

2024 CHKD CONCUSSION UPDATE : AMSTERDAM CONSENSUS REVIEW

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DISCLOSURE

- I have no financial relationships or anything else to disclose

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GOALS

1. Review the methodology of the Amsterdam International Consensus on Concussion In Sport
2. Summarize the review articles produced and published in this consensus process updating evidence on ten selected relevant topics
3. Review of Amsterdam consensus recommendations

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- Vienna(2001), Prague(2004), Zurich(2008), Zurich(2012)
- Last Concussion Statement on Concussion in sport was 2016 in Berlin
- The purpose of the statements is to provide recommendations, based on the available research, literature at the time of publication, to inform the prevention, detection and management of SRC(Sport Related Concussion)
- These documents are not guidelines, but rather statements that reflect the current state of the evidence base and are intended to be adapted to inform health care practices

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- Scientific committee of experts from different areas selected ten systemic review questions to evaluate the most current evidence related to SRC
- Coauthors for each review topic were selected and prepared reviews
- Consensus meeting: Two day open meeting presenting review articles and then one day expert panel meeting

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- 28 experts discussed reviews and voted on recommendations to be made in statement
- Final day of meeting was a tools meeting to refine SCAT6, Child SCAT6, SCOAT6, Child SCOAT6, CRT6

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Ten systematic review questions were ultimately selected to identify and evaluate the evidence on SRC to inform the consensus conference regarding:

- Prevention
- Sideline screening
- Office assessment
- Rest and exercise
- Rehabilitation
- Persisting symptoms
- Recovery
- Return to sport and school
- Potential long-term consequences
- Retirement from sport

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    graph TD
      A[Identification of Research Questions] --> B[Preparation of 10 Systematic Reviews]
      C[Editorial Considerations in Consensus Symposium] --> B
      B --> D[6th International Conference on Concussion in Sport Amsterdam, Oct 27-28, 2022]
      D --> E[Expert Round Meeting (Oct 29, 2022)]
      E --> F[Methodology Paper]
      E --> G[10 Systematic Reviews]
      E --> H[Amsterdam 2022 International Consensus Statement on Concussion in Sport]
      E --> I[Concussion "Tool" (ICHS, SCAT5, CHM SCAT5, SCQAT5, CSM SCQAT5)]
  
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Systematic review

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

WHAT IS ALREADY KNOWN ON THIS TOPIC

- Primary prevention strategies in sport can reduce the high burden of concussion such as policy eliminating body checking in child ice hockey.
- More evidence is needed to support the protective effect of mouthguards, additional padding in American football helmets, appropriate helmet fit in collision sport, policy limiting contact practice in adolescent American football, head contact rule enforcement in contact sports (eg, American football, ice hockey), and training strategies targeting modifiable intrinsic risk factors.

WHAT THIS STUDY ADDS

- Mouthguards are associated with a 28% lower rate of sport-related concussion in ice hockey.
- Policy disallowing bodychecking in child and adolescent ice hockey is associated with a 58% reduced concussion rate, without unintended consequences associated with reduced bodychecking experience when subsequently participating in hockey later in life.
- Strategies limiting contact practice in American football, head contact rule enforcement in contact sports (eg, American football, ice hockey), and training strategies targeting modifiable intrinsic risk factors.
- Autism spectrum training programs in rugby is associated with a 32%–60% lower concussion rate.
- Current concussion management strategies may reduce recurrent concussion rates.

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Systematic review

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

1. What sport-related concussion (SRC) prevention strategies reduce concussion and/or head impact risk (eg, equipment, applicable training strategies)?

- Mouthguard use should be supported in child and adolescent ice hockey (Grading of Recommendations Assessment, Development and Evaluation, GRADE quality rating: low).
- Policy disallowing bodychecking should be supported for all children and most levels of adolescent ice hockey (GRADE quality rating: high).
- Strategies limiting contact practice in American football should inform related policy and recommendations for all levels (GRADE quality rating: low).
- Neuroanatomical training/vision/prop programmes are recommended, based on research in rugby, while more research is needed for females and other team sports. The focus should be on exercise components targeting concussion prevention (GRADE quality rating: moderate).
- Policy mandating optimal concussion management strategies to reduce recurrent concussion rates is recommended (GRADE quality rating: very low).

2. Are there unintended consequences of SRC prevention strategies?

- Prior bodychecking experience in ice hockey games was not associated with lower concussion rates when adolescent players played in leagues permitting bodychecking, suggesting no unintended consequences of policy disallowing bodychecking to reduce policy recommendation above (GRADE quality rating: moderate).
- Future research should consider evaluation of unintended consequences of concussion prevention strategies across all contexts.

