

HEADS UP: Collaborative Care for Concussion & TBI

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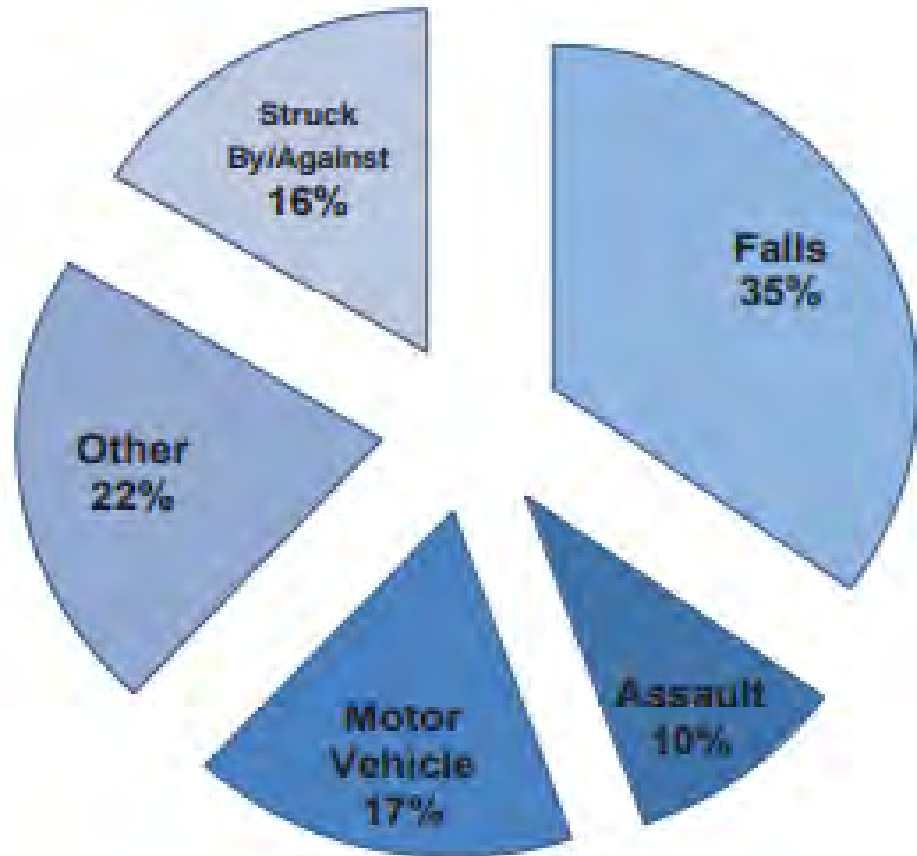


Epidemiology Pediatric TBI

- **Leading cause of death in kids** greater than 1 year
- **+329,290 ER visits** <19 with dx TBI or Concussion
- **Males>females 60:40**
- Biphasic peaks; <5 yr and adolescence
- **\$1 billion+ in hospital charges** for TBI in kids <17
- At 12 months post injury 26-31% have unmet needs

Need community partnerships to prevent, identify, and address pediatric concussion & TBI

Typical Causes of TBI



Crying is ok.

Shaking a baby isn't.

exchangeclubfoundation.org



Spectrum of Head Injury

Concussion
(complicated or not)

Traumatic brain injury

Mild (12-15 GCS)

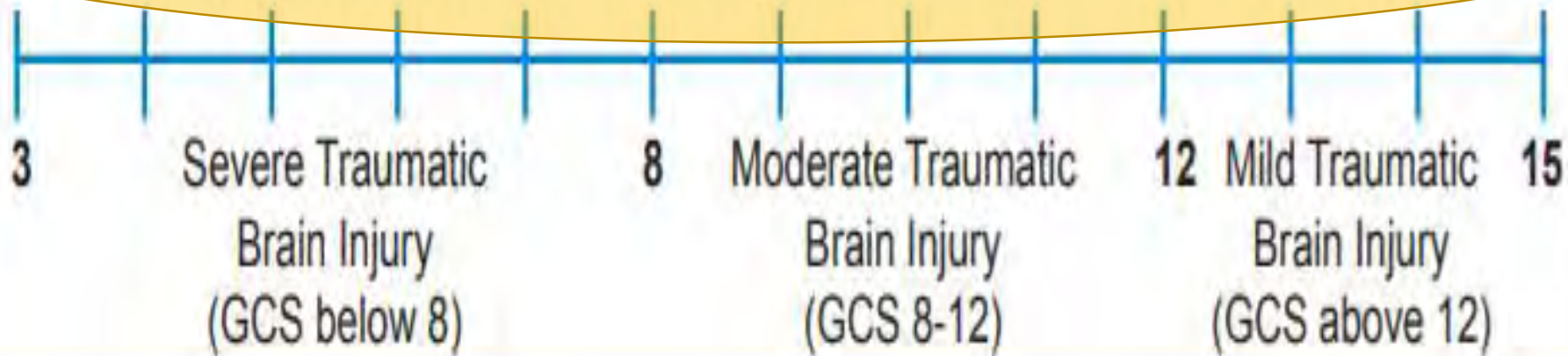
Moderate (9-11 GCS)

