect a student's ability to perform at school academically, socially, or behaviorally, it is the school's responsibility to intervene to assist the student during recovery (Halstead, et. al, 2013; Zirkel & Brown, 2014). For this to happen, the school professionals who work with the student must understand how a concussion impacts learning and how to appropriately support the student (Halstead, et. al, 2013).

To effectively support students it is recommended that schools have policies and procedures in place to manage the needs of these students (Sady, Vaughan, & Gioia, 2011). This provides a process by which schools are familiar with how to identify, assess, and provide adjustments to meet the student's health and academic needs following an injury. The protocol developed by the school should allow for support to be implemented immediately upon the student's return to school, ensure the student receives consistent messages from school professionals, and data is collected to determine how to best support the student as well as to track the recovery process (Zirkel & Brown, 2014; Sady, Vaughan, & Gioia, 2011). These supports not only increase the probability that the student can participate in and benefit from school but being proactive will hopefully mitigate the need to pursue child find and eligibility under IDEA (Zirkel & Brown, 2014).

Returning to School:

Students do not need to be asymptomatic to return to school (McAvoy, 2012a; Halstead, et. al, 2013). In fact, once symptoms are tolerable and manageable it is beneficial for a student to attend school with appropriate academic adjustments to minimize disruption to their life and prevent any secondary issues (Halstead, et. al, 2013). School professionals should be familiar with how a student's symptoms can both directly and indirectly affect their learning. For example, symptoms may impact a student's ability to be engaged in class (physical, emotional, and sleep symptoms) or they may have difficulty processing and retaining information (cognitive symptoms) (Sady, Vaughan, & Gioia, 2011). A list of symptoms can be found on page 7 and 16.

Individuals recovering from a concussion may experience different combinations of symptoms at varying degrees of severity, different symptom thresholds and a different recovery timeline (McAvoy, 2012a). These variances will influence the type and degree to which academic adjustments need to be utilized. It is also important to keep in mind that the recovery process will not only vary between students but the same student may experience a different recovery process following different concussive injuries (Halstead, et. al, 2013). This highlights the importance of an individualized approach to supporting students recovering from a concussion (McAvoy, 2012a; Sady, Vaughan, & Gioia, 2011; Halstead, et. al, 2013).

Prior to a student returning to school it should be determined that symptoms are "tolerable, short-lived, and/or amenable to rest and intervention" (Halstead, et. al, 2013). Returning to school and engaging in some level of learning should be feasible if the symptoms are manageable, intermittent and school professionals are able to support the student through appropriate academic adjustments (McAvoy, 2012a). The benefit of having the student passively attend school, even just listening and observing, far outweighs the secondary issues that can arise from keeping a student out of school too long (Halstead, et. al, 2013).

Some information has been published to provide more guidance around how to determine when it is appropriate for a student to return to school. However, keep in mind that is critical for there to be communication between the parent, student, and school to help determine when the student returns to school and the degree of academic adjustments (McAvoy, 2012a). In addition, these decisions are to be made on an individualized basis while taking into account numerous factors.

In determining when a student can return to school consider if they can attend for 30 to 45 minutes. This is based upon the observation that a good amount of learning (even passively) can typically take place in 30 to 45 minute increments. High schools (especially) lend themselves either to 7 or 8 periods, 30-45 minutes in length or 4 block periods, 90-minutes in length, allowing for rest mid-period or between periods or alternating periods (Halstead, et. al, 2013).

REAP Recommendations to Parents for Return to School:

STAY HOME- BED REST	STAY HOME – LIGHT ACTIVITY
If your child's symptoms are so severe that he/she cannot concentrate for even 10 minutes, he/she should be kept home on total bed rest - no texting, no driving, no reading, no video games, no homework, limited TV. It is unusual for this state to last beyond a few days. Consult a physician if this state lasts more than 2 days. **MAXIMUM REST = MAXIMUM RECOVERY**	If your child's symptoms are improving but he/she can still only concentrate for up to 20 minutes, he/she should be kept home- but may not need total bed rest. Your child can start light mental activity (e.g. sitting up, watching TV, light reading), as long as symptoms do not worsen. If they do, cut back the activity and build in more rest. **NO physical activity allowed!**

TRANSITION BACK TO SCHOOL
When your child is beginning to tolerate 30 to 45 minutes of light mental activity, you can consider returning them to school. As they return to school:
• Parents should communicate with the school (school nurse, teacher, school mental health and/or counselor) when bringing the student into school for the first time after the concussion. • Parents and the school should decide together the level of academic adjustment needed at school depending upon: ✓ The severity of symptoms present ✓ The type of symptoms present ✓ The times of day when the student feels better or worse • When returning to school, the child MUST sit out of physical activity – gym/PE classes, highly physically active classes (dance, weight training, athletic trainings) and physically active recess until medically cleared. • Consider removing child from band or music if symptoms are provoked by sound.

*Review REAP (Remove/Educe, Educate, Adjust/Accommodate, Pace) a community-based concussion management program for additional information (McAvoy, 2013c).

Cognitive Rest:

Although there is very limited research on how to manage return to learn (RTL), consensus is that physical AND cognitive rest are beneficial to the recovery process (McCrory, et al., 2013, Zirkel & Brown, 2014, Halstead, et. al, 2013, McAvoy, 2012a, Sady, Vaughan, & Gioia, 2011, McLeod & Gioia, 2010). Any student with a concussion should be allowed to reduce the amount of mental strain on the brain cells during recovery from the concussion. It is documented that mental/cognitive strain on the brain during the 1 to 3 week recovery from the concussion will cause an exacerbation of the symptoms and will hamper/delay recovery of the concussion (Majerske, et al., 2008). A recent study reiterated these results finding that individuals engaging in full cognitive activity took longer to recover than those who decreased cognitive activity (Brown, Mannix, et al. 2014).

It can be beneficial to assess what type of cognitive demands the student may be more sensitive to and to be mindful that activities at home (cognitive and sleep symptoms) may impact their ability to be engaged in school. Most students and parents do not realize that cognitive activities at home can exacerbate symptoms such as texting, playing video games, watching TV, working on a computer, etc. Therefore, parents and students should be taught that cognitive rest may require that these cognitive stressors be reduced for a period of time during recovery depending on the individual student's tolerance (Halstead, et. al, 2013; Sady, Vaughan, & Gioia, 2011; McLeod & Gioia, 2010).

The goal is to allow the student to be engaged in cognitive activities but to remain below their symptom threshold (Sady, Vaughan, & Gioia, 2011). School professionals need to work with the student to determine the appropriate amount of cognitive rest which involves not overexerting the brain but also not imposing unnecessary restrictions (Halstead, et. al, 2013). Each student will have a different level of tolerance for various cognitive activities which reiterates the importance of individualizing support (McLeod & Gioia, 2010). As the student recovers the level of manageable cognitive activity should slowly increase (Sady, Vaughan, & Gioia, 2011; Halstead, et. al, 2013; McLeod & Gioia, 2010).

The Role of the Teacher:

Each student's RTL process will vary in terms of when they return to school, their ability to tolerate their school schedule (this refers to tolerance for specific classes and length of the school day), and the type/degree of academic adjustments needed. The student and school professionals should be attuned to which classes exacerbate symptoms and therefore may be less tolerable. This may be impacted by the type of learning required in the class (i.e.: memorization) coupled with the type of symptoms experienced. Teachers should be in tune to both reported symptoms but also signs such as difficulty concentrating, irritability, memory difficulties etc. (Sady, Vaughan, & Gioia, 2011). It is important for the student to be academically engaged without feeling overwhelmed to the point where recovery could be hindered. School professionals are in the ideal position to determine which academic adjustments will best support the student during recovery and how to adjust academic demands during the RTL process (McAvoy, 2012a).

The Symptom Wheel on the following page may assist you as you begin to work with a student who has suffered from a concussion. The purpose of the Symptom Wheel is to help educators align concerns with solutions. Numerous symptoms have been identified within the Symptom Wheel and the adjacent boxes provide examples of corresponding interventions.

