SCHOOL NURSES TOOLKIT

REFERENCE INFORMATION

USE THE LINKS BELOW TO VIEW A SPECIFIC RESOURCE

Six Types of Concussion - Information on the 6 types or clinical trajectories of concussion

A Fact Sheet for School Nurses – CDC's fact sheet specific to school nurses

School Accommodation Examples – Sample 504/IEP Accommodations and Modifications in the classroom for a student with traumatic brain injury, from CBIRT.org. See also tnstep.org for TN special education assistance for families

Tennessee's Return to Learn/Return to Play: Concussion Management Guidelines – Good information about steps to return a child to the classroom and steps for gradual return to play

Brain Links Flyer – Information on the Brain Links program. Brain Links can come to your school and train school personnel on concussion and TBI

Sample Return to School Letter from Doctor – An example of what you might receive from the doctor

CDC Online Training for Healthcare Providers – Earn free CME, CNE, and CEU credits

Link to The Guideline: Center for Disease Prevention and Control Guideline on the Diagnoses and Management of Mild Traumatic Brain Injury in Children, JAMA Pediatrics online September 2018 and CDC's five key recommendations from the guideline. Newest guideline for physicians.

CDC mTBI Pediatric Guideline Supplemental Documents

- CDC Pediatric mTBI Diagnostic Recommendations at a Glance – An overview of all the diagnostic recommendations for physicians
- CDC Pediatric mTBI Prognostic Recommendations at a Glance – An overview of all the prognostic recommendations for physicans
- CDC Management and Treatment at a Glance – An overview of the management and treatment recommendations for physicians

Research Summary and References – Summary of research provided in training and references

Brain Links

CONCUSSION
CLINICAL TRAJECTORIES

A Model for Understanding Assessment, Treatment and Rehabilitation

COGNITIVE/FATIGUE

Cognitive difficulties include decreased concentration, increased distractibility, difficulty learning/retaining new information or decreased multitasking abilities. Sometimes accompanied by increased fatigue as the day progresses.

VESTIBULAR

Impairments of the vestibular system – the balance center of the brain – affect one's ability to interpret motion, coordinate head and eye movements, or stabilize vision upon head movement.

OCULAR

Ocular dysfunction occurs when the movement of the eyes in tandem, or binocular eye movement, is affected. This may result in difficulties bringing the eyes together, or moving one's eyes to track motion.

POST-TRAUMATIC MIGRAINE

Post-traumatic migraine symptoms include headaches, nausea, and/or sensitivity to light or noise.

CERVICAL

Sometimes, the concussive blow affects the extra-cranial region including the neck and/or spinal cord. An injury of this type may lead to ongoing headaches.

ANXIETY/MOOD

This occurs when someone has a hard time turning his or her thoughts off, being particularly ruminative, of suffering from excessive worry or concern.

UPMC LIFE CHANGING MEDICINE

ReThink CONCUSSIONS

SIX TYPES OF CONCUSSION

1. Cognitive/Fatigue
2. Vestibular
3. Ocular
4. Post-traumatic Migraine
5. Cervical
6. Anxiety/Mood

FACTS

- Symptoms will be broad and generalized during the first week following concussion and will generally include symptoms like headache and fatigue.
- After the first week, if symptoms persist, they will tend to fall into one of the 6 clinical trajectories.
- There could be more than one trajectory type present.
- Specific trajectory and outcome depends on several factors:
  - Direction of force (linear vs. rotational)
  - Location of impact
  - Amount of force involved
  - Pre-injury risk factors

ACTIVE TREATMENT

Research is showing that active, specialized treatment – focused on specific symptoms – helps the brain recover from injury.

- Neuropsychology
- Vestibular Physical Therapy
- Exertional Physical Therapy
- Physical Medicine and Rehabilitation
- Neuro-optometry/ Neuro-ophthalmology
- Orthopedist
- Neurosurgery
- Neuroradiology
- Chiropractic
- Cognitive Therapy/ Speech Language Pathology

RISK FACTORS (which may delay recovery)

- History of prior concussions
- Motion sickness
- Visual problems
- Learning or attention issues
- Migraine history
- Gender *(female)*
- Age *(younger children tend to take longer to recover)*

Source: Kontos, A.P. Collins, M.W., (2018). Concussion: A Clinical Profile Approach to Assessment and Treatment.

Brain Links is supported by the Administration for Community Living (ACL) of the U.S. Department of Health and Human Services under Grant No. 90TBSG0024-01-00 and in part by the TN Department of Health, Traumatic Brain Injury Program.

A Fact Sheet for School Nurses

HEADS UP SCHOOLS

THE FACTS:

* All concussions are serious.
* Most concussions occur without loss of consciousness.
* Recognition and proper response to concussions when they first occur can help aid recovery and prevent further injury, or even death.

To download this fact sheet in Spanish, please visit: www.cdc.gov/Concussion.
Para obtener una copia electrónica de esta hoja de información en español, por favor visite: www.cdc.gov/Concussion.

What is a concussion?

A concussion is a type of brain injury that changes the way the brain normally works. A concussion is caused by a bump, blow, or jolt to the head. Concussions can also occur from a fall or blow to the body that causes the head and brain to move rapidly back and forth. Even what seems to be a mild bump to the head can be serious.

How can I recognize a concussion?

To help you recognize a concussion, ask the injured student or witnesses of the incident about:

1. *Any* kind of forceful blow to the head or to the body that resulted in rapid movement of the head.

-and-

2. *Any* change in the student's behavior, thinking, or physical functioning. (See the signs and symptoms of concussion.)

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

May 2010

How can concussions happen in schools?

Children and adolescents are among those at greatest risk for concussion. Concussions can result from a fall, or any time a student's head comes into contact with a hard object, such as the floor, a desk, or another student's head or body. The potential for a concussion is greatest during activities where collisions can occur, such as during physical education (PE) class, playground time, or school-based sports activities.

Students may also get a concussion when doing activities outside of school, but then come to school when symptoms of the concussion are presenting. For example, adolescent drivers are at increased risk for concussion from motor vehicle crashes.

Concussions can have a more serious effect on a young, developing brain and need to be addressed correctly. Proper recognition and response to concussion symptoms in the school environment can prevent further injury and can help with recovery.

What are the signs and symptoms of concussion?

Students who experience ***one or more*** of the signs and symptoms listed below after a bump, blow, or jolt to the head or body should be referred to a health care professional experienced in evaluating for concussion.

There is no one single indicator for concussion. Rather, recognizing a concussion requires a symptom assessment. The signs and symptoms of concussion can take time to appear and can become more noticeable during concentration and learning activities in the classroom. For this reason, it is important to watch for changes in how the student is acting or feeling, if symptoms become worse, or if the student just "doesn't feel right."

SIGNS OBSERVED BY SCHOOL NURSES

- Appears dazed or stunned
- Is confused about events
- Answers questions slowly
- Repeats questions
- Can't recall events *prior* to the hit, bump, or fall
- Can't recall events *after* the hit, bump, or fall
- Loses consciousness (even briefly)
- Shows behavior or personality changes

SYMPTOMS REPORTED BY THE STUDENT

Thinking/Remembering:
- Difficulty thinking clearly
- Difficulty concentrating or remembering
- Feeling more slowed down
- Feeling sluggish, hazy, foggy, or groggy

Emotional:
- Irritable
- Sad
- More emotional than usual
- Nervous

Physical:
- Headache or "pressure" in head
- Nausea or vomiting
- Balance problems or dizziness
- Fatigue or feeling tired
- Blurry or double vision
- Sensitivity to light or noise
- Numbness or tingling
- Does not "feel right"

Sleep*:
- Drowsy
- Sleeps *less* than usual
- Sleeps *more* than usual
- Has trouble falling asleep

**Only ask about sleep symptoms if the injury occurred on a prior day.*

Remember, you can't see a concussion and some students may not experience or report symptoms until hours or days after the injury. Most young people with a concussion will recover quickly and fully. But for some, concussion signs and symptoms can last for days, weeks, or longer.

What are concussion danger signs?

In rare cases, a dangerous blood clot may form on the brain in a person with a concussion and crowd the brain against the skull. The student should be taken to an emergency department right away if s/he exhibits any of the following danger signs after a bump, blow, or jolt to the head or body:

- One pupil larger than the other
- Is drowsy or cannot be awakened
- A headache that gets worse and does not go away
- Weakness, numbness, or decreased coordination
- Repeated vomiting or nausea
- Slurred speech
- Convulsions or seizures
- Cannot recognize people or places
- Becomes increasingly confused, restless, or agitated
- Has unusual behavior
- Loses consciousness (even a brief loss of consciousness should be taken seriously)

For more information and tool kits for youth sports coaches and high school coaches, visit www.cdc.gov/Concussion.

What can school nurses and school professionals do?

Below are steps for you to take when a student comes to your office after a bump, blow, or jolt to the head or body.

1. **Observe student for signs and symptoms of concussion for a minimum of 30 minutes.**

2. **Complete the *Concussion Signs and Symptoms Checklist* and monitor students consistently during the observation period.** The form includes an easy-to-use checklist of signs and symptoms that you can look for when the student first arrives at your office, fifteen minutes later, and at the end of 30 minutes, to determine whether any concussion symptoms appear or change.

3. **Notify the student's parent(s) or guardian(s) that their child had an injury to the head.**
   - > **If signs or symptoms are present:** refer the student right away to a health care professional with experience in evaluating for concussion. Send a copy of the *Concussion Signs and Symptoms Checklist* with the student for the health care professional to review. Students should follow their health care professional's guidance about when they can return to school and to physical activity.
   - > **If signs or symptoms are not present:** the student may return to class, but should not return to sports or recreation activities on the day of the injury. Send a copy of the *Concussion Signs and Symptoms Checklist* with the student for their parent(s) or guardian(s) to review and ask them to continue to observe the student at home for any changes. Explain that signs and symptoms of concussion can take time to appear. Note that if signs or symptoms appear, the student should be seen right away by a health care professional with experience in evaluating for concussion.

Children and teens with a concussion should NEVER return to sports or recreation activities on the same day the injury occurred. They should delay returning to their activities until a health care professional experienced in evaluating for concussion says they are symptom-free and it's OK to return to play. This means, until permitted, not returning to:

- Physical Education (PE) class,
- Sports practices or games, or
- Physical activity at recess.

School Policies:

Students Returning to School after a Concussion

Check with your school administrators to see if your district or school has a policy in place to help students recovering from a concussion succeed when they return to school. If not, consider working with your school administration to develop such a policy. Policy statements can include the district's or school's commitment to safety, a brief description of concussion, a plan to help students ease back into school life (learning, social activity, etc.), and information on when students can safely return to physical activity following a concussion.

What do I need to know about students returning to school after a concussion?

Supporting a student recovering from a concussion requires a collaborative approach among school professionals, health care professionals, parents, and students. All school staff, such as teachers, school nurses, counselors, administrators, speech-language pathologists, coaches, and others should be informed about a returning student's injury and symptoms, as they can assist with the transition process and making accommodations for a student. If symptoms persist, a 504 meeting may be called. Section 504 Plans are implemented when students have a disability (temporary or permanent) that affects their performance in any manner. Services and accommodations for students may include speech-language therapy, environmental adaptations, curriculum modifications, and behavioral strategies.

