Rocky Mountain Hospital for Children
At Presbyterian/St. Luke's
Health ONE

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

REAP℠ The Benefits of Good Concussion Management

Center for Concussion

REAP℠

Remove/Reduce
Educate
Adjust/Accommodate
Pace

Authored by Karen McAvoy, PsyD

ROCKY MOUNTAIN HOSPITAL *for* CHILDREN

At Presbyterian/St. Luke's

HealthONE

In recent years growing public and medical concern has been focused on the issue of concussions. From our youngest students/athletes to professional team competitors, awareness of a concussion's influence on both short-term and long-term health has escalated in the past decade.

New clinical studies surrounding this growing concern have led to youth concussion clinics opening in most states. However, this proliferation of concussion clinics comes at a time when there is little clear medical consensus on a way to manage and treat concussions.

The REAP approach, developed for Rocky Mountain Hospital for Children's Center for Concussion, offers guidance on a coordinated team approach that will lessen the frustration that the student/athletes, their parents, schools, coaches, certified athletic trainers and the medical professional often experience as they attempt to coordinate care.

REAP has grown as a training resource over the past five years and it is continually updated with the most current research and guidance. In fact, in November of 2013, the American Academy of Pediatrics released a Clinical Report on Returning to Learning Following a Concussion (PEDIATRICS Volume 132, Number 5, November 2013) *"based upon expert opinion and adapted from a program in Colorado". Rocky Mountain Hospital for Children is proud to announce that the program referenced in the AAP Clinical Report is REAP!*

Reginald Washington, MD
FAAP, FAAC, FAHA
Chief Medical Officer
Rocky Mountain Hospital for Children - HealthONE

REAP is authored by: Karen McAvoy, PsyD

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REAP,[SM] which stands for **Remove/Reduce · Educate · Adjust/Accommodate · Pace,** is a community-based model for Concussion Management that was developed in Colorado. The early origins of REAP stem from the dedication of one typical high school and its surrounding community after the devastating loss of a freshman football player to "Second Impact Syndrome" in 2004. The author of REAP, Dr. Karen McAvoy, was the psychologist at the high school when the tragedy hit. As a School Psychologist, Dr. McAvoy quickly pulled together various team members at the school (Certified Athletic Trainer, School Nurse, Counselors, Teachers and Administrators) and team members outside the school (Students, Parents and Healthcare Professionals) to create a safety net for all students with concussion. Under Dr. McAvoy's direction from 2004 to 2009, the multi-disciplinary team approach evolved from one school community to one entire school district. Funded by an education grant from the Colorado Brain Injury Program in 2009, Dr. McAvoy sat down and wrote up the essential elements of good multi-disciplinary team concussion management and named it REAP.

With the opening of Rocky Mountain Hospital for Children in August of 2010, Dr. McAvoy was offered the opportunity to open and direct the Center for Concussion, where the multi-disciplinary team approach is the foundation of treatment and management for every student/athlete seen in the clinic.

Family Team	School Physical Team	School Academic Team	Medical Team

The benefits of good concussion management spelled out in REAP are known throughout communities in Colorado, nationally and internationally. REAP has been customized and personalized for various states and continues to be the "go-to" guide from the emergency department to school district to the office clinic waiting room.

Download a digital version of this publication at RockyMountainHospitalForChildren.com.

Rocky Mountain Hospital for Children
Center for Concussion
Centennial Medical Plaza
14000 E. Arapahoe Rd., Suite #300
Centennial, CO 80112

Phone: 720.979.0840 Fax: 303.690.5948

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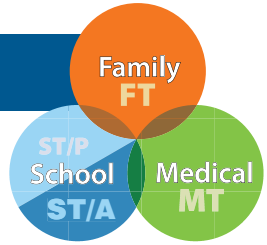
Education • Services • Research

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 all of the teams. As information is especially pertinent to a certain group, it is noted by a color.

>> Pay close attention to the sections in ORANGE

Family Team	Student, Parents; may include Friends, Grandparents, Primary Caretakers, Siblings and others…	For more specific information, download parent fact sheets from the various **"Heads Up"** Toolkits on the CDC website: cdc.gov/concussion/headsup/pdf/Heads_Up_factsheet_english-a.pdf and cdc.gov/concussions/pdf/Fact_Sheet_ConcussTBI-a.pdf.

>> Pay close attention to the sections in LIGHT BLUE

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: cdc.gov/Concussion/HeadsUp/high_school.html

>> Pay close attention to the sections in DARKER BLUE

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: cdc.gov/concussion/HeadsUp/Schools.html and cdc.gov/concussion/pdf/TBI_Returning_to_School-a.pdf

>> Pay close attention to the sections in GREEN

Medical Team	Emergency Department, Primary Care Providers, Nurses, Concussion Specialists, Neurologists, Clinical Neuropsychologists and others…	For more specific information, download the free **"Heads Up: Brain Injury in your Practice"** from the CDC website: cdc.gov/concussion/HeadsUp/Physicians_tool_kit.html

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Common Concussion Myths...

