



UNM Youth Sports Concussion Management Education/Training Program



Funded by the State of New Mexico, GOVERNOR'S COMMISSION ON DISABILITY, Brain Injury Advisory Council (MOU # 17-645-P700-007).

Background/Statement of Need

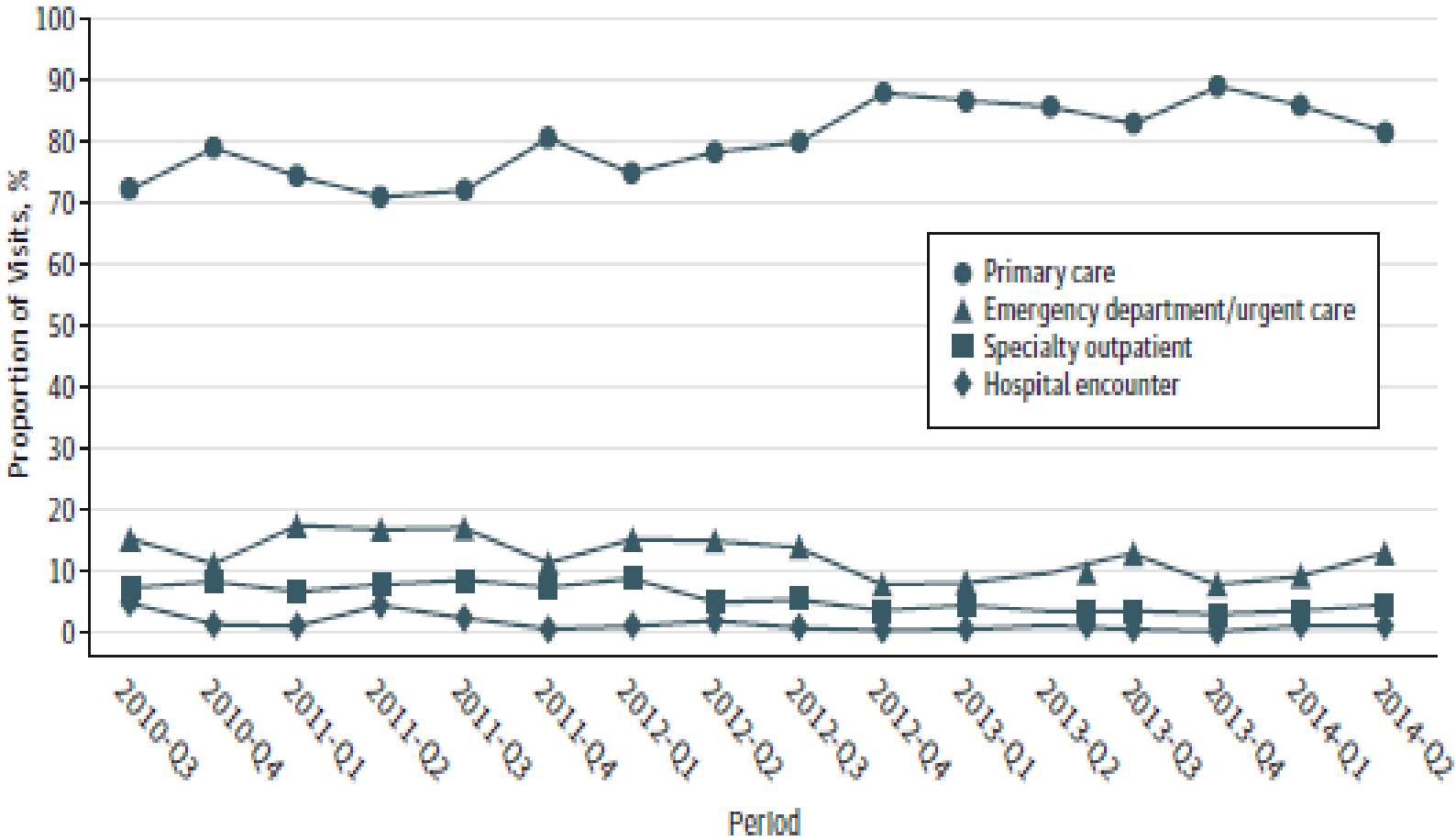
- Mild traumatic brain injury, including concussion is common in youth participating in sports and is increasingly viewed as a significant public health concern.
- The most recent estimate is that between 1.1 and 1.9 million sports and recreation-related concussions occur annually in youth (Bryan et al., 2016).
- Studies of athletes suggest that adolescents could be more vulnerable than adults to brain injuries.
- Traumatic brain injury of any severity can pose a threat to a child's future ability to learn and function fully. Time away from school can pose a significant threat to their academic and psychological well-being.



Need for education/training for medical professionals and school professionals regarding diagnosis and management of sports concussion

Point of Health Care Entry for Youth with Concussion Within a Large Pediatric Care Network (Arbogast et al., 2016)

Figure. Proportion of Concussion Visits by Initial Point of Health Care Entry Over Time Among The Children's Hospital of Philadelphia Primary Care Patients (N = 8083)



Key Points:

- 82% of children initially seek health care for concussion with primary care and only 12% within emergency departments
- Efforts to measure incidence of concussion cannot be based on ED visits and primary care clinicians must be trained in concussion diagnosis and management.

High School Principals' Resources, Knowledge, and Practices regarding the Returning Student with Concussion

Heyer et al., 2015. J. Pediatrics.

- A recent survey of Ohio public high school principals demonstrates lack of training/education and preparedness in concussion management:
 - Only 37% of principals reported having concussion training in the past year
 - Those with training were more likely to promote concussion training in their schools
 - 22% reported having no “point person” or case manager at their school to monitor the academic progress of students with mTBI.
 - Schools without a designated case manager for concussions were less likely to have athletic trainers

Less than 40% of schools reported having athletic trainers in NM

New Mexico State-Wide Survey of Youth Sports Concussion (UNM Brain & Behavioral Health Institute, 2014)

- Survey of NMAA schools 2013-2014 school year; funded by NM Brain Injury Advisory Council
 - 60% of schools did *not* have an athletic trainer responsible for diagnosing and managing sports concussions.
 - 44% of schools felt that they had adequate resources in their school to diagnosis and management sports concussions
 - 71% of schools indicated they were interested in more education/training on diagnosis of sports concussions
 - 75% of schools indicated interest in more education/training in management of sports concussions
 - 87% of healthcare professionals indicated interest or strong interest in obtaining additional education/training in diagnosis of sports concussion
 - 91% of healthcare professionals indicated interest or strong interest in obtaining additional training in management in sports concussion.

Aims/Objectives:

- To increase concussion awareness and improve knowledge of healthcare professionals and school systems regarding the management of concussion in youth—to prevent further injury, and to promote healing/recovery.
- Develop a community-based concussion management education program for schools and medical professionals in order to improve the health and well-being of the recovering student-athlete

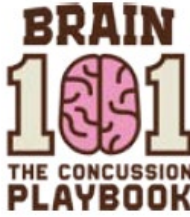
Approach:

- Identify and establish multidisciplinary healthcare and school partnerships/teams in NM communities
- Provide education to healthcare & school professional Concussion Management teams (CMT) regarding concussion and how to manage the concussion recovery process
- Assist communities in development of concussion management protocols for identification, diagnosis, and management of concussion for return to learn and play via gradual increase in activity through systematic monitoring and guidance, implementation of academic, physical and emotional interventions/accommodations as needed, and coordinated medical to school communication

Development of Concussion Management Training Curriculum

- Reviewed current practices and scientific literature on best practice for diagnosing and managing pediatric concussion and developed a new curriculum for healthcare and school professionals and model of telehealth consultation.

- [CDC Heads Up](#)
- U. of Oregon The Center on Brain Injury Research & Training
- [ORCAS Brain 101: The Concussion Playbook](#)
- The Children's Hospital of Philadelphia Center for Injury Research and Prevention
- Rocky Mountain Hospital for Children
- Ontario Neurotrauma Foundation
- Children's National Health System
- AAN Summary of evidence-based guideline update: Evaluation and management of concussion in sports
- Center for Injury Research and Prevention, The Children's Hospital of Philadelphia Research Institute
- Youth Sports concussion Safety Center, momsTEAM
- Zurich Consensus Statement on Concussion (2012)
- Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016



Safe Concussion Outcome Recovery & Education (SCORE) Program



Consensus statement on concussion in sport —the 5th international conference on concussion in sport held in Berlin, October 2016

Community Concussion Management Team (CMT): Healthcare and School Professional Partnerships

- The Concussion Management Team (CMT) serves to assist the student-athlete's recovery from a concussion. These team members are suggestions and may vary according to local resources.

Community Medical/Healthcare Professional Team

- Emergency physicians
- Sports Medicine physicians
- Pediatricians
- Family Practice Physicians
- Physician's Assistants
- Physical therapists
- Neuropsychologists

Family

- Student-Athlete
- Parents
- Guardians

Academic Professionals (School Concussion Management Team)

- Athletic Team (Coaches, Athletic Trainers)
- Academic Team (Teachers, Counselors, School Social workers, Speech pathologists, School Psychologists)
- Administrators (Principals/Assistant Principals/Athletic Directors)
- School Medical Team (Team Physicians, School Nurses, Physical therapists, School-based healthcare professionals)

Concussion Team Members: Roles and Responsibilities

- **School Concussion Management Team (CMT) Coordinator**
 - The CMT Coordinator is a school professional (e.g., athletic trainer, school counselor, school nurse, assistant administrator) who functions as a liaison among healthcare providers, students, families, and school staff.
 - Leads the development and implementation of a Gradual Return to Activity Plan for each student who needs one.
 - CMT Coordinator oversees the monitoring and tracking of the plan.
- **School Administrator**
 - Important role in fostering a culture around sports concussion, put systems in place to manage it effectively, and provide the support necessary to return students to full academic and physical activity as quickly and safely as possible.
- **Athletic Director**
 - supports coach, student, athlete, and parent training, promotes a culture of awareness, ensures that coaches teach safe techniques, advocates for proper and well maintained equipment, monitors appropriate incident protocol, promotes good officiating, and tracks injuries.

Concussion Team Members: Roles and Responsibilities

- Athletic Trainer (AT)
 - healthcare expert in preventing, recognizing, managing, and rehabilitating injuries that result from physical activity. The AT works under the direction of a licensed physician and in cooperation with other healthcare professionals, athletic administrators, coaches, and parents. The AT is often the medical provider most familiar with each student; their involvement makes it easier to evaluate and manage injuries effectively.
- School Counselor/Psychologist
 - informs teachers of learning adjustments while a student is symptomatic and in some instances may assist with the ongoing assessments necessary to move forward with longer-term needs for 504 plans.
- School Nurse
 - works with the AT, teachers, other school staff, the student's medical provider and the family to help make recommendations on proper care and recovery; provides ongoing care as needed at school.
- Team Physician
 - is designated by the school or club to provide medical direction to the AT and the athletic program and help develop the school emergency action plan. This person should be appropriately trained in the assessment and management of concussions and sports medicine in general. Schools and clubs with team physicians usually delegate the team doctor to make final decisions regarding return to play in collaboration with the school concussion management team and the student's medical provider.

Concussion Team Members: Roles and Responsibilities

- Community Medical Provider (pediatrician, sports medicine physician, family physician, ED physician, physician's assistant, physical therapist,
 - can be recruited if a school does not have a Team Physician. This person should be trained in the assessment and management of concussions and could be a pediatrician, family practitioner, or other community healthcare provider.
- Neuropsychologist
 - can assist in conducting and interpreting assessments of protracted postconcussion neurocognitive and behavioral/emotional symptoms. This community-based provider may also be a Licensed Psychologist trained in the assessment of concussion.

Concussion Management Team (CMT):

- CMT should be familiar with the concussion laws in their state and their state's interscholastic athletic association's concussion policy.
- Before implementing any policy, make sure it aligns with the concussion laws and interscholastic athletic concussion policies in your state

NM State Law (SB 137)



- Remove immediately from activity when signs/symptoms are present.
- Must not return to full activity prior to a minimum of 240 hours (10 days).
- Release from medical professional required for return.
- Follow school district's return to play guidelines.
- Coaches continue to monitor for signs/symptoms once athletes return to activity.

Link to SB 137

<https://www.nmlegis.gov/Sessions/16%20Regular/final/SB0137.pdf>

Concussion Basics:

- What is a Concussion?
- Neuropathophysiology of mTBI
- Concussion Signs & Symptoms
- Concussion Danger Signs
- School Concussion Action Plan
- Recovery from Concussion
- Returning to School Returning to Sports and Activities
- Brain Injury Safety Tips and Prevention

It is important that healthcare professionals, school staff, students, and parents know how to **recognize** a concussion and need to know how to **respond** in ways that protect student-athletes and ensure their safe **return** to school activities.



What is a concussion?



Consensus statement on concussion in sport
—the 5th international conference on
concussion in sport held in Berlin, October
2016

Sport related concussion (SRC) is a traumatic brain injury induced by biomechanical forces. Several common features that may be utilized in clinically defining the nature of a concussive head injury include:

- ▶ *SRC may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an impulsive force transmitted to the head.*
- ▶ *SRC typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, signs and symptoms evolve over a number of minutes to hours.*
- ▶ *SRC may result in neuropathological changes, but the acute clinical signs and symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.*
- ▶ *SRC results in a range of clinical signs and symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive features typically follows a sequential course. However, in some cases symptoms may be prolonged.*

The clinical signs and symptoms cannot be explained by drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction, etc) or other comorbidities (eg, psychological factors or coexisting medical conditions).

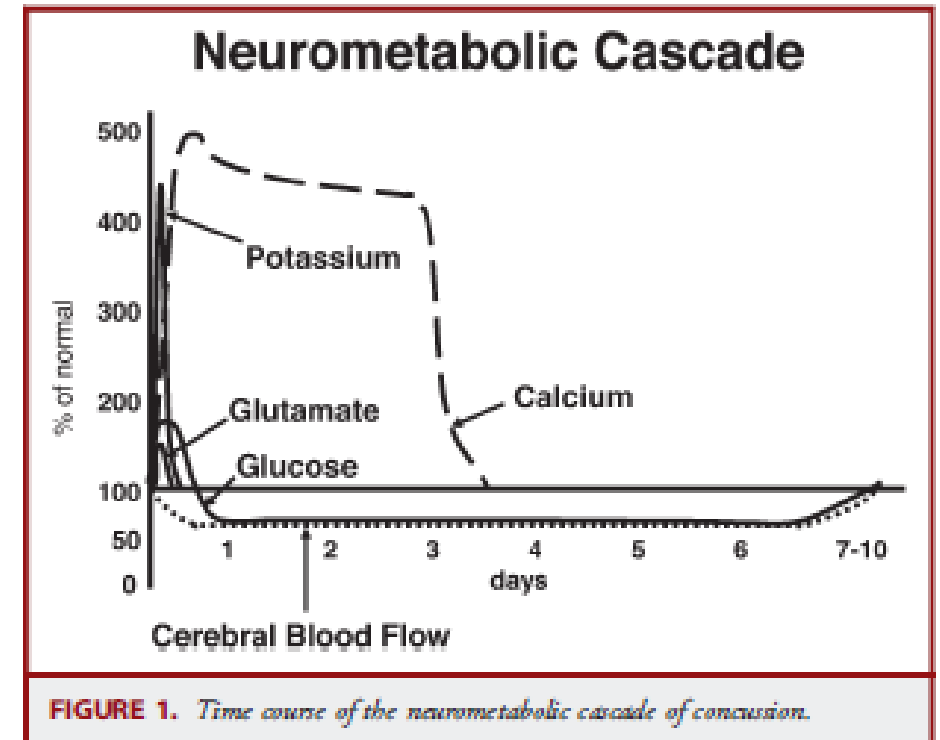
Concussions Are Serious. Medical providers may describe a concussion as a “mild” brain injury because concussions are usually not life-threatening. Even so, the effects of a concussion can be serious.

(www.cdc.gov/headsup/index.html)

*Link to HEADS UP Video:
What is a Concussion?*

Neuropathophysiology of Concussion

- A concussion or mild traumatic brain injury is believed to affect the neurochemistry of the brain.
- Acceleration and deceleration forces that result from a blow to the head or body stretch and strain brain tissue, sets off a complex cascade of changes to the brain's neurometabolic and neurotransmission functions, temporarily disrupting neural membranes and resulting in impaired neural connectivity and reduced cerebral energy



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[Link to Animation of Concussion Video](#)

What are the signs and symptoms of a concussion?

