



Center for Concussion

How every family, school and medical professional can create a Community-Based Concussion Management Program

REAP The Benefits of Good Concussion Management

Authored by Karen McAvoy, Psy.D.



The REAP Project

Reduce
Educate
Accommodate
Pace



At Presbyterian/St. Luke's Medical Center
The Medical Center of Aurora
North Suburban Medical Center
Rose Medical Center
Sky Ridge Medical Center
Swedish Medical Center



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The REAP Project

which stands for **Reduce • Educate • Accommodate • Pace** is a community-based model for Concussion Management that was developed in Colorado. The early origins of REAP stem from a groundbreaking study funded by the Centers for Disease Control (CDC) in 2004. In a typical high school in Colorado, a team of researchers (Dise-Lewis, Lewis and McAvoy) followed 92 students/athletes with concussions over a three-year period. The students/athletes taught the researchers many valuable lessons on how to manage a concussion.

The Colorado CDC study highlighted that **good concussion management** is not dependent upon any one particular neurocognitive test or intervention but instead **depends upon education and collaboration!**

The lessons learned from the Colorado CDC study were put into writing as — REAP. Funded by a grant from the Colorado TBI Trust Fund in 2009, the REAP model was piloted between Rocky Mountain Hospital for Children HealthONE Emergency Departments and four school districts.

In one year (2009-2010), the REAP project received over 150 referrals of students/athletes evaluated in Emergency Departments (ED) for concussion. After leaving the ED's, families, schools and community medical professionals were quickly contacted by the REAP Project and **education and community collaboration** commenced immediately. Countless more REAP referrals spontaneously developed via “word of mouth” between parents, physicians, schools and districts. The short-term and the long-term benefits from REAP have been overwhelmingly positive.

REAP is continuing to expand across Colorado as a model program for Community-Based Concussion Management.



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Medical note from Sue Kirelik, MD, Director of Pediatric Emergency Medicine, Rocky Mountain Hospital for Children at Sky Ridge Medical Center, REAP Medical Advisor.



Newer recommendations are that children and teens should be treated much more conservatively than adults when it comes to concussion. The developing brain is very different from the adult brain; it is much more likely to manifest symptoms later and have longer term problems when injured, especially if the child is not allowed to rest and recover. Because each concussion and each child is different, grading scales are no longer recommended. Care for each child and each concussion must be individualized.

TRUE or FALSE?

A concussion is just a “bump on the head.”

False! Actually, a concussion is a traumatic brain injury (TBI). The symptoms following a concussion can range from mild to severe and usually involve: confusion, disorientation, memory loss, slowed reaction times and extreme emotional reactions. The severity of the symptoms cannot be predicted at the time of the injury.

TRUE or FALSE?

A parent should awaken a child who falls asleep after a head injury.

False! Current medical advice is that it is not dangerous to allow a child to sleep after a head injury, once they have been medically evaluated. The best treatment for a concussion is sleep and rest.

TRUE or FALSE?

A concussion is usually diagnosed by neuroimaging tests (ie. CT scan or MRI).

False! Concussions cannot be detected by neuroimaging tests; a concussion is a functional, not structural, injury. Concussions are typically diagnosed by careful examination of the signs/symptoms of concussion at the time of injury and the resolution of symptoms afterwards. While a CT scan or an MRI is often used to rule out more serious bleeding in the brain, it is not a diagnostic test for concussion. A *negative* scan does not mean that a concussion did not occur.





Did You Know...

>> **More than 80% of concussions resolve very successfully if managed well within the first three weeks post-injury.**¹ REAP sees the first three weeks post- injury as a “window of opportunity.” Research shows that the average recovery time for a child/adolescent is about three weeks, slightly longer than the average recovery time for an adult.²

- >> The REAP project works on the premise that **concussion is best managed by a Multi-Disciplinary Team** that includes: the Student/Athlete, the Family, various members of the School Team and the Medical Team. The unique perspective from each of these various teams is essential!
- >> **The first day of the concussion is considered Day 1.** The first day of recovery also starts on Day 1. The REAP Project can help the Family, School and Medical Teams mobilize immediately to maximize recovery during the entire three week “window of opportunity.”

TRUE or FALSE?

Loss of consciousness (LOC) is necessary for a concussion to be diagnosed.

False! According to the American Academy of Neurology (AAN), a concussion is any “traumatically induced alteration in mental status that may or may not involve a loss of consciousness.” CDC reports that an estimated 1.6 to 3.8 million sports- and recreation-related concussions occur in the United States each year.³ 90% of concussions do not involve a loss of consciousness. While many students receive a concussion from sports-related activities, numerous other concussions occur from non-sports related activities – from falls, from motor vehicle, bicycle and playground accidents.

Message to Parents

To maximize your child’s recovery from concussion, double up on the R’s. **REDUCE** and **REST!** Insist that your child rest, especially for the first few days post-concussion and throughout the three-week recovery period. Some symptoms of concussion can be so severe on the first day or two that your child may need to stay home from school. When your child is at school, request that he/she be allowed to “sit out” of sports, recess and physical education classes immediately after the concussion. Work with your Multi-Disciplinary Concussion Management Team to determine when your child is ready to return to physical activity, recess and/or PE classes (see PACE).