TRUE or FALSE?

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

False! CDC reports that an estimated 1.6 to 3.8 million sports- and recreation-related concussions occur in the United States each year.[1] Most 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 accidents and bicycle and playground accidents.

TRUE or FALSE?

A concussion is just a "bump on the head."

False! Actually, a concussion is a traumatic brain injury (TBI). The symptoms of a concussion can range from mild to severe and may include: confusion, disorientation, memory loss, slowed reaction times, emotional reactions, headaches and dizziness. You can't predict how severe a concussion will be or how long the symptoms will last 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 and symptoms after the injury. Symptoms during a concussion are thought to be due to an ENERGY CRISIS in the brain cells. At the time of the concussion, the brain cells (neurons) stop working normally. Because of the injury there is not enough "fuel" (sugar/glucose) that is needed for the cells to work efficiently – for playing and for thinking. **While a CT scan or an MRI may be used after trauma to the head to look for bleeding or bruising in the brain, it will be normal with a 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.[2] 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.[3]

>> REAP works on the premise that a **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. REAP can help the Family, School and Medical Teams mobilize immediately to maximize recovery during the entire three week "window of opportunity."

Medical note
from Sue Kirelik, MD, Medical Director of the Center for Concussion

When it comes to concussion, the newest recommendations are that kids and teens should be treated much more conservatively than adults. Little is known about the long term risks of concussion that occur in childhood and adolescence, but there is concern that concussions can add up over time and cause permanent problems.

Message to Parents

To maximize your child's recovery from concussion, double up on the Rs. REDUCE and REST! Insist that your child rest, especially for the first few days following the 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 returns to 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 Adjust/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, text messaging, social media and computer screen time
- 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!

When should your child go back to school?
See page 8.

Supplemental information and downloadable forms for parents can be found at RockyMountainHospitalForChildren.com.

EVERY Member of Every Team is Important!

Every team has an essential part to play at certain stages of the recovery

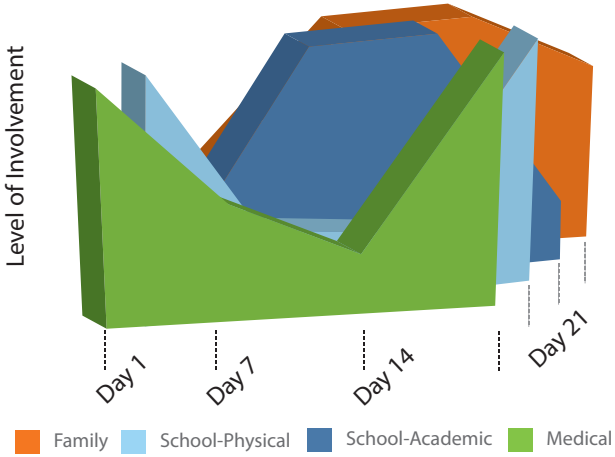
First the School Physical Team (coach, ATC, playground supervisor) and/or the Family Team (parent) have a critical role in the beginning of the concussion as they may be the first to RECOGNIZE and IDENTIFY the concussion and REMOVE the student/athlete from play.

Second The Medical Team then has an essential role in DIAGNOSING the concussion and RULING-OUT a more serious medical condition.

Third for the next 1 to 3 weeks the Family Team and the School Academic Team will provide the majority of the MANAGEMENT by REDUCING social/home and school stimulation.

Fourth when all FOUR teams decide that the student/athlete is 100% back to pre-concussion functioning, the Medical Team can approve the Graduated Return to Play (RTP) steps. See the PACE page.

Finally when the student/athlete successfully completes the RTP steps, the Medical Team can determine final "clearance."



The FOUR teams pass the baton from one to the other (and back again), all the while communicating, collaborating and adjusting the treatment/management.

Communication and Collaboration = Teamwork!

Multi-Disciplinary Teamwork = the safest way to manage a concussion!

A "Multi-Disciplinary Team" Team members who provide multiple perspectives of the student/athlete AND Team members who provide multiple sources of data

Who will be on the Family Team (FT)? Who from the family will watch, monitor and track the emotional and sleep/energy symptoms of the concussion and how will the Family Team communicate with the School and Medical Teams?

Who will be on the School Team — Physical (ST-P)? Who at the school will watch, monitor and track the physical symptoms of the concussion? Who is the ST-P Point Person?

