ICC
CHAMPIONING WORLD CRICKET

# CONCUSSION MANAGEMENT GUIDELINES

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## Introduction

While concussion is not a common injury in cricket and the incidence of repetitive head trauma even less so, nevertheless, due to the potential health risks associated with head trauma, management guidelines are required. The ICC's Concussion Management Guidelines follow the guidance provided by the 2016 Berlin Concussion Consensus which is the current best practice benchmark. The Consensus has been interpreted in the context of what fits the unique aspects of international cricket.

Concussion is defined as a 'traumatic brain injury induced by biomechanical forces'(1). It typically results in a rapid onset of neurological impairment that resolves spontaneously, although in some cases, clinical features may evolve over time. A concussion does not cause any structural damage to the brain, but acute clinical signs and symptoms largely reflect functional disturbance. Nevertheless, concussion is a potentially serious injury that may have both short (increased musculoskeletal and brain injury risk) and long-term (CTE, dementia and mental health issues) health risks. Concussion therefore requires a conservative management approach.

These guidelines cover head injuries and concussion during both games and training for both men and women.

## Awareness and preparation

All players, support staff and officials should be aware of the potential health risks of concussion and the ICC Concussion Guidelines, aimed at protecting players from these potential risks.

**Furthermore, all participants in the sport need to be aware that** any player who has a concussion diagnosed or concussion strongly suspected during a match, must be removed from that match and only return to competition when cleared by a medical practitioner

experienced in the management of concussion**. In one day or Twenty20 matches, this means the player cannot return to play in that game, unless the concussion diagnosis is reversed by a medical practitioner experienced in the diagnosis and management of concussion. In a multi-day match, this means that the player must be medically cleared before he/she can return to the game.**

The ICC, Member Federations, National teams and their health care personnel are all responsible for raising the awareness of the risks related to head trauma and the need for a more conservative approach to the management of concussion. Team health care personnel need to make sure that they are able to manage the diagnosis and management of concussion. If a team has a physiotherapist as the primary health care provider, that practitioner needs to be specifically trained in the diagnosis and management of concussion and have back up specialist medical support for advise regarding difficult management decisions.

## Concussion diagnosis background

The diagnosis of concussion is based on symptoms and/or signs of acute neurological dysfunction such as altered mental state or cognitive impairment. The symptoms and signs may come on rapidly, evolve over time, have a delayed onset (up to 48 hours) and usually resolve relatively quickly. The condition can present in different ways depending on what aspect of the brain's function has been disturbed. The condition can be difficult to interpret clinically as many of the symptoms and signs are largely non-specific.

Following head trauma, even with a normal neurological examination including SCAT5 assessment soon after that injury, a final diagnosis cannot be made because of the frequent incidence of delayed symptoms of concussion. A final clearance can only be made after delayed onset concussion has been excluded at about 48 hours post-injury. Therefore, on-going monitoring and formal examinations need to be a part of the diagnosis of, or exclusion of, concussion.

## Clear and immediate diagnosis of concussion

Cricket at the elite level generally has good medical support at matches. If during the course of a match, a player receives a significant knock to the head or neck and is unable to immediately resume play, a concussion should be suspected and the most senior member of the team's health care personnel, ideally a doctor, should immediately attend to the player.

From a practical perspective, a player with new (post-trauma) neurological symptoms or signs or any evidence of a disturbed mental state or cognitive function following a significant head knock, is considered to have concussion until an alternative diagnosis is confirmed.

***When should a team doctor/physio run out for an on-field assessment following head trauma?***

1. *If called on by the umpire;*
2. *If a player is down and players are calling for assistance;*
3. *Immediately, if the player is unable to stand and move after 3 to 4 seconds;*
4. *If a player calls for a new helmet following a head injury; and*
5. *At the end of the over, if the player resumes play after having sustained a blow to the head.*

If any of the following signs are observed, then the diagnosis of concussion is clear:

- confirmed loss of consciousness
- suspected loss of consciousness (prolonged immobility > 5 seconds)
- seizure, convulsion or tonic posturing (stiffening of any limb)
- ataxia, loss of motor control, inability to stand or staggering
- dazed or blank stare
- player in a confused state, disoriented or with memory impairment

In such circumstances, the player should be immediately removed from the match with the diagnosis of concussion already made. A SCAT5, referred to later in these Guidelines, could be deferred to after the day's play if there are conflicting priorities at the time.

