2024 Updates to Concussion Management - "Bumps to the Brain”

Maine AAP Fall Webinar Series
October 16, 2024

Michele LaBotz MD CAQSM FAAP FACSM
Associate Professor, Tufts University School of Medicine
Medical Director, University of New England Athletic Training Program

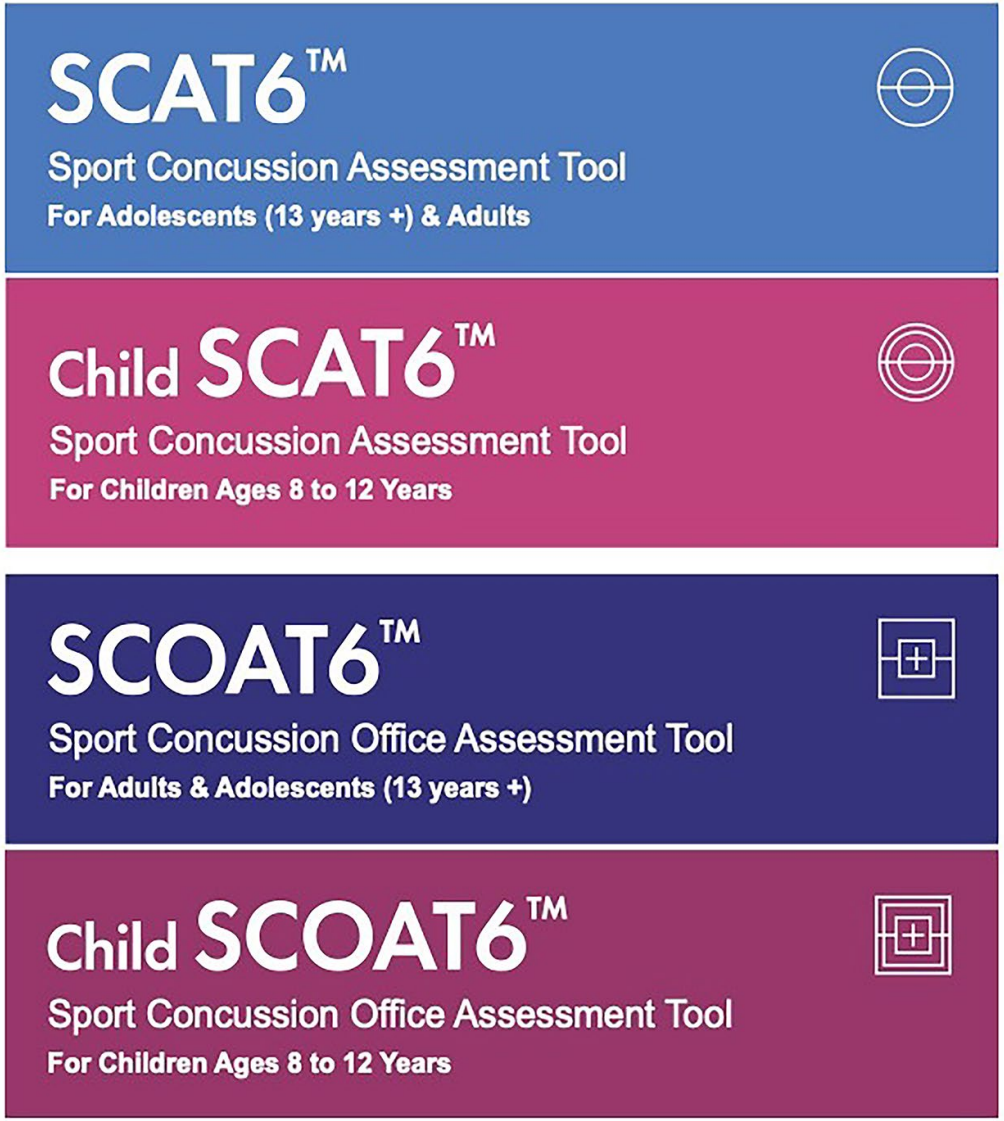
DISCLOSURE

- I have no relevant financial relationship(s) with the manufacturer(s) or any commercial product(s) or provider(s) of any commercial service(s) discussed in this CME activity.

LEARNING OBJECTIVES

- Office evaluation
  - Resources
  - Identify potentially treatable issues
- Return to learn
- Return to sport
- Prevention
- Sequela/retirement

Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport–Amsterdam, October 2022