- The clinical signs and symptoms of concussion are related to changes in the energy demands of the brain. Youth may report or show one or more of these signs and symptoms after a bump, blow, or jolt to the head or body that may indicate they have a concussion or more serious brain injury.
- Most signs or symptoms of a concussion are evident soon after the traumatic event, although sometimes they may occur hours or a few days later.
- Sometimes children may have a hard time explaining that they don't feel normal and it's up to the parents and their friends, family or coaches to know that they aren't acting like themselves and get them to rest or to seek medical attention.

SIGNS MAY BE OBSERVED:

- 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

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"

Emotional:

- Irritable
- Sad
- More emotional than usual
- Nervous

Sleep:

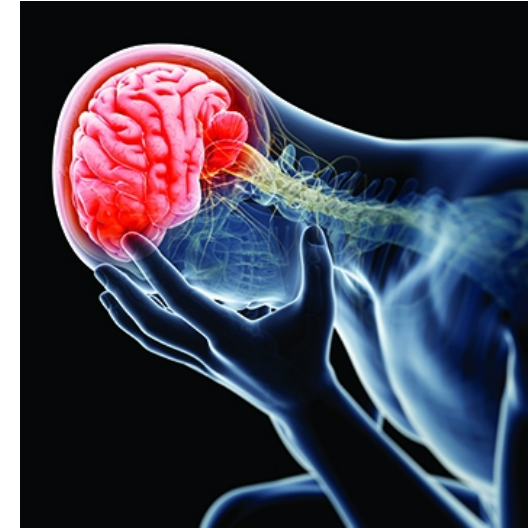
- Drowsy
- Sleeps less than usual
- Sleeps more than usual
- Has trouble falling asleep

[Link to HEADS UP Video: Concussion Signs & Symptoms](#)

Danger Signs/Symptoms: When to call 911?

Although rare, some individuals can develop a hematoma (a collection of blood on the brain) after a bump, blow, or jolt to the head or body. Call 9-1-1 right away, or take the student-athlete to the emergency department if he or she has one or more of the following danger signs after a bump, blow, or jolt to the head or body:

- One pupil larger than the other.
- Drowsiness or inability to wake up.
- A headache that gets worse and does not go away.
- Slurred speech, weakness, numbness, or decreased coordination.
- Repeated vomiting or nausea, convulsions or seizures (shaking or twitching).
- Unusual behavior, increased confusion, restlessness, or agitation.
- Loss of consciousness (passed out/knocked out). Even a brief loss of consciousness should be taken seriously.



[Link to HEADS UP Video: Concussion Danger Signs](#)

CDC Concussion Action Plan: What to do if a concussion is suspected

A. Remove from play.

- When in doubt, sit them out!
- Keep a young athlete with a possible concussion out of play the same day of the injury and until cleared by a health care provider.

[Link to Concussion Signs & Symptoms Checklist](#)

B. Seek medical attention.

- After you remove a young athlete with a possible concussion from practice or play, the decision about return to practice or play is a medical decision that should be made by a health care provider.
- As a coach or parent, providing the healthcare provider with information regarding the injury is helpful using the Concussion Care Plan Letter and Signs/Symptoms Checklist.

[Link to School Concussion Care Plan Letter to Physicians](#)

C. Inform and educate parents

- Give parents/guardian HEADS UP fact sheet for parents. This fact sheet can help parents watch the young athlete for concussion signs or symptoms that may show up or get worse once the young athlete is at home or returns to school.

[Link to ACE Evaluation Form](#)

D. Get Written Concussion Care Instructions

- Ask for written instructions from the young athlete's health care provider on return to play. These instructions should include information about when they can return to play/school and what steps you should take to help them safely return to play.
- The healthcare professional could use the ACE Care Plan-School Version to be returned to the school (preferably to the school concussion case manager)

[Link to ACE Care Plan-School Version](#)

Recovery from a concussion: What to expect

- Most people make a good recovery from a concussion. As the days go by, your child or teen can expect to slowly feel better.
- Length of recovery from mild traumatic brain injury (mTBI) is variable, ranging from several days to several weeks in most students.
- Rest is important immediately after a concussion because it helps the brain heal. Your child or teen may need to limit activities while he or she is recovering from a concussion. There is evidence stating the need for physical and cognitive rest, but there are no clear answers as to the ideal duration. Extreme prolonged rest may delay recovery.



Diagnosis and Management of Concussion: Guidance for Healthcare Professionals

- Online concussion training courses
 - CDC Heads Up
 - National Federation of High Schools
- Will help you understand a concussion and the potential consequences of this injury,
- Recognize concussion signs and symptoms and how to respond,
- Learn about steps for returning to activity (play and school) after a concussion, and
- Focus on prevention and preparedness to help keep athletes safe season-to-season.
- Receive certificate of completion



Link to CDC Online Concussion Training for Clinicians



<https://nfhslearn.com/>

Diagnosis and Management of Concussion: Guidance for Healthcare Professionals



Consensus statement on concussion in sport
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2016

• **Sideline Evaluation**

- Majority of sports-related concussions occur without loss of consciousness or frank neurological signs
- No perfect diagnostic test or marker to make an immediate diagnosis of concussion
- In all suspected cases of concussion, the individual should be removed from the playing field and assessed by a physician or licensed healthcare provider
- Players manifesting clear on-field signs of concussion (eg., loss of consciousness, tonic posturing, balance disturbance) should be immediately removed from sporting participation
- Sideline evaluation of cognitive function is an essential component in assessment for rapid screening, but not meant to replace a comprehensive neurological evaluation; nor should they be used as a standalone tool for management of concussion
 - Sport Concussion Assessment Tool-5 (SCAT5)--
 - Standardized Assessment of Concussion (SAC)
- When a player shows any symptoms or signs of concussion:
 - An evaluation by physician or other licensed healthcare provider on site using standard emergency management principles should be conducted and particular attention should be given to excluding cervical spine injury
 - If no healthcare provider is available, the player should be safely removed from practice or play and urgent referral for evaluation should be arranged
 - Once first aid issues are addressed, an assessment of cognitive function using SCAT5 or other sideline assessment tools
 - The player should not be left alone after the injury and serial monitoring for deterioration is essential of the initial few hours after injury
 - A player with diagnosed concussion should not be allowed to return to play on the day of injury (*NOTE: NM law states that minimal return to play is 10 days!*).

Diagnosis and Management of Concussion: Guidance for Healthcare Professionals

- Medical Exam Basics
 - Clinical Interview
 - Concussion hx
 - Hx of prior concussions (how many? Signs/symptoms? Duration?)
 - Physical exam
 - neurological examination including a thorough assessment of mental status, cognitive functioning, sleep/wake disturbance, ocular function, vestibular function, gait and balance)
 - SCAT, BESS, PCSS, PCSI, SAC
 - A determination of the clinical status of the patient, including whether there has been improvement or deterioration since the time of injury. This may involve seeking additional information from parents, coaches, teammates and eyewitnesses to the injury.
 - A determination of the need for emergent neuroimaging in order to exclude a more severe brain injury involving a structural abnormality.
 - Need for admission (Red Flags/dangerous signs/sxs)
 - Assess for risk factors for persistent post concussion symptoms

Diagnosis and Management of Concussion: Guidance for Healthcare Professionals

- Neuropsychological Assessment (NP)

- Neuropsychologists are uniquely qualified to interpret NP tests and can play an important role within the context of a multifaceted-multimodal and multidisciplinary approach to managing concussion.
- NP assessment should not be the sole basis of management decisions.
- Brief computerized cognitive evaluation tools are not a substitute for complete NP assessment
- Baseline or pre-season NP testing is not felt to be required or mandatory, but can be helpful or add useful information to overall interpretation of a NP assessment and provides an educational opportunity to discuss significance of injury with athlete
- Post-injury NP testing not required for all athletes.
- Post-injury NP testing may be used to assist return to play decisions and is typically performed when the athlete is symptom-free. There may be situations when NP assessment may add important information in the early stages after injury.

Concussion Diagnostic and Assessment Tools for Healthcare Providers

Links to tools

- ChildSCAT5 Sport Concussion Assessment Tool for Children aged 5-12
- SCAT5 Sport Concussion Assessment Tool for Athletes aged 13+
- CDC Acute Concussion Evaluation Form (ACE)
- Post concussion Symptom Inventory for Children (PCSI; aged 5-7)
- Post Concussion Symptom Inventory for Children (PCSI; aged 8-12)
- Post Concussion Symptom Inventory Self Assessment (PCSI; Ages 13-18)
- Post Concussion Symptom Scale (PCSS)



The Child Sport Concussion Assessment Tool 5th Edition (Child SCAT5)

SCAT5

SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION
DEVELOPED BY THE CONCUSSION IN SPORT GROUP
FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by



FIFA



FEI



ACUTE CONCUSSION EVALUATION (ACE)
PHYSICIAN/CLINICIAN OFFICE VERSION

Post Concussion Symptom Scale



Patient details

Name: _____
DOB: _____
Address: _____
ID number: _____
Examiner: _____
Date of Injury: _____ Time: _____

WHAT IS THE SCAT5?

The SCAT5 is a standardized tool for evaluating concussions designed for use by physicians and licensed healthcare professionals¹. The SCAT5 cannot be performed correctly in less than 10 minutes.

If you are not a physician or licensed healthcare professional, please use the Concussion Recognition Tool 5 (CRT5). The SCAT5 is to be used for evaluating athletes aged 13 years and older. For children aged 12 years or younger, please use the Child SCAT5.

Preseason SCAT5 baseline testing can be useful for interpreting post-injury test scores, but is not required for that purpose. Detailed instructions for use of the SCAT5 are provided on page 7. Please read through these instructions carefully before testing the athlete. Brief verbal instructions for each test are given in italics. The only equipment required for the tester is a watch or timer.

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Recognise and Remove

A head impact by either a direct blow or indirect transmission of force can be associated with a serious and potentially fatal brain injury. If there are significant concerns, including any of the red flags listed in Box 1, then activation of emergency procedures and urgent transport to the nearest hospital should be arranged.

Key points

- Any athlete with suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration. No athlete diagnosed with concussion should be returned to play on the day of injury.
- If an athlete is suspected of having a concussion and medical personnel are not immediately available, the athlete should be referred to a medical facility for urgent assessment.
- Athletes with suspected concussion should not drink alcohol, use recreational drugs and should not drive a motor vehicle until cleared to do so by a medical professional.
- Concussion signs and symptoms evolve over time and it is important to consider repeat evaluation in the assessment of concussion.
- The diagnosis of a concussion is a clinical judgment, made by a medical professional. The SCAT5 should NOT be used by itself to make, or exclude, the diagnosis of concussion. An athlete may have a concussion even if their SCAT5 is "normal".

Remember:

- The basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Do not attempt to move the athlete (other than that required for airway management) unless trained to do so.
- Assessment for a spinal cord injury is a critical part of the initial on-field assessment.
- Do not remove a helmet or any other equipment unless trained to do so safely.

IMMEDIATE OR ON-FIELD ASSESSMENT

The following elements should be assessed for all athletes who are suspected of having a concussion prior to proceeding to the neurocognitive assessment and ideally should be done on-field after the first first aid / emergency care priorities are completed.

If any of the "Red Flags" or observable signs are noted after a direct or indirect blow to the head, the athlete should be immediately and safely removed from participation and evaluated by a physician or licensed healthcare professional.

Consideration of transportation to a medical facility should be at the discretion of the physician or licensed healthcare professional.

The GCS is important as a standard measure for all patients and can be done serially if necessary in the event of deterioration in conscious state. The Maddocks questions and cervical spine exam are critical steps of the immediate assessment; however, these do not need to be done serially.

STEP 1: RED FLAGS

RED FLAGS:

- Neck pain or tenderness
- Double vision
- Weakness or tingling/ burning in arms or legs
- Severe or increasing headache
- Seizure or convulsion
- Loss of consciousness
- Deteriorating conscious state
- Vomiting
- Increasingly restless, agitated or combative

STEP 2: OBSERVABLE SIGNS

Witnessed Observed on Video

Lying motionless on the playing surface	Y	N
Balance / gait difficulties / motor incoordination: stumbling, slow / laboured movements	Y	N
Disorientation or confusion, or an inability to respond appropriately to questions	Y	N
Blank or vacant look	Y	N
Facial injury after head trauma	Y	N

STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS²

"I am going to ask you a few questions, please listen carefully and give your best effort. First, tell me what happened?"

What venue are we at today?	Y	N
Which half is it now?	Y	N
Who scored last in this match?	Y	N
What team did you play last week / game?	Y	N
Did your team win the last game?	Y	N

Note: Appropriate sport-specific questions may be substituted.

Name: _____
DOB: _____
Address: _____
ID number: _____
Examiner: _____
Date: _____

STEP 4: EXAMINATION GLASGOW COMA SCALE (GCS)³

Time of assessment			
Date of assessment			
Best eye response (E)			
No eye opening	1	1	1
Eye opening in response to pain	2	2	2
Eye opening to speech	3	3	3
Eyes opening spontaneously	4	4	4
Best verbal response (V)			
No verbal response	1	1	1
Incomprehensible sounds	2	2	2
Inappropriate words	3	3	3
Confused	4	4	4
Oriented	5	5	5
Best motor response (M)			
No motor response	1	1	1
Extension to pain	2	2	2
Abnormal flexion to pain	3	3	3
Flexion / Withdrawal to pain	4	4	4
Localizes to pain	5	5	5
Obeys commands	6	6	6
Glasgow Coma score (E + V + M)			

CERVICAL SPINE ASSESSMENT

Does the athlete report that their neck is pain free at rest?	Y	N
If there is NO neck pain at rest, does the athlete have a full range of ACTIVE pain free movement?	Y	N
Is the limb strength and sensation normal?	Y	N

In a patient who is not lucid or fully conscious, a cervical spine injury should be assumed until proven otherwise.

OFFICE OR OFF-FIELD ASSESSMENT

Please note that the neurocognitive assessment should be done in a distraction-free environment with the athlete in a resting state.

STEP 1: ATHLETE BACKGROUND

Sport / team / school: _____

Date / time of injury: _____

Years of education completed: _____

Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

How many diagnosed concussions has the athlete had in the past?: _____

When was the most recent concussion?: _____

How long was the recovery (time to being cleared to play) from the most recent concussion?: _____ (days)

Has the athlete ever been:

	Yes	No
Hospitalized for a head injury?		
Diagnosed / treated for headache disorder or migraines?		
Diagnosed with a learning disability / dyslexia?		
Diagnosed with ADD / ADHD?		
Diagnosed with depression, anxiety or other psychiatric disorder?		

Current medications? If yes, please list:

2

STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

Please Check: Baseline Post-Injury

Please hand the form to the athlete

	none	mild	moderate	severe			
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6
Total number of symptoms:							of 22
Symptom severity score:							of 132
Do your symptoms get worse with physical activity?							Y N
Do your symptoms get worse with mental activity?							Y N
If 100% is feeling perfectly normal, what percent of normal do you feel?							
If not 100%, why?							

Please hand form back to examiner

3

STEP 3: COGNITIVE SCREENING

Standardised Assessment of Concussion (SAC)*

ORIENTATION

What month is it?	0	1
What is the date today?	0	1
What is the day of the week?	0	1
What year is it?	0	1
What time is it right now? (within 1 hour)	0	1
Orientation score	of 5	

IMMEDIATE MEMORY

The Immediate Memory component can be completed using the traditional 5-word per trial list or optionally using 10-words per trial to minimise any ceiling effect. All 3 trials must be administered irrespective of the number correct on the first trial. Administer at the rate of one word per second.

Please choose EITHER the 5 or 10 word list groups and circle the specific word list chosen for this test.

I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order. For Trials 2 & 3: I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before.

