SCAT2

Sport Concussion Assessment Tool 2

Symptom Evaluation

How do you feel?
You should score yourself on the following symptoms, based on how you feel now.

<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>Trouble falling asleep (if applicable)</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>
</tbody>
</table>

Total number of symptoms (Maximum possible 22)

Symptom severity score
(Add all scores in table, maximum possible: 22 x 6 = 132)

Do the symptoms get worse with physical activity? Y N
Do the symptoms get worse with mental activity? Y N

Overall rating
If you know the athlete well prior to the injury, how different is the athlete acting compared to his / her usual self? Please circle one response.

no different very different unsure

What is the SCAT2?1
This tool represents a standardized method of evaluating injured athletes for concussion and can be used in athletes aged from 10 years and older. It supersedes the original SCAT published in 2005. This tool also enables the calculation of the Standardized Assessment of Concussion (SAC) score and the Maddocks questions for sideline concussion assessment.

Instructions for using the SCAT2
The SCAT2 is designed for the use of medical and health professionals. Preseason baseline testing with the SCAT2 can be helpful for interpreting post-injury test scores. Words in Italics throughout the SCAT2 are the instructions given to the athlete by the tester.

This tool may be freely copied for distribution to individuals, teams, groups and organizations.

What is a concussion?
A concussion is a disturbance in brain function caused by a direct or indirect force to the head. It results in a variety of non-specific symptoms (like those listed below) and often does not involve loss of consciousness. Concussion should be suspected in the presence of any one or more of the following:

- Symptoms (such as headache), or
- Physical signs (such as unsteadiness), or
- Impaired brain function (e.g. confusion) or
- Abnormal behaviour.

Any athlete with a suspected concussion should be REMOVED FROM PLAY, medically assessed, monitored for deterioration (i.e., should not be left alone) and should not drive a motor vehicle.
Cognitive & Physical Evaluation

1 Symptom score (from page 1)
   22 minus number of symptoms
   of 22

2 Physical signs score
   Was there loss of consciousness or unresponsiveness? [ ] Y  [ ] N
   If yes, how long? ___________ minutes
   Was there a balance problem/unsteadiness? [ ] Y  [ ] N

3 Glasgow coma scale (GCS)
   Best eye response (E)
     No eye opening ____________________________ 1
     Eye opening in response to pain __________ 2
     Eye opening to speech ______________________ 3
     Eyes opening spontaneously __________________ 4
   Best verbal response (V)
     No verbal response __________________________ 1
     Incomprehensible sounds ______________________ 2
     Inappropriate words __________________________ 3
     Confused ___________________________________ 4
     Oriented ____________________________________ 5
   Best motor response (M)
     No motor response ___________________________ 1
     Extension to pain _____________________________ 2
     Abnormal flexion to pain _______________________ 3
     Flexion/Withdrawal to pain _____________________ 4
     Localizes to pain ______________________________ 5
     Obeyes commands ______________________________ 6
   Glasgow Coma Score (E + V + M)
   ________________________________ of 15

4 Sideline Assessment – Maddocks Score
   “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)
   At what venue are we at today? [ ] 0  [ ] 1
   Which half is it now? ____________________________ [ ] 0  [ ] 1
   Who scored last in this match? ___________________ [ ] 0  [ ] 1
   What team did you play last week/game? ___________ [ ] 0  [ ] 1
   Did your team win the last game? _______________ [ ] 0  [ ] 1
   Maddocks score
   ________________________________ of 5

5 Cognitive assessment
   Standardized Assessment of Concussion (SAC)
   Orientation (1 point for each correct answer)
   What month is it? ___________________________ [ ] 0  [ ] 1
   What is the date today? _______________________ [ ] 0  [ ] 1
   What is the day of the week? ___________________ [ ] 0  [ ] 1
   What year is it? ______________________________ [ ] 0  [ ] 1
   What time is it right now? (within 1 hour) ______ [ ] 0  [ ] 1
   Orientation score ________________ of 5

   Immediate memory
   “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 athlete that delayed recall will be tested.