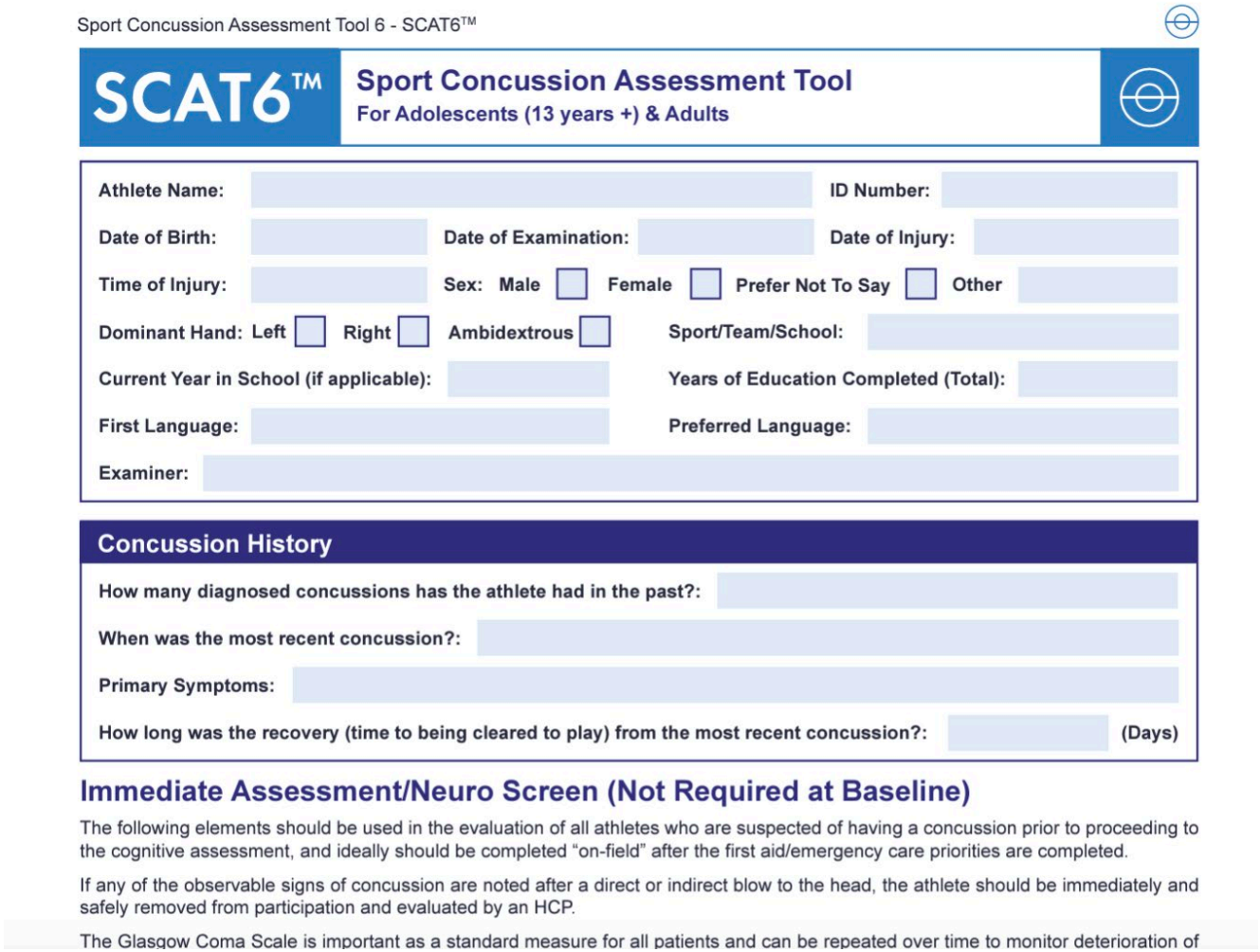


Davis GA, Schneider KJ, Anderson V, et al. Pediatric Sport-Related Concussion: Recommendations From the Amsterdam Consensus Statement 2023. *Pediatrics* January 2024; 153 (1): e2023063489. 10.1542/peds.2023-063489

MMC Pediatrics Grand Rounds: https://knowledgeconnection.mainehealth.org/pediatrics_gr/51/

SPORTS CONCUSSION ASSESSMENT TOOL 6
SCAT-6 *

- Use <72 hours after injury
  - Immediate sxs
  - Symptom score
  - Cognitive eval
    - Orientation/memory/concentration
  - Coordination/balance



Sport Concussion Assessment Tool 6 - SCAT6™

SCAT6™ **Sport Concussion Assessment Tool**
For Adolescents (13 years +) & Adults

Athlete Name: ID Number:
Date of Birth: Date of Examination: Date of Injury:
Time of Injury: Sex: Male ☐ Female ☐ Prefer Not To Say ☐ Other
Dominant Hand: Left ☐ Right ☐ Ambidextrous ☐ Sport/Team/School:
Current Year in School (if applicable): Years of Education Completed (Total):
First Language: Preferred Language:
Examiner:

Concussion History

How many diagnosed concussions has the athlete had in the past?:
When was the most recent concussion?:
Primary Symptoms:
How long was the recovery (time to being cleared to play) from the most recent concussion?: (Days)

Immediate Assessment/Neuro Screen (Not Required at Baseline)

The following elements should be used in the evaluation of all athletes who are suspected of having a concussion prior to proceeding to the cognitive assessment, and ideally should be completed "on-field" after the first aid/emergency care priorities are completed.

If any of the observable signs of concussion are noted after a direct or indirect blow to the head, the athlete should be immediately and safely removed from participation and evaluated by an HCP.