Encourage teachers and coaches to monitor students who return to school after a concussion. Students may need to limit activities while they are recovering from a concussion. Exercising or activities that involve a lot of concentration, such as studying, working on the computer, or playing video games, may cause concussion symptoms (such as headache or tiredness) to reappear or get worse. After a concussion, physical and cognitive activities—such as concentration and learning—should be carefully monitored and managed by health and school professionals.

If a student already had a medical condition at the time of the concussion (such as chronic headaches), it may take longer to

recover from the concussion. Anxiety and depression may also make it harder to adjust to the symptoms of a concussion.

School professionals should watch for students who show increased problems paying attention, problems remembering or learning new information, inappropriate or impulsive behavior during class, greater irritability, less ability to cope with stress, or difficulty organizing tasks. Students who return to school after a concussion may need to:

- Take rest breaks as needed,
- Spend fewer hours at school,
- Be given more time to take tests or complete assignments,
- Receive help with schoolwork, and/or
- Reduce time spent on the computer, reading, or writing.

It is normal for a student to feel frustrated, sad, and even angry because s/he cannot return to recreation or sports right away, or cannot keep up with schoolwork. A student may also feel isolated from peers and social networks. Talk with the student about these issues and offer support and encouragement. As the student's symptoms decrease, the extra help or support can be gradually removed.

What can I do to prevent and prepare for a concussion?

Here are some steps you can take to prevent concussions in school and ensure the best outcome for your students:

Prepare a concussion action plan. To ensure that concussions are identified early and managed correctly, have an action plan in place before the start of the school year. This plan can be included in your school or district's concussion policy. You can use the online action plan for sports and recreation activities at: www.cdc.gov/concussion/response/html. Be sure that other appropriate school and athletic staff know about the plan and have been trained to use it.

Educate parents, teachers, coaches, and students about concussion. Parents, teachers, and coaches know their students well and may be the first to notice when a student is not acting normally. Encourage teachers, coaches, and students to:

- Learn about the potential long-term effects of concussion and the dangers of returning to activity too soon.
- Look out for the signs and symptoms of concussion and send students to see you if they observe any or even suspect that a concussion has occurred.
- View videos about concussion online at: www.cdc.gov/Concussion.

Prevent long-term problems. A repeat concussion that occurs before the brain recovers from the previous concussion—usually within a short period of time (hours, days, or weeks)—can slow recovery or increase the likelihood of having long-term problems. In rare cases, repeat concussions

can result in edema (brain swelling), permanent brain damage, and even death. Keep students with a known or suspected concussion out of physical activity, sports, or playground activity on the day of the injury and until a health care professional with experience in evaluating for concussion says they are symptom-free and it is OK for the student to return to play.

Create safe school environments. The best way to protect students from concussions is to prevent concussions from happening. Make sure your school has policies and procedures to ensure that the environment is a safe, healthy place for students. Talk to all school staff and administrators and encourage them to keep the physical space safe, keep stairs and hallways clear of clutter, secure rugs to the floor, and check the surfaces of all areas where students are physically active, such as playing fields and playgrounds. Playground surfaces should be made of shock-absorbing material, such as hardwood mulch or sand, and maintained to an appropriate depth. Proper supervision of students is also important.

Monitor the health of your student athletes. Make sure to ask whether an athlete has ever had a concussion and insist that your athletes are medically evaluated and are in good condition to participate in sports. Keep track of athletes who sustain concussions during the school year. This will help in monitoring injured athletes who participate in multiple sports throughout the school year.

Some schools conduct preseason baseline testing (also known as neurocognitive tests) to assess brain function—learning and memory skills, ability to pay attention or concentrate, and how quickly someone can think and solve problems. If an athlete has a concussion, these tests can be used again during the season to help identify the effects of the injury. Before the first practice, determine whether your school would consider baseline testing.

For more detailed information about concussion diagnosis and management, please download *Heads Up: Facts for Physicians about Mild Traumatic Brain Injury* from CDC at: www.cdc.gov/Concussion.

Again, remember your concussion ABCs:

A—Assess the situation

B—Be alert for signs and symptoms

C—Contact a health care professional

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

HEADS UP SCHOOLS

For more information on concussion and to order additional materials for school professionals **FREE- OF-CHARGE**, visit: **www.cdc.gov/Concussion**.

cbirt

UNIVERSITY OF OREGON

504/IEP Accommodations & Modifications in the Classroom for a Student with a Traumatic Brain Injury

Student: _____Teacher: _____ Grade: _____ Date: _____ Birth Date: _____

Presenting Concerns: _____

Persons Responsible for Providing Selected Items: _____

Directions: Circle the challenges that affect your child or student. Check the accommodations that may be helpful.

Environment

- Post class rules
- Post daily schedule
- Give preferential seating
- Change to another class
- Change schedule (most difficult in morning)
- Eliminate distractions (visual, auditory & olfactory)
- Modify length of school day
- Provide frequent breaks
- Provide a quiet work place
- Maintain consistent schedule
- Provide system for transition

Transitions

- Specified person to oversee transition between classes or end of day
- Advanced planning for transition between grades/schools
- Modified graduation requirements
- Assistance with identifying post-secondary supports
- Identification of community resources for persons with brain injury

Method of Instruction

- Repeat directions
- Circulate teacher around room
- Provide visual prompts
- Provide immediate feedback
- Point out similarities to previous learning & work
- Use manipulative materials
- Teach to current level of ability (use easier materials)
- Speak clearly
- Pre-teach or reteach
- Use peer tutor or partner
- Use small group instruction
- Use simple sentences
- Use individualized instruction
- Pause frequently
- Use cooperative learning
- Encourage requests for clarification, repetition, etc.
- Use examples relevant to student's life
- Demonstrate & encourage use of technology

Behavioral Needs

- Early interventions for situations that may escalate
- Teach expected behavior
- Increase student academic success rate
- Learn to recognize signs of stress
- Give non-verbal cues to discontinue behavior
- Reinforce positive behavior
- Set goals with student
- Use social opportunities as rewards
- Teach student to use advance organizers at beginning of lesson
- Role play opportunities
- Use proactive behavior management strategies
- Daily/weekly communication with parents
- Modification of non-academic tasks (e.g., lunch or recess)
- Time & place to regroup when upset
- Additional structure in daily routine
- Frequent specific feedback about behavior

Assistive Technology

- Multimedia software
- Electronic organizers
- Shortcuts on computers
- Concept mapping software
- Accessibility options on computer
- Proofreading programs
- Alternative keyboards
- Voice output communication devices and reminders
- Enlarged text or magnifiers
- Recorded text & books
- Specialized calculators
- Picture & symbol supported software
- Talking spell checker & dictionary
- Computer for responding & homework
- Use of communication devices
- Word predicting programs
- iPad/tablet
- Smart Phone

cbirt

UNIVERSITY OF OREGON

504/IEP Accommodations & Modifications in the Classroom for a Student with a Traumatic Brain Injury

Memory Deficits

- Monitoring planner (check-off system)
- Written & verbal directions for tasks
- Posted directions
- Frequent review of information
- Strategy for note taking during long reading assignment
- Provide a copy of notes
- Open book or note tests
- Reminders for completing & turning in work
- Repetition of instructions by student to check for comprehension

Visual Spatial Deficits

- Large print materials
- Distraction free work area
- Modified materials (e.g., limit amount of material presented on single page, extraneous picture)
- Graphs & tables provided to student
- Use of math & reading template or guide

Gross Motor/Mobility Difficulties

- Priority in movement (e.g., going first or last)
- Adaptive physical education
- Modified activity level for recess
- Special transportation
- Use of ramps or elevators
- Restroom adaptations
- Early release from class
- Assistance with carrying lunch tray, books, etc.
- Escort between classes
- Alternative evacuation plan
- Simple route finding maps & cues

Attention

- Visual prompts
- Positive reinforcement
- Higher rate of task change
- Verbal prompts to check work

Organizational Skills

- Study guide or timeline
- Daily calendar for assignments & tasks (digital or written)
- Instructions in using a planner or app
- Provide color-coded materials
- High-lighted materials to emphasize important or urgent information

Academic Progress

- Assigned person to monitor student's progress
- Contact person (home & school)
- Weekly progress report (home & school)

Fine Motor Difficulties

- Copy of notes provided
- Oral examinations
- Note-taker for lectures
- Scribe for test taking
- Recorded lectures

Curriculum

- Reduce length of assignments
- Change skill or task
- Modify testing type or setting
- Allow extra time
- Teach study skills
- Teach sequencing skills
- Teach memory strategies
- Write assignments in daily log
- Teach peers how to be helpful

Fatigue

- Reduced schedule
- Planned rest breaks
- Schedule arranged for high cognitive demand tasks to be followed by less stressful coursework

Processing Delays

- Complex direction broken into steps
- Repetition of pertinent information
- Cueing student to question prior to asking
- Use of precise language

Other Considerations

Home/School Relations

- School counseling
- Scripts about the injury & hospitalization
- Schedule regular meetings for all staff to review progress & maintain consistency
- Schedule parent conferences every _____
- Parent visits/contact
- Home visits

Disability Awareness

- Explain disabilities to other students
- Teach peers how to be helpful
- Training for school staff

This checklist serves as a starting point for identifying student needs and developing appropriate accommodations. Because rapid changes take place after a brain injury, the plan must be frequently reviewed and updated to meet the changing needs of the student. Be sure to review and change the plan as frequently as needed.

Return to Learn/Return to Play: Concussion Management Guidelines

Tennessee Department of Health | August 2020

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This document can be viewed online at https://www.tn.gov/health/health-program-areas/fhw/vipp/tbi/resources.html

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Table of Contents

What is a Concussion?

Concussion/TBI

A concussion is a type of traumatic brain injury, or TBI, is caused by a bump, blow or jolt to the head or by a hit to the body that causes the head and brain to move rapidly back and forth. This sudden movement can cause the brain to bounce around or twist in the skull, creating changes in the brain, and sometimes stretching and damaging the brain cells (CDC, 2015).

Aside from the elderly, children and adolescents are among those at greatest risk for concussion. The potential for a concussion in young people is greatest during activities where collisions can occur, such as during physical education class, playground time or sports activities. However, concussions can happen any time a student's head comes into contact forcefully with a hard object, such as a floor, desk or another student's head or body. Proper recognition and response to concussion can prevent further injury and help with recovery (CDC, 2015).

Medical providers may describe a concussion as a "mild" brain injury because concussions are usually not life-threatening. Even so, the effects of a concussion can be serious (CDC, 2015).

Traumatic brain injury is a serious public health problem in the United States. Each year, traumatic brain injuries contribute to a substantial number of deaths and cases of permanent disability. In 2014, 2.5 million TBIs occurred either as an isolated injury or along with other injuries (CDC, 2015).

Why are Concussions a Big Deal?

A concussion can occur from an impact to the body or the head. The most common cause of a concussion is a whiplash type injury, involving a rapid acceleration of the head.

Most concussions (90 percent) occur without loss of consciousness. Concussions can occur in any sport or during regular daily activities.