***What should an on-field assessment include?***

1. *Ask the player if they have any symptoms such as dizziness or headache or just not their normal selves;*
2. *Talk to the player - are they responding inappropriately?*
3. *Does the player have a dazed appearance or a blank stare or does not seem their normal selves?*
4. *Is the player able to stand or walk normally unassisted?*
5. *Is the player unable to resume after a 3-4 minute stoppage in play?*
6. *Ask the player modified Maddocks questions relevant to cricket and*
7. *If available check the video of the incident for video signs of clear or suspected concussion.*

*If the doctor or physio notes any of the above issues, then the player should be taken off the field immediately for a SCAT assessment.*

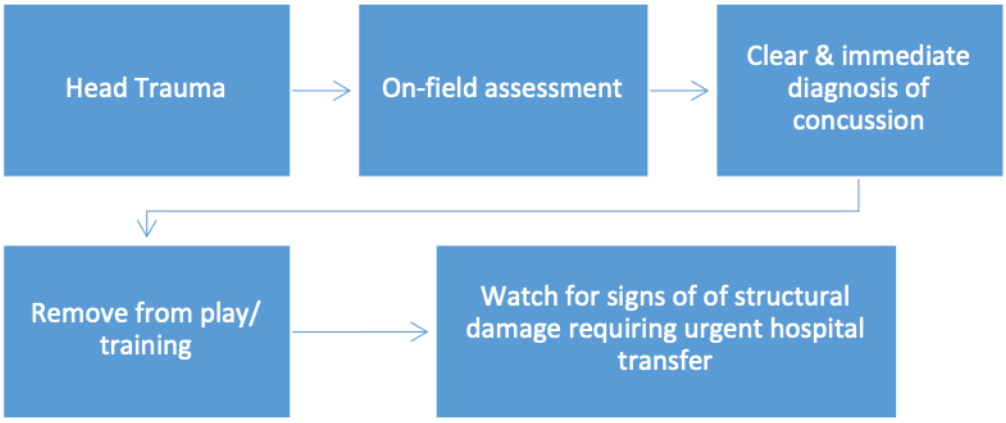



*Fig 1. Clear and immediate diagnosis of concussion*

## Role of the umpire and players on the field

An umpire should call for medical assistance if a player receives a significant head knock (unable to immediately return to play) or indeed has immediate worrying signs. In addition, a less severe helmet strike/head injury should demand immediate medical attendance if a player appears:

- to have loss of consciousness
- dazed

- unable to stand or is staggering

The team doctor or the appropriate member of the team's health care team should be called onto the field to assess the player. In such circumstances, the observations of the umpire or players on the field should be passed onto the team doctor or physiotherapist.

The umpire may be called to intervene if a player refuses to leave the field in circumstances where a team medical representative insists that a neurological assessment is indicated or the player has been diagnosed with concussion (it is important to remember that the player may be cognitively impaired).

### Role of a video review

If video of the injury incident is available, it should be reviewed. This can occur after the player has been attended to on the field of play or may help inform management if the incident was missed.

The purpose of this review is to observe the mechanism of the trauma, assist with determining whether immediate signs of concussion were present and missed in the direct observation of an incident.

If signs of a significant impact (e.g. a direct frontal blow to the helmet) and/or suspected concussion are present following the video review, the player should be immediately removed from the field of play with the need for further examination.

