Pediatric Neurological Assessment

Establish a Baseline
- Parent/child interview
- Health record information

Baseline Healthy  Minor Illness  After baseline seizures  With Fever
Clockwise rotation
Use RIGHT side of brain
- Imaginative
- See the “big picture”
- Philosophy & religion
- Appreciates
- Knows object function
- Fantasy
- Present possibilities
- Impetuous
- Risk taking

Counterclockwise
Use LEFT side of Brain
- Factual
- Detail oriented
- Math & science
- Order, patterns
- Knows object name
- Reality
- Form strategies
- Practical
- Safe

The Frontal Lobe
- Executive functioning
- Personality
- Judgment
- Reasoning
- Motor function
- Speech
- Memory
- Olfactory reception

The Parietal Lobe
- Primary sensory area
- Awareness of one’s own body parts
- Spatial concepts
The Temporal Lobe

- Primary auditory area
- Receptive speech
- Memory

The Occipital Lobe

- Perception and interpretation of vision

The Cerebellum

- Integrates sensory perception & motor movement
The Cerebellum

- Fine motor movement
- Alternating hand movements
- Point to point movement
- Gait

Motor Assessment

- Observation
  - Symmetry, atrophy, involuntary movements
- Strength
  - Pronator drift
- Tone & reflexes

Sensory Assessment

- Light touch
- Temperature
- Pain
- Vibration
- Proprioception
The Brainstem

- Midbrain
- Pons
- Medulla

Cranial Nerve Assessment

- I Olfactory
  - Smell

- II Optic
  - Visual acuity and fields
Cranial Nerve Assessment

III Oculomotor
- PERRLA
- Ptosis
- Eye movement

IV Trochlear
- Eye movement

VI Abducens
- Eye movement

Extra-Ocular Movements

V Trigeminal
- Blink reflex
- Facial sensation
- Masseter muscle strength
Cranial Nerve Assessment

**VII Facial**
- Symmetry of facial expression
- Salivary function & taste
- Tearing

**VIII Vestibulocochlear**
- Hearing
- Balance
Cranial Nerve Assessment

- IX Glossopharyngeal & X Vagus
  - Speech
  - Swallow
  - Gag
  - Palate
  - Vital organ mechanics

- XII Hypoglossal
  - Tongue movement

Cranial Nerve Assessment

- XI Accessory
  - Head, neck & shoulder strength

Glasgow Coma Scale
Mini Mental Status Exam

<table>
<thead>
<tr>
<th>Orientation</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name, age, date/month/year</td>
<td>8 (1 for each name)</td>
</tr>
<tr>
<td>Registration</td>
<td>5 (1 for each name)</td>
</tr>
<tr>
<td>Identify three objects by name and ask patient to repeat</td>
<td>2 (1 for each object)</td>
</tr>
<tr>
<td>Attention and calculation</td>
<td>2 (1 for each calculation)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Cranial Nerves</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyes</td>
<td>2 (1 for each eye)</td>
</tr>
<tr>
<td>Facial symmetry</td>
<td>1</td>
</tr>
<tr>
<td>Speech</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor/Sensory</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength, balance</td>
<td>1</td>
</tr>
<tr>
<td>Sensation</td>
<td>1</td>
</tr>
</tbody>
</table>

Neuro Assessment in 3 Steps

Compare to Baseline Neuro Assessment

1. Mental status
   - Is child acting appropriately?
   - Engage child in conversation
   - Elicit highest level of functioning

2. Cranial Nerves
   - Eyes
   - Facial symmetry
   - Speech

3. Motor/Sensory
   - Strength, balance
   - Sensation

Red Flags for School Nurses

- Persistent nausea & vomiting
- Focal neurological deficits
- Significant deterioration in child’s condition:
  - Progressive somnolence
  - Slurred speech
  - Inability or difficulty walking
  - Worsening mental status
- Findings suggestive of a skull fracture
  - Palpable deformity, hemotympanum, CSF leak
- Concern for cervical spine injury

Deviation from Baseline
CONCUSSION

- Alteration in mental status caused by direct or indirect force to the head or body
- Majority - NO loss of consciousness
- Often unrecognized
- 80-90% resolve in a short period
- Children have longer recovery times

CONCUSSION RISKS

- Children 5-18 years
  - Bicycling, football, basketball, playground activities, soccer, hockey, ski/snowboarding
- History of Concussion
- Lack of proper diagnosis and management
**CONCUSSION CURRENT PRACTICE**

Signs of Concussion → Acute Concussion → Appropriate Management

---

**SIGNS OF CONCUSSION**

3 symptom types:

- **Cognitive**
- **Somatic/Physical**
- **Behavior/Emotional**

---

**COGNITIVE SYMPTOMS**

- Hard time concentrating
- Trouble remembering
- Mentally ‘foggy’
- Confusion
- Speed of thinking slowed down
- Taking a longer time to react
**SOMATIC/PHYSICAL SYMPTOMS**

- Balance problems
- Headache
- Dizziness
- Nausea
- Poor coordination
- Fatigue
- Sensitivity to bright light and/or noise
- Sleep disturbance

**EMOTIONAL/BEHAVIORAL SYMPTOMS**

- Irritable
- More emotional
- Feel sad
- Feel nervous

**CONCUSSION CURRENT PRACTICE**

**Assessment**

- Exclusion of more serious injury
- Standardized objective assessment
  - Use tools (SCAT3, Post Concussive Symptom Scale)
  - Serial assessments
  - Clinical judgment
  - Err on the side of caution
## SCAT3

### POST CONCUSSIVE SYMPTOM SCALE

<table>
<thead>
<tr>
<th>Domain</th>
<th>Scale</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mood</td>
<td></td>
<td></td>
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<tr>
<td>Fatigue</td>
<td></td>
<td></td>
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<tr>
<td>Balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td></td>
<td></td>
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<tr>
<td>Sleep</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive function</td>
<td></td>
<td></td>
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<tr>
<td>Concentration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision</td>
<td></td>
<td></td>
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<tr>
<td>Speech</td>
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<tr>
<td>Physical symptoms</td>
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<tr>
<td>Dizziness</td>
<td></td>
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<tr>
<td>Speech pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

## BALANCE ERROR SCORING SYSTEM (BESS)

### Testing Instructions
- Stand in middle of the platform.
- Hold on to the handle if needed.
- Follow the instructions given by the examiner.