A "ding," "getting your bell rung" or what seems to be a mild bump, blow or jolt to the head can be serious and can change the way the brain normally works (CDC, 2013).

Because of changes in the neurophysiology of the brain, symptoms may continue to develop over the next few days following an injury.

After a concussion, among other effects, nerve cells and connections within the brain become stressed, resulting in the possible breaking of some connections between different brain areas and limiting the ability of the brain to process information efficiently and quickly (Molfese, 2013).

These changes can lead to a set of symptoms affecting the student's cognitive, physical, emotional and sleep functions, which may result in reduced ability to do tasks at home, at school or at work. Concussions can have an impact on the student's ability to learn in the classroom. Tracking symptoms tells a big part of the story during recovery.

During this time of recovery, returning to play before symptoms have resolved incurs the risk of further injury, and returning to full-time academics before symptoms have cleared can result in prolonged recovery time.

As the chemistry of the brain returns to normal, the symptoms begin to subside and for most people, they resolve within one to four weeks. During the recovery period, monitor students for full resolution of symptoms and refer for further evaluation or treatment if needed.

Ignoring the symptoms and trying to "tough it out" often makes symptoms worse.

Second Impact Syndrome may occur when a brain already injured takes another blow or hit before the brain recovers from the first, usually within a short period of time (hours, days or weeks). A repeat concussion can slow recovery or increase the likelihood of having long-term problems. In rare cases, repeat concussions can result in edema (brain swelling), permanent brain damage and even death (CDC, 2013).

(Adapted from Return to Learn, 2014)

Signs and Symptoms of Concussions

The signs and symptoms of concussion can show up right after an injury or may not appear or be noticed until hours or a few days after the injury. Be alert for any of the following signs or symptoms. Also, watch for changes in how the student is acting or feeling, if symptoms are getting worse or if the student just "doesn't feel right" (CDC, 2015).

Signs Reported by the Student:

Emotional:

- Irritability
- Sadness
- More emotional than usual
- Nervousness

Physical:

- Headache or "pressure" in head
- Nausea or vomiting
- Balance problems or dizziness
- Fatigue or feeling tired
- Blurry or double vision
- Numbness or tingling
- Does not "feel right"

Signs observed by staff:

- Appears dazed or stunned
- Is confused about events
- Answers questions slowly
- Repeats questions
- Can't recall events prior to the hit, bump or fall
- Can't recall events after the hit, bump or fall
- Loses consciousness (even briefly)
- Shows behavior or personality changes
- Forgets class schedule or assignments

Cognitive:

- Difficulty thinking clearly
- Difficulty remembering or concentrating
- Feeling slowed down
- Feeling sluggish, hazy or foggy

Sleep:

- Drowsy
- Sleeps less than usual
- Sleeps more than usual
- Has trouble falling asleep (Only ask sleep symptoms if injury occurred prior to date reported)

Danger Signs:

Be alert for symptoms that worsen over time. A student should be seen in the emergency department right away if s/he has:

- **One pupil that is larger than the other**
- **Drowsiness or cannot be awakened**
- **A headache that gets worse and does not go away**
- **Weakness, numbness or decreased coordination**
- **Repeated vomiting**
- **Slurred speech**
- **Seizures**
- **Difficulty recognizing people or places**
- **Increased confusion, restlessness or agitation**
- **Unusual behavior**
- **Loss of consciousness**

Prevention

A concussion is a traumatic brain injury that can be prevented in many cases. Being an active participant in sports and engaging in physical activity does place student-athletes at higher risk for injury; however, there are preventive measures that schools can take. This section is intended to remind school districts about the importance of prevention. Schools should:

- Conduct periodic safety reviews of common play/sporting areas
- Provide appropriate and adequate staffing for sporting events and recess
- Provide appropriate access to protective gear (helmets, mouth guards)
- Provide appropriate fitting of protective gear
- Design guidelines and enforcement of appropriate and fair rules and techniques (CDE, 2014)

Design, Implement and Review a school-wide "concussion action plan" for all school staff and faculty. Know what to do BEFORE a student/athlete has an injury.

Implement Safe Stars Initiative

The Safe Stars initiative recognizes youth sports leagues throughout Tennessee for providing the highest level of safety for their youth athletes. Safe Stars consists of three levels: gold, silver and bronze, and involves implementation of policies around topics such as concussion education, weather safety and injury prevention.

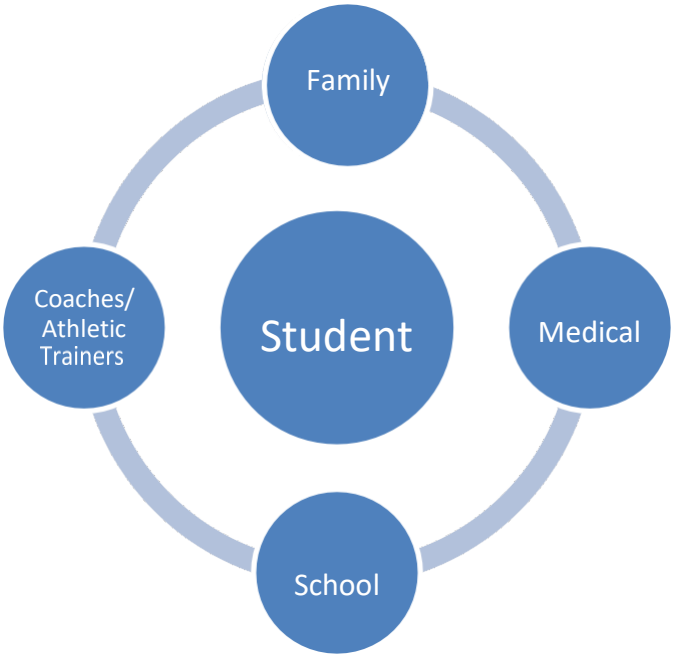
Safe Stars' goal is to provide resources and opportunities for every youth sports league to enhance their safety standards. The criteria for achieving recognition as a Safe Stars league has been developed by a committee of health professionals dedicated to reducing sports-related injuries among youth.

To learn more please visit:
www.tn.gov/health/health-program-areas/fhw/vipp/safe-stars-initiative.html.

Concussion Management Team

Once a concussion has been diagnosed by a health care professional, managing the concussion is best accomplished by creating a support system for the student. Communication and collaboration among parents, school personnel, coaches, athletic trainers and health care providers is essential for the recovery process. This support system oversees the return to academics and return to play process. A medical release signed by the parents allows for two-way communication between the school personnel and the health care provider (McAvoy, 2012, Return to Learn, 2014).

A collaborative approach with the student as the focus!



Each school district creates a concussion management policy that incorporates:

- Knowledge about concussions as a mild traumatic brain injury
- Training for all coaches, athletes, parents and school staff members about concussion management
- A Concussion Management Team with a designated Concussion Management Team Point Person
    - The Concussion Management Point Person may be the school nurse, the 504 designee, a guidance counselor or an administrator. Choose the individual that works best for your school's situation.

The Concussion Management Team

Members may include:

Physicians

Neuropsychologists

Physician Assistant

Parents

School Administrator or Designee

Athletic Director

Athletic Trainer

Coach

Teacher

Speech Language Pathologist

Nurse Practitioner

School Nurse

School Psychologist

School Counselor

Occupational Therapist

Physical Therapist

Student-Athlete

(Return to Play, 2014)

The Concussion Management Process

This is an example of the concussion management process that includes best practice components for all students.

Student Sustains a Concussion	• Remove from physical activity (P.E., recess, athletics, etc.) • Notify parents
Concussion Management Team Point Person is Notified	• CMT Point Person will notify the student's teachers, counselor, school nurse, parent/ guardian, coach, athletic trainer
CMT Records Collection	• The CMT will collect pertinent information regarding student's recovery (symptom checklist, school accommodations, medical release forms, etc.) • The CMT Point Person should maintain all records collected • The CMT Point Person is responsible for maintaining communication with parents, school nurse and health care providers
Return to Learn	• The student's academic accommodations will decrease as the symptoms begin to resolve
Symptom Free	• Record collection from CMT indicates the student is symptom-free without medications • Student is no longer requiring academic accommodations in the classroom
Return to Play	• Under guidance of health care provider, athlete may return to play *gradually (graduated RTP guidelines)* • Completion of graduated RTP protocol without return of symptoms is required for full medical clearance

(Adapted from Colorado, 2014)

Returning to School

The student may return to school when symptoms are tolerable and manageable, **as long as the school is making appropriate accommodations for the student**. The school must understand concussions and the necessary academic accommodations in order to facilitate returning students to the learning environment.

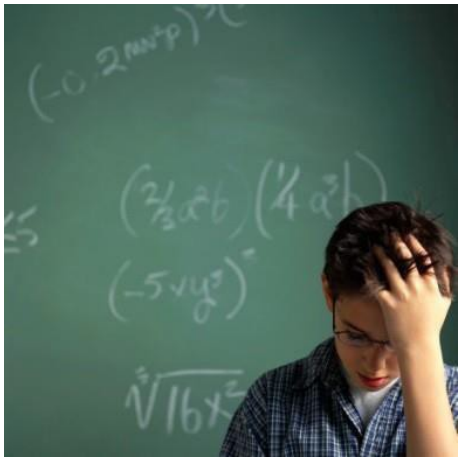
Key points:

- If symptoms prevent the student from concentrating on mental activities for ten minutes or less, complete cognitive rest is required. The student should be kept home from school with limited external stimulation (texting, watching TV, playing video games, etc.) or driving. In some, but not all, cases these stimulating activities may worsen the symptoms of concussion.
- If symptoms allow the student to concentrate on mental activities for up to 20 minutes or less, parents should consider keeping the student home from school, but may allow increased time periods of external stimulation as long as symptoms do not get worse.
- **See Cognitive Activity Monitoring Log in Appendix A**

When the student can tolerate 30 minutes of light mental activity, parents can consider returning him or her to the classroom. Best practices suggest: (a) parents communicate with the school and sign **a medical release of information (See Appendix B)** for the school to communicate with the health care provider, and (b) implement the appropriate academic accommodations provided by the treating health care provider and concussion management team.

Academic Accommodations: See School Accommodations Template in Appendix C

The balance between the student's medical and academic needs should be closely coordinated between school personnel and the health care provider. Each concussed student can have different symptoms, a different level of severity and a different recovery. Academic accommodations should be tailored to the specific needs of the individual student (McAvoy, 2014). Certain symptoms lend themselves to certain interventions. Especially in the acute phase of the concussion (one-four weeks), interventions should be applied generously in the classroom setting. Symptoms may be worse in some classes than in others. Teachers are encouraged to apply any intervention that is needed for the student based on the symptoms (McAvoy, 2015).