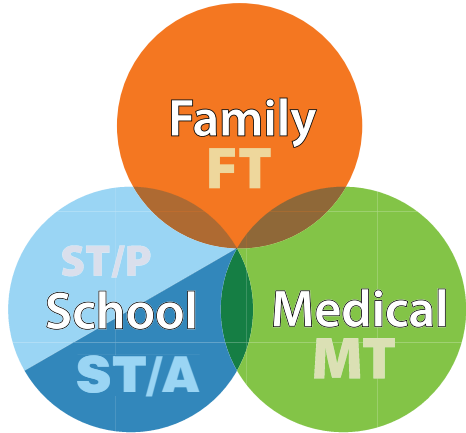
Don’t let your child convince you he/she will rest “later” (after the prom, after finals, etc.). Rest must happen immediately! The school team will help your child reduce their academic load (see ACCOMMODATE). However, it is your job to help to reduce sensory load at home. Advise your child/teen to:

- avoid loud group functions (games, dances)
- limit video games and text messaging
- limit reading and homework

A concussion will almost universally slow reaction time; therefore, driving should not be allowed pending medical clearance.

Plenty of sleep and quiet, restful activities after the concussion maximizes your child’s chances for a great recovery!

Community-Based Multi-Disciplinary Concussion Management Team



How to use this Manual

Because it is important for each member of the Multi-Disciplinary Concussion Management Team to know and understand their part and the part of other members, this manual was written for the entire team. However, as information is especially pertinent to a certain group, it is noted by a color.

>> Pay close attention to the sections in **ORANGE**

FT	Family Team	Student, Parents; may include Friends, Grandparents, Primary Caretakers and others...	For more specific information, download parent fact sheets from the various "Heads Up" Toolkits on the CDC website: www.cdc.gov/concussion/
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>> Pay close attention to the sections in **LIGHT BLUE**

ST/P	School Physical Team	Coaches, Certified Athletic Trainers (ATC), Physical Education Teachers, Playground Supervisors, School Nurses and others...	For more specific information, download the free "Heads Up: Concussion in High School Sports or Concussion in Youth Sports" from the CDC website: www.cdc.gov/concussion/
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>> Pay close attention to the sections in **DARKER BLUE**

ST/A	School Academic Team	Teachers, Counselors, School Psychologists, School Social Workers, Administrators, School Neuropsychologists and others...	For more specific information, download the free "Heads Up to Schools: Know Your Concussion ABCs" from the CDC website: www.cdc.gov/concussion/HeadsUp/Schools.html
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>> Pay close attention to the sections in **GREEN**

MT	Medical Team	Emergency Department, Primary Care Providers, Nurses, Concussion Specialists, Neurologists, Clinical Neuro-psychologists and others...	For more specific information, download the free "Heads Up: Brain Injury in your Practice" from the CDC website: www.cdc.gov/concussion/HeadsUp/physicians_tool_kit.html
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Jacob Snakenberg

April 19, 1990 – September 19, 2004

In the Fall of 2004, Jake Snakenberg was a freshman football player at Grandview High School. He likely sustained a concussion in a game the week prior, however, he did not fully understand that he had experienced a concussion and he did not report his symptoms to anyone. 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.

After your child/student has been evaluated and determined to have a concussion,

There is One Immediate and Essential Focus

>> **Reduce** the potential of further injury or stress to the brain! With concussion, it is important to reduce **both physical AND cognitive demands!**

Most of us know that when an athlete is injured, stress on that injured area needs to be immediately reduced. If an athlete sprains an ankle while running a marathon, the immediate action is to remove the runner from the race. With proper management of the injury and gradual rehabilitation, the athlete may be allowed to run again in a later race. Athletes know that following injury, immediate removal from activity and gradual return to activity is necessary to avoid serious, long-term physical effects or the potential for re-injury. Following a concussion, the student/athlete should be removed from sports, recess, physical education classes, etc. until further notice (see PACE).

In the marathon of life, a concussion is much like the sprained ankle --- it is an injury to the brain. Since the brain is the organ responsible for managing all moving (physical) and thinking (cognitive) functions of the body, both physical and cognitive demands on the brain must be reduced during recovery from concussion. Reducing just the physical demands alone (and not the cognitive demands) may delay or hamper recovery. Since school is the place where thinking demands are at their highest, REAP places great emphasis on helping the School Team-Academic (ST-A) understand their part in concussion management. In REAP, the ACCOMMODATE page will help schools provide strategies for cognitive reduction in school.

In rare cases, an unresolved concussion may set the stage for permanent brain damage and/or death.⁴ This phenomenon, known as Second Impact Syndrome (SIS), theoretically can occur when a second blow to the head is sustained before the first concussion has healed. The concern for SIS in the developing adolescent brain has led to the practice that concussion symptoms should be 100% resolved before further significant physical or cognitive stress is encountered.

Once the injury happens, the treatment of choice is to EDUCATE and COLLABORATE

Did you know that a doctor cannot predict the course of recovery at the time of the injury? The course of recovery depends 100% on the on-going (sometimes daily!) monitoring, management and resolution of symptoms!