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Systematic review

CHAT GPT 4.0

produce an image of a futuristic mouth guard that prevents concussion

Here is the image of the futuristic mouth guard specifically designed to prevent concussions. The mouth guard incorporates multiple shock-absorbing gel layers, reinforced impact zones, cutting-edge sensors for real-time impact monitoring, and advanced ventilation channels, all with a sleek, high-tech appearance.

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Systematic review

Clinical recovery from concussion—return to school and sport: a systematic review and meta-analysis

WHAT IS ALREADY KNOWN ON THIS TOPIC

- Symptom burden (number and severity) post-injury is a significant predictor of longer recovery after sport-related concussion (SRC).
- Clinical recovery from SRC is assessed using symptom surveys, which guide return to learn (RTL) and return to sport (RTS).
- Physical activity and prescribed aerobic exercise treatment are beneficial early in recovery after SRC.
- Management, RTL and RTS decisions after SRC should be individualised.

WHAT THIS STUDY ADDS

- Continuing to play and delayed access to healthcare providers (HCPs) after SRC are associated with longer recovery after SRC.
- Similar RTL and RTS management strategies can be implemented for different cohorts (eg, age, sex) with minimal differences in the time for recovery.
- HCPs must account for preinjury and postinjury factors (eg, depression/anxiety and previous history) that may affect recovery.
- The majority of athletes (59%) or an equal number of athletes (59%) who may need recovery a full RTL with no academic support by 10 days.
- Over the last two decades, studies report athletes are taking longer to become symptom free and RTS, which may reflect evolving management strategies.

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Systematic review

Clinical recovery from concussion—return to school and sport: a systematic review and meta-analysis

Category	Total	Inadmissible	Acceptable	High Quality
Total	277	54 (20.1%)	191 (68.9%)	22 (7.9%)
Balance/Motor	24	18 (75.0%)	4 (16.7%)	2 (8.3%)
Biobehavioural/Other	47	11 (23.4%)	31 (65.7%)	5 (10.6%)
Cognition	144	11 (8.0%)	113 (81.0%)	20 (14.0%)
Outcomes/Healthcare	14	12 (85.7%)	1 (7.1%)	1 (7.1%)
Physical Exam	107	17 (15.9%)	84 (78.5%)	6 (5.6%)
Symptoms	147	14 (9.5%)	119 (81.0%)	14 (9.5%)

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Systematic review

Clinical recovery from concussion—return to school and sport: a systematic review and meta-analysis

1. Clinical recovery

- The time for clinical recovery and completion of return to sport (RTS) has increased and the measures used to assess recovery have expanded. (SORT A)
- The symptom burden reported immediately/early after sport-related concussion (SRC) remains the most consistent predictor of recovery. (SORT A)
- There does not appear to be a difference in recovery based on any specific factor or cohort (eg, age or sex), with significant heterogeneity in findings. (SORT B)
- The significant variability in assessment tools and of recovery endpoints, however, underscores the importance of developing standardised definitions of and approaches to measuring recovery after SRC. (SORT A)

2. Return to learn (RTL) and RTL strategy (online supplemental table 1)

- Healthcare providers (HCPs) should work with stakeholders on education and school policies to facilitate academic support for students with SRC who are needed. (SORT A)
- Many athletes return to school without needing academic support. Risk factors for longer RTL duration should be assessed in all athletes with SRC to identify those who may benefit from academic support. (SORT B)
- While the RTL and RTS strategies can occur in parallel, student-athletes should complete full RTL before unrestricted RTS. (SORT B)

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Systematic review

Clinical recovery from concussion—return to school and sport: a systematic review and meta-analysis

3. RTS and RTS strategy

- The RTS strategy (online supplemental table 1) should be modified by the following points:
 - The earlier steps of exercise or treatment (steps 1–3) can be differentiated from the later steps (steps 4–6) of RTS when the demands and risks of their sport are present and the intensity and rigour progress to full competitive play. (SORT A)
 - Concussion can impede or prevent an athlete's training "model"¹⁰ across all athletes (youth, elite and adult), supporting readiness to RTS.^{11,12,14–16} (SORT B)
 - While all athletes can be managed using the same general approach, HCPs must account for individual anatomical and potential factors (eg, depression/anxiety, migrain e history) that may affect recovery. (SORT A)
 - HCPs can expect typical unrestricted RTS following SRC within 1 month of injury, but refer to specialty providers may be necessary when factors that increase risk of prolonged/unrestricted recovery occur. (SORT B)
 - HCPs should avoid prescribing absolute physical and cognitive rest in the first 24–48 hours after SRC. Step 1 is "relative rest" where athletes are encouraged to engage in activities of daily living, walking and brief cognitive loads. (SORT B)
 - An exercise tolerance test or other assessment environment can be initiated as part of the treatment plan and advanced to moderate aerobic exercise and low-intensity strength training (step 2), provided there is no more than mild and brief exacerbation of current concussion symptoms. (SORT A)
 - Concussion symptoms that persist or worsen away from the team environment, with no inbuilt risk for head contact (step 3), allow the introduction of

movement and change of direction, challenging the sensorimotor system as part of the treatment of SRC. (SORT A)