Classroom Strategies for Concussion Recovery

Symptom	School Setting Adjustment
Headache	• Frequent breaks • Reduce exposure to specific aggravators: bright lights/computer work/noisy environment • Rest periods if needed in nurse's office or quiet environment
Dizziness	• Allow student to put head down on desk • Give student early dismissal from class to avoid crowed hallways
Visual Problems: Light Sensitivity, Double Vision, Blurry Vision	• Reduce exposure to computers, light boards, videos • Reduce brightness on screens • Allow student to wear hat/sunglasses • Consider use of audio books • Turn off fluorescent lights • Seat student closer to the center of the classroom (blurry vision) • Have school nurse cover one eye with a patch for students with double vision
Noise Sensitivity	• Allow student to have lunch in a quiet area with one classmate • Limit/avoid band, choir, shop classes • Consider use of ear plugs • Allow early dismissal from class to avoid noisy hallways • Avoid noisy gyms/sporting events
Difficulty Concentrating or Remembering	• Avoid testing or completing major projects during recovery • Allow extra time to complete non-standardized tests • Postpone standardized testing • Consider one test per day during exams • Consider use of notes, a note taker or reader for oral testing
Sleep Disturbance	• Allow for late start or short day to catch up on sleep • Allow rest breaks in a quiet area

Adapted from: Halstead, M.E., McAvoy, K., Devore, C.D., Carl, R., Lee, M., Logan, K. (2013). Return to learning following a concussion. American Academy of Pediatrics. 132: 5, 948-957.doi:10.1542/peds.2013-2867

Symptoms Checklist

In most cases, symptoms may be the primary way to know when and how a concussion is getting better. Since the report of symptoms can be quite subjective, it is helpful to use a rating scale. The rating scale can act as a common language for everyone involved in managing the concussion. Most concussion management programs utilize a symptom scale with a 0 to 6 rating scale (0 = not present; 6 = most severe).

Name:_____ Date:_____

Date of Injury:_____

Symptom	None	Mild		Moderate		Severe	
Headache	0	1	2	3	4	5	6
Nausea	0	1	2	3	4	5	6
Vomiting	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Fatigue	0	1	2	3	4	5	6
Trouble falling asleep	0	1	2	3	4	5	6
Sleeping more than usual	0	1	2	3	4	5	6
Sleeping less than usual	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
Sensitive to light	0	1	2	3	4	5	6
Sensitive to noise	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous/Anxious	0	1	2	3	4	5	6
Feeling more emotional	0	1	2	3	4	5	6
Numbness or tingling	0	1	2	3	4	5	6
Feeling like in a fog	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Visual problems	0	1	2	3	4	5	6
Total Symptoms Score							

The Graded Symptoms Checklist is recommended by the National Athletic Trainers Association (Casa et al., 2012). The 0 to 6 symptoms scale is commonly used by various tests: ImPACT and SCAT3.

(Adapted from Colorado, 2014)

When and How to Write a 504 Plan

Typically, 90 percent of kids with concussions will recover within four weeks of their injuries**.** If a student has not resolved from a concussion within the typical three to four week time frame, it may be prudent to begin to look at a more "targeted" approach. (McAvoy and Eagan, 2015). If a 504 Plan is indicated, the 504 designee (CMT Point Person) at the school should set up a meeting with all the necessary members of the concussion management team (teachers, parents, counselors, administrators, school nurse, etc.). When writing a 504 Plan, one must identify what the most problematic symptoms are which will let you know which interventions to use in your plan. There are certain conditions or "modifiers" of concussion that we know may prolong the recovery process. Those modifiers are:

- A history of migraine headache or family history of migraines
- A pre-existing headache disorder
- ADHD
- A history of previous concussions
- Learning disability
- A history of anxiety and depression
- Sleep disorder

Be specific in the writing you 504 Plan. Do not write a plan "for concussion"; use the phrasing, "Section 504 Plan for X (specified symptom) secondary to concussion.

Examples:

Section 504 Plan for Headaches secondary to a concussion	• Head down on the desk in classroom • Pass to leave room to visit nurse • Able to take medications in school clinic
Section 504 Plan for Slowed Processing Speed secondary to a concussion	**Appropriate Interventions**: • Extended time on in-class assignments • Extended time on tests
Section 504 Plan for Convergence Insufficiency secondary to a concussion (MacAvoy & Eagan Brown, 2015)	**Appropriate Interventions**: • Teacher or peer notes printed out • In-class and homework on paper instead of computer screens whenever possible • Books on tape

There should also be an overall medical and education plan addressing the following questions:

- How long do we expect the symptoms to linger?
- Is the student still being treated for his/her concussion/symptoms?
- Do we expect the student to fully recover?
- What are the medical interventions being used?
- What side effect should we expect?

Remember:

- Only a small percentage of students with a concussion will need a 504 Plan.
- A Release of Medical Information Form will be needed for the school to communicate with the medical provider (Appendix B).
- When the Concussion Management Team works together to identify the underlying cause(s) for the prolonged recovery, addresses those areas, supports the student with academic accommodations, monitors the progress and adjusts the plan as needed, full recovery is possible (McAvoy and Eagan- Brown, 2015.

Return to Play

Tennessee Sports Concussion Law

In April 2013, Tennessee became the 44th state to pass a sport concussion law designed to reduce youth sports concussions and increase awareness of traumatic brain injury.

The legislation, Public Chapter 148, has three key components:

- ☐ To inform and educate coaches, youth athletes and their parents and require them to sign a concussion information form before competing.
- ☐ To require removal of a youth athlete who appears to have suffered a concussion from play or practice at the time of the suspected concussion.
- ☐ To require a youth athlete to be cleared by a licensed health care professional before returning to play or practice.

Both public and private school sports and recreational leagues for children under age 18 that require a fee are affected by the law. The law covers all sports. This website contains all the resources coaches, youth athletes and parents need to fulfill the intent of the law.

See more at:
https://www.tn.gov/health/health-program-areas/fhw/vipp/tbi/tn-sports-concussion.html

(TN Sports Concussion Law, 2013)

Within the school setting, any student who shows signs or symptoms of a concussion should be removed from physical activity (recess, physical education, dance class, etc.), and needs to be cleared medically before returning to physical activity. Medical providers approved to clear children for return to play from concussion are as follows:

- ☐ Medical Doctor (MD)
- ☐ Osteopathic Physician (DO)
- ☐ Clinical Neuropsychologist (PhD) with concussion training
- ☐ Physician Assistant (PA) with concussion training who is a member of a health care team supervised by a Tennessee licensed medical doctor or osteopathic physician.

See Return to Play Example, Appendix D

Return to Play Decisions

- ☐ According to the Concussion in Sport Group-4 Guidelines (2013), any child who is suspected of having a concussion should be removed from play and should not return to play that day.
- ☐ No return to sport should be considered until the child has returned to school successfully. A successful return to school would mean they no longer are in need of school accommodations.
- ☐ Children should not be returning to physical activity if they are still experiencing concussion symptoms, unless otherwise directed by their treating health care provider.
- ☐ Children should not be taking any medications to mask concussion symptoms in the graduated return to play process
- ☐ A graduated return to play process is recommended to be performed by the child with symptom monitoring at each step (McCrory, 2013).

Gradual Return to Play Plan

Return to play should occur in gradual steps beginning with light aerobic exercise only to increase your heart rate (e.g., stationary cycle); moving to increasing your heart rate with movement (e.g., running); then adding controlled contact if appropriate; and finally return to sports competition. Pay careful attention to your symptoms and your thinking and concentration skills at each stage or activity. After completion of each step without recurrence of symptoms, you can move to the next level of activity the next day under the direction of your health care provider. Move to the next level of activity only if you do not experience any symptoms at the present level. If your symptoms return, let your health care provider know, and await further instructions.

Day 1: Low levels of physical activity (i.e., symptoms do not come back during or after the activity). This includes walking, light jogging, light stationary biking and light weightlifting (low weight – moderate reps, no bench, no squats).

Day 2: Moderate levels of physical activity with body/head movement. This includes moderate jogging, brief running, moderate intensity on the stationary cycle, moderate intensity weightlifting (reduce time and or reduced weight from your typical routine).

Day 3: Heavy non-contact physical activity. This includes sprinting/running, high intensity stationary cycling, completing the regular lifting routine, non-contact sport specific drills (agility – with three planes of movement).

Day 4: Sports-specific practice.

Day 5: Full contact in a controlled drill or practice.

Day 6: Return to competition.

(TN Sports Concussion Law, 2013)

References:

1. Centers for Disease Control and Prevention-Concussion Fact Sheet for School Professionals (2013). www.cdc.gov/headsup/pdfs/custom/headsupconcussion_fact_sheet_for_schools.pdf

2. Centers for Disease Control and Prevention-Basic Information about Traumatic Brain Injury and Concussion. www.cdc.gov/traumaticbraininjury/basics.html

3. Colorado Department of Education Concussion Management Guideline (2014). www.cde.state.co.us/healthandwellness/concussionguidelines7-29-2014-0

4. Return to Learn: Bridging the Gap from Concussion to the Classroom (2014). www.education.ne.gov/sped/birsst/BRIDGING%20THE%20GAP%20Booklet%20plus%20Appendices.pdf

5. Halstead ME, McAvoy K, Devore CD, et al. Returning to learning following a concussion. Pediatrics. 2013;132(5):948-957. doi:10.1542/peds.2013-2867 https://pubmed.ncbi.nlm.nih.gov/24163302/

6. McAvoy, K & Eagan-Brown, B (2015). When to write a 504 Plan: Part 1. http://nebula.wsimg.com/b7526f238f9c921d00a11d9a5769226f?AccessKeyId=E4B9300FA35CD0310DEE&disposition=0&alloworigin=1

7. McAvoy, K & Eagan-Brown, B (2015). When to write a 504 Plan: Part 2. http://nebula.wsimg.com/ce204367cd9b3c9ca304eceda7bbbb2c?AccessKeyId=E4B9300FA35CD0310DEE&disposition=0&alloworigin=1

8. McAvoy, K & Eagan-Brown, B (2015). How to write a 504 Plan. http://nebula.wsimg.com/b39dbbc04d4ee60fc623f9da5fedb363?AccessKeyId=E4B9300FA35CD0310DEE&disposition=0&alloworigin

9. Tennessee Sports Concussion Law (2013). https://www.tn.gov/health/health-program-areas/fhw/vipp/tbi/tn-sports-concussion.html

10. McCory, P., Meeuwisse, W. H., Aubry, M., Cantu, B., Dvořák, J., Echemendia, R. J., & Sills, A.(2013). Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012. *British journal of sports medicine*, *47*(5), 250-258.