>> **STEP 1: Educate...Know the Symptoms** Knowing *if* the student/athlete is recovering from the symptoms of concussion and *how* the student/athlete is recovering from his/her symptoms is still the best measure of recovery. Therefore, it is essential that everyone understand, recognize and be mindful of **ALL** symptoms related to concussion. Every symptom is important. The common symptoms of concussion cluster in general categories:

PHYSICAL How a Person Feels Physically

- | | |
|--------------------------|----------------------|
| Headache/Pressure | Nausea |
| Blurred vision | Vomiting |
| Dizziness | Numbness/Tingling |
| Poor balance | Sensitivity to light |
| Ringing in ears | Sensitivity to noise |
| Seeing "stars" | Disorientation |
| Vacant stare/Glassy eyed | Neck Pain |

COGNITIVE How a Person Thinks

- Feel in a "fog"
- Feel "slowed down"
- Difficulty remembering
- Difficulty concentrating/easily distracted
- Slowed speech
- Easily confused

EMOTIONAL How a Person Feels Emotionally

- | | |
|--------------------------|--------------------|
| Inappropriate emotions | Irritability |
| Personality change | Sadness |
| Nervousness/Anxiety | Lack of motivation |
| Feeling more "emotional" | |

MAINTENANCE How a Person Experiences Their Energy Level and/or Sleep Patterns

- | | |
|------------------------|--------------------------|
| Fatigue | Drowsiness |
| Excess sleep | Sleeping less than usual |
| Trouble falling asleep | |



Medical Box

"It is not appropriate for a child or adolescent athlete with concussion to Return-to-Play (RTP) on the same day as the injury, regardless of the athletic performance."⁵

Consensus Statement on Concussion in Sport: the 3rd International Conference on Concussion in Sport, Zurich 2008

IMPORTANT!

All symptoms of concussion are important; however, monitoring of physical symptoms is critical! If physical symptoms worsen, especially headache, confusion, disorientation, vomiting, difficulty awakening, within the first 48 to 72 hours, it is often a sign that a more serious medical condition is developing in the brain.

SEEK IMMEDIATE MEDICAL ATTENTION!

Thorough symptom monitoring is the key to good management. Therefore, REAP strongly suggests that all Multi-Disciplinary Concussion Team members, especially the student/athlete, learn to rate symptoms on a scale of 0 to 6. Assigning numbers to symptom intensity provides an objective measure and a common language for all team members to understand (see the Symptom Checklist in the APPENDIX).

>> STEP 2: Collaborate...Managing Your Multi-Disciplinary Concussion Management Team

Most students/athletes report that symptoms of concussion are most intense and most frequent Days 1 through 4, continue throughout Week 1 and begin to wane during Weeks 2 and 3. REAP has developed a suggested timeframe to check and monitor symptoms over a three-week period. REAP has also assigned recommended responsibilities to certain teams to manage specific symptoms. As every concussion is different and unique, the Concussion Management Team must remain fluid and flexible.

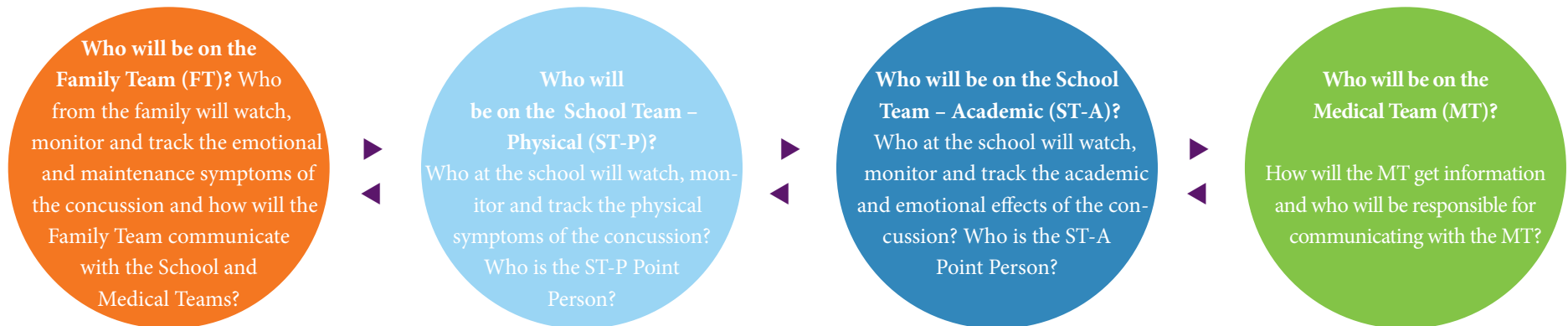
REAP is based upon the premise that there are a few essential elements that must be factored into any good concussion management program. Those essential factors are:

A multiple perspective TEAM

All team members must monitor and manage physical, cognitive, emotional and maintenance symptoms
AND

All team members must use frequent symptom reports to make immediate accommodations/adjustments.

As long as a school/community can provide for these essential elements, the principles of REAP (aka **good concussion management**) can be applied successfully across any community or school district. On a case-by-case basis, each Multi-Disciplinary Team should utilize the guidelines recommended in REAP to determine:



For each case, who will be the overall REAP Manager and coordinate the vortex of information between the FT, ST-P, ST-A and MT?

EDUCATE

Message to Educators

REAP cannot stress enough – management of concussion requires that there is an equal partnership between the members of the school team who manage physical reduction and those who manage cognitive reduction. See ACCOMMODATE for how to reduce cognitive load.