SYMPTOM WHEEL
Suggested Academic Adjustments

PHYSICAL:
"Strategic Rest"- scheduled 15 to 20 minute "head on desk" breaks (mid-morning; mid-afternoon and/or as needed)

Sunglasses (inside and outside)

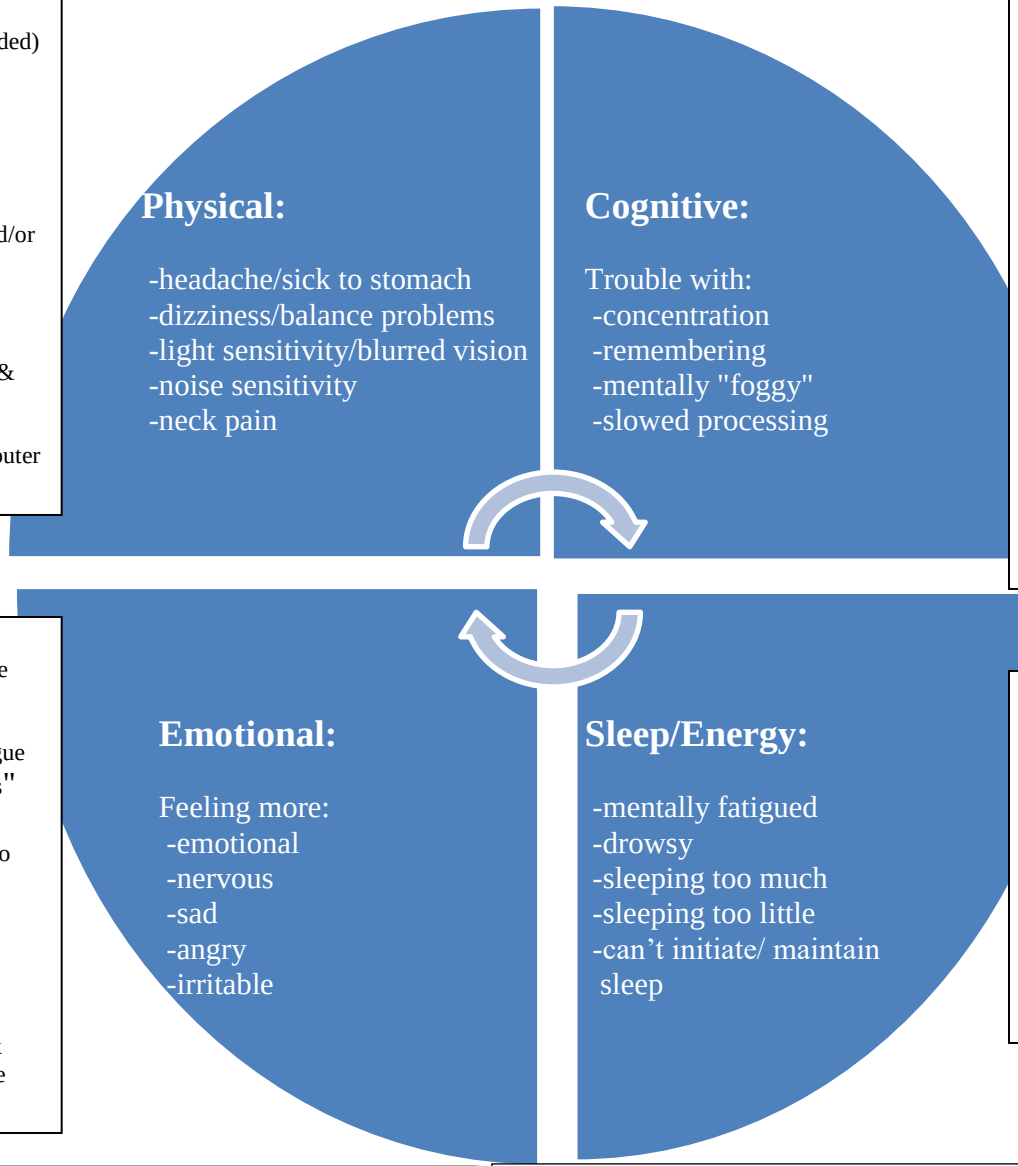
Quiet room/environment, quiet lunch, quiet recess

More frequent breaks in classroom and/or in clinic

Allow quiet passing in halls

REMOVE from PE, physical recess, & dance classes without penalty

Sit out of music, orchestra and computer classes if symptoms are provoked



COGNITIVE:
REDUCE workload in the classroom/homework

REMOVE non-essential work

REDUCE repetition of work (i.e. only do even problems; go for quality not quantity)

Adjust "due" dates; allow for extra time

Allow student to "audit" classwork

Exempt/postpone large test/projects; alternative testing (quiet testing, one-on-one testing, oral testing)
Allow demonstration of learning in alternative fashion
Provide written instructions

Allow for "buddy notes" or teacher notes, study guides, word banks

Allow for technology (tape recorder, smart pen) if tolerated

EMOTIONAL:
Allow student to have "signal" to leave room

Help staff understand that mental fatigue can manifest in "emotional meltdowns"

Allow student to remove him/herself to de-escalate

Allow student to visit with supportive adult (counselor, nurse, advisor)

Watch for secondary depression and anxiety, usually due to academic work piling up and/or social isolation. These emotional factors can delay recovery

SLEEP/ENERGY:
Allow for rest breaks while sitting in classroom: rest eyes, rest head on desk for 5 to 10 minutes per hour/period

Allow student to start school later in the day

Allow student to leave school early

Alternate "mental challenge" with "mental rest"

Symptom wheel updated 2013 (McAvoy, 2013c)
Original symptom wheel 2011 (CDE Concussion Management Guidelines January 2012)

The academic adjustments provided should be based upon the specific symptoms experienced by that particular student and adjusted as appropriate on an individual timeline (Sady, Vaughan, & Gioia, 2011). Academic adjustments implemented should be "logical, reasonable, and flexible" throughout the recovery process to meet the student's academic and health needs based on current symptoms (McAvoy, 2012a). To do this effectively the school should assess the student's needs, intervene as appropriate, monitor progress, and make adjustments as needed. This process (assess, intervene, monitor progress, adjust) is repeated until the student has recovered from the concussion (McAvoy, 2012a). It has been found that a controlled RTL process with a gradual increase in activity results in improved symptoms compared to abrupt return to full activity (Master, Gioia et. al, 2012).

Teachers can do a lot to aid in the healing of the concussion by "frontloading" academic adjustments for the concussed student. "Frontloading" academic adjustments refers to providing the majority of adjustments immediately following the injury and then weaning back on these adjustments over the next couple weeks as symptoms subside. The idea behind "frontloading" interventions is to allow time for the brain to rest and recover from the concussion. (Halstead, et. al, 2013, McAvoy, 2012a)

Guidelines have been developed that recommend that teachers assess a student's workload and categorize assignments based on what material is absolutely necessary versus excusable. Cognitive rest encompasses activities within the classroom as well as assignments. If all of the assignments and exams are simply postponed this can cause considerable anxiety for the student who recognizes that it will be difficult to make up all assignments. The idea behind removing nonessential school work is based on the fact that it may be physically impossible for the student to manage a double workload (new work + make-up work) (Master, Gioia et. al, 2012). The chart below conceptualizes two different ways modifying workload has been depicted.

William Heinz, M.D. – (Heinz, 2012)	
Excused Assignments	Not to be made up.
Accountable Assignments	Responsible for content, not process.
Responsible Assignments	Must be completed by student and will be graded.

Karen McAvoy, Psy.D. –(McAvoy, 2013c)	
Removed Work	Consider removing at least 25% of the workload.
Negotiable Work	Consider either "adjusting" workload or "delaying" workload.
Required Work	Consider requiring no more than 25% of workload.

It is not uncommon for students to be reluctant to accept adjustments and try to push through symptoms to complete work (Sady, Vaughan, & Gioia, 2011; Halstead, et al, 2013). Teachers of younger students should be aware that the student may have difficulty articulating their symptoms and academic needs (Halstead, et al, 2013).

Collecting Data:

Keeping an eye on the concussion and utilizing multiple sources of data is the safest way to manage a student-athlete through the course of recovery from the concussion. Therefore, best practice suggests that the responsibility of concussion management falls to the student, family, various school professionals and the medical professional. In other words, a multi-disciplinary team approach to concussion management is best practice (McAvoy, 2013c; Halstead et al, 2013; Sady, Vaughan, & Gioia, 2011).

Symptoms of the concussion will likely be evident at school. The pattern and trend of symptoms in both the school and home setting are essential pieces of data. Tracking symptoms during the recovery process will help guide schools in determining appropriate adjustments and to adjust supports based on the student's recovery process (Halstead et. al, 2013; Zirkel & Brown, 2014). This data should be used to help guide both return to learn and return to play decisions. All decisions should be made based on the data collected (Zirkel & Brown, 2014).

Symptom checklists are a common way to evaluate symptoms and to identify which adjustments may be beneficial. A sample checklist can be found on page 19. It is helpful to check in with the student weekly through a confidential conversation to assess their progress and to determine if adjustments need to be altered (Halstead et al, 2013). The symptom checklist helps to ensure that the student identifies the full range of symptoms that they may be experiencing not just the symptoms that are more predominant (McGrath, 2010). It should be confirmed that the reported symptoms have presented post-injury and to ascertain if the onset of symptoms are directly related to the concussion. Health care providers can provide insight into whether the symptoms are a direct result of the concussive injury or another medical issue/preexisting condition. Schools should also take into account factors that may influence the student such as social stressors (Halstead, et. al, 2013). As symptoms are tracked during the recovery process be cognizant of any symptoms that either emerge or worsen as this can be an indication of cognitive overexertion (Sady, Vaughan, & Gioia, 2011; Halstead, et al, 2013).

Parents and the health care provider should use the data collected from the school to make informed decisions particularly as it relates to medical clearance for return to play activities. The data collected by the school needs to be communicated to the parent. If the school has appropriate release of information then they can communicate directly with the health care provider. Information from the school can also be communicated to the health care provider via the parent/legal guardian.