- Medical determination of readiness to return to at-risk activities should occur prior to returning to any activities at risk of contact, collision or fall, and in keeping with local requirements. Athletes should be back to their pre-injury level of function. (SORT A)
- Step 4 includes non-contact training drills, return to the team environment and full-strength training. (SORT B)
- Step 5 is return to full contact practice where the athlete participates in normal training, fully integrating the athlete back into the team environment, and step 6 is the return to full, unrestricted play. (SORT B)


4. To improve the clinical recommendations, the following definitions should be adopted:

- Symptom resolution at rest—resolution of symptoms that are associated with the current concussion at rest. (SORT B)
- Complete symptom resolution—resolution of symptoms associated with the current concussion at rest with no return of symptoms during or after maximal physical and cognitive exertion. (SORT B)
- RTL—completion of the RTL strategy,¹⁰ with return to pre-injury learning activities with no new academic support, including school accommodations or learning adjustments. (SORT A)
- RTS—completion of the RTS strategy,¹⁰ with no symptoms and no clinical finding that are associated with the current concussion at rest and with maximal physical exertion. (SORT B)

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CHAT GPT 3.5

Iroquois playing lacrosse wearing gourds for concussion prevention



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Systematic review

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

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ An initial period of relative rest after sport-related concussion (SRC) may be important based on expert consensus.
- ⇒ Excessive physical activity or exercise early after SRC can temporarily exacerbate symptoms.
- ⇒ Excessive cognitive activity early after SRC can temporarily exacerbate symptoms.

WHAT THIS STUDY ADDS

- ⇒ Strict rest until symptom resolution is not effective for SRC.
- ⇒ Light-to-moderate physical activity (eg, walking) that does not more than mildly exacerbate symptoms) during the 48 hours after SRC facilitates recovery.
- ⇒ Individualised baseline symptom threshold aerobic exercise treatment, based on systematic exercise testing that identifies the individual's mild symptom exacerbation heart rate threshold, can safely be started within 2–14 days of SRC, facilitates recovery and reduces the incidence of postconcussive symptoms persisting beyond 1 month from injury.
- ⇒ Reducing time spent viewing screens (eg, phones, computers) during the first 48 hours after injury appears to facilitate recovery.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Clinicians should no longer recommend strict or prolonged physical and cognitive rest ("cocooning") for the management of SRC.
- ⇒ Clinicians should encourage athletes to engage in light physical and cognitive activity but to limit social screen time within the first 48 hours of injury.
- ⇒ Clinicians can consider prescribing individualised heart rate-based aerobic exercise treatment to reduce the risk of symptoms persisting >1 month.
- ⇒ Clinicians should advise athletes that brief, mild symptom exacerbation (no more than a 2-point increase on a 0–10 scale compared with the pre-activity level) during physical or cognitive activity does not delay recovery.
- ⇒ More research is needed on the effects of early cognitive activity and sleep quality for SRC.

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Systematic review

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

Key recommendations

- ⇒ Meta-analysis reveals that subsymptom threshold aerobic exercise treatment (based on formal exercise testing) should be prescribed to adolescents as soon as 2 days after sport-related concussion (SRC), which facilitates recovery by a mean of -4.64 days (95% CI -6.69, -2.59). Grading of Recommendations, Assessment, Development and Evaluations recommendation is high.
- ⇒ Subsymptom threshold aerobic exercise treatment (based on formal exercise testing) should be prescribed to adolescents as soon as 2 days after SRC to significantly reduce their incidence of persisting postconcussive symptoms (PPCS) beyond 1 month. Aerobic exercise is also effective for reducing symptoms in adults with SRC.
- ⇒ Adolescents and young adults should return to light physical activity (eg, walking and easy activities of daily living) and limit their cognitive activity and screen use within the first 48 hours after injury to facilitate recovery.
- ⇒ Concussion symptom exacerbation is typically brief, does not delay recovery and should not prevent athletes with SRC from resuming activity/exercise after brief relative rest.

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What tests and measures accurately diagnose persisting post-concussive symptoms in children, adolescents and adults following sport-related concussion? A systematic review

WHAT IS ALREADY KNOWN?