## Suspected diagnosis of concussion (where the diagnosis is not clear on the initial attendance)

In circumstances where there has been head or neck trauma and following attendance on the field, the diagnosis is not obvious but there are potential symptoms or signs of concussion, such as:

- the player complains of a headache or dizziness
- is unable to resume playing in 3-4 minutes
- the player 'seems' not to be their normal self

- there was the 'possibility' of the player being unsteady on their feet

The player should be removed for further neurological assessment in the medical room. This assessment should closely follow the SCAT5 and will take at least 10 minutes.

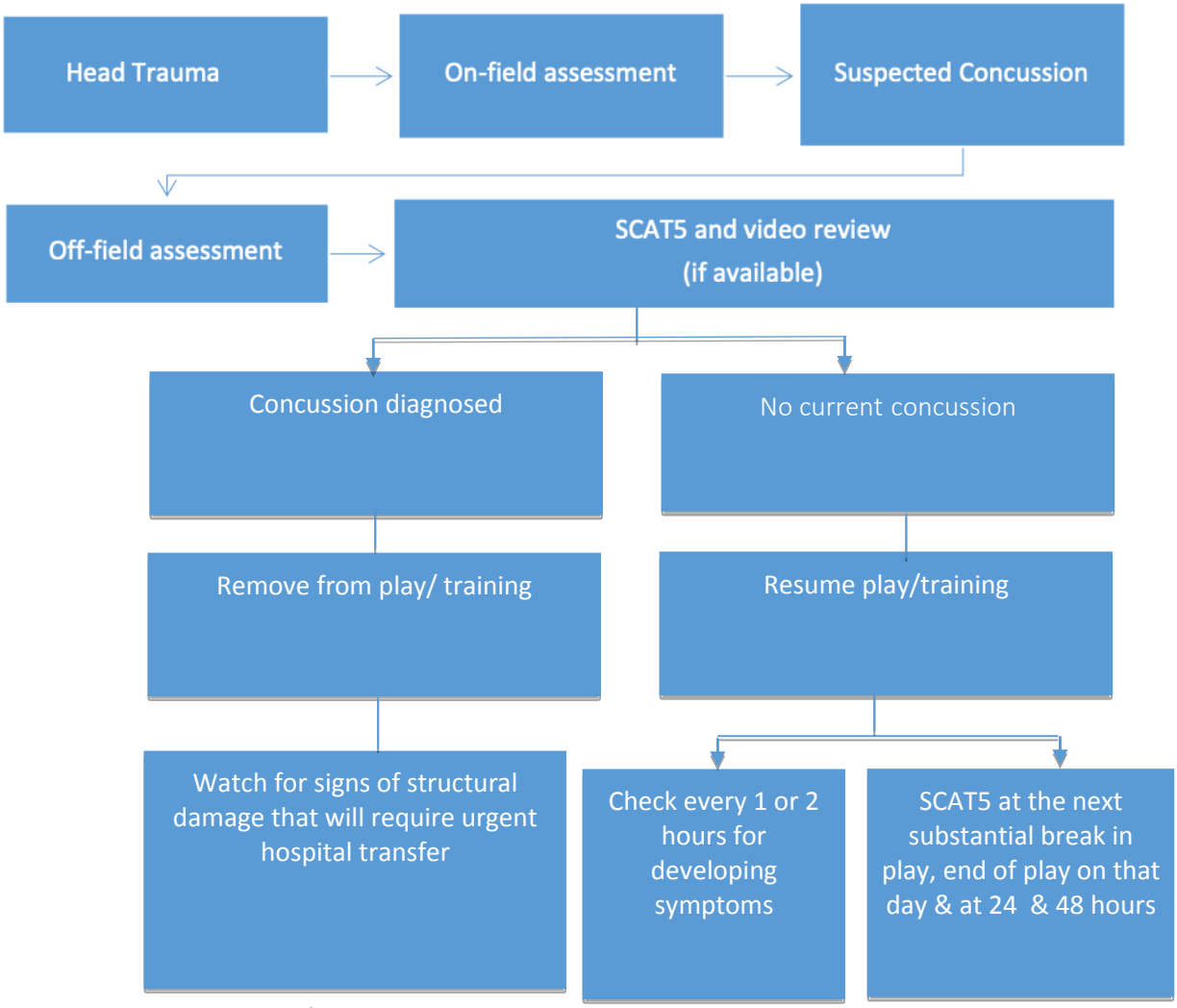



*Fig 2. Suspected diagnosis of concussion*

## Concussion not suspected - risk of delayed onset concussion

Approximately 20% of concussion cases have a delayed onset. In a technical sense, concussion can only be excluded 48 hours after an incident of significant head or neck trauma.