Additional Resources:

1. Brain Links http://tndisability.org/brain
2. Center on Brain Injury Research & Training. https://cbirt.org
3. Colorado Kids with Brain Injury. https://cokidswithbraininjury.com/
4. Get Schooled on Concussions: Return to Learn. www.getschooledonconcussions.com/

Appendix A

Cognitive Activity Monitoring (CAM) Log

Name_____ Parent/ Teacher:_____

DATE TIME							
LOCATION (circle one)	Home School	Home School	Home School	Home School	Home School	Home School	Home School
COGNITIVE ACTIVITY:							
DURATION:							
SYMPTOM (PRE/POST)	**Rate 0-10**	**Rate 0-10**	**Rate 0-10**	**Rate 0-10**	**Rate 0-10**	**Rate 0-10**	**Rate 0-10**
HEADACHE	____/____	____/____	____/____	____/____	____/____	____/____	____/____
FATIGUE	____/____	____/____	____/____	____/____	____/____	____/____	____/____
CONCENTRATION PROBLEMS	____/____	____/____	____/____	____/____	____/____	____/____	____/____
IRRITABILITY	____/____	____/____	____/____	____/____	____/____	____/____	____/____
FOGGINESS	____/____	____/____	____/____	____/____	____/____	____/____	____/____
LIGHT/ NOISE SENSITIVITY	____/____	____/____	____/____	____/____	____/____	____/____	____/____
Other:_____	____/____	____/____	____/____	____/____	____/____	____/____	____/____
PRE-POST DIFFERENCE	_____	_____	_____	_____	_____	_____	_____

Appendix B

Authorization of Release of Medical Information for Concussion

School Name:_____
Patient Name:_____Date of Birth:_____
Address:_____
City:_____State:_____Zip:_____
Social Security #:_____
I hereby authorize:_____
Name of Person/Organization Disclosing PHI

To release the following information to (School Receiving PHI) School:_____
Name:_____Title:_____
Address:_____
Phone:_____Fax:_____
Email:_____

Information to be shared:

- Medical records pertaining to concussion care
- Progress Notes
- Other:_____
- Academic Accommodations Forms
- Mental/Behavioral health records

The Information may be disclosed for the following purpose(s) only:

- Continued Treatment
- At the request of the patient/legal guardian

I understand that by voluntarily signing this authorization:

- I authorize the use of my protected health information as described above for the purpose(s) listed.
- I have the right to withdraw permission for the release of my information. If I sign this authorization to use or disclose information, I can revoke this authorization at any time. The revocation must be made in writing to the person/organization disclosing the information and will not affect information that has already been used or disclosed.
- I have a right to receive a copy of the authorization.

Unless revoked or otherwise indicated, the authorization's automatic expiration date will be one year from the date of my signature or upon the occurrence of the following event:_____

_____ _____
Signature of Patient/Legal Representative Date

_____
Description of Legal Representatives Authority

Appendix C

The Tennessee Department of Health School Accommodations Template for Concussion

Patient/Student:_____ Date:_____

Please excuse the above named patient from school today due to a medical appointment.

The student has sustained a concussion and is currently under the care of his or her physician and/or _____ the undersigned. S/he is not permitted to participate in any contact sport activity until formally cleared by his or her physician and/or the undersigned.

Please consider the following concussion-related recommendations:

Gym Class recommendations:

_____ No gym class

_____ Restricted gym class as specified: _____

Recommended **Academic** accommodations:

_____Untimed tests

_____Open note/open book or oral tests

_____Tutoring

_____Reduced workload when possible

_____15 minute rest breaks from class every hour(s)

_____Modified/reduced homework assignments

_____Extended time on homework/projects

_____Tape record class lectures

_____Should not return to school until concussion symptoms are resolved

_____Other recommendations: _____

The patient/student will be re-evaluated on:_____

Healthcare Provider Name:_____ Address: _____

Signature:_____

Appendix D

CONCUSSION RETURN TO PLAY

Athlete's Name: _____ Date of Birth: _____

Date of Injury: _____

This return to play is based on today's evaluation Date of Evaluation: _____

Care Plan completed by: _____

Return to this office date/time: _____

Return to School date: _____

RETURN TO SPORTS INFO:

1. Athletes should not return to practice or play the same day that their injury occurred.
2. Athletes should never return to play or practice if they still have ANY symptoms – serious injury or death (although rare) can result
3. Athletes, be sure that your coach and/or athletic trainer are aware of your injury, symptoms and have the contact information for the health care provider treating your concussion.

Please initial:

_____ The athlete reports that he/she has no symptoms while participating in daily activities at this time.

_____ I have education the athlete and parents/guardian about the dangers of returning to play before symptoms have cleared.

The following are the return to sports recommendations at this time: (Please initial any recommendations selected)

PHYSICAL EDUCATION CLASS:

_____ Do NOT return to PE class at this time. (See "Return to this office date/time" above).

_____ Student MAY return to PE class after completion of Gradual Return to Play Plan (on back).

SPORTS:

_____ Do NOT return to sports practice or competition at this time.

_____ May GRADUALLY return to sports **activities** following the Gradual Return to Play Plan described on the back, under the supervision of the health care professional for your school or team.

_____ May be advanced back to **competition** after successful completion of the Gradual Return to Play Plan described on the back and after a **phone conversation** with treating health care provider.

_____ Must **return to the treating healthcare provider** for final clearance to return to competition after completing the Gradual Return to Play Plan. (See "Return to this office date/time" above).

_____ All steps of Return to Play Plan have been completed successfully. Cleared for full participation in all activities without restriction.

_____ No concussion suspected, cleared for full participation without a gradual return to play plan.

Appendix D

Treating Health Care Provider Information (Please print or stamp):

Provider's Name:_____Provider's Office Phone: _____

Provider's Signature:_____Office Address: _____

Please check:
____Medical Doctor (MD) w/ concussion training
____Osteopathic Physician (DO)
____Clinical Neuropsychologist w/ concussion training
____Physician Assistant (PA who is a member of a health care team supervised by a Tennessee licensed medical doctor or osteopathic physician.*
*Clearance by a PA is not accepted by the Tennessee Secondary School Athletic Association.

GRADUAL RETURN TO PLAY PLAN
Return to play should occur in gradual steps beginning with light aerobic exercise only to increase your heart rate (e.g. stationary cycle); moving to increasing your heart rate with movement (e.g. running); then adding controlled contact if appropriate; and finally return to sports competition.

Pay careful attention to your symptoms and your thinking and concentration skills at each stage of activity. After completion of each step **without recurrence of symptoms and no pain medication**, you can move to the next level of activity the next day. Move to the next level of activity only if you do not experience any symptoms at the present level. If your symptoms return, let your health care provider know, return to the first level of activity and restart the program gradually. This Gradual Return to Play process is for your own safety. Returning to play while still experiencing symptoms can result in serious injury or death. It is critical that you honestly report your symptoms to your doctor, coach and health care professional at the school.

GRADUAL RETURN TO PLAY PLAN:
"Day 1" means first day cleared to participate in Gradual Return to Play Plan, not first day after injury.

Day 1: Low levels of physical activity (i.e. symptoms do not come back during or after the activity). This includes walking, light jogging, light stationary biking and light weightlifting (low weight – moderate reps, no bench, no squats).
Day 2: Moderate levels of physical activity with body/head movement. This includes moderate jogging, brief running, moderate intensity on the stationary cycle, moderate intensity weightlifting (reduced time and or reduced weight from your typical routine).
Day 3: Heavy non-contact physical activity. This includes sprinting/running, high intensity stationary cycling, completing the regular lifting routine, non-contact sport-specific drills (agility with 3 planes of movement).
Day 4: Sports-specific practice.
Day 5: Full contact in a controlled drill or practice.
Day 6: Return to competition.

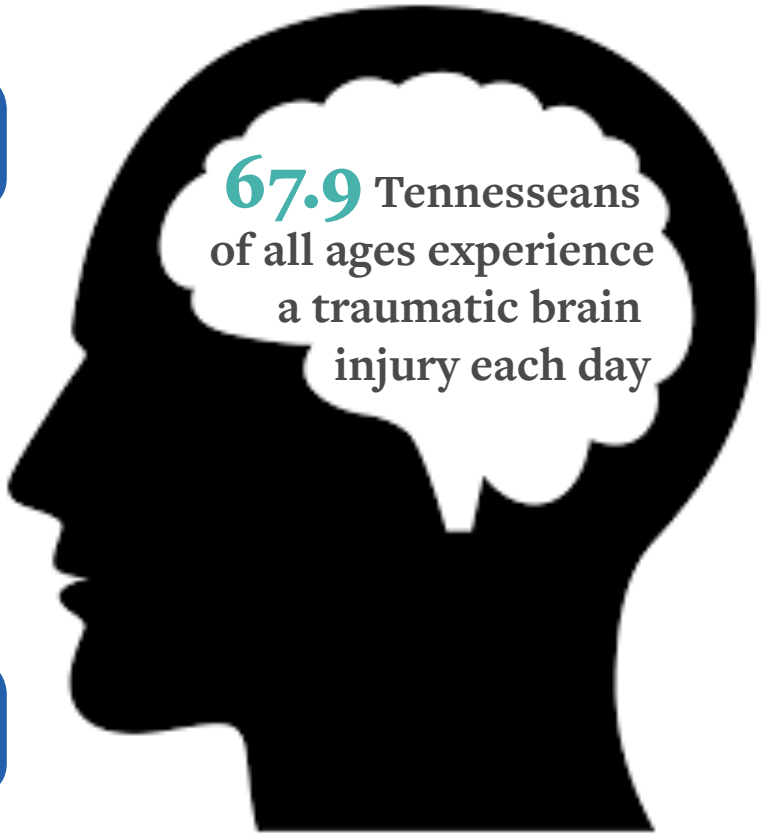
Adapted from the *Acute Concussion Evaluation Care Plan* from the Center for Disease Control and Prevention (https://www.cdc.gov/injury/), the *TSSAA Concussion Return to Play* form (https://cms-files.tssaa.org/documents/tssaa/forms/Concussion-Return-to-Play-Form-updated-12.2019.pdf) and the *TN Return to Learn/Return to Play: Concussion Management Guidelines*. All medical providers are encouraged to review the sites if they have questions regarding the latest information on the evaluation and care of a youth athlete following a concussion injury.

Brain Links

Enriching the lives of Tennesseans with traumatic brain injury by training and empowering the professionals serving them.

The Need

Traumatic Brain Injury (TBI) is a complex diagnosis that can pose long-term challenges both for the person and the professionals serving him or her.



We Can Help

Brain Links is a statewide team of brain injury specialists. We equip professionals to better serve people with TBI with current, research-based training and tools.

We'll work with your schedule & continuing education unit needs. Our services are provided ***at no cost.***

For more info contact Brain Links at: 615-515-8616 or tbi@tndisability.org

Brain Links

Brain Links is supported by the Administration on Community Living (ACL) of the U.S. Department of Health and Human Services under Grant No. 90TBSG0024-01-00 and in part by the Tennessee Department of Health, Traumatic Brain Injury Program.

We Provide:

Evidence-based TBI trainings tailored to your discipline

Certificates for educational credits

Toolkits for screening, symptom tracking, reference, parent education and communication with schools

Assistance with goal writing and treatment plan development support for rehabilitation, direct service support and related services

Educational resources including parent-friendly educational materials

Resources for return to home, school or work settings

TENNESSEE DISABILITY COALITION

kidcentral tn
KIDCENTRALTN.COM

SCHOOL LETTER

Returning to School After a Concussion

CDC HEADS UP
SAFE BRAIN. STRONGER FUTURE.

DEAR SCHOOL STAFF:

This letter offers input from a healthcare provider with experience in treating concussion, a type of traumatic brain injury. This letter was created to help school professionals and parents support students returning to school after a concussion. You can use these recommendations to make decisions about support for your student based on his or her specific needs. This letter is not intended to create a 504 Plan or an IEP unless school professionals determine that one is needed. Most students will only need short-term support as they recover from a concussion. A strong relationship between the healthcare provider, the school, and the parents will help your student recover and return to school.