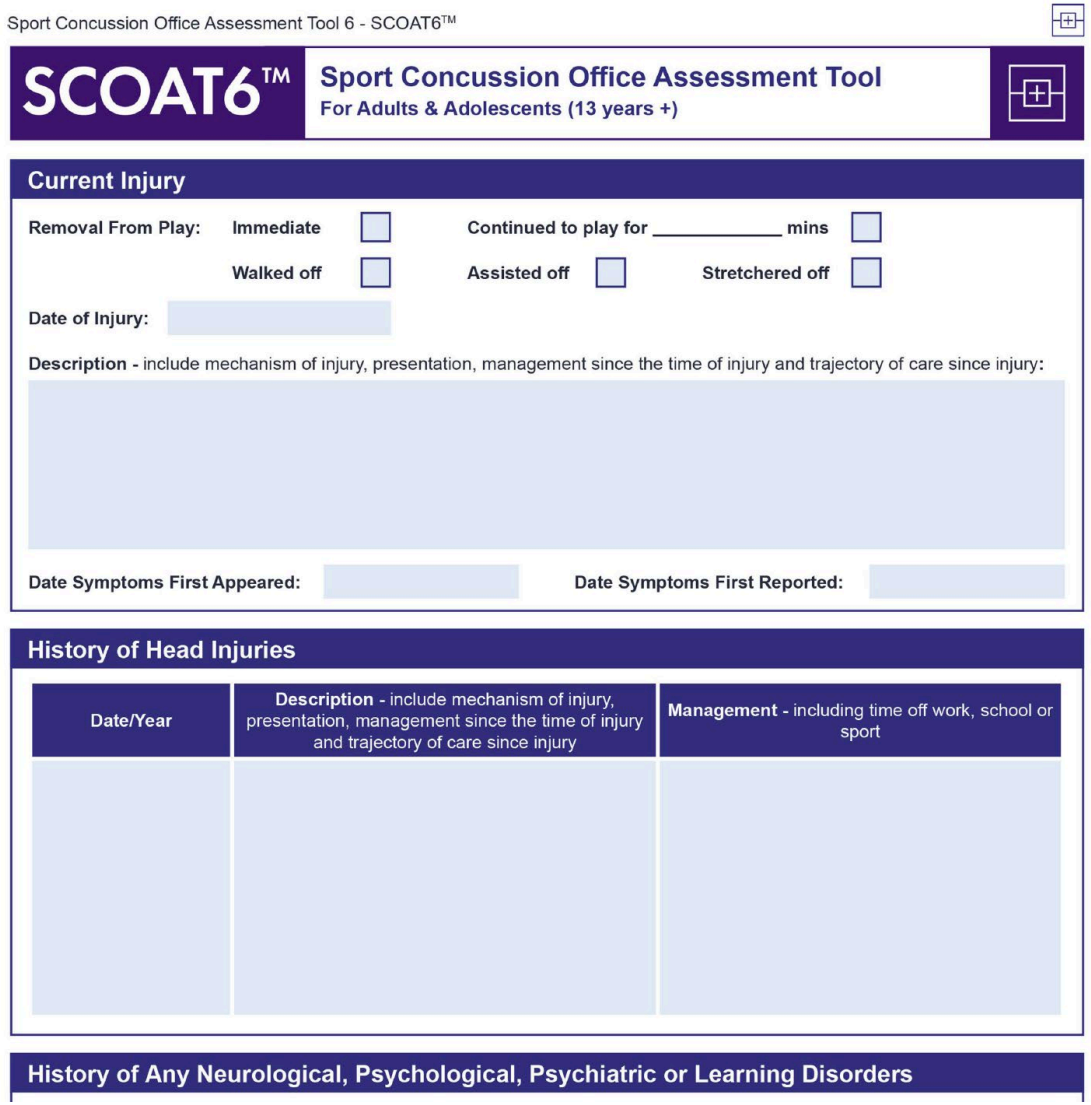
The Glasgow Coma Scale is important as a standard measure for all patients and can be repeated over time to monitor deterioration of

* Separate forms for children 8-12 yo and those 13+ yo

SPORT CONCUSSION OFFICE ASSESSMENT TOOL 6

SCOAT-6

- Office-based assessment >72 hours after injury
  - HPI/medical/family hx
  - Symptom score
  - Cognitive
    - Memory/concentration
  - Orthostatic vital signs
  - Cervical spine
  - Cranial nerves/neuro exam
  - Balance
  - Vestibular/oculomotor
  - Anxiety/depression screen
  - Sleep screen



Sport Concussion Office Assessment Tool 6 - SCOAT6™

SCOAT6™ Sport Concussion Office Assessment Tool
For Adults & Adolescents (13 years +)

Current Injury

Removal From Play: Immediate ☐ Continued to play for _____ mins ☐
Walked off ☐ Assisted off ☐ Stretchered off ☐

Date of Injury:

Description - include mechanism of injury, presentation, management since the time of injury and trajectory of care since injury:

Date Symptoms First Appeared: Date Symptoms First Reported:

History of Head Injuries

Date/Year	**Description** - include mechanism of injury, presentation, management since the time of injury and trajectory of care since injury	**Management** - including time off work, school or sport

History of Any Neurological, Psychological, Psychiatric or Learning Disorders

* Separate forms for children 8-12 yo and those 13+ yo

WHAT DO YOU DO WITH THE RESULTS OF THESE EVALUATIONS?

Symptom Evaluation

Please rate your symptoms below based on how you feel now with **"1"** representing a very mild symptom and **"6"** representing a severe symptom.