- ⇒ Up to 30% of children and adults with sport-related concussion experience persisting post-concussive symptoms (PPCS).
- ⇒ A variety of pre-injury, acute and subacute factors, both neurobiological and psychosocial in nature, can help predict PPCS.
- ⇒ Tests and measures validated for the contemporaneous diagnosis of PPCS are needed.

WHAT ARE THE NEW FINDINGS?

- ⇒ Of 26 studies that met inclusion criteria, none focused on diagnostic accuracy. Most had small convenience samples, cross-sectional designs and a high risk of bias. Studies also were heterogeneous regarding participant characteristics, the definitions of concussion and PPCS, timing of assessment and the tests and measures employed.
- ⇒ The diagnosis of PPCS continues to depend on symptom report, preferably using standardised and validated symptom rating scales. The scant existing research does not indicate that any other specific tool or measure has satisfactory accuracy for the clinical diagnosis of PPCS.
- ⇒ Large prospective, longitudinal cohort studies are needed to examine the diagnosis of PPCS using a common set of tests and measures. Future studies would benefit from shared operational criteria for the diagnosis of both concussion and PPCS.

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What tests and measures accurately diagnose persisting post-concussive symptoms in children, adolescents and adults following sport-related concussion? A systematic review

Key recommendations

- ⇒ Persisting symptoms can be assessed using standardized and validated symptom rating scales. However, evidence-based recommendations regarding the use of other specific tests or measures in the clinical diagnosis of persisting symptoms in any age group are not possible based on existing research (level 2).
- ⇒ Generally, a formal clinical assessment conducted by a multidisciplinary team, is recommended to characterise individuals with persisting symptoms, including the types, pattern and severity of symptoms, and any associated conditions or other factors that may be contributing (level 2).
- ⇒ Differential diagnosis should proceed according to relevant disciplinary or professional standards in the specific clinical or sporting context (level 3). Important diagnostic considerations in the context of persisting symptoms include distinguishing pre-existing or new-onset mental health issues; learning or attention difficulties; visual, ocular-motor, cervical and vestibular problems; headache and migraine; sleep disturbance; dysautonomia, including orthostatic intolerance and postural orthostatic tachycardia syndrome; and pain.

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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

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ The majority of individuals will recover during the initial 2-4 weeks following sport-related concussion (SRC), but up to 30% of adolescents and adults may have persisting symptoms and require rehabilitation.
- ⇒ A brief period of 24-48 hours of rest followed by return to activities of daily living and a return to sport and school strategy is recommended.
- ⇒ Subsymptom threshold aerobic exercise, cervicovestibular rehabilitation and collaborative care may be of benefit following SRC.

WHAT THIS STUDY ADDS

- ⇒ For adolescents and adults with symptoms of dizziness, neck pain and/or headaches for greater than 10 days, an individualised cervicovestibular rehabilitation programme is recommended.
- ⇒ For adolescents with dizziness for greater than 5 days, vestibular rehabilitation may be of benefit.
- ⇒ For adolescents with persisting symptoms of all types, active rehabilitation and collaborative care may be of benefit.

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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

Key recommendations

- ⇒ For adolescents and adults with dizziness, neck pain and/or headaches for greater than 10 days following concussion, rehabilitation should include an individualised approach including cervicovestibular rehabilitation which may decrease the time to medical clearance to return to light aerobic activity (HR 2.91 (95% CI 1.01 to 8.43)) and medical clearance to return to sport (HR 3.91 (95% CI 1.34 to 11.34)).
- ⇒ For adolescents with persisting vestibular symptoms or impairments, vestibular rehabilitation may be of benefit to decrease symptoms and time to medical clearance to return to sport.
- ⇒ For adolescents with persisting symptoms for greater than 30 days, active rehabilitation and/or collaborative care may decrease symptoms.

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Examining later-in-life health risks associated with sport-related concussion and repetitive head impacts: a systematic review of case-control and cohort studies

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Survey studies reveal that some former contact and collision sport athletes report difficulties with cognitive functioning and mental health.
- ⇒ Some cross-sectional studies of former contact and collision sport athletes, compared with control subjects, have identified changes in brain structure, physiology or biochemistry.
- ⇒ Some death certificate studies of former professional soccer and American-style football players have reported associations between amyotrophic lateral sclerosis (ALS) and dementia as a cause of death and participation in sports.