Home activities and school demands can be increased as symptoms subside (McAvoy, 2012a; Halstead et. al, 2013). This process should be individualized and gradual based on the symptom threshold. For some students this gradual increase in tolerance of cognitive activity may occur at a more rapid pace than others (Sady, Vaughan, & Gioia, 2011; McLeod, Gioia, 2010). For clear guidelines on how to add back in physical activities (commonly referred to as return to play), readers are encouraged to go to the Consensus Statement on Concussion in Sport: The 4th International Conference in Sport held in Zurich, November 2012 (McCrory, et al., 2013).

Speak a Common Language:

If symptoms are the only way to know when and how the concussion is getting better, then it helps that the student, family, school nurse, teachers, counselors, coaches, certified athletic trainers, teachers, other school personnel and health care provider all speak the same language. Since a report of symptoms can be quite subjective, it is often helpful to use a rating scale. The rating scale can act as a common language for everyone involved in managing the concussion. Most concussion management programs now subscribe to a 0 to 6 rating scale (0 = not present; 6 = most severe experience of the symptom).

Symptom Checklist
(sample form)

Symptoms:	0 Mild	1	2	3	4	5	6 Severe
Headache							
Nausea							
Vomiting							
Balance problems							
Dizziness							
Fatigue							
Trouble falling asleep							
Sleeping more than usual							
Sleeping less than usual							
Drowsiness							
Sensitivity to light							
Sensitivity to noise							
Irritability							
Sadness							
Nervous/anxious							
Feeling More emotional							
Numbness or tingling							
Feeling like in a fog							
Difficulty remembering							
Difficulty concentrating							
Visual problems							
Other							

The Graded Symptom Checklist is recommended by the National Association of Athletic Trainers (Casa et al., 2012). The 0 to 6 symptom scale is commonly accepted by various tests: ImPACT (Immediate Post-concussion Assessment and Cognitive Test) and the SCAT3 (Sport Concussion Assessment Tool 3).

What to do when the concussion does not "clear" in the typical 3 to 4 weeks:

It is estimated that symptoms will linger beyond 3 to 4 weeks in approximately 10 to 20 percent of concussions (Collin et al., 2006). The term post-concussion syndrome (PCS) is often used to refer to situations where the individual is experiencing persistent symptoms for a prolonged period of time (Zirkel & Brown, 2014). When this happens, the school team is encouraged to continue academic adjustments and physical restrictions for a longer period of time. Symptoms may continue for weeks or even months. The Zurich Guidelines indicates that other pathologies should be considered when a concussion does not resolve in the anticipated timeframe (McCrory et al., 2013). This highlights the importance of the multi-disciplinary team communicating and collaborating to appropriately assess and support the student.

It is best practice for a school district to have a system in place by which a student can be evaluated for additional services such as a health plan, a section 504 plan, a Response to Intervention (RTI)/ Multi-Tiered System of Support Plan (MTSS), or special education per IDEA, if needed.

Applying Response to Intervention / Multi-Tiered System of Support to Concussion Management:

All 50 states have advanced concussion awareness through legislation focusing on early identification and early intervention. In the field of education, Response to Intervention (RTI)/ Multi-Tiered System of Support (MTSS) is an initiative that similarly focuses on awareness, early identification and early intervention for emerging learning and behavioral difficulties. As an approach to dealing with potential difficulties, RTI has grown in acceptance and support since its introduction in the reauthorization of IDEA (Individuals with Disabilities Education Act) in 2004 (US Department of Education, 2004). The essential elements of RTI/MTSS include:

- A multi-tier (three) level of increased intervention and support
- Quick implementation of research-based interventions, on-going progress to monitor and evaluate effectiveness
- Family education and involvement (RTI Action Network, n.d).

The essential elements of RTI/MTSS are often displayed on a three level pyramid:

1. Eighty to ninety percent of students benefit from the foundational Tier 1 (Universal Level). With good teacher training and awareness, problems can be detected in students in the collective setting of the general education classroom and can be immediately supported with ***adjustment*** of curriculum within the classroom (McAvoy, 2012b). Interventions are proactive and preventive (Batsche et al., 2005).

2. At Tier 2, an estimated 5% to 10% of students will need more targeted assessment and/or intervention (Targeted Level). Progress monitoring of these students may reveal a specific or continued need and may require small group instruction or ***accommodation*** of curriculum (McAvoy, 2012b).

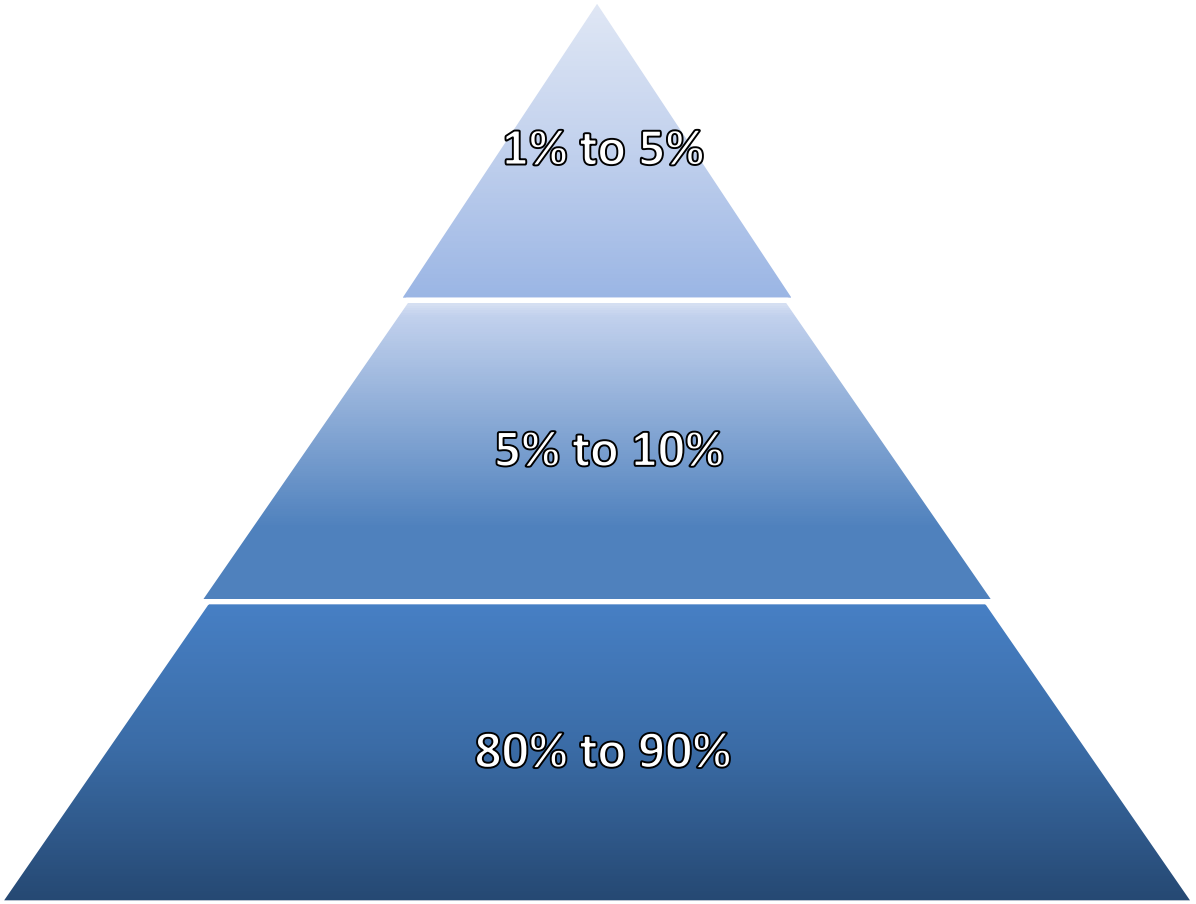
3. Finally, an estimated 1% to 5% of students will not respond to interventions at Tiers 1 or 2. They will need the most individualized intensive intervention of Tier 3 (Intensive Level). Special education identification is usually necessary at this level allowing for ***modification*** of curriculum, concentrated and individualized instruction and/or specialized placement (McAvoy, 2012b).

In the field of brain injury, a concussion ***is*** a brain injury. As many school districts are now being mandated through legislation to provide concussion awareness, education and management for students, school districts are being challenged to meet this new requirement. The existing model of RTI easily lends itself to a "Response to Management (RTM)" concussion protocol. (McAvoy, 2012b)

Tier 3
-Intensive Interventions
-High Intensity
-Longer Duration

Tier 2
-Targeted Group Interventions
-At- risk students
-High Efficiency
-Rapid Response

Tier 1
-Universal Interventions
-Preventive and Proactive



Tier 3
-Special Education/IDEA
-Academic Modifications

Tier 2
-Formalized Intervention Plans
-Academic Accommodations

Tier 1
-Multi-Disciplinary Teams
-Classroom Adjustments

Response to Intervention (RTI)
(Batsche et al, 2005)

Response to Management (RTM)
(McAvoy, 2012b)

Tier 1: Universal Level

Research determined that 80% to 90% of concussions resolve in 3 to 4 weeks (Collins et al., 2006). The majority of students with a concussion will respond positively to a well-orchestrated system of cognitive reduction, physical rest and academic adjustments in the general education classroom. Schools can assess a student's educational needs and determine how to best support their learning without medical consultation.