### Scoring Criteria
- **Single Leg Balance**: 1 point for each leg.
- **Double Leg Balance**: 2 points for each leg.
- **Total Score**: Maximum 4 points.

### Errors
- Allow the hands off the bar
- Starting the test
- Cutting corners
- Failing to match or reach the target
- Not standing upright
- Not matching length of each leg
- Not matching angle of each leg
- Not matching depth of each leg
- Not matching position of both legs
- Not matching position of both hands
- Not matching position of both feet
- Not matching position of both knees
- Not matching position of both shoulders
- Not matching position of both necks
- Not matching position of both heads
- Not matching position of both ears
- Not matching position of both eyes
- Not matching position of both eyes
- Not matching position of both eyes
- Not matching position of both eyes
- Not matching position of both eyes
- Not matching position of both eyes

### Example Scores
- Single Leg Balance: 1 point for each leg
- Double Leg Balance: 2 points for each leg
- Total Score: Maximum 4 points

---

### BESS Score Card

<table>
<thead>
<tr>
<th>Error</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow the hands off the bar</td>
<td></td>
</tr>
<tr>
<td>Starting the test</td>
<td></td>
</tr>
<tr>
<td>Cutting corners</td>
<td></td>
</tr>
<tr>
<td>Failing to match or reach the</td>
<td></td>
</tr>
<tr>
<td>target</td>
<td></td>
</tr>
<tr>
<td>Not standing upright</td>
<td></td>
</tr>
<tr>
<td>Not matching length of each</td>
<td></td>
</tr>
<tr>
<td>leg</td>
<td></td>
</tr>
<tr>
<td>Not matching angle of each</td>
<td></td>
</tr>
<tr>
<td>leg</td>
<td></td>
</tr>
<tr>
<td>Not matching depth of each</td>
<td></td>
</tr>
<tr>
<td>leg</td>
<td></td>
</tr>
<tr>
<td>Not matching position of both</td>
<td></td>
</tr>
<tr>
<td>legs</td>
<td></td>
</tr>
<tr>
<td>Not matching position of both</td>
<td></td>
</tr>
<tr>
<td>hands</td>
<td></td>
</tr>
<tr>
<td>Not matching position of both</td>
<td></td>
</tr>
<tr>
<td>feet</td>
<td></td>
</tr>
<tr>
<td>Not matching position of both</td>
<td></td>
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<tr>
<td>knees</td>
<td></td>
</tr>
<tr>
<td>Not matching position of both</td>
<td></td>
</tr>
<tr>
<td>shoulders</td>
<td></td>
</tr>
<tr>
<td>Not matching position of both</td>
<td></td>
</tr>
<tr>
<td>heads</td>
<td></td>
</tr>
<tr>
<td>Not matching position of both</td>
<td></td>
</tr>
<tr>
<td>eyes</td>
<td></td>
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<tr>
<td>Not matching position of both</td>
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<tr>
<td>eyes</td>
<td></td>
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<tr>
<td>eyes</td>
<td></td>
</tr>
<tr>
<td>Not matching position of both</td>
<td></td>
</tr>
<tr>
<td>eyes</td>
<td></td>
</tr>
</tbody>
</table>

---

### BESS Total Score

- Maximum 4 points

---

### Notes
- If error is found, record score.
SECOND IMPACT SYNDROME
- Massive brain swelling
- Occurs after suffering a second concussion before symptoms of an earlier concussion have subsided
- Incidence highest in school age children
- Symptoms quickly progress

POST CONCUSSIVE SYNDROME
- Group of somatic and cognitive symptoms (headache, vertigo, depression)
- Symptoms last few months up to 1 year after a concussion
- Diagnostic criteria must be met
- More common in high school athletes than young children

CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)
- Progressive degeneration disease
- Accumulation of Tau Protein
- Symptoms of dementia
  - May appear within months to decades of the injuries
CONCUSSION
CLINICAL MANAGEMENT

- No Return to play (RTP)
- Physical AND cognitive rest
- Graded program of exertion prior to return to play

ACUTE CONCUSSION EVALUATION
“ACE”

- CDC.gov/concussion
  - Heads Up: brain injury in your practice
  - ACE; school version

- Care Plan

CONCUSSION
CLINICAL MANAGEMENT

- Acute - first 3 days of injury
  - Education, brief cognitive screen, caregiver anxiety, no return to contact
- Post-Acute - 4 days -3 months
  - Behavioral prescriptions, education, avoid further injury, accommodations and modification, emotional toll of no sports
- Long-term - >4months
  - Comprehensive neuropsych eval, CBT, develop strategies, post-injury family dynamics, may be non-injury related
CONCUSSION
SCHOOL MODIFICATIONS

- Rest breaks
- Decreased school and homework load
- Untimed tests/no standardized tests
- Pre-printed notes
- Communication with parent
- Expect student to look well and not ask for help!

STEPWISE RETURN TO SPORT

1. No activity, complete rest. Once asymptomatic, proceed to level 2.
2. Light aerobic exercise such as walking or stationary cycling, no resistance training.
3. Non-contact training drills.
4. Full contact training after medical clearance.
5. Game play.

If child develops signs of concussion at anytime, REST for 24hrs, then go back to the PREVIOUS ASYPTOMATIC STEP.

CONCUSSION
CLINICAL MANAGEMENT

- Prolonged symptom management with medication
  - RTP should not occur while on medication that may mask/modify symptoms
- Prolonged symptoms need to be managed by a multidisciplinary team with experience in concussion
- Consideration of modifying factors
Why is balance acutely affected?