_____ was seen for a concussion on _____
Student Name Date

in _____ office or clinic.
Healthcare Provider's Name

The student is currently reporting the following symptoms:

PHYSICAL

- ☐ Bothered by light or noise
- ☐ Dizziness or balance problems
- ☐ Feeling tired, no energy
- ☐ Headaches
- ☐ Nausea or vomiting
- ☐ Vision problems

THINKING OR REMEMBERING

- ☐ Attention or concentration problems
- ☐ Feeling slowed down
- ☐ Foggy or groggy
- ☐ Problems with short- or long-term memory
- ☐ Trouble thinking clearly

SOCIAL OR EMOTIONAL

- ☐ Anxiety or nervousness
- ☐ Irritability or easily angered
- ☐ Feeling more emotional
- ☐ Sadness

SLEEP

- ☐ Sleeping less than usual
- ☐ Sleeping more than usual
- ☐ Trouble falling asleep

The student also reported these symptoms:

_____

_____

_____

RETURNING TO SCHOOL

Based on the student's current symptoms, I recommend that the student:

☐ Be permitted to return to school and activities while school professionals closely monitor the student. School professionals should observe and check in with the student for the first two weeks, and note if symptoms worsen. If symptoms do not worsen during an activity, then this activity is OK for the student. If symptoms worsen, the student should cut back on time spent engaging in that activity, and may need some short-term support at school. Tell the student to update his or her teachers and school counselor if symptoms worsen.

☐ Is excused from school for _____ days.

☐ Return to school with the following changes until his or her symptoms improve.

(**NOTE:** Making short-term changes to a student's daily school activities can help him or her return to a regular routine more quickly. As the student begins to feel better, you can slowly remove these changes.)

Based on the student's symptoms, please make the short-term changes checked below:

- ☐ No physical activity during recess
- ☐ No physical education (PE) class
- ☐ No after school sports
- ☐ Shorten school day
- ☐ Later school start time
- ☐ Reduce the amount of homework
- ☐ Postpone classroom tests or standardized testing
- ☐ Provide extended time to complete school work, homework, or take tests
- ☐ Provide written notes for school lessons and assignments (when possible)
- ☐ Allow for a quiet place to take rest breaks throughout the day
- ☐ Lessen the amount of screen time for the student, such as on computers, tablets, etc.
- ☐ Give ibuprofen or acetaminophen to help with headaches (as needed)
- ☐ Allow the student to wear sunglasses, earplugs, or headphones if bothered by light or noise
- ☐ **Other:** _____

Most children with a concussion feel better within a couple of weeks. However, for some, symptoms can last for a month or longer. **If there are any symptoms that concern you, or are getting worse, notify the student's parents that the student should be seen by a healthcare provider as soon as possible.**

For information on helping students return to school safely after a concussion, visit **www.cdc.gov/HEADSUP**.

Healthcare Provider's Name (printed)	Healthcare Provider's Signature	Date

For additional questions, you may reach me at: _____

CDC'S ONLINE TRAINING FOR HEALTHCARE PROVIDERS

HEADS UP

HEADS UP to Healthcare Providers is a free online training developed by CDC and the American Academy of Pediatrics. The goal of the training is to provide an overview of the evidence-based recommendations outlined in the CDC Pediatric mTBI Guideline and to equip healthcare providers with practical strategies to integrate these recommendations into clinical practice.

WHAT YOU WILL LEARN

By the end of the training, you will be prepared to:

- Discuss what happens to the brain during and after an mTBI
- Identify at least three best practices related to diagnosis of mTBI
- Devise an appropriate management plan for pediatric patients with mTBI
- Describe prevention strategies for pediatric mTBI

FOLLOW THE URL TO BEGIN

HTTPS://WWW.CDC.GOV/HEADSUP/PROVIDERS/TRAINING/

Brain Links

https://www.tndisability.org/brain

@BrainLinksTN

Brain Links is supported by the Administration for Community Living (ACL) of the U.S. Department of Health and Human Services under Grant No. 90TBSG0024-01-00 and in part by the TN Department of Health, Traumatic Brain Injury Program.

CENTERS FOR DISEASE CONTROL AND PREVENTION GUIDELINE ON THE DIAGNOSIS AND MANAGEMENT OF MILD TRAUMATIC BRAIN INJURY AMONG CHILDREN

FULL REPORT

https://jamanetwork.com/journals/jamapediatrics/article-abstract/2698456

Offering 19 sets of clinical recommendations that cover diagnosis, prognosis, and management and treatment, the CDC Pediatric mTBI Guideline is applicable to healthcare providers in all practice settings. The CDC Pediatric mTBI Guideline outlines specific actions healthcare providers can take to help young patients and their parents/caregivers, including five key practice-changing recommendations.

5 KEY RECOMMENDATIONS

1. Do not routinely image pediatric patients to diagnose mTBI.
2. Use validated, age-appropriate symptom scales to diagnose mTBI.
3. Assess for risk factors for prolonged recovery, including history of mTBI or other brain injury, severe symptom presentation immediately after the injury, and personal characteristics and family history (such as learning difficulties and family and social stressors.)
4. Provide patients and their parents/caregivers with instructions on returning to activity customized to their symptoms.
5. Counsel patients and their parents/caregivers to return gradually to non-sports activities after no more than a 2-3 days of rest.

Brain Links is supported by the Administration for Community Living (ACL) of the U.S. Department of Health and Human Services under Grant No. 90TBSG0024-01-00 and in part by the TN Department of Health, Traumatic Brain Injury Program.

CDC PEDIATRIC mTBI GUIDELINE

Diagnostic Recommendations

CDC HEADS UP
SAFE BRAIN. STRONGER FUTURE.

This handout for healthcare providers describes diagnosis-related recommendations contained in the CDC Pediatric mTBI Guideline.

GOAL OF THE CDC mTBI GUIDELINE

The goal of the CDC Pediatric Mild Traumatic Brain Injury (mTBI) Guideline is to help healthcare providers take action to improve the health of their pediatric patients with mTBI. To do this, the Guideline consists of 19 clinical recommendations that cover diagnosis, prognosis, and management and treatment. These recommendations are applicable to healthcare providers working in: inpatient, emergency, primary, and outpatient care settings.

The Guideline was developed through a rigorous process guided by the American Academy of Neurology methodology and 2010 National Academy of Sciences methodology for the development of evidence-based guidelines. An extensive review of scientific literature, spanning 25 years of research, formed the basis of the Guideline.

mTBI in children

Childrens' developing brains are more vulnerable to mTBI because:

- **Their axons are not as well-myelinated.**
- **They are more susceptible to chemical and metabolic changes.**

RECOMMENDATIONS FOR THE DIAGNOSIS OF mTBI

Six sets of diagnostic recommendations are included in the Guideline. These recommendations focus on:

- **Neuroimaging**
- **Neuropsychological tools**
- **Serum Biomarkers**

Diagnostic Recommendations

NEUROIMAGING

Computed Tomography (CT)

Clinical evaluation of a child with possible mTBI includes balancing the likelihood of potentially devastating complications of a more severe injury against the risks associated with a head CT.

- Healthcare providers **should not** routinely obtain a head CT for diagnostic purposes in children with mTBI.
- Healthcare providers **should** use validated clinical decision rules to identify children with mTBI at low risk for intracranial injury (ICI), in whom a head CT is not indicated, as well as children who may be at higher risk for clinically important ICI, and therefore may warrant a head CT. Existing decision rules combine a variety of factors that, when assessed together, may increase the risk for more serious injury. Such risk factors include the following:
  - Age < 2 years old
  - Loss of consciousness
  - Severe mechanism of injury
  - Vomiting
  - Amnesia
  - Clinical suspicion for skull fracture
  - Severe or worsening headache
  - Nonfrontal scalp hematoma
  - Glasgow Coma Score < 15
- For children diagnosed with mTBI, healthcare providers **should** discuss the risk of a pediatric head CT in the context of risk factors for ICI with the patient and his/her family.

USE VALIDATED CLINICAL DECISION RULES TO IDENTIFY ICI

It is critical to rule out ICI while avoiding unnecessary risks related to exposure from a head CT. Strong clinical evidence indicates that use of clinical decision rules are effective in identifying children at low risk for ICI.

Magnetic Resonance Imaging (MRI)

There is currently insufficient evidence to recommend the use of brain MRI in the diagnosis of mTBI in children.

- Healthcare providers **should not** routinely use MRI in the acute evaluation of cases of suspected or diagnosed mTBI.

Single Photon Emission Computed Tomography (SPECT)

Insufficient evidence currently exists to recommend the use of SPECT in the diagnosis of mTBI in children.

- Healthcare providers **should not** use SPECT in the acute evaluation of cases of suspected or diagnosed mTBI.

Skull X-rays

CT is better at detecting intracranial injuries, and in the instances where CT is not available, validated clinical decision rules are better than skull X-rays when screening patients with increased risk for ICI.

- Skull X-rays **should not** be used in the diagnosis of pediatric mTBI.
- Skull X-rays **should not** be used in the screening for ICI.

Diagnostic Recommendations

EXAMPLES OF VALIDATED SCALES INCLUDE, BUT AREN'T LIMITED TO:

- Post-Concussion Symptom Scale
- Health and Behavior Inventory
- Post-Concussion Symptom Inventory
- Acute Concussion Evaluation

NEUROPSYCHOLOGICAL TOOLS

Symptom Scales

There are several validated tools that can be applied quickly and inexpensively.

- Healthcare providers **should** use an age-appropriate, validated symptom rating scale as a component of the diagnostic evaluation in children presenting with acute mTBI.

Computerized Cognitive Testing

There is insufficient evidence to determine whether baseline testing in children better identifies mTBI as compared to post-injury scores alone.

- Healthcare providers **may** use validated, age-appropriate computerized cognitive testing in the acute period of injury as a component of the diagnosis of mTBI.

Standardized Assessment of Concussion (SAC)

There is insufficient evidence to support the use of the SAC in the diagnosis of children with mTBI.

SERUM BIOMARKERS

Serum Biomarkers

There is insufficient evidence to currently recommend any of the studied biomarkers for the diagnosis of mTBI in children.

- Healthcare providers **should not** perform these tests outside of a research setting at this time for the diagnosis of children with mTBI.

Take action to improve the health of your young patients with mTBI.

To view all 19 sets of recommendations, including those that cover prognosis and management/treatment, and to learn more about the CDC Pediatric mTBI Guideline, visit **www.cdc.gov/HEADSUP**.

CDC PEDIATRIC mTBI GUIDELINE

Prognostic Recommendations

This handout for healthcare providers describes prognosis-related recommendations contained in the CDC Pediatric mTBI Guideline.

