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**Return to Learn (R2L)**

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## Concussion

- mild Traumatic Brain Injury (mTBI)
- is a brain injury and is defined as complex pathophysiological process affecting the brain, induced by biomechanical forces
- 'Typically' results in rapid onset of short-lived impairment of neurologic function that resolves spontaneously (but there can be long-term sequelae)

## Epidemiology

- 65% are estimated to occur in the pediatric population
- 50% of the concussions in the age 11-15 years old population are not sport-related
- Significant pediatric public health issue

## Epidemiology

- Concussion accounts for approximately 10% of all high school athletic injuries
- Girls have a higher rate of concussion than boys in similar sports

## Concussion Rates in HS Sports

Sport	Injury rate, per 1000 athlete exposures
Football	0.47-1.03
Girls' Soccer	0.36
Boys' Lacrosse	0.28-0.34
Boys' Soccer	0.22
Girls' Basketball	0.21

## Concussion Symptoms

- 4 categories
  - Physical
  - Sleep
  - Thinking/Memory (Cognitive)
  - Mood Disruption (Emotional)

### Concussion Symptoms

**Physical**

Headache	Nausea
Vomiting	Balance
Slowed reaction time	Dizziness
Sensitivity to light	Sensitivity to sound
Fuzzy or blurry vision	

### Concussion Symptoms

**Sleep**

Sleeping more or less than usual

Drowsiness or fatigue

Trouble falling sleep

### Concussion Symptoms

**Thinking/Memory**

Difficulty thinking or memory

Difficulty remembering

Confusion

Feeling 'mentally foggy'

Feeling slowed down

### Concussion Symptoms

**Mood Disruption**

More emotional

Irritable

Sad

Nervous

Depressed

### Looks can be deceiving

- Heat exhaustion and heat stroke
- Dehydration
- Medication side effects
- Exertion headache
- Hypoglycemia

### Looks can be deceiving

- Migraine headache
- Neck injury
- Seizure aura/post-ictal state
- Altitude sickness

### Looks can be deceiving

■ **“Monday Morning Concussion”**

- Symptoms of a concussion may not develop immediately after the injury
- 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.

### Brain Development

- Total brain size is about 90 percent of adult size by age 6 years, the brain continues to undergo dynamic changes throughout adolescence and into young adulthood (*Yakovlev and Lecours, 1967*)
- The developing brain responds differently to concussion than does the mature brain (*Choe et al., 2012; Shrey et al., 2011*)

### Complications

■ **Second Impact Syndrome**

- A second concussion occurs before the first concussion has properly healed
- Results in cerebral vascular congestion, which can progress to diffuse cerebral swelling and death\*
- All reported cases are of athletes younger than 20 years

### Post-concussion Syndrome

- Post-concussion syndrome is the persistence of a constellation of physical, cognitive, emotional, and sleep symptoms beyond the usual recovery period after a concussion
- Prolonged concussion symptoms

### Cognitive Rest

- No school attendance
- No home/school work
- No reading
- No video games

### Cognitive Rest

- No texting
- No computer
- No television
- Essentially eliminating or limiting screen time

### Physical and Cognitive Rest

- May participate in normal activities of daily life that do not result in an increased heart rate or break a sweat
- Activities should not trigger or worsen symptoms
- Avoid diverting glucose from the brain during the period of reduced bioavailability in the acute post-injury phase

### Cognitive Rest

- Starting with strict cognitive rest and then relax the restrictions as the patient's symptom allow, provides an effective means of initiating the acute management of concussion for all patients

### + Myths

- You have to have a hit to the head to get a concussion
- You have to lose consciousness to have a concussion
- You need a CT scan or MRI to diagnose a concussion
- Child should be awakened every 2-3 hours for neurological checks
- Helmets prevent concussions
- Kids recover quicker than adults

### Common Myths?

- You have to get hit in the head to have a concussion-
- A concussion may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an "impulsive" force transmitted to the head

### Common Myths?

- You have to get loss of consciousness to be diagnosed with a concussion
- Only 10-20% of children with concussions report being "knocked out"

### Common Myths?

- Imaging is necessary for the evaluation and management of concussion

### Neuroimaging

- Concussion may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury
- Abnormalities are not seen on standard structural neuroimaging studies

### Common Myths ?

- Wake up the child every two hours to perform neuro checks
- As long as more serious injuries have been ruled out, a child diagnosed with concussion can sleep as much as he/she needs

### Common Myths?

- Helmets Prevent Concussions

### Helmets

- Helmets reduce the risk of skull fractures
- Helmets reduce the risk of brain bleeding



### Helmets

- Helmets DO NOT reduce or eliminate the risk of concussion

### Helmets

- There is no difference between all the different types of helmets or the age of the helmet as long as it has been refurbished
- Studies
  - 2011 Temple University
  - 2012 University of Wisconsin
  - 2014 Florida State University

### Common Myths?

- Kids recover quicker than adults.