If following an on-field assessment, concussion is not diagnosed, the player may immediately resume playing.

If following an off-field assessment (including a SCAT5), concussion is not diagnosed, the player may return to the match.

However, because of the potential evolving nature of any brain dysfunction and delayed onset risk, the player should be observed and checked regularly (if practical, initially about every 1 or 2 hours), looking for developing symptoms or signs of concussion. A player must be removed from the match if concussion symptoms develop.

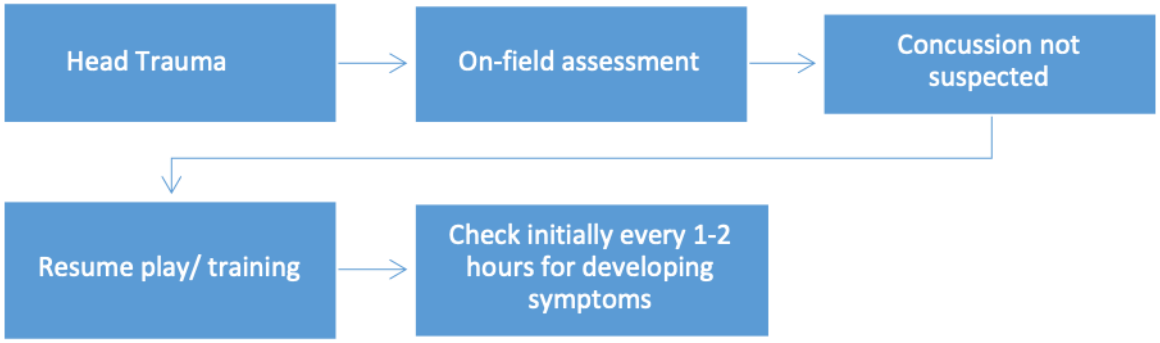



*Fig 3. Concussion not suspected*

A formal assessment should be repeated after the match or day's play and again about 24 to 48 hours later, utilising the SCAT5 (i.e. before start of play next day).

## Concussion diagnosed

Whether by obvious signs or symptoms or following neurological examination including the SCAT5, if the diagnosis of concussion is made, the player should be immediately and permanently removed from further participation in the match or training on that day and not permitted to return until cleared by a health care practitioner, ideally a medical practitioner, who is trained and experienced in the management of concussion.

### Immediate management of concussion

*At a match or training*

A player diagnosed with concussion must be immediately and permanently removed from further participation in the match or training on that day. Because of this requirement, the

initial focus of management is to diagnose or exclude concussion.

***S**erious structural head injury - emergency referral to a hospital*

If a player diagnosed with concussion or suspected concussion has or develops signs of a more serious brain injury, then the player should be urgently transferred to a hospital with a neurosurgical unit. Signs of a possible serious structural brain injury include:

- deteriorating conscious state
- subsequent convulsion or seizure
- double vision
- accelerating symptoms such as headache or vomiting
- focal neurological signs or symptoms in the limbs such as weakness or altered sensation
- neck pain or tenderness
- increasing agitation, irritability or combativeness

## Rehabilitation

The Berlin Consensus describes a graded return to play process leading to a formal medical clearance. Each stage of the rehabilitation should be reviewed to ensure that concussion symptoms have not returned. Generally, concussion symptoms will settle within 2-3 days and a player diagnosed with concussion is ready to return in about a week but in some individuals this time might be shorter or longer. Experienced medical oversight, as occurs in elite teams, is essential if a player is to return to play within a week or on a subsequent day of a multi-day match. A team physiotherapist may fulfill this role in the absence of a team doctor, if they have been specifically trained and have had supervised experience in the management of concussion and have adequate specialist medical advice available. An experienced match day doctor can support the process under these circumstances.