0	1	2	3	4	5	6
None	Mild		Moderate		Severe	

Symptom	Date of Assessment				
	Pre-injury	Day injured (date) _____	Consult 1 _____	Consult 2 _____	Consult 3 _____
	Rating	Rating	Rating	Rating	Rating
Headaches					
Pressure in head					
Neck pain					
Nausea or vomiting					
Dizziness					
Blurred vision					
Balance problems					
Sensitivity to light					
Sensitivity to noise					
Feeling slowed down					
Feeling like "in a fog"					
Difficulty concentrating					
Difficulty remembering					
Fatigue or low energy					
Confusion					
Drowsiness					
More emotional					
Irritability					
Sadness					
Nervous or anxious					
Sleep disturbance					
Abnormal heart rate					
Excessive sweating					
Other _____					

Symptom Evaluation (Continued)

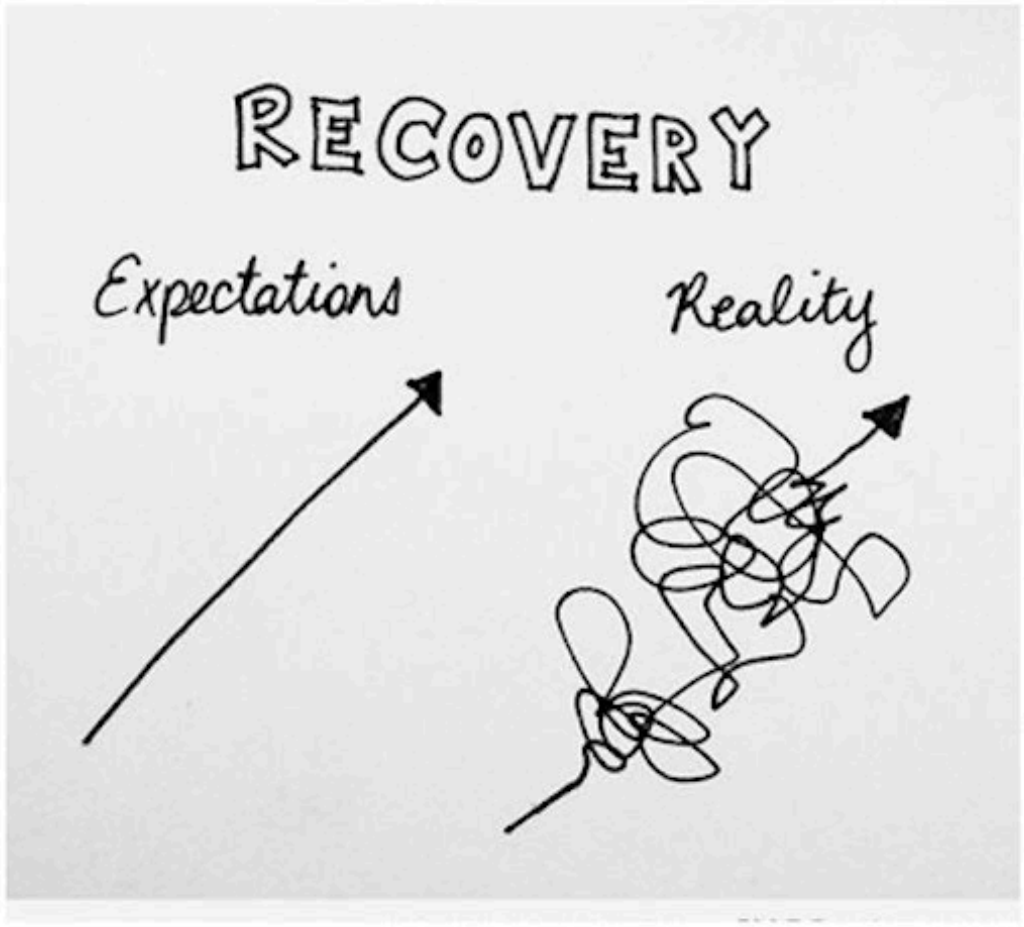
Symptom	Date of Assessment				
	Pre-injury	Day injured (date) _____	Consult 1 _____	Consult 2 _____	Consult 3 _____
	Rating	Rating	Rating	Rating	Rating
Do symptoms worsen with physical activity?					
Do symptoms worsen with cognitive (thinking) activity?					
Symptom number					
Symptom severity score					
What percentage of normal do you feel?					

PROGNOSTICATE

- Higher initial total symptom scores correlate with longer symptom duration
- Following symptom scores with successive evaluations indicates pace of recovery
  - Can be reassuring to patients/families/providers

IDENTIFY TREATMENT OPPORTUNITIES

- Symptoms that persist >10 days may improve more quickly with dedicated treatment



IDENTIFY TREATMENT OPPORTUNITIES

- VOMS
  - Vestibular
  - Oculomotor
- Cervical strain
- Sleep disorder
- Attention
- Depression/somatic

VOMS INDICATORS

- Vestibular symptoms
  - Dizziness/nausea/balance
- Oculomotor symptoms
  - Difficulty reading/tracking

VESTIBULAR

- Treatment
  - Physical therapy
    - Accommodation/compensation is the goal
      - Might feel worse before better
      - Avoid medications

OCULOMOTOR

- Treatment
  - Physical therapy/vision therapy*
  - May benefit from:
    - Magnifier/”reader” glasses
    - Change font size/color on screens
  - Neuro-optometry evaluation

*University of Toronto and Children’s Hospital of Orange County have good home rehab programs on-line