List	Alternate 5 word lists					Score (of 5)		
						Trial 1	Trial 2	Trial 3
A	Finger	Penny	Blanket	Lemon	Insect			
B	Candle	Paper	Sugar	Sandwich	Wagon			
C	Baby	Monkey	Perfume	Sunset	Iron			
D	Elbow	Apple	Carpet	Saddle	Bubble			
E	Jacket	Arrow	Pepper	Cotton	Movie			
F	Dollar	Honey	Mirror	Saddle	Anchor			
Immediate Memory Score						of 15		
Time that last trial was completed								

List	Alternate 10 word lists					Score (of 10)		
						Trial 1	Trial 2	Trial 3
G	Finger	Penny	Blanket	Lemon	Insect			
	Candle	Paper	Sugar	Sandwich	Wagon			
H	Baby	Monkey	Perfume	Sunset	Iron			
	Elbow	Apple	Carpet	Saddle	Bubble			
I	Jacket	Arrow	Pepper	Cotton	Movie			
	Dollar	Honey	Mirror	Saddle	Anchor			
Immediate Memory Score						of 30		
Time that last trial was completed								

Name: _____
 DOB: _____
 Address: _____
 ID number: _____
 Examiner: _____
 Date: _____

CONCENTRATION

DIGITS BACKWARDS

Please circle the Digit list chosen (A, B, C, D, E, F). Administer at the rate of one digit per second reading DOWN the selected column.

I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7.

Concentration Number Lists (circle one)					
List A	List B	List C			
4-9-3	5-2-6	1-4-2	Y	N	0
6-2-9	4-1-5	6-5-8	Y	N	1
3-8-1-4	1-7-9-5	6-8-3-1	Y	N	0
3-2-7-9	4-9-6-8	3-4-8-1	Y	N	1
6-2-9-7-1	4-8-5-2-7	4-9-1-5-3	Y	N	0
1-5-2-8-6	6-1-8-4-3	6-8-2-5-1	Y	N	1
7-1-8-4-6-2	8-3-1-9-6-4	3-7-6-5-1-9	Y	N	0
5-3-9-1-4-8	7-2-4-8-5-6	9-2-6-5-1-4	Y	N	1
List D	List E	List F			
7-8-2	3-8-2	2-7-1	Y	N	0
9-2-6	5-1-8	4-7-9	Y	N	1
4-1-8-3	2-7-9-3	1-6-8-3	Y	N	0
9-7-2-3	2-1-6-9	3-9-2-4	Y	N	1
1-7-9-2-6	4-1-8-6-9	2-4-7-5-8	Y	N	0
4-1-7-5-2	9-4-1-7-5	8-3-9-6-4	Y	N	1
2-6-4-8-1-7	6-9-7-3-8-2	5-8-6-2-4-9	Y	N	0
8-4-1-9-3-5	4-2-7-9-3-8	3-1-7-8-2-6	Y	N	1
Digits Score:					of 4

MONTHS IN REVERSE ORDER

Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November. Go ahead.

Dec - Nov - Oct - Sept - Aug - Jul - Jun - May - Apr - Mar - Feb - Jan	0	1
Months Score	of 1	
Concentration Total Score (Digits + Months)	of 5	

STEP 4: NEUROLOGICAL SCREEN

See the instruction sheet (page 7) for details of test administration and scoring of the tests.

Can the patient read aloud (e.g. symptom check-list) and follow instructions without difficulty?	Y	N
Does the patient have a full range of pain-free PASSIVE cervical spine movement?	Y	N
Without moving their head or neck, can the patient look side-to-side and up-and-down without double vision?	Y	N
Can the patient perform the finger-nose coordination test normally?	Y	N
Can the patient perform tandem gait normally?	Y	N

BALANCE EXAMINATION

Modified Balance Error Scoring System (mBESS) testing⁵

Which foot was tested (i.e. which is the non-dominant foot)? Left Right

Testing surface (hard floor, field, etc.) _____

Footwear (shoes, barefoot, braces, tape, etc.) _____

Condition	Errors
Double leg stance	of 10
Single leg stance (non-dominant foot)	of 10
Tandem stance (non-dominant foot at the back)	of 10
Total Errors	of 30

Name: _____
 DOB: _____
 Address: _____
 ID number: _____
 Examiner: _____
 Date: _____

STEP 5: DELAYED RECALL:

The delayed recall should be performed after 5 minutes have elapsed since the end of the Immediate Recall section. Score 1 pt. for each correct response.

Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order.

Time Started _____

Please record each word correctly recalled. Total score equals number of words recalled.

Total number of words recalled accurately: _____ of 5 or _____ of 10

CLINICAL NOTES:

Name: _____
 DOB: _____
 Address: _____
 ID number: _____
 Examiner: _____
 Date: _____

STEP 6: DECISION

Domain	Date & time of assessment:		
Symptom number (of 22)			
Symptom severity score (of 132)			
Orientation (of 5)			
Immediate memory	of 15 of 30	of 15 of 30	of 15 of 30
Concentration (of 5)			
Neuro exam	Normal Abnormal	Normal Abnormal	Normal Abnormal
Balance errors (of 30)			
Delayed Recall	of 5 of 10	of 5 of 10	of 5 of 10

Date and time of injury: _____

If the athlete is known to you prior to their injury, are they different from their usual self?
 Yes No Unsure Not Applicable
 (If different, describe why in the clinical notes section)

Concussion Diagnosed?
 Yes No Unsure Not Applicable

If re-testing, has the athlete improved?
 Yes No Unsure Not Applicable

I am a physician or licensed healthcare professional and I have personally administered or supervised the administration of this SCAT5.

Signature: _____

Name: _____

Title: _____

Registration number (if applicable): _____

Date: _____



CONCUSSION INJURY ADVICE

(To be given to the person monitoring the concussed athlete)

This patient has received an injury to the head. A careful medical examination has been carried out and no sign of any serious complications has been found. Recovery time is variable across individuals and the patient will need monitoring for a further period by a responsible adult. Your treating physician will provide guidance as to this timeframe.

If you notice any change in behaviour, vomiting, worsening headache, double vision or excessive drowsiness, please telephone your doctor or the nearest hospital emergency department immediately.

Other important points:

Initial rest: Limit physical activity to routine daily activities (avoid exercise, training, sports) and limit activities such as school, work, and screen time to a level that does not worsen symptoms.

- 1) Avoid alcohol
- 2) Avoid prescription or non-prescription drugs without medical supervision. Specifically:
 - a) Avoid sleeping tablets
 - b) Do not use aspirin, anti-inflammatory medication or stronger pain medications such as narcotics
- 3) Do not drive until cleared by a healthcare professional.
- 4) Return to play/sport requires clearance by a healthcare professional.

Clinic phone number: _____

Patient's name: _____

Date / time of injury: _____

Date / time of medical review: _____

Healthcare Provider: _____

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SCORING ON THE SCAT5 SHOULD NOT BE USED AS A STAND-ALONE METHOD TO DIAGNOSE CONCUSSION, MEASURE RECOVERY OR MAKE DECISIONS ABOUT AN ATHLETE'S READINESS TO RETURN TO COMPETITION AFTER CONCUSSION.

INSTRUCTIONS

Words in *Italics* throughout the SCAT5 are the instructions given to the athlete by the clinician

Symptom Scale

The time frame for symptoms should be based on the type of test being administered. At baseline it is advantageous to assess how an athlete "typically" feels whereas during the acute/post-acute stage it is best to ask how the athlete feels at the time of testing.

The symptom scale should be completed by the athlete, not by the examiner. In situations where the symptom scale is being completed after exercise, it should be done in a resting state, generally by approximating his/her resting heart rate.

For total number of symptoms, maximum possible is 22 except immediately post injury, if sleep item is omitted, which then creates a maximum of 21.

For Symptom severity score, add all scores in table, maximum possible is 22 x 6 = 132, except immediately post injury if sleep item is omitted, which then creates a maximum of 21x6=126.

Immediate Memory

The Immediate Memory component can be completed using the traditional 5-word per trial list or, optionally, using 10-words per trial. The literature suggests that the Immediate Memory has a notable ceiling effect when a 5-word list is used. In settings where this ceiling is prominent, the examiner may wish to make the task more difficult by incorporating two 5-word groups for a total of 10 words per trial. In this case, the maximum score per trial is 10 with a total trial maximum of 30.

Choose one of the word lists (either 5 or 10). Then perform 3 trials of immediate memory using this list.

Complete all 3 trials regardless of score on previous trials.

"I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order." The words must be read at a rate of one word per second.

Trials 2 & 3 MUST be completed regardless of score on trial 1 & 2.

Trials 2 & 3:

"I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before."

Score 1 pt. for each correct response. Total score equals sum across all 3 trials. Do NOT inform the athlete that delayed recall will be tested.

Concentration

Digits backward

Choose one column of digits from lists A, B, C, D, E or F and administer those digits as follows:

Say: *"I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7."*

Begin with first 3 digit string.

If correct, circle "Y" for correct and go to next string length. If incorrect, circle "N" for the first string length and read trial 2 in the same string length. One point possible for each string length. Stop after incorrect on both trials (2 N's) in a string length. The digits should be read at the rate of one per second.

Months in reverse order

"Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November... Go ahead"

1 pt. for entire sequence correct

Delayed Recall

The delayed recall should be performed after 5 minutes have elapsed since the end of the Immediate Recall section.

"Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order."

Score 1 pt. for each correct response

Modified Balance Error Scoring System (mBESS)⁵ testing

This balance testing is based on a modified version of the Balance Error Scoring System (BESS)⁵. A timing device is required for this testing.

Each of 20-second trial/stance is scored by counting the number of errors. The examiner will begin counting errors only after the athlete has assumed the proper start position. The modified BESS is calculated by adding one error point for each error during the three 20-second tests. The maximum number of errors for any single condition is 10. If the athlete commits multiple errors simultaneously, only

one error is recorded but the athlete should quickly return to the testing position, and counting should resume once the athlete is set. Athletes that are unable to maintain the testing procedure for a minimum of five seconds at the start are assigned the highest possible score, ten, for that testing condition.

OPTION: For further assessment, the same 3 stances can be performed on a surface of medium density foam (e.g., approximately 50cm x 40cm x 6cm).

Balance testing – types of errors

- | | | |
|---------------------------------|---|---|
| 1. Hands lifted off iliac crest | 3. Step, stumble, or fall | 5. Lifting forefoot or heel |
| 2. Opening eyes | 4. Moving hip into > 30 degrees abduction | 6. Remaining out of test position > 5 sec |

"I am now going to test your balance. Please take your shoes off (if applicable), roll up your pant legs above ankle (if applicable), and remove any ankle taping (if applicable). This test will consist of three twenty second tests with different stances."

(a) Double leg stance:

"The first stance is standing with your feet together with your hands on your hips and with your eyes closed. You should try to maintain stability in that position for 20 seconds. I will be counting the number of times you move out of this position. I will start timing when you are set and have closed your eyes."

(b) Single leg stance:

"If you were to kick a ball, which foot would you use? [This will be the dominant foot] Now stand on your non-dominant foot. The dominant leg should be held in approximately 30 degrees of hip flexion and 45 degrees of knee flexion. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."

(c) Tandem stance:

"Now stand heel-to-toe with your non-dominant foot in back. Your weight should be evenly distributed across both feet. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."

Tandem Gait

Participants are instructed to stand with their feet together behind a starting line (the test is best done with footwear removed). Then, they walk in a forward direction as quickly and as accurately as possible along a 38mm wide (sports tape), 3 metre line with an alternate foot heel-to-toe gait ensuring that they approximate their heel and toe on each step. Once they cross the end of the 3m line, they turn 180 degrees and return to the starting point using the same gait. Athletes fail the test if they step off the line, have a separation between their heel and toe, or if they touch or grab the examiner or an object.

Finger to Nose

"I am going to test your coordination now. Please sit comfortably on the chair with your eyes open and your arm (either right or left) outstretched (shoulder flexed to 90 degrees and elbow and fingers extended), pointing in front of you. When I give a start signal, I would like you to perform five successive finger to nose repetitions using your index finger to touch the tip of the nose, and then return to the starting position, as quickly and as accurately as possible."

References

- McCrory et al. Consensus Statement On Concussion In Sport – The 5th International Conference On Concussion In Sport Held In Berlin, October 2016. British Journal of Sports Medicine 2017 (available at www.bjbm.bmj.com)
- Maddocks, DL; Dicker, GD; Saling, MM. The assessment of orientation following concussion in athletes. Clinical Journal of Sport Medicine 1995; 5: 32-33
- Jennett, B., Bond, M. Assessment of outcome after severe brain damage: a practical scale. Lancet 1975; i: 480-484
- McCrea M. Standardized mental status testing of acute concussion. Clinical Journal of Sport Medicine. 2001; 11: 176-181
- Guskiewicz KM. Assessment of postural stability following sport-related concussion. Current Sports Medicine Reports. 2003; 2: 24-30

CONCUSSION INFORMATION

Any athlete suspected of having a concussion should be removed from play and seek medical evaluation.

Signs to watch for

Problems could arise over the first 24-48 hours. The athlete should not be left alone and must go to a hospital at once if they experience:

- Worsening headache
- Repeated vomiting
- Weakness or numbness in arms or legs
- Drowsiness or inability to be awakened
- Unusual behaviour or confusion or irritable
- Unsteadiness on their feet.
- Inability to recognize people or places
- Seizures (arms and legs jerk uncontrollably)
- Slurred speech

Consult your physician or licensed healthcare professional after a suspected concussion. Remember, it is better to be safe.

Rest & Rehabilitation

After a concussion, the athlete should have physical rest and relative cognitive rest for a few days to allow their symptoms to improve. In most cases, after no more than a few days of rest, the athlete should gradually increase their daily activity level as long as their symptoms do not worsen. Once the athlete is able to complete their usual daily activities without concussion-related symptoms, the second step of the return to play/sport progression can be started. The athlete should not return to play/sport until their concussion-related symptoms have resolved and the athlete has successfully returned to full school/learning activities.

When returning to play/sport, the athlete should follow a stepwise, medically managed exercise progression, with increasing amounts of exercise. For example:

Graduated Return to Sport Strategy

Exercise step	Functional exercise at each step	Goal of each step
1. Symptom-limited activity	Daily activities that do not provoke symptoms.	Gradual reintroduction of work/school activities.
2. Light aerobic exercise	Walking or stationary cycling at slow to medium pace. No resistance training.	Increase heart rate.
3. Sport-specific exercise	Running or skating drills. No head impact activities.	Add movement.
4. Non-contact training drills	Harder training drills, e.g., passing drills. May start progressive resistance training.	Exercise, coordination, and increased thinking.
5. Full contact practice	Following medical clearance, participate in normal training activities.	Restore confidence and assess functional skills by coaching staff.
6. Return to play/sport	Normal game play.	

In this example, it would be typical to have 24 hours (or longer) for each step of the progression. If any symptoms worsen while exercising, the athlete should go back to the previous step. Resistance training should be added only in the later stages (Stage 3 or 4 at the earliest).

Written clearance should be provided by a healthcare professional before return to play/sport as directed by local laws and regulations.

Graduated Return to School Strategy

Concussion may affect the ability to learn at school. The athlete may need to miss a few days of school after a concussion. When going back to school, some athletes may need to go back gradually and may need to have some changes made to their schedule so that concussion symptoms do not get worse. If a particular activity makes symptoms worse, then the athlete should stop that activity and rest until symptoms get better. To make sure that the athlete can get back to school without problems, it is important that the healthcare provider, parents, caregivers and teachers talk to each other so that everyone knows what the plan is for the athlete to go back to school.

Note: If mental activity does not cause any symptoms, the athlete may be able to skip step 2 and return to school part-time before doing school activities at home first.

Mental Activity	Activity at each step	Goal of each step
1. Daily activities that do not give the athlete symptoms	Typical activities that the athlete does during the day as long as they do not increase symptoms (e.g. reading, texting, screen time). Start with 5-15 minutes at a time and gradually build up.	Gradual return to typical activities.
2. School activities	Homework, reading or other cognitive activities outside of the classroom.	Increase tolerance to cognitive work.
3. Return to school part-time	Gradual introduction of school-work. May need to start with a partial school day or with increased breaks during the day.	Increase academic activities.
4. Return to school full-time	Gradually progress school activities until a full day can be tolerated.	Return to full academic activities and catch up on missed work.