Typical graded return to play for cricket:

- 24 hours relative rest
- light aerobic exercise
- light training

- full training
- cleared to compete

If at any of these stages' symptoms return, the player should drop back an exercise level.

If the player is a student they may require a couple of days off school to rest. A player should not return to full training if unable to attend school or work without symptoms returning.

## The return to play decision - for a subsequent match or during a multi-day match

A concussed player requires a formal medical clearance to return to training and play and never permitted to return on the day of the injury. Usually a player will recover in about 7 days but this can vary from individual to individual.

## Management of a difficult concussion case

If the concussion symptoms continue for more than 3 weeks a player should be referred to a specialist who is experienced in the management of concussion. The player should be referred for a full neuropsychological assessment and a standard MRI to exclude structural brain damage. Other investigations will be undertaken as determined by the specialist neurological examination.

In difficult cases, the specialist, in collaboration with the team doctor, is responsible for clearing the player to return to full training and competition.

## Role of formal neuropsychological assessment

Formal neuropsychological assessments are indicated in the management of difficult concussion, i.e players with persistent symptoms or signs, escalating symptoms related to separate concussion incidents and/or potential retirement decisions related to concussions.

## Baseline testing

Baseline testing is a useful adjunct to the neurological assessment and in tracking recovery. This may utilise the actual SCAT5, online systems such as Cogsport and ImPACT or pen and paper cognitive screening tools. Generally, the more neurological function that can be tested, the better for informed management.

Baseline testing is recommended for elite teams but not community level sport. If baseline testing had been undertaken (ie. computerized cognitive testing such as CogState or ImPACT, SCAT5 or written cognitive assessment) the player should return to baseline, alongside normal neurological examinations, before the player can return to competition. Any baseline neurophysiological testing is an adjunct to a neurological assessment and any final decision must be by a doctor interpreting all the clinical information.

## Community level competition

At the community level, a cricket match is highly unlikely to have a medical practitioner present. Therefore, any possibility of concussion should see the player removed from play and referred to a medical practitioner for management of concussion.

The Berlin Consensus has developed a concussion recognition tool and this document will assist parents and coaches in recognising the possibility of concussion.

*pocket Concussion Recognition Tool (CTR)* -
http://bjsm.bmj.com/content/bjsports/47/5/267.full.pdf

## Concussion in children

Managing the identification of concussion in children requires a more conservative approach. The Child SCAT5 has been developed for use by medical professionals for the

assessment of children between the ages 5-12 years. For players aged 13 years or older, the SCAT5 can be used.

*Child SCAT5* - http://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097492childscat5.full.pdf

Rehabilitation of children is slower and initial attention should be to remove the child from school and monitor symptoms related to schoolwork and then exercise and sport.

If symptoms persist for 3 weeks, the child should be referred to a pediatric concussion specialist.