Who will be on the School Team — Academic (ST-A)? Who at the school will watch, monitor and track the academic and emotional effects of the concussion? Who is the ST-A Point Person?

Who will be on the Medical Team (MT)? How will the MT get information from all of the other teams and who with the MT will be responsible for coordinating data and updates from the other teams?

>> REAP suggests the following timeframe:

TEAM	Week 1	Week 2	Week 3
Family Team Help child understand he/she must be a "honest partner" in the rating of symptoms	• Impose rest. • Assess symptoms daily — especially monitor sleep/energy and emotional symptoms.	• Continue to assess symptoms (at least 3X week or more as needed), monitor if symptoms are improving. • Continue to assess symptoms and increase/decrease stimulation at home accordingly.	• Continue with all assessments (at least 2X week or more as needed). • Continue to assess symptoms and increase/decrease stimulation at home accordingly.
School Team Physical Coach/ATC/School Nurse *(Assign 1 point person to oversee/manage physical symptoms)*	• REMOVE from all 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.	• Continue to assess symptoms (at least 3X week or more as needed). • ATC: postural-stability assessment.	• Continue with all assessments (at least 2X week or more as needed). • ATC: postural-stability assessment.
School Team Academic Educators, School Psychologist, Counselor, Social Worker *(Assign1 point person to oversee/manage cognitive/emotional symptoms)*	• REDUCE (do not eliminate) all cognitive demands. • Meet with student periodically to create academic adjustments for cognitive/emotional reduction no later than Day 2/3 and then assess again by Day 7. • Educate all teachers on the symptoms of concussion. • See ADJUST/ACCOMMODATE section.	• Continue to assess symptoms (at least 3X week or more as needed) and slowly increase/decrease cognitive and academic demands accordingly. • Continue academic adjustments as needed.	• Continue with all assessments (at least 2X week or more as needed) and increase/decrease cognitive and academic demands accordingly. • Continue academic adjustments as needed. • Assess if longer term academic accommodations are needed (May need to consider a 504 Plan beyond 3+ weeks).
Medical Team	• Assess and diagnose concussion. • Assess for head injury complications, which may require additional evaluation and management (Supplemental information for MDs may be found at RockyMountainHospitalForChildren.com). • Recommend return to school with academic adjustments once symptoms are improving and tolerable, typically within 48 to 72 hours. • 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.	• 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.	• Continue to consult with school and home teams. • Weeks 3+, consider referral to a Specialty Concussion Clinic if still symptomatic. **It is best practice that a medical professional be involved in the management of each and every concussion, not just those covered by legislation.**

**Family should sign a Release of Information so that School Team and Medical Team can communicate with each other*

>> **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. It is typical for symptoms to be present for up to three weeks. If symptoms persist into Week 4, see SPECIAL CONSIDERATIONS.

>> Once a concussion has been diagnosed:

Jake 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.

STEP ONE: REMOVE student/athlete from all physical activities.
REDUCE school demands and home/social stimulation.

The biggest concern with concussions in children/teens is the risk of injuring the brain again before recovery. The concussed brain is in a vulnerable state and even a minor impact can result in a much more severe injury with risk of permanent brain damage or rarely, even death. "Second Impact Syndrome" or "SIS" is thought to occur when an already injured brain takes another hit resulting in possible massive swelling, brain damage and/or death[4]. Therefore, once a concussion has been identified, it is critical to REMOVE a student/athlete from ALL physical activity including PE classes, dance, active recess, recreational and club sports until medically cleared.

Secondly, while the brain is still recovering, all school demands and home/social stimulation should be REDUCED. Reducing demands on the brain will promote REST and will help recovery.

Family Team	**REMOVE** student/athlete from all physical activity immediately including play at home (ie. playground, bikes, skateboards), recreational, and/or club sports. **REDUCE** home/social stimulation including texting, social media, video games, TV, driving and going to loud places (the mall, dances, games). Encourage **REST**.
School Physical Team	**REMOVE** student/athlete from all physical activity immediately. Support **REDUCTION** of school demands and home/social stimulation. Provide encouragement to **REST** and take the needed time to heal.
School Academic Team	**REMOVE** student/athlete from all physical activity at school including PE, recess, dance class. **REDUCE** school demands (see ADJUST/ACCOMMODATE for Educators on pages 9-10). Encourage "brain **REST**" breaks at school.
Medical Team	**REMOVE** student/athlete from all physical activity immediately. **RULE-OUT** more serious medical issues including severe traumatic brain injury. Consider risk factors — evaluate for concussion complications. Support **REDUCTION** of school demands and home/social stimulation. Encourage **REST**.

STEP TWO: EDUCATE all teams on the story the symptoms are telling. It might be two steps forward...one step back.