WHAT THIS STUDY ADDS

- ⇒ The case-control and cohort studies included in this review suggest that (i) former amateur athletes are not at increased risk for depression or suicidality, (ii) former professional soccer players are not at increased risk for psychiatric hospitalisation and (iii) former professional American-style football and soccer players are not at increased risk for mortality from psychiatric disorders or suicide.
- ⇒ The studies included in this review do not demonstrate that participation in amateur sports are not at increased risk for cognitive impairment, neurological disorders or neurodegenerative diseases compared with men from the general population.
- ⇒ In contact sports or men who participated in professional sports reported an association with neurological diseases (eg, ALS) and dementia in former professional American-style football players and professional soccer players.
- ⇒ Well-designed case-control and cohort studies with better control of confounding factors, including genetic, demographic and environmental factors, are needed to determine if these associations are causal.
- ⇒ We did not identify any published case-control or cohort studies that (i) examined age of first exposure to sports-related head impacts and later-in-life health risks, (ii) used neuroimaging as an outcome, (iii) examined later-in-life risks for women or (iv) were considered posttestes cohort studies of chronic traumatic encephalopathy neuropathological change.

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CHAT GPT4

Design the perfect helmet to prevent concussion in American Football

Let's generate an image of this customized football helmet.




Here is the customized high-tech helmet designed specifically for American football. The helmet features reinforced protection, a robust faceguard, and additional padding, making it both safe and comfortable for players on the field.

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CHAT GPT4

Make it more aggressive appearing



Here is the customized American football helmet with a more aggressive appearance. The design features a menacing faceguard and a sleek, robust shape to enhance its formidable look on the field.

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CHAT GPT4

adapt it for a dystopian post-apocalyptic world where it looks more aggressive, threatening, and slightly steampunk



Here is the high-tech American football helmet adapted for a dystopian post-apocalyptic world with an aggressive, threatening, and slightly steampunk appearance. The design features rugged, battle-worn detailing, rivets, metal accents, and a menacing spiked facemask. The helmet is both protective and visually striking, fitting the theme perfectly.

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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

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Advice from clinicians is commonly sought regarding decisions about when an athlete should retire or discontinue participating in contact or collision sport following sport-related concussion (SRC).
- ⇒ Decisions on when to cease participation in contact or collision sport are complex and multifaceted.
- ⇒ Historically, several opinion-based articles have been published, however, there are no evidence-based guidelines to facilitate decision-making by athletes with clinical input from healthcare providers.

WHAT THIS STUDY ADDS

- ⇒ No evidence was identified to support the inclusion of any patient-specific, injury-specific or other factors (eg, imaging findings) as absolute indications for retirement or discontinued participation in contact or collision sport.
- ⇒ **Discontinuing participation**—discontinuation from contact or collision sport in the context of SRC or repeated head trauma should involve clinicians with expertise in traumatic brain injury and sport and be individualized with consideration of psychosocial, injury-specific and sport-specific factors, any persisting symptoms and evolving **agonistic concerns**.
- ⇒ Clinicians should provide athletes (and their families or guardians) with the scientific facts and uncertainties of their condition, as well as the potential risks of returning to their previous sport and/or alternative activities with less chance of head trauma or SRC. The discussion should highlight the benefits of regular physical activity and incorporate the athlete's preferences, risk tolerance and capability to make an informed decision.

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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

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ The Sport Concussion Assessment Tool (SCAT) tools are used worldwide to assist in the evaluation and management of sport-related concussion.
- ⇒ The SCAT tools have evolved over time based on clinical findings, clinician input, scientific investigations and systematic reviews of the literature. The SCAT tools are designed to be self-sufficient without the use of ancillary equipment.

WHAT THIS STUDY ADDS

- ⇒ The SCAT tools are effective in discriminating between concussed and non-concussed athletes within 72 hours of injury.
- ⇒ Except for the Symptom Scale, the SCAT tools have limited utility in return to play decisions beyond 7 days post injury.
- ⇒ The SCAT5 concentration subtests exhibit marked ceiling effects. Increasing task complexity would be beneficial.
- ⇒ The SCAT3 and SCAT5 8-item word lists have significant ceiling effects whereas the 10-item word list is normally distributed.
- ⇒ Increasing complexity of specific tasks (eg, months in reverse, tandem gait) will likely increase the clinical utility of these tools.
- ⇒ **Empirical data are limited in pre-adolescent, women and para athletes, sport type, and in geographical and culturally diverse athletes.**
- ⇒ Differences were found on demographic, social/cultural, and linguistic variables, which amplify the importance of developing robust multilingual, language and age-appropriate normative SCAT data, including in para athletes.