Immediate Post-Concussive Assessment and Cognitive Testing

- Objective evaluation of post-injury condition
- Tracks recovery for safe RTP
- Measures verbal & visual memory, processing speed & reaction time

Factors that impact recovery

<table>
<thead>
<tr>
<th>Factors</th>
<th>Modifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>Number, Duration (&gt;10 days), Severity</td>
</tr>
<tr>
<td>Signs</td>
<td>Prolonged LOC (&gt;1 min), amnesia</td>
</tr>
<tr>
<td>Sequelae</td>
<td>Concussive convulsions</td>
</tr>
<tr>
<td>Temporal</td>
<td>Frequency - repeated concussions over time</td>
</tr>
<tr>
<td></td>
<td>Timing - injuries close together in time</td>
</tr>
<tr>
<td></td>
<td>“Recency” - recent concussion or TBI</td>
</tr>
<tr>
<td>Threshold</td>
<td>Repeated concussions occurring with progressively less impact force or slower recovery after each successive concussion</td>
</tr>
<tr>
<td>Age</td>
<td>Child and adolescent (&lt;18 years old)</td>
</tr>
<tr>
<td>Co- and Pre-morbidities</td>
<td>Migraine, depression or other mental health disorders, attention deficit hyperactivity disorder (ADHD), learning disabilities (LD), sleep disorders</td>
</tr>
<tr>
<td>Medication</td>
<td>Psychoactive drugs, anticoagulants</td>
</tr>
<tr>
<td>Behaviour</td>
<td>Dangerous style of play</td>
</tr>
<tr>
<td>Sport</td>
<td>High-risk activity, contact and collision sport, high sporting level</td>
</tr>
</tbody>
</table>
CONCUSSION

**SCHOOL NURSE'S ROLE**
- Identifying signs & symptoms
- Advocate for cognitive and physical rest
- Use of Step Wise Approach for return to activity
- Refer to Specialist if needed

**EDUCATION**

Red Flags for School Nurses

- Prolonged Loss of Consciousness
- High Impact
- Acute worsening of child's condition

CONCUSSION LAW

- Act relative to safety regulations in school athletic programs
- Development of an interscholastic head injury safety training program
  - DPH division of violence & injury prevention
  - Requires annual participation
  - CDC.gov/concussion
  - National Federation of State HS Association's Concussion in Sports.

**PREVENTION**

- Proper recovery from concussion
- Protective equipment
- Rule changes

Questions?

Thank you
Many years ago when I was in nursing school, I learned a saying that was supposed to help me recall the cranial nerves. You’ve probably heard it: On Old Olympus Towering Tops A Finn and German Viewed Some Hops. It didn’t make much sense to me, and it didn’t help me remember the cranial nerves.

A few years ago, a colleague taught me a much easier way to remember the cranial nerves and their locations—by drawing a face and using numbers as the facial features. Each number represents one of the 12 cranial nerves, and the placement of the numbers represents the location of or an association with them. (See Cranial nerves by the numbers.)

Olfactory nerve (CN I)
Located in the nose, cranial nerve (CN) I controls the sense of smell. This nerve isn’t frequently tested, even by neurologists. However, suspect an abnormality in a neurologic patient who has a poor appetite.

To assess the nerve, use soap and coffee—both are easy to find on a unit. Or take a trip to the kitchen for cloves and vanilla. Don’t use a substance with a harsh odor, such as ammonia, because it will stimulate the intranasal pain endings of CN V.

Have the patient close both eyes, close one nostril, and gently inhale to smell the scent. Remember to do both nostrils.

Optic nerve (CN II)
Located in and behind the eyes, CN II controls central and peripheral vision.

The fovea in the center of the retina is responsible for visual acuity in our central vision. Test one eye at a time. Ask the patient to read his I.V. bag. Then have him count how many fingers you are holding up 6 inches in front of him.

Test peripheral vision one eye at a time, too. Cover one eye and instruct the patient to look at your nose. Move your index fingers to check the superior and inferior fields one at a time. Ask the patient to note any movement in the peripheral visual fields.

Oculomotor nerve (CN III)
Also positioned in and behind the eyes, CN III controls pupillary constriction.

To test the patient’s pupils, dim the lights, bring the light of the penlight from the outside periphery to the center of each eye, and note the response. Use the mm chart to describe pupil size; descriptions such as “small,” “medium,” and “large” are too subjective.

Also, check where the eyelid falls on the pupil. If it droops, note that the patient has ptosis.

It’s easy to check cranial nerves III, IV, and VI together.

Trochlear nerve (CN IV)
Cranial nerve IV acts as a pulley to move the eyes down—toward the tip of the nose.

To assess the trochlear nerve, instruct the patient to follow your finger while you move it down toward his nose.

Trigeminal nerve (CN V)
Cranial nerve V covers most of the face.

If a patient has a problem with this nerve, it usually involves the forehead, cheek, or jaw—the three areas of the trigeminal nerve. Check sensation in all three areas, using a soft and a dull object. Check sensation of the scalp, too.

Test the motor function of the temporal and masseter muscles by assessing jaw opening strength. If you suspect a problem with cranial nerves VI and VII, check the corneal reflex with a cotton wisp since it’s easy to do while you’re checking trigeminal nerve function.

Abducens nerve (CN VI)
Cranial nerve VI controls eye movement to the sides.

Ask the patient to look toward each ear. Then have him follow your fingers through the six cardinal fields of gaze.

Here’s another easy technique you can use: With your finger, make a big X in the air and then draw a horizontal line across it. Observe the patient for nystagmus or twitching of the eye.
Facial nerve (CN VII)
Cranial nerve VII controls facial movements and expression.
Assess the patient for facial symmetry. Have him wrinkle his forehead, close his eyes, smile, pucker his lips, show his teeth, and puff out his cheeks. Both sides of the face should move the same way. When the patient smiles, observe the nasolabial folds for weakness or flattening.

Acoustic nerve (CN VIII)
Cranial nerve VIII, located in the ears, controls hearing.
Check hearing by rubbing your fingers together by each ear.

