



**HEAD INJURY & CONCUSSION
GUIDELINES**

2018





**NEW
DEVELOPMENTS
2018**

**SOME OF THE KEY DEVELOPMENTS SINCE
THE LAST ECB CONCUSSION GUIDELINES.**

- Concussions can present after 24 (20%) - 48hrs (3-5%). Only 50% occur immediately and 47% occur in the absence of physical signs.
- Thus in cricket a concussion can develop and therefore may only present itself over the course of a longer format of the game.
- Most sports are using a combination of video and off-field assessment, with some having independent assessments.
- Cricket is unique in the length of the game which creates issues around pressures on medical staff and player to continue to play on. A concussion replacement policy is now being piloted in the English game after use by Cricket Australia.
- The ICC Medical committee has been formed and is looking at formation of guidelines.
- Significant helmet strikes can have sequelae and therefore players need ongoing monitoring without immediate evidence of concussion.
- Baseline Testing is essential.
- Cricket will remain a 6 day graded return for confirmed concussion.
- If a suspected concussion later turns not to be a concussion, a doctor experienced in concussion management must make the assessment to allow return sooner than 6 days.



ECB CONCUSSION GUIDELINES

ecb.co.uk/concussion

ECB health and safety Science and Medicine department

Where appropriate these guidelines are to be used by adequately trained medical practitioners and should be used in conjunction with required standards of advanced life support and emergency care.

These are guidelines only and all players, where uncertainty or a significant concern is raised, should immediately be referred to specialist care.

The 2018 guidelines are a revision and development of the 2015 guidelines based on the Berlin Consensus 2016, the 2017 Dublin Implementation Consensus panel, ECB medical advisory groups, the 2016 American Neurology Sports Concussion Conference, the RFU Drake Concussion symposiums 2016 and 2017, the 2017 IOC Injury prevention conference and the data from ECB concussion screening programs and RECOS research program.

Furthermore, injury surveillance data and shared international cricket experience with other National Governing Bodies has helped form these guidelines. ICC concussion guidelines are being introduced in 2018.

The new guidelines are also supported by in the professional game with the introduction of concussion substitutes (Replacement Policy). The current management pathway helps to define application in the cricket environment.

The guidelines do not replace or supersede the evaluation by a doctor or appropriately trained medical / healthcare professional. Forms and further information at ecb.co.uk/concussion

CONCUSSION IS A SERIOUS AND COMPLEX CONDITION THAT REQUIRES RESPECT

The management of the condition (Berlin 2016)

Remember:

- 1 Recognise
- 2 Remove
- 3 Re-evaluate
- 4 Rest
- 5 Rehabilitation
- 6 Refer
- 7 Recover
- 8 Return to sport

A concussion can be one of the most complex and challenging injuries to diagnose and manage. The immediate care appears increasingly important in light of developing awareness of the relationship between concussive episodes and early onset degenerative brain disease.

Concussion cannot be diagnosed through any one question, sign, symptom or test. It requires multiple modes of assessment that may well need repeating, and then a necessary careful reintroduction to play. Because of this complex process, concussion is not only easily missed and under-diagnosed, but often results in inappropriate early return to play, it is now considered more than a simple functional disturbance.

The management in cricket is no different to any other sport and should still follow the basic premise of the Berlin Consensus 2016.

DEFINITION OF A SPORT RELATED CONCUSSION (SRC)

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

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

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

CONCUSSION/HEAD INJURY IN CRICKET

The risk of concussion in cricket appears relatively low compared to some sports but carries significant risk in that the cricket ball can be projected at a high velocity directly at someone's head within the laws of the game. Although protective headgear is usually worn it is not failsafe, not worn in all situations, and uncommonly by fielders and umpires. Furthermore the design of helmets does not routinely cover the occipital region well, despite the use of additional protection. The development of additional protection in this area has been introduced but has no set standards at this time.

Head injuries are most common while in the process of batting but can occur when in the field, especially in close fielding positions or if collisions occur in the act of fielding.

ONFIELD ASSESSMENT

In the event of a head or neck injury a concussion the appropriate medical personal or most responsible individual should attend to the potentially injured player. In the first class game this is most likely to be a physio.

They should consider running out in the following circumstances:

1. If summoned by an umpire.
2. If the player is down and/or calling for assistance.
3. If the player sustains any significant blow and/or any worrying signs
ie dazed, confused, falls to the ground, change in behaviour.
4. If video review suggests an assessment is required.
(for more information on video review see page 16).

When out in the middle the physio will need to undertake an on-field assessment. They should consider the Pocket CRT (Appendix 1) using the modified Maddock's test as per page 6 below.

If in the professional game and using the CSX app, this is referred to as a PSA (pitch-side assessment).

The management should then follow the protocol for either an obvious concussion or suspected concussion according to flow chart 1 or 2 respectively.

Role of Umpires / Coaches

The umpire / coach is not expected to diagnose a concussion episode. However, they are required to call onto the field medical personal for any helmet strikes or concerns around a players welfare. Education modules are being developed by the ECB and simple literature / guidance is available at ecb.co.uk/concussion

RECOGNITION OF CONCUSSION (REMOVAL FROM FIELD)

If called to the field, a pocket CRT with amended Maddocks questions should be used if the concussion is not obvious.

Recognising the concussion is perhaps the most important step in immediate management.