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CONSENSUS STATEMENT

Consensus Statement Process:

- 31 experts made up expert panel and voted on proposed changes to policy statement
- Experts were all "senior clinicians and researchers across multiple disciplines and areas of expertise"
- Vote >80% of members deemed "consensus"

<ol style="list-style-type: none"> 1. Recognize 2. Reduce 3. Remove 4. Refer 5. Reevaluate 6. Rest 	<ol style="list-style-type: none"> 7. Rehabilitate 8. Recover 9. Return to Learn/Return to Sport 10. Reconsider 11. Residual Effects 12. Retire
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CONSENSUS STATEMENT: RECOGNIZE

DEFINITION	Count	Percentage
• Modified Berlin	11/28	(39.3%)
• ACRM with preamble	14/28	(57.1%)
• Abstinence	1/28	(3.6%)
• Modified Berlin	22/28	(78.6%)
• ACRM with preamble	4/28	(14.3%)
• Alternative viewpoint*	2/28	(7.1%)

* Sport-related concussion is a 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. This initiates a neurotransmitter and metabolic cascade, with possible axonal injury, blood flow change and inflammation affecting the brain. Symptoms and signs may present immediately, or evolve over minutes or hours, and commonly resolve within days, but may be prolonged. No abnormality is seen on standard structural neuroimaging studies (computed tomography or magnetic resonance imaging T1- and T2-weighted images), but in the research setting, abnormalities may be present on functional, blood flow or metabolic imaging studies. Sport-related concussion results in a range of clinical symptoms and signs that may or may not involve loss of consciousness. The clinical symptoms and signs of concussion cannot be explained solely by (but may occur concomitantly with) drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction) or other comorbidities (such as psychological factors or coexisting medical conditions). The conceptual definition above does not provide specific

- Notable : Committee members didn't reach 80% threshold

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CONSENSUS STATEMENT: REDUCE

Relevant Consensus Recommendations

1. Mouthguard use should be supported in child and adolescent ice hockey.
2. Policy disallowing body checking should be supported for all children and most levels of adolescent ice hockey.
3. Strategies limiting contact practice in American football should inform related policies and recommendations for all levels.
4. NMT warm-up programs are recommended, based on research in rugby, and more research is needed for female athletes and in other team sports specifically targeting exercise components aimed to reduce concussion rates.

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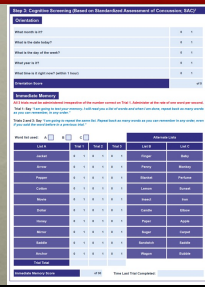
CONSENSUS STATEMENT: REMOVE: SIDELINE EVALUATION

- Previous versions of the SCAT have been shown to be most effective in discriminating between concussed and non-concussed athletes within 72 hours of injury and up to 5-7 days postinjury,
- Although their clinical utility appears to diminish after 72 hours.
- Ceiling effects were apparent on the 5-word list learning and concentration subtests
- Changes to SCAT were proposed to expert panel who couldn't reach consensus on first vote
- Expert concerns surrounding
 - 1. Invalidating existing normative data
 - 2. Time constraints on sideline

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CONSENSUS STATEMENT: REMOVE: SIDELINE EVALUATION

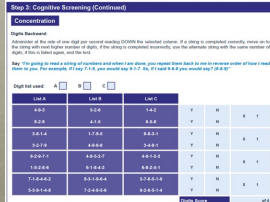
Recommended key SCAT changes after second round of voting:
Improve psychometric properties: longer word list (eg, 12- or 15-word list) and remove the 5-word list.



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CONSENSUS STATEMENT: REMOVE: SIDELINE EVALUATION

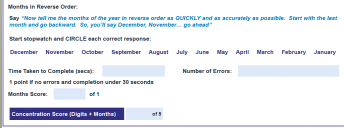
Recommended key SCAT changes after second round of voting:
Add digits (ie, increase the longest string by two digits) to the digit span backward subtest to reduce ceiling effects.



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CONSENSUS STATEMENT: REMOVE: SIDELINE EVALUATION

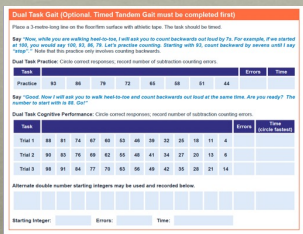
Recommended key SCAT changes after second round of voting:
Revise months backward to include a component of timed information processing



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CONSENSUS STATEMENT: REMOVE: SIDELINE EVALUATION

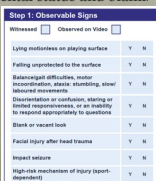
Recommended key SCAT changes after second round of voting:
Add timed dual gait tasks.



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CONSENSUS STATEMENT: REMOVE: SIDELINE EVALUATION

Recommended key SCAT changes after second round of voting:
Add a more robust set of visible signs to the SCAT6/Child SCAT6/CRT6, including:
Falling with no protective action, tonic posturing, impact seizure, ataxia/motor incoordination, altered mental status and blank/vacant/dazed look.