CDC HEADS UP
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mTBI in children

Symptoms of mTBI generally fall into four categories:

• Somatic • Cognitive • Mood/Affective • Sleep

Symptom resolution:

30% Experience symptoms one month post-injury

10% Experience symptoms three months post-injury

5% Experience symptoms one year post-injury

RECOMMENDATIONS FOR THE PROGNOSIS OF mTBI

Five sets of prognostic recommendations are included in the Guideline. These recommendations focus on:

- Counseling patients on prognosis
- Evaluating for premorbid conditions
- Assessing for risk factors
- Use of tools for predicting prognosis
- Interventions for poor prognosis

Prognostic Recommendations

GENERAL HEALTHCARE PROVIDER COUNSELING OF PROGNOSIS

Evidence suggests education and clear communication from healthcare providers can optimize outcomes.

- Healthcare providers **should** counsel patients and families that the large majority (70-80%) of children with mTBI do not show significant difficulties that last more than 1-3 months post-injury.
- Healthcare providers **should** counsel patients and families that although some factors predict an increased or decreased risk for prolonged symptoms, each child's recovery from mTBI is unique and will follow its own trajectory.

PROGNOSIS RELATED TO PREMORBID CONDITIONS

There is an increased risk of delayed recovery or prolonged symptoms associated with certain premorbid conditions in children with mTBI.

- Healthcare providers **should** assess the premorbid history of children either prior to an injury, as a part of pre-participation athletic examinations, or as soon as possible post-injury in children with mTBI, to assist in determining prognosis.
- Healthcare providers **should** counsel children and families completing pre-participation athletic examinations, and children with mTBI and their families, that recovery from mTBI might be delayed in those with:
  - Premorbid histories of mTBI
  - Lower cognitive ability (for children with an intracranial lesion)
  - Neurological or psychiatric disorder
  - Learning difficulties
  - Increased pre-injury symptoms (such as headache disorders)
  - Family and social stressors

ASSESSMENT OF CUMULATIVE RISK FACTORS AND PROGNOSIS

Evidence indicates that a variety of demographic and injury-related factors predict outcomes in pediatric mTBI.

- Healthcare providers **should** screen for a variety of known risk factors for persistent symptoms in children with mTBI.
- Healthcare providers **may** use validated prediction rules, which combine information about multiple risk factors for persistent symptoms, to provide prognostic counseling to children with mTBI evaluated in emergency department settings.

FACTORS ASSOCIATED WITH POOR PROGNOSIS:

- Older children or adolescents
- Children of Hispanic ethnicity
- Children from a lower socioeconomic status
- Children with more severe presentations of mTBI (including those associated with an intracranial injury)
- Children who report a higher level of acute postconcussion symptoms
- Children with a neurological or psychiatric disorder
- Children with learning difficulties
- Children with family and social stressors

CDC PEDIATRIC mTBI GUIDELINE

Prognostic Recommendations

EXAMPLES OF VALIDATED SCALES INCLUDE, BUT AREN'T LIMITED TO:

- Post-Concussion Symptom Scale
- Health and Behavior Inventory
- Post-Concussion Symptom Inventory
- Accute concussion Evaluation

ASSESSMENT TOOLS AND PROGNOSIS

Healthcare providers can more effectively counsel patients with mTBI when they have assessed risk factors for outcomes and recovery. However, there is no single assessment tool to predict outcomes.

- Healthcare providers **should** use a combination of tools to assess recovery in children with mTBI.
- Healthcare providers **should** use validated symptom scales to assess recovery in children with mTBI.
- Healthcare providers **may** use validated cognitive testing (including measures of reaction time) to assess recovery in children with mTBI.
- Healthcare providers **may** use balance testing to assess recovery in adolescent athletes with mTBI.

INTERVENTIONS FOR mTBI WITH POOR PROGNOSIS

While most symptoms of mTBI resolve within 1-3 months, some children are at risk for persistent symptoms or delayed recovery. Children who are at higher risk for delayed recovery are more likely to need further intervention.

- Healthcare providers **should** monitor children with mTBI who are determined to be at high risk for persistent symptoms based on premorbid history, demographics, or injury characteristics.
- For children with mTBI whose symptoms do not resolve as expected with standard care (i.e., after 4-6 weeks), healthcare providers **should** provide or refer for appropriate assessments or interventions.

Take action to improve the health of your young patients with mTBI.

To view all 19 sets of recommendations, including those that cover diagnosis and management and treatment, and to learn more about the CDC Pediatric mTBI Guideline, visit **www.cdc.gov/HEADSUP**.

CDC PEDIATRIC mTBI GUIDELINE

Management and Treatment Recommendations

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This handout for healthcare providers provides an overview of the management and treatment-related recommendations contained in the CDC Pediatric mTBI Guideline.

GOAL OF THE CDC mTBI GUIDELINE

The goal of the CDC Pediatric Mild Traumatic Brain Injury (mTBI) Guideline is to help healthcare providers take action to improve the health of their pediatric patients with mTBI. To do this, the Guideline consists of 19 clinical recommendations that cover diagnosis, prognosis, and management and treatment. These recommendations are applicable to healthcare providers working in: inpatient, emergency, primary, and outpatient care settings.

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mTBI in children

While most have a good recovery, some children experience both acute and long-term problems that affect them:

Physically **Cognitively** **Psychologically**

RECOMMENDATIONS FOR TREATMENT AND MANAGEMENT OF mTBI

Eight sets of management and treatment recommendations are included in the Guideline. These recommendations focus on:

General areas of treatment for patients and families

Symptom and problem-specific treatments

Management and Treatment Recommendations

Counsel patients to return gradually to non-sports activities after no more than 2-3 days of rest.

GENERAL AREAS OF TREATMENT FOR PATIENTS AND FAMILIES

Health outcomes can generally be optimized through patient education and behavior modification. In addition, evidence suggests that rest, or reduction in cognitive and physical activity, is beneficial immediately following mTBI. This should be followed shortly after the injury with a gradual return to activity.

Patient and Family Education and Reassurance

- In providing education and reassurance to the family, the healthcare provider **should** include the following information:
  - Warning signs indicating a more serious injury
  - Expected course of symptoms and recovery
  - Instructions on monitoring post-concussive symptoms
  - Prevention of further injury
  - Management of cognitive and physical activity, or rest
  - Instructions regarding return to school and return to play or recreation
  - Clear healthcare provider follow-up instructions from a healthcare provider

Cognitive and Physical Rest and Aerobic Treatment

Collaboration among healthcare providers, schools, and families should be coordinated to gradually adjust interventions and return the child to full participation without worsening symptoms.

- Healthcare providers **should** counsel patients to observe more restrictive physical and cognitive activity during the first several days following mTBI in children.
- Following these first several days, healthcare providers **should** counsel patients and families to resume a gradual schedule of activity that does not exacerbate symptoms, with close monitoring of symptom expression (number, severity).
- Following the successful resumption of a gradually increased schedule of activity, healthcare providers **should** offer an active rehabilitation program of progressive reintroduction of noncontact aerobic activity that does not exacerbate symptoms, with close monitoring of symptom expression (number, severity).
- Healthcare providers **should** counsel patients to return to full activity when they return to premorbid performance if they have remained symptom-free at rest, and with increasing levels of physical exertion.

Return to school and play plans can be found at **www.cdc.gov/HEADSUP**.

Management and Treatment Recommendations

Psychosocial and Emotional Support

Evidence suggests that social support (both tangible help and emotional involvement) contributes to healthy behaviors, and improved overall quality of life.

- Healthcare providers **may** assess the extent and types of social support (e.g., emotional, informational, instrumental, appraisal) available for children with mTBI, and emphasize social support as a key element in the education of caregivers and educators.

Return to School

- To assist children returning to school following mTBI, medical and school-based teams **should** counsel the student and family regarding the process of gradually increasing the duration and intensity of academic activities as tolerated, with the goal of increasing participation without significantly exacerbating symptoms.
- Return to school protocols **should** be customized based on the severity of postconcussion symptoms in children with mTBI as determined jointly by medical and school-based teams.
- For any student with prolonged symptoms that interfere with academic performance, school-based teams **should** assess the educational needs of that student and determine the student's need for additional educational supports, including those described under pertinent federal statutes.
- Postconcussion symptoms and academic progress in school **should** be monitored collaboratively by the student, family, healthcare provider, and school teams, who jointly determine which modifications or accommodations are needed to maintain an academic workload without significantly exacerbating symptoms.
- The provision of educational supports **should** be monitored and adjusted on an ongoing basis by the school-based team until the student's academic performance has returned to pre-injury levels.
- For students who demonstrate prolonged symptoms and academic difficulties despite an active treatment approach, healthcare providers **should** refer the child for a formal evaluation by a specialist in pediatric mTBI.

70–80% of children with mTBI will demonstrate functional recovery by 1-3 months.

Management and Treatment Recommendations

Healthcare providers should identify and tailor treatment plans/referrals to address:

- **Acutely worsening headache:** consider neuroimaging
- **Chronic headache:** nonopioid analgesia (monitor for overuse), multidisciplinary evaluation
- **Vestibulo-ocular dysfunction:** vestibular rehabilitation
- **Worsening sleep problems:** sleep hygiene, sleep specialist
- **Cognitive impairment:** treatment directed at etiology, neuropsychological evaluation
- **Emotional dysfunction:** psychotherapeutic evaluation and treatment

SYMPTOM OR PROBLEM–SPECIFIC TREATMENT AND MANAGEMENT

Post-traumatic Headache Treatment and Management

Painful headaches are one of the most common symptoms in children after mTBI and may require intervention.

- Healthcare providers in the emergency department **should** clinically observe and consider obtaining a head CT in children presenting with a severe and worsening headache, along with other symptoms or risk factors, following mTBI to evaluate for ICI requiring further management in accordance with validated clinical decision making rules.
- Children undergoing observation periods for headache with acutely-worsening symptoms **should** undergo emergent neuroimaging.
- Healthcare providers and caregivers **should** offer non-narcotic analgesia to children with a painful headache following acute mTBI, but also provide counseling to the family regarding the risks of analgesic overuse, including a rebound headache.
- There is insufficient evidence to recommend the administration of 3% hypertonic saline as a treatment for an acute headache following mTBI in children. Healthcare providers **should not** administer this medication to children with mTBI for treatment of symptoms outside of a research setting at this time.
- Chronic headache following mTBI is likely to be multifactorial; therefore, healthcare providers **should** refer children with chronic headache after mTBI for multidisciplinary evaluation and treatment, with consideration of analgesic overuse as a contributory factor.

Vestibulo-ocular Motor Dysfunction

Dizziness is another potentially debilitating symptom of mTBI, and limited evidence suggests that early vestibular physical therapy may benefit patients experiencing dizziness.

- Healthcare providers **may** refer children with subjective or objective evidence of persistent vestibulo-ocular motor dysfunction following mTBI to a program of vestibular rehabilitation.

Management and Treatment Recommendations

Sleep Treatment and Management

Sleep disturbances after mTBI are common and may exacerbate ongoing problems. Adequate sleep has been shown to improve overall health and should be an important part of treatment for children with mTBI.

- Healthcare providers **should** provide guidance on proper sleep hygiene methods to facilitate recovery from pediatric mTBI.
- If sleep problems emerge or continue, despite appropriate sleep hygiene measures, healthcare providers **may** refer children with mTBI to a sleep disorder specialist for further assessment.

Cognitive Impairment Treatment and Management

Problems with attention, memory and learning, response speed, and other cognitive impairment can occur following mTBI. These disturbances can result in significant problems with learning in school, or social interactions.