Clues to concussion can include:

- Severity of helmet strike (Video Review)
- Any loss of consciousness / responsiveness
- Slow to get up / lying motionless for any period
- Blank or vacant expression
- Balance / coordination problems: unsteady on feet
- Disorientation / confusion, difficulty answering questions / unaware of situation
- Loss of memory
- Visible facial or head injury

If the player has any features of the above they must be **removed** from the field for further assessment and or resuscitated and stabilised as appropriate.

Modified Maddocks

“What venue are we at today?”

“Which session of the game are we in?”

“Who is bowling / batting at the moment in this game?”

“What team did you play last week / game?”

“What was the score / your score in the last game?”

If using CSX - Use PSA (pitch side assessment tool)
In addition, a player should be observed for additional signs as per table 1 (below)

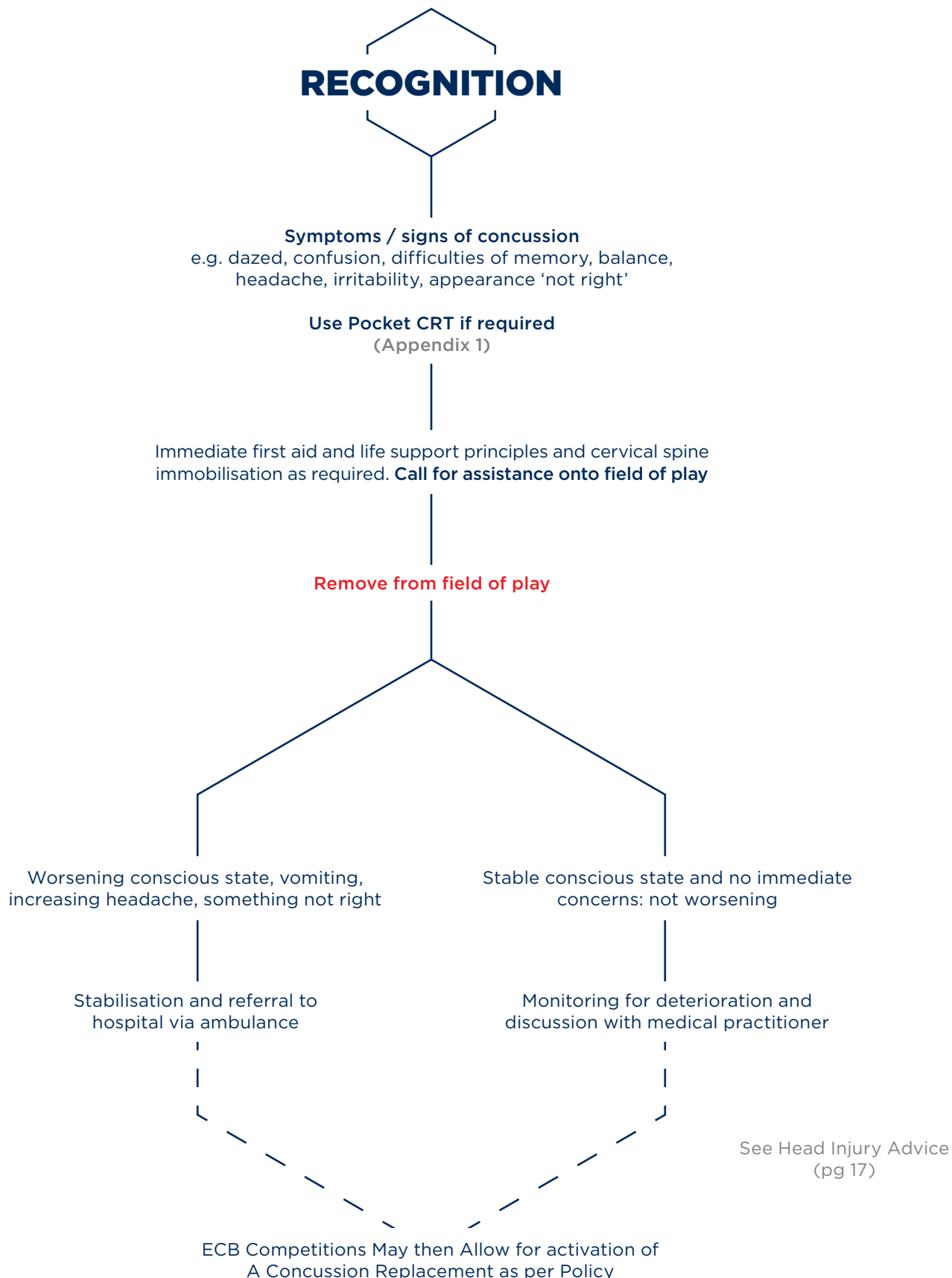
TABLE 1
ADDITIONAL SIGNS AND SYMPTOMS OF A CONCUSSION

Emotional	Cognitive	Physical
Nervous or anxious Irritable Sad More emotional	Confused Feeling slowed down Fatigue or low energy - feeling like “in a fog” Loss of memory “Don’t feel right” Sensitive to noise Difficulty remembering Difficulty concentrating	Loss of consciousness - headache Seizure or convulsion - dizziness Balancing problems Nausea or vomiting Drowsiness - “pressure in head” Blurred vision Sensitive to light Neck pain

FLOW CHART 1

MANAGEMENT OF HEAD INJURY / CONCUSSION

Basic first aid principles apply with immediate assessment of level of consciousness AVPU and subsequent ADBCDE, e.g. airways, cervical management, breathing, circulation, cervical neck management and call for assistance.