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CONSENSUS STATEMENT: REMOVE: SIDELINE EVALUATION

In the middle school and high school setting, where emphasis is placed on identifying true or possible concussion, will these changes improve identification of concussion?

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CONSENSUS STATEMENT: RE-EVALUATE : OFFICE ASSESSMENT

- The SCOAT6/Child SCOAT6 is designed to assist clinicians in assessing important clinical manifestations influencing the presentation of concussion, identifying areas for potential individualized therapeutic interventions, directing the need for specialist referral(s) and monitoring recovery.
- The SCOAT6/Child SCOAT6 does not replace the HCP's clinical acumen; rather, it provides a standardized framework that can be adapted to help inform the clinical evaluation in an office setting.

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CONSENSUS STATEMENT: RE-EVALUATE : OFFICE ASSESSMENT

Recommended to be included:

- Word recall and Digit Backwards tests
- Measurement of systolic and diastolic blood pressure as well as heart rate taken in two positions
- C/S and neurologic eval
- Timed Tandem gait test including dual task with cognitive task
- Modified VOMS
- Delayed word recall
- Additional symptoms for child and parent
- An age-appropriate measure of cognitive reaction time
- Validated pediatric measures of (1) orthostatic tachycardia, (2) orthostatic intolerance, (3) vestibular and oculomotor function and (4) child mental health and sleep questionnaires

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SCOAT COMMENTS

How is this likely to change how I manage this patient?

```

    graph LR
      A[Knee Pain] --> B[History Pt and Parent  
ROM  
Effusion  
Pain]
      B --> C[Varus/Valgus instability  
Anterior drawer  
Lachman  
Posterior Drawer  
McMurray's  
Apleys  
Dial Test  
Patellar apprehension  
Sweep Test  
Passive Knee Extension]
      C --> D[Radiographs  
MRI  
CT  
Labwork  
Referrals]
  
```

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SCOAT COMMENTS

How is this likely to change how I manage this patient?

```


    graph LR
      A[Concussion] --> B[History Pt and Parent  
Neurologic Exam  
• CNS  
• Motor  
• Sensory  
• Basic Balance]
      B --> C[Word Recall  
Digit Backward  
BP / HR two positions  
Timed Tandem gait w/  
dual and cog task  
Modified VOMS  
Delayed Word Recall  
Mental health  
questionnaire  
Sleep questionnaire  
Vestibular function  
Oculomotor function]
      C --> D[Academic accommodations  
Vestibular Rehab  
Subsymptom  
Exercise therapy  
Mental Health  
Advanced Imaging]
  
```

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CONSENSUS STATEMENT: RE-EVALUATE : OFFICE ASSESSMENT

AMSSM 2023 : Amsterdam Concussion Update : Michael Turner MD co-author on Amsterdam Concussion Statement

DR MICHAEL TURNER

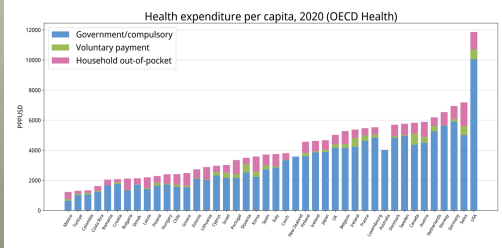


Professional Biography
Dr Michael Turner is Medical Director and CEO of The International Concussion and Health Injury Research Foundation (ICHRIF) and Honorary Clinical Associate Professor at University College London (UCL).
His former substantive posts include - Chief Medical Advisor (CMA) to the Lawn Tennis Association (1994-2015), CMA to British Horseracing (1992-2013), CMA to the British Ski and Snowboard Federation (1975-2000) and membership of the Medical Committees of FIS, the ITF and European Horseracing.
He was a member of the WADA TUE Expert Group (2014-2018), Deputy Director and Director of Medical Services at the British Olympic Association (1988-1996) and Team GB Medical Officer at the Calgary 1988, Albertville 1992 and Lillehammer 1994 Winter Olympic Games.
He is a co-author of the Concussion in Sport Consensus Statements from Zurich 2012 and Berlin 2016, and in the recent period for Paris 2021. His main areas of interest include safety in high-risk sports, protective equipment in sport, ADHD protection, concussion and anti-doping.