OCULOMOTOR

- Academics are particularly difficult
  - Avoid reading/writing
    - ”Note buddy” or pre-printed notes
  - Auditory learning
  - Oral assessments
    - If otherwise at cognitive baseline

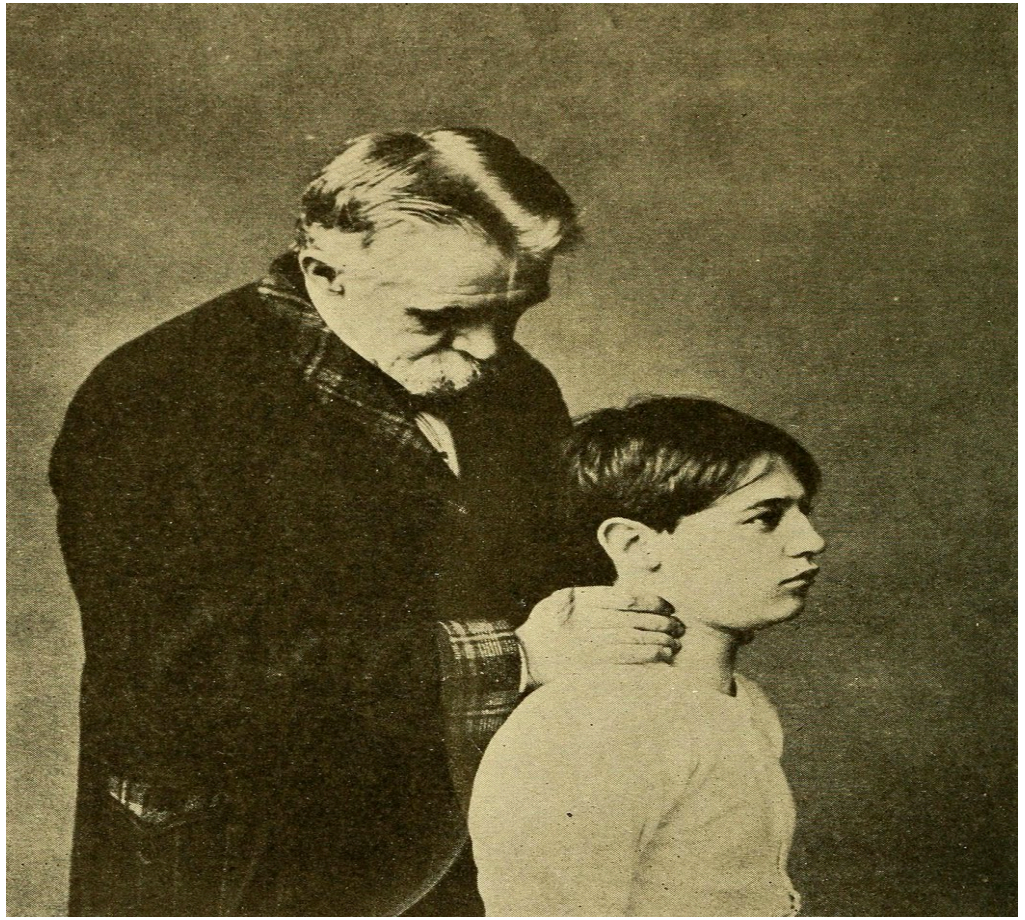
CERVICALGIA

Findings/symptoms

- Neck pain/cervical headaches
- Pain
  - Palpation
  - Neck movement

Treatment

- Manual treatment
  - Physical therapy
  - OMT/chiropractic



SLEEP DISORDER

- Findings/symptoms
  - Difficulty falling/staying asleep
  - Altered circadian rhythm
  - Daytime somnolence
- Treatment
  - Sleep hygiene
  - Physical activity
    - Details coming up
  - Melatonin
  - Amitriptyline

ATTENTION ISSUES

- Findings/symptoms
  - Decreased concentration
    - By history and on examination
  - Distractibility
  - Academic difficulty

Photo courtesy of: www.amenclinics.com

ATTENTION ISSUES

- Treatment
  - Academic accommodations
    - As for ADHD
  - Physical activity
  - Amantadine
    - <40 kg: 5 mg/kg/day orally in 2 divided doses
    - >40 kg: 100 mg bid