If the athlete continues to have symptoms with mental activity, some other accommodations that can help with return to school may include:

- Starting school later, only going for half days, or going only to certain classes
- Taking lots of breaks during class, homework, tests
- No more than one exam/day
- More time to finish assignments/tests
- Shorter assignments
- Quiet room to finish assignments/tests
- Repetition/memory cues
- Use of a student helper/tutor
- Not going to noisy areas like the cafeteria, assembly halls, sporting events, music class, shop class, etc.
- Reassurance from teachers that the child will be supported while getting better

The athlete should not go back to sports until they are back to school/learning, without symptoms getting significantly worse and no longer needing any changes to their schedule.

Child SCAT5

SPORT CONCUSSION ASSESSMENT TOOL
FOR CHILDREN AGES 5 TO 12 YEARS
FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by



Patient details

Name: _____
DOB: _____
Address: _____
ID number: _____
Examiner: _____
Date of Injury: _____ Time: _____

WHAT IS THE CHILD SCAT5?

The Child SCAT5 is a standardized tool for evaluating concussions designed for use by physicians and licensed healthcare professionals¹.

If you are not a physician or licensed healthcare professional, please use the Concussion Recognition Tool 5 (CRT5). The Child SCAT5 is to be used for evaluating Children aged 5 to 12 years. For athletes aged 13 years and older, please use the SCAT5.

Preseason Child SCAT5 baseline testing can be useful for interpreting post-injury test scores, but not required for that purpose. Detailed instructions for use of the Child SCAT5 are provided on page 7. Please read through these instructions carefully before testing the athlete. Brief verbal instructions for each test are given in italics. The only equipment required for the tester is a watch or timer.

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Recognise and Remove

A head impact by either a direct blow or indirect transmission of force can be associated with a serious and potentially fatal brain injury. If there are significant concerns, including any of the red flags listed in Box 1, then activation of emergency procedures and urgent transport to the nearest hospital should be arranged.

Key points

- Any athlete with suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration. No athlete diagnosed with concussion should be returned to play on the day of injury.
- If the child is suspected of having a concussion and medical personnel are not immediately available, the child should be referred to a medical facility for urgent assessment.
- Concussion signs and symptoms evolve over time and it is important to consider repeat evaluation in the assessment of concussion.
- The diagnosis of a concussion is a clinical judgment, made by a medical professional. The Child SCAT5 should NOT be used by itself to make, or exclude, the diagnosis of concussion. An athlete may have a concussion even if their Child SCAT5 is "normal".

Remember:

- The basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Do not attempt to move the athlete (other than that required for airway management) unless trained to do so.
- Assessment for a spinal cord injury is a critical part of the initial on-field assessment.
- Do not remove a helmet or any other equipment unless trained to do so safely.

1

IMMEDIATE OR ON-FIELD ASSESSMENT

The following elements should be assessed for all athletes who are suspected of having a concussion prior to proceeding to the neurocognitive assessment and ideally should be done on-field after the first first aid / emergency care priorities are completed.

If any of the "Red Flags" or observable signs are noted after a direct or indirect blow to the head, the athlete should be immediately and safely removed from participation and evaluated by a physician or licensed healthcare professional.

Consideration of transportation to a medical facility should be at the discretion of the physician or licensed healthcare professional.

The GCS is important as a standard measure for all patients and can be done serially if necessary in the event of deterioration in conscious state. The cervical spine exam is a critical step of the immediate assessment, however, it does not need to be done serially.

STEP 1: RED FLAGS

RED FLAGS:

- Neck pain or tenderness
- Double vision
- Weakness or tingling/ burning in arms or legs
- Severe or increasing headache
- Seizure or convulsion
- Loss of consciousness
- Deteriorating conscious state
- Vomiting
- Increasingly restless, agitated or combative

STEP 2: OBSERVABLE SIGNS

Witnessed Observed on Video

Lying motionless on the playing surface	Y	N
Balance / gait difficulties / motor incoordination: stumbling, slow / laboured movements	Y	N
Disorientation or confusion, or an inability to respond appropriately to questions	Y	N
Blank or vacant look	Y	N
Facial injury after head trauma	Y	N

STEP 3: EXAMINATION GLASGOW COMA SCALE (GCS)²

Time of assessment			
Date of assessment			
Best eye response (E)			
No eye opening	1	1	1
Eye opening in response to pain	2	2	2
Eye opening to speech	3	3	3
Eyes opening spontaneously	4	4	4
Best verbal response (V)			
No verbal response	1	1	1

Name: _____
DOB: _____
Address: _____
ID number: _____
Examiner: _____
Date: _____

Incomprehensible sounds	2	2	2
Inappropriate words	3	3	3
Confused	4	4	4
Oriented	5	5	5
Best motor response (M)			
No motor response	1	1	1
Extension to pain	2	2	2
Abnormal flexion to pain	3	3	3
Flexion / Withdrawal to pain	4	4	4
Localizes to pain	5	5	5
Obeys commands	6	6	6
Glasgow Coma score (E + V + M)			

CERVICAL SPINE ASSESSMENT

Does the athlete report that their neck is pain free at rest?	Y	N
If there is NO neck pain at rest, does the athlete have a full range of ACTIVE pain free movement?	Y	N
Is the limb strength and sensation normal?	Y	N

In a patient who is not lucid or fully conscious, a cervical spine injury should be assumed until proven otherwise.

OFFICE OR OFF-FIELD ASSESSMENT STEP 1: ATHLETE BACKGROUND

Please note that the neurocognitive assessment should be done in a distraction-free environment with the athlete in a resting state.

Sport / team / school: _____
Date / time of injury: _____
Years of education completed: _____
Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

How many diagnosed concussions has the athlete had in the past?: _____

When was the most recent concussion?: _____
How long was the recovery (time to being cleared to play) from the most recent concussion?: _____ (days)

Has the athlete ever been:

Hospitalized for a head injury?	Yes	No
Diagnosed / treated for headache disorder or migraines?	Yes	No
Diagnosed with a learning disability / dyslexia?	Yes	No
Diagnosed with ADD / ADHD?	Yes	No
Diagnosed with depression, anxiety or other psychiatric disorder?	Yes	No

Current medications? If yes, please list: _____

STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

To be done in a resting state

Please Check: Baseline Post-Injury

2

Child Report³

	Not at all/ Never	A little/ Rarely	Somewhat/ Sometimes	A lot/ Often
I have headaches	0	1	2	3
I feel dizzy	0	1	2	3
I feel like the room is spinning	0	1	2	3
I feel like I'm going to faint	0	1	2	3
Things are blurry when I look at them	0	1	2	3
I see double	0	1	2	3
I feel sick to my stomach	0	1	2	3
My neck hurts	0	1	2	3
I get tired a lot	0	1	2	3
I get tired easily	0	1	2	3
I have trouble paying attention	0	1	2	3
I get distracted easily	0	1	2	3
I have a hard time concentrating	0	1	2	3
I have problems remembering what people tell me	0	1	2	3
I have problems following directions	0	1	2	3
I daydream too much	0	1	2	3
I get confused	0	1	2	3
I forget things	0	1	2	3
I have problems finishing things	0	1	2	3
I have trouble figuring things out	0	1	2	3
It's hard for me to learn new things	0	1	2	3
Total number of symptoms:				of 21
Symptom severity score:				of 63
Do the symptoms get worse with physical activity?		Y	N	
Do the symptoms get worse with trying to think?		Y	N	

Overall rating for child to answer:

	Very bad	Very good
On a scale of 0 to 10 (where 10 is normal), how do you feel now?	0 1 2 3 4 5 6 7 8 9 10	

If not 10, in what way do you feel different?:

Name: _____
 DOB: _____
 Address: _____
 ID number: _____
 Examiner: _____
 Date: _____

Parent Report

The child:

	Not at all/ Never	A little/ Rarely	Somewhat/ Sometimes	A lot/ Often
has headaches	0	1	2	3
feels dizzy	0	1	2	3
has a feeling that the room is spinning	0	1	2	3
feels faint	0	1	2	3
has blurred vision	0	1	2	3
has double vision	0	1	2	3
experiences nausea	0	1	2	3
has a sore neck	0	1	2	3
gets tired a lot	0	1	2	3
gets tired easily	0	1	2	3
has trouble sustaining attention	0	1	2	3
is easily distracted	0	1	2	3
has difficulty concentrating	0	1	2	3
has problems remembering what he/she is told	0	1	2	3
has difficulty following directions	0	1	2	3
tends to daydream	0	1	2	3
gets confused	0	1	2	3
is forgetful	0	1	2	3
has difficulty completing tasks	0	1	2	3
has poor problem solving skills	0	1	2	3
has problems learning	0	1	2	3
Total number of symptoms:				of 21
Symptom severity score:				of 63
Do the symptoms get worse with physical activity?		Y	N	
Do the symptoms get worse with mental activity?		Y	N	

Overall rating for parent/teacher/coach/carer to answer

On a scale of 0 to 100% (where 100% is normal), how would you rate the child now?

If not 100%, in what way does the child seem different?

3

STEP 3: COGNITIVE SCREENING

Standardized Assessment of Concussion - Child Version (SAC-C)⁴

IMMEDIATE MEMORY

The Immediate Memory component can be completed using the traditional 5-word per trial list or optionally using 10-words per trial to minimise any ceiling effect. All 3 trials must be administered irrespective of the number correct on the first trial. Administer at the rate of one word per second.

Please choose EITHER the 5 or 10 word list groups and circle the specific word list chosen for this test.

I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order. For Trials 2 & 3: I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before.

List	Alternate 5 word lists					Score (of 5)		
	Finger	Penny	Blanket	Lemon	Insect	Trial 1	Trial 2	Trial 3
A	Finger	Penny	Blanket	Lemon	Insect			
B	Candle	Paper	Sugar	Sandwich	Wagon			
C	Baby	Monkey	Perfume	Sunset	Iron			
D	Elbow	Apple	Carpet	Saddle	Bubble			
E	Jacket	Arrow	Pepper	Cotton	Movie			
F	Dollar	Honey	Mirror	Saddle	Anchor			
Immediate Memory Score						of 15		
Time that last trial was completed								

List	Alternate 10 word lists					Score (of 10)		
	Finger	Penny	Blanket	Lemon	Insect	Trial 1	Trial 2	Trial 3
G	Finger	Penny	Blanket	Lemon	Insect			
	Candle	Paper	Sugar	Sandwich	Wagon			
H	Baby	Monkey	Perfume	Sunset	Iron			
	Elbow	Apple	Carpet	Saddle	Bubble			
I	Jacket	Arrow	Pepper	Cotton	Movie			
	Dollar	Honey	Mirror	Saddle	Anchor			
Immediate Memory Score						of 30		
Time that last trial was completed								

Name: _____
 DOB: _____
 Address: _____
 ID number: _____
 Examiner: _____
 Date: _____

CONCENTRATION

DIGITS BACKWARDS

Please circle the Digit list chosen (A, B, C, D, E, F). Administer at the rate of one digit per second reading DOWN the selected column.

I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7.

Concentration Number Lists (circle one)					
List A	List B	List C			
5-2	4-1	4-9	Y	N	0
4-1	9-4	6-2	Y	N	1
4-9-3	5-2-6	1-4-2	Y	N	0
6-2-9	4-1-5	6-5-8	Y	N	1
3-8-1-4	1-7-9-5	6-8-3-1	Y	N	0
3-2-7-9	4-9-6-8	3-4-8-1	Y	N	1
6-2-9-7-1	4-8-5-2-7	4-9-1-5-3	Y	N	0
1-5-2-8-6	6-1-8-4-3	6-8-2-5-1	Y	N	1
7-1-8-4-6-2	8-3-1-9-6-4	3-7-6-5-1-9	Y	N	0
5-3-9-1-4-8	7-2-4-8-5-6	9-2-6-5-1-4	Y	N	1
List D	List E	List F			
2-7	9-2	7-8	Y	N	0
5-9	6-1	5-1	Y	N	1
7-8-2	3-8-2	2-7-1	Y	N	0
9-2-6	5-1-8	4-7-9	Y	N	1
4-1-8-3	2-7-9-3	1-6-8-3	Y	N	0
9-7-2-3	2-1-6-9-	3-9-2-4	Y	N	1
1-7-9-2-6	4-1-8-6-9	2-4-7-5-8	Y	N	0
4-1-7-5-2	9-4-1-7-5	8-3-9-6-4	Y	N	1
2-6-4-8-1-7	6-9-7-3-8-2	5-8-6-2-4-9	Y	N	0
8-4-1-9-3-5	4-2-7-3-9-8	3-1-7-8-2-6	Y	N	1
Digits Score:					of 5

DAYS IN REVERSE ORDER

Now tell me the days of the week in reverse order. Start with the last day and go backward. So you'll say Sunday, Saturday. Go ahead.

Sunday - Saturday - Friday - Thursday - Wednesday - Tuesday - Monday	0 1
Days Score	of 1
Concentration Total Score (Digits + Days)	of 6

STEP 4: NEUROLOGICAL SCREEN

See the instruction sheet (page 7) for details of test administration and scoring of the tests.

Can the patient read aloud (e.g. symptom checklist) and follow instructions without difficulty?	Y	N
Does the patient have a full range of pain-free PASSIVE cervical spine movement?	Y	N
Without moving their head or neck, can the patient look side-to-side and up-and-down without double vision?	Y	N
Can the patient perform the finger nose coordination test normally?	Y	N
Can the patient perform tandem gait normally?	Y	N

BALANCE EXAMINATION

Modified Balance Error Scoring System (BESS) testing⁵

Which foot was tested (i.e. which is the non-dominant foot)	<input type="checkbox"/> Left <input type="checkbox"/> Right
Testing surface (hard floor, field, etc.)	_____
Footwear (shoes, barefoot, braces, tape, etc.)	_____
Condition	Errors
Double leg stance	_____ of 10
Single leg stance (non-dominant foot, 10-12 y/o only)	_____ of 10
Tandem stance (non-dominant foot at back)	_____ of 10
Total Errors	5-9 y/o of 20 10-12 y/o of 30

Name: _____
 DOB: _____
 Address: _____
 ID number: _____
 Examiner: _____
 Date: _____

STEP 5: DELAYED RECALL:

The delayed recall should be performed after 5 minutes have elapsed since the end of the Immediate Recall section. Score 1 pt. for each correct response.

Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order.

Time Started _____

Please record each word correctly recalled. Total score equals number of words recalled.

Total number of words recalled accurately: _____ of 5 or _____ of 10



For the Neurological Screen (page 5), if the child cannot read, ask him/her to describe what they see in this picture.

Name: _____
 DOB: _____
 Address: _____
 ID number: _____
 Examiner: _____
 Date: _____

CLINICAL NOTES:

STEP 6: DECISION

Domain	Date & time of assessment:		
Symptom number Child report (of 21) Parent report (of 21)			
Symptom severity score Child report (of 63) Parent report (of 63)			
Immediate memory	_____ of 15 _____ of 30	_____ of 15 _____ of 30	_____ of 15 _____ of 30
Concentration (of 6)			
Neuro exam	Normal Abnormal	Normal Abnormal	Normal Abnormal
Balance errors (5-9 y/o of 20) (10-12 y/o of 30)			
Delayed Recall	_____ of 5 _____ of 10	_____ of 5 _____ of 10	_____ of 5 _____ of 10

Date and time of injury: _____

If the athlete is known to you prior to their injury, are they different from their usual self?

Yes No Unsure Not Applicable
 (If different, describe why in the clinical notes section)

Concussion Diagnosed?

Yes No Unsure Not Applicable

If re-testing, has the athlete improved?

Yes No Unsure Not Applicable

I am a physician or licensed healthcare professional and I have personally administered or supervised the administration of this Child SCAT5.

Signature: _____

Name: _____

Title: _____

Registration number (if applicable): _____

Date: _____

SCORING ON THE CHILD SCAT5 SHOULD NOT BE USED AS A STAND-ALONE METHOD TO DIAGNOSE CONCUSSION, MEASURE RECOVERY OR MAKE DECISIONS ABOUT AN ATHLETE'S READINESS TO RETURN TO COMPETITION AFTER CONCUSSION.

**Concussion injury advice for the child and parents/carergivers**

(To be given to the person monitoring the concussed child)

This child has had an injury to the head and needs to be carefully watched for the next 24 hours by a responsible adult.