   List | Trial 1 | Trial 2 | Trial 3 | Alternative word list
   __________________________|___________|___________|___________|____________________
   elbow | 0 1 0 1 0 1 | candle | baby | finger
   apple | 0 1 0 1 0 1 | paper | monkey | penny
   carpet | 0 1 0 1 0 1 | sugar | perfume | blanket
   saddle | 0 1 0 1 0 1 | sandwich | sunset | lemon
   bubble | 0 1 0 1 0 1 | wagon | iron | insect
   Total

   Immediate memory score
   ______ of 15

   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 7-1-9, you would say 9-1-7.”
   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.

   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...Go ahead”
   1 pt. for entire sequence correct
   ______ of 5

   Concentration score
   ______ of 5

---


Balance examination
This balance testing is based on a modified version of the Balance Error Scoring System (BESS)\(^2\). A stopwatch or watch with a second hand is required for this testing.

Balance testing
“I am now going to test your balance. Please take your shoes off, roll up your pant legs above ankle (if applicable), and remove any ankle taping (if applicable). This test will consist of two thirty-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.”

Balance testing – types of errors
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 athlete. The examiner will begin counting errors only after the individual 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 total number of errors for any single condition is 10. If a 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 subject is set. Subjects 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.

Which foot was tested: \boxed{[ ] Left \hspace{1cm} [ ] Right} (i.e. which is the non-dominant foot)

Condition
<table>
<thead>
<tr>
<th>Total errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double Leg Stance (feet together)</td>
</tr>
<tr>
<td>Single leg stance (non-dominant foot)</td>
</tr>
<tr>
<td>Tandem stance (non-dominant foot at back)</td>
</tr>
</tbody>
</table>

Balance examination score (30 minus total errors) of 30

Coordination examination
Upper limb coordination
Finger-to-nose (FTN) task: “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.”

Which arm was tested: \boxed{[ ] Left \hspace{1cm} [ ] Right}

Scoring: \boxed{5 correct repetitions in < 4 seconds = 1}

Note for testers: Athletes 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.

Coordination score

Cognitive assessment
Standardized Assessment of Concussion (SAC)
Delayed recall
“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.

List | Alternative word list
-----|-------------------
elbow | candle
apple | baby
saddle | finger
bubble | penny

Delayed recall score

Overall score

Test domain | Score
---|---
Symptom score | of 22
Physical signs score | of 2
Glasgow Coma score (E + V + M) | of 15
Balance examination score | of 30
Coordination score | of 1
Subtotal | of 70
Orientation score | of 5
Immediate memory score | of 5
Concentration score | of 15
Delayed recall score | of 5
SAC subtotal | of 30
SCAT2 total | of 100
Maddocks Score | of 5

Definitive normative data for a SCAT2 “cut-off” score is not available at this time and will be developed in prospective studies. Embedded within the SCAT2 is the SAC score that can be utilized separately in concussion management. The scoring system also takes on particular clinical significance during serial assessment where it can be used to document either a decline or an improvement in neurological functioning.

Scoring data from the SCAT2 or SAC 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.
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. It is expected that recovery will be rapid, but 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, dizziness, worsening headache, double vision or excessive drowsiness, please telephone the clinic or the nearest hospital emergency department immediately.

Other important points:
• Rest and avoid strenuous activity for at least 24 hours
• No alcohol
• No sleeping tablets
• Use paracetamol or codeine for headache. Do not use aspirin or anti-inflammatory medication
• Do not drive until medically cleared
• Do not train or play sport until medically cleared

Concussion injury advice  (To be given to 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. It is expected that recovery will be rapid, but 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, dizziness, worsening headache, double vision or excessive drowsiness, please telephone the clinic or the nearest hospital emergency department immediately.

Other important points:
• Rest and avoid strenuous activity for at least 24 hours
• No alcohol
• No sleeping tablets
• Use paracetamol or codeine for headache. Do not use aspirin or anti-inflammatory medication
• Do not drive until medically cleared
• Do not train or play sport until medically cleared

Clinic phone number

SCAT2 SPORT CONCUSSION ASSESSMENT TOOL 2 | PAGE 4