- Quite critical of many recommendations of Amsterdam Concussion Statement
- Good luck trying to get an appointment for a concussion in the NHS

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CONSENSUS STATEMENT: RE-EVALUATE : OFFICE ASSESSMENT



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CONSENSUS STATEMENT: RE-EVALUATE : OFFICE ASSESSMENT



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CONSENSUS STATEMENT: RE-EVALUATE : OFFICE ASSESSMENT



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CONSENSUS STATEMENT: RE-EVALUATE : OFFICE ASSESSMENT



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CONSENSUS STATEMENT: RE-EVALUATE : OFFICE ASSESSMENT



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CONSENSUS STATEMENT: REST AND EXERCISE

- Best evidence shows complete rest until symptom resolution is not beneficial
- Clinicians are encouraged to recommend early (after 24–48 hours) return to physical activity as tolerated (eg, walking or stationary cycling while avoiding the risk of contact, collision or fall).
- The best data on cognitive exertion show that reduced screen use in the first 48 hours after injury is warranted but may not be effective beyond that.
- Individuals can systematically advance their exercise intensity based on the degree of symptom exacerbation experienced during the prior bout of aerobic exercise.

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CONSENSUS STATEMENT: REST AND EXERCISE

- HCPs with access to exercise testing can safely prescribe sub-symptom threshold aerobic exercise treatment within 2–10 days after SRC
- Athletes may continue/advance the duration and intensity of PA or prescribed aerobic exercise provided there is no more than mild

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CONSENSUS STATEMENT: REHABILITATION

- If dizziness, neck pain and/or headaches persist for more than 10 days, cervicovestibular rehabilitation is recommended.
- For children, adolescents and adults with dizziness/balance problems, either vestibular rehabilitation or cervicovestibular rehabilitation may be of benefit.
- In the case of a recurrence of symptoms when progressing through the return-to-Learn (RTL) or return-to-Sport (RTS) strategies, re-evaluation and referral for rehabilitation may be of benefit to facilitate recovery.

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CONSENSUS STATEMENT: RETURN TO LEARN AND SPORT

- The systematic review revealed that the vast majority of athletes (93%) of all ages have a full RTL with no additional academic support by 10 days
- Avoid complete rest and isolation
- Encourage early return to activities of daily living

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CONSENSUS STATEMENT: RETURN TO SPORT

- Research is clear that HCPs should avoid prescribing absolute physical and cognitive rest (ie, 'cocooning') after SRC; instead, they should allow athletes to engage in activities of daily living
- Unrestricted RTS following SRC typically occurs within 1 month of injury in children, adolescents and adults, with an estimated pooled mean time to RTS of 19.8 days

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CHAT GPT 4.0

generate an image demonstrating cocooning treatment for concussion



Here is the image demonstrating cocooning treatment for a concussion. The patient is lying comfortably in a quiet, dimly lit room surrounded by soft pillows and blankets, creating a cozy and restful environment. The serene atmosphere emphasizes rest and relaxation as the primary focus of the treatment.

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CHAT GPT 4.0

make it more insect like



Here is the image demonstrating cocooning treatment for a concussion with an insect-like appearance. The setting resembles the inside of an insect cocoon, with natural, organic textures and silk-like materials, creating a cozy and restful environment for the patient. The serene and slightly ethereal atmosphere emphasizes rest and relaxation.

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CONSENSUS STATEMENT: POTENTIAL LONG TERM EFFECTS

Literature reviewed for future mental health problems, cognitive impairment and neurologic diseases

1. Former amateur athletes (primarily American football players) are not at increased risk for depression or suicidality during early adulthood or as older adults
2. Former professional soccer players are not at increased risk for psychiatric hospitalization during their adult life
3. Former professional football and soccer players are not at increased risk for death associated with having a psychiatric disorder or as a result of suicide.

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CONSENSUS STATEMENT: POTENTIAL LONG TERM EFFECTS

4. Former male amateur athletes were not at increased risk for cognitive impairment, neurological disorders or neurodegenerative diseases compared with men from the general population.
5. In contrast, studies of former professional athletes examining causes of death reported greater mortality rates from neurological diseases and dementia in former professional American football players and professional soccer players.
6. Former professional football players and soccer players have greater mortality rates from ALS

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CONSENSUS STATEMENT: POTENTIAL LONG TERM EFFECTS

Chronic Traumatic Encephalopathy

- CTE studies of former athletes are not cohort studies that can examine causation or quantify risk and thus were not included in the systematic review.
- It is reasonable to consider extensive exposure to repetitive head impacts, such as that experienced by some professional athletes, as potentially associated with the development of the specific neuropathology described as CTE-NC

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SUMMARY

- “These documents are not guidelines, but rather statements that reflect the current state of the evidence base and are intended to be adapted to inform health care practices”
- While the amount of research on concussion and its management continues to grow, much of it is lower quality evidence
- Hopefully this talk assists everyone's understanding of how the Consensus Statement on concussion in sport is generated and how to interpret how it may guide or affect concussion management on the field and in clinic.

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