Severe (<8 GCS)

Severity of Brain Injury

Emergency personnel evaluating an individual who recently sustained a brain injury typically assess the severity of a brain injury by using an assessment called the **Glasgow Coma Scale (GCS)**. The scale, which generates a score between 3-15, comprises three tests: eye opening, verbal and motor responses.

NOTE: There may be no correlation between the initial Glasgow Coma Scale score and the initial level of brain injury and a person's short or long-term recovery or functional abilities.



Classification of Traumatic Brain Injury (TBI) Severity

Criteria	TBI Severity		
	Mild	Moderate	Severe
Structural Imaging	Normal	Normal or abnormal	Normal or abnormal
Loss of consciousness	0-30 minutes	>30 min and <24 hours	>24 hours
Alteration of consciousness/mental state**	A moment up to 24 hours	>24 hours; severity based on other criteria	
Posttraumatic amnesia	0-1 day	>1 day and <7 days	>7 days
Glasgow Coma Score (best available score in first 24 hours)	13 to 15	9 to 12	<9

**Alteration must be immediately related to the trauma to the head. Typical symptoms would be looking and feeling dazed and uncertain of what is happening; confusion; difficulty thinking clearly or responding appropriately to questions; and being unable to describe events immediately before or after the trauma event.

Management of concussion. Department of Veterans Affairs/Department of Defense Evidence Based Practice (2009). Available at: <http://1.usa.gov/18g27Hh>

Open versus Closed

HEAD INJURY - TYPES

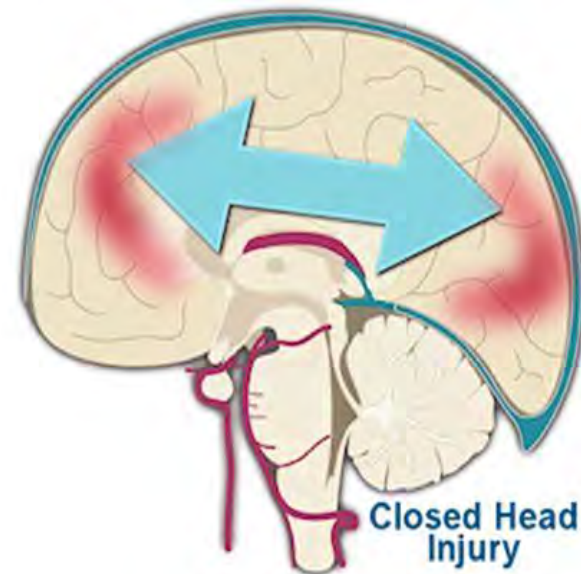
OPEN HEAD INJURY:

There is penetration to the skull.



CLOSED HEAD INJURY

There is NO penetration to the skull.