If you notice any change in behavior, vomiting, dizziness, worsening headache, double vision or excessive drowsiness, please call an ambulance to take the child to hospital immediately.

Other important points:

Following concussion, the child should rest for at least 24 hours.

- The child should not use a computer, internet or play video games if these activities make symptoms worse.
- The child should not be given any medications, including pain killers, unless prescribed by a medical doctor.
- The child should not go back to school until symptoms are improving.
- The child should not go back to sport or play until a doctor gives permission.

Clinic phone number: _____

Patient's name: _____

Date / time of injury: _____

Date / time of medical review: _____

Healthcare Provider: _____

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Contact details or stamp

INSTRUCTIONS

Words in *Italics* throughout the Child SCAT5 are the instructions given to the athlete by the clinician

Symptom Scale

In situations where the symptom scale is being completed after exercise, it should still be done in a resting state, at least 10 minutes post exercise.

At Baseline	On the day of injury	On all subsequent days
<ul style="list-style-type: none">The child is to complete the Child Report, according to how he/she feels today, andThe parent/carer is to complete the Parent Report according to how the child has been over the previous week.	<ul style="list-style-type: none">The child is to complete the Child Report, according to how he/she feels now.If the parent is present, and has had time to assess the child on the day of injury, the parent completes the Parent Report according to how the child appears now.	<ul style="list-style-type: none">The child is to complete the Child Report, according to how he/she feels today, andThe parent/carer is to complete the Parent Report according to how the child has been over the previous 24 hours.

For Total number of symptoms, maximum possible is 21

For Symptom severity score, add all scores in table, maximum possible is $21 \times 3 = 63$

Standardized Assessment of Concussion Child Version (SAC-C)

Immediate Memory

Choose one of the 5-word lists. Then perform 3 trials of immediate memory using this list.

Complete all 3 trials regardless of score on previous trials.

"I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order." The words must be read at a rate of one word per second.

OPTION: The literature suggests that the Immediate Memory has a notable ceiling effect when a 5-word list is used. (In younger children, use the 5-word list). In settings where this ceiling is prominent the examiner may wish to make the task more difficult by incorporating two 5-word groups for a total of 10 words per trial. In this case the maximum score per trial is 10 with a total trial maximum of 30.

Trials 2 & 3 MUST be completed regardless of score on trial 1 & 2.

Trials 2 & 3: *"I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before."*

Score 1 pt. for each correct response. Total score equals sum across all 3 trials. Do NOT inform the athlete that delayed recall will be tested.

Concentration

Digits backward

Choose one column only, from List A, B, C, D, E or F, and administer those digits as follows:

"I am going to read you some numbers and when I am done, you say them back to me backwards, in reverse order of how I read them to you. For example, if I say 7-1, you would say 1-7."

If correct, circle "Y" for correct and go to next string length. If incorrect, circle "N" for the first string length and read trial 2 in the same string length. One point possible for each string length. Stop after incorrect on both trials (2 N's) in a string length. The digits should be read at the rate of one per second.

Days of the week in reverse order

"Now tell me the days of the week in reverse order. Start with Sunday and go backward. So you'll say Sunday, Saturday ... Go ahead"

1 pt. for entire sequence correct

Delayed Recall

The delayed recall should be performed after at least 5 minutes have elapsed since the end of the Immediate Recall section.

"Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order."

Circle each word correctly recalled. Total score equals number of words recalled.

Neurological Screen

Reading

The child is asked to read a paragraph of text from the instructions in the Child SCAT5. For children who can not read, they are asked to describe what they see in a photograph or picture, such as that on page 6 of the Child SCAT5.

Modified Balance Error Scoring System (mBESS)⁵ testing

These instructions are to be read by the person administering the Child SCAT5, and each balance task should be demonstrated to the child. The child should then be asked to copy what the examiner demonstrated.

Each of 20-second trial/stance is scored by counting the number of errors. The This balance testing is based on a modified version of the Balance Error Scoring System (BESS):

A stopwatch or watch with a second hand is required for this testing.

"I am now going to test your balance. Please take your shoes off, roll up your pants above your ankle (if applicable), and remove any ankle taping (if applicable). This test will consist of two different parts."

OPTION: For further assessment, the same 3 stances can be performed on a surface of medium density foam (e.g., approximately 50cm x 40cm x 6cm).

(a) Double leg stance:

The first stance is standing with the feet together with hands on hips and with eyes closed. The child should try to maintain stability in that position for 20 seconds. You should inform the child that you will be counting the number of times the child moves out of this position. You should start timing when the child is set and the eyes are closed.

(b) Tandem stance:

Instruct or show the child how to stand heel-to-toe with the non-dominant foot in the back. Weight should be evenly distributed across both feet. Again, the child should try to maintain stability for 20 seconds with hands on hips and eyes closed. You should inform the child that you will be counting the number of times the child moves out of this position. If the child stumbles out of this position, instruct him/her to open the eyes and return to the start position and continue balancing. You should start timing when the child is set and the eyes are closed.

(c) Single leg stance (10-12 year olds only):

"If you were to kick a ball, which foot would you use? [This will be the dominant foot] Now stand on your other foot. You should bend your other leg and hold it up (show the child). Again, try to stay in that position for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you move out of this position, open your eyes and return to the start position and keep balancing. I will start timing when you are set and have closed your eyes."

Balance testing – types of errors

- Hands lifted off iliac crest
- Opening eyes
- Step, stumble, or fall
- Moving hip into > 30 degrees abduction
- Lifting forefoot or heel
- Remaining out of test position > 5 sec

Each of the 20-second trials is scored by counting the errors, or deviations from the proper stance, accumulated by the child. The examiner will begin counting errors only after the child has assumed the proper start position. The modified BESS is calculated by adding one error point for each error during the 20-second tests. The maximum total number of errors for any single condition is 10. If a child commits multiple errors simultaneously, only one error is recorded but the child should quickly return to the testing position, and counting should resume once subject is set. Children who are unable to maintain the testing procedure for a minimum of five seconds at the start are assigned the highest possible score, ten, for that testing condition.

Tandem Gait

Instruction for the examiner - Demonstrate the following to the child:

The child is instructed to stand with their feet together behind a starting line (the test is best done with footwear removed). Then, they walk in a forward direction as quickly and as accurately as possible along a 38mm wide (sports tape), 3 metre line with an alternate foot heel-to-toe gait ensuring that they approximate their heel and toe on each step. Once they cross the end of the 3m line, they turn 180 degrees and return to the starting point using the same gait. Children fail the test if they step off the line, have a separation between their heel and toe, or if they touch or grab the examiner or an object.

Finger to Nose

The tester should demonstrate it to the child.

"I am going to test your coordination now. Please sit comfortably on the chair with your eyes open and your arm (either right or left) outstretched (shoulder flexed to 90 degrees and elbow and fingers extended). When I give a start signal, I would like you to perform five successive finger to nose repetitions using your index finger to touch the tip of the nose as quickly and as accurately as possible."

Scoring: 5 correct repetitions in < 4 seconds = 1

Note for testers: Children fail the test if they do not touch their nose, do not fully extend their elbow or do not perform five repetitions.

References

- McCrory et al. Consensus Statement On Concussion In Sport – The 5th International Conference On Concussion In Sport Held In Berlin, October 2016. British Journal of Sports Medicine 2017 (available at www.bjsm.bmj.com)
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- Ayr, L.K., Yeates, K.O., Taylor, H.G., Brown, M. Dimensions of postconcussive symptoms in children with mild traumatic brain injuries. Journal of the International Neuropsychological Society. 2009; 15:19–30
- McCreia M. Standardized mental status testing of acute concussion. Clinical Journal of Sports Medicine. 2001; 11: 176-181
- Guskiewicz KM. Assessment of postural stability following sport-related concussion. Current Sports Medicine Reports. 2003; 2: 24-30

CONCUSSION INFORMATION

If you think you or a teammate has a concussion, tell your coach/trainer/parent right away so that you can be taken out of the game. You or your teammate should be seen by a doctor as soon as possible. YOU OR YOUR TEAMMATE SHOULD NOT GO BACK TO PLAY/SPORT THAT DAY.

Signs to watch for

Problems can happen over the first 24-48 hours. You or your teammate should not be left alone and must go to a hospital right away if any of the following happens:

- New headache, or headache gets worse
- Neck pain that gets worse
- Becomes sleepy/drowsy or can't be woken up
- Cannot recognise people or places
- Feeling sick to your stomach or vomiting
- Acting weird/strange, seems/feels confused, or is irritable
- Has any seizures (arms and/or legs jerk uncontrollably)
- Has weakness, numbness or tingling (arms, legs or face)
- Is insteady walking or standing
- Talking is slurred
- Cannot understand what someone is saying or directions

Consult your physician or licensed healthcare professional after a suspected concussion. Remember, it is better to be safe.

Graduated Return to Sport Strategy

After a concussion, the child should rest physically and mentally for a few days to allow symptoms to get better. In most cases, after a few days of rest, they can gradually increase their daily activity level as long as symptoms don't get worse. Once they are able to do their usual daily activities without symptoms, the child should gradually increase exercise in steps, guided by the healthcare professional (see below).

The athlete should not return to play/sport the day of injury.

NOTE: An initial period of a few days of both cognitive ("thinking") and physical rest is recommended before beginning the Return to Sport progression.

Exercise step	Functional exercise at each step	Goal of each step
1. Symptom-limited activity	Daily activities that do not provoke symptoms.	Gradual reintroduction of work/school activities.
2. Light aerobic exercise	Walking or stationary cycling at slow to medium pace. No resistance training.	Increase heart rate.
3. Sport-specific exercise	Running or skating drills. No head impact activities.	Add movement.
4. Non-contact training drills	Harder training drills, e.g., passing drills. May start progressive resistance training.	Exercise, coordination, and increased thinking.
5. Full contact practice	Following medical clearance, participate in normal training activities.	Restore confidence and assess functional skills by coaching staff.
6. Return to play/sport	Normal game play.	

There should be at least 24 hours (or longer) for each step of the progression. If any symptoms worsen while exercising, the athlete should go back to the previous step. Resistance training should be added only in the later stages (Stage 3 or 4 at the earliest). The athlete should not return to sport until the concussion symptoms have gone, they have successfully returned to full school/learning activities, and the healthcare professional has given the child written permission to return to sport.

If the child has symptoms for more than a month, they should ask to be referred to a healthcare professional who is an expert in the management of concussion.

Graduated Return to School Strategy

Concussion may affect the ability to learn at school. The child may need to miss a few days of school after a concussion, but the child's doctor should help them get back to school after a few days. When going back to school, some children may need to go back gradually and may need to have some changes made to their schedule so that concussion symptoms don't get a lot worse. If a particular activity makes symptoms a lot worse, then the child should stop that activity and rest until symptoms get better. To make sure that the child can get back to school without problems, it is important that the health care provider, parents/caregivers and teachers talk to each other so that everyone knows what the plan is for the child to go back to school.

Note: If mental activity does not cause any symptoms, the child may be able to return to school part-time without doing school activities at home first.

Mental Activity	Activity at each step	Goal of each step
1. Daily activities that do not give the child symptoms	Typical activities that the child does during the day as long as they do not increase symptoms (e.g. reading, texting, screen time). Start with 5-15 minutes at a time and gradually build up.	Gradual return to typical activities.
2. School activities	Homework, reading or other cognitive activities outside of the classroom.	Increase tolerance to cognitive work.
3. Return to school part-time	Gradual introduction of school-work. May need to start with a partial school day or with increased breaks during the day.	Increase academic activities.
4. Return to school full-time	Gradually progress school activities until a full day can be tolerated.	Return to full academic activities and catch up on missed work.

If the child continues to have symptoms with mental activity, some other things that can be done to help with return to school may include:

- Starting school later, only going for half days, or going only to certain classes
- More time to finish assignments/tests
- Quiet room to finish assignments/tests
- Not going to noisy areas like the cafeteria, assembly halls, sporting events, music class, shop class, etc.
- Taking lots of breaks during class, homework, tests
- No more than one exam/day
- Shorter assignments
- Repetition/memory cues
- Use of a student helper/tutor
- Reassurance from teachers that the child will be supported while getting better

The child should not go back to sports until they are back to school/learning, without symptoms getting significantly worse and no longer needing any changes to their schedule.

Concussion Management Guidance for Healthcare Professionals: Concussion Management Basics

- Patient-Family Education and reassurance.
- Physical and cognitive rest until acute symptoms have resolved
- Gradual return to school and social activities
- Low level exercise for those who are slow to recover

- Provide information on role of physical/cognitive rest and exercise
- Provide guidelines for gradual, step-wise return to activity (play and learn)
- Complete ACE Care Plan (School Version) or letter of accommodation

Resources for physicians to guide return to activity:

- [Link to ACE Care Plan \(School Version\)](#)



**ACUTE CONCUSSION EVALUATION (ACE)
CARE PLAN**



ACUTE CONCUSSION EVALUATION (ACE)

CARE PLAN

Gerard Gioia, PhD¹ & Micky Collins, PhD²
¹Children's National Medical Center
²University of Pittsburgh Medical Center

Patient Name: _____
 DOB: _____ Age: _____
 Date: _____ ID/MR# _____
 Date of Injury: _____

You have been diagnosed with a concussion (also known as a mild traumatic brain injury). This personal plan is based on your symptoms and is designed to help speed your recovery. Your careful attention to it can also prevent further injury.

You should not participate in any high risk activities (e.g., sports, physical education (PE), riding a bike, etc.) if you still have any of the symptoms below. It is important to limit activities that require a lot of thinking or concentration (homework, job-related activities), as this can also make your symptoms worse. If you no longer have any symptoms and believe that your concentration and thinking are back to normal, you can slowly and carefully return to your daily activities. Children and teenagers will need help from their parents, teachers, coaches, or athletic trainers to help monitor their recovery and return to activities.

Today the following symptoms are present (circle or check).				No reported symptoms
Physical		Thinking	Emotional	Sleep
Headaches	Sensitivity to light	Feeling mentally foggy	Irritability	Drowsiness
Nausea	Sensitivity to noise	Problems concentrating	Sadness	Sleeping more than usual
Fatigue	Numbness/Tingling	Problems remembering	Feeling more emotional	Sleeping less than usual
Visual problems	Vomiting	Feeling more slowed down	Nervousness	Trouble falling asleep
Balance Problems	Dizziness			

RED FLAGS: Call your doctor or go to your emergency department if you suddenly experience any of the following

Headaches that <u>worsen</u>	Look <u>very</u> drowsy, can't be awakened	Can't <u>recognize</u> people or places	Unusual behavior change
Seizures	<u>Repeated</u> vomiting	Increasing confusion	Increasing irritability
Neck pain	Slurred speech	Weakness or numbness in arms or legs	Loss of consciousness

Returning to Daily Activities

- Get lots of rest. Be sure to get enough sleep at night- no late nights. Keep the same bedtime weekdays and weekends.
- Take daytime naps or rest breaks when you feel tired or fatigued.
- Limit physical activity as well as activities that require a lot of thinking or concentration. These activities can make symptoms worse.**
 - Physical activity includes PE, sports practices, weight-training, running, exercising, heavy lifting, etc.
 - Thinking and concentration activities (e.g., homework, classwork load, job-related activity).
- Drink lots of fluids and eat carbohydrates or protein to main appropriate blood sugar levels.
- As symptoms decrease, you may begin to gradually return to your daily activities. If symptoms worsen or return, lessen your activities, then try again to increase your activities gradually.**
- During recovery, it is normal to feel frustrated and sad when you do not feel right and you can't be as active as usual.
- Repeated evaluation of your symptoms is recommended to help guide recovery.