- Healthcare providers **should** attempt to determine the etiology of cognitive dysfunction within the context of other mTBI symptoms.
- Healthcare providers **should** recommend treatment for cognitive dysfunction that reflects its presumed etiology.
- Healthcare providers **may** refer children with persisting complaints related to cognitive function for a formal neuropsychological evaluation to help determine etiology, and to recommend targeted treatment.

Take action to improve the health of your young patients with mTBI.

To view all 19 sets of recommendations, including those that cover diagnosis and prognosis, and to learn more about the CDC Pediatric mTBI Guideline, visit **www.cdc.gov/HEADSUP**.

Research Summary and References
Support for the Toolkit

TOOLKIT

This toolkit, and specifically the *Concussion Management Protocol,* were developed based on the research summarized below. The research supports educating practitioners (rationale for the **Reference** section), properly evaluating, monitoring and referring patients (rationale for the **In-Office** section) and properly educating those with mTBI/ TBI (rational for the **Send-Home** sections).

CHILDREN:

Healthcare providers outside hospitals are on the front lines:

Most (82%) of those 0 to 17 years will seek initial care with their primary care physician (Arbogast, et al., 2016). Since most of our incidence data comes from Emergency Department's (ED's), we are significantly underestimating the extent of the TBI issue (Study included over 8,000 patients).

The very young are frequently not diagnosed or treated:

The newest pediatric mTBI guidelines recommend using an age-appropriate validated concussion scale (Lumba-Brown, et al., 2018), but one does not exist yet that focuses on children five and under. We must look for additional signs in children five years and under. For this age range, parents endorse the typical symptoms from the ACE, but in answer to an open-ended question, 82% also reported additional symptoms (Suskauer, et al., 2018), including:

- Appetite changes
- Behavioral dysregulation
- Decreased engagement
- Disrupted sleep
- Bladder incontinence (Enuresis)
- Increased dependence
- Stomachaches

The study also concluded that it is important to monitor behavior dysregulation over time. At first, parents saw disengagement, and then behavior dysregulation emerged and persisted. Behavioral dysregulation was among most commonly reported symptoms and was still present at the time of the evaluation (over one month post).

Children with TBI may develop or have ongoing concerns and should be monitored (for years):

They are more likely to have a variety of health/academic issues compared to those with no TBI (Haarbauer-Krupa, Lee, et al., 2018). The highest prevalence are:

- Learning disorders
- ADD/ADHD
- Speech Language problems
- Developmental delay
- Anxiety
- Bone, joint or muscle problems

Children with mild (Taylor, 2015) and moderate and severe (Schwartz, 2003) injuries are more at risk for persistent behavior problems. The risk rises with severity of the mTBI and younger age at injury.
Even in children whose injuries were significant enough to show skull or brain tissue damage on imaging, only one-fourth received any rehabilitations services afterward and only one-fourth received a neuropsychological assessment. None of the children received early intervention or special education preschool services after their TBI (Haarbauer-Krupa, Lundine, et al., 2018). This study concludes:

- Healthcare providers should provide information to parents on what to watch for and long term implications.

- Healthcare providers should make appropriate referrals at the time of diagnosis.
- Referral to rehabilitation can help with transition to preschool.

Another study (Niedzwecki, et al., 2018) concluded that even though children did not receive inpatient care, some will still benefit from rehabilitation for subsequent problems, including memory and learning issues (that were not pre-existing).

This study also found that medical issues at the time of injury, like elevations or depressions of Intra-cranial pressure (ICP), unstable blood pressure, unstable oxygenation, delayed nutrition or seizures, can impact the child's IQ at 12 months.

- The study's recommendation for trauma treatment is that rehab services be included early in the continuum – this would include consultation early in the ICU or acute care settings and referrals to an outpatient concussion clinic.

In the first year after injury, a substantial portion of children with moderate or severe TBI have unmet or unrecognized healthcare needs, with cognitive services being most frequent among these. Because of this finding, the authors recommended that cognition be screened in the primary care setting (Slomine, et al., 2006).

Reason for unmet needs:

- Lack of a physician's recommendation or referral
- Not provided in the school settings
- Failure of parent follow-up
- Cost

Children with all levels of impairment had educational needs, while those with less severe injuries were at greater risk of being underserved (Kingery, et al., 2017).

Earlier age at time of injury produces more functional impairment (Taylor, et al., 2015). The more severe the injury and the younger age at injury, the greater the need for monitoring and follow up (Anderson, Catroppa, Dudgeon, 2006; Anderson, Catroppa, Haritou, 2006).

On the first visit, provide educational materials, accommodations for return to school and recommend a follow up visit (at which time appropriate referrals can be made):

- Many children did not even visit a healthcare provider in the year following their injury (Slomine, et al., 2006).

Ongoing family support is important:

Family support is important because those with family dysfunction/poor coping, the child had greater dysfunction (Schwartz, 2003; Anderson, Catroppa, Dudgeon, et al., 2006; Taylor, 2008).

Families also reported needing information, emotional support and access to community-based services (Jones, 2017).

Schools need the support/recommendations of healthcare providers:

Teachers are not adequately trained to identify brain injuries and issues related to them (Davies, et al., 2013).

On specialized testing, children with TBI tend to show specific patterns of deficit that will not be revealed through standard special education testing. A neuropsychological evaluation will pick up these patterns. In a study of mild complicated TBI (with orthopedic controls), children who were injured before age 6 and were about 5 years post injury were tested. Both groups were within normal limits on most cognitive, language and reading measures; but they had some differences in verbal IQ, receptive

language and reading comprehension. The biggest differences were in pragmatic language (which leads to social issues), story retell, and word fluency (Haarbauer-Krupa, King, et al., 2019).

Schools will not provide all of what a child needs (Niedzwecki, 2018). Schools are only required to provide those services that directly relate to academics.

The gap in academic achievement widens over time (compared with non-injured classmates) (Ewing-Cobbs, 2006; Farmer, 1997; Taylor & Yeates, 2002; Todis & Glang, 2008; Todis, Glang, Bullis, et al., 2011; Wagner, et al., 2006). So, if children with TBI do not qualify for services at first, they should be referred again if they continue to have difficulties.

"Children who receive systematic transition services a part of their medical care are more likely to be identified for specialized support services at school, such as speech therapy (Haarbauer-Krupa, Ciccia, et al., 2017).

Use of the ACE tools (screening tool and Care Plan) "increased patient follow-up and improved recall of and adherence to ED discharge recommendations (Zuckerbraun, 2014)."

Pediatric Guideline:

Also see the CDC Pediatric Guideline (Lumba-Brown, et al., 2018) on mTBI in this toolkit for 19 sets of recommendations, with these 5 key take away points:

1. Do not routinely image pediatric patients to diagnose mTBI.
2. Use validated, age-appropriate symptom scales to diagnose mTBI.
3. Assess risk factors for prolonged recovery, including history of mTBI or other brain injury, severe symptom presentation immediately after the injury, and personal characteristics and family history (such as learning difficulties and family and social stressors).
4. Provide patients and their parents with instructions on returning to activity customized to their symptoms.
5. Counsel patients and their parents/caregivers to return gradually to non-sports activities after no more than 2-3 days of rest.

Consequences of brain injury for all ages:

Once a person has one brain injury, the risk for another increases, and the risk increases with each subsequent injury. A person with a brain injury is also more likely to be incarcerated (or involved with the criminal justice system) (Farrer & Hedges, 2011; Shiroma, et al., 2012; Williams, et al., 2010; Im, et al., 2014), to have psychiatric issues ((McCarthy, et al., 2006; Kaponen, et al., 2002; Zgaljardic, et al., 2015), to be involved with substance abuse (Kreutzer, et al., 1996), and to be socially isolated (Morton & Wehman, 1995; Hawthorne, et al., 2009). Long-term psychiatric disorders are associated with greater risk for substance abuse (Zgaljardic, et al., 2015). Prior TBI has been identified as a potential contributing factor to domestic violence (Romero-Martinez & Moya-Albiol, 2013). Not surprisingly, TBI is found in female victims of domestic violence (Corrigan, et al., 2001).

ADULTS

Follow up and education are important:

Findings from a study (Seabury, et al., 2018) of follow-up care that was provided to people at 11 Level 1 trauma centers across the country:

- Less than half received TBI educational material at discharge or saw a health care practitioner within 3 months after injury.
- Only 27% were called by 2 weeks.
- Follow-up care varied by site, from 19% to 72%.

- For those with a positive CT scan, over one-third had not seen a medical practitioner for follow-up.
- Even among those with 3 or more moderate to severe post-concussive symptoms, only about half saw a medical practitioner within 3 months.
    - Of those that did, 80% reported that it was helpful. The majority saw a general practitioner and 38% saw a neurologist. Only 15% reported visiting a clinic specializing in TBI care.

A few conclusions from the paper:

- "Failure to follow-up with patients could have adverse consequences, as simply providing educational materials to patients with mTBI is associated with improved outcomes."[35]
- "Our findings reveal the consequences that may result from the absence of systems of follow-up care for patients with mTBI and concussion. They also highlight an apparent lack of appreciation by many clinicians of the substantial symptom and life burdens experienced by a significant proportion of patients with injuries labeled mild."

Use of the ACE tools (screening tool and Care Plan) "increased patient follow-up and improved recall of and adherence to ED discharge recommendations (5-21 year olds) (Zuckerbraun, 2014)."

Unmet Needs:

Poor psychosocial health was reported by a substantial portion in a study at one year post injury
TBI may cause decades lasting vulnerability to psychiatric illness in some individuals. They were most susceptible to depression, delusional disorders and personality disturbances. This study highlights the importance of psychiatric follow up even decades (30 years) later (Kaponen, et al., 2002).
Heinemann found unmet needs at 7 years. The most prevalent were improving memory and problem solving, increasing income and improving job skills (Heinemann, et al., 2002).

Also see the Updated Mild Traumatic Brain Injury Guideline for Adults in this toolkit.

Model of 6 types of concussion and active treatments (pediatric and adult):

There is now a great body of evidence supporting the 6 types of concussion and the active treatments for each type. A good resource to start with is *Concussion: A Clinical Profile Approach to Assessment and Treatment* by Kontos and Collins (2018) and *A comprehensive, targeted approach to the clinical care of athletes following sport-related concussion* (Collins, et al., 2013).

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TRAUMATIC BRAIN INJURY/CONCUSSION

CHANGES TO WATCH FOR OVER TIME:

- Headaches
- Changes in sleep patterns
- Fatigue
- Changes in vision
- Balance, coordination changes, dizziness
- Mood swings, gets mad easily
- Changes in personality
- Not feeling like themselves
- Trouble with attention and thinking
- Memory problems, especially short term
- Depression/Anxiety
- Difficulty handling stress
- Inappropriate behavior
- Grades dropping, falling behind in class
- Changes in work performance

Brain Links

Bringing together professionals to recognize the far-reaching and unique nature of brain injury and to improve services for survivors.

ACL Administration for Community Living

TBI SPP Traumatic Brain Injury State Partnership Program

https://www.tndisability.org/brain

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