Glossopharyngeal nerve (CN IX) and vagus nerve (CN X)
Cranial nerves IX and X, which innervate the tongue and throat (pharynx and larynx), are checked together.
Assess the sense of taste on the back of the tongue. Observe the patient’s ability to swallow by noting how he handles secretions. Ask the patient to open his mouth and say AHHHHHHH. The uvula should be in the midline, and the palate should rise.

Spinal accessory nerve (CN XI)
This nerve controls neck and shoulder movement.
Ask the patient to raise his shoulders against your hands to assess the trapezius muscle. Then ask the patient to turn his head against your hand to assess the sternocleidomastoid muscle.

Hypoglossal nerve (CN XII)
Cranial nerve XII innervates the tongue.
Ask the patient to stick out his tongue. It should be in the midline. Look for problems with eating, swallowing, or speaking.
You can check this nerve when you check cranial nerves IX and X.
So there you have it: No Olympus, no Finn, and no hops. Just an easy way to remember—and check—the cranial nerves.

Selected references
Barbara Bolek, APRN, MSN, CCRN, PCCN, is a Staff Development Specialist at Provena Saint Joseph Medical Center in Joliet, Illinois.
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).

<table>
<thead>
<tr>
<th>Physical</th>
<th>Thinking</th>
<th>Emotional</th>
<th>Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headaches</td>
<td>Sensitivity to light</td>
<td>Feeling mentally foggy</td>
<td>Irritability</td>
</tr>
<tr>
<td>Nausea</td>
<td>Sensitivity to noise</td>
<td>Problems concentrating</td>
<td>Sadness</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Numbness/Tingling</td>
<td>Problems remembering</td>
<td>Feeling more emotional</td>
</tr>
<tr>
<td>Visual problems</td>
<td>Vomiting</td>
<td>Feeling more slowed down</td>
<td>Nervousness</td>
</tr>
<tr>
<td>Balance Problems</td>
<td>Dizziness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

### Returning to Daily Activities

1. Get lots of rest. Be sure to get enough sleep at night- no late nights. Keep the same bedtime weekdays and weekends.
2. Take daytime naps or rest breaks when you feel tired or fatigued.
3. 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).
4. Drink lots of fluids and eat carbohydrates or protein to maintain appropriate blood sugar levels.
5. 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.
6. 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.
7. Repeated evaluation of your symptoms is recommended to help guide recovery.

### Returning to School

1. 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.
2. 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

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*This form is part of the "Heads Up: Brain Injury in Your Practice" toolkit developed by the Centers for Disease Control and Prevention (CDC).*
Returning to Sports

1. **You should NEVER return to play if you still have ANY symptoms** – (Be sure that you do not have any symptoms at rest and while doing any physical activity and/or activities that require a lot of thinking or concentration.)
2. Be sure that the PE teacher, coach, and/or athletic trainer are aware of your injury and symptoms.
3. It is normal to feel frustrated, sad and even angry because you cannot return to sports right away. With any injury, a full recovery will reduce the chances of getting hurt again. It is better to miss one or two games than the whole 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 provider.
  - Return to play should occur in **gradual steps** beginning with aerobic exercise only to increase your heart rate (e.g., stationary cycle); moving to increasing your heart rate with movement (e.g., running); then adding controlled contact if appropriate; and finally return to sports competition.
  - Pay careful attention to your symptoms and your thinking and concentration skills at each stage of activity. Move to the next level of activity only if you do not experience any symptoms at the each level. If your symptoms return, stop these activities and let your health care professional know. Once you have not experienced symptoms for a minimum of 24 hours and you receive permission from your health care professional, you should start again at the previous step of the return to play plan.

Gradual Return to Play Plan

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

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

This referral plan is based on today's evaluation:
- Return to this office. Date/Time
- Refer to: Neurosurgery_____ Neurology_____ Sports Medicine_____ Physiatrist_____ Psychiatrist_____ Other_____
- Refer for neuropsychological testing
- Other______________________________

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

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Returning to School (Continued)

Until you (or your child) have fully recovered, the following supports are recommended: *(check all that apply)*

- 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 activities that require 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.
What is childSCAT3?1
The ChildSCAT3 is a standardized tool for evaluating injured children for concussion and can be used in children aged from 5 to 12 years. It supersedes the original SCAT and the SCAT2 published in 2005 and 2009, respectively. For older persons, ages 13 years and over, please use the SCAT3. The ChildSCAT3 is designed for use by medical professionals. If you are not qualified, please use the Sport Concussion Recognition Tool. Pre-exercise baseline testing with the ChildSCAT3 can be helpful for interpreting post-injury test scores.

Specific instructions for use of the ChildSCAT3 are provided on page 3. If you are not familiar with the ChildSCAT3, please read through these instructions carefully. This tool may be freely copied in its current form for distribution to individuals, teams, groups and organizations. Any revision and any reproduction in a digital form require approval by the Concussion in Sport Group.

NOTE: If any of the following signs are observed after a direct or indirect blow to the head, the child should stop participation, be evaluated by a medical professional and should not be permitted to return to sport the same day if a concussion is suspected.

- Symptoms (e.g., headache), or
- Physical signs (e.g., unsteadiness), or
- Impaired brain function (e.g., confusion) or
- Abnormal behaviour (e.g., change in personality).

SIDELINE ASSESSMENT
Indications for Emergency Management

NOTE: A hit to the head can sometimes be associated with a more severe brain injury. If the concussed child displays any of the following, then do not proceed with the ChildSCAT3, instead activate emergency procedures and urgent transportation to the nearest hospital:

- Glasgow Coma score less than 15
- Deteriorating mental status
- Potential spinal injury
- Progressive, worsening symptoms or new neurologic signs
- Persistent vomiting
- Evidence of skull fracture
- Post traumatic seizures
- Coagulopathy
- History of Neurosurgery (e.g., Shunt)
- Multiple injuries

Potential signs of concussion?
If any of the following signs are observed after a direct or indirect blow to the head, the child should stop participation, be evaluated by a medical professional and should not be permitted to return to sport the same day if a concussion is suspected.