Coup - Countercoup

Coup-Countercoup Brain Injury

01
Initial impact
from outside
force



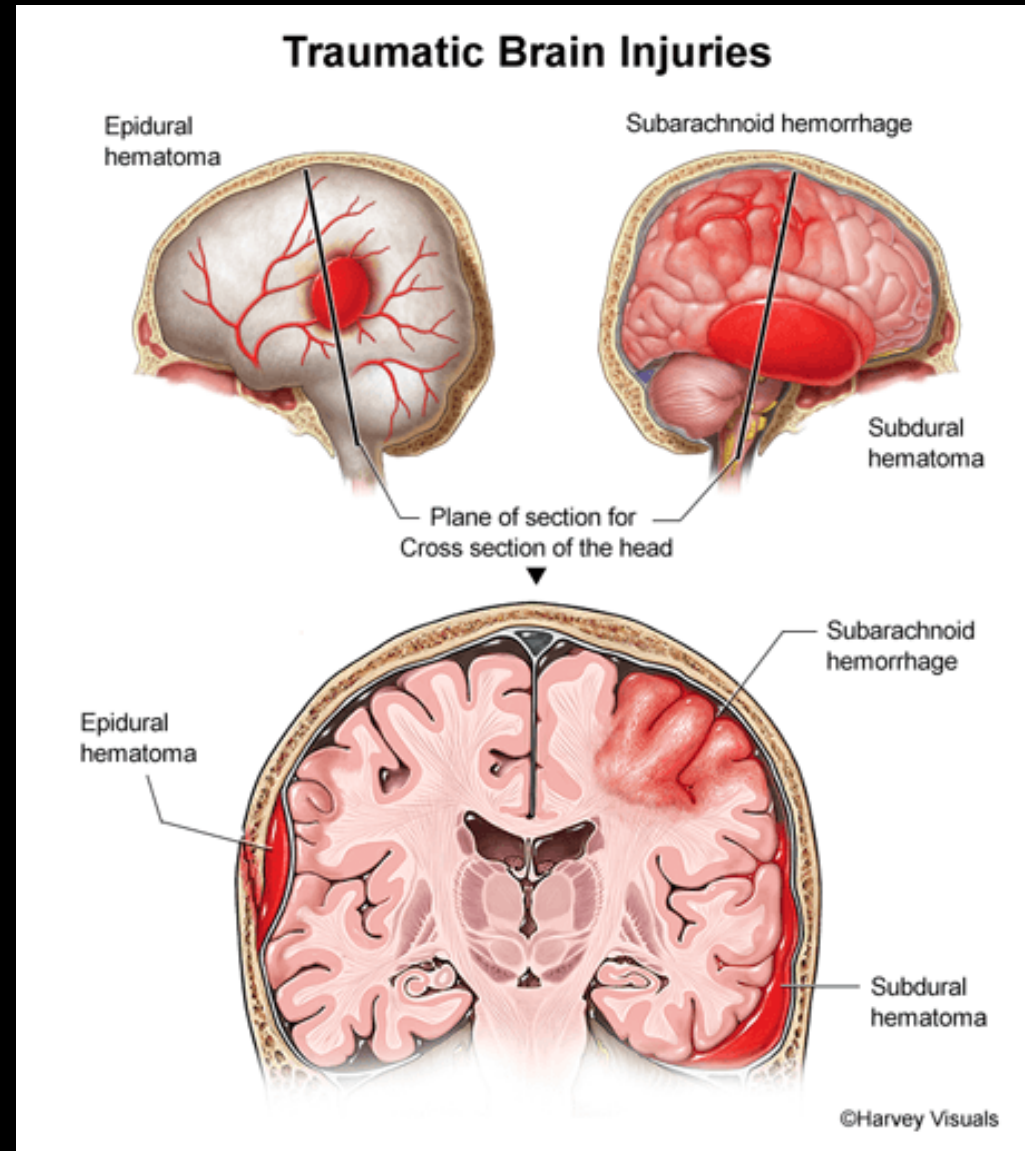
02
causing the brain
to impact front of
the skull

03
Rebound of the
head



04
Causes brain to
impact opposite
side of skull

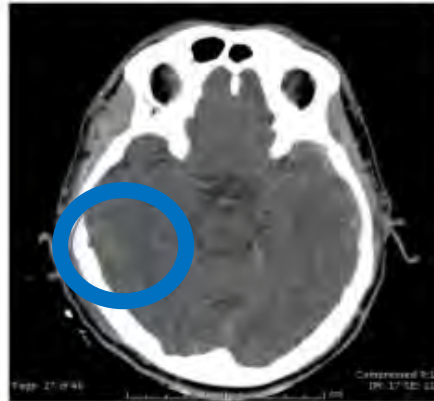
Non-Hemorrhagic or Hemorrhagic



Contusion or Diffuse Axonal Injury

Cerebral Contusion

- Can be normal early; can be non-hemorrhagic
- Imaging worsened with time, most evident after 24 h



Day 0



Day 1

Diffuse axonal injury



Primary Versus Secondary

- **Primary injuries occur at the moment of trauma** and are a direct result of the contact and/or acceleration-deceleration and rotational forces that the brain encounters
- **Secondary injuries are the biochemical and physiological sequelae** of the primary insult that evolve during the hours and days that follow the initial trauma

Primary Injuries

- Skull fractures
- Contusions
- Intracranial hemorrhage
- Diffuse axonal injury (DAI)