During the Colorado CDC study, the ATC often acted as the ST-P; other times (for non-sports related concussions) the School Nurse acted as the ST-P. In some school districts, a well-educated Coach or Office Manager acted as the ST-P. Similarly, the study found that the School Psychologist/Social Worker or Counselor often acted as the ST-A. However, occasionally, a General Education Teacher served as the ST-A.

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In order to obtain a common language between all Concussion Management Team members, an objective measure of symptoms has been found to be helpful. Therefore, one important suggestion in REAP is that the REAP Manager (case by case) take responsibility for meeting with the student (daily or at specified intervals, see REAP TIMEFRAME) to help the student/athlete rate symptoms. Areas of symptom concern/improvement are then shared with the team members responsible for managing other various symptoms. This allows for immediate accommodations/adjustments to be made. The majority of the communication in the Colorado CDC study occurred via phone, email or in spontaneous check-in meetings. Formal meetings were infrequent and usually not necessary. **The REAP Project promotes better management of concussion through better management of information and better coordination between team members.**

REAP realizes that every community and every school district has strengths and limitations. If resources allow for only one Point Person at a school, it is important that that one person be equally committed to managing all symptoms — cognitive, emotional, maintenance, as well as, physical symptoms. It is possible that in some smaller communities, there may only be one person on a School Team. That one school Point Person can still partner with someone from the Family Team and together, they can partner with someone from the Medical Team. REAP feels that more “eyes” on the concussion and more varied perspectives (even if only two to three perspectives!) lead to better decision-making. Based on the experiences of the Colorado CDC study and the school districts currently using REAP, the REAP model does not depend upon “more



resources,” but instead on the strength of a strongly educated and well-coordinated team.

Whether on a concussion-by-concussion basis, or in a planning phase, the REAP Project is happy to travel to your community to help you to get the essential factors of **good concussion management** in place to meet the unique needs of your community.

Medical Box

“Monday Morning Concussion” – Symptoms of a concussion may not develop immediately after the injury. In fact, symptoms may appear hours or even days later. One common scenario is when a student/athlete suffers a concussion on a Friday or Saturday, perhaps during a sporting event. The student/athlete may have a quiet weekend with few or no symptoms. It is not until they return to school on Monday, when the “thinking demands” from schoolwork increases, does the student/athlete begin to experience symptoms. It is important to recognize that these symptoms are related to the concussion. Students, parents and educators must learn to watch for delayed symptoms. In addition, they must pay attention to the activities that worsen those symptoms after they appear.

-Sue Kirelik, MD, Director of Pediatric Emergency Medicine, Rocky Mountain Hospital for Children at Sky Ridge Medical Center, REAP Medical Advisor

Ciera was 15 years old when she suffered a concussion while playing basketball. Her symptoms of passing out, constant headaches and fatigue plagued her for the remainder of her freshman year. A few accommodations helped Ciera successfully complete the school year. “It really helped me when my teachers had class notes already printed out. That way I could just highlight what the teacher was emphasizing and focus on the concept rather than trying to take notes. Since having a brain injury, I don’t really see words on the board, I just see letters. Therefore, having the notes beforehand takes some of the frustration off of me and I am able to concentrate and retain what is being taught in class. Being able to rest in the middle of the day is also very important for me. I become very fatigued after a morning of my rigorous classes, so my counselors have helped me adjust my schedule which allows me some down time so I can keep going through my day. Lastly, taking tests in a different place such as the conference room or teacher’s office has helped a great deal.” CIERA LUND

>> REAP suggests the following timeframe:

TEAM		Week 1	Week 2	Week 3
FT	<p>Family Team Help child understand he/she must be a "honest partner" in the rating of symptoms</p> <p><i>*Sign a Release of Information so that School Team and Medical Team can communicate with each other as soon as possible.</i></p>	<ul style="list-style-type: none"> • Impose rest. • Assess symptoms daily – especially monitor maintenance symptoms and emotional symptoms. 	<ul style="list-style-type: none"> • Continue to assess symptoms (at least 3X week or more as needed), monitor if symptoms are improving. • Increase demands and assess symptoms. 	<ul style="list-style-type: none"> • Continue with all assessments (at least 2X week or more as needed). • Increase or decrease demands based upon outcome (see PACE).
ST/P	<p>School Team Physical Coach/ATC/School Nurse</p> <p><i>(1 point person to oversee/manage physical symptoms)</i></p>	<ul style="list-style-type: none"> • REAP suggests immediate removal from play/physical activities! • Assess physical symptoms daily, use objective rating scale. • ATC: assess postural-stability (see NATA reference in RESOURCES). • School Nurse: monitor visits to school clinic. If symptoms at school are significant, contact parents and send home from school. 	<ul style="list-style-type: none"> • Continue to assess symptoms (at least 3X week or more as needed). • Step-wise increase in physical demands (see PACE). • ATC: postural-stability assessment. 	<ul style="list-style-type: none"> • Continue with all assessments (at least 2X week or more as needed). • Increase or decrease physical demands based upon outcome (see PACE) • ATC: postural-stability assessment.
ST/A	<p>School Team Academic Educators, School Psychologist, Counselor, Social Worker</p> <p><i>(1 point person to oversee/manage cognitive/emotional symptoms)</i></p>	<ul style="list-style-type: none"> • Reduce all cognitive demands (reduce, do not eliminate cognitive demands). • Meet with student individually to create academic accommodation plan for cognitive/emotional reduction no later than Day 2/3 & then assess again by Day 7. • Educate all teachers on the symptoms of concussion (see "Concussion is More Than a Bump to the Head" in Appendix). • Make immediate academic accommodations. • See ACCOMMODATE section. 	<ul style="list-style-type: none"> • Continue to assess symptoms (at least 3X week or more as needed). • Slowly increase cognitive and academic demands (see PACE). • Continue academic accommodations as needed. 	<ul style="list-style-type: none"> • Continue with all assessments (at least 2X week or more as needed). • Increase or decrease cognitive and academic demands based upon outcome (see PACE). • Continue academic accommodations as needed. • Assess if longer term academic accommodations are needed (504 Plan, IEP, etc.).
MT	<p>Medical Team</p>	<ul style="list-style-type: none"> • Assess and diagnose concussion. • Educate student/athlete and family on the typical course of concussion and the need for rest. • Monitor that symptoms are improving throughout Week 1 - not worsening in the first 48 to 72 hours. 	<ul style="list-style-type: none"> • Continue to consult with school and home teams. • Follow-up medical check including: comprehensive history, neurologic exam, detailed assessment of mental status, cognitive function, gait and balance. 	<ul style="list-style-type: none"> • Continue to consult with school and home teams. <p>It is best practice that a medical professional be involved in the management of each and every concussion.</p>