- Any loss of consciousness?
  - “If so, how long?”
- Balance or motor incoordination (stumbles, slow/laboured movements, etc.)?
  - “If so, how long?”
- Disorientation or confusion (inability to respond appropriately to questions)?
  - “If so, how long?”
- Loss of memory?
  - “If so, how long?”
- Blank or vacant look:
  - “Before or after the injury?”
- Visible facial injury in combination with any of the above:
  - “Before or after the injury?”

SIDeline Assessment – child-Maddocks Score3
“I am going to ask you a few questions, please listen carefully and give your best effort.”
Modified Maddocks questions (1 point for each correct answer)

Where are we at now?
Where are we at now?
0 1
Is it before or after lunch?
Is it before or after lunch?
0 1
What did you have last lesson/class?
What did you have last lesson/class?
0 1
What is your teacher’s name?
What is your teacher’s name?
0 1

child-Maddocks score
Child-Maddocks score is for sideline diagnosis of concussion only and is not used for serial testing.

Any child with a suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration (i.e., should not be left alone). No child diagnosed with concussion should be returned to sports participation on the day of Injury.

BACKGROUND

For Parent/carer to complete:

How many concussions has the child had in the past?
When was the most recent concussion?
How long was the recovery from the most recent concussion?
Has the child ever been diagnosed with depression, ADD/ADHD, seizure disorder?

For use by medical professionals only

SPORT CONCUSSION ASSESSMENT TOOL 3 | PAGE 1

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**SYMPTOM EVALUATION**

**Child report**

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

Total number of symptoms (Maximum possible 20)

Symptom severity score (Maximum possible 20x3 = 60)

**Parent report**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>never</th>
<th>rarely</th>
<th>sometimes</th>
<th>often</th>
</tr>
</thead>
<tbody>
<tr>
<td>The child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>has trouble sustaining attention</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>is easily distracted</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>has difficulty concentrating</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>has problems remembering what he/she is told</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>has difficulty following directions</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>tends to daydream</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>gets confused</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>is forgetful</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>has difficulty completing tasks</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>has poor problem solving skills</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>has problems learning</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>has headaches</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>feels dizzy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>has a feeling that the room is spinning</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>feels faint</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>has blurred vision</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>has double vision</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>experiences nausea</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>gets tired a lot</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>gets tired easily</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Total number of symptoms (Maximum possible 20)

Symptom severity score (Maximum possible 20x3 = 60)

**COGNITIVE & PHYSICAL EVALUATION**

**Cognitive assessment**

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

**Orientation** (1 point for each correct answer)

<table>
<thead>
<tr>
<th>Question</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>What month is it?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the date today?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the day of the week?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What year is it?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Orientation score of 4

**Immediate memory**

<table>
<thead>
<tr>
<th>List</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Alternative word list</th>
</tr>
</thead>
<tbody>
<tr>
<td>elbow</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>apple</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>carpet</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>bubble</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>candle</td>
<td>1</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>paper</td>
<td>1</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>sugar</td>
<td>1</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>sandwich</td>
<td>1</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>perfume</td>
<td>1</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>blanket</td>
<td>1</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>sunset</td>
<td>1</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>wagon</td>
<td>1</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>iron</td>
<td>1</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Immediate memory score total of 15

**Concentration: Digits Backward**

<table>
<thead>
<tr>
<th>List</th>
<th>Trial 1</th>
<th>Alternative digit list</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4-9-3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3-8-1-4</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6-2-9-7-1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>7-1-8-4-6-2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

**Concentration: Days in Reverse Order**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Double leg stance: Errors</th>
<th>Tandem stance (non-dominant foot at back): Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday-Saturday-Friday-Thursday-Wednesday-Tuesday-Monday</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Concentration score of 6

**Balance examination**

Do one or both of the following tests.

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

Modified Balance Error Scoring System (BESS) testing

<table>
<thead>
<tr>
<th>Which foot was tested</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>left</td>
<td></td>
<td></td>
</tr>
<tr>
<td>right</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Testing surface (hard floor, field, etc.)

Condition

<table>
<thead>
<tr>
<th>Double leg stance:</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tandem stance (non-dominant foot at back):</td>
<td>Errors</td>
</tr>
</tbody>
</table>

Tandem gait

Time taken to complete (best of 4 trials): _________ seconds

If child attempted, but unable to complete tandem gait, mark here

**Coordination examination**

Upper limb coordination

<table>
<thead>
<tr>
<th>Which arm was tested</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
</table>

Coordination score of 1

**SAC Delayed Recall**

Delayed recall score of 5

Since signs and symptoms may evolve over time, it is important to consider repeat evaluation in the acute assessment of concussion.
INSTRUCTIONS
Words in italics throughout the ChildSCAT3 are the instructions given to the child by the tester.

Sideline Assessment – child-Maddocks Score
To be completed on the sideline/in the playground, immediately following concussion. There is no requirement to repeat these questions at follow-up.

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.

On the day of injury
- the child is to complete the Child Report, according to how he/she feels now.

On all subsequent days
- the child is to complete the Child Report, according to how he/she feels today, and
- the parent/carer is to complete the Parent Report according to how the child has been over the previous 24 hours.

Standardized Assessment of Concussion – Child Version (SAC-C)²
Orientation
Ask each question on the score sheet. A correct answer for each question scores 1 point. If the child does not understand the question, give an incorrect answer, or no answer, then the score for that question is 0 points.

Immediate memory
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.

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.

Complete all 3 trials regardless of score on trial 1 & 2. Read the words at a rate of one per second.
Score 1 pt. for each correct response. Total score equals sum across all 3 trials. Do not inform the child that delayed recall will be tested.

Concentration
Digits Backward:
I am going to read you a string of numbers and when I am done, you repeat 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, go to next string length. If incorrect, read trial 2. One point possible for each string length. Stop after incorrect on both trials. The digits should be read at the rate of one per second.

Days 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 completion of the Balance and Coor- dination Examination.
"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.

Balance examination
These instructions are to be read by the person administering the ChildSCAT3, and each balance task should be demonstrated to the child. The child should then be asked to copy what the examiner demonstrated.