DEPRESSION/SOMATIC

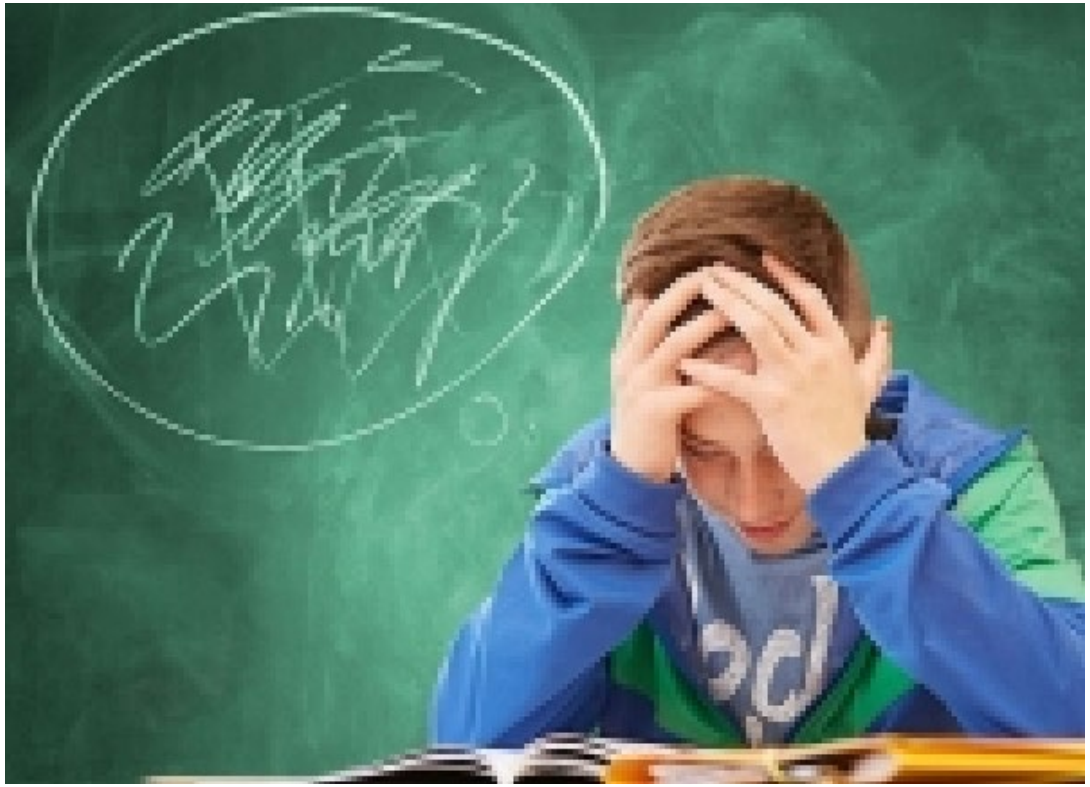
- Treatment
  - Physical activity
  - Social engagement
  - Counseling
  - SSRI/amitriptyline
    - Amitriptyline can also be helpful for headaches
    - Avoid consistent use of OTC analgesics


RETURN TO LEARN

RETURN TO LEARN

- 93% of athletes have returned to full academics with no additional support within 10 days
  - But, these are often patients we don’t even see!

- But for the other 7%….



RETURN TO LEARN

Step	Mental activity	Activity at each step	Goal
1	Daily activities that do not result in more than a mild exacerbation of symptoms related to the current concussion	Typical activities during the day (eg, reading) while minimising screen time. Start with 5–15 min at a time and increase gradually.	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 greater access to rest breaks during the day.	Increase academic activities
4	Return to school full time	Gradually progress in school activities until a full day can be tolerated without more than mild* symptom exacerbation.	Return to full academic activities and catch up on missed work

Patricios JS, Schneider KJ, Dvorak J*, et al*. Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport–Amsterdam, October 2022
British Journal of Sports Medicine 2023;**57**:695-711

RETURN TO LEARN: STEP 1

- “To minimise academic and social disruptions during the RTL strategy, HCPs should avoid recommending complete rest and isolation, even for the initial 24–48 hours, and instead recommend a period of relative rest.”
  - This means:
    - Avoid activity that “significantly” increases symptoms
      - Okay for mild symptom exacerbation
        - No more than 2 points on 10 point scale
    - Avoid activity that significantly increases risk of additional head injury

BUT, EVERYTHING ELSE IS OKAY!!

RETURN TO LEARN: STEP 2

Gradual increase in cognitive load in controlled environment

Reading or homework in quiet setting

- Home, school library, etc.

Mild increase in symptoms during cognitive exertion is typical

Does NOT indicate a setback

RETURN TO LEARN: STEP 3

- Increase activity in school setting
  - Templated school note very helpful for academic accommodations
    - Outlining current symptoms
    - Recommended adaptations to environment and workload
  - CDC note, or embedded in EHR

SCHOOL LETTER

Returning to School After a Concussion

CDC HEADS UP
SAFE BRAIN. STRONGER FUTURE.

DEAR SCHOOL STAFF:

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

_____ was seen for a concussion on _____
Student Name — Date

in _____ office or clinic.
Healthcare Provider's Name

The student is currently reporting the following symptoms:

PHYSICAL

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

THINKING OR REMEMBERING

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

SOCIAL OR EMOTIONAL

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

SLEEP

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

The student also reported these symptoms:

_____

_____

_____

CDC

https://www.cdc.gov/traumatic-brain-injury/media/pdfs/mtbi_returntoschool_factsheet-pin.pdf

RETURNING TO SCHOOL

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

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

☐ Is excused from school for _____ days.

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

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

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

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

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

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

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

For additional questions, you may reach me at: _____

RETURN TO LEARN: STEP 4

- Return to full participation in academic activity
  - Removal of academic accommodations
  - Full participation in testing, classroom activity

RETURN TO ACTIVITY/SPORT

CDC Return to Play Concussion Protocol

1. Rest and return to limited activity

2. Light aerobic exercise

3. Sport-specific exercise

4. Non-contact drills

5. Full-contact practice

6. Return to play

RETURN TO ACTIVITY/SPORT

- Each step takes minimum 24 hours
- Mean time for return to full sport is 20 days.
- If activity-related symptoms not improving after 2-4 weeks consider referral for rehabilitation/PT.

