

Concussion assessment in cycling:

A systematic review and call to action

Mr Richard Anderson & Dr Neil Heron

Overview

- What is concussion?
- Why is it an issue?
- SCAT5 and difficulties implementing it in road cycling
- Systematic review
- What work needs to be done in cycling? What can we learn from other sports?
- Next steps

What is concussion?

- Traumatic Brain Injury
- Can occur WITHOUT direct impact to the head or loss of consciousness
- Varied presentations. Signs & symptoms:
 - Physical
 - Cognitive
 - Behavioural
- Following a crash, riders should be assessed for concussion and removed from racing if concussion is suspected
 - To aid recovery and prevent further injury

Why does the issue need addressing?

- Common:
 - 4-13% of all cycling injuries
 - Up to 20% of acute injuries
 - Prevalence increasing
- Risk of further injury – musculoskeletal injuries, further concussion, second impact syndrome
- Risk to others
- Long term consequences: Chronic traumatic encephalopathy
- Difficult to assess & manage in cycling: Toms Skujins – 2017 Tour of California



What is recommended?

Berlin Consensus Statement on Concussion in Sport

- Is the SCAT5 fit for purpose in cycling?

SCAT5® SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION
DEVELOPED BY THE CONCUSSION IN SPORT GROUP
FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by



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FEI

Patient details

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of Injury: _____ Time: _____

WHAT IS THE SCAT5?

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

Key points

- Any athlete with suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration. No athlete diagnosed with concussion should be returned to play on the day of injury.

UCI CYCLING REGULATIONS

§ 5 Concussion and return to competition

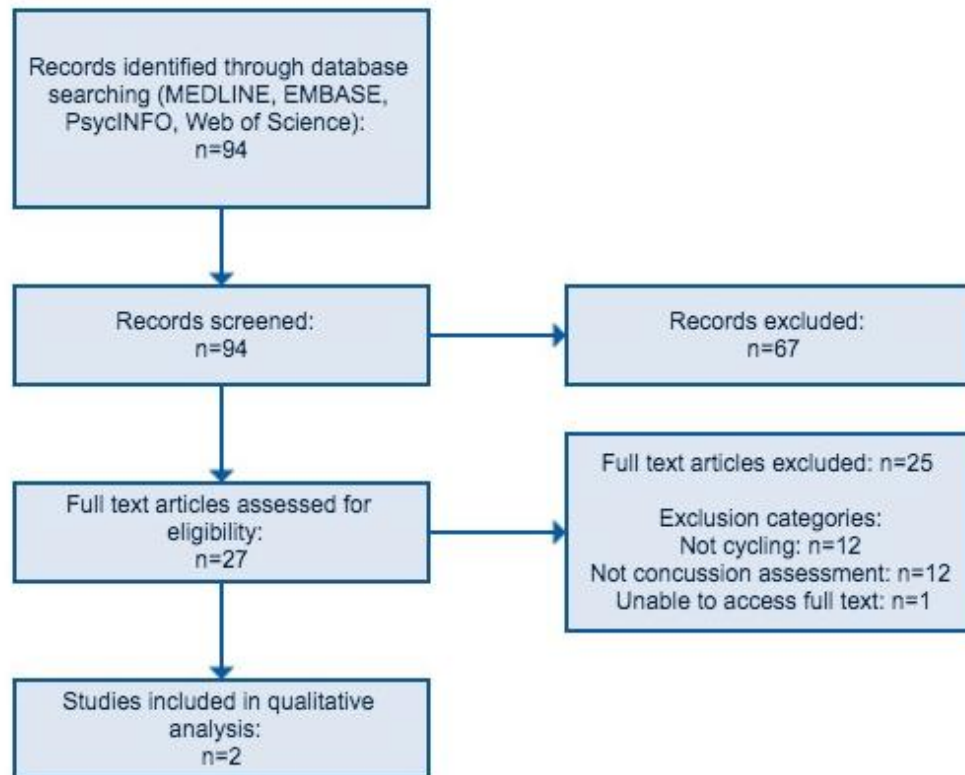
- 13.3.061** All those in the presence of a rider and in particular all doctors and paramedical assistants shall be watchful for riders showing symptoms of concussion.
- 13.3.062** Concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. The diagnosis of acute concussion usually involves the assessment of a range of domains including clinical symptoms, physical signs, behavior, balance, sleep and cognition.
- 13.3.063** If any one or more of the following components is seen to be present, a concussion should be suspected:
1. Symptoms: somatic (e.g. headache), cognitive (e.g. feeling like in a fog) and/or emotional symptoms (e.g. lability)
 2. Physical signs (e.g. loss of consciousness, amnesia)
 3. Behavioural changes (e.g. irritability)
 4. Cognitive impairment (e.g. slowed reaction times)
 5. Sleep disturbance (e.g. drowsiness)
- 13.3.064** Any rider with a suspected concussion should be immediately removed from the competition or training and urgently assessed medically.
- 13.3.065** For appropriate clinical evaluation for suspected concussion, for concussion management and return to training and competition doctors should refer to the published guidelines (Consensus statement on concussion in Sport – 4th International Conference, Zurich 2012) and the Sport Concussion Assessment Tool 3 (SCAT 3) and any update thereof.