## Concussion replacement

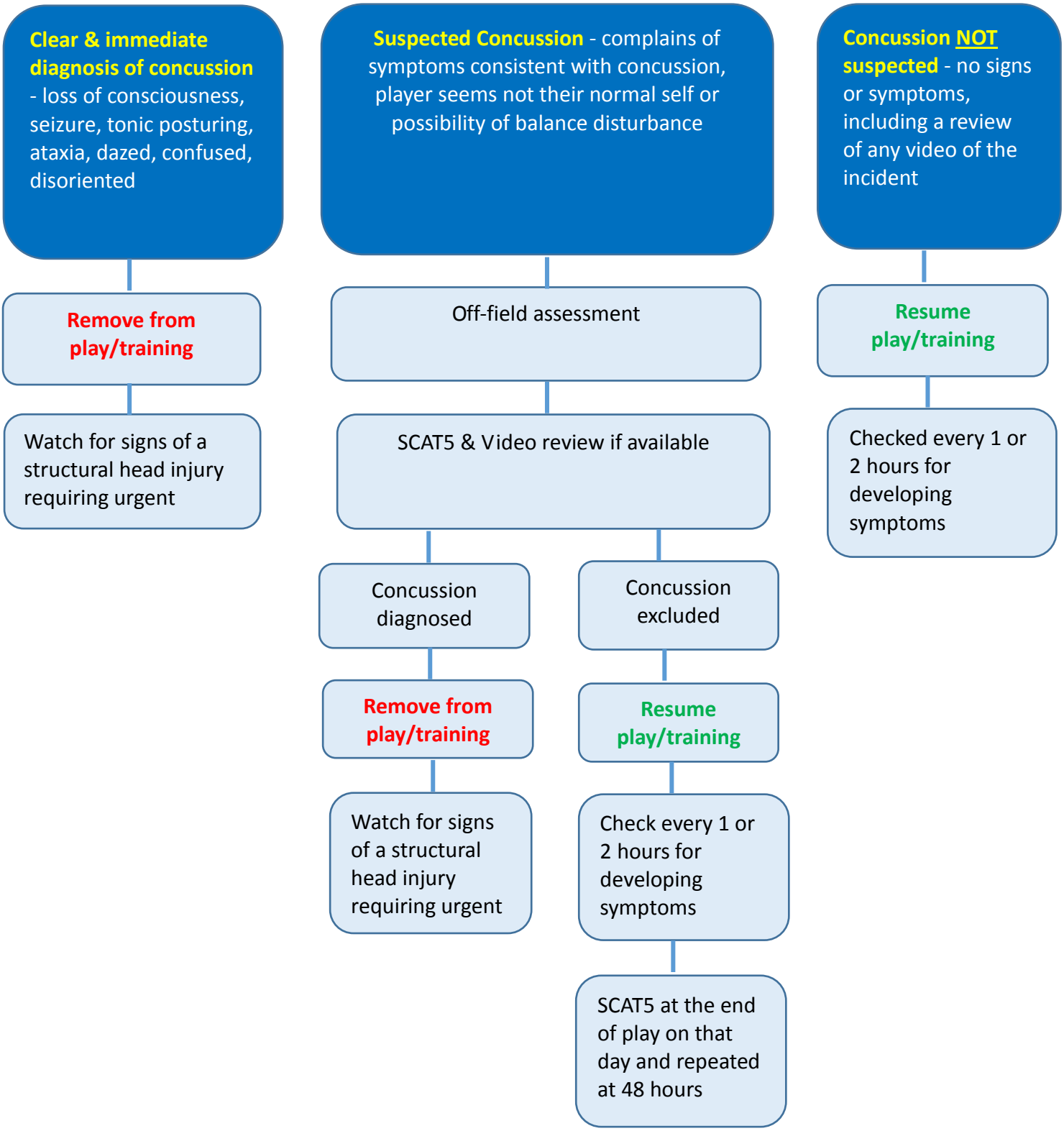
International cricket allows for a concussion replacement in the playing conditions. These rules should be followed under such circumstances.

## REFERENCES

1. McCrory P, Meeuwisse WH, Aubry M, Cantu B, Dvorak J, Echemendia RJ, et al. Consensus Statement On Concussion In Sport - The 4th International Conference On Concussion In Sport Held In Zurich, November 2012. British Journal of Sports Medicine. 2013;47(5):1-11. Eng.

# Head Trauma Assessment

*(Following on-field assessment by a team doctor or physio)*



# SCAT5©

## SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION

DEVELOPED BY THE CONCUSSION IN SPORT GROUP
FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by

**Patient details**

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of Injury: _____ Time: _____

## WHAT IS THE SCAT5?

**The SCAT5 is a standardized tool for evaluating concussions designed for use by physicians and licensed healthcare professionals[1]. 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.