>> Don't be alarmed by the symptoms - symptoms are the hallmark of concussion. The goal is to watch for a slow and steady improvement in ALL symptoms over time. If symptoms persist into Week 4, see SPECIAL CONSIDERATIONS.

Interesting research note:

The Colorado CDC Study demonstrated that concussed students were rarely absent from school during their recovery — and they rarely needed to be absent from school, beyond Day 1 or 2, especially when schools were managing their cognitive load appropriately. This finding is reinforced by a 2008 study showing that concussed students who maintained moderate levels of activity (not 100% bed rest and not 100% on-the-go) had the most positive recovery!⁶

School Team Educators

When an athlete is injured, the coaches keep the athlete “engaged” with the team (by attending practices, traveling with the team) even when the athlete cannot play. This concept of keeping the student involved and engaged in academics, in spite of the concussion, is very important. While cutting back on the cognitive load, the school team must devise a plan to keep the student “academically conditioned and engaged in learning” throughout the entire three-week recovery period.

Medical Box

The newest research shows that neuropsychological testing has significant clinical value in concussion management, especially with teenagers and especially when baseline scores are available. The addition of neuropsychological tests is an emerging best practice. However, limited resources and training are a reality for school districts. An extensive list of paper and pencil neurocognitive tests known to be sensitive to TBI can be found at COkidswithbraininjury.com. Whether or not a school district chooses to include any type of neurocognitive testing, REAP is still the foundation of the Concussion Management program. Data gathered from serial post-concussion testing (by Day 2/3, by Day 7, by Day 14 and by Day 21, until asymptomatic) can only serve to provide additional information. No test score should ever be used in isolation. Professionals must adhere to all ethical guidelines of test administration and interpretation.

Most Common “Thinking” Cognitive Problems Post-Concussion

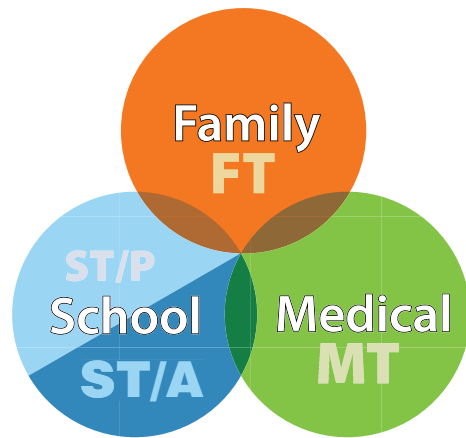
And suggested accommodations

Areas of concern	Suggested Accommodations
Fatigue, specifically Mental Fatigue	<ul style="list-style-type: none"> > Schedule strategic rest periods. Do not wait until the student’s over-tiredness results in an emotional “meltdown.” > Adjust the schedule to incorporate a 15-20 minute rest period mid-morning and mid-afternoon. > It is best practice for the student to be removed from recess/sports. Resting during recess or PE class is advised. > Do not consider “quiet reading” as rest for all students.
Difficulty concentrating <i>Feels like being in a “fog”</i>	<ul style="list-style-type: none"> > Reduce the cognitive load – it is a fact that smaller amounts of learning will need to take place during the recovery. > Since learning during recovery is compromised, the academic team must decide: What is the most important concept for the student to learn during this recovery? > Be careful not to tax the student cognitively by demanding that all learning continue at the rate prior to the concussion.
Slowed processing speed <i>Feels like being converted from high speed internet to dial up internet</i>	<ul style="list-style-type: none"> > Provide extra time for tests and projects. > Assess whether the student has large tests or projects due during the 3-week recovery period and remove or adjust due dates. > Provide a peer notetaker or copies of teacher’s notes during recovery.
Difficulty with working memory <i>The ability to temporarily store and manage information during complex cognitive processes such as learning and reasoning</i>	<ul style="list-style-type: none"> > Initially exempt the student from routine work/tests. > Since memory during recovery is limited, the academic team must decide: What is the most important concept(s) for the student to know? > Work toward comprehension of a smaller amount of material versus rote memorization.
Difficulty converting new learning into memory	<ul style="list-style-type: none"> > Allow student to “audit” the material during this time. > Remove “busy” work that is not essential for comprehension. Making the student accountable for all of the work missed during the recovery period (3 weeks) places undue cognitive and emotional strain on him/her and may hamper recovery. > Ease student back into full academic/cognitive load.
Emotional symptoms	Be mindful of emotional symptoms throughout! Students are often scared, overloaded, frustrated, irritable, angry and depressed as a result of concussion. They respond well to support and reassurance that what they are feeling is often the typical course of recovery.