After a concussion, the brain cells are not working well. The good news is that with most concussions, the brain cells will recover in 1 to 3 weeks. When you push the brain cells to do more than they can tolerate (before they are healed) symptoms will get worse. When symptoms get worse, the brain cells are telling you that you've done too much. As you recover, you will be able to do more each day with fewer symptoms. If trying to read an algebra book or going to the mall flares a symptom initially, the brain is simply telling you that you have pushed too hard today and you need to back it down… try again in a few days. Thankfully, recovery from a concussion is quite predictable… most symptoms will decrease over 1 to 3 weeks and the ability to add back in home/social and school activities will increase over 1 to 3 weeks. Therefore, learn to "read" the symptoms. They are actually telling you the rate of recovery from the concussion.

NOTE: Home/social stimulation and school tasks can be added back in by the parent/teacher as tolerated. Physical activities, however, cannot be added back in without medical approval (see PACE).

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"	

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

Fatigue	Drowsiness
Excess sleep	Sleeping less than usual
Trouble falling asleep	

Do not worry that your child has symptoms for 1 to 3 weeks; it is typical and natural to notice symptoms for up to 3 weeks. You just want to make sure you are seeing slow and steady resolution of symptoms every day. To monitor your child's progress with symptoms, chart symptoms periodically (see TIMEFRAME on page 5) and use the Symptom Checklist (see APPENDIX). In a small percentage of cases, symptoms from a concussion can last from weeks to months. (See SPECIAL CONSIDERATIONS on page 13.)

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 4th International Conference on Concussion in Sport, Zurich 2012.

IMPORTANT!

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

SEEK IMMEDIATE MEDICAL ATTENTION!

STEP THREE: ADJUST/ACCOMMODATE for PARENTS.

AFTER YOUR CHILD HAS RECEIVED THE DIAGNOSIS OF CONCUSSION by a healthcare professional, their symptoms will determine when they should return to school. As the parent, you will likely be the one to decide when your child goes back to school because you are the one who sees your child every morning before school. Use the chart below to help decide when it is right to send your child back to school:

STAY HOME- BED REST

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

STAY HOME – LIGHT ACTIVITY

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 training) and physically active recess until medically cleared.
- Consider removing child from band or music if symptoms are provoked by sound.

>> GOING BACK TO SCHOOL

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

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 head injury 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 increase, 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, Medical Director of the Center for Concussion

STEP THREE: ADJUST/ ACCOMMODATE for EDUCATORS.

School Team Educators

Alternate challenging classes with lighter classes (e.g. alternate a "core" class with an elective or "off" period). If this is not possible, be creative with flexing mental work followed by "brain rest breaks" in the classroom (head on desk, eyes closed for 5-10 minutes).

Medical Box

The newest research shows that neuropsychological testing has significant clinical value in concussion management. The addition of neuropsychological tests is an emerging best practice. However, limited resources and training are a reality for school districts. 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. However, 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 adjustments/accommodations

Areas of concern	Suggested Accommodations for Return-to-Learn (RTL)
Fatigue, specifically Mental Fatigue	> 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 strongly advised. > Do not consider "quiet reading" as rest for all students. > Consider letting the student have sunglasses, headphones, preferential seating, quiet work space, "brain rest breaks," passing in quiet halls, etc. as needed.
Difficulty concentrating	> Reduce the cognitive load — it is a fact that smaller amounts of learning will 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	> Provide extra time for tests and projects and/or shorten tasks. > 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. > Grade work completed — do not penalize for work not done.
Difficulty with working memory	> 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	> 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. Watch for secondary symptoms of depression — usually from social isolation. Watch for secondary symptoms of anxiety — usually from concerns over make-up work or slipping grades.

STEP THREE: ADJUST/ACCOMMODATE for EDUCATORS continued.

Typically, student's symptoms only require 2 to 3 days of absence from school. If more than 3 days are missed, call a meeting with parents and seek a medical explanation.

Teachers, please consider categorizing work into:

Work REMOVED	Consider removing at least 25% of the workload.
NEGOTIABLE	Consider either **"adjusting"** workload (i.e. collage instead of written paper) **OR "delaying"** workload...however, be selective about the workload you postpone.
Work REQUIRED	Consider requiring no more than 25% of the workload.

Academic adjustments fall within the pervue of the classroom/school. They are NOT determined by a healthcare professional. The teacher has the right to adjust up or down academic supports as needed, depending upon how the student is doing daily. Medical "release" from academic adjustments is not necessary.

