The Amsterdam Consensus Statement on concussion in sport: What does it mean for sport leaders in Canada?

Amsterdam Consensus - Kathryn Schneider Canadian Guideline - Stephanie Cowle

Sport Concussion Education Tools: What they are, who they're for and where to find them

Making Headway – Adam Solitt
Massive Open Online Course (MOOC) in Concussion – Pierre Fremont
Concussion Awareness and Training Tool (CATT) – Shelina Babul
Pediatric Living Guidelines – Jennifer Dawson
Adult Living Guidelines – Alex Lithopoulos/Shawn Marshall

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International Consensus Conference on Concussion in Sport

Amsterdam 27-28 October 2022

Jointly organised by:













Consensus Statement on Concussion in Sport:

The 6th International Conference

Amsterdam, October 2022

Amsterdam Concussion Consensus

Summary of the published evidence at the time of the conference

- Editorials introduction, definition, tools
- Methodology paper
- **10** Systematic Reviews
- Consensus Statement
- New concussion assessment "Tools"



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Consensus process

A priori systematic review methodology A priori consensus process with external review Anonymous voting + alternate viewpoints

Athlete voice Para sport considerations Ethical perspectives

Declaration of conflicts of interest

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International Consensus Conference on Concussion

Discussion

Amsterdam 2022 process: A summary of the methodology for the Amsterdam International Consensus on Concussion in Sport

Kathryn J Schneider , ^{1,2,3} Jon S Patricios , ⁴ Willem Meeuwisse, ⁵ Geoff M Schneider, K Alix Hayden o, Zahra Premji o, K Osman Hassan Ahmed (5), 9,10,11 Cheri Blauwet (5), 12,13 Steven Broglio (1), 14 Robert C Cantu, 15,16 Gavin A Davis (1), 17,18 Jiri Dvorak , ¹⁹ Ruben J Echemendia , ²⁰ Carolyn A Emery , ¹ Grant L Iverson (1), 21,22 John J Leddy (1), 23 Michael Makdissi, 24,25 Michael McCrea (10), 26 Michael McNamee, 27,28 Margot Putukian (10), 29 Keith Owen Yeates , ^{2,3,30} Amanda M Black , ¹ Joel S Burma , ¹ Meghan Critchley, 31 Paul H Eliason , 31 Anu M Räisänen , 32 Jason B Tabor , ³¹ Clodagh Toomey, ^{1,33} Paul E Ronksley, ³⁴ J David Cassidy³⁵

over time. The purpose of this paper is to summarise the methodology for the Amsterdam 2022 International Consensus on Concussion in Sport and the resulting consensus statement.

THE CONSENSUS METHODOLOGY

The Amsterdam 2022 International Consensus on Concussion in Sport used a consensus conference methodology which is outlined below. The consensus process included identification of research questions, preparation of 10 systematic reviews, 12-21 the open consensus conference (2 days), closed expert panel consensus meeting (EPCM) (1 day), and a meeting to determine the format for practical tools for the identification, evaluation, and management of SRC (1 day). In addition to this methodology paper, each of the 10 systematic reviews, the International Consensus Statement on Concussion in Sport, and the 'tools' (Sport Concussion Assessment Tool 6 (SCAT6),



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Jon S Patricios , ¹ Kathryn J Schneider , ² Jiri Dvorak , ³

Amsterdam, October 2022

Consensus statement on concussion in sport: the 6th

International Conference on Concussion in Sport—

Osman Hassan Ahmed , ^{4,5} Cheri Blauwet , ^{6,7} Robert C Cantu, ^{8,9}

Gavin A Davis , ^{10,11} Ruben J Echemendia , ^{12,13} Michael Makdissi, ^{14,15}

Michael McNamee, 16,17 Steven Broglio , 18 Carolyn A Emery , 2

Nina Feddermann-Demont, 19,20 Gordon Ward Fuller , 21 Christopher C Giza, 22,23

Kevin M Guskiewicz, 24 Brian Hainline , 25 Grant L Iverson , 26,27

Jeffrey S Kutcher, ²⁸ John J Leddy , ²⁹ David Maddocks, ³⁰ Geoff Manley , ³¹

Michael McCrea , 32 Laura K Purcell, 33 Margot Putukian , 34 Haruhiko Sato , 35

Markku P Tuominen, ³⁶ Michael Turner , ^{37,38} Keith Owen Yeates , ³⁹ Stanley A Herring, 40,41 Willem Meeuwisse 42