Secondary Injuries

- Traumatic Hematoma
- Edema
- Increased ICP
- Hydrocephalus
- Ischemia
- DAI

Concussion Symptoms

- Headaches (93.4%)
- Dizziness/unsteadiness (74.6%)
- Concentration (56.6%)
- Vision changes/photophobia (37.5%)
- Nausea (28.9%)
- Fatigue/Drowsiness (26.5%)
- Phonophobia (18.9%)
- Tinnitus (10.7%)
- Irritability (9.2%)
- Sleeping problems
- Depression
- Memory problems
- Slowed mental processing speed
- Word finding problems

Concussion Recovery

- 1-2 weeks of pronounced physiological, cognitive, and post-concussive symptoms
- Most adults recover by 10 days
- Pediatrics look to take longer:
 - 3 weeks (Gordon, 2006, Semin Neurol, 13: 243-255.)
 - Almost everyone is fully recovered at 3 months.
 - However, upwards of 20% of youth can have continued symptoms at 45-90 days post (McCrea, et al., 2013).
- Concussion recovery is heavily influenced by many variables

Predictors of protracted Concussion recovery

- Prior concussion
- Younger age
- Amnesia following concussion
- Number of initial symptoms reported
- Pre-morbid functioning



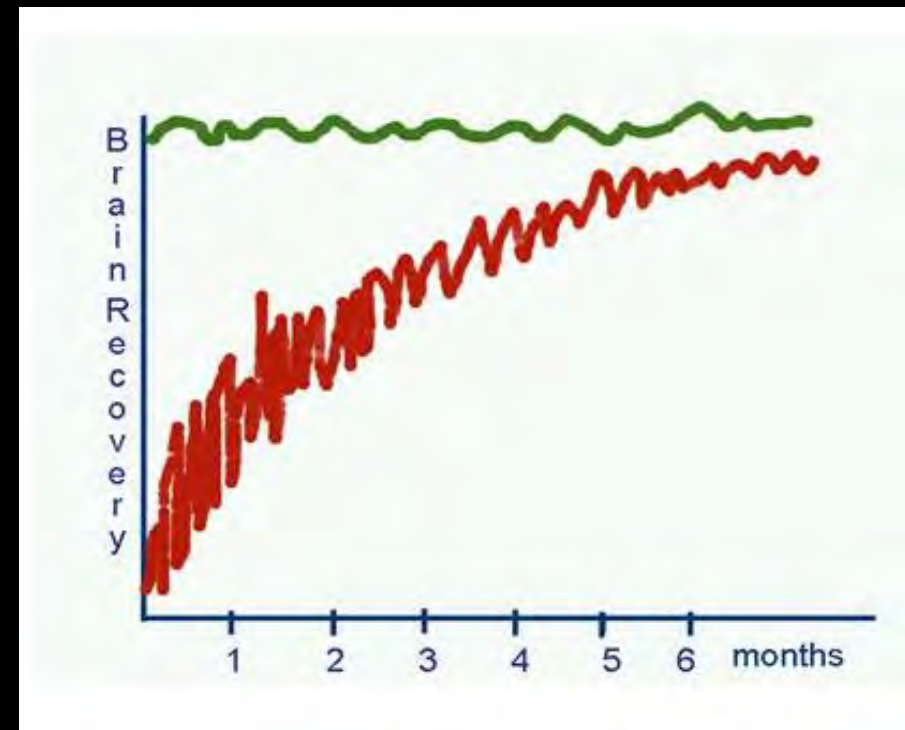
© Mayfield Clinic

Figure 2. The brain is composed of three parts: the brainstem, cerebellum, and cerebrum. The cerebrum is divided into four lobes: frontal, parietal, temporal, and occipital.

The table lists the lobes of the brain and their normal functions as well as problems that may occur when injured. While an injury may occur in a specific area, it is important to understand that the brain functions as a whole by interrelating its component parts.

	Healthy Brain	Injured Brain
Frontal lobe	Personality / emotions Intelligence Attention / concentration Judgment Body movement Problem solving Speech (speak & write)	Loss of movement (paralysis) Repetition of a single thought Unable to focus on a task Mood swings, irritability, impulsiveness Changes in social behavior and personality Difficulty with problem solving Difficulty with language; can't get the words out (aphasia)
Parietal lobe	Sense of touch, pain and temperature Distinguishing size, shape and color Spatial perception Visual perception	Difficulty distinguishing left from right Lack of awareness or neglect of certain body parts Difficulties with eye-hand coordination Problems with reading, writing, naming Difficulty with mathematics
Occipital lobe	Vision	Defects in vision or blind spots Blurred vision Visual illusions / hallucinations Difficulty reading and writing
Temporal lobe	Speech (understanding language) Memory Hearing Sequencing Organization	Difficulty understanding language and speaking (aphasia) Difficulty recognizing faces Difficulty identifying / naming objects Problems with short- and long-term memory Changes in sexual behavior Increased aggressive behavior
Cerebellum	Balance Coordination	Difficulty coordinating fine movements Difficulty walking Tremors Dizziness (vertigo) Slurred speech
Brainstem	Breathing Heart rate Alertness / consciousness	Changes in breathing Difficulty swallowing food and water Problems with balance and movement Dizziness and nausea (vertigo)