See Head Injury Advice
(pg 17)

MATCH DAY MANAGEMENT

The management of a concussion requires well established, immediate care plans, equipment, staffing and training in accordance with ECB guidelines. However, there are key and important steps in the management of concussion. These include:

1. **Recognise:** Both the immediate and delayed presentation of concussion can be complex and thus a high index of suspicion must be maintained. Symptoms and signs must be used as well as tools such as the Pocket CRT (Appendix 1*). If in doubt the player should be removed from the field of play for further assessment. Additional signs and symptoms are outlined in Table 1. Video evidence and severity of event may demand further assessment off field.
2. **Remove:** Any suspected or confirmed concussion demands removal from the field of play.
3. **Re-evaluate:** Once the player has been removed from the field of play, this allows for a formal assessment using SCAT5 (Appendix 2**) and/or medical evaluation. If the situation appears unclear or worsening, immediate referral to specialist care including hospital emergency departments is necessary. A medical doctor trained in the management of head injuries may make an assessment at the ground.
4. **Rest and Recovery:** If concussion has been confirmed, first 24hrs includes both physical and cognitive rest. The recovery shall follow the grade return to play.
5. **Return to Play (RTP):** If a diagnosis of a concussion is made, an appropriate graded return to play in accordance with Berlin consensus and with cricket specific functional testing (Page 13 – Table 2) should be undertaken once symptomatic (following the required Rest / Recovery). This GRTP player requires six days for a confirmed concussion.

As well as a suspected concussion, all trauma and suspected injuries should be managed as per advanced life support included in ECB Cricket Trauma Management training.

If the testing is normal and there are no concerns then the player can stay on, and upon leaving the field can be monitored with repeated observations such as using a Pocket CRT.

Modified Maddocks

The CRT and SCAT5 questions will need to be modified for cricket:

- “What venue are we at today?”
- “Which session of the game are we in?”
- “Who is bowling / batting at the moment in this game?”
- “What team did you play last week / game?”
- “What was the score / your score in the last game?”

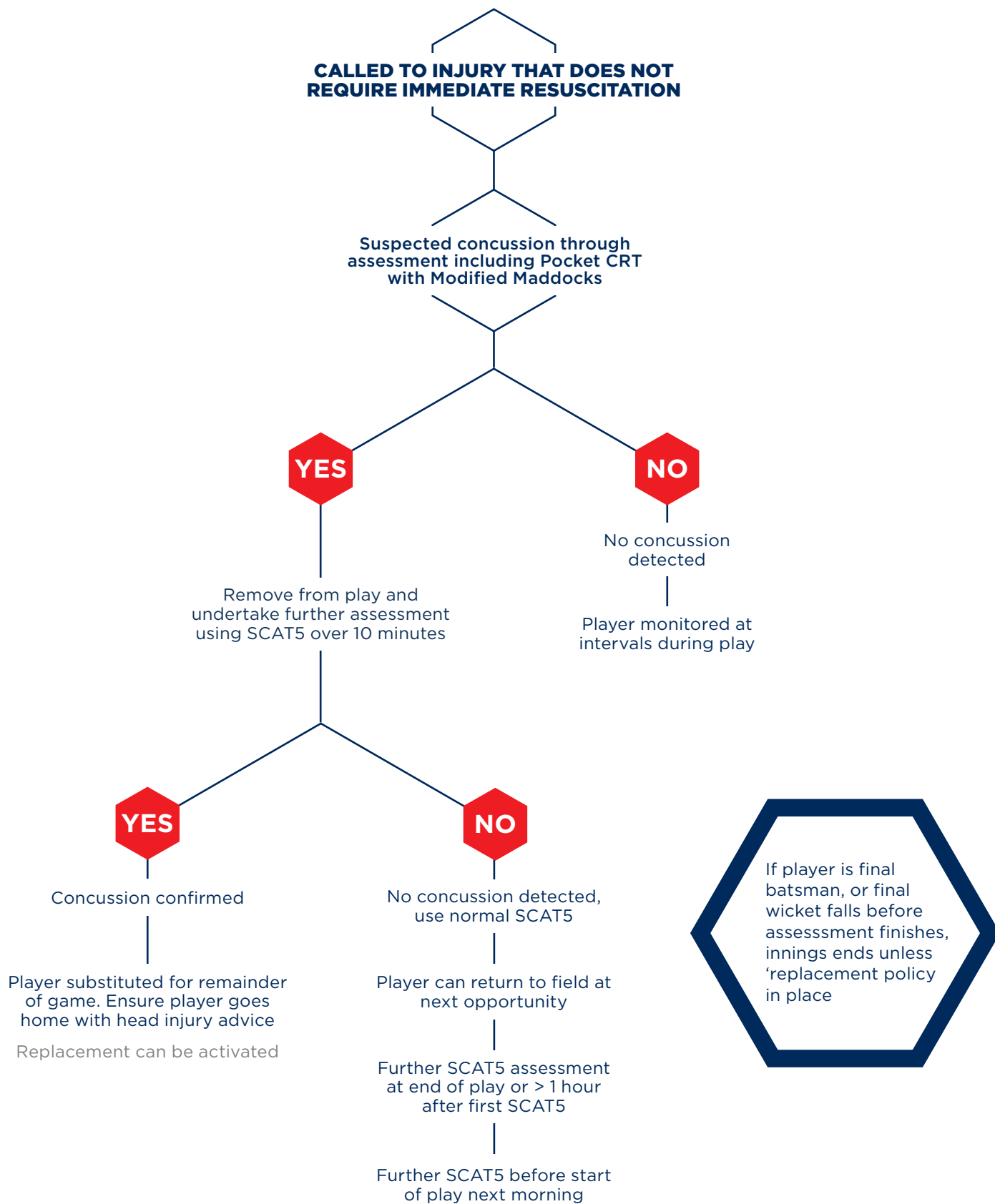
These questions should be used in the same manner as the Pocket CRT or SCAT5 questions they replace.

*If using CSX app use PSA

**If using CSX - use Game HIA

FLOW CHART 2 MANAGEMENT OF SUSPECTED / POSSIBLE CONCUSSION

Without significant deterioration and possible normal outcome of assessments.



SUSPECTED / DETERMINED CONCUSSION

The player will need removal from the field of play and a full head injury assessment should be undertaken using the SCAT5. Cricket allows for a player to be substituted whilst fielding, or to retire hurt when batting. If the subsequent assessment using SCAT5 determines no actual concussion the batsman can return to the field at the next opportunity. A fielder can return at an appropriate moment in play.

All players suspected of a concussion must be removed from the field of play and follow ECB / Berlin consensus return to play guidelines.

SIDELINE EVALUATION

It is critical in determining disposition decisions for the athlete. The sideline evaluation is based on recognition of injury, assessment of symptoms, cognitive and cranial nerve function, and balance. Serial assessments are often necessary. Because SRC is often an evolving injury, and signs and symptoms may be delayed, erring on the side of caution (ie, keeping an athlete out of participation when there is any suspicion of injury) is important.

The suspected diagnosis of SRC can include one or more of the following clinical domains:

- a. Symptoms: somatic (eg, headache), cognitive (eg, feeling like in a fog) and/or emotional symptoms (eg, lability)
- b. Physical signs (eg, loss of consciousness, amnesia, neurological deficit)
- c. Balance impairment (eg, gait unsteadiness)
- d. Behavioural changes (eg, irritability)
- e. Cognitive impairment (eg, slowed reaction times)
- f. Sleep/wake disturbance (eg, somnolence, drowsiness)

If after 10 mins assessment no concussion is diagnosed, player can return but continue to be observed with additional SCAT5 at end of days play or worsening of symptoms.

If after removal a concussion is confirmed and the concussion replacement is activated, a player is permanently removed from the game.

Confirmed concussion

True Immediate / Diagnosed of concussion leads to permanent removal from game and completion of Concussion SCAT5 and ECB concussion substitute forms and medical records in CRICKET SQUAD. This would include any loss of consciousness.

FOLLOW UP ASSESSMENTS

Any player who fulfils the previous criteria needs ongoing head injury assessment on removal from play, at the end of the day's play with a minimum of at least an hour after the initial SCAT5, and the following morning before the start of play. These repeat assessments allow for the subtle or delayed concussion to be more accurately determined.

All players who have required a SCAT5 assessment should not be discharged without head injury advice

NEXT DAY ASSESSMENT BEFORE PLAY

Cricket somewhat uniquely continues play for many days and thus the morning after the original injury allows a final SCAT5 to be undertaken to help exclude a delayed diagnosis of concussion. This can include additional subtle signs such as sleep disturbance, feeling "in a fog", emotional changes and memory function. If at this stage the repeat SCAT5 is indicative of a concussion then the management must be as per the 'concussion diagnosed' section (next page). A Delayed concussion can then be 'picked up' and enter the rest / recovery and GRTP and activation of 'replacement' can be considered.

CONCUSSION DIAGNOSED

When a concussion is diagnosed the player must be removed from the field of play and may not return in that game regardless of duration of the match (limited over, T20, 2-5 days). A concussion must be managed by a healthcare professional who is trained and practised in head injury management. If the practitioner is uncertain then consultation / referral to a doctor with appropriate training must occur.

If there are any concerns regarding the severity of the injury or the potential for deterioration then the player should be transferred to specialist medical care and in the following circumstances needs urgent transfer to hospital:

1. Prolonged period of loss of consciousness
2. Reduced GCS – deterioration in level of consciousness
3. Seizures
4. Ongoing confusion
5. Worsening headaches
6. Signs of intracranial pressure or intracranial nerve injury
7. Vomiting
8. Indication of additional trauma / neck injury / spinal cord injury

• **These concussion guidelines do not replace medical judgment and all uncertainties require assessment by an appropriately trained and skilled doctor.**

• **Special attention needs to be made for children / adolescents whose recovery is slower; this will be covered separately.**

CONCUSSION REPLACEMENT POLICY (PROFESSIONAL GAME)

For the 2018 season, across the “Professional Game” only, the ECB are introducing concussion replacement regulations, that will allow for a player with a suspected concussion to be replaced according to the replacement policy (see ECB website). This will require the appropriate medical personnel at the game to notify the Cricket Liaison Officer (CLO) or designated authority that a player has sustained a concussion and that they wish to activate the concussion replacement.

This will require completion of the concussion replacement form and appropriate medical records, including CSX HIA/PSA and Cricket Squad entry, as well as video review where possible. Full documentation is

required as per ECB otherwise it may be considered a violation of the policy.

HEAD INJURY ADVICE

Any player where a suspicion of a head injury / concussion has been raised must be monitored both on and off the field and should not leave the ground without head injury advice. For additional information see page 17.



Head injury advice sheet, see page 17

GRADUATED RETURN TO PLAY (GRTP)

The nature of any concussion should be taken on a case-by-case basis.

However, regardless of the extent or nature of the concussion there is a need for immediate cognitive and physical rest.

The understanding of the injury is evolving but it is certain that neurophysiology suggests that the brain does not begin to recover for some days after the initial insult and that there is an increased risk of injury for some time after the initial injury.

A healthcare professional trained in the management of RTP and head injuries must supervise the GRTP. Where there appears to be any delay or complication, the GRTP must be in conjunction with a doctor with specialist training in head injury management and RTP. All concussions must be discussed with the club CMO, appropriate specialist doctor and a face-to-face review.

All symptoms need to be absent for 24 hours before simple cognitive and physical activities can be undertaken. Graded steps of gradual increase in activity must be accompanied by a 24-hour window to check for further symptoms or signs. To achieve the level 5 / 6 as identified in Table 2, the player needs a 24-hour period for each level and therefore means no further return to a full training situation for six days.

Failed graded return

Under the GRTP programme, the player can proceed to the next stage only if there are no symptoms of concussion during rest and at the level of exercise achieved in the previous GRTP stage. If any symptoms occur while going through the GRTP programme, the player must return to the previous stage and attempt to progress again after a minimum 24-hour period of rest without symptoms.

TABLE 2
GRADED RETURN TO PLAY (BERLIN 2016)

Staged Rehabilitation	Functional exercise at each stage of rehabilitation	Objective of each stage
No activity for 24 hours	Complete rest: physical and cognitive Needs minimum 24-hour. Window of being symptom free	Recovery / rest
Symptom-limited activity	Daily activities that do not provoke symptoms	Gradual reintroduction of work/school activities
Light aerobic exercise	Walking, swimming or stationary cycling, keeping intensity Mild to moderate (i.e. not out of breath) <70% maximum permitted heart rate. Duration should not exceed approx. 20-30 min. Avoid resistance exercises	Increase exertion / heart rate / SNS
Sport-specific exercise	Simple fielding (catching / throwing), low key batting. Bowlers bowl to empty net at around 50% avoiding exposure to H.I. risk. Controlled, familiar and predictable batting drills. Increase H.R. activities to closer to maximum	Add movement / coordination
Non-contact training drills	Progression to more complex training drills, e.g. moderately challenging fielding drills. Batting against throws / machine (predictable). Bowling to empty net 75%-100%. May start progressive resistance training. Maximum cardiovascular stress	Exercise, coordination and cognitive load
Full-contact practice	Following medical clearance, participate in normal / match preparation at high intensity, i.e. bowlers bowl to batsmen. Full batting, bowling and fielding	Restore confidence and assess functional skills by coaching staff
Return to play	Normal game play	

CHILDREN AND ADOLESCENTS: ADDITIONAL RISK

Children's / adolescents' (5-19 yrs) brains are still developing and as such, require additional caution in the management of head injuries. The child and adolescent brain is still improving its learning potential and thus it is imperative that the cognitive function is restored as a priority before any return to sport is considered.

This in addition to other differences in physiological responses and specific risks (e.g. diffuse cerebral swelling related to head impact) demands a more conservative RTP approach. It is appropriate to extend the amount of time of asymptomatic rest and/or the length of the graded exertion in children and adolescents.

All children under the age of 12 should be assessed using the Child SCAT5 (Appendix 3).

The priority in the management of RTP in any child / adolescent must be seen to be a successful return to normal school function before they can return to sport. It is likely that in this case the RTP is 23 days. There are specific additional return-to-school guidelines, which include extra-time for assignments / exams, quiet study areas, increased breaks, rests and reduction in stressful / responsible situations. Any return to play should be signed off by appropriate medical clearance and any worsening symptoms and signs or failure to recover as expected, demands further specialist referral.

ADDITIONAL RISK MODIFIERS

Apply guidelines and RTP advice even more rigorously to this population than adults.

TABLE 3
FACTORS THAT MODIFY CONCUSSION PROGRESSION OF RETURN TO PLAY

ADDITIONAL RISK MODIFIERS

- Symptoms – number
- Duration – (>10 days)
- Severity
- Signs – prolonged loss of consciousness (LOC) (>1 min)
- Loss of memory
- Post concussion – new onset convulsion
- Temporal frequency – repeated concussions over time
- Timing – injuries close together in time
- 'Recency' – recent concussion or traumatic brain injury (TBI)
- Threshold – repeated concussions occurring with progressively less impact force or slower recovery after each successive concussion
- Age – child and adolescent (<18 years old)
- Comorbidities and premorbidities
- Migraine, depression or other mental health, attention deficit hyperactivity disorders (ADHD), learning disabilities (LD) and sleep disorders

Child SCAT5[®]

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

supported by

Patient details

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of injury: _____ Time: _____

WHAT IS THE CHILD SCAT5?

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

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

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

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Recognise and Remove

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

Key points

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

Remember:

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

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 Davis GA, et al. *Br J Sports Med* 2017;0:1-8. doi:10.1136/bjsports-2017-097492b06a25

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Child SCAT 5, see appendix

CONSEQUENCES OF A CONCUSSION

Short term

Short term consequences can include physical, physiological and psychological issues. Patients with a concussion can have headaches, poor cognition, poor coordination, reduced physical performance and alteration of mood (more specifically depression). People who have had a concussion in other sports are 8 times as likely to suffer a significant musculoskeletal injury within that game if they continue to play, and over the next six months have a 40% increased risk of musculoskeletal injury compared to a non-concussed cohort.

Long term

There is no direct evidence of long term deficits following exposure to concussion in cricket. However, there continuing interest into understanding the long term consequence of Traumatic Brain Injury (TBI). Some of the findings have suggested that profound neurodegenerative changes may be a consequence of repeated moderate TBI such as those seen in boxing and traumatic / contact sports including American Football and Rugby often. This can be referred to as Chronic Traumatic Encephalopathy.

FAILED RETURN TO PLAY / RECURRENT CONCUSSIONS

Any delay or concerns relating to a failure to progress in a return to play program or deterioration demands urgent neurological or neurosurgical consultancy before continuing or progressing.

Similarly any individual that has been exposed to recurrent concussions demands a prolonged recovery period (i.e 3 weeks) and/or onward referral.

RESEARCH

The ECB is dedicated to ensuring the game is safe for participants and support staff and that the understanding of the injury of a concussion and relationship with the sport is clear. The ECB is therefore continuing to audit and engage with the research community supported by relationships with the RECOS research groups and Universities.

If you wish to contact this group, please contact Dr Nick Peirce CMO nick.peirce@ecb.co.uk or Katherine Boden, Research Administrator katherine.boden@ecb.co.uk. Up-to-date details can be found on ecb.co.uk/concussion.

Whilst these guidelines are for use by appropriately trained healthcare professionals they may help inform. There are additional guidelines for use across the recreational game and educational sector (available from NCPC and ECB website).

ECB PREVENTION OF CONCUSSION PROGRAMME

In order for the true incidence, prevalence, pattern and nature of concussion to be best understood, all head injuries, concussions and 'near misses' must be recorded using the ECB injury surveillance system or reported to the ECB Chief Medical Officer, a member of the ECB medical panel or National Lead for Physiotherapy. All completed SCAT5 forms should be uploaded and a standardised head injury recording sheet will be provided on the ECB online injury surveillance system. These are monitored and processed by the concussion coordinators / medical interns from Loughborough University.

BASELINE TESTING

The ECB mandates all players undertake a baseline testing with a minimum being a SCAT5 assessment. This will form part of the off-season player profiling screening. This can then be compared to post-injury scores in both the diagnosis of a concussion and the RTP evaluation.

In addition IMPACT baseline testing must be undertaken every 2 years in the off-season or repeated annually in players who have had a helmet strike that season. Additional research tools including King Devick and nine-hole peg testing are in their second season of research evaluation.

PROTECTIVE EQUIPMENT: HELMET, GRILLS, FACEGUARDS

Helmets have been tested for some time with regards to their ability to attenuate head form impact and appear effective.

There is overwhelming evidence from injury surveillance that wearing an appropriate head protector can significantly reduce the risk of serious injury to cricketers when batting or close-fielding.

The design and manufacture of cricket head protectors is now governed by British Standard **BS7928:2013**, which has been adopted by the ICC as the international standard. The wearing of head protectors that meet this standard is mandated across the professional game and in under age cricketers (less than 18 yrs) and is strongly advised for all cricketers when batting, wicket-keeping up to the stumps, or fielding close to the wicket, whether in matches or practice sessions. This is also recommend for coaches when throwing down in the nets and may be considered by umpires in certain formats of the game. Batting, wicket-keeping up to the stumps, or fielding close to the wicket, whether in matches or practice sessions, is likely to be mandatory in the near future in many circumstances.

VIDEO REVIEW

The use of videos in sport is now become increasingly widespread with both immediate and subsequent analysis helping both in recognising concussive episodes and understanding the signs of injury and the events that can lead to them. All healthcare professionals should look to review available videos of injurious episode if they have not witnessed the event themselves. In cricket it may be difficult to see the players reaction when helmeted and indeed with the prolonged periods of play medical personnel will often not see the initial episode. In the professional games the fixed camera video analysis coded by performance analysts or the television coverage should be made available to the medical team as soon as practicable.

Video should be reviewed to assess the nature of the impact. Any ball strike that does not amount to a glancing blow should be assessed on the field. Any severe blow with worrying signs should be removed from the field with an off-field assessment / SCAT5. Similarly, an umpire or coach should alert the medical team to this level of contact.

A concussion assessment is mandatory if the severity impact is considered significant and / or there any features accompanying the helmet strike that on video review suggest the player had become dazed, gone to ground or features of difficulty with motor / balance control.

The severity of the impact can be implied by the direction of ball travel after the helmet strikes. Severe strikes with significant energy transfer are likely to see the ball stop dead or rebound back down the wicket. Moderate head strikes may see the ball travel at approximately 90 degrees with glancing blows that travel directly behind the player most likely to be the only helmet strikes that do not require assessment

Video Signs Demanding Review and Potential Removal From Play:



Frontal / back down the wicket

Severe Helmet Strike
(Direction of Ball Travel is back down the wicket or stops dead indicating significant transfer of energy)



90 degree rebound

Moderate Helmet Strikes with Accompanying Worrying Signs
(direction of ball travel is approx. 90 degrees)

HEAD INJURY ADVICE

This patient has received an injury to the head and no sign of any serious complications has been found.

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

Important points:

- Rest (physically and mentally), including training or playing sports, until symptoms resolve and you are medically cleared
- No alcohol
- No prescription or non-prescription drugs without medical supervision

General advice:

To recover more quickly, it is important to:

- Rest from stressful situations, including school, college or work until you feel recovered
- Undertake a Graded Return to activities including use of computers at work and at school, video games and more vigorous physical activity
- Avoid contact sports until you have completed the required return to sport program

Specifically:

- it may be normal to experience mild headache, nausea, or difficulties concentrating or tiredness for a short period.
- No sleeping tablets
- Do not use aspirin, anti-inflammatory medication or sedating painkillers
- Do not drive until medically cleared
- Do not train or play sport until medically cleared

Medical Help:

- if symptoms fail to disappear after 10 days or you become concerned about worsening signs, please see your GP

If you are concerned contact your GP/NHS 111, attend A&E or call an ambulance 999/112

APPENDICES

Appendix I
Pocket Concussion Tool
(Pocket CRT)

Appendix II
SCAT5 - baseline testing

Appendix III
Child SCAT5

References

McCrory P, et al. Br J Sports Med 2013;
47:250-258

Nordstrom, A et al. Br J Sports Med 2014;
48:09:1447-1450

Contacts

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POCKET CONCUSSION RECOGNITION TOOL™

TO HELP IDENTIFY CONCUSSION IN CHILDREN, YOUTH AND ADULTS



Recognise & remove

Concussion should be suspected **if one or more** of the following visible clues, signs, symptoms or errors in memory questions are present.

1. Visible clues of suspected concussion

Any one or more of the following visual clues can indicate a possible concussion:

- Loss of consciousness or responsiveness
- Lying motionless on ground / slow to get up
- Unsteady on feet / balance problems or falling over / Uncoordination
- Grabbing / clutching of head
- Dazed, blank or vacant look
- Confused / not aware of plays or events

2. Signs and symptoms of suspected concussion

Presence of any **one or more** of the following signs and symptoms may suggest a concussion:

- Loss of consciousness	- Headache
- Seizure or convulsion	- Dizziness
- Balance problems	- Confusion
- Nausea or vomiting	- Feeling slowed down
- Drowsiness	- “Pressure in head”
- More emotional	- Blurred vision
- Irritability	- Sensitivity to light
- Sadness	- Amnesia
- Fatigue or low energy	- Feeling like “in a fog”
- Nervous or anxious	- Neck pain
- “Don’t feel right”	- Sensitivity to noise
- Difficulty remembering	- Difficulty concentrating

POCKET CONCUSSION RECOGNITION TOOL™

TO HELP IDENTIFY CONCUSSION IN CHILDREN, YOUTH AND ADULTS

3. Memory function

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

“What venue are we at today?”

“Which half is it now?”

“Who scored last in this game?”

“What team did you play last week / game?”

“Did your team win the last game?”

Any athlete with a suspected concussion should be IMMEDIATELY REMOVED FROM PLAY, and should not be returned to activity until they are assessed medically. Athletes with a suspected concussion should not be left alone and should not drive a motor vehicle.

It is recommended that, in all cases of suspected concussion, the player is referred to a medical professional for diagnosis and guidance as well as return to play decisions, even if the symptoms resolve.

Red flags

If ANY of the following are reported then the player should be safely and immediately removed from the field. If no qualified medical professional is available, consider transporting by ambulance for urgent medical assessment:

- Athlete complains of neck pain
- Increasing confusion or irritability
- Repeated vomiting
- Seizure or convulsion
- Weakness or tingling / burning in arms or legs
- Deteriorating conscious state
- Severe or increasing headache
- Unusual behaviour change
- Double vision

Remember:

- In all cases, the basic principles of first aid (danger, response, airway, breathing, circulation) should be followed
- Do not attempt to move the player (other than required for airway support) unless trained to do so
- Do not remove helmet (if present) unless trained to do so

SCAT5[®]

SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION

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

supported by



FIFA[®]



FEI

Patient details

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of Injury: _____ Time: _____

WHAT IS THE SCAT5?

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

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

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

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Recognise and Remove

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

Key points

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

Remember:

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

IMMEDIATE OR ON-FIELD ASSESSMENT

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

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

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

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

STEP 1: RED FLAGS

RED FLAGS:

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

STEP 2: OBSERVABLE SIGNS

Witnessed Observed on Video

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

STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS²

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

Mark Y for correct answer / N for incorrect

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

Note: Appropriate sport-specific questions may be substituted.

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

STEP 4: EXAMINATION

GLASGOW COMA SCALE (GCS)³

Time of assessment			
Date of assessment			

Best eye response (E)

No eye opening	1	1	1
Eye opening in response to pain	2	2	2
Eye opening to speech	3	3	3
Eyes opening spontaneously	4	4	4

Best verbal response (V)

No verbal response	1	1	1
Incomprehensible sounds	2	2	2
Inappropriate words	3	3	3
Confused	4	4	4
Oriented	5	5	5

Best motor response (M)

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

CERVICAL SPINE ASSESSMENT

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

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

OFFICE OR OFF-FIELD ASSESSMENT

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

STEP 1: ATHLETE BACKGROUND

Sport / team / school: _____

Date / time of injury: _____

Years of education completed: _____

Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

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

When was the most recent concussion?: _____

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

Has the athlete ever been:

	Yes	No
Hospitalized for a head injury?	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

STEP 3: COGNITIVE SCREENING

Standardised Assessment of Concussion (SAC)⁴

ORIENTATION

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

IMMEDIATE MEMORY

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

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

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

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

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

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

CONCENTRATION

DIGITS BACKWARDS

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

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

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

MONTHS IN REVERSE ORDER

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

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

STEP 4: NEUROLOGICAL SCREEN

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

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

BALANCE EXAMINATION

Modified Balance Error Scoring System (mBESS) testing⁵

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

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

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

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

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

STEP 5: DELAYED RECALL:

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

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

Time Started

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

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

STEP 6: DECISION

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

Date and time of injury: _____

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

Yes No Unsure Not Applicable

(If different, describe why in the clinical notes section)

Concussion Diagnosed?

Yes No Unsure Not Applicable

If re-testing, has the athlete improved?

Yes No Unsure Not Applicable

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

Signature: _____

Name: _____

Title: _____

Registration number (if applicable): _____

Date: _____

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

INSTRUCTIONS

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

Symptom Scale

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

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

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

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

Immediate Memory

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

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

Complete all 3 trials regardless of score on previous trials.

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

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

Trials 2 & 3:

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

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

Concentration

Digits backward

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

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

Begin with first 3 digit string.

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

Months in reverse order

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

1 pt. for entire sequence correct

Delayed Recall

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

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

Score 1 pt. for each correct response

Modified Balance Error Scoring System (mBESS)⁵ testing

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

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

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

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

Balance testing – types of errors

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

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

(a) Double leg stance:

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

(b) Single leg stance:

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

(c) Tandem stance:

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

Tandem Gait

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

Finger to Nose

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

References

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. McCreary 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 accommodations that can help with return to school may include:

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

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

Child SCAT5[®]

SPORT CONCUSSION ASSESSMENT TOOL

FOR CHILDREN AGES 5 TO 12 YEARS

FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by



FIFA[®]



FEI

Patient details

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of Injury: _____ Time: _____

WHAT IS THE CHILD SCAT5?

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

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

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

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Recognise and Remove

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

Key points

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

Remember:

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

1

IMMEDIATE OR ON-FIELD ASSESSMENT

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

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

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

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

STEP 1: RED FLAGS

RED FLAGS:

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

STEP 2: OBSERVABLE SIGNS

Witnessed Observed on Video

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

STEP 3: EXAMINATION GLASGOW COMA SCALE (GCS)²

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

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

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

CERVICAL SPINE ASSESSMENT

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

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

OFFICE OR OFF-FIELD ASSESSMENT STEP 1: ATHLETE BACKGROUND

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

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

Gender: M / F / Other

Dominant hand: left / neither / right

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

When was the most recent concussion?: _____

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

Has the athlete ever been:

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

Current medications? If yes, please list: _____

STEP 2: SYMPTOM EVALUATION

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

To be done in a resting state

Please Check: Baseline Post-Injury

2

Child Report³

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

Overall rating for child to answer:

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

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

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

Parent Report

The child:

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

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

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

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

STEP 3: COGNITIVE SCREENING

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

IMMEDIATE MEMORY

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

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

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

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

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

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

CONCENTRATION

DIGITS BACKWARDS

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

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

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

DAYS IN REVERSE ORDER

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

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

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

BALANCE EXAMINATION

Modified Balance Error Scoring System (BESS) testing⁵

Which foot was tested (i.e. which is the non-dominant foot) 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, 10-12 y/o only)	_____ of 10
Tandem stance (non-dominant foot at back)	_____ of 10
Total Errors	5-9 y/o of 20 10-12 y/o of 30

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

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

Date and time of injury: _____

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

Concussion Diagnosed?
 Yes No Unsure Not Applicable

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

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

Signature: _____

Name: _____

Title: _____

Registration number (if applicable): _____

Date: _____

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



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

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

CLINICAL NOTES:



Concussion injury advice for the child and parents/carergivers

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

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

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

Other important points:

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

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

Clinic phone number: _____
 Patient's name: _____
 Date / time of injury: _____
 Date / time of medical review: _____
 Healthcare Provider: _____

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Contact details or stamp

INSTRUCTIONS

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

Symptom Scale

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

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

For Total number of symptoms, maximum possible is 21

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

Standardized Assessment of Concussion Child Version (SAC-C)

Immediate Memory

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

Complete all 3 trials regardless of score on previous trials.

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

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

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

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

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

Concentration

Digits backward

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

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

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

Days of the week in reverse order

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

1 pt. for entire sequence correct

Delayed Recall

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

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

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

Neurological Screen

Reading

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

Modified Balance Error Scoring System (mBESS)⁵ testing

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

Each of 20-second trial/stance is scored by counting the number of errors. The This balance testing is based on a modified version of the Balance Error Scoring System (BESS)³.

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

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

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

(a) Double leg stance:

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

(b) Tandem stance:

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

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

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

Balance testing – types of errors

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

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

Tandem Gait

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

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

Finger to Nose

The tester should demonstrate it to the child.

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

Scoring: 5 correct repetitions in < 4 seconds = 1

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

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- Guskiewicz KM. Assessment of postural stability following sport-related concussion. Current Sports Medicine Reports. 2003; 2: 24-30

CONCUSSION INFORMATION

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

Signs to watch for

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

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

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

Graduated Return to Sport Strategy

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

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

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

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

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

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

Graduated Return to School Strategy

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

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

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

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

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

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

For more information
please visit:
ecb.co.uk/concussion