These interventions provided at Tier 1 (Universal Level) are simple academic adjustments to the existing classroom curriculum with slight changes to support physical and cognitive rest (refer to page 16 for examples of academic adjustments). The term academic ***adjustments*** is used intentionally to highlight the use of "universal interventions" which can be provided in the general education classroom immediately (without the delay affiliated with formal planning meetings). They are non-formalized adjustments and do not require changes to the curriculum (Halstead et. al, 2013).

General education teachers can support the student by providing appropriate individualized academic adjustments upon notification of the injury (Halstead et al, 2013). Teachers can use their professional judgment to determine which adjustments are most appropriate for that particular student. Information on "frontloading" academic adjustments can be found on page 17. The student's symptoms/ academic needs should be assessed, appropriate interventions implemented, progress monitored and adjustments made as appropriate. The idea is that adjustments can be applied quickly and easily altered as the student's needs change (McAvoy, 2012a).

Tier 2: Targeted Interventions

With the RTM model, the 10% to 20% of students who do not respond sufficiently to interventions at Tier 1 may need to be considered for "Tier 2: Targeted Intervention". It is suggested that the multi-disciplinary concussion team engaged at Tier 1 continue to both collect data on symptoms (assess- intervene- monitor progress- adjust) as well as communicate and collaborate with medical professionals and parents (family engagement) to promote further recovery. The objective of Tier 2 is to expand and strengthen academic ***accommodations*** to allow for greater recovery from the concussion (McAvoy, 2012b).

Communication between school professionals, the student, the family and medical providers is incredibly beneficial as you work to determine how best to support a student where you feel universal interventions may not be sufficient. In addition, the collaboration between multi-disciplinary teams is critical as you work to assess if other factors may be impacting the student's recovery process.

At Tier 2, a more formalized academic plan may be required for the student (McAvoy, 2012b).

Additional information on formalized academic plans:

Individualized Healthcare Plan:
CDE School Nursing and Health- Health Conditions
http://www.cde.state.co.us/healthandwellness/snh_healthissues

Section 504 Plans:
Office for Civil Rights http://www2.ed.gov/about/offices/list/ocr/504faq.html

Determining if a formalized academic plan may be appropriate:

Health care providers are unable to predict the length of recovery or severity of symptoms at the time of diagnosis. As your multi-disciplinary team works to determine if a formalized academic plan is appropriate there are several factors that should be considered.

- Assess symptoms in terms of frequency, severity, duration, and educational impact. Determine if the duration and severity of symptoms have resulted in compromised attendance and achievement goals (McAvoy, 2012a).
- Review academic adjustments that have been provided to the student, their degree of effectiveness and if adjustments are not sufficient despite being used to their maximum (McAvoy, 2012a). This would involve determining if adjustments have exceeded what can reasonably be provided within general education. The school problem-solving team should consider what other interventions may be helpful to the student (Halstead et. al, 2013).
- Review how much time has lapsed since the injury and how symptoms have progressed over that time period. Keep in mind that a formalized academic plan may not be necessary simply because the student is 3 to 4 weeks post injury. It may not be advantageous to develop a formal plan if it is anticipated that the concussed student may only need 1 or 2 more weeks of academic adjustments.
- Review the student's history of head injuries. Multiple head injuries may be an underlying issue in the prolonged recovery (McAvoy, 2012a).

- Take into consideration other factors that may impact the recovery process. Such as: history of concussions (number of previous concussions, time lapse between injuries, previous length of recovery and severity of symptoms), diagnosis of post-concussion syndrome (Zirkel & Brown, 2014), predisposition to headaches, family history, school avoidance (Halstead et. al, 2013), idiosyncratic neurological functioning (learning issues, attention issues, anxiety, depression, spectrum issues, sensory issues, underlying psychiatric issues etc.) (Sady, Vaughan, & Gioia, 2011; McLeod, Gioia, 2010).

It has been recommended that while school districts should have a process for responding to students as it relates to concussion and child-find responsibilities under IDEA and Section 504. However, this should not be common practice because academic adjustments should be able to appropriately support the majority of students. The symptoms must be of a severity and duration that qualifies the student under eligibility standards. Based on typical recovery from a concussion the school should be able to meet the majority of concussed students' physical and academic needs through either professional due diligence or an IHP. These determinations are the responsibility of the school (not the medical team) and should be based on data (Zirkel & Brown, 2014).

Tier 3: Intensive Interventions

At the peak of the RTI/RTM pyramid is the smallest percentage (1% to 5%) of students who do not adequately respond to concussion management efforts at Tiers 1 and 2 (McAvoy, 2012b). While these numbers are low, a small but significant percentage of students with concussion suffer severe and long-term neurocognitive and physical effects (Willer & Leddy, 2006). Students resistant to management attempts at Tiers 1 or 2 may need the most intensive level of assessment and intervention provided at Tier 3 (McAvoy, 2012b).

At Tier 3, ***modification*** of curriculum and protection under IDEA may be necessary (McAvoy, 2012a). The term academic modification is used to refer to the rare situations where the school has determined that the student is so severely impacted that they require specially designed instruction, specialized programming, specialized placement and/or modification of the general education curriculum that can only be accessed through special education (McAvoy, 2012b). This would mean that general education even with the implementation of academic accommodations is not sufficient.

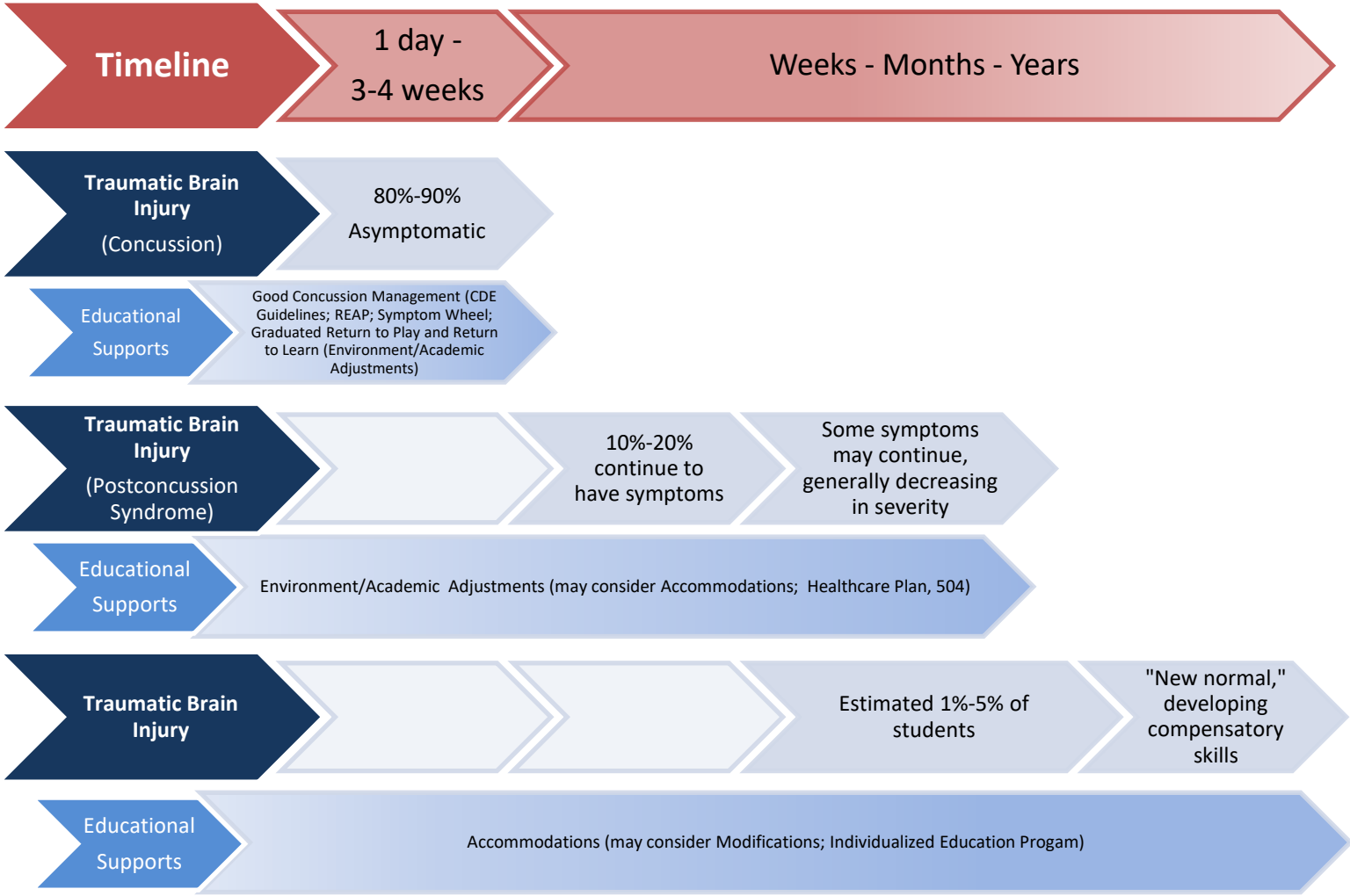
Assessing for eligibility under IDEA means that the district believes that the student may meet criteria for a disability classification and in meeting criteria it is demonstrated that the student has a need for special education. This evaluation is triggered by the student's current developing profile (which includes factors such as academic performance, medical information, and behaviors) as it relates to the source, severity, and effect of symptoms (Zirkel & Brown, 2014).