Modified Balance Error Scoring System (BESS) testing
This balance testing is based on a modified version of the Balance Error Scoring System (BESS)⁵. A stopwatch or watch with a second hand is required for this testing.

This balance testing is based on a modified version of the Balance Error Scoring System (BESS) testing

(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 the child 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.

Balance testing – types of errors - Parts (a) and (b)
1. Hands lifted off iliac crest
2. Opening eyes
3. Step, stumble, or fall
4. Moving hip into > 30 degrees abduction
5. Lifting forefoot or heel
6. 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 two 20-sec- ond 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.

OPTION: For further assessment, the same 2 stances can be performed on a surface of medium density foam (e.g., approximately 50cm x 40cm x 6cm).

Tandem Gait⁶
Use a clock (with a second hand) or stopwatch to measure the time taken to complete this task.
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 meter 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. A total of 4 trials are done and the best time is retained. 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. In this case, the time is not recorded and the trial repeated, if appropriate.

Explain to the child that you will time how long it takes them to walk to the end of the line and back.

Coordination examination
Upper limit coordination
Finger-to-nose (FTN) task:
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.
Score: 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. Failure should be scored as 0.

References & Footnotes
1. This tool has been developed by a group of international experts at the 4th In- ternational Consensus meeting on Concussion in Sport held in Zurich, Switzerland in November 2012. The full details of the conference outcomes and the authors of the tool are published in The BISM Injury Prevention and Health Protection, 2013, Volume 47, Issue 5. The outcome paper will also be simultaneously co-published in other leading biomedical journals with the copyright held by the Concussion in Sport Group, to allow unrestricted distribution, providing no alterations are made.
CHILD ATHLETE INFORMATION

Any child suspected of having a concussion should be removed from play, and then seek medical evaluation. The child must NOT return to play or sport on the same day as the suspected concussion.

Signs to watch for

Problems could arise over the first 24–48 hours. The child should not be left alone and must go to a hospital at once if they develop any of the following:

- New Headache, or Headache gets worse
- Persistent or increasing neck pain
- Becomes drowsy or can’t be woken up
- Can not recognise people or places
- Has Nausea or Vomiting
- Behaves unusually, seems confused, or is irritable
- Has any seizures (arms and/or legs jerk uncontrollably)
- Has weakness, numbness or tingling (arms, legs or face)
- Is unsteady walking or standing
- Has slurred speech
- Has difficulty understanding speech or directions

Remember, it is better to be safe. Always consult your doctor after a suspected concussion.

Return to school

Concussion may impact on the child’s cognitive ability to learn at school. This must be considered, and medical clearance is required before the child may return to school. It is reasonable for a child to miss a day or two of school after concussion, but extended absence is uncommon. In some children, a graduated return to school program will need to be developed for the child. The child will progress through the return to school program provided that there is no worsening of symptoms. If any particular activity worsens symptoms, the child will abstain from that activity until it no longer causes symptom worsening. Use of computers and internet should follow a similar graduated program, provided that it does not worsen symptoms. This program should include communication between the parents, teachers, and health professionals and will vary from child to child. The return to school program should consider:

- Extra time to complete assignments/tests
- Quiet room to complete assignments/tests
- Avoidance of noisy areas such as cafeterias, assembly halls, sporting events, music class, shop class, etc
- Frequent breaks during class, homework, tests
- No more than one exam/day
- Shorter assignments
- Repetition/memory cues
- Use of peer helper/tutor
- Reassurance from teachers that student will be supported through recovery through accommodations, workload reduction, alternate forms of testing
- Later start times, half days, only certain classes

CONCUSSION INJURY ADVICE FOR THE CHILD AND PARENTS/CARERS

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

This child 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. It is expected that recovery will be rapid, but the child will need monitoring 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 transport the child to hospital immediately.

Other important points:

- Following concussion, the child should rest for at least 24 hours.
- The child should avoid any computer, internet or electronic gaming activity if these activities make symptoms worse.
- The child should not be given any medications, including pain killers, unless prescribed by a medical practitioner.
- The child must not return to school until medically cleared.
- The child must not return to sport or play until medically cleared.

The child is not to return to play or sport until he/she has successfully returned to school/learning, without worsening of symptoms. Medical clearance should be given before return to play.

If there are any doubts, management should be referred to a qualified health practitioner, expert in the management of concussion in children.

Return to sport

There should be no return to play until the child has successfully returned to school/learning, without worsening of symptoms.

Children must not be returned to play the same day of injury. When returning children to play, they should medically cleared and then follow a stepwise supervised program, with stages of progression.

For example:

<table>
<thead>
<tr>
<th>Rehabilitation stage</th>
<th>Functional exercise at each stage of rehabilitation</th>
<th>Objective of each stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No activity</td>
<td>Physical and cognitive rest</td>
<td>Recovery</td>
</tr>
<tr>
<td>Light aerobic exercise</td>
<td>Walking, swimming or stationary cycling</td>
<td>Increase heart rate</td>
</tr>
<tr>
<td>Sport-specific exercise</td>
<td>Skating drills in ice hockey, running drills in soccer</td>
<td>Add movement</td>
</tr>
<tr>
<td>Non-contact training drills</td>
<td>Progression to more complex training drills, eg passing drills in football and ice hockey</td>
<td>Exercise, coordination, and cognitive load</td>
</tr>
<tr>
<td>Full contact practice</td>
<td>Following medical clearance participate in normal training activities</td>
<td>Restore confidence and assess functional skills by coaching staff</td>
</tr>
</tbody>
</table>

Return to play Normal game play

There should be approximately 24 hours (or longer) for each stage and the child should drop back to the previous asymptomatic level if any post-concussive symptoms recur. Resistance training should only be added in the later stages.

If the child is symptomatic for more than 10 days, then review by a health practitioner, expert in the management of concussion, is recommended.

Medical clearance should be given before return to play.