>> More in-depth information and recommendations can be found in the BrainSTARS Manual (see RESOURCES)

Management of Concussion is Difficult Because it is a Moving Target

A medical doctor, whether in the Emergency Department or at a follow-up clinic, cannot predict the length or the course of recovery from a concussion. The best assessment of whether a student is ready to return 100% to play or to learning is:



- >> Have symptoms resolved?
(Those that are NOT being treated with medications)
- >> Do symptoms worsen or return upon exertion?

That information is only available on a daily basis to the student, the family and the school team(s). Even the most involved medical professional will likely not be able to see the student on a daily basis; therefore, symptom assessment and monitoring must be collected by the Family and School Team(s) and must be shared with the Medical Team. The key to success is **communication and collaboration!**

In the spirit of teamwork, the decision for the student/athlete to begin the graduated Return to Play (RTP) protocol and return to 100% participation in learning or play activities cannot and should not be made by any one single member of the team. For example, an ATC should not return a student/athlete to contact sports without family/educator/medical professional input and support. Likewise, a community medical professional should not make a Return to Play decision without family and school input. In addition, REAP provides a word of caution ... although gaining in popularity at this time, no one single assessment tool (computerized or paper/pencil neuropsychological testing, balance assessment or others) should ever be used in isolation in making the decision. The best practice is clear... multiple points of data, from multiple sources **MUST** be considered to make the soundest decision. **In other words, the initiation of the Return to Play/Return to Learning decision must be made by consensus of the Multi-Disciplinary Concussion Management Team, in consultation with a medical professional.**

Graduated Return to Learning/Cognitive Return

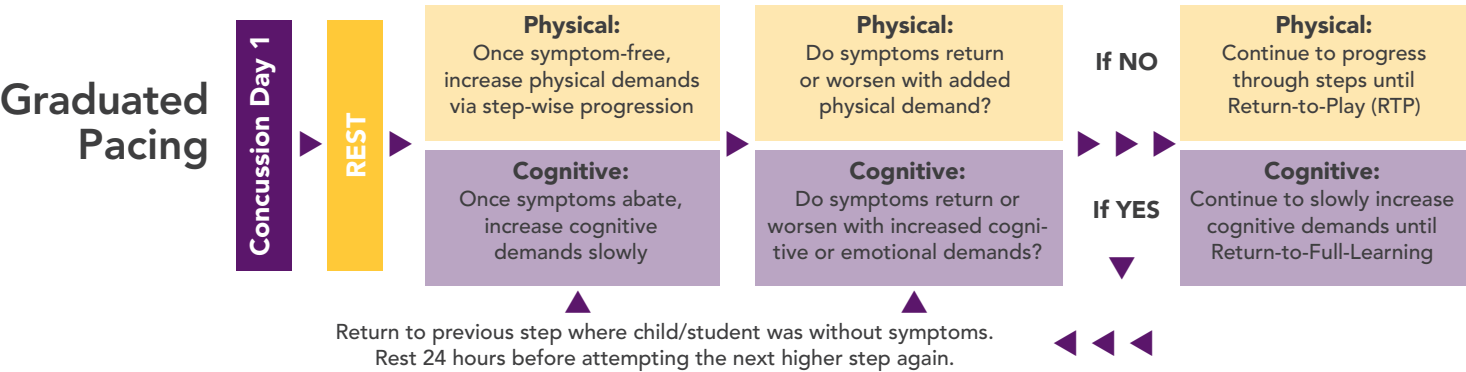
Resumption of normal cognitive activity follows the same principles as the resumption of graduated physical activity. The student/athlete should have a period of time with mental rest until symptom-free and then progress to a gradual increase of cognitive demands. Cognitive activity is gradually increased, as long as the student remains symptom free during the progression. If symptoms emerge with mental exertion, cognitive activity is again reduced until the student is able to complete that level of cognitive load without symptoms.

NOTE: Unless a student/athlete is acutely ill from the concussion (usually only Day 1 or 2), he/she may return to school without significant delay. However, in order to maximize recovery, academic accommodations should be in place immediately upon return to school.