If the student is so severely impacted that an IEP is being considered then communication and collaboration between the school, family and medical provider is especially important. The medical provider can provide critical data to the school that may assist them as they work to determine the appropriateness of an IEP (Halstead et. al, 2013). Medical documentation may include information regarding the student's current symptoms, etiology, and prognosis. However, it is still up to the school to determine educational impact of the medical condition.

For additional information on determination of eligibility for a traumatic brain injury refer to the Colorado Department of Education Special Education Traumatic Brain Injury disability webpage (http://www.cde.state.co.us/cdesped/SD-TBI.asp).

Guidance on Providing Educational Supports:

*There is NO "one-size fits all" formula for recovery from a brain injury. Therefore, the information below is intended to provide general information only.



For additional information, review the Brain injury in Children and Youth: A Manual for Educators located on the following websites: http://www.cde.state.co.us/cdesped/SD-TBI.asp and http://cokidswithbraininjury.com/. (Chart is used with permission from Heather Hotchkiss, MSW.)

Section 4: Return to Play

S.B. 11-040 does not specify the school district's role from when the student is removed from play to when they return to play. According to S.B. 11-040, at a minimum, the school district must receive written clearance from a health care provider for any student-athlete, between the ages of 11 through 18 years, who has been removed from play due to a suspected concussion. A health care provider is specified as:

- Doctor of Medicine
- Doctor of Osteopathic Medicine
- Licensed Nurse Practitioner
- Licensed Physician Assistant
- Licensed Doctor of Psychology with training in neuropsychology or concussion evaluation and management

Outlined below is a range of options school districts may consider when working with a student who has sustained a concussion and is transitioning from removal from play to return to play. This process can be applied to all students, not just student-athletes. These suggestions are not required by S.B. 11-040 but are considered best practice.

Best practice suggests:

- A student with a concussion should be removed from all physical activity that occurs at school, including but not limited to physical education classes, dance classes, physical play at recess and school organized sports. Removing the student from physical activity is necessary to:
  - Reduce the risk of another injury to the brain. It is documented that the developing brain is at higher risk for the phenomenon of Second Impact Syndrome – a devastating or fatal second blow to the brain during the recovery of the first blow to the brain (Cantu, 1998). It has also been noted that adolescents that in addition to being vulnerable to a brain injury may also experience a longer recovery (Sady, Vaughan, & Gioia, 2011).
  - Reduce the amount of physical stress on the brain cells. It is documented that physical strain on the brain during the 1 to 3 week recovery from a concussion will cause an exacerbation of symptoms and will hamper/delay recovery of the concussion (CDC, 2012).

Return to Play (RTP) Decision:

Best practice for RTP follows the guidelines set forth by the Consensus Statement on Concussion in Sport: The 4th International Conference on Concussion in Sport held in Zurich (McCrory, et al., 2013). Although there is little guidance on RTP for children and adolescents in the 4th Zurich Guidelines, a few items have been outlined below:

4th Zurich Guidelines (2013)	Applied to School Environment
"It was agreed by the panel that no return to sport or activity should occur before the child/adolescent athlete has managed to return to school successfully".	In a school setting, this would infer that a student cannot be started on the graduated RTP steps until they have returned "successfully back to school" (inferred as full-time, functioning well & pre-concussion academic functioning).
"Children should not be returned to sport until clinically completely symptom-free, which may require a longer time frame than for adults".	The 4th Zurich Guidelines do not define "clinically completely symptom-free"; however, schools and teachers have many measures of a student's cognitive, emotional and physical recovery. In a school setting, this might look like: • Student's ability to handle all schoolwork, with no academic adjustments, to the level of their pre-concussion functioning. • Teacher's observations and professional judgment of student functioning at a pre-concussion level. • Student's ability to handle behavior and emotions at their pre-concussion level of functioning. • This would imply that a student who is getting ready to start the RTP steps would no longer need any academic adjustments (for symptom management) at school.
"An important consideration in RTP is that concussed athletes should not only be symptom-free, but also they should not be taking any pharmacological agents/medications that may mask or modify the symptoms of concussion."	This would imply that a student who is getting ready to start the RTP steps would no longer need any medications (over-the-counter or prescribed) for concussion symptom resolution at home or school.
"Because of the different physiological response and longer recovery after concussion and specific risks (e.g.: diffuse cerebral swelling) related to head impact during childhood and adolescence, a more conservative RTP approach is recommended. It is appropriate to extend the amount of time of asymptomatic rest and/or the length of the graded exertion in children and adolescents".	The 4th Zurich Guidelines do not specify number of days of "asymptomatic rest and/or length of the graded exertion in children and adolescents." In the absence of evidence-based recommendations, a school district and school ATC (if involved) should consider to err on the side of being conservative.
"It is not appropriate for a child or adolescent athlete with concussion to RTP on the same day as the injury, regardless of the level of athletic performance".	In a school setting, this would require immediate removal of student from play on the same day of injury, regardless the level of athletic performance. This would also require the school to have a system by which a student is immediately removed from play/physical activity if a concussion is suspected at school (on the playground, halls, classroom) – and not returned to play/physical activity (afternoon recess, PE class) later in the day.

(Chart is used with permission from Karen McAvoy, Psy.D.)

*It is recommended that the Consensus Statement on Concussion in Sport: The 4th International Conference on Concussion in Sport held in Zurich be read in its entirety and that the statements above be read in context.

When the data from the family and school (athletics AND academics) has been provided to the health care provider, the health care provider can then determine the safest time to start the graduated RTP. The health care provider may return the athlete *progressively* back to play per the graduated return to play guidelines. The 4th Zurich Guidelines outlines a six step, graduated RTP which stays consistent with the concept that the concussed brain will flare a symptom if it is asked to exert beyond its capacity physically or mentally (McAvoy, 2012a). As the athlete is asked to perform more and more rigorous physical activity (with 24 hours in between steps), a symptom will develop if the brain cells have not yet re-regulated themselves. If no symptoms return with increased exertion, the athlete will continue to move through RTP guidelines until eventually reaching the final step.

The graduated RTP guidelines are accepted as best practices for athletes. Best practice suggests that a graduated RTP is important for any and all students (not just an athlete) returning to activity.

The Graduated Return to Play Guidelines are as follows: (McCrory et al., 2013):

Stage	Activity	Functional Exercise	Objective of Stage
1	No Activity	Symptom limited physical and cognitive rest	Recovery
2	Light aerobic activity	Walking, Swimming or stationary cycling keeping intensity <70% maximum permitted heart rate. No resistance training.	Increase heart rate
3	Sport-Specific exercise	Skating drills in ice hockey, running drills in soccer. No head impact activities.	Add movement
4	Non-contact training drills	Progression to more complex training drills, (e.g., passing drills in football and ice hockey). May start progressive resistance training.	Exercise, coordination and cognitive load
5	Full-contact practice	Following medical clearance, participate in normal training activities; full exertion	Restore confidence and assess functional skills by coaching staff
6	Return to play	Return to normal activity	

*Review the Consensus Statement on Concussion in Sport: The 4th International Conference on Concussion in Sport for more specifics on implementing RTP Guidelines.

Neurocognitive Testing

Neurocognitive testing in the context of concussion may consist of brief computerized tests that assess an athlete's neurocognitive functioning pre-concussion and post-concussion. At the time of this writing, there are currently five neurocognitive tests on the market:

- ANAM (Automated Neuropsychological Assessment Metrics)
- AxonSports
- CNS Vital Signs
- ImPACT (Immediate Post-concussion Assessment and Cognitive Test)

While these measures are popular in the field of concussion management, they are not mandated in the 4th Zurich Guidelines. CDE does not endorse any one of these neurocognitive tests, nor does it endorse the addition of neurocognitive testing to a school district's concussion management protocol. Adding a neurocognitive test presents unique logistical and liability challenges to a school district. **A school district is advised to seek legal and risk management council before subscribing to any computerized neurocognitive test.**

However, if a school district does choose to incorporate a neurocognitive test into its concussion management protocol, that school district should be cognizant of and comply with:

Test administration guidelines:

- Who is credentialed to give the test?
- Who is credentialed to interpret the test?

Most of the neurocognitive tests have some guidelines about the credentialing of personnel to give/interpret the test. Research this carefully and comply.

Test standardization guidelines:

- Under what conditions the test should be given?
- Baseline tests are often suggested with these five neurocognitive tests. Be cognizant that baseline be administered systematically and in a standardized fashion.
- Under what conditions and at what intervals should post-concussion testing be given?