ABSTRACT

For over two decades, the Concussion in Sport Group has held meetings and developed five international statements on concussion in sport. This 6th statement summarises the processes and outcomes of the 6th International Conference on Concussion in Sport held in Amsterdam on 27-30 October 2022 and should be read in conjunction with the (1) methodology paper that outlines the consensus process in detail and (2) 10 systematic reviews that informed the conference outcomes. Over 3½ years, author groups conducted systematic reviews of predetermined priority topics relevant to concussion in sport. The format of the conference export panel meetings and workshops

methodology. The purpose of this Statement is to provide a summary of the evidence and practice recommendations based on science and expert panel consensus recommendations at the time of the conference. Additional outputs of the consensus process include freely available evidence-informed tools to assist in the detection and assessment of SRC, including the Concussion Recognition Tool-6 (CRT6), Sport Concussion Assessment Tool-6 (SCAT6), Child SCAT6, Sport Concussion Office Assessment Tool-6 (SCOAT6) and Child SCOAT6. Apart from this Statement, in the interest of knowledge translation, the tools are free to distribute in their original formate

For numbered affiliations see

Correspondence to

end of article.

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JSP and KJS are joint first authors.

Accepted 2 June 2023

RECOGNIZE: Definition

Conceptual definition

"Traumatic brain injury caused by a direct blow to the head, neck or body resulting in an impulsive force being transmitted to the brain that occurs in sports and exercise-related activities."





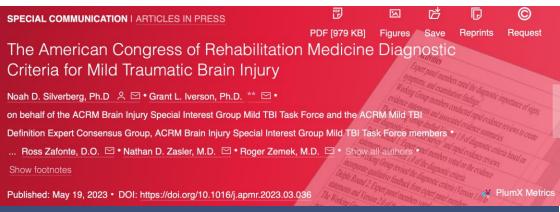












Definition of sport-related concussion: the 6th International Conference on Concussion in Sport

Gavin A Davis , ^{1,2} Jon Patricios , ³ Kathryn J Schneider , ⁴ Grant L Iverson , ⁵ Noah D Silverberg , ⁶

REDUCE: Prevention Recommendations:

- Mouthguards in child and adolescent ice hockey
- Policy to disallow bodychecking in child and most levels of adolescent ice hockey
- Contact practice limitations in American football
- Neuromuscular training warm-up
- Concussion management strategy policies to reduce recurrent concussion rates





Systematic review

Prevention strategies and modifiable risk factors for sport-related concussions and head impacts: a systematic review and meta-analysis

Paul H Eliason , ¹ Jean-Michel Galarneau, ¹ Ash T Kolstad , ¹ M Patrick Pankow, ¹ Stephen W West , Stuart Bailey, Lauren Miutz, Amanda Marie Black, Steven P Broglio, Steven A Davis, Brent E Hagel, Jonathan D Smirl, Davis, Steven P Broglio, Steve P Broglio, Steven P Broglio, Steve P Broglio, Steve P Broglio, S Keith A Stokes, ⁸ Michael Takagi, ⁶ Ross Tucker, ⁹ Nick Webborn , ¹⁰ Roger Zemek (1), 11 Alix Hayden, 12 Kathryn J Schneider (1), 1 Carolyn A Emery (1), 17

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RECOGNIZE and REMOVE

Systematic review

Acute evaluation of sport-related concussion and implications for the Sport Concussion Assessment Tool (SCAT6) for adults, adolescents and children: a systematic review

RE-EVALUATE

Systematic review

Beyond acute concussion assessment to office management: a systematic review informing the development of a Sport Concussion Office Assessment Tool (SCOAT6) for adults and children

```
Jon S Patricios , Geoff M Schneider, Jacqueline van Ierssel , Jacquelin
```





CRT6™



Concussion Recognition Tool

To Help Identify Concussion in Children, Adolescents and Adults

What is the Concussion Recognition Tool?

A concussion is a brain injury. The Concussion Recognition Tool 6 (CRT6) is to be used by non-medically trained individuals for the identification and immediate management of suspected concussion. It is not designed to diagnose concussion.