Returning to School

- If you (or your child) are still having symptoms of concussion you may need extra help to perform school-related activities. As your (or your child's) symptoms decrease during recovery, the extra help or supports can be removed gradually.
- Inform the teacher(s), school nurse, school psychologist or counselor, and administrator(s) about your (or your child's) injury and symptoms. School personnel should be instructed to watch for:
 - Increased problems paying attention or concentrating
 - Increased problems remembering or learning new information
 - Longer time needed to complete tasks or assignments
 - Greater irritability, less able to cope with stress
 - Symptoms worsen (e.g., headache, tiredness) when doing schoolwork

-Continued on back page-

Returning to School (Continued)

Until you (or your child) have fully recovered, the following supports are recommended:

- No return to school. Return on (date) _____
- Return to school with following supports. Review on (date) _____
- Shortened day. Recommend _____ hours per day until (date) _____
- Shortened classes (i.e., rest breaks during classes). Maximum class length: _____ minutes
- Allow extra time to complete coursework/assignments and tests.
- Lessen homework load by _____%. Maximum length of nightly homework: _____ minutes
- No significant classroom or standardized testing at this time.
- Check for the return of symptoms (use symptom table on front page of this form) when doing a lot of attention or concentration.
- Take rest breaks during the day as needed.
- Request meeting of 504 or School Management Team to discuss this plan and needed supports.

Returning to Sports

- You should NEVER return to play if you still have ANY symptoms** – (Be sure that you are at rest and while doing any physical activity and/or activities that require a lot of thinking or concentration.)
- Be sure that the PE teacher, coach, and/or athletic trainer are aware of your injury and symptoms.
- It is normal to feel frustrated, sad and even angry because you cannot return to sports right away. Your recovery will reduce the chances of getting hurt again. It is better to miss one or two games than to miss a season.

The following are recommended at the present time:

- Do not return to PE class at this time
- Return to PE class
- Do not return to sports practices/games at this time
- Gradual** return to sports practices under the supervision of an appropriate health care professional
 - Return to play should occur in gradual steps beginning with aerobic exercise only to increase heart rate (e.g., stationary cycle); moving to increasing your heart rate with movement (e.g., running, swimming, etc.) contact if appropriate; and finally return to sports competition.
 - Pay careful attention to your symptoms and your thinking and concentration skills at each level. Do not return to the next level of activity only if you do not experience any symptoms at the each level. Stop these activities and let your health care professional know. Once you have not experienced any symptoms for a minimum of 24 hours and you receive permission from your health care professional, you may return to the previous step of the return to play plan.

Gradual Return to Play Plan

- No physical activity
- Low levels of physical activity (i.e., walking). This includes walking, light jogging, light stationary biking, light weight, higher reps, no bench, no squat).
- Moderate levels of physical activity with body/head movement. This includes moderate jogging, moderate intensity stationary biking, moderate-intensity weightlifting (reduced time and/or reduced weight).
- Heavy non-contact physical activity. This includes sprinting/running, high-intensity stationary biking routine, non-contact sport-specific drills (in 3 planes of movement).
- Full contact in controlled practice.
- Full contact in game play.

*Neuropsychological testing can provide valuable information to assist physicians with treatment planning, such as when to return to play.

This referral plan is based on today's evaluation:

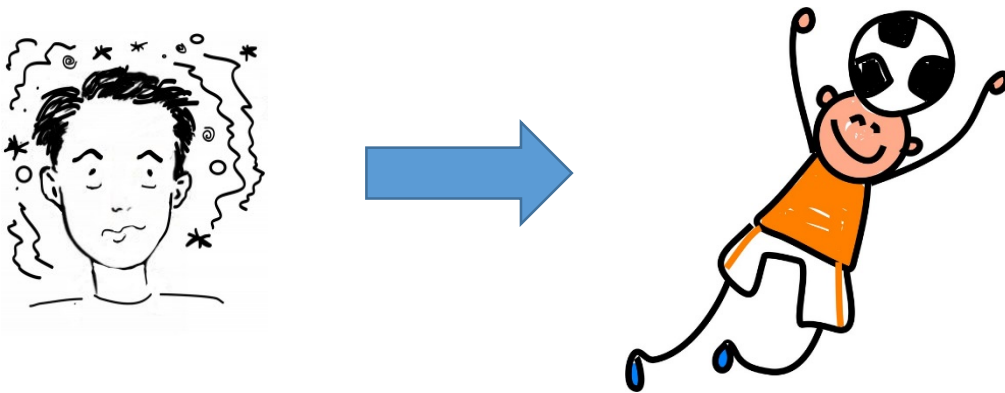
- Return to this office. Date/Time _____
- Refer to: Neurosurgery _____ Neurology _____ Sports Medicine _____ Psychiatrist _____ Psychologist _____
- Refer for neuropsychological testing _____
- Other _____

ACE Care Plan Completed by: _____ MD RN NP PhD ATC

SCHOOL VERSION

Concussion Management Guidance for Healthcare Professionals: Patient-Family Education

- Provide anticipatory guidance & verbal reassurance that reduces anxiety and helps set realistic expectations, promotes recovery and prevents re-injury.
- Patient and family/caregivers need to know:
 - current symptoms are expected and common;
 - that it is expected that most patients (80-90%) recover within 7-10 days
 - However, some children/adolescents still have symptoms at one month and beyond, and need to be monitored.



Recovery is expected!

Resources for Parent Information:

A Fact Sheet for
YOUTH SPORTS PARENTS



- Link to CDC Facts Sheets
- Link to cbirt <http://cbirt.org/ocamp/parents/>

cbirt

Concussion Management Guidance for Healthcare Professionals: Rest and Exercise for Concussion Recovery

Consensus statement on concussion in sport:
the 4th International Conference on Concussion
in Sport held in Zurich, November 2012

Paul McCrory,¹ Willem H Meeuwisse,^{2,3} Mark Aubry,^{4,5,6} Bob Cantu,^{7,8}
Jiří Dvořák,^{9,10,11} Ruben J Echemendia,^{12,13} Lars Engebretsen,^{14,15,16}
Karen Johnston,^{17,18} Jeffrey S Kutcher,¹⁹ Martin Raftery,²⁰ Allen Sills,²¹
Brian W Benson,^{22,23,24} Gavin A Davis,²⁵ Richard G Ellenbogen,^{26,27}
Kevin Guskiewicz,²⁸ Stanley A Herring,^{29,30} Grant L Iverson,³¹ Barry D Jordan,^{32,33,34}
James Kissick,^{6,35,36,37} Michael McCrea,³⁸ Andrew S McIntosh,^{39,40,41}
David Maddocks,⁴² Michael Makdissi,^{43,44} Laura Purcell,^{45,46} Margot Putukian,^{47,48}
Kathryn Schneider,⁴⁹ Charles H Tator,^{50,51,52,53} Michael Turner⁵⁴

McCrory P, et al. *Br J Sports Med* 2013;**47**:250–258. doi:10.1136/bjsports-2013-092313

“The cornerstone of concussion management is physical and cognitive rest until the acute symptoms resolve and then a grade programme of exertion prior to medical clearance and return to play....Low level exercise for those who are slow to recover may be of benefit.”

Concussion Management Guidance for Healthcare Professionals: Rest and Exercise for Concussion Recovery

Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016

Paul McCrory,¹ Willem Meeuwisse,² Jiří Dvorak,^{3,4} Mark Aubry,⁵ Julian Bailes,⁶ Steven Broglio,⁷ Robert C Cantu,⁸ David Cassidy,⁹ Ruben J Echemendia,^{10,11} Rudy J Castellani,¹² Gavin A Davis,^{13,14} Richard Ellenbogen,¹⁵ Carolyn Emery,¹⁶ Lars Engebretsen,¹⁷ Nina Feddermann-Demont,^{18,19} Christopher C Giza,^{20,21} Kevin M Guskiewicz,²² Stanley Herring,²³ Grant L Iverson,²⁴ Karen M Johnston,²⁵ James Kissick,²⁶ Jeffrey Kutcher,²⁷ John J Leddy,²⁸ David Maddocks,²⁹ Michael Makdissi,^{30,31} Geoff Manley,³² Michael McCrea,³³ William P Meehan,^{34,35} Sinji Nagahiro,³⁶ Jon Patricios,^{37,38} Margot Putukian,³⁹ Kathryn J Schneider,⁴⁰ Allen Sills,^{41,42} Charles H Tator,^{43,44} Michael Turner,⁴⁵ Pieter E Vos⁴⁶

“There is currently insufficient evidence that prescribing complete rest achieves these objectives. After a brief period of rest during the acute phase (24-48 hours) after injury, patients can be encouraged to become gradually and progressively more active while staying below their cognitive and physical symptom-exacerbation thresholds (ie, activity level should not bring on or worsen their symptoms). It is reasonable for athletes to avoid vigorous exertion while they are recovering. The exact amount and duration of rest is not yet well defined in the literature and requires further study.”

5-Step Return to Play Progression

Baseline: Back to School First

Athlete is back to their regular school activities, is no longer experiencing symptoms from the injury when doing normal activities, and has the green-light from their health care provider to begin the return to play process.



**NM State Law
Must not return
to full activity
prior to a
minimum of 240
hours (10 days)**

Step 1: Light aerobic activity

Begin with light aerobic exercise only to increase an athlete's heart rate. This means about 5 to 10 minutes on an exercise bike, walking, or light jogging. No weight lifting at this point.



Step 2: Moderate activity

Continue with activities to increase an athlete's heart rate with body or head movement. This includes moderate jogging, brief running, moderate-intensity stationary biking, moderate-intensity weightlifting (less time and/or less weight from their typical routine).



Step 3: Heavy, non-contact activity

Add heavy non-contact physical activity, such as sprinting/running, high-intensity stationary biking, regular weightlifting routine, non-contact sport-specific drills (in 3 planes of movement).



Step 4: Practice & full contact

Young athlete may return to practice and full contact (if appropriate for the sport) in controlled practice.



Step 5: Competition

Young athlete may return to competition.

- Monitor for concussion symptoms after each day's return to play progression activity.
- One should only move to the next step if they do not have any new symptoms at the current step.
- If symptoms come back or if new symptoms present, (a sign that the athlete is pushing too hard), then one should stop these activities and the medical provider should be contacted.
- After more rest and no concussion symptoms, the athlete can start at the previous step.

**Link to HEADS Up Video:
Returning to Sports**

- Monitor for concussion symptoms after each day's return to play progression activity.
- One should only move to the next step if they do not have any new symptoms at the current step.
- If symptoms come back or if new symptoms present, (a sign that the athlete is pushing too hard), then one should stop these activities and the medical provider should be contacted.
- After more rest and no concussion symptoms, the athlete can start at the previous step.



NM State Law Must not return to full activity prior to a minimum of 240 hours (10 days)

Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016

Paul McCrory,¹ Willem Meeuwisse,² Jiří Dvorak,^{3,4} Mark Aubry,⁵ Julian Bailes,⁶ Steven Broglio,⁷ Robert C Cantu,⁸ David Cassidy,⁹ Ruben J Echemendia,^{10,11} Rudy J Castellani,¹² Gavin A Davis,^{13,14} Richard Ellenbogen,¹⁵ Carolyn Emery,¹⁶ Lars Engebretsen,¹⁷ Nina Feddermann-Demont,^{18,19} Christopher C Giza,^{20,21} Kevin M Guskiewicz,²² Stanley Herring,²³ Grant L Iverson,²⁴ Karen M Johnston,²⁵ James Kissick,²⁶ Jeffrey Kutcher,²⁷ John J Leddy,²⁸ David Maddocks,²⁹ Michael Makdissi,^{30,31} Geoff Manley,³² Michael McCrea,³³ William P Meehan,^{34,35} Sinji Nagahiro,³⁶ Jon Patricios,^{37,38} Margot Putukian,³⁹ Kathryn J Schneider,⁴⁰ Allen Sills,^{41,42} Charles H Tator,^{43,44} Michael Turner,⁴⁵ Pieter E Vos⁴⁶

Consensus statement

Table 1 Graduated return-to-sport (RTS) strategy

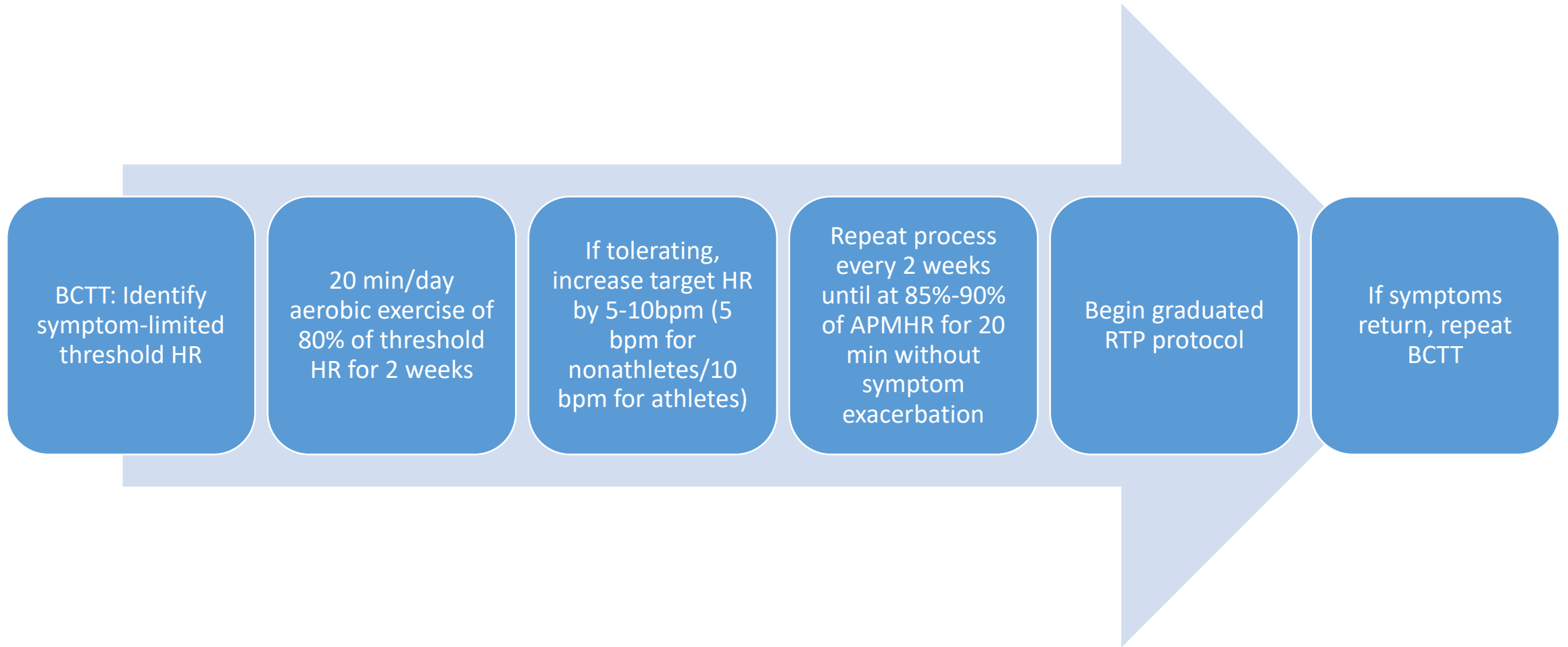
Stage	Aim	Activity	Goal of each step
1	Symptom-limited activity	Daily activities that do not provoke symptoms	Gradual reintroduction of work/school activities
2	Light aerobic exercise	Walking or stationary cycling at slow to medium pace. No resistance training	Increase heart rate
3	Sport-specific exercise	Running or skating drills. No head impact activities	Add movement
4	Non-contact training drills	Harder training drills, eg, passing drills. May start progressive resistance training	Exercise, coordination and increased thinking
5	Full contact practice	Following medical clearance, participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6	Return to sport	Normal game play	

NOTE: An initial period of 24–48 hours of both relative physical rest and cognitive rest is recommended before beginning the RTS progression.

There should be at least 24 hours (or longer) for each step of the progression. If any symptoms worsen during exercise, the athlete should go back to the previous step. Resistance training should be added only in the later stages (stage 3 or 4 at the earliest). If symptoms are persistent (eg, more than 10–14 days in adults or more than 1 month in children), the athlete should be referred to a healthcare professional who is an expert in the management of concussion.

Buffalo Concussion Treadmill Test

- Graded aerobic exercise treatment protocol to help speed recovery and return to activity.