2 KEY POINTS

1. Steps 1 and 2 of “return to activity” concurrent with “return to learn” progression
   - Universally recommended within several days of injury for athletes AND non-athletes
     - Enhances concussion recovery
2. Recommendations for return to full participation in contact sport have NOT changed
   - Asymptomatic at rest AND with exertion
   - Removal of all academic accommodations and return to prior level of academic performance

RETURN TO ACTIVITY: STEP 1

- Symptom-limited activity for the first 24-48 hours after concussion
    - Daily/low intensity activity that does not exacerbate symptoms

RETURN TO ACTIVITY: STEP 2

- Aerobic conditioning/light training
  - Start at low intensity aerobic activity and can progress as tolerated
    - Typically start with stationary cycling/walking
    - Okay for mild symptom exacerbation
      - No more than 2 points on 10 point scale
  - Some families appreciate concrete guidance
    - Light intensity up to 55% maximum heart rate*
    - Moderate intensity up to 70% maximum heart rate*

*Maximum heart rate = 220-age

RETURN TO ACTIVITY: STEP 2

- If symptoms increase more than recommended:
  - Stop exercise
  - “Try again tomorrow”

- Steps 1 and 2 should be recommended for both athletes and non-athletes

RETURN TO SPORT: STEP 3

- Sport-specific training
  - Higher intensity “skills and drills”
    - Away from team environment
    - Directional changes
    - Avoid any activity with increased head injury risk
  - Same symptom-related limitations as above

RETURN TO SPORT: STEPS 4-6

Athlete should remain symptom-free during these steps

Different than steps 2 and 3

If exertional symptoms re-emerge during this period, then return to step 3

RETURN TO SPORT: STEP 4

- Only after:
  - Full resolution of reported concussion symptoms
  - Return to prior level of cognitive function
  - Clearance from health care provider
- High intensity, non-contact training
  - Re-integrate into team environment
  - Multi-tasking/coordination

RETURN TO SPORT: STEP 5

- Full participation in practice
  - Including contact/collision
- Restores confidence
- Skills assessment by coaching staff

RETURN TO SPORT: STEP 6

Full game play

RETURN TO SPORT: SPECIAL CONSIDERATIONS

- For many non-contact, non-collision sports steps 4-6 can be condensed
  - Track and field
  - Cross country running/skiing
  - Swimming
  - Tennis

- PREVENTION
- SEQUELA
- RETIREMENT

PREVENTION

- Current evidence-supported recommendations:
  - Policies disallowing body checking in ice hockey
    - Children and most adolescents
  - Limiting full-contact practice in American football
  - Mouthguard use in ice hockey
  - Possible benefit of neuromuscular training programs
    - Focus on coordination
  - Inconclusive for headgear
  - Securely fit helmets MAY reduce concussion rate/severity
    - American football/ice hockey

RECONSIDER LONG TERM EFFECTS

- Methodology is generally lower quality
  - Retrospective case-control or cohort studies
  - Not able control for multiple factors contributing to
    - Mental health
    - Other causes morbidity/mortality
  - Most studies are in males

RECONSIDER LONG TERM EFFECTS

- Former amateur athletes are NOT at increased risk in adulthood
  - Depression or suicidality in adulthood
  - Cognitive impairment, neurological disorders, neurodegenerative disease (male studies)
- Former professional soccer players are NOT at increased risk for psychiatric hospitalization in adulthood
- Former professional soccer and football players are NOT at increased risk for psychiatric-related death or suicide
- Former professional soccer and football players DO have higher rates of mortality from neurologic disease, including
  - Dementia
  - ALS

Patricios JS, Schneider KJ, Dvorak J*, et al*. Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport–Amsterdam, October 2022
British Journal of Sports Medicine 2023;**57:**695-711

RETIRE

- No definitive guidelines
  - Multi-disciplinary individualized shared decision-making
    - Including: athlete, family, HCPs, school personnel
- Consider
  - Current data on long-term risk
  - Family understanding of long-term risk
    - Health literacy
  - Sport-specific injury risk

RETIRE

- “Red flag” patterns
  - Repetitive injury
    - Reductions in injury threshold
    - Prolongation of recovery with successive concussions
  - Emergence of new neurologic diagnosis after concussion
    - Concussion as “unmasker” of previously quiescent/subclinical conditions
      - ADHD
      - Migraine
      - Anxiety/depression

RETIRE

- Emphasize the sport is not “all or nothing”
  - “Temporary” retirement is an option
    - Taking a season/year away from
      - Competitive sport
      - Contact/collision activity
  - Participation in lower risk sport
- Emphasize the value of continued participation in healthy levels of physical activity

RESOURCE

- Revised for 2024
- Practical information
  - Clinicians
  - Families
  - Sport-related personnel