PHYSICAL:

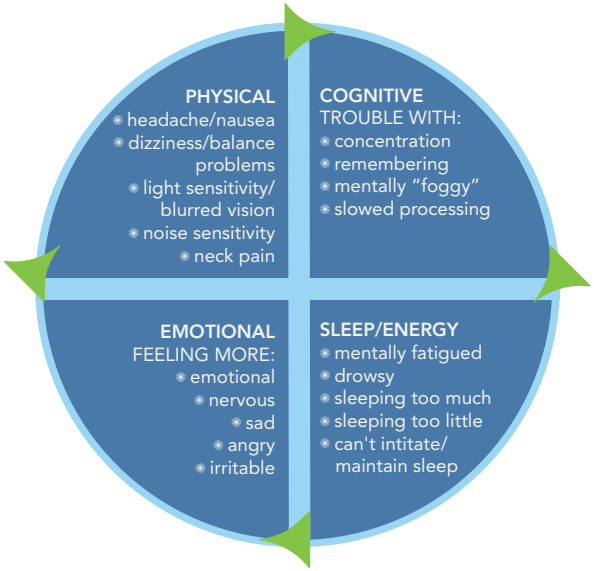
- "Strategic Rest"scheduled 15 to 20 minute breaks in clinic/quiet space (mid-morning; mid-afternoon and/or as needed)
- Sunglasses (inside and outside)
- Quiet room/environment, quiet lunch, quiet recess
- More frequent breaks in classroom and/or in clinic
- Allow quiet passing in halls
- REMOVE from PE, physical recess, & dance classes without penalty
- Sit out of music, orchestra and computer classes if symptoms are provoked

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 symptoms of depression and anxiety usually due to social isolation and concern over "make-up work" and slipping grades. These extra emotional factors can delay recovery

Symptom Wheel

Suggested Academic Adjustments



Read "Return to Learning: Going Back to School Following a Concussion" at nasponline.org/publications/cq/40/6/return-to-learning.aspx

COGNITIVE:

- REDUCE workload in the classroom/homework
- REMOVE non-essential work
- REDUCE repetition of work (ie. 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

SLEEP/ENERGY:

- Allow for rest breaks –in classroom or clinic (ie."brain rest breaks = head on desk; eyes closed for 5 to 10 minutes)
- Allow student to start school later in the day
- Allow student to leave school early
- Alternate "mental challenge" with "mental rest"

Interventions:

Keep in mind, brain cells will heal themselves a little bit each day. Students should be able to accomplish more and more at school each day with fewer and fewer symptoms. Therefore, as the teacher sees recovery, he/she should require more work from the student. By the same token, if a teacher sees an exacerbation of symptoms, he/she should back down work for a short time and re-start it as tolerated.

Data collection:

How the student performs in the classroom is essential data needed by the healthcare professional at the time of clearance. Schools should have a process in place by which a teacher can share observations, thoughts, concerns back to the parents and healthcare professional throughout the recovery. Healthcare professionals should REQUIRE input from teachers on cognitive recovery before approving the Graduated Return-to-Play steps. (See Teacher Feedback Form in APPENDIX.) Parents should sign a Release of Information at the school and/or at the healthcare professionals office for seamless communication between school teams and medical team.

Supplemental materials and downloadable forms for teachers may be found at RockyMountainHospitalForChildren.com.

How do I get back to my sport?
A.K.A. How do I get "cleared" from this concussion

While 80 to 90% of concussions will be resolved in 3 to 4 weeks, a healthcare professional, whether in the Emergency Department or in a clinic, cannot predict the length or the course of recovery from a concussion. In fact, a healthcare professional should never tell a family that a concussion will resolve in X number of days because every concussion is different and each recovery time period is unique. The best way to assess when a student/athlete is ready to start the step-wise process of "Returning-to-Play" is to ask these questions:

>> Is the student/athlete 100% symptom-free at home?

- Use the Symptom Checklist every few days. All symptoms should be at "0" on the checklist or at least back to the perceived "baseline" symptom level.
- Look at what the student/athlete is doing. At home they should be acting the way they did before the concussion, doing chores, interacting normally with friends and family.
- Symptoms should not return when they are exposed to the loud, busy environment of home/social, mall or restaurants.

>> Is the student 100% symptom-free at school?

- Your student/athlete should be handling school work to the level they did before the concussion.
- Use the Teacher Feedback Form (APPENDIX) to see what teachers are noticing.
- Watch your child/teen doing homework; they should be able to complete homework as efficiently as before the concussion.
- In-school test scores should be back to where they were pre-concussion.
- School workload should be back to where it was pre-concussion.
- Symptoms should not return when they are exposed to the loud, busy environment of school.

>> If the school or healthcare professional has used neurocognitive testing, are scores back to baseline or at least reflect normative average and/or baseline functioning?