Patient Name: _____
 DOB: _____ Age: _____
 Date: _____ ID/MR# _____

A. Injury Characteristics Date/Time of Injury _____ Reporter: Patient Parent Spouse Other _____

1. Injury Description _____

1a. Is there evidence of a forcible blow to the head (direct or indirect)? Yes No Unknown
 1b. Is there evidence of intracranial injury or skull fracture? Yes No Unknown
 1c. Location of Impact: Frontal Lt Temporal Rt Temporal Lt Parietal Rt Parietal Occipital Neck Indirect Force
 2. Cause: MVC Pedestrian-MVC Fall Assault Sports (specify) _____ Other _____
 3. **Amnesia Before (Retrograde)** Are there any events just BEFORE the injury that you/ person has no memory of (even brief)? Yes No Duration _____
 4. **Amnesia After (Anterograde)** Are there any events just AFTER the injury that you/ person has no memory of (even brief)? Yes No Duration _____
 5. **Loss of Consciousness:** Did you/ person lose consciousness? Yes No Duration _____
 6. **EARLY SIGNS:** Appears dazed or stunned Is confused about events Answers questions slowly Repeats Questions Forgetful (recent info)
 7. **Seizures:** Were seizures observed? No Yes Detail _____

B. Symptom Check List* Since the injury, has the person experienced any of these symptoms any more than usual today or in the past day?
 Indicate presence of each symptom (0=No, 1=Yes). *Lovell & Collins, 1998 JHTR

PHYSICAL (10)			COGNITIVE (4)			SLEEP (4)			
Headache	0	1	Feeling mentally foggy	0	1	Drowsiness	0	1	
Nausea	0	1	Feeling slowed down	0	1	Sleeping less than usual	0	1 N/A	
Vomiting	0	1	Difficulty concentrating	0	1	Sleeping more than usual	0	1 N/A	
Balance problems	0	1	Difficulty remembering	0	1	Trouble falling asleep	0	1 N/A	
Dizziness	0	1	COGNITIVE Total (0-4) _____		SLEEP Total (0-4) _____				
Visual problems	0	1	EMOTIONAL (4)		Exertion: Do these symptoms <u>worsen</u> with: Physical Activity <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Cognitive Activity <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Overall Rating: How <u>different</u> is the person acting compared to his/her usual self? (circle) Normal 0 1 2 3 4 5 6 Very Different				
Fatigue	0	1	Irritability	0					1
Sensitivity to light	0	1	Sadness	0					1
Sensitivity to noise	0	1	More emotional	0					1
Numbness/Tingling	0	1	Nervousness	0					1
PHYSICAL Total (0-10) _____			EMOTIONAL Total (0-4) _____						
(Add Physical, Cognitive, Emotion, Sleep totals) Total Symptom Score (0-22) _____									

C. Risk Factors for Protracted Recovery (check all that apply)

Concussion History? Y ___ N ___			Headache History? Y ___ N ___			Developmental History		Psychiatric History
Previous # 1 2 3 4 5 6+	<input checked="" type="checkbox"/>		Prior treatment for headache	<input checked="" type="checkbox"/>		Learning disabilities	<input checked="" type="checkbox"/>	Anxiety
Longest symptom duration Days ___ Weeks ___ Months ___ Years ___			History of migraine headache ___ Personal ___ Family			Attention-Deficit/ Hyperactivity Disorder		Depression Sleep disorder
If multiple concussions, less force caused reinjury? Yes ___ No ___						Other developmental disorder		Other psychiatric disorder

List other comorbid medical disorders or medication usage (e.g., hypothyroid, seizures) _____

D. RED FLAGS for acute emergency management: Refer to the emergency department with sudden onset of any of the following:

* Headaches that worsen	* Looks very drowsy/ can't be awakened	* Can't recognize people or places	* Neck pain
* Seizures	* Repeated vomiting	* Increasing confusion or irritability	* Unusual behavioral change
* Focal neurologic signs	* Slurred speech	* Weakness or numbness in arms/legs	* Change in state of consciousness

E. Diagnosis (ICD): Concussion w/o LOC 850.0 Concussion w/ LOC 850.1 Concussion (Unspecified) 850.9 Other (854) _____
 No diagnosis

F. Follow-Up Action Plan Complete **ACE Care Plan** and provide copy to patient/family.
 No Follow-Up Needed _____
 Physician/Clinician Office Monitoring: Date of next follow-up _____
 Referral: _____
 Neuropsychological Testing
 Physician: Neurosurgery _____ Neurology _____ Sports Medicine _____ Physiatrist _____ Psychiatrist _____ Other _____
 Emergency Department

A concussion (or mild traumatic brain injury (MTBI)) is a complex pathophysiological process affecting the brain, induced by traumatic mechanical forces secondary to direct or indirect forces to the head. Disturbance of brain function is related to neurometabolic dysfunction, rather than structural injury, and is typically associated with normal structural neuroimaging findings (i.e., CT scan, MRI). Concussion may or may not involve a loss of consciousness (LOC). Concussion results in a constellation of physical, cognitive, emotional, and sleep-related symptoms. Symptoms may last from several minutes to days, weeks, months or even longer in some cases.

ACE Instructions

The ACE is intended to provide an evidence-based clinical protocol to conduct an initial evaluation and diagnosis of patients (both children and adults) with known or suspected MTBI. The research evidence documenting the importance of these components in the evaluation of an MTBI is provided in the reference list.

A. Injury Characteristics:

1. Obtain **description of the injury** – how injury occurred, type of force, location on the head or body (if force transmitted to head). Different biomechanics of injury may result in differential symptom patterns (e.g., occipital blow may result in visual changes, balance difficulties).
2. Indicate the **cause of injury**. Greater forces associated with the trauma are likely to result in more severe presentation of symptoms.
- 3/4. **Amnesia:** Amnesia is defined as the failure to form new memories. Determine whether amnesia has occurred and attempt to determine length of time of memory dysfunction – **before** (retrograde) and **after** (anterograde) injury. Even seconds to minutes of memory loss can be predictive of outcome. Recent research has indicated that amnesia may be up to 4-10 times more predictive of symptoms and cognitive deficits following concussion than is LOC (less than 1 minute).¹
5. **Loss of consciousness (LOC)** – If occurs, determine length of LOC.
6. **Early signs.** If present, ask the individuals who know the patient (parent, spouse, friend, etc) about specific signs of the concussion that may have been observed. These signs are typically observed early after the injury.
7. Inquire whether **seizures** were observed or not.

B. Symptom Checklist:²

1. Ask patient (and/or parent, if child) to report presence of the four categories of symptoms since injury. It is important to assess all listed symptoms as different parts of the brain control different functions. One or all symptoms may be present depending upon mechanisms of injury.³ Record "1" for Yes or "0" for No for their presence or absence, respectively.
2. For all symptoms, indicate presence of symptoms as experienced within the past 24 hours. Since symptoms can be present premorbidly/at baseline (e.g., inattention, headaches, sleep, sadness), it is important to assess **change** from their usual presentation.
3. **Scoring:** Sum total **number** of symptoms present per area, and sum all four areas into Total Symptom Score (score range 0-22). (Note: most sleep symptoms are only applicable after a night has passed since the injury. Drowsiness may be present on the day of injury.) If symptoms are new and present, there is no lower limit symptom score. Any **score > 0** indicates **positive symptom** history.
4. **Exertion:** Inquire whether any symptoms worsen with physical (e.g., running, climbing stairs, bike riding) and/or cognitive (e.g., academic studies, multi-tasking at work, reading or other tasks requiring focused concentration) exertion. Clinicians should be aware that symptoms will typically worsen or re-emerge with exertion, indicating incomplete recovery. Over-exertion may protract recovery.
5. **Overall Rating:** Determine how different the person is acting from their usual self. Circle "0" (Normal) to "6" (Very Different).

C. Risk Factors for Protracted Recovery: Assess the following risk factors as possible complicating factors in the recovery process.

1. **Concussion history:** Assess the number and date(s) of prior concussions, the duration of symptoms for each injury, and whether less biomechanical force resulted in re-injury. Research indicates that cognitive and symptom effects of concussion may be cumulative, especially if there is minimal duration of time between injuries and less biomechanical force results in subsequent concussion (which may indicate incomplete recovery from initial trauma).^{4,8}
2. **Headache history:** Assess personal and/or family history of diagnosis/treatment for headaches. Research indicates headache (migraine in particular) can result in protracted recovery from concussion.^{9,11}
3. **Developmental history:** Assess history of learning disabilities, Attention-Deficit/Hyperactivity Disorder or other developmental disorders. Research indicates that there is the possibility of a longer period of recovery with these conditions.¹²
4. **Psychiatric history:** Assess for history of depression/mood disorder, anxiety, and/or sleep disorder.¹³⁻¹⁶

D. Red Flags: The patient should be carefully observed over the first 24-48 hours for these serious signs. Red flags are to be assessed as possible signs of deteriorating neurological functioning. Any positive report should prompt strong consideration of referral for emergency medical evaluation (e.g. CT Scan to rule out intracranial bleed or other structural pathology).¹⁷

E. Diagnosis: The following ICD diagnostic codes may be applicable.

- 850.0 (Concussion, with no loss of consciousness)** – Positive injury description with evidence of forcible direct/ indirect blow to the head (A1a); plus evidence of active symptoms (B) of any type and number related to the trauma (Total Symptom Score >0); no evidence of LOC (A5), skull fracture or intracranial injury (A1b).
- 850.1 (Concussion, with brief loss of consciousness < 1 hour)** – Positive injury description with evidence of forcible direct/ indirect blow to the head (A1a); plus evidence of active symptoms (B) of any type and number related to the trauma (Total Symptom Score >0); positive evidence of LOC (A5), skull fracture or intracranial injury (A1b).
- 850.9 (Concussion, unspecified)** – Positive injury description with evidence of forcible direct/ indirect blow to the head (A1a); plus evidence of active symptoms (B) of any type and number related to the trauma (Total Symptom Score >0); unclear/unknown injury details; unclear evidence of LOC (A5), skull fracture or intracranial injury.

Other Diagnoses – If the patient presents with a positive injury description and associated symptoms, but additional evidence of intracranial injury (A1b) such as from neuroimaging, a moderate TBI and the diagnostic category of 854 (Intracranial injury) should be considered.

F. Follow-Up Action Plan: Develop a follow-up plan of action for symptomatic patients. The physician/clinician may decide to (1) monitor the patient in the office or (2) refer them to a specialist. Serial evaluation of the concussion is critical as symptoms may resolve, worsen, or ebb and flow depending upon many factors (e.g., cognitive/physical exertion, comorbidities). Referral to a specialist can be particularly valuable to help manage certain aspects of the patient's condition. (Physician/Clinician should also complete the ACE Care Plan included in this tool kit.)

1. **Physician/Clinician serial monitoring** – Particularly appropriate if number and severity of symptoms are steadily decreasing over time and/or fully resolve within 3-5 days. If steady reduction is not evident, referral to a specialist is warranted.
2. **Referral to a specialist** – Appropriate if symptom reduction is not evident in 3-5 days, or sooner if symptom profile is concerning in type/severity.
 - **Neuropsychological Testing** can provide valuable information to help assess a patient's brain function and impairment and assist with treatment planning, such as return to play decisions.
 - **Physician Evaluation** is particularly relevant for medical evaluation and management of concussion. It is also critical for evaluating and managing focal neurologic, sensory, vestibular, and motor concerns. It may be useful for medication management (e.g., headaches, sleep disturbance, depression) if post-concussive problems persist.

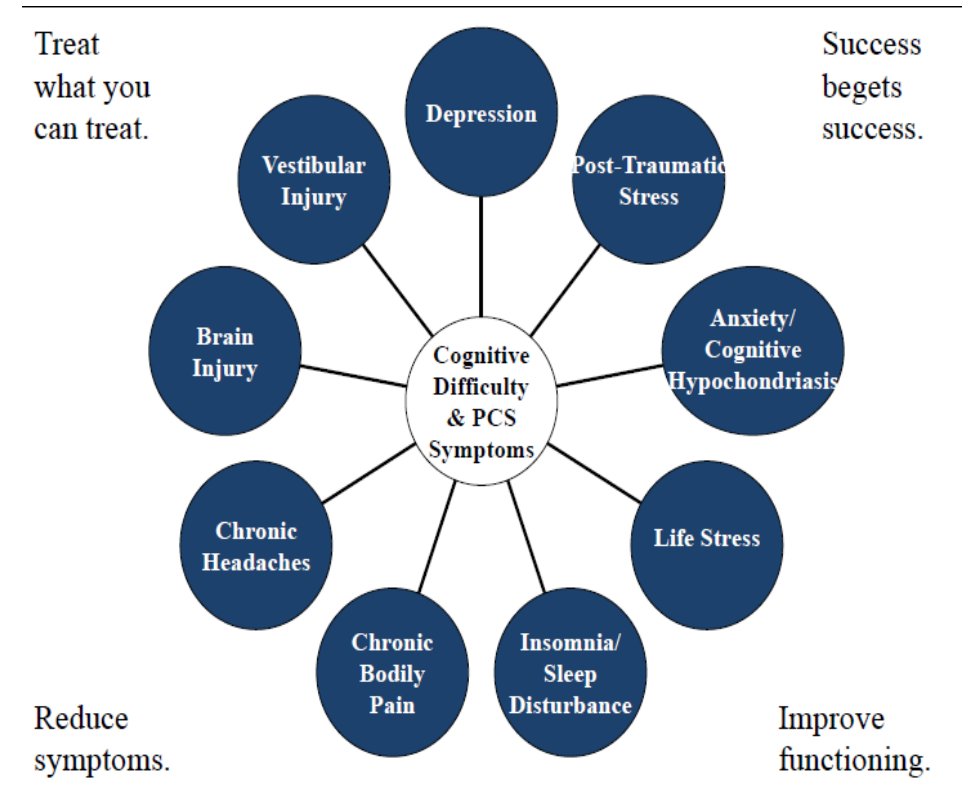
Concussion Management Guidance for Healthcare Professionals

- **Acute headache treatment**

- Acetaminophen for first 24 hours
- After 24 hours Acetaminophen or NSAIDS
- For intractable HA that worsens, take to Emergency Department

Concussion Management Guidance for Healthcare Professionals: Persistent Post-Concussive Symptoms and Problems

- Focused, evidence-based treatments for persistent post-concussive symptoms/problems (ie >10-14 days in adults; > 4 weeks in children)
 - Persistent Headaches
 - Assess for need for neurology consult, physical therapy, or behavior medicine, ophthalmology or alternative medicine treatment
 - Balance/proprioception or cervical-cranial dysfunction (e.g., whiplash) problems
 - Physical Therapy/Vestibular Rehabilitation
 - Graded active rehabilitation/exercise (e.g., aerobic exercise, coordination exercises, visualization/positive imagery) is safe, feasible and reduction in post-concussive symptoms (Gagnon et al. 2016)
 - Psychological Treatment



Adapted from G. Iverson. INS2016

Requires a Biopsychosocial Perspective

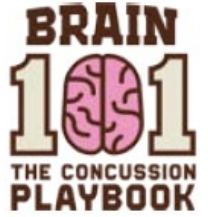
Concussion Management Guidance for Healthcare Professionals: Risk Factors for Persistent Post-Concussive Symptoms

A range of factors may influence evaluation, management of concussion, and predict potential for prolonged or persistent symptoms for the healthcare professional to consider

Factors	Modifier
Symptoms	Number; Duration (>10 days); Severity
Signs	Prolonged loss of consciousness (LOC) (> 1 min); Amnesia
Sequelae	Concussive convulsions
Temporal	Frequency-repeated concussions over time; Timing-injuries close together in time; 'Recency'-recent concussion or TBI
Threshold	Repeated concussions occurring with progressively less impact force or slower recovery after each successive concussion
Age	Child and adolescent (<18 years old)
Comorbidities	Migraine, depression or other mental health disorders, attention deficit hyperactivity disorder (ADHD), learning disabilities (LD), sleep disorders
Medication	Psychoactive drugs, anticoagulants
Behavior	Dangerous style of play
Sport	High-risk activity, contact and collision sport, high sporting level

Concussion Management Guidance for School Professionals

- Online Concussion Training Programs:
 - CDC Concussion Training for Schools provides fact sheets and resources for school nurses, teachers, counselors, etc. to assist return to school/learning.
 - Brain 101: The concussion Playbook is a web-based, school-wide mTBI training/management program that incorporates skills training, guidelines on creating a concussion management team, and strategies for supporting students in the classroom.
 - Glang et al. (2105) showed that student athletes and parents at *Brain 101* schools had better sports concussion knowledge, knowledge application, and behavioral intention to implement effective concussion management practices compared to control schools
 - Students who had concussions in *Brain 101* schools also received more individualized/customized academic accommodations than students in control schools.