Notes:

Patient’s name
Date/time of injury
Date/time of medical review
Treating physician

Clinic phone number

CONCUSSION INJURY ADVICE FOR THE CHILD AND PARENTS/CARERS

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

This child 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. It is expected that recovery will be rapid, but the child will need monitoring 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 transport the child to hospital immediately.

Other important points:

- Following concussion, the child should rest for at least 24 hours.
- The child should avoid any computer, internet or electronic gaming activity if these activities make symptoms worse.
- The child should not be given any medications, including pain killers, unless prescribed by a medical practitioner.
- The child must not return to school until medically cleared.
- The child must not return to sport or play until medically cleared.

Clinic phone number

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WHAT IS THE SCAT5?

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

- 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

<table>
<thead>
<tr>
<th>Witnessed</th>
<th>Observed on Video</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lying motionless on the playing surface</td>
<td>Y</td>
</tr>
<tr>
<td>Balance / gait difficulties / motor incoordination: stumbling, slow / laboured movements</td>
<td>Y</td>
</tr>
<tr>
<td>Disorientation or confusion, or an inability to respond appropriately to questions</td>
<td>Y</td>
</tr>
<tr>
<td>Blank or vacant look</td>
<td>Y</td>
</tr>
<tr>
<td>Facial injury after head trauma</td>
<td>Y</td>
</tr>
</tbody>
</table>

STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS

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

- Mark Y for correct answer / N for incorrect

<table>
<thead>
<tr>
<th>Question</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>What venue are we at today?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Which half is it now?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Who scored last in this match?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>What team did you play last week / game?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Did your team win the last game?</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

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

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

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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:
- 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.

Please Check: ☐ Baseline ☐ Post-Injury

Please hand the form to the athlete

<table>
<thead>
<tr>
<th>Symptom</th>
<th>none</th>
<th>mild</th>
<th>moderate</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>“Pressure in head”</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Neck Pain</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Nausea or vomiting</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Dizziness</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Blurred vision</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Balance problems</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sensitivity to light</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sensitivity to noise</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Feeling slowed down</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Feeling like “in a fog”</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>“Don’t feel right”</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Difficulty remembering</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Fatigue or low energy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Confusion</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>More emotional</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Irritability</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sadness</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Nervous or Anxious</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Trouble falling asleep (if applicable)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

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

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

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3
**STEP 3: COGNITIVE SCREENING**

**Standardised Assessment of Concussion (SAC)**

### ORIENTATION

<table>
<thead>
<tr>
<th>Question</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>What month is it?</td>
<td>0/1</td>
</tr>
<tr>
<td>What is the date today?</td>
<td>0/1</td>
</tr>
<tr>
<td>What is the day of the week?</td>
<td>0/1</td>
</tr>
<tr>
<td>What year is it?</td>
<td>0/1</td>
</tr>
<tr>
<td>What time is it right now? (within 1 hour)</td>
<td>0/1</td>
</tr>
</tbody>
</table>

**Orientation score:** 0/5

### 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.

**Immediate Memory Score:** 0/15

### 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)**

<table>
<thead>
<tr>
<th>List</th>
<th>Alternate 5 word lists</th>
<th>Score (of 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Finger Penny Blanket Lemon Insect</td>
<td>0/1/1</td>
</tr>
<tr>
<td>B</td>
<td>Candle Paper Sugar Sandwich Insect</td>
<td>0/1</td>
</tr>
<tr>
<td>C</td>
<td>Baby Monkey Perfume Sunset Wagon</td>
<td>0/1</td>
</tr>
<tr>
<td>D</td>
<td>Elbow Apple Carpet Saddle Bubble</td>
<td>0/1</td>
</tr>
<tr>
<td>E</td>
<td>Jacket Arrow Pepper Cotton Movie</td>
<td>0/1</td>
</tr>
<tr>
<td>F</td>
<td>Dollar Honey Mirror Saddle Anchor</td>
<td>0/1</td>
</tr>
</tbody>
</table>

**Immediate Memory Score:** 0/15

<table>
<thead>
<tr>
<th>List</th>
<th>Alternate 10 word lists</th>
<th>Score (of 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Finger Penny Blanket Lemon Insect</td>
<td>0/1/1</td>
</tr>
<tr>
<td>H</td>
<td>Candle Paper Sugar Sandwich Wagon</td>
<td>0/1</td>
</tr>
<tr>
<td>I</td>
<td>Baby Monkey Perfume Sunset Iron</td>
<td>0/1</td>
</tr>
<tr>
<td>J</td>
<td>Elbow Apple Carpet Saddle Bubble</td>
<td>0/1</td>
</tr>
<tr>
<td>K</td>
<td>Jacket Arrow Pepper Cotton Movie</td>
<td>0/1</td>
</tr>
<tr>
<td>L</td>
<td>Dollar Honey Mirror Saddle Anchor</td>
<td>0/1</td>
</tr>
</tbody>
</table>

**Immediate Memory Score:** 0/30

**Concentration Total Score (Digits + Months):**

**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.


**Months Score:** 0/1

**Concentration Total Score (Digits + Months):**

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**STEP 4: NEUROLOGICAL SCREEN**

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

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

**BALANCE EXAMINATION**

Modified Balance Error Scoring System (mBESS) testing

<table>
<thead>
<tr>
<th>Condition</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double leg stance</td>
<td>of 10</td>
</tr>
<tr>
<td>Single leg stance (non-dominant foot)</td>
<td>of 10</td>
</tr>
<tr>
<td>Tandem stance (non-dominant foot at the back)</td>
<td>of 10</td>
</tr>
<tr>
<td>Total Errors</td>
<td>of 30</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Time Started</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Please record each word correctly recalled. Total score equals number of words recalled.</td>
<td></td>
</tr>
<tr>
<td>Total number of words recalled accurately:</td>
<td>of 5</td>
</tr>
</tbody>
</table>