“Recovery” in Moderate to Severe TBI



Environmental Factors

- Mechanism of injury
- Multiple TBIs
- Polytrauma
- Severity of injury

- Deployment and postdeployment stressors
- Disability supports/service status
- Family functioning
- Social support
- Transportation access

Personal Factors

- Age
- Cognitive reserve (e.g., IQ, education)
- Gender
- Genetics
- Premorbid neurodevelopmental or mental health disorders

- Behavioral problems (e.g., anger, aggression)
- Comorbid conditions concurrent with TBI (visual impairment)
- Comorbid conditions due to TBI (e.g., epilepsy)
- Lack of awareness of deficits
- Neurodevelopmental disorders
- Pain
- Psychological comorbid conditions (e.g., anxiety, depression, PTSD)
- Sleep disturbances

Medical Care Factors

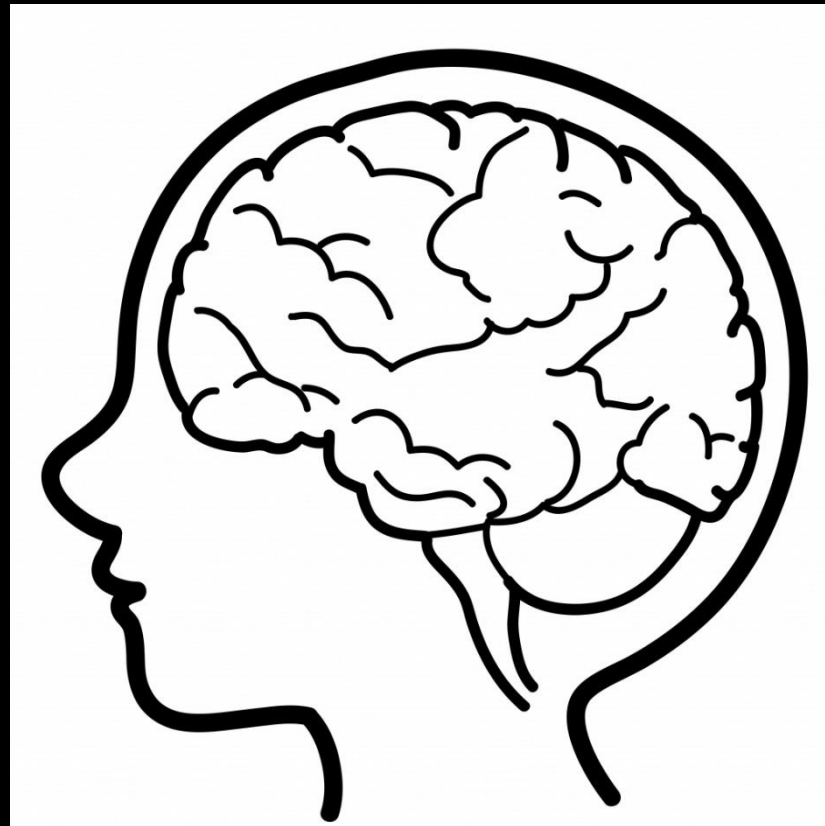
- Access to acute care
- Quality of care

- Access to general medical, mental or behavioral, and rehabilitation care
- Quality of care

Factors Affecting Initial Response to TBI

Factors Affecting Recovery from TBI

It's not just **what happens to the brain** . . .



. . . it's **the brain it happens to.**

It is *not just* the injury to the brain,

But the



it happens to

and the



it happens to

and the

context

it happens in

Key Themes for School & Community Engagement

- Primary Prevention
- Early Management
- Active rehabilitation
- Positive Behavioral Supports
- Accommodations
- Education
- School/Community Climate
- School Policies and Practices
- Local, State & National Policies

**COMMUNICATION &
COORDINATION**

Prevention

- Seatbelts, Child Restraints & Uncluttered Vehicles
- Addressing DUI
- Helmet Use
- Safe Living Areas (Windows, Stairs)
- Playground Surfaces
- Parameters for Play

Concussion Presentation

- At school or school function
- Return to school after sustaining concussion elsewhere
- History of concussion

Concussion in Sports and Recreation



If a concussion occurs during sports- and recreation-related activities, implement the [HEADS UP action plan](#).