Recognise and Remove

Red Flags: CALL AN AMBULANCE

If ANY of the following signs are observed or complaints are reported after an impact to the head or body the athlete should be immediately removed from play/game/activity and transported for urgent medical care by a healthcare professional (HCP):

- Neck pain or tenderness
- · Seizure, 'fits', or convulsion
- Loss of vision or double vision
- Loss of consciousness
- Increased confusion or deteriorating conscious state (becoming less responsive, drowsy)
- · Weakness or numbness/tingling in more than one arm or leg
- Repeated Vomiting
- Severe or increasing headache
- Increasingly restless, agitated or combative
- · Visible deformity of the skull

Remember

- In all cases, the basic principles of first aid should be followed: assess danger at the scene, check airway, breathing, circulation; look for reduced awareness of surroundings or slowness or difficulty answering questions.
- Do not attempt to move the athlete (other than required for airway support) unless trained to do so.
- · Do not remove helmet (if present) or other equipment.
- · Assume a possible spinal cord injury in all cases of head
- · Athletes with known physical or developmental disabilities should have a lower threshold for removal from play.

This tool may be freely copied in its current form for distribution to individuals, teams, groups, and organizations. Any alteration (including translations and digital reformatting), re-branding, or sale for commercial gain is not permissible without the expressed written consent of BMJ.

If there are no Red Flags, identification of possible concussion should proceed as follows:

Concussion should be suspected after an impact to the head or body when the athlete seems different than usual. Such changes include the presence of any one or more of the following: visible clues of concussion, signs and symptoms (such as headache or unsteadiness), impaired brain function (e.g. confusion), or unusual behaviour.

CRT6™

Developed by: The Concussion in Sport Group (CISG)













COLLCASSIOLI MACORILIIOLI 10010 - CM 10

Concussion Recognition Tool

To Help Identify Concussion in Children, Adolescents and Adults



1: Visible Clues of Suspected Concussion

Visible clues that suggest concussion include:

- Loss of consciousness or responsiveness
- · Lying motionless on the playing surface
- · Falling unprotected to the playing surface
- · Disorientation or confusion, staring or limited responsiveness, or an inability to respond appropriately to questions
- Dazed, blank, or vacant look
- Seizure, fits, or convulsions
- · Slow to get up after a direct or indirect hit to the head
- . Unsteady on feet / balance problems or falling over / poor coordination / wobbly

2: Symptoms of Suspected Concussion

Physical Symptoms	Changes in Emotions	
Headache	More emotional	
"Pressure in head"	More Irritable	
Balance problems	Sadness	
Nausea or vomiting	Nervous or anxious	
Drowsiness		
Dizziness	Changes in Thinking	
Blurred vision	Difficulty concentrating	
More sensitive to light	Difficulty remembering	
More sensitive to noise	Feeling slowed down	
Fatigue or low energy	Feeling like "in a fog"	
"Don't feel right"		
Neck Pain	Remember, symptoms may develop over minutes or hour following a head injury.	

3: Awareness

(Modify each question appropriately for each sport and age of athlete)

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

"Where are we today?"

"What event were you doing?"

"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 PRACTICE OR PLAY and should NOT RETURN TO ANY ACTIVITY WITH RISK OF HEAD CONTACT, FALL OR COLLISION, including SPORT ACTIVITY until ASSESSED MEDICALLY, even if the symptoms resolve.

Athletes with suspected concussion should NOT:

- Be left alone initially (at least for the first 3 hours). Worsening of symptoms should lead to immediate medical attention.
- . Be sent home by themselves. They need to be with a responsible adult.
- . Drink alcohol, use recreational drugs or drugs not prescribed by their HCP
- · Drive a motor vehicle until cleared to do so by a healthcare professional



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.

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.

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

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.

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Completion Guide

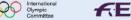
Athlete's Name:	
Date of Birth:	Sex: Male Female Prefer Not To Say Other
Sport:	
Occupational or Education	al Status:
Current or Highest Educati	onal Level or Qualification Achieved:
Examiner:	Date of Examination:
Referring Physician's Name	e:

* 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	y Health Care	Professiona	is Only
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SCOAT6™

Developed by: The Concussion in Sport Group (CISG)

















Sport Concussion Office Assessment Tool For Children Ages 8 to 12 Years

What is the Child SCOAT6?*

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

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

The Child SCOAT6 is used for evaluating athletes aged 8 -12 years. For athletes aged 13 years and older, please use the SCOAT6.