## 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.

1

## IMMEDIATE OR ON-FIELD ASSESSMENT

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

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

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

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

## STEP 1: RED FLAGS

**RED FLAGS:**

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

## STEP 2: OBSERVABLE SIGNS

Witnessed ☐ Observed on Video ☐

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

## STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS[2]

*"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

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

Note: Appropriate sport-specific questions may be substituted.

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

## STEP 4: EXAMINATION GLASGOW COMA SCALE (GCS)[3]

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

## CERVICAL SPINE ASSESSMENT

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

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

## OFFICE OR OFF-FIELD ASSESSMENT

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

## STEP 1: ATHLETE BACKGROUND

Sport / team / school: _____

Date / time of injury: _____

Years of education completed: _____

Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

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

When was the most recent concussion?: _____

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

**Has the athlete ever been:**

| | | |
|---|---|---|
| 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:

_____

_____

_____

_____

_____

_____

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

2

## STEP 2: SYMPTOM EVALUATION

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

**Please Check: ☐ Baseline ☐ Post-Injury**

**Please hand the form to the athlete**

| | none | mild | | moderate | | severe | |
|---|---|---|---|---|---|---|---|
| Headache | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| "Pressure in head" | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Neck Pain | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Nausea or vomiting | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Dizziness | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Blurred vision | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Balance problems | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Sensitivity to light | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Sensitivity to noise | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Feeling slowed down | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Feeling like "in a fog" | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| "Don't feel right" | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Difficulty concentrating | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Difficulty remembering | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Fatigue or low energy | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Confusion | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Drowsiness | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| More emotional | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Irritability | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Sadness | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Nervous or Anxious | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Trouble falling asleep (if applicable) | 0 | 1 | 2 | 3 | 4 | 5 | 6 |

| | |
|---|---|
| Total number of symptoms: | of 22 |
| Symptom severity score: | of 132 |
| Do your symptoms get worse with physical activity? | Y N |
| Do your symptoms get worse with mental activity? | Y N |
| If 100% is feeling perfectly normal, what percent of normal do you feel? | |

If not 100%, why?

_____

_____

_____

**Please hand form back to examiner**

3

## STEP 3: COGNITIVE SCREENING

**Standardised Assessment of Concussion (SAC)**

### ORIENTATION

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

### IMMEDIATE MEMORY

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

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

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

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

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

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

## CONCENTRATION

### DIGITS BACKWARDS

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

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

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

### MONTHS IN REVERSE ORDER

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

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

4

## STEP 4: NEUROLOGICAL SCREEN

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

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

## BALANCE EXAMINATION

**Modified Balance Error Scoring System (mBESS) testing[5]**

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

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

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

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

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

5

## STEP 5: DELAYED RECALL:

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

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

**Time Started**

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

_____

_____

_____

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

6

## STEP 6: DECISION

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

Date and time of injury: _____

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

Concussion Diagnosed?
☐ **Yes** ☐ **No** ☐ **Unsure** ☐ **Not Applicable**

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

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

Signature: _____

Name: _____

Title: _____

Registration number (if applicable): _____

Date: _____

**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.**

## 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: _____



Contact details or stamp

## INSTRUCTIONS

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

### Symptom Scale

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

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

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

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

### Immediate Memory

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

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

Complete all 3 trials regardless of score on previous trials.

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

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

Trials 2 & 3:

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

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

### Concentration

### Digits backward

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

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

Begin with first 3 digit string.

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

### Months in reverse order

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

1 pt. for entire sequence correct

### Delayed Recall

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

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

Score 1 pt. for each correct response

### Modified Balance Error Scoring System (mBESS)[5] testing

This balance testing is based on a modified version of the Balance Error Scoring System (BESS)[3]. 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. 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

*"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


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

## CONCUSSION INFORMATION

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

### Signs to watch for

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

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

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

### Rest & Rehabilitation

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

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

### Graduated Return to Sport Strategy

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

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

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

### Graduated Return to School Strategy

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

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

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

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

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

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