If a school district is involved in giving a neurocognitive test to a concussed student, results of that test should be shared with the parent and with the medical provider. Senate Bill 11-040 states that a Health Care Provider (as outlined in the legislation) needs to evaluate and provide written clearance to RTP for the youth athlete.

Take Home Points:

- No RTP decision can be based on test results alone. The neurocognitive test should only be used as additional information in the context of the more comprehensive multi-disciplinary team management protocol.
- No school district concussion management protocol can substitute the use of a test in lieu of sending the athlete to an approved health care provider.
- A neurocognitive test is a concussion management **tool**; it is not intended to be considered the concussion management plan/protocol for the district.

Other Testing:

It is standard practice in concussion identification and management, that sideline and post-concussion tests of mental status, orientation and postural-stability are used. School districts are advised to research the test credentialing, administration and interpretation requirements as well. These tests can be found under these names:

- Balance Error Scoring System (BESS)
- The Standardized Assessment of Concussion (SAC)
- Sport Concussion Assessment Tool 3 (SCAT3)
- Child-Sport Concussion Assessment Tool 3 (Child- SCAT3)

The results of these tests should be shared with the health care provider to be incorporated into the final medical clearance.

Section 5: Concussion Management

A multi-disciplinary concussion management team should consist of:

Family Team – the student, the parents, guardians, grandparents, siblings, student's peers

Medical Team - Doctor of Medicine (MD), Doctor of Osteopathic Medicine (DO), Nurse Practitioner (NP), Physician Assistant (PA), a licensed psychologist (with training in concussion management or a neuropsychologist). The health care provider may work closely with other medical professionals. Those adjunct team members may include: physical therapist, massage therapist, chiropractor, and occupational therapist. These professionals cannot medically clear the student-athlete of the concussion but they can be involved in the treatment of the concussion.

School Team - the school team has two distinct and important parts:

- The physical team – may include the certified athletic trainer, school nurse, coach, and physical education teacher, the athletic director and others.
- The academic team – may include the teacher, counselor, school psychologist, school social worker, an administrator and others.

(Additional information on the components of a multi-disciplinary team can be found in REAP.)

How to Create a Multi-Disciplinary Team:

CHSAA endorses the multi-disciplinary concussion management team approach as the safest way to return any student-athlete to play (CHSAA, 2013a). The multi-disciplinary team approach involves communication and collaboration. It supports the premise that: multiple "eyes" (perspectives) on the concussion and multiple "sources of data" will lead to the safest way to manage a concussion (McAvoy, 2013c).

PROGRESS MONITOR and SHARE DATA	Week 1	Week 2	Week 3
Family Team	*Assess and track physical, emotional, cognitive and especially sleep/energy symptoms *Continue to rest and reduce activity levels at home (i.e.: home restrictions may include no/limited texting, video games, TV, malls, etc.)	Continue into week two as needed *Parents can lift home restrictions as child can tolerate and as symptoms subside	Continue into week three as needed
School **Academic Team**	*Assess and track physical, emotional, sleep/energy and especially cognitive symptoms * Observe informal (academic performance) and formal cognitive measures (if a school district has made a choice to use neurocognitive tests) *Intervene: Adjust academic demands (refer to the symptom wheel on page 16)	Continue into week two as needed *Teachers can lift cognitive restrictions as student can tolerate and as symptoms subside	Continue into week three as needed
School **Physical Team**	*Assess and track cognitive, emotional, sleep/energy and especially physical symptoms * Observe formal and informal physical measures of mental status and balance (if a school district has made a choice to use such tests) *Continue to keep student out of physical activity	Continue into week two as needed *Schools cannot lift physical restrictions (i.e., PE, sports, physical play at recess, dance) at school until medically cleared by health care provider as required by Senate Bill 11-040 for athletes and as best practices for non-athletes	Continue into week three as needed
Medical Team **Ideally, the decision to return an athlete to play is based upon multiple sources of data and is made by consensus of the multi-disciplinary team** **However, the medical team has the ultimate responsibility to make final medical clearance**	*Assess concussion *Rule out other medical conditions *Collect symptom reports, formal and informal testing data from parents, school academic team, and school physical team	Continue into week two as needed *The health care provider can determine when it is safe (i.e., the student is 100% symptom free) to start the graduated return to play guidelines based on the data from parents and the school teams. (McCrory et al, 2013).	Continue into week three as needed

(Chart has been adopted from REAP and used with permission from Karen McAvoy, PsyD.)

One size does not fit all for the multi-disciplinary team. Large school districts may have many resources and smaller districts may have limited resources. Regardless of the size or demographics, any community/school can create a multi-disciplinary concussion team. The main focus of all school districts creating a concussion management protocol is – communication and collaboration. The essential players and flow of information is as follows:

A concussion is suspected or reported

This information comes to the school via:

- *An incident observed at a school sporting event*
- *An incident observed at a school*
- *An incident reported to the school from an outside source*

School Teams

School Academic Team:

1. It is important that the School Academic Team is informed of the injury.
2. Teachers are educated on how to adjust classwork and homework to reduce mental demands.
3. Student's cognitive recovery is monitored and checked frequently by a designated school professional on the School Academic Team.
4. All observations and data are shared with the School Physical Team, Family Team and the Medical Team. This communication and collaboration occurs from the time of injury through the entire recovery process.

AND

School Physical Team:

1. It is important that the School Physical Team is informed of the injury.
2. The student is removed from P.E. class, dance, physical play at recess etc.
3. The student-athlete is also removed from sports.
4. All observations and data are shared with the School Academic Team, Family Team and the Medical Team. This communication and collaboration occurs from the time of injury through the entire recovery process.

Communication between all three teams is imperative to good concussion management.

Family Team ⟷ **Medical Team**

All teams watch for symptoms and collect data, formally and/or informally. All data must be shared amongst team members and across teams. It is best practice that the return to play decision is made with convergent data by consensus of the multi-disciplinary team. When data is "divergent" and/or when there is no consensus on the multi-disciplinary team, a problem solving process should be engaged, with oversight from a school administrator. Under current legislation written clearance from a Health Care Provider is required for the youth athlete to RTP. A school team should consider all data in their decision-making for all academic and physical activities at school. For best practices and ultimately student safety the school has an obligation to take into account all data as they determine if a student has fully recovered from the concussion prior to RTP.

Individualized planning may be needed for other situations such as:

- Dissention/disagreement on the multi-disciplinary team
- Divergent data which cannot be explained
- Medical clearance provided from a health care provider despite school data which clearly indicates that the student is still symptomatic and/or has not returned to learn
- Differences of opinion about a student-athlete's RTP after one concussion, after multiple concussions etc.
- Questions about retirement from play
- Questions about level of academic adjustments/accommodations provided by the school
- Problem-solving arena for students moving from universal to targeted to intensive interventions as it relates to response to intervention (for more information see page 21)

Section 6: Developing Concussion Management Protocol

The purpose of this section is to assist school professionals within Colorado as they work to develop concussion management guidelines within their school district. This section has been designed to use in conjunction with the content found earlier in these guidelines. It was added to the guidelines in February 2014 to give school professionals a starting point and questions to consider as they begin developing protocol. Each school district within Colorado is unique and therefore the processes and forms utilized may vary based on student population, current processes in place, staffing, etc. As school districts work to develop concussion management protocol, it is important to ensure compliance with "The Jake Snakenberg Youth Concussion Act" Senate Bill 11-040.

CDE facilitates bi-monthly concussion action team (CAT) meetings. These informal meetings provide school professionals with the opportunity to engage in conversations with other school professionals across the state. During these meetings, school professionals share ideas, ask questions, and problem solve challenges or concerns that they may currently be facing. It can be beneficial to participate in these meetings as you work to develop and implement concussion management protocol. These meetings are available by teleconference. To receive information on the CAT meetings contact Toni Grishman, BSN, RN, CDE Senior Brain Injury Health Consultant at Grishman_t@cde.state.co.us

Considerations before Getting Started:

*Who should be involved in developing concussion management protocol?

It is ideal to develop a work group comprised of individuals that represent various disciplines within the school. Examples of school staff that you should consider having in your work group include teacher, school nurse, counselor, school psychologist, athletic trainer, athletic director, and an administrator. A multi-disciplinary work group helps to ensure that the role of each discipline is appropriately represented in the concussion management protocol developed to support students who have sustained a concussion. In addition, they can play a critical role in assisting in the implementation of the protocol.

It is beneficial to meet on a regular basis while you are in the process of developing concussion protocol. It is also helpful for the work group to be a manageable size to ensure productivity. Risk management and school district attorneys may want to review protocol prior to implementation and/or prior to neurocognitive testing being included in the protocol (refer to neurocognitive testing on page 31).

*What should we do before our initial meeting?

Your school team should assess if there are any processes currently in place related to concussion management. Keep in mind, these processes may be formal or informal. These processes may be school district protocol or protocol being used by a single school within the district. The processes may include protocol being used by school nurses, athletic trainers for athletes, or the process of involving problem solving teams when students experience difficulties in academics for an extended period of time.