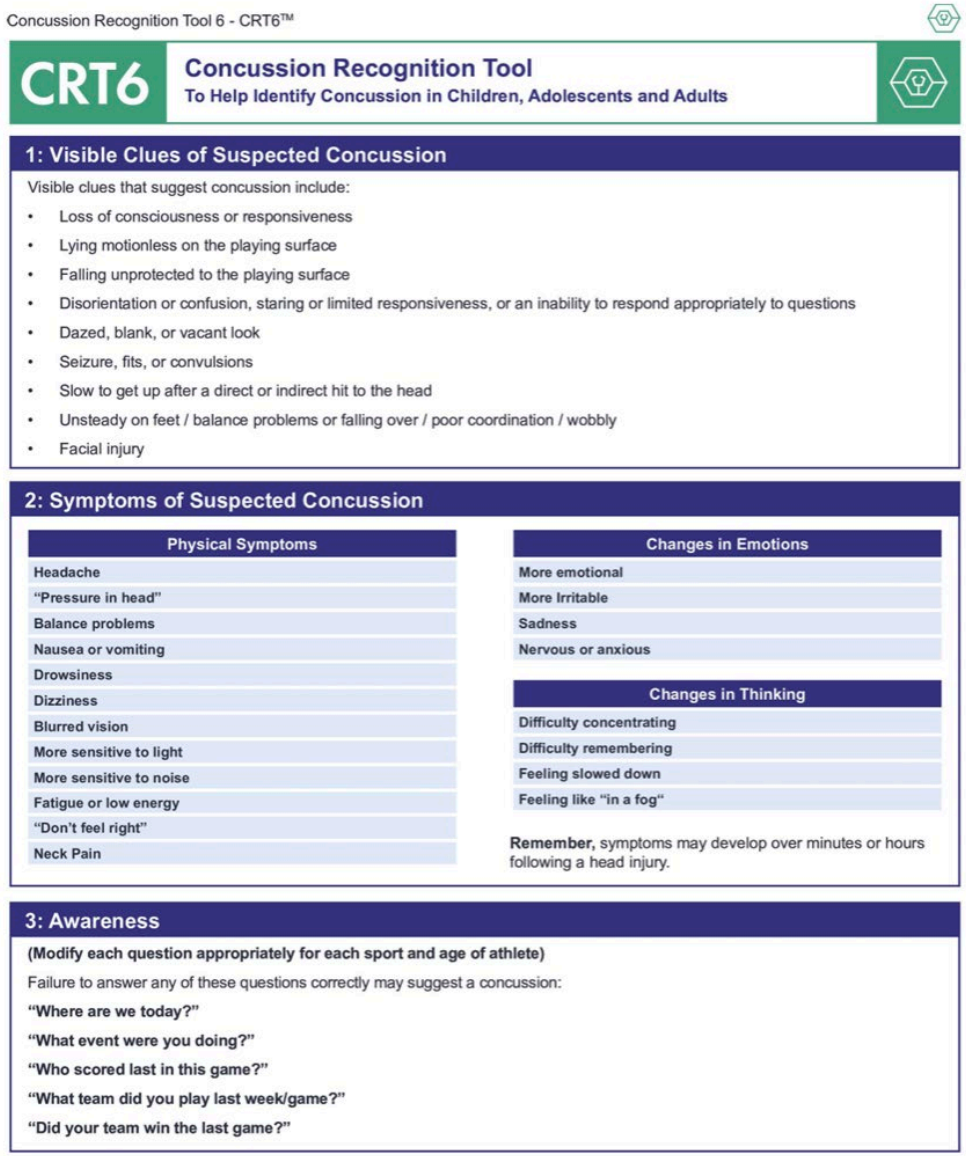
Maine Department of Education

CONCUSSION MANAGEMENT RESOURCE GUIDE

Office of School and Student Supports
Maine Department of Education

RESOURCE

- Concussion recognition tool for non-clinicians
  - Families
  - Non-clinical sports personnel
    - Coaches
    - Referees



Concussion Recognition Tool 6 - CRT6™

CRT6

Concussion Recognition Tool

To Help Identify Concussion in Children, Adolescents and Adults

1: Visible Clues of Suspected Concussion

Visible clues that suggest concussion include:

- Loss of consciousness or responsiveness
- Lying motionless on the playing surface
- Falling unprotected to the playing surface
- Disorientation or confusion, staring or limited responsiveness, or an inability to respond appropriately to questions
- Dazed, blank, or vacant look
- Seizure, fits, or convulsions
- Slow to get up after a direct or indirect hit to the head
- Unsteady on feet / balance problems or falling over / poor coordination / wobbly
- Facial injury

2: Symptoms of Suspected Concussion

Physical Symptoms
Headache
"Pressure in head"
Balance problems
Nausea or vomiting
Drowsiness
Dizziness
Blurred vision
More sensitive to light
More sensitive to noise
Fatigue or low energy
"Don't feel right"
Neck Pain

Changes in Emotions
More emotional
More Irritable
Sadness
Nervous or anxious

Changes in Thinking
Difficulty concentrating
Difficulty remembering
Feeling slowed down
Feeling like "in a fog"

Remember, symptoms may develop over minutes or hours following a head injury.

3: Awareness

(Modify each question appropriately for each sport and age of athlete)

Failure to answer any of these questions correctly may suggest a concussion:

"Where are we today?"

"What event were you doing?"

"Who scored last in this game?"

"What team did you play last week/game?"

"Did your team win the last game?"

TAKE HOME

- Symptom scores are high yield
  - Can point you toward “treatable” symptom sets
- Vestibular oculomotor symptoms are particularly troublesome
  - May predict longer recovery
- Mild symptom exacerbation with return to learn and return to activity is expected
- Early return to low intensity physical activity beneficial
  - Both athletes and non-athletes
- No defined guidance regarding post-concussion retirement from sport

THANK YOU