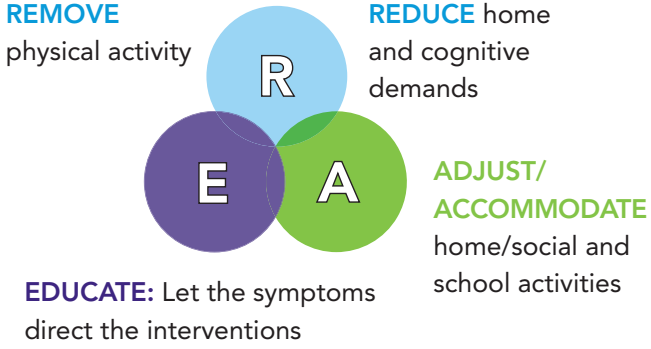
>> If a Certified Athletic Trainer is involved with the concussion, does the ATC feel that the student/athlete is 100% symptom-free?

- Ask ATC for feedback and/or serial administrations of the Symptom Checklist.

>> Is your child off all medications used to treat the concussion?

- This includes over the counter medications such as ibuprofen, naproxen and acetaminophen which may have been used to treat headache or pain.

If the answer to any of the questions is "NO," stay the course with management and continue to repeat:



… for however long it takes for the brain cells to heal!

The true test of recovery is to notice a steady decrease in symptoms while noticing a steady increase in the ability to handle more rigorous home/social and school demands.

PARENTS and TEACHERS try to add in more home/social and school activities (just NOT physical activities) and test out those brain cells!

Once the answers to the questions above are all "YES," turn the page to the PACE page to see what to do next!

STEP FOUR: PACE

FAMILY TEAM Is the student/athlete 100% back to pre-concussion functioning?

SCHOOL ACADEMIC TEAM Is the student/athlete 100% back to pre-concussion academic functioning

WHEN ALL FOUR TEAMS AGREE

that the student/athlete is 100% recovered, the MEDICAL TEAM can then approve the starting of the Graduated RTP steps. The introduction of physical activity (in the steps outlined in order below) is the last test of the brain cells to make sure they are healed and that they do not "flare" symptoms. This is the final and formal step toward "clearance" and the safest way to guard against a more serious injury.

MEDICAL TEAM approves the start of the RTP steps

SCHOOL PHYSICAL TEAM Often the ATC at the school takes the athlete through the RTP steps.

If there is no ATC available, the MEDICAL TEAM should teach the FAMILY TEAM to administer and supervise the RTP steps.

A Graduated Return-to-Play (RTP) Recommended by The 2012 Zurich Consensus Statement on Concussion in Sport*

1	**No activity**	Symptom limited physicial and cognitive rest.	Recovery
	When 100% symptom free for 24 hours proceed to Stage 2. (Recommend longer symptom-free periods at each stage for younger student/athletes)		
2	**Light aerobic exercise**	Walking, swimming or stationary cycling keeping intensity <70% maximum permitted heart rate. No resistance training.	Increase heart rate
	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.*		
3	**Sport-specific exercise**	Skating drills in ice hockey, running drills in soccer. No head-impact activities.	Add movement
	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.*		
4		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
	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.*		
5	**Full-contact practice**	Following medical clearance, participate in normal training activities.	Restore confidence and assess functional skills by coaching staff
	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.*		
6	**Return to play**	Normal game play.	No restrictions

*bjsm.bmj.com/content/47/5/250.full

The healthcare professional should give the responsibility of the graduated RTP steps over only to a trained professional such as an ATC, PT or should teach the parents. A coach, school nurse or PE teacher does NOT need to be responsible for taking concussed student/athletes through these steps.

Research Note: Earlier introduction of physical activity is being researched and may become best practice. However, at this time, any early introduction of physical exertion should only be conducted in a supervised and safe environment by trained professionals.

Special Considerations

>> As we know, 80 to 90% of concussions will resolve within 3 to 4 weeks.

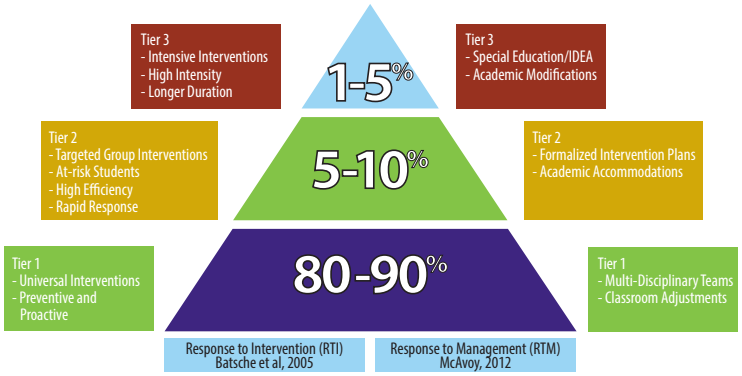
However, there remains the 10 to 20% of student/athletes who have on-going physical, cognitive, emotional or sleep/energy symptoms well beyond the 3 to 4 week mark. In those cases, the parent and medical professionals are advised to look to the school system for existing supports. The 2004 Re-authorization of IDEA (Individuals with Disability Education Act) introduced an educational initiative called "Response to Intervention (RTI)." RTI contends that good teaching and reasonable academic "adjustments" in the general education classroom can help to support 80 to 90% of students with mild/temporary learning or behavioral issues. The same concept holds true for concussions. We have called this "Response to Management (RTM)."