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

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Completion Guide

For use by Health Care Professionals Only

OOO Olympic

Athlete's Name:	
Date of Birth:	Sex: Male Female Prefer Not To Say
Sport:	
Age First Played Contact Sport:	School Class/Grade/Level:
Handedness (Writing): L R Ambidextrou	s Handedness (Sport): L R Ambidextrous
Dominant Leg (Sport): L R Ambidextrou	s 🔲
Name of Accompanying Parent/Carer:	
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 Child SCOAT6 beyond this timeframe but should be aware of the parameters of the review.

100.00			
Develo	ped by: The Concus	ssion in Sport Gro	up (CISG)

Supported by









Child SCOAT6™

Current injury History of Injury **PMHx Family History Symptoms** Verbal cognitive tasks Orthostatic vital signs Cervical spine assessment Neurological Exam Balance - BESS Timed Tandem Gait Complex Tandem Gait **Dual Task Modified VOMS Anxiety Screen Depression Screen** Sleep Screen Computerized Cognitive Test Graded aerobic exercise test

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REST and Exercise Recommendations

- Initial period *relative rest for 24-48 hours*
 - Light physical and cognitive activity
 - Limit screen time
- Aerobic Exercise as a treatment
 - Facilitates recovery (2-10 days)
 - Prevents prolonged recovery
 - Individualized to the athlete

Symptom exacerbation?

Mild = 1 or 2/10 increase on a 0-10 scale

Brief = resolves within an hour

Stop if >2/10 increase Remain > 1 hour

Systematic review

Rest and exercise early after sport-related concussion: a systematic review and meta-analysis

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REHABILITATION Recommendations

- Cervicovestibular (integrated neck and balance interventions) rehabilitation is recommended for athletes with headaches, neck pain dizziness, and/or balance problems at 10 days.
- Collaborative care and active rehabilitation for adolescents when symptoms persist for greater than 4 weeks.
- In combination with aerobic exercise!

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Systematic review

Targeted interventions and their effect on recovery in children, adolescents and adults who have sustained a sport-related concussion: a systematic review

Kathryn J Schneider , ^{1,2,3} Meghan L Critchley, ⁴ Vicki Anderson, ^{5,6} Gavin A Davis , ^{7,8} Chantel T Debert, ⁹ Nina Feddermann-Demont, ¹⁰ Isabelle Gagnon , ¹¹ Kevin M Guskiewicz, ¹² K Alix Hayden, ¹³ Stanley Herring, ¹⁴ Corson Johnstone, ⁴ Michael Makdissi, ^{15,16} Christina L Master , ¹⁷ Rosemarie Scolaro Moser (10 , 18 Jon S Patricios (10 , 19 Johna K Register-Mihalik, 20 Paul E Ronksley, ²¹ Noah D Silverberg , ²² Keith Owen Yeates , ²³, ²³

Rest & Exercise Rehabilitation Refer - Persisting symptoms Recovery - Technology Return-to-Learn / Return-to-Sport

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NEW Return-to-Learn and Return-to-Sport strategies

Return to Learn (RTL) Strategy

	Return to Learn (RTL) Strategy		Activity at Each Step	Goal	
	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 typic	cal activities.
	2	School activities.	Homework, reading, or other cognitive activities outside of the classroom.	Increase tolerance to work.	cognitive
	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 ac	ctivities.
	4	Return to school full time.	Gradually progress school activities until a full day can be tolerated without more than mild* symptom exacerbation.	Refurn to full academ	
6™ Edita Interna Confer in Spor	-	Full contact practice.	Participate in normal training activities.	assess runctional skills by coaching staff.	
	ren 6	Return to sport.	Normal game play.		ım ctober 2022

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













RETIRE Recommendations

- No clear evidence of factors that unequivocally lead to retirement.
- Retirement decisions are complex and multifaceted often require multidisciplinary clinical evaluation to inform decisions.
- Should be individualized, shared decision making consider:
 - Patient/athlete preferences and risk tolerance
 - Injury
 - Sport-specific
 - Ethical
 - Socio-cultural