Athletes with a concussion should never return to sports or recreation activities the day of the injury and until a health care professional, experienced in evaluating for concussion, says they are symptom-free and it's OK to return to play.

SPORTS CONCUSSION ASSESSMENT-SCAT 3

SYMPTOM EVALUATION

3

Child report

Name: _____

	never	rarely	sometimes	often
I have trouble paying attention	0	1	2	3
I get distracted easily	0	1	2	3
I have a hard time concentrating	0	1	2	3
I have problems remembering what people tell me	0	1	2	3
I have problems following directions	0	1	2	3
I daydream too much	0	1	2	3
I get confused	0	1	2	3
I forget things	0	1	2	3
I have problems finishing things	0	1	2	3
I have trouble figuring things out	0	1	2	3
It's hard for me to learn new things	0	1	2	3
I have headaches	0	1	2	3
I feel dizzy	0	1	2	3
I feel like the room is spinning	0	1	2	3
I feel like I'm going to faint	0	1	2	3
Things are blurry when I look at them	0	1	2	3
I see double	0	1	2	3
I feel sick to my stomach	0	1	2	3
I get tired a lot	0	1	2	3
I get tired easily	0	1	2	3

Total number of symptoms (Maximum possible 20) _____

Symptom severity score (Maximum possible 20x3=60) _____

self rated

clinician interview

self rated and clinician monitored

GOALS for Acute Concussion Management

- More severe head injury has been ruled out
- Educate patient and family
- Focus on preventing premature return to high-risk activities
- Monitor and Manage Symptoms
- Monitor response to treatment recommendations

Treatment in Acute Recovery

- Education and Reassurance
- Rest-Mental and Physical
- Monitor symptoms
- School/Work Accommodations (504 Plan)
 - Rest breaks
 - Shortened day
 - Extended time for task completion
 - Accessing assistance
 - Reducing time spent on computer, reading, or writing
- Gradual and step-wise return to mental activity, physical activity and sports

Education and Reassurance

- **Educational information and materials**
 - Common symptoms
 - Typical time course of recovery
 - Reassurance regarding recovery
 - Suggested coping strategies
- **Brief symptom screening**
- Access to therapist/neuropsychologist
- **Access to multi-disciplinary team or specialists**

TREATMENT

Kirkwood et al., 2015

COMMUNICATE

- Nature of Injury
- Any restrictions on physical activity
- Accommodations for school participation (gradual return)
- Expectation for Recovery
- Monitoring for Red Flags
- Student and Family Needs/Preferences

For example:

<http://www.cdc.gov/headsup/providers/discharge-materials.html>



MONITOR

- Identify a case manager
- Share information with all relevant providers/stakeholders
- Monitor recovery
 - Sustaining Attention
 - Slowed Processing Speed
 - Difficulty Learning New Information
 - Fatigue



CREATE A
SAFETY NET

- Develop a plan for missed work
- Implement temporary accommodations
 - Delay Exams
 - Shorten/Reduce Work
 - Extended Time
 - Access to Notes
 - Preferential Seating
 - Access to organizational and/or academic support



REFER

If student does not recover as expected, work with family to access needed follow-up care:

- Primary medical provider
- School team
- Neuropsychologist

Restoration of
Cerebral Function

Impact on Physical &
Cognitive Functioning

REST

Vulnerability to Injury

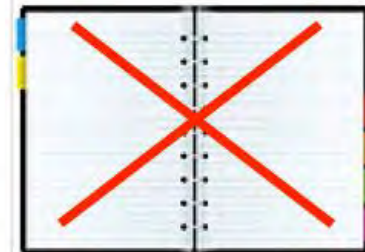
Potential to Slow Recovery



This means...



NO sports



NO school work



NO screens

REST your injury!

CONCUSSION-U 2014



NO computers



NO video games



NO TV

REST!?