>> In RTI and RTM, we maximize the student/athlete's recovery by focusing on good academic "adjustments" in the general education classroom.

The 10 to 20% of students who struggle beyond the general education classroom may need a small amount of "targeted intervention" called academic "accommodation." Academic "accommodations" may be provided via a Health Plan, a Learning Plan, a 504 Plan[6] or an RTI Plan. It is still hoped that the accommodations for learning, behavior or concussions are temporary and amenable to intervention but may take months (instead of weeks) for progress to show. Lastly, with RTI and RTM, in the rare event that a permanent "disability" is responsible for the educational struggle, the student may be assessed and staffed into special education services (IDEA) and provided an IEP (Individualized Education Plan). This would constitute an extremely small number of students with a concussion.

The multi-disciplinary teams need to continue to work together with the student/athlete with protracted recovery. Parents and medical professionals need to seek medical explanation and treatment for slowed recovery; educators need to continue to provide the appropriate supports and the school physical team needs to continue to keep the student/athlete out of physical play.

Concussion Management Guidelines [8]



Adjustments/Accommodations/ Modifications

DAYS TO WEEKS: Academic Adjustments
Informal, flexible day-to-day adjustments in the general education classroom for the first 3 to 4 weeks of a concussion. Can be lifted easily when no longer needed.

WEEKS TO MONTHS: Academic Accommodations
Slightly longer accommodations to the environment/ learning to account for a longer than 4+ week recovery. Helps with grading, helps justify school supports for a longer time.

MONTHS TO YEARS: Academic Modifications
Actual changes to the curriculum/placement/instruction

Medical Box

Students who have Attention Deficits, Learning Disabilities, a history of migraine headaches, sleep disorders, depression or other mental health 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.[7]

Retirement from sport: If the burden of one concussion or each successive concussion is significant, the family, school and medical teams should discuss retirement from sport.

Resources

Centers for Disease Control (CDC)	CDC.gov	1-800-CDC-INFO
Colorado Brain Injury Program	tbicolorado.org	303-866-4779
CO Child/Adolescent Brain Injury	COkidswithbraininjury.com	
Brain Injury Association of Colorado (BIAC)	biacolorado.org	303-355-9969
Brain Injury Alliance of Colorado (BIAC)	biausa.org	1-800-444-6443
Colorado High School Activities Association (CHSAA)	chsaa.org	303-344-5050
Colorado Department of Education (CDE)	cde.state.co.us	303-866-2879
National Association of Athletic Trainers (NATA)	nata.org 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	nfhslearn.org

>> Please Note:
This publication is not a substitute for seeking medical care.

REAP is available for customization in your state.

>> All questions or comments and requests for inservices/trainings can be directed to:

- Karen McAvoy, PsyD, *Director of the Center for Concussion*
  Rocky Mountain Hospital for Children / Rocky Mountain Youth Sports Medicine Institute
  Centennial Medical Plaza, 14000 E. Arapahoe Rd., Suite #300
  Centennial, CO 80112
  Phone: 720.979.0840 Fax: 303.690.5948
  Karen.McAvoy@HealthONEcares.com

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- Ciera Lund and the Lund family

This manual is available in Spanish upon request.

This program is part of HealthONE's Rocky Mountain Hospital for Children.