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Systematic review

When should an athlete retire or discontinue participating in contact or collision sports following sport-related concussion? A systematic review

```
Michael Makdissi , <sup>1,2</sup> Meghan L Critchley , <sup>3</sup> Robert C Cantu, <sup>4</sup>

Jeffrey G Caron , <sup>5,6</sup> Gavin A Davis , <sup>7,8</sup> Ruben J Echemendia , <sup>9,10</sup>

Pierre Fremont , <sup>11</sup> K Alix Hayden , <sup>12</sup> Stanley A Herring, <sup>13</sup> Sidney R Hinds , <sup>14</sup>

Barry Jordan, <sup>15</sup> Simon Kemp , <sup>16,17</sup> Michael McNamee , <sup>18,19</sup> David Maddocks, <sup>20</sup>

Shinji Nagahiro, <sup>21</sup> Jon Patricios , <sup>22</sup> Margot Putukian , <sup>23</sup> Michael Turner , <sup>24,25</sup>

Stacy Sick, <sup>3</sup> Kathryn J Schneider , <sup>3,26,27</sup>
```











REFINE - Para Sport recommendations

- Limited evidence to date in para athletes.
- Important to recognize characteristics of the individual's impairment and how this may affect prevention strategies, detection of symptoms, diagnosis, recovery and treatment.
- Commonly used tools may need to be adapted to an individualized approach.
- Recent position statement by the Concussion in Para Sport Group (CIPS).

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REFINE - Paediatrics recommendations

- Child 5-12 years; adolescent 13-18 years
- Return to school is a priority for children and adolescents.
- Paediatric athletes less likely to have trained medical personnel on the sideline – CRT6 can be a useful tool.
- Consider the benefits of a physically active lifestyle

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Amsterdam 27-28 October 2022













Future research

- Outside of NA
- Cultural context
- **Females**
- Genders

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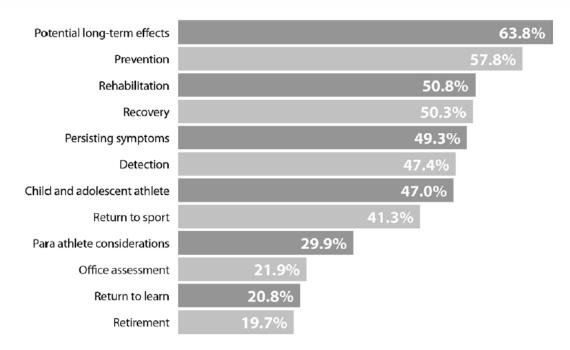


Figure 3 Percentage of conference attendees who voted for each topic as a top five priority for future research.

Amsterdam 2022 International Consensus on Concussion in Sport: calling clinicians to action!

Kathryn J Schneider , ^{1,2,3} Jon S Patricios ⁴

The June 2023 editions of BJSM contain world.² In fact, there are 14 translations

PROGRESS BUT MORE TO DO

or who have sustained an SRC.

Appropriate early management of concussion, including the use of exer-

and Child SCOAT6 (see page 672) are designed to guide the subacute (>3 days

from injury) assessment of SRC. These

assessment tools are all freely available to

enable broad access for all stakeholders

involved in the care of athletes at risk of

Warm up

the long-awaited papers emanating from a of the SCAT5 available.³

Consensus Statement on Concussion in Sport

The 6th International Conference on Concussion in Sport Held in Amsterdam, October 2022

Jon S. Patricios, Kathryn J. Schneider, Jiří Dvorák, Osman H. Ahmed, Cheri A. Blauwet, Robert Cantu, Gavin A. Davis, Ruben J. Echemendia, Michael Makdissi, Mike McNamee, Steven P. Broglio, Carolyn Emery, Nina Feddermann-Demont, Gordon Fuller, Chris Giza, Kevin M. Guskiewicz, Brian Hainline, Grant Iverson, Jeffrey Kutcher, John Leddy, David Maddocks, Geoffrey T. Manley, Michael A. McCrea, Laura Purcell, Margot Putukian, Haruhiko Sato, Markku Tuominen, Michael Turner, Keith Owen Yeates, Stanley A. Herring, Willem Meeuwisse

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Thank you team!