School processes that are already established for documenting medical needs, making temporary academic adjustments, and communicating student specific needs to staff may be applicable to your concussion protocol. If your team is able to include concussion into already existing processes for other temporary health needs or temporary adjustments to academic work then this can make the development and implementation of protocol to support concussed students less cumbersome. Keep in mind most concussions will resolve within 1 to 3 weeks with physical and cognitive rest (refer to page 5).

The school team should review this guide in its entirety and review current literature on best practices prior to developing concussion management protocol. In addition, school professionals can take advantage of the opportunity to ask questions and converse with other school professionals during CDE Concussion Action Team meetings.

**What are some potential agenda items for the initial meeting?*

Determine the purpose of your work group and what you are trying to accomplish. This may involve developing protocol for one school versus the school district, starting with the development of concussion protocol for athletes then expanding to cover all students, piloting the protocol in a few schools then expanding it to others once the protocol has been piloted and adjusted as needed. It is important to ensure that at a minimum the school district is in compliance with Senate Bill 11-040.

Once the work group goals have been determined take into consideration the questions outlined below. Keep in mind that concussion management protocols will vary between school districts based on the student population, staff to student ratio, processes currently being used within the school, and the type of school (i.e., elementary, middle, high school, private, charter, etc.).

**What should your team consider as they develop concussion protocol?*

- Are there any concerns regarding how concussions are currently being managed?
- Have members of the work group reviewed current literature, gathered information from CDE Concussion Action Team meetings, reviewed best practices, etc.? What practices would be beneficial to incorporate into your protocol?
- Are there other processes already in place within the school that can easily lend themselves to concussion protocol?
- What are the current job responsibilities of staff and how can they be applied to supporting students who have sustained a concussion?
- Do you have the support of administration?
- Will this protocol support ALL students?
- Can the protocol be used at the elementary, middle and high schools?
- Will this protocol be sustainable? Assess if the protocol is dependent upon a specific person or role. Can the protocol be triggered through multiple ways?
- Can the protocol be adapted as needed to meet future demands?

Getting Started:

The process outlined on the following page represents one example of a simplified concussion management process. The purpose of the step-by-step process is to provide general guidance as well as a visual illustration to emphasis the importance of notifying school staff of the injury, collecting data, and supporting the student during recovery. It is important to remember that the recovery process will look different for each student and it may not be a linear process for every student. The CDE Concussion Management Guidelines should be read in its entirety and additional supplemental articles reviewed as needed to fully understand best practices and factors that may impact the recovery process.

The information provided on pages 41 - 47 will need to be adapted to fit your specific school and/or school district. The content is provided in this manner to provide school professionals with considerations to take into account as they determine how to coordinate supporting a concussed student.

This is an example of a concussion management process that includes components cited within best practices for all students.

Step 1 Injury Occurs

Student Sustains concussion

Meet with Student
Communicate with parents and health care provider (with appropriate consent). The type and severity of symptoms will influence appropriate timing for return to school and academic adjustments.

Remove from Physical Activity
(Physical Education, Recess, Athletics, Dance, etc.)

Step 2 Team is Notified

- Counselor
- Student's Teacher(s)
- School Health Aid/ School Nurse
- Parent/ Guardian
- Coach/ Athletic Trainer (for athletes)

Provide Data

Step 3 Collect Data

Point Person
(should be someone with the ability to follow a student regardless of athletic status)
(Refer to page 45)

Provide Data (If Appropriate)

Step 4 Provide Data

- **School Nurse** (involvement of school nurse regarding the recovery of the student may vary)
- **Health Care Provider** *Only with appropriate consent
- **Parent/ Guardian** *Encourage parent to share data with Health Care Provider

Repeat steps 2-4 until student is symptom- free.

Step 5 Return to Learn

1. The student's academic adjustments should gradually decrease as symptoms resolve until the student eventually returns to their normal academic rigor.

(Refer to page 20 for information on students who continue to experience symptoms.)

Step 6 Symptom-Free

1. Data collected from student, school staff, parents & neurocognitive testing (if appropriate) indicates student is symptom- free.
2. Student is symptom- free with no medications (such as Tylenol, ibuprofen etc.)
3. Student is no longer requiring adjustments within the classroom/to their school schedule.

(Refer to page **20 for information on students who continue to experience symptoms.)**

Step 7 Return to Play

1. Medical evaluation and approval to begin Graduated RTP.
2. Upon successful completion of the Graduated RTP Protocol you may obtain final medical clearance.
   (Refer to Senate Bill 11-040 for requirements of the legislation.)

* Communication must continue between school academic team, school physical team, family, and medical provider because gradually increasing physical activity may flair a symptom.

Communication between the multi-disciplinary team (page 33) occurs throughout the entire recovery process.

Step 1

Injury Occurs

A concussion may occur in school, during athletics or outside of school grounds. It is essential that awareness be raised among school staff, athletics, students and parents/legal guardians on how to recognize/report a concussion and how to initiate concussion management protocol to ensure the student is appropriately supported.

Once the school obtains information regarding the injury it is important that they follow up with the student, parent/legal guardian and/or the individual who witnessed the injury. It is beneficial to gather information on what happened, the medical diagnosis, and how the student is being impacted i.e., current symptoms (refer to page 19).

Information on the injury should then be communicated to all school team members that work with the student. The student should not be engaging in any physical activity where they may be reinjured such as: athletics, PE class, physical play at recess and also take into account situations where they are at risk of being hit or knocked over as a bystander (refer to page 11).

It is beneficial to follow and support a student regardless of their current athletic status. Take a moment to consider the fact that all concussed students can be impacted academically and are at risk of an additional injury during recovery. Additional situations to consider include: a concussed student who is about to transition into an athletic sport, a student transitioning between sports, an athlete being managed by an athletic trainer as the season ends but will still require academic adjustments.

Step 2

Team is Notified

The step-by-step process located on page 41 provides suggestions of disciplines that may need to be notified after an injury has occurred. This list is not comprehensive and school districts need to determine which school professionals need to be notified of the injury in order to properly support the student. In addition, take into consideration the best way to notify school staff this may be verbally, through written communication, or through electronic communication.

As you determine each disciplines role in concussion management you should take into consideration their current job responsibilities. In communication with each discipline determine if they are currently providing support related to concussion management or if they are providing support that is similar to what is needed for concussion management.

School professionals may notice concussion signs and symptoms that the student is experiencing following the concussion. The list below represents disciplines that may be involved in supporting the student during recovery the recovery process.

School Nurse: Take into consideration what medical injuries nurses are currently notified of and how they prefer to be notified. What protocol do they follow for a "head bump" versus a suspected concussion? What is required by risk management for a head injury? What injuries are documented and who documents injuries? Who communicates with medical providers? When a concussion is documented do you also record when the student is symptom free, returns to learning, and has been cleared by a medical provider?

School Health Aid/ Para or Administrative Assistant: This refers to the school staff member who is responsible for seeing students when the nurse is not in the building. They should be aware of the signs and symptoms of a concussion, who to notify if a student is injured, and which students have sustained a concussion since they may seek rest and/or medications for symptoms.

Student's Teachers: The teachers should be aware of the injury so they can reduce cognitive demands as appropriate. For more information on academic adjustments refer to Section 3: Implications on Learning.

It is beneficial to notify the teacher of the student's reported symptoms and suggested classroom adjustments. This may take more coordination for students who have multiple classes and teachers. Teachers should also be aware that adjustments that are appropriate in the first few days following the injury may not be appropriate in subsequent days. Academic adjustments may need to be continuously adjusted as the student recovers. School professionals should be assessing the student's academic needs, intervening as appropriate, monitoring progress, and modifying academic adjustments as needed.

Parent/Legal Guardian: Review your current processes for notifying a parent when an injury occurs on school grounds and determine if they apply to all head injuries or suspected concussions. When a parent is notified of a head injury are they provided information on what to watch for at home? Is information also included on how to best support their child at home during the recovery process?

Senate Bill 11-040 "The Jake Snakenberg Youth Concussion Act" requires that the parent or legal guardian be notified if a student-athlete is suspected of having sustained concussion. To locate Senate Bill 11-040 refer to "Section 7: References". It is best practice for school districts to have a process of notifying parents/legal guardians of all head bumps and symptoms to look for following the injury. It is important to keep in mind that a serious injury such as a bleed may not be evident immediately following the injury. It is also recommended that parents are notified not only of the potential impact of a concussion but also the school policy for concussion management.

Information that is geared towards parents has been developed by the Center for Disease Control and Prevention (CDC) and can also be found in REAP. This information can be downloaded for free on-line. For additional information on these resources refer to Section 7: References.

Counselor: The counselors within the school may be involved in supporting teachers as they work to determine appropriate academic adjustments, assist in determining if/how to best adjust class schedule (especially for students with multiple teachers), and may be involved in problem solving teams for students who are having difficulty recovering from the concussion symptoms (refer to Section 3: Implications on Learning).

Coach/ Athletic Trainer: Communication between school academics and school athletics is essential. If a student is suspected of having sustained a concussion during athletics there needs to be a process of communicating this information to the school so the student can be followed, removed from physical activity and cognitive demands reduced. The coach or certified athletic trainer (ATC) may have valuable information/data such as signs and symptoms following an injury, pre-season baseline assessment data, etc. In addition, an asymptomatic student who has begun the graduated RTP guidelines may flare symptoms. School professionals from both academics and athletics should still be communicating during this process.