[Link to Brain 101: The Concussion Playbook](http://brain101.orcasinc.com/)
<http://brain101.orcasinc.com/>



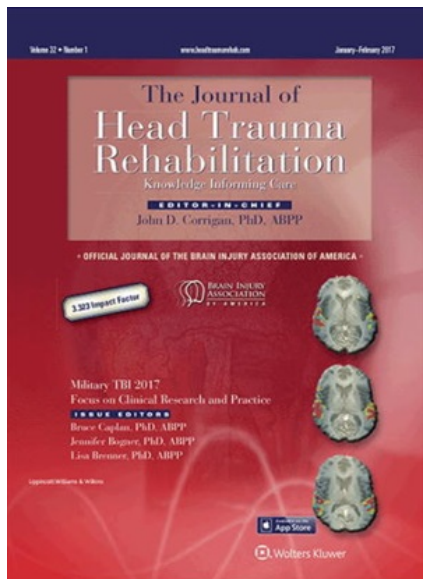
[Link to CDC concussion Training for schools](#)

Concussion Management Guidance for School Professionals



Medical-School Partnerships in Guiding Return to School Following Mild Traumatic Brain Injury in Youth (Gioia, 2016)

Best practice recommends that all youth sports organizations build a protocol and assemble a concussion management team in advance to effectively deal with concussion when it happens.



Building Statewide Infrastructure for the Academic Support of Students With Mild Traumatic Brain Injury (Gioia et al., 2015)

School system-wide concussion management policies/plans should require that all school personnel understand:

- the academic effects of mTBI,
- the gradual process needed to assist students' return to school life (learning, social activity, PE, etc), and
- guidelines for when students can safely return to full physical and cognitive activities.

Return to Academics Protocol After Concussion/mild TBI

Step 1. Rest.

- No mental exertion (computer, texting, video games, or homework), stay at home, no driving.

Step 2. Light mental activity

- Up to 30 minutes of mental exertion, but no prolonged concentration, stay at home, no driving.
- Progress to next level when able to handle up to 30 minutes of mental exertion without worsening of symptoms.

Step 3. Part-time school

- Maximum accommodations (shortened day/schedule, built-in breaks, provide quiet place for mental rest, no significant classroom or standardized testing, modify rather than postpone academics, provide extra time, extra help, and modified assignments).
- Progress to next level when able to handle 30–40 minutes of mental exertion without worsening of symptoms.

Step 4. Part-time school

- Moderate accommodations (no standardized testing, modified classroom testing, moderate decrease of extra time, help, and modification of assignments).
- Progress to next level when able to handle 60 minutes of mental exertion without worsening of symptoms.

Step 5. Full-time school

- Minimal accommodations (no standardized testing, but routine testing ok; continued decrease of extra time, help, and modification of assignments; may require more supports in academically challenging subjects).
- Progress to next level when able to handle all class periods in succession without worsening of symptoms AND medical clearance for full return to academics.

Step 6. Full time school

- Full academics with no accommodations (attends all classes, full homework).

ACE Post Concussion Gradual Return to School

Stage	Description	Activity Level	Criteria to Move to Next Stage	Date Criteria Met
0	No return, at home	Day 1 - Maintain low level cognitive and physical activity. No prolonged concentration. Cognitive Readiness Challenge: As symptoms improve, try reading or math challenge task for 10-30 minutes; assess for symptom increase.	To Move To Stage 1: (1) Student can sustain concentration for 30 minutes before significant symptom exacerbation, AND (2) Symptoms reduce or disappear with cognitive rest breaks* allowing return to activity.	
1	Return to School, Partial Day (1-3 hours)	Attend 1-3 classes, intersperse rest breaks. No tests or homework. Minimal expectations for productivity.	To Move To Stage 2: Symptom status improving, tolerates 4-5 hours of activity; 2-3 cognitive rest breaks built into school day.	
2	Full Day, Maximal Supports (required throughout day)	Attend most classes, with 2-3 rest breaks (20-30'), no tests. Minimal HW ($\leq 60'$). Minimal-moderate expectations for productivity.	To Move To Stage 3: Symptom number & severity improving, needs 1-2 cognitive rest breaks built into school day.	
3	Return to Full Day, Moderate Supports (provided in response to symptoms during day)	Attend all classes with 1-2 rest breaks (20-30'); begin quizzes. Moderate HW (60-90') Moderate expectations for productivity. Design schedule for make-up work.	To Move To Stage 4: Continued symptom improvement, needs no more than 1 cognitive rest break per day	
4	Return to Full Day, Minimal Supports (Monitor final recovery)	Attend all classes with 0-1 rest breaks (20-30'); begin modified tests (breaks, extra time). HW (90+')	To Move To Stage 5: No active symptoms, no exertional effects across the full school day.	
5	Full Return, No Supports Needed	Full class schedule, no rest breaks. Max. expectations for productivity. Begin to address make-up work.	N/A	

Link to
HEADS UP
Video:
Returning to
School

*Cognitive rest break: a period during which the student refrains from academic or other cognitively demanding activities, including schoolwork, reading, TV/games, conversation. May involve a short nap or relaxation with eyes closed in a quiet setting.

Consensus statement

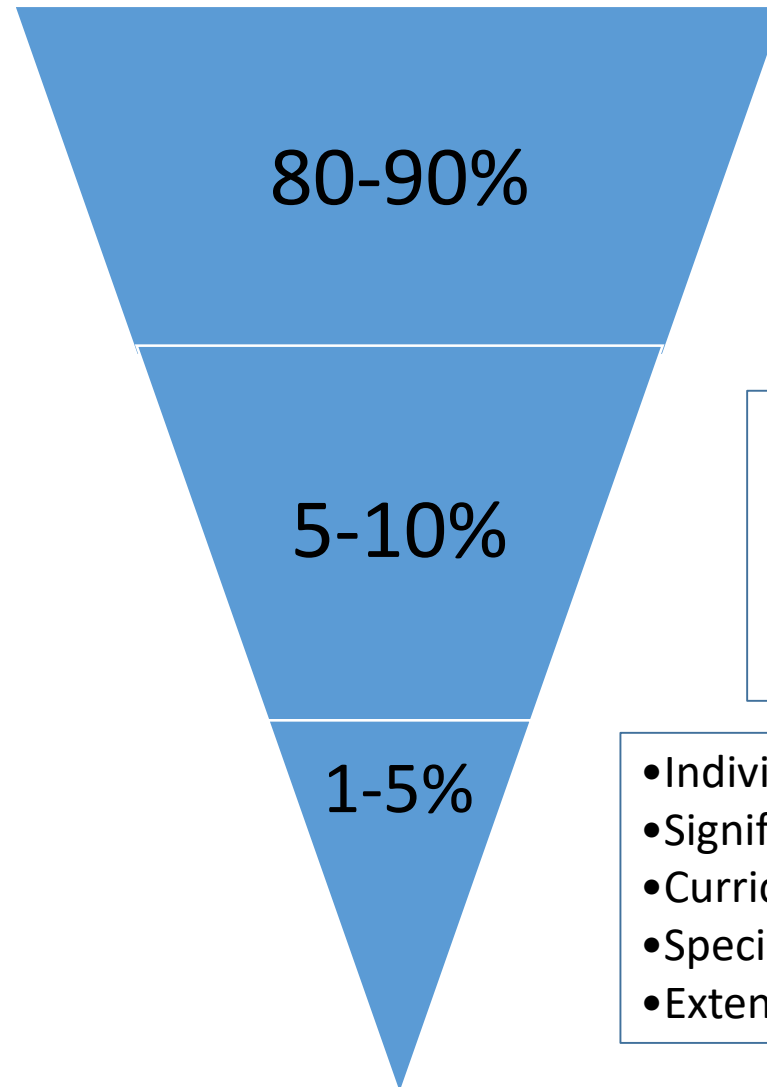
Table 2 Graduated return-to-school strategy

Stage	Aim	Activity	Goal of each step
1	Daily activities at home that do not give the child symptoms	Typical activities of the child during the day as long as they do not increase symptoms (eg, reading, texting, screen time). Start with 5–15 min at a time and gradually build up	Gradual return to typical activities
2	School activities	Homework, reading or other cognitive activities outside of the classroom	Increase tolerance to cognitive work
3	Return to school part-time	Gradual introduction of schoolwork. May need to start with a partial school day or with increased breaks during the day	Increase academic activities
4	Return to school full time	Gradually progress school activities until a full day can be tolerated	Return to full academic activities and catch up on missed work

Returning to School

A school-wide academic accommodation protocol for students with concussions or brain injuries can be effectively implemented in most schools using the following progression.

- Most students who sustain a concussion return to pre-injury functioning within 3–4 weeks of their injury.
- Symptoms may linger beyond this time in approximately 10–20% of concussions. When this happens, the school team must continue academic adjustments and physical restrictions for a longer time.
- Symptoms might continue for weeks or even months.
- It is best practice for a school district to have a system in place by which a student can be evaluated for appropriate services (e.g., Section 504 plan, Special Education/Individualized Education Plan).



- Multi-Disciplinary Teams
- Common Classroom Adjustments
- Slight Environmental Modifications
- Recover Quickly

- Targeted Group Interventions
- Formalized Intervention Plans (504 Plan)
- Academic Accommodations
- Environmental Modifications
- Recover Within 3-4 Weeks

- Individual Student Interventions
- Significant Environmental Modifications
- Curricular Modifications
- Special Education/IDEA
- Extended Recovery Time

Academic Effects and Accommodations for Youth with Concussion

Persistent Symptom	Effect of attending school	Accommodation
Headache	Difficulty concentrating	Frequent breaks, quiet area, hydration
Fatigue	Decreased attention, concentration	Frequent breaks, shortened day, only certain classes
Photophobia/phonophobia	Worsening symptoms (headache)	Sunglasses, ear plugs or headphones, avoid noisy areas (cafeterias, assemblies, sport events, music class), limit computer work
Anxiety	Decreased attention or concentration, overexertion to avoid falling behind	Reassurance and support from teachers about accommodations, reduced workload
Difficulty concentrating	Limited focus on school work	Shorter assignments, decreased workload, frequent breaks, having someone read aloud, more time to complete assignments and tests, quiet area to complete work
Difficulty remembering	Difficulty retaining new information, remembering instructions, accessing learned information	Written instructions, smaller amounts to learn, repetition

Return to School Information and Strategies

Possible General Support

- Re-integration into school occurs gradually (e.g., student returns part-time before building up to a full schedule)
- Student not asked to do all missed work, and extra help given to get student caught back up
- Extra check-in meetings provided with teacher
- Rest time or breaks provided during the day
- Overall homework and class work load reduced
- Cognitively demanding in-school tasks reduced (e.g., no more than one test each day)

Possible Specific Classroom-based Supports

- Tests put off until recovery complete
- Extra time given to complete tests
- Flexibility allowed for assignment due dates
- Preferential seating provided to allow for closer teacher monitoring and decreased distractions
- Access to a model peer's or teacher's notes allowed

Links to:

- Return to school Information and strategies
- CBIRT Accommodations and Modifications in the Classroom for student with TBI (http://media.cbirt.org/uploads/files/classroomaccommodations_ocamp.pdf)
- CBIRT Academic Accommodations Matrix (http://media.cbirt.org/uploads/files/academic_accommodations_matrix.pdf)

**Consensus statement on concussion in sport
--the 5th international conference on
concussion in sport held in Berlin, October
2016**

Consensus statement on concussion in sport—the 5th
international conference on concussion in sport held
in Berlin, October 2016

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“Schools are encouraged to have an SRC policy that includes education on SRC prevention and management for teachers, staff, students and parents, and should offer appropriate academic accommodation and support to students recovery from SRC. Student should have regular medical follow-up after an SRC to monitor recovery and help with return to school, and students may require temporary absence from school after injury.

Children and adolescents should not return to sport until they have successfully returned to school. However, early introduction of symptom-limited physical activity is appropriate.”

Creating a Concussion Management Plan

A Concussion Management Plan/Protocol should ensure the following:

Designated individuals mobilize the plan immediately when concussion is suspected; establish and maintain channels of communication with appropriate stakeholders; and see the plan through until the athlete is safely returned to activity.

Appropriate emergency healthcare professionals are designated and available.

Parents/guardians are notified and given information at the time of suspected concussion and throughout the return-to academics and return-to-play processes.

Healthcare professionals, parents, coaches, referees, and other stakeholders work together on a return-to-activity plan that includes symptom monitoring and lines of clear, ongoing communication.

Academic Professionals (School Concussion Management Team)

- Athletic Team (Coaches, Athletic Trainers)
- Academic Team (Teachers, Counselors, School Social workers, Speech pathologists, School Psychologists)
- Administrators (Principals/Assistant Principals/Athletic Directors)
- School Medical Team (Team Physicians, School Nurses, Physical therapists,
- School-based healthcare professionals)

School Concussion Management Policy/Creating a Concussion Management Plan

- Links to:
- cbirt Sample School District Policy
- APS concussion policy

Link to sample school district policy at <http://cbirt.org/ocamp/resources>).

Brain Injury Safety Tips and Prevention

- There are many ways to help reduce the risk of a concussion or other serious brain injury both on and off the sports field.
 - Use age appropriate protective equipment
 - Ensure safe physical environment (e.g., adequate lighting, padding goal posts)
 - Educate athletes, parents, and coaches about good sportsmanship practices
 - Enforce game rules
 - Encourage athletes to report (i.e., not hide) injuries
 - Train people in first aid and how to manage suspected concussions
 - Strengthen rules for return to play
 - Strengthen public health infrastructure to properly assess burden and determine injury related risk factors

Adapted from: Haddon, W. Advances in the epidemiology of injuries as a basis for public health. Pub Health Rep 95:411-421, 1980.

Brain Injury Safety Tips and Prevention

- Sufficient evidence to support mandatory helmet use in skiing/snowboarding to reduce of overall head injury.
- Evidence for mouthguard use to prevent concussion is mixed
- Strong evidence that disallowing body checking under age 13 is protective in reducing risk of concussion
- Vision training may reduce concussion in collegiate football players
- Limiting contact in youth football practices may reduce frequency of head contact, but not necessarily reduce concussion

Resources

- Heads Up App (<https://www.cdc.gov/headsup/resources/app.html>)
- CDC Customizable materials (<https://www.cdc.gov/headsup/resources/custom.html>)
- For Parents and Youth
 - HEADS UP Fact Sheets for Parents (<https://www.cdc.gov/headsup/youthsports/parents.html>)
- For healthcare professionals
 - HEADS UP Online Concussion Training for Health Care Providers (<https://www.cdc.gov/headsup/providers/training/index.html>)
 - HEADS UP Tools for Health Care Providers (<https://www.cdc.gov/headsup/providers/tools.html>)
- For school professionals (nurses, teachers, coaches, counselors, administrators)
 - HEADS UP Fact Sheet for Parents (<https://www.cdc.gov/headsup/schools/parents.html>)
 - HEADS UP Fact Sheet for School Professionals (<https://www.cdc.gov/headsup/schools/nurses.html>)
- For coaches
 - Concussion Training (<https://www.cdc.gov/headsup/resources/index.html>)
- HEADS UP Brain Injury Safety Tips and Prevention (https://www.cdc.gov/headsup/basics/concussion_prevention.html)
- ChildSCAT5 Sport Concussion Assessment Tool for Children aged 5-12
- SCAT5 Sport Concussion Assessment Tool for Athletes aged 13+
- CDC Acute Concussion Evaluation Form (ACE)
- Post concussion Symptom Inventory for Children (PCSI; aged 5-7)
- Post Concussion Symptom Inventory for Children (PCSI; aged 8-12)
- Post Concussion Symptom Inventory Self Assessment (PCSI; Ages 13-18)
- Post Concussion Symptom Scale (PCSS)

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- ORCAS Brain 101: The Concussion Playbook (<http://brain101.orcasinc.com/>)
- Rocky Mountain Hospital for Children (<http://rockymountainhospitalforchildren.com/service/concussion-management-reap-guidelines>)
- U. of Oregon The Center on Brain Injury Research & Training (<http://cbirt.org/ocamp/>)
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