The 2008 Zurich Consensus Statement on Concussion in Sport Recommends

A Graduated Return-to-Play (RTP)

STAGE	ACTIVITY	FUNCTIONAL EXERCISE	CHILD/STUDENT EQUIVALENT	OBJECTIVE OF STAGE
1	No physical activity as long as there are symptoms <i>(This step could take days or even weeks)</i>	Complete physical rest	Quiet time with maximum rest	Recovery
	<i>When 100% symptom free for 24 hours proceed to Stage 2. (Recommend longer symptom-free periods at each stage for younger student/athletes) ▼</i>			
2	Light aerobic activity	Walking, swimming, stationary cycling - 10-15 minutes of exercise, no resistance	Solitary play or quiet play alone or with parent	Increase heart rate <i>(light to moderate work-out not requiring cognitive attention or high degree of coordination)</i>
	<i>If symptoms reemerge with this level of exertion, then return to the previous stage. If the student remains symptom free for 24 hours after this level of exertion, then proceed to the next stage. ▼</i>			
3	Sport-specific exercise	Skating/running drills, 20-30 minutes - no weightlifting, no head contact	Supervised play, low risk activities	Add movement <i>(increased attention and coordination required)</i>
	<i>If symptoms re-emerge with this level of exertion then return to the previous stage. If the student remains symptom free for 24 hours after this level of exertion then proceed to the next stage. ▼</i>			
4	Non-contact training drills	Progression to more complex training drills; may start progressive resistance training	May run/jump as tolerated	Exercise, coordination <i>(mimics athlete's sport without risk of head injury)</i>
	<i>If symptoms re-emerge with this level of exertion then return to the previous stage. If the student remains symptom free for 24 hours after this level of exertion then proceed to the next stage. ▼</i>			
5	Full-contact practice	Following medical clearance, participate in normal training activities; full exertion	Normal participation with parental/ adult supervision	Restore confidence and assess functional skills by coaching staff <i>(or family)</i>
	<i>If symptoms re-emerge with this level of exertion then return to the previous stage. If the student remains symptom free for 24 hours after this level of exertion then proceed to the next stage. ▼</i>			
6	Return to play	Normal game play	Normal playtime	No restrictions



Special Considerations

>> When Symptoms do not Resolve as Expected

Approximately 10% to 20% of concussions do not resolve in one to three weeks. When, and if, symptoms (physical, cognitive, emotional or maintenance) do not resolve as expected, it is suggested that the student/athlete work with their medical professional to pursue a more specialized outpatient evaluation (medical, neuropsychological or psychosocial).

As stated throughout this manual, an uncomplicated concussion will generally resolve within one to three weeks. Except for the most acute phases of the concussion (usually Days 1 or 2), it is not advised for student/athletes to be absent from school due to the concussion. In an extremely rare case in which long-term symptoms of the concussion result in an extended absence from school, it would be best for the student/athlete to be considered for assessment and/or services under a 504 Plan or IDEA /Traumatic Brain Injury.⁷ It is beyond the scope of this manual to speak to assessment and programming for brain injury. Many school districts have Brain Injury Teams, which can provide support. Some Departments of Education have a regional TBI Coordinator available for statewide consultation. Educators can find guidelines for brain injury at www.COkidswithbraininjury.com. Other brain injury resources are listed in the RESOURCES section.

>> Long-Term Monitoring

Studies have had difficulty estimating the true number of students/athletes who may initially recover well from a concussion but suffer later from learning, emotional or behavioral issues. Are those problems related to the earlier concussion? No one can say for sure, but educators suspect there may be some connection – especially in the case of multiple concussions.

The REAP Project provides a model by which families, schools and medical professionals can manage the concussion in the short-term – three weeks. However, it has become clear that REAP provides a more global gift. In the process of managing a concussion for three weeks, the student/athlete becomes known to a multi-disciplinary team. As the student/athlete progresses beyond the concussion, the family,

the school and the medical professional become cognizant of the injury and can track the student/athlete forward.

- >> If physical symptoms return or are exacerbated, immediate medical attention can be sought.
- >> If emotional or personality changes are noted by parents, they can voice their concern to schools or medical professionals.
- >> If learning or behavioral changes are noted by the school, team members will know to question their connection to the recent resolution of the concussion – and can pursue assessment or intervention. In an academic setting, this ability to recognize problems and intervene early is consistent with the federal mandate of “Response to Intervention (RTI).”



Medical Box

Students who have Attention Deficits, Learning Disabilities, a history of migraine headaches, sleep disorders, depression or other psychiatric disorders may have more difficulty recovering from a concussion.

Students who have had multiple concussions, a recent prior concussion or who are getting symptomatic after less impact may be at risk for long-term complications. Research supports the fact that a person who sustains one concussion is at higher risk for sustaining a future concussion.⁸

REAP provides a template by which concussions can be tracked forward. With REAP, good concussion management does not end with the three-week recovery of a single concussion. In the short run, REAP raises awareness – to assure that all students/athletes fully recover, one concussion at a time. In the long run, REAP places responsibility on the community – to assure that, with the knowledge of past concussions, we keep students/athletes safe from the vulnerability of future concussions

Resources

Centers for Disease Control (CDC)	www.CDC.gov	1-800-CDC-INFO
Colorado TBI Trust Fund	www.tbicolorado.org	303-866-4779
CO Child/Adolescent Brain Injury	www.COkidswithbraininjury.com	
Brain Injury Association of Colorado (BIAC)	www.biacolorado.org	303-355-9969
Brain Injury Association of America (BIAA)	www.biausa.org	1-800-444-6443
Colorado High School Activities Association (CHSAA)	www.chsaa.org	303-866-6600
Colorado Department of Education (CDE)	www.cde.state.co.us	303-866-6600
BrainSTARS		720-777-5470
National Association of Athletic Trainers (NATA)	www.nata.org www.journalofathletictraining.org	
National Federation of State High School Associations	nfhs.org	317-972-6900
Coaches Training: (free, online coach-training sessions)	National Federation of State High School Associations	www.nfhslearn.org
>> All questions or comments and requests for inservices/trainings can be directed to:	ACTIVE Athletic Concussion Training for Coaches	concussion.orcasinc.com

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This manual is available in Spanish upon request.