**STEP 6: DECISION**

<table>
<thead>
<tr>
<th>Domain</th>
<th>Date &amp; time of assessment:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom number (of 22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptom severity score (of 132)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orientation (of 5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate memory</td>
<td>of 15 of 30</td>
<td>of 15 of 30</td>
</tr>
<tr>
<td>Concentration (of 5)</td>
<td>Normal Abnormal Normal Abnormal Normal Abnormal</td>
<td></td>
</tr>
<tr>
<td>Neuro exam</td>
<td>Normal Abnormal Normal Abnormal Normal Abnormal</td>
<td></td>
</tr>
<tr>
<td>Balance errors (of 30)</td>
<td>of 5 of 10 of 10</td>
<td></td>
</tr>
<tr>
<td>Delayed Recall</td>
<td>of 5 of 10 of 10</td>
<td></td>
</tr>
</tbody>
</table>

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: ________________________________

**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.**

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CLINICAL NOTES:

Name: __________________________________________
DOB: __________________________________________
Address: ________________________________________
ID number: ______________________________________
Examiner: ________________________________________
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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INSTRUCTIONS

Words in Italic 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 21 x 6 = 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 1 & 2 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)® testing
This balance testing is based on a modified version of the Balance Error Scoring System (BESS)®. 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
2. Step, stumble, or fall
3. Step, stumble, or fall
4. Moving hip into > 30 degrees abduction
5. Lifting forefoot or heel
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
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
- Drowsiness or inability to be awakened
- Inability to recognize people or places

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

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

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.

<table>
<thead>
<tr>
<th>Mental Activity</th>
<th>Activity at each step</th>
<th>Goal of each step</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Daily activities that do not give the athlete symptoms</td>
<td>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.</td>
<td>Gradual return to typical activities.</td>
</tr>
<tr>
<td>2. School activities</td>
<td>Homework, reading or other cognitive activities outside of the classroom. May need to start with a partial school day or with increased breaks during the day.</td>
<td>Increase tolerance to cognitive work.</td>
</tr>
<tr>
<td>3. Return to school part-time</td>
<td>Gradual introduction of schoolwork. 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.</td>
<td>Increase academic activities.</td>
</tr>
<tr>
<td>4. Return to school full-time</td>
<td>Gradually progress school activities until a full day can be tolerated.</td>
<td>Gradual return to full academic activities and catch up on missed work.</td>
</tr>
</tbody>
</table>

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
- More time to finish assignments/tests
- No more than one exam/day
- Shorter assignments
- Quiet room to finish assignments/tests
- Use of a student helper/tutor
- Repetition/memory cues
- 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 schools until they are back to school/learning, without symptoms getting significantly worse and no longer needing any changes to their schedule.
Updated information and services can be found at:
http://bjsm.bmj.com/content/early/2017/04/26/bjsports-2017-097506S

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# Concussion Signs and Symptoms Checklist

**Student's Name:** ____________________________________________  **Student's Grade:** _______  **Date/Time of Injury:** __________

**Where and How Injury Occurred:** (Be sure to include cause and force of the hit or blow to the head.)
_______________________________________________________________________________________________________________________

**Description of Injury:** (Be sure to include information about any loss of consciousness and for how long, memory loss, or seizures following the injury, or previous concussions, if any. See the section on Danger Signs on the back of this form.)
_______________________________________________________________________________________________________________________

**DIRECTIONS:**

Use this checklist to monitor students who come to your office with a head injury. Students should be monitored for a minimum of 30 minutes. Check for signs or symptoms when the student first arrives at your office, fifteen minutes later, and at the end of 30 minutes.

**Students who experience one or more of the signs or symptoms of concussion after a bump, blow, or jolt to the head should be referred to a health care professional with experience in evaluating for concussion.** For those instances when a parent is coming to take the student to a health care professional, observe the student for any new or worsening symptoms right before the student leaves. Send a copy of this checklist with the student for the health care professional to review.

## Observed Signs

<table>
<thead>
<tr>
<th></th>
<th>0 MINUTES</th>
<th>15 MINUTES</th>
<th>30 MINUTES</th>
<th>MINUTES Just prior to leaving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appears dazed or stunned</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Is confused about events</td>
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<tr>
<td>Repeats questions</td>
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<tr>
<td>Answers questions slowly</td>
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</tr>
<tr>
<td>Can't recall events prior to the hit, bump, or fall</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can't recall events after the hit, bump, or fall</td>
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<td></td>
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</tr>
<tr>
<td>Loses consciousness (even briefly)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Shows behavior or personality changes</td>
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<tr>
<td>Forgets class schedule or assignments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Physical Symptoms

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

## Cognitive Symptoms

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

## Emotional Symptoms

- Irritable
- Sad
- More emotional than usual
- Nervous

To download this checklist in Spanish, please visit: www.cdc.gov/Concussion. Para obtener una copia electrónica de esta lista de síntomas en español, por favor visite: www.cdc.gov/Concussion.
Danger Signs:

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

- One pupil (the black part in the middle of the eye) larger than the other
- Drowsiness or cannot be awakened
- A headache that gets worse and does not go away
- Weakness, numbness, or decreased coordination
- Repeated vomiting or nausea
- Slurred speech
- Convulsions or seizures
- Difficulty recognizing people or places
- Increasing confusion, restlessness, or agitation
- Unusual behavior
- Loss of consciousness (even a brief loss of consciousness should be taken seriously)

Additional Information About This Checklist:

This checklist is also useful if a student appears to have sustained a head injury outside of school or on a previous school day. In such cases, be sure to ask the student about possible sleep symptoms. Drowsiness, sleeping more or less than usual, or difficulty falling asleep may indicate a concussion.

To maintain confidentiality and ensure privacy, this checklist is intended only for use by appropriate school professionals, health care professionals, and the student’s parent(s) or guardian(s).

For a free tear-off pad with additional copies of this form, or for more information on concussion, visit: www.cdc.gov/Concussion.

Resolution of Injury:

___ Student returned to class
___ Student sent home
___ Student referred to health care professional with experience in evaluating for concussion

SIGNATURE OF SCHOOL PROFESSIONAL COMPLETING THIS FORM: ____________________________________________

TITLE: ___________________________________________________________________________________________

COMMENTS: