

Sport Concussion Office Assessment Tool – 6

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SCOAT6™

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

What is the SCOAT6?*

The SCOAT6 is a tool for evaluating concussion in a controlled office environment by Health Care Professionals (HCP) typically from 72 hours (3 days) following a sport-related concussion.

Brief verbal instructions for some components of the SCOAT6 are included. Detailed instructions for use of the SCOAT6 are provided in an accompanying document. Please read through these instructions carefully before using the SCOAT6.

The diagnosis of concussion is a clinical determination made by an HCP. The various components of the SCOAT6 may assist with the clinical assessment and help guide individualised management.

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The SCOAT6 is used for evaluating athletes aged 13 years and older. For children aged 12 years or younger, please use the Child SCOAT6.

Completion Guide

Blue: Complete only at first assessment Green: Recommended part of assessment Orange: Optional part of assessment

Athlete's Name:

Date of Birth: Sex: Male Female Prefer Not To Say Other

Sport:

Occupational or Educational Status:

Current or Highest Educational Level or Qualification Achieved:

Examiner: Date of Examination:

Referring Physician's Name:

Referring Physician's Contact Details:

* In reviewing studies informing the SCOAT6 and Child SCOAT6, the period defined for the included papers was 3–30 days. HCPs may choose to use the SCOAT6 beyond this timeframe but should be aware of the parameters of the review.

For use by Health Care Professionals Only

SCOAT6™

Developed by: The Concussion in Sport Group (CISG)

Supported by:

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SCOAT6™ Sport Concussion Office Assessment Tool

For Adults & Adolescents (13 years +)



Current Injury

Removal From Play: Immediate Continued to play for _____ mins

Walked off Assisted off Stretchered off

Date of Injury:

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

Date Symptoms First Appeared: Date Symptoms First Reported:

History of Head Injuries

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

History of Any Neurological, Psychological, Psychiatric or Learning Disorders

| Diagnosis | Year Diagnosed | Management Including Medication |
|---|----------------|---------------------------------|
| <input type="checkbox"/> Migraine | | |
| <input type="checkbox"/> Chronic headache | | |
| <input type="checkbox"/> Depression | | |
| <input type="checkbox"/> Anxiety | | |
| <input type="checkbox"/> Syncope | | |
| <input type="checkbox"/> Epilepsy/seizures | | |
| <input type="checkbox"/> Attention deficit hyper-activity disorder (ADHD) | | |
| <input type="checkbox"/> Learning disorder/ dyslexia | | |
| <input type="checkbox"/> Other _____ | | |



List All Current Medications - including over-the-counter, naturopathic and supplements

| Item | Dose | Frequency | Reason Taken |
|------|------|-----------|--------------|
| | | | |
| | | | |
| | | | |
| | | | |

Family History of Any Diagnosed Neurological, Psychological, Psychiatric, Cognitive or Developmental Disorders

| Family Member | Diagnosis | Management Including Medication |
|---------------|---|---------------------------------|
| | <input type="checkbox"/> Depression | |
| | <input type="checkbox"/> Anxiety | |
| | <input type="checkbox"/> Attention deficit hyper-activity disorder (ADHD) | |
| | <input type="checkbox"/> Learning disorder/ dyslexia | |
| | <input type="checkbox"/> Migraine | |
| | <input type="checkbox"/> Other _____ | |

Additional Notes:



Symptom Evaluation

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

| | | | | | | |
|-----------|-----------|---|---------------|---|---|-------------|
| 0 None | 1 Mild | 2 | 3 Moderate | 4 | 5 | 6 Severe |
|-----------|-----------|---|---------------|---|---|-------------|

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



Symptom Evaluation (Continued)

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

Verbal Cognitive Tests

Immediate Memory

All 3 trials must be administered irrespective of the number correct on Trial 1. Administer at the rate of one word per second in a monotone voice.

Trial 1: Say *"I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order."*

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

Word list used: A B C

| List A | Trial | | | Alternate Lists | |
|--------------------|---------|---------|---------|-----------------|---------|
| | Trial 1 | Trial 2 | Trial 3 | List B | List C |
| Jacket | 0 1 | 0 1 | 0 1 | Finger | Baby |
| Arrow | 0 1 | 0 1 | 0 1 | Penny | Monkey |
| Pepper | 0 1 | 0 1 | 0 1 | Blanket | Perfume |
| Cotton | 0 1 | 0 1 | 0 1 | Lemon | Sunset |
| Movie | 0 1 | 0 1 | 0 1 | Insect | Iron |
| Dollar | 0 1 | 0 1 | 0 1 | Candle | Elbow |
| Honey | 0 1 | 0 1 | 0 1 | Paper | Apple |
| Mirror | 0 1 | 0 1 | 0 1 | Sugar | Carpet |
| Saddle | 0 1 | 0 1 | 0 1 | Sandwich | Saddle |
| Anchor | 0 1 | 0 1 | 0 1 | Wagon | Bubble |
| Trial Total | | | | | |

Immediate Memory Total _____ of 30

Time last trial completed:

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Verbal Cognitive Tests: Alternate 15-word lists

Alternate 15-word lists may be accessed by scanning or clicking the QR code.

Record the total below.

Total _____ of 45



Digits Backwards

Administer at the rate of one digit per second in a monotone voice reading DOWN the selected column. If a string is completed correctly, move on to the string with next higher number of digits; if the string is completed incorrectly, use the alternate string with the same number of digits; if this is failed again, end the test.

Say *“I’m 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. So, if I said 9-6-8 you would say? 8-6-9”*

Digit list used: A B C

| List A | List B | List C | | | | |
|-------------|-------------|-------------|---|--------------|---|------|
| 4-9-3 | 5-2-6 | 1-4-2 | Y | N | 0 | 1 |
| 6-2-9 | 4-1-5 | 6-5-8 | Y | N | | |
| 3-8-1-4 | 1-7-9-5 | 6-8-3-1 | Y | N | 0 | 1 |
| 3-2-7-9 | 4-9-6-8 | 3-4-8-1 | Y | N | | |
| 6-2-9-7-1 | 4-8-5-2-7 | 4-9-1-5-3 | Y | N | 0 | 1 |
| 1-5-2-8-6 | 6-1-8-4-3 | 6-8-2-5-1 | Y | N | | |
| 7-1-8-4-6-2 | 8-3-1-9-6-4 | 3-7-6-5-1-9 | Y | N | 0 | 1 |
| 5-3-9-1-4-8 | 7-2-4-8-5-6 | 9-2-6-5-1-4 | Y | N | | |
| | | | | Digits score | | of 4 |

Months in Reverse Order

Say *“Now tell me the months of the year in reverse order as QUICKLY and as accurately as possible. Start with the last month and go backward. So, you’ll say December, November... go ahead”*

Start stopwatch and CIRCLE each correct response:

December November October September August July June May April March February January

Time Taken to Complete (secs): (N <30 sec) Number of Errors:



Examination

Orthostatic Vital Signs

The first blood pressure and heart rate measurements are taken after the patient lies supine on the examination table for at least 2 minutes. The patient is then asked to stand up without support and with both feet firmly on the ground and the second measurements are taken after standing for 1 minute. Ask the patient if they experience any dizziness or light-headedness upon standing (initial orthostatic intolerance) or by one minute (orthostatic intolerance).

| Orthostatic Vital Signs | Supine | Standing (after 1 minute) |
|---|---|---|
| Blood Pressure (mmHg) | | |
| Heart Rate (bpm) | | |
| Symptoms ¹ <ul style="list-style-type: none"> Dizziness or light-headedness Fainting Blurred or fading vision Nausea Fatigue Lack of concentration | No <input type="checkbox"/> Yes <input type="checkbox"/> If yes: Description | No <input type="checkbox"/> Yes <input type="checkbox"/> If yes: Description |
| Results | <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal | |

Test results are deemed clinically significant if they include at least one of the following AND symptoms:
 (1) systolic BP drop of ≥ 20 mmHg or (2) diastolic BP drop of ≥ 10 mmHg (3) HR decreases (4) HR increases by > 30 bpm

Cervical Spine Assessment

| Cervical Spine Palpation | Signs and Symptoms | |
|--------------------------|---------------------------------|-----------------------------------|
| Muscle Spasm | <input type="checkbox"/> Normal | <input type="checkbox"/> Abnormal |
| Midline Tenderness | <input type="checkbox"/> Normal | <input type="checkbox"/> Abnormal |
| Paravertebral Tenderness | <input type="checkbox"/> Normal | <input type="checkbox"/> Abnormal |

| Cervical Active Range of Motion | Result | |
|---------------------------------|---------------------------------|-----------------------------------|
| Flexion (50-70°) | <input type="checkbox"/> Normal | <input type="checkbox"/> Abnormal |
| Extension (60-85°) | <input type="checkbox"/> Normal | <input type="checkbox"/> Abnormal |
| Right Lateral Flexion (40-50°) | <input type="checkbox"/> Normal | <input type="checkbox"/> Abnormal |
| Left Lateral Flexion (40-50°) | <input type="checkbox"/> Normal | <input type="checkbox"/> Abnormal |
| Right Rotation (60-75°) | <input type="checkbox"/> Normal | <input type="checkbox"/> Abnormal |
| Left Rotation (60-75°) | <input type="checkbox"/> Normal | <input type="checkbox"/> Abnormal |



Neurological Examination

Cranial Nerves

Normal Abnormal Not tested

Notes:

Other Neurological Findings

| | | | | | | |
|-----------------------|--------|--------------------------|----------|--------------------------|------------|--------------------------|
| Limb Tone: | Normal | <input type="checkbox"/> | Abnormal | <input type="checkbox"/> | Not tested | <input type="checkbox"/> |
| Strength: | Normal | <input type="checkbox"/> | Abnormal | <input type="checkbox"/> | Not tested | <input type="checkbox"/> |
| Deep Tendon Reflexes: | Normal | <input type="checkbox"/> | Abnormal | <input type="checkbox"/> | Not tested | <input type="checkbox"/> |
| Sensation: | Normal | <input type="checkbox"/> | Abnormal | <input type="checkbox"/> | Not tested | <input type="checkbox"/> |
| Cerebellar Function: | Normal | <input type="checkbox"/> | Abnormal | <input type="checkbox"/> | Not tested | <input type="checkbox"/> |

Comments:

Balance

Barefoot on a firm surface with or without foam mat.

Foot Tested: Left Right (i.e. test the non-dominant foot)

Modified BESS

Double Leg Stance: of 10
 Tandem Stance: of 10
 Single Leg Stance: of 10
 Total Errors: of 30

On Foam

Double Leg Stance: of 10
 Tandem Stance: of 10
 Single Leg Stance: of 10
 Total Errors: of 30

Timed Tandem Gait

Place a 3-metre-long line on the floor/firm surface with athletic tape.

Say *“Please walk heel-to-toe quickly to the end of the tape, turn around and come back as fast as you can without separating your feet or stepping off the line.”*

| Time to Complete Tandem Gait Walking (seconds) | | | | |
|--|----------------------|----------------------|----------------------|----------------------|
| Trial 1 | Trial 2 | Trial 3 | Average 3 Trials | Fastest Trial |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |

Abnormal/failed to complete Unstable/sway Fall/over-step Dizzy/nauseous



Complex Tandem Gait

Forward

Say *“Please walk heel-to-toe quickly five steps forward, then continue forward with eyes closed for five steps”* 1 point for each step off the line, 1 point for truncal sway or holding onto an object for support.

Forward Eyes Open Points:

Forward Eyes Closed Points:

Forward Total Points:

Backward

Say *“Please walk heel-to-toe again, backwards five steps eyes open, then continue backwards five steps with eyes closed.”* 1 point for each step off the line, 1 point for truncal sway or holding onto an object for support.

Backward Eyes Open Points:

Backward Eyes Closed Points:

Backward Total Points:

Total Points (Forward + Backward):

Dual Task Gait

Say *“Now, while you are walking heel-to-toe, I will ask you to recite the following words in reverse order / count backwards out loud by 7s (for instance starting at 100, then 93, 86 etc.) / recite the months of the year in reverse order”*

(select one cognitive task). Allow for a verbal practice attempt of the cognitive task selected.

| Cognitive Tasks | | | | | | | | | | | | |
|---|----------|----------|---------|-----------|--------|-------|-------|-------|-------|-------|----------|---------|
| Trial 1 (Words - spell backwards) | VISIT | ALERT | FENCE | BRAVE | MOUSE | DANCE | CRAWL | LEARN | | | | |
| OR Trial 2 (Subtract serial 7s) | 95 | 88 | 81 | 74 | 67 | 60 | 53 | 46 | | | | |
| OR Trial 3 (Months backwards) | December | November | October | September | August | July | June | May | April | March | February | January |

Before attempting the dual task: *“Good. Now I will ask you to walk heel-to-toe calling the answers out loud at the same time. Are you ready?”*

Number of Trials Attempted: Number of Correct Trials: Average Time (s):

Cognitive Accuracy Score (Number Correct / Number Attempted):

Comments:



Modified Vestibular/Ocular-Motor Screening (mVOMS) for Concussion

For detailed instructions please see the Supplement.

| mVOMS | Not Tested | Headache | Dizziness | Nausea | Fogginess | Comments |
|--|------------|----------|-----------|--------|-----------|----------|
| Baseline symptoms | N/A | | | | | |
| Smooth pursuits (2 horizontal and 2 vertical, 2 seconds to go full distance right-left and back; up-down and back) | | | | | | |
| Saccades – Horizontal (10 times each direction) | | | | | | |
| VOR – Horizontal (10 repetitions) (metronome set at 180 beats per minute – change direction at each beep, wait 10 secs to ask symptoms) | | | | | | |
| VMS (x 5, 80° rotation side to side) (at 50 bpm, change direction each beep, wait 10 secs to ask symptoms) | | | | | | |

Anxiety Screen

Not Done

Assign scores of 0, 1, 2, and 3 to the response categories, respectively, of “not at all,” “several days,” “more than half the days,” and “nearly every day.”

| Over the last 2 weeks, how often have you been bothered by any of the following problems? | Not at all | Several days | More than half the days | Nearly every day |
|---|------------|--------------|-------------------------|------------------|
| 1. Feeling nervous, anxious, or on edge | 0 | 1 | 2 | 3 |
| 2. Not being able to stop or control worrying | 0 | 1 | 2 | 3 |
| 3. Worrying too much about different things | 0 | 1 | 2 | 3 |
| 4. Trouble relaxing | 0 | 1 | 2 | 3 |
| 5. Being so restless that it's hard to sit still | 0 | 1 | 2 | 3 |
| 6. Becoming easily annoyed or irritable | 0 | 1 | 2 | 3 |
| 7. Feeling afraid as if something awful might happen | 0 | 1 | 2 | 3 |

Anxiety Screen Score: 0–4: minimal anxiety 5–9: mild anxiety
10–14: moderate anxiety 15–21: severe anxiety

Depression Screen

Not Done

The purpose is to screen for depression in a “first-step” approach. Patients who screen positive should be further evaluated with the [PHQ-9](#) to determine whether they meet criteria for a depressive disorder.

| Over the last 2 weeks, how often have you been bothered by any of the following problems? | Not at all | Several days | More than half the days | Nearly every day |
|---|------------|--------------|-------------------------|------------------|
| 1. Little interest or pleasure in doing things | 0 | 1 | 2 | 3 |
| 2. Feeling down, depressed or hopeless | 0 | 1 | 2 | 3 |

Depression Screen Score: (Ranges from 0-6, 3 being the cutpoint to screen for depression)



Sleep Screen

Not Done

| 1. During the past week how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed.) | |
|--|---|
| 5 to 6 hours | 4 |
| 6 to 7 hours | 3 |
| 7 to 8 hours | 2 |
| 8 to 9 hours | 1 |
| More than 9 hours | 0 |

| 2. How satisfied/dissatisfied were you with the quality of your sleep? | |
|--|---|
| Very dissatisfied | 4 |
| Somewhat dissatisfied | 3 |
| Somewhat satisfied | 2 |
| Satisfied | 1 |
| Very satisfied | 0 |

| 3. During the recent past, how long has it usually taken you to fall asleep each night? | |
|---|---|
| Longer than 60 minutes | 3 |
| 31-60 minutes | 2 |
| 16-30 minutes | 1 |
| 15 minutes or less | 0 |

| 4. How often do you have trouble staying asleep? | |
|--|---|
| Five to seven times a week | 3 |
| Three of four times a week | 2 |
| Once or twice a week | 1 |
| Never | 0 |

| 5. During the recent past, how often have you taken medicine to help you sleep? (prescribed or over-the-counter) | |
|---|---|
| Five to seven times a week | 3 |
| Three of four times a week | 2 |
| Once or twice a week | 1 |
| Never | 0 |

Sleep Screen Score:

A higher sleep disorder score (SDS) indicates a greater likelihood of a clinical sleep disorder:

- 0-4 (Normal)
- 5-7 (Mild)
- 8-10 (Moderate)
- 11-17 (Severe)



Delayed Word Recall

Minimum of 5 minutes after immediate recall

Say *“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.”*

Word list used: A B C

| Word list used: A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> | | | Alternate Lists | |
|--|-------|----------|-----------------|--|
| List A | Score | List B | List C | |
| Jacket | 0 1 | Finger | Baby | |
| Arrow | 0 1 | Penny | Monkey | |
| Pepper | 0 1 | Blanket | Perfume | |
| Cotton | 0 1 | Lemon | Sunset | |
| Movie | 0 1 | Insect | Iron | |
| Dollar | 0 1 | Candle | Elbow | |
| Honey | 0 1 | Paper | Apple | |
| Mirror | 0 1 | Sugar | Carpet | |
| Saddle | 0 1 | Sandwich | Saddle | |
| Anchor | 0 1 | Wagon | Bubble | |

Score: of 10

Record Actual Time (mins) Since Completing Immediate Recall:

Computerised Cognitive Test Results (if used)

Not Done

Test Battery Used:

Recent Baseline - if performed (Date):

Post-Injury Result (Rest):

Post-Injury Result (Post-Exercise Stress):

Graded Aerobic Exercise Test

Not Done

Exclude contra-indications: cardiac condition, respiratory disease, significant vestibular symptoms, motor dysfunction, lower limb injuries, cervical spine injury.

Protocol Used:

Overall Assessment

Summary:



Management and Follow-up Plan

Cervical or brain imaging (X-rays/CT/MRI)

Imaging Requested:

Reason:

Findings:

Recommendations regarding return to:

Class:

Work:

Driving:

Sport:

(See revised graduated [return-to-learn](#) and [return-to-sport](#) guidelines)

Referral

Further assessment, intervention or management

Assessment by:

Name:

- | | |
|---|---|
| <input type="checkbox"/> Athletic Trainer/Therapist | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Exercise Physiologist | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Neurologist | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Neuropsychologist | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Neurosurgeon | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Ophthalmologist | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Optometrist | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Paediatrician | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Physiatrist/Rehab Phys | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Physiotherapist | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Psychologist | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Psychiatrist | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Sport and Exercise Medicine Phys | <input style="width: 100%;" type="text"/> |
| <input type="checkbox"/> Other | <input style="width: 100%;" type="text"/> |

Pharmacotherapy Prescribed:

Date of Review:

Date of Follow-up:



Additional Clinical Notes

Return-to-Learn (RTL) Strategy

Facilitating RTL is a vital part of the recovery process for student-athletes. HCPs should work with stakeholders on education and school policies to facilitate academic support, including accommodations/learning adjustments for students with SRC when needed. Academic support should address risk factors for greater RTL duration (e.g., social determinants of health, higher symptom burden) by adjusting environmental, physical, curricular, and testing factors as needed. **Not all athletes will need a RTL strategy or academic support.** If symptom exacerbation occurs during cognitive activity or screen time, or difficulties with reading, concentration, or memory or other aspects of learning are reported, clinicians should consider implementation of a RTL strategy at the time of diagnosis and during the recovery process. When the RTL strategy is implemented, it can begin following an initial period of relative rest (Step1: 24-48 hrs), with an incremental increase in cognitive load (Steps 2 to 4). Progression through the strategy is symptom limited (i.e., no more than a mild exacerbation of current symptoms related to the current concussion) and its course may vary across individuals based on tolerance and symptom resolution. Further, while the RTL and RTS strategies can occur in parallel, student-athletes should complete full RTL before unrestricted RTS.

| Step | Mental Activity | Activity at Each Step | Goal |
|------|--|---|---|
| 1 | Daily activities that do not result in more than a mild exacerbation* of symptoms related to the current concussion. | Typical activities during the day (e.g., reading) while minimizing screen time. Start with 5–15 min at a time and increase gradually. | Gradual return to typical activities. |
| 2 | School activities. | Homework, reading, or other cognitive activities outside of the classroom. | Increase tolerance to cognitive work. |
| 3 | Return to school part time. | Gradual introduction of schoolwork. May need to start with a partial school day or with greater access to rest breaks during the day. | Increase academic activities. |
| 4 | Return to school full time. | Gradually progress school activities until a full day can be tolerated without more than mild* symptom exacerbation. | Return to full academic activities and catch up on missed work. |

NOTE: Following an initial period of relative rest (24-48 hours following injury at Step 1), athletes can begin a gradual and incremental increase in their cognitive load. Progression through the strategy for students should be slowed when there is more than a mild and brief symptom exacerbation.

*Mild and brief exacerbation of symptoms is defined as an increase of no more than 2 points on a 0-10 point scale (with 0 representing no symptoms and 10 the worst symptoms imaginable) for less than an hour when compared with the baseline value reported prior to cognitive activity.

For use by Health Care Professionals only



Return-to-Sport (RTS) Strategy

Return to sport participation after an SRC follows a graduated stepwise strategy, an example of which is outlined in Table 2. RTS occurs in conjunction with return to learn (see RTL strategy) and under the supervision of a qualified HCP. Following an initial period of relative rest (Step 1: approximately 24-48 hours), clinicians can implement Step 2 [i.e., light (Step 2A) and then moderate (Step 2B) aerobic activity] of the RTS strategy as a treatment of acute concussion. The athlete may then advance to steps 3-6 on a time course dictated by symptoms, cognitive function, clinical findings, and clinical judgement. Differentiating early activity (step 1), aerobic exercise (Step 2), and individual sport-specific exercise (Step 3) as part of the treatment of SRC from the remainder of the RTS progression (Steps 4-6) can be useful for the athlete and their support network (e.g., parents, coaches, administrators, agents). Athletes may be moved into the later stages that involve risk of head impact (Steps 4-6 and Step 3 if there is any risk of head impact with sport-specific activity) of the RTS strategy following authorization by the HCP and after resolution of any new symptoms, abnormalities in cognitive function, and clinical findings related to the current concussion. Each step typically takes at least 24 hours. Clinicians and athletes can expect a minimum of 1 week to complete the full rehabilitation strategy, but typical unrestricted RTS can take up to one month post-SRC. The time frame for RTS may vary based on individual characteristics, necessitating an individualized approach to clinical management. Athletes having difficulty progressing through the RTS strategy or with symptoms and signs that are not progressively recovering beyond the first 2-4 weeks may benefit from rehabilitation and/or involvement of a multidisciplinary team of HCP experienced in managing SRC. Medical determination of readiness, including psychological readiness, to return to at-risk activities should occur prior to returning to any activities at risk of contact, collision or fall (e.g. multiplayer training drills), which may be required prior to any of steps 3-6, depending on the nature of the sport or activity that the athlete is returning to and in keeping with local laws/requirements.

| Step | Exercise Strategy | Activity at Each Step | Goal |
|--|--|---|---|
| 1 | Symptom-limited activity. | Daily activities that do not exacerbate symptoms (e.g., walking). | Gradual reintroduction of work/school. |
| 2 | Aerobic exercise 2A – Light (up to approx. 55% max HR) then 2B – Moderate (up to approximately 70% max HR) | Stationary cycling or walking at slow to medium pace. May start light resistance training that does not result in more than mild and brief exacerbation* of concussion symptoms. | Increase heart rate. |
| 3 | Individual sport-specific exercise NOTE: if sport-specific exercise involves any risk of head impact, medical determination of readiness should occur prior to step 3. | Sport-specific training away from the team environment (e.g., running, change of direction and/or individual training drills away from the team environment). No activities at risk of head impact. | Add movement, change of direction. |
| Steps 4-6 should begin after resolution of any symptoms, abnormalities in cognitive function, and any other clinical findings related to the current concussion, including with and after physical exertion. | | | |
| 4 | Non-contact training drills. | Exercise to high intensity including more challenging training drills (e.g., passing drills, multiplayer training). Can integrate into team environment. | Resume usual intensity of exercise, coordination, and increased thinking. |
| 5 | Full contact practice. | Participate in normal training activities. | Restore confidence and assess functional skills by coaching staff. |
| 6 | Return to sport. | Normal game play. | |

maxHR = predicted maximal Heart Rate according to age (i.e., 220-age)

| Age Predicted Maximal HR= 220-age | Mild Aerobic Exercise | Moderate Aerobic Exercise |
|-----------------------------------|-------------------------------------|-------------------------------------|
| 55% | 220-age x 0.55 = training target HR | |
| 70% | | 220-age x 0.70 = training target HR |

NOTE: *Mild and brief exacerbation of symptoms (i.e., an increase of no more than 2 points on a 0-10 point scale for less than an hour when compared with the baseline value reported prior to physical activity). Athletes may begin Step 1 (i.e., symptom-limited activity) within 24 hours of injury, with progression through each subsequent step typically taking a minimum of 24 hours. If more than mild exacerbation of symptoms (i.e., more than 2 points on a 0-10 scale) occurs during Steps 1 -3, the athlete should stop and attempt to exercise the next day. If an athlete experiences concussion-related symptoms during Steps 4-6, they should return to Step 3 to establish full resolution of symptoms with exertion before engaging in at-risk activities. Written determination of readiness to RTS should be provided by an HCP before unrestricted RTS as directed by local laws and/or sporting regulations.

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Competing interests GAD is a member of the Scientific Committee of the 6th International Consensus Conference on Concussion in Sport; an honorary member of the AFL Concussion Scientific Committee; Section Editor, Sport and Rehabilitation, NEUROSURGERY; and has attended meetings organised by sporting organisations including the NFL, NRL, IIHF, IOC and FIFA; however, has not received any payment, research funding or other monies from these groups other than for travel costs. RJE is a paid consultant for the NHL and co-chair of the NHL/ NHLPA Concussion Subcommittee. He is also a paid consultant and chair of the Major League Soccer concussion committee, and a consultant to the US Soccer Federation. He previously served as a neuropsychology consultant to Princeton University Athletic Medicine and EyeGuide. He is currently a co-PI for a grant funded by the NFL (NFL-Long) through Boston Children's Hospital. He occasionally provides expert testimony in matters related to MTBI and sports concussion, and occasionally receives honoraria and travel support/reimbursement for professional meetings. PF is a coinvestigator on a research grant from the NFL's 'Play Smart. Play Safe.' Initiative and an Executive committee member of the Canadian Concussion Network (financed by the Canadian Institute of Health Research). He received honorarium for an Expert group discussion on blood biomarkers for concussion in December 2020. GWF has received travel expenses to attend academic meetings from World Rugby. He has also collaborated on research projects with World Rugby as chief or co-investigator. He is previous associate editor of the British Journal of Sports Medicine. He has not received any other payments or support from any sporting or commercial bodies. He has no other conflicts of interest. KGH is Research Development Director, Pac-12 Conference Member, Pac-12 Brain Trauma Task Force Member, NFL Head Neck and Spine Committee Deputy Editor, British Journal of Sports Medicine Head Football Physician, University of Washington Dr. K. Alix Hayden has nothing to disclose. SAH Co-founder and senior advisor, The Sports Institute at UW Medicine (unpaid), Centers for Disease Control and Prevention and National Center for Injury Prevention and Control Board Pediatric Mild Traumatic Brain Injury Guideline Workgroup (unpaid), Concussion in Sport Group (travel support), NCAA Concussion Safety Advisory Group (unpaid), Team Physician, Seattle Mariners, Former Team Physician, Seattle Seahawks, occasional payment for expert testimony, travel support for professional meetings ML is the CMO GB Boxing, CMO GB Snowsports. NE Director GB Taekwondo. NE Director SWA (share options). Director Active Movement. Director GB Obstacle course racing. Founder and medical board member of Safe MMA. Director of Marylebone Health Group. Private medical practice at ISEH 170 Tottenham Court Road. Private medical practice Marylebone Health Group. MMA Sport and exercise medicine physician working in private consulting practice. Shareholder of Olympic Park Sports Medicine Centre in Melbourne. Ex-senior physician at the Hawthorn Football Club (AFL) Ex-Chief Executive Officer of the AFL Doctors Association. Research grants received from the Australian Football League, outside the submitted work. Travel support received from the Australian Football League, FIFA and the International Olympic Committee to attend and present at international conferences. Member of the Scientific Committee for the 6th International Consensus Conference on Concussion in Sport. Honorary member of the International Concussion in Sport Group. Honorary member of the Australian Rugby Union Concussion Advisory Group. Independent Concussion Consultant for World Rugby. MMC has received

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