### Common Myths

- Children recover quicker from concussions compared to adults

### + Return to Learn

- Brain injury is a **leading** cause of death and disability in children and adolescents
- Brain injury severity does not equate with how the student will function academically or socially/emotionally in school

### + Return to Learn

- Physical recovery is not a sign that the brain has healed. You can't gauge recovery from brain injury based on how a child looks on the outside



### + Return to Learn



### + Return to Learn

- Children do not simply “bounce back” after brain injury. In fact, injury to the developing brain can impact future learning
  - 50% of students will recover at two weeks
  - 90% of students will recover after four to six weeks
  - The 10% who take longer than six weeks can experience recovery times for months upwards to a year or more

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- Effects of brain injury are not always immediately apparent and may not become evident until the child passes through important developmental stages
- Over time, difficulties may emerge as the demands are increased on parts of the brain originally injured

**+ Return to Learn**

- Immediately after a concussion, complete cognitive (thinking, processing) rest is beneficial to help reduce symptoms
- Light cognitive activity can be resumed once patient has had significant improvement in symptoms at rest
- School-specific activity should be increased gradually

**+ Return to Learn**

- Returning to the full demands of school must be carefully managed
- Returning to a full academic load too soon following a concussion can significantly increase recovery time and intensify symptoms
- Students must be symptom free in the academic environment before return to play begins

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- **Current research demonstrates high levels of cognitive activity (thinking) following concussion prolongs recovery for up to 100 days in students, compared to 20-30 days for students who are provided accommodations immediately.**
- **(Journal of Pediatrics, 1/6/14)**

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- Many students return to school with lingering effects that impact classroom performance
- Initiative is to develop a program in Texas that helps:
  - Re-enter students into school after a new brain injury
  - Students previously identified as having a brain injury who may begin to develop educational effects over the years as the brain matures and develops

**+ Return to Learn**

- Initiative with:
  - Brain Injury Association of America, Texas Division
  - TEA, Texas Education Agency




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- All schools (public, private, charter, and Career & Technical Centers) will be invited to partner

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- Texas model will be based on a program developed in Pennsylvania



- A brain injury school re-entry consulting program

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- BrainSTEPS is working to make sure that the individuals who provide educational support to children with brain injury have:
  - an understanding of brain injury
  - the resulting challenges
  - the support and interventions that will help these students achieve educational success through graduation

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- **BrainSTEPS** serves the following types of acquired brain injuries:
  - Concussions (mild TBI), moderate and severe Traumatic Brain Injuries caused by:
    - Sports and recreational activities
    - Falls, assault, and abuse
    - Motor vehicle accidents (includes bicycle), pedestrian accidents
    - Shaken baby syndrome

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- **BrainSTEPS** serves the following types of acquired brain injuries:
  - Non-Traumatic Brain Injuries caused by:
    - Stroke, brain tumor, aneurysm, lack of oxygen to the brain
    - Lightning strikes, chemotherapy/radiation impacts to the brain, near drowning, seizure disorder
    - Brain infections (encephalitis, meningitis), toxic or metabolic injury, and viruses.

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- **BrainSTEPS** supports school districts in the following ways:
  - Identification of students with traumatic and non-traumatic brain injuries
  - School re-entry planning
  - Intervention selection and implementation
  - Educational plan development
  - Concussion management for return to academics
  - Teacher training, peer training, family training
  - Ongoing, annual monitoring until graduation
  - Family support and resource sharing
  - Awareness training to medical, rehabilitation, and community facilities

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- CMTs
  - Partner with BrainSTEPS consulting teams that cover the state, based out of the educational Intermediate Units
- The BrainSTEPS teams are available to schools as a **2nd layer** of more intensive student concussion support, consultation and training, for concussed students who are still symptomatic after 4 weeks or if they have not returned to their academic baseline

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- CMTs:
  - Consult with schools regarding identification, school re-entry planning, IEP/504 Plan development, intervention selection and implementation, long-term monitoring of students and other issues professionals face in supporting students with brain injury
- BrainSTEPS teams are available to consult with CMTs at any time

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- Our model will be based on a program developed in Denver, Colorado



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

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- R.E.A.P. Program
- REAP stands for the four essential elements of concussion treatment and management:
  - R - Remove/Reduce physical and cognitive, or mental demands
  - E - Educate the student athlete, families, educators, coaches and medical professionals on all of the potential symptoms
  - A - Adjust/Accommodate for the student athlete academically
  - P - Pace the student athlete back to learning, activity, and play

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- This community-based program works on the premise that concussion is best managed by a multidisciplinary team that includes:
  - The student/athlete
  - Family
  - Various members of the school team
  - Medical team
- REAP helps families, schools and medical professionals develop a multidisciplinary team around the student athlete to help ensure their recovery from the concussion

**+ The Heart of Return to Learn**

- **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.

**+ The Heart of Return to Learn**

- **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.

**+ The Heart of Return to Learn**

- **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.

**+ The Heart of Return to Learn**

- **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 *concepts* for the student to know?
  - Work toward comprehension of a smaller amount of material versus rote memorization.

**+ The Heart of Return to Learn**

- **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.

**+ The Heart of Return to Learn**

- **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.

**+ The Heart of Return to Learn**

- **Collaboration**
  - Student
  - Family
  - School team
  - Medical team

**+ Learning and Health**

- The 19th century education advocate Horace Mann, considered the father of American public education, wrote, **“In the great work of education, our physical condition, if not the first step in point of importance, is the first in order of time. On the broad and firm foundation of health alone can the loftiest and most enduring structures of the intellect be reared.”**

11.02.15 The Children's Hospital of San Antonio

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- **Goals:**
  - Pilot the programs
  - Legislation in 2017
    - Stand alone law or amendment to current concussion law
  - Develop relationships with adult TBI programs to provide resources beyond graduation

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- [brainsteps.net](http://brainsteps.net)
- [cokidswithbraininjury.com](http://cokidswithbraininjury.com)
- [rockymountainhospitalforchildren.com/service/concussion-management-reap-guidelines](http://rockymountainhospitalforchildren.com/service/concussion-management-reap-guidelines)

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- Thank you
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