Concussion In Children

>> It's more than just a bump on the head!

Concussion in children can cause temporary changes in how they act, think and feel. If your child has had a concussion, he or she might act differently and probably will be more tired for awhile. It's a good idea to let your child have a few days off from school, take more rest and have fewer expectations to meet for the next week or two. Over the next several weeks, watch for these possible changes:



Changes in Behavior and Energy	Changes in Thinking	Changes at School	Changes in Feelings
<ul style="list-style-type: none">• Has lots of headaches• Is very tired; sleeps too much or too little• Tantrums; impulsive or aggressive at times; "short fuse"• Quiet, shy, or talking less than usual• Doesn't seem "motivated;" not concerned about performance• Doesn't listen when corrected; doesn't seem to care when in trouble• Not interested in usual activities• Has trouble getting started on work or activities	<ul style="list-style-type: none">• Not organized; doesn't complete tasks• Forgets or can't remember things• Is upset by noises, lights, crowds or busy places	<ul style="list-style-type: none">• Forgets assignments or does not hand in work• Does well one day and poorly the next; grades are worse• Messy, incomplete or dis-organized work• Doesn't pay attention in class	<ul style="list-style-type: none">• Big emotional reactions• Gets upset easily; more worried or moody• Quiet or sad• Seems easily overwhelmed

Keep in mind that new problems in acting, thinking or feeling can be due to your child's concussion. Remember that you can get help for these problems. Tell your child's doctor, your school nurse, school psychologist and a teacher about the concussion. Ask your school personnel to reduce the demands on your child for the next few weeks. The Colorado Department of Education (CDE), Brain Injury Association of Colorado (BIAC) and COkidswithbraininjury.com have helpful information on TBI management on their websites.

Symptom Checklist

Name: _____ Assessment Date: _____

Date of Injury: _____ Time of Injury 2-3 Hrs 24 Hrs 48 Hrs 72 Hrs Daily Weekly

SYMPTOMS	SEVERITY RATING						
	0	1	2	3	4	5	6
Headache	0	1	2	3	4	5	6
Nausea	0	1	2	3	4	5	6
Vomiting	0	1	2	3	4	5	6
Balance Problems	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Fatigue	0	1	2	3	4	5	6
Trouble Falling Asleep	0	1	2	3	4	5	6
Sleeping More than Usual	0	1	2	3	4	5	6
Sleeping Less than Usual	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
Sensitivity to Light	0	1	2	3	4	5	6
Sensitivity to Noise	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous/Anxious	0	1	2	3	4	5	6
Feeling More Emotional	0	1	2	3	4	5	6
Numbness or Tingling	0	1	2	3	4	5	6
Feeling Slowed Down	0	1	2	3	4	5	6
Feeling like "In a Fog"	0	1	2	3	4	5	6
Difficulty Concentrating	0	1	2	3	4	5	6
Difficulty Remembering	0	1	2	3	4	5	6
Visual Problems	0	1	2	3	4	5	6
Other	0	1	2	3	4	5	6
TOTAL							

Courtesy of/Adapted from the University of Pittsburgh Medical Center and the NATA Graded Symptom Checklist (GSC)

NOTE: Symptom Checklists can be used not only for the initial evaluation but also for each subsequent follow-up assessment until all signs and symptoms have cleared at rest and during physical exertion. In lieu of simply checking each symptom present, the ATC can ask the athlete to grade or score the severity of the symptoms on a scale of 0–6, where 0 = not present, 1 = mild, 3 = moderate, and 6 = most severe.





The REAP Project is dedicated in memory of

Jacob Snakenberg

April 19, 1990 – September 19, 2004

To prevent future loss of life due to concussion



Rocky Mountain Youth Sports Medicine Institute

is a comprehensive service for the prevention, treatment and rehabilitation of sports injuries in children and adolescents that will include:

- ✿ state-of-the-art physicians' practice designed for care of the student athlete
- ✿ specialty care for patients from the skeletally immature through young adult
- ✿ a commitment to outstanding communication with patients, families and referring physicians
- ✿ full-spectrum musculoskeletal imaging capabilities
- ✿ sports medicine concussion program
- ✿ sports injury and performance research
- ✿ same-day availability for patient consultation

RockyMountainHospitalForChildren.com



At Presbyterian/St. Luke's Medical Center
The Medical Center of Aurora
North Suburban Medical Center
Rose Medical Center
Sky Ridge Medical Center
Swedish Medical Center



Center for Concussion at Rocky Mountain Youth Sports Medicine Institute

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