Symptom Checklist

Name: _____ Assessment Date: _____

Date of Injury: _____

Pathways	Symptoms	Time of Injury	2-3 Hrs	24 Hrs	48 Hrs	72 Hrs	Daily	Weekly
			Mild	Mild	Moderate	Moderate	Severe	Severe
A	I feel like I'm going to faint	0	1	2	3	4	5	6
V	I'm having trouble balancing	0	1	2	3	4	5	6
	I feel dizzy	0	1	2	3	4	5	6
	It feels like the room is spinning	0	1	2	3	4	5	6
O	Things look blurry	0	1	2	3	4	5	6
	I see double	0	1	2	3	4	5	6
H	I have headaches	0	1	2	3	4	5	6
	I feel sick to my stomach (nauseated)	0	1	2	3	4	5	6
	Noise/sound bothers me	0	1	2	3	4	5	6
	The light bothers my eyes	0	1	2	3	4	5	6
C	I have pressure in my head	0	1	2	3	4	5	6
	I feel numbness and tingling	0	1	2	3	4	5	6
N	I have neck pain	0	1	2	3	4	5	6
S/E	I have trouble falling asleep	0	1	2	3	4	5	6
	I feel like sleeping too much	0	1	2	3	4	5	6
	I feel like I am not getting enough sleep	0	1	2	3	4	5	6
	I have low energy (fatigue)	0	1	2	3	4	5	6
	I feel tired a lot (drowsiness)	0	1	2	3	4	5	6
Cog	I have trouble paying attention	0	1	2	3	4	5	6
	I am easily distracted	0	1	2	3	4	5	6
	I have trouble concentrating	0	1	2	3	4	5	6
	I have trouble remembering things	0	1	2	3	4	5	6
	I have trouble following directions	0	1	2	3	4	5	6
	I feel like my thinking is "foggy"	0	1	2	3	4	5	6
	I feel like I am moving at a slower speed	0	1	2	3	4	5	6
	I don't feel "right"	0	1	2	3	4	5	6
	I feel confused	0	1	2	3	4	5	6
	I have trouble learning new things	0	1	2	3	4	5	6
E	I feel more emotional	0	1	2	3	4	5	6
	I feel sad	0	1	2	3	4	5	6
	I feel nervous	0	1	2	3	4	5	6
	I feel irritable or grouchy	0	1	2	3	4	5	6

Other: _____

Pathways of concern: A=Autonomic V=Vestibular O=Oculomotor H=Headache (Migraine &Non-Migraine) C=Cervicogenic N=Neck Strain S/E=Sleep/Energy Cog=Cognitive E=Emotional

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Teacher Feedback Form

Date _____

>> Student's Name _____

Date of Concussion _____

Student: you have been diagnosed with a concussion. It is **your responsibility to gather data from your teachers** before you return to the doctor for a follow-up visit. A day or two before your next appointment, go around to all of your teachers (especially the CORE classes) and ask them to fill in the boxes below based upon how you are **currently functioning** in their class(es).

Teachers: Thank you for your help with this student. Your feedback is very valuable. We do not want to release this student back to physical activity if you are still seeing physical, cognitive, and emotional or sleep/energy symptoms in your classroom(s). If you have any concerns, please state them below.

1. Your name 2. Class taught	Is the student still receiving any academic adjustments in your class? If so, what?	Have you noticed, or has the student reported, any concussion symptoms lately? (e.g. complaints of headaches, dizziness, difficulty concentrating, remembering; more irritable, fatigued than usual etc.?) If yes, please explain.	Do you believe this student is performing at their pre-concussion learning level?
			❑ Yes ❑ No Date: Signature:
			❑ Yes ❑ No Date: Signature:
			❑ Yes ❑ No Date: Signature:
			❑ Yes ❑ No Date: Signature:

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SENATE BILL 11-040

(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.

(a) 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.

REMOVAL FROM PLAY FOR A "SUSPECTED" CONCUSSION

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. The signs and symptoms cannot be readily explained by a condition other than concussion.

RETURN TO PLAY

(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:
• a 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.

(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.

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 return to play.

THIS IS COLORADO LAW

Rocky Mountain Hospital for Children
At Presbyterian/St. Luke's
Health ONE

RockyMountainHospitalForChildren.com

Center for Concussion

At Centennial Medical Plaza
14000 East Arapahoe Road, Building C, Suite 300
Centennial, CO 80112
720.979.0840

At Red Rocks Medical Center
400 Indiana Street, Suite 350
Golden, CO 80401
303.861.2663

Jake Snakenberg Fund

Dedicated to the Memory
of Jake Snakenberg
April 19, 1990 -
September 19, 2004

In the fall of 2004, Jake Snakenberg passed away from "Second Impact Syndrome." As a result of Jake's death, with the support of Jake's family and a team of dedicated health professionals, REAP and the Center for Concussion exist today.

The Jake Snakenberg Fund is a program of Rocky Mountain Children's Health Foundation, whose mission is to *enhance the quality of life for pediatric patients in the Rocky Mountain region.*

To ensure the ongoing efforts to educate coaches and parents on concussion recognition, please consider a gift to the Jake Snakenberg Fund.

Online: www.rmchildren.org/donation

Mail to:
Rocky Mountain Children's Health Foundation
2055 High Street Suite 240, Denver, CO 80205

Contact: Luanne Williams, Executive Director
303.839.6873

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Rocky Mountain Children's Health Foundation

Printing of this brochure was paid for by the Jake Snakenberg Fund of the Rocky Mountain Children's Health Foundation.

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