- Focus on what patient **CAN** do
- Emphasize **temporary** prescription for rest
- Better compliance most likely to **reduce length of restrictions**
- **Support parents/family**



Symptomatic Treatment

- Headaches
- Balance Problems – Dizziness/Vertigo
- Sleep problems and fatigue
- Visual Disturbances
- Autonomic Dysfunction

Risks of Prolonged Watchful Waiting

Physical deconditioning

Anxiety

Stress

Mild depression

Irritability

Acting-out behaviors

Social difficulties

Academic Problems

Active Rehabilitation

Targeted, individualized symptom management and intervention for:

- Aerobic rehabilitation and re-conditioning
- Balance and oculomotor concerns
- Cognitive deficits
- Pain management
- Sleep
- Adjustment and coping
- Other social, emotional, behavioral concerns

EXERCISE AS TREATMENT

Mood

Pain

Sleep

Neuroplasticity

Self-Esteem

Cognitive Functioning

Psychologists Role in Intervention

- Education and Reassurance
- Symptom tracking
- Identifying and managing triggers
- Identifying and accessing alleviating factors
- High-level school/work accommodations
- Psychological intervention targeting sleep, pain, stress, adjustment, coping
- Cognitive-behavioral therapy
- Systems-level intervention

RETURN TO LEARN



TABLE 1.

Return-to-Learn Plan

Stage	Activity	Objective
No activity	Complete cognitive rest — no school, no homework, no reading, no texting, no video games, no computer work.	Recovery
Gradual reintroduction of cognitive activity	Relax previous restrictions on activities and add back for short periods of time (5-15 minutes at a time).	Gradual controlled increase in subsymptom threshold cognitive activities.
Homework at home before school work at school	Homework in longer increments (20-30 minutes at a time).	Increase cognitive stamina by repetition of short periods of self-paced cognitive activity.
School re-entry	Part day of school after tolerating 1-2 cumulative hours of homework at home.	Re-entry into school with accommodations to permit controlled subsymptom threshold increase in cognitive load.
Gradual reintegration into school	Increase to full day of school.	Accommodations decrease as cognitive stamina improves.
Resumption of full cognitive workload	Introduce testing, catch up with essential work.	Full return to school; may commence Return-to-Play protocol (see Step 2 in Table 2).

Source: Master CL, Gioia GA, Leddy JJ, Grady MF

Name: _____ Date of injury: _____

This calendar was designed to help you and your child monitor concussion symptoms during the recovery process.
 You may want to bring this with you to your doctor's office to share your progress.

Date:							
Location (circle one)	Home School (half day or full day)	Home School (half day or full day)	Home School (half day or full day)	Home School (half day or full day)	Home School (half day or full day)	Home School (half day or full day)	Home School (half day or full day)
Cognitive activity and duration							
Physical activity and duration							
Symptoms							
Method to reduce symptoms? (i.e., rest)							
Duration of symptoms							

RETURN TO PLAY



Return to Play Consensus Guidelines

- Consensus Statement on Concussion in Sport—the 4th International Conference on Concussion in Sport Held in Zurich, November 2012
- American Academy of Neurology
<https://www.aan.com/Guidelines/home/GetGuidelineContent/583>
- Centers for Disease Control – www.cdc.gov
- National Athletic Trainers Association – www.nata.org

TABLE 3.

Return-to-Play Protocol

Stage	Activity	Objective
No activity	Complete physical rest.	Recovery
Light aerobic exercise	Walking, swimming, aerobic exercise up to 70% of maximum predicted heart rate, no resistance training.	Increase heart rate.
Sport-specific exercise	Sport-specific exercise such as skating and running drills; no head impacts.	Add movement.
Noncontact training drills	Progress to complex drills; add resistance training.	Exercise, coordination, add cognitive load.
Full contact practice	Normal practice after cleared by medical personnel.	Restore confidence and timing, allow assessment of functional skills.
Return to play	Normal game play.	Full return to play.

Source: Adapted from Consensus Statement on Concussion in Sport 3rd International Conference on Concussion in Sport held in Zurich, November 2008³

Parameters

- Symptom free without pain medication
- 24 hours for each step
- Symptom free during activity and 24 hours of rest following
- If symptoms occur, drop back to prior step until symptom free for 24 hours
- If uncomplicated, return-to-play can be completed in about 1 week

Presentation of Moderate to Severe TBI

- Injury occurs at school
- Injury occurs in community for enrolled student
- Student returns to school following new injury
- History of moderate to severe TBI

Immediate

- Establish clear **pathway of communication** with family
- **Respect family** needs and preferences
 - What information is shared? How is it shared?
 - Visitors?
 - Organized school response?
- **Provide reassurance** to family @ school & community supports
- **Support peers & foster supportive school climate**