Communication between academics and athletics:
This communication is important for many reasons. Please consider the following scenarios:

1. A student who sustained a concussion in athletics. The school also needs to be informed so they can provide the appropriate academic support and remove the student from physical activity.

2. A student who sustains an injury outside of school. The school teams (teachers/ nurse/ counselor/ coach/ ATC) need to be notified so the student can be removed from physical activity and appropriate academic adjustments be provided while the student is recovering.

3. A student who has sustained a concussion and is about to transition into an athletic activity. This could also be a student who is transitioning between sports and the coach/athletic trainer for the upcoming sport needs to be aware of the injury and where the student is in the recovery process.

Step 3 Collect Data

The school will want to ensure that information regarding how a student is recovering from the concussion is shared with the appropriate individuals (parent and/or health care provider with appropriate consent). Some examples of information that is relevant for the school to share include classroom adjustments needed to support the student, symptoms reported or observed (changes from typical behavior), neurocognitive data, etc.

For logistical reasons it may be easier for an identified school professional within the academic setting to collect any information that is relevant for the parent and/or health care provider. This "point person" may vary by school, school district, and on a case-by-case student basis.

Who is a "Point Person"?

It is essential that the "point person" be someone who is regularly within the school setting and who has some ability to support/influence academic adjustments. This individual may be determined on a case-by-case basis depending on who knows the student the best and who is able to facilitate collecting relevant data and implementing appropriate interventions.

The appropriate person may vary by school district, school setting, and/or by student. For example, in some schools the nurse may be appropriate; however, in other schools a nurse may not be as accessible. The counselor may also be considered as the appropriate point person if this individual knows the student and can best advocate for the student's needs. In some situations the school may determine that a teacher is the most appropriate point person.

Ideally, information should be communicated in a way that is convenient for both the "point person" as well as school staff. If it is not convenient for school staff then this may impact the amount of feedback received. Information may be collected electronically (e-mail or documentation in a shared document/school electronic system) or written (submit paper copies). Also, consider if staff will be required to share feedback (even if this means noting that no symptoms were observed) or if it is understood that no feedback means symptom-free.

As a school team, review the current methods of documenting other health concerns/injuries and academic adjustments. If the school has the ability to document electronically this could allow schools to assess the educational impact of concussions on students through queries. The school may want to use queries to collect information on how many concussions have occurred, average length of recovery, most frequent academic adjustments needed, the number of school absences recorded due to concussions, etc. At a minimum it is recommended that the school record when the injury has occurred, when the student is "symptom free" (see page 7 for a list of symptoms) and when the student has obtained medical clearance. Your team should determine which school professionals will need to have access to the data and how to record appropriate information (preferably by a means that fits into current processes).

Step 4 Provide Data

The information collected regarding how the student is managing during the recovery process (symptoms experienced, changes from typical behavior, and adjustments needed within the school setting) should be reported to the parent/legal guardian. If the school has appropriate consent then this information can also be provided directly to the health care provider managing the student during this recovery process.

Repeat Steps 2 – 4 until symptom- free: The school multi-disciplinary team should be continuously monitoring the student, providing appropriate adjustments, and assessing progress. Keep in mind that the adjustments a student needs when they return to school are likely to change over time (this could occur in days to weeks following the concussion). The need for academic adjustments typically declines overtime (refer to Section 3: Implications on Learning).

Step 5 Return to Learn

As a student recovers from the concussion their symptoms should decrease and subsequently school professionals should be able to gradually decrease academic adjustments. This means they are engaged in school, completing assignments etc. with no academic adjustments and symptoms are not resurfacing. The Consensus Statement on Concussion in Sport: The 4th International Conference on Concussion in Sport held in Zurich indicates that the student-athlete should return to school successfully before they return to their sport or activity (McCrory et al., 2013). Best practice would apply this to all students. For additional information refer to Section 3: Implications on Learning.

Step 6 Symptom-Free

This occurs when all of the data collected during the recovery process (from parents, teachers, the student, neurocognitive testing, etc.) indicate that the student is no longer experiencing any symptoms, is no longer requiring academic adjustments/has returned to academic baseline, and is no longer needing medications to manage the concussion symptoms (refer to the Consensus Statement on Concussion in Sport: the 4th International Conference on Concussion in Sport held in Zurich).

Data supporting that the student is "symptom-free" within the school setting should be provided to the parent/legal guardian and to the health care provider (via the parent/legal guardian or directly with consent). The medical provider should incorporate this information with his/her own data and clinical expertise to determine where the student is in the recovery process.

Step 7 Return to Play

Best Practice would involve the student being symptom-free and the health care provider evaluating and providing approval to begin Graduated RTP. Following successful completion of the Graduated RTP Protocol the Health Care Provider can then provide final medical clearance. Senate Bill 11-040 requires that the youth athlete is "evaluated by a health care provider and receives written clearance to return to play from the health care provider."

Remember, a student should not RTP if they are still requiring adjustments in the school setting. This has been reiterated in the 4th Zurich Guidelines (McCrory et al., 2013). For this reason, along with the fact that a student may develop a symptom while increasing physical activity it is important that the school-academic team and the school-physical team stay in communication with each other regarding the student's recovery.

Review Senate Bill 11-040 for information on medical clearance, when a student-athlete *may* begin graduated RTP, and who is credentialed to be involved in these decisions/ processes. It is also important for the schools to review the language within the Consensus Statement on Concussion in Sport: the 4th International Conference on Concussion in Sport held in Zurich as it relates to graduated RTP.

Considerations following the Development of Concussion Protocol:

**Has the protocol been reviewed by appropriate school staff?*

This may include administration, risk management, legal, school professionals who will be involved in the process and in supporting students.

**How will you educate staff on this process as well as literature related to supporting students who have sustained a concussion?*

This may involve educating staff by discipline or by school. The information may be conveyed by one individual, by administration, or by a team of administrators that represent each discipline. Information may be explained in a variety of ways such as during an in-service or a meeting scheduled specifically to discuss this process. Take time to consider how staff have been informed about other processes implemented within the school/school district.

Determine how incoming staff will be provided with this information and how frequently staff will be reeducated on the content. In addition, make sure that staff is notified of who to contact if they have any questions.

**How will you educate parents/ students/ community?*

Parents, students, and health care providers are a part of the multi-disciplinary concussion management team discussed on page 33 and 34. This partnership will be enhanced if all parties are familiar with how a student can be impacted by a concussion, how to effectively communicate/ work with the school, and the school's process for supporting students.

Remember:

As school professionals work together to support students who have sustained a concussion it is important to review current literature and have a clear understanding the requirements of Colorado legislation and policies as well as best practices within the field.

CDE is available to provide support as needed to school districts. In addition, Concussion Action Team (CAT) meetings provide school professionals with the opportunity to engage in conversations with other school professionals across the state. It is an opportunity for school professionals to share ideas, ask questions, and problem solve challenges that they may currently be facing. These meetings are available by teleconference. To receive information on the CAT meetings contact Toni Grishman, BSN, RN, CDE Senior Brain Injury Health Consultant at grishman_t@cde.state.co.us.

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Concussion Resources:

American Academy of Neurology
https://www.aan.com/tools-and-resources/practicing-neurologists-administrators/patient-resources/sports-concussion-resources

Automated Neuropsychological Assessment Metrics (ANAM)
http://vistalifesciences.com/anam-faqs

AxonSports:
http://www.axonsports.com/

Brain 101:
http://brain101.orcasinc.com/

Brain Injury Alliance of Colorado:
http://biacolorado.org/

Brainline Concussion in Kids:
https://www.brainline.org/kids-tbi/concussion-kids

Centers for Disease Control and Prevention: Heads Up
https://www.cdc.gov/headsup/index.html

CNS Vital Signs
http://cnsvs.com/

Colorado Department of Education- Exceptional Student Services Unit:
http://www.cde.state.co.us/cdesped/SD-TBI.asp

Colorado Department of Education- Health and Wellness:
http://www.cde.state.co.us/HealthAndWellness/BrainInjury.htm

Colorado High School Activities Association (CHSAA)
http://www2.chsaa.org/

Colorado Kids Brain Injury Resource Network:
http://cokidswithbraininjury.com/

Colorado Senate Bill 11-040:
http://www.leg.state.co.us/clics/clics2011a/csl.nsf/billcontainers/A9CE9CEE12645CAA8725780800800D80/$FILE/040_01.pdf

Individuals with Disabilities Education Act (IDEA)
http://idea.ed.gov/

Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT):
https://www.impacttest.com/about/

MYBRAINTEST
https://www.mybraintest.org/

National Federation of State High School Associations (NFHS):
http://www.nfhslearn.com/

Response to Intervention (RTI) Action Network:
http://rtinetwork.org

Sport Concussion Assessment Tool – 5th Edition
https://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097506SCAT5.full.pdf

Standardized Assessment of Concussion (SAC):
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC155418/#!po=35.0000