Acute Hospitalization

- Continue **coordinated communication**
- **Focus on child & family** needs and preferences
- Begin to **lay foundation for possible next steps**



Inpatient Rehabilitation

- Continue **coordinated communication**
- **Focus on child & family** needs and preferences
- Coordinate with Rehab team re: **Academics/School Work**
- **Develop transition plan**
 - Identify special education case manager
 - Plans for IEP
 - Diagnostic Teaching



Sequelae of Brain Injury

Physical & Medical

Balance

Fine and gross motor skills

Range of motion/flexibility

Coordination

Spasticity (stiffness) and ataxia (shakiness)

Pain, particularly headache

Changes in or loss of senses

Seizure disorder

Hastened aging process

Quality of speech and swallowing issues

Endurance

Sleep disturbance

Cognitive

Information processing

Orientation to person, place and time

Sequencing

Problem-solving and judgment

Memory

Planning and organizing

Attention/concentration

Communication problems (word-finding, understanding others, staying on topic)

Flexible thinking

Being able to initiate or start things

Emotional/Behavioral

Depression

Anxiety

Aggression

Flat or restricted affect

Mood swings

Emotional lability

Social skills

Disinhibition

Apathy

Exaggerated personality

Changes in drives (hunger, sex, and temper)

Impulsivity

Return to School

- **Coordinated communication** remains key
- Attention to any **grief/loss/post-traumatic** complications
- Educate **peers** and identify supportive peers
- **Therapy, Medical & Neuropsychological Evaluation Data**
- Implementation of **504 Plan/IEP**
 - Include Health Plan, as needed (e.g., seizures, medications)
 - Therapy services
 - Academic support
 - Accommodations
- Focus on **Positive Behavioral Supports**



Grieving Kid's

BILL OF RIGHTS

As written by Good Grief Teens

EVERY GRIEVING KID HAS THE RIGHT TO:

♥ Attend the funeral of the person who died.

Know the details of the death. ♥

♥ Ask as many questions as they want.

Have their personal space respected. ♥

♥ Grieve the way they want to grieve.

Feel what they want to feel. ♥

♥ Cry whenever they feel the need to.

To be able enjoy themselves. ♥

♥ Not be expected to always be happy.

To talk about grief when they want to. ♥

♥ Not talk about grief when they don't want to.

Have fun days, and not talk about death. ♥

♥ Not receive unnecessarily long hugs.

Be treated the same as before the death. ♥

♥ Have people remember that they are still grieving. ♥

Challenges & Solutions

- Lack of Information/Misinformation
 - Catastrophizing
 - Minimizing
- Access to resources
- Communication
- Invisibility
- One size does not fit all – need individualization

Resources

- Missouri Department of Health and Senior Services - <http://health.mo.gov/living/healthcondiseases/tbi/>
- Missouri Brain Injury Association - <http://www.biamo.org/>
- Brain Injury Association of Missouri - <http://www.biausa.org/>
- Centers for Disease Control & Prevention – Concussion & TBI Resources - <https://www.cdc.gov/traumaticbraininjury/index.html>
- Children’s Hospital of Philadelphia-Concussion Resources – <http://www.chop.edu/conditions-diseases/concussion/health-resources>

- Returning to School after TBI

<http://www.msktc.org/tbi/factsheets/Returning-To-School-After-Traumatic-Brain-Injury>

- Classroom Interventions for Students with TBI

<https://www.brainline.org/article/classroom-interventions-students-traumatic-brain-injuries>

HEADS UP

- HEADS UP
- Brain Injury Basics +
- Helmet Safety
- HEADS UP to Parents
- HEADS UP to Youth Sports +
- HEADS UP to School Sports +
- HEADS UP to Schools +
- HEADS UP to Health Care Providers +
- Sports Concussion Policies and Laws
- HEADS UP Resource Center +
- Get Involved
- HEADS UP Partners +
- About HEADS UP +



Keeping children and teens healthy and safe is always a top priority. Whether you are a [parent](#), [youth sports coach](#), [school coach](#), [school professional](#), or [health care provider](#), this site will help you recognize, respond to, and minimize the risk of concussion or other serious brain injury.



Download the Rocket Blades gaming app today!



HEADS UP to Parents




HEADS UP to Providers



I need to know...

- [How to get concussion training](#)
- [How to get the HEADS UP app](#)
- [How to get HEADS UP content on my website](#)
- [What a concussion is](#)

 [Get Email Updates](#)

THANK YOU!

Contact information

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