Cycling specific issues

- Crashes unseen by doctors, team cars, cameras etc
- First responder – neutral service mechanic?
- Decision to allow a rider to continue or not to continue, must be made quickly and in sub-optimal conditions
- No substitutions
- Not possible to temporarily withdraw a rider for a ‘sideline assessment’
- Riders unwilling to report issues
- Currently there is no internationally agreed protocol for in-race concussion assessment in road cycling

Methods

Aim: a systematic review of the literature on concussion assessment in cycling



A 'knock on the noggin'

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A 14-year-old mountain biker is brought by his parents to a local emergency care centre with a 5 cm facial laceration and a headache. He had been biking on one of the local trails alone and is a bit vague about the nature of the injury; "I must have fallen and cut myself on a rock". He called his father on his cell phone at the time and arranged to meet him at the trailhead. He was wearing a helmet that was inspected by his father, which sustained no apparent impact.

His Glasgow Coma Scale score is 15, and other than occasional yawning and apparent reduced attention, he seems fine. He is a bit tender over his right shoulder, and his jersey is dirty on this side.

After cleaning and suturing the wound, he is discharged home.

Learning points

- A high index of suspicion for concussion is always warranted. Not all head injuries involve brain injury (1), but enough do that it is always wise to consider this possibility.
- Concussion, a functional injury, accounts for most minor brain injuries. Only a few acutely injured children have structural abnormalities on imaging (2), and a subset may require neurosurgical intervention (2).
- Concussion may be quite subtle in presentation, particularly within the first 24 h (3). During the initial assessment, if there remains any doubt about the patient's clinical status, choose to remove the patient from activity. 'If in doubt, sit them out'.

Over the next two days, he complained about a persistent headache, which felt worse when he climbed the stairs, and was not relieved with ibuprofen. He has been very irritable with his two younger siblings finding them too loud. He called from

The patient returns two weeks later, stating he has been headache-free for five days. He is attending school full-time as an honour-level student. His physical examination appears to be normal.

Learning points

- Most adolescents' concussions will resolve within several days (6), and 95% within three weeks (7).
- Because of the difficulty determining when concussions are 'over' (8) and concern about children and adolescents' vulnerability to brain injury, many agree on an asymptomatic period of several days before initiating return to play (6).
- Once medically cleared, a stepwise return to play exertional protocol should be followed with at least one day per step (5).
- In February 2012, a CPSP one-time survey showed that Canadian paediatricians frequently encounter patients with concussions. They use heterogeneous criteria to determine when patients become asymptomatic and variable return to play duration. More research and education are needed to ensure optimal management of concussions in the paediatric population.

Recommended reading

Purcell LK; Canadian Paediatric Society, Healthy Active Living and Sports Medicine Committee. Evaluation and management of children and adolescents with sports-related concussion. *Paediatr Child Health* 2012;17(1):31-4. <www.cps.ca/en/documents/position/concussion-evaluation-management> (Accessed February 2, 2013)

An Epidemic of Traumatic Brain Injury in Professional Cycling: A Call to Action

Mark W. Greve, MD and M. Ramin Modabber, MD†*

Road racing is one of the most dangerous endeavors in cycling, perhaps in all professional sport. It takes place in an uncontrolled environment, in all weather conditions, as nearly 200 riders frequently traveling at high speed compete for place (and space) with hundreds of accompanying cars and motorbikes. Injuries are common, endemic to the sport. By stage 9 of the 2011 Tour de France, there were 14 broken bones, 16 riders retired for medical reasons, and 1 was being treated in an intensive care unit.¹

Professional cycling experienced a devastating year of traumatic brain injuries in 2011. On May 9, 2011, Wouter Weylandt died as a result of traumatic brain injury on a descent during the Giro D'Italia. Colombian cyclist Juan Mauricio Soler experienced devastating neurological injury in June from a crash at the Tour de Suisse. In the 2011 Tour de France, Jani Brajkovic, Tom Boonen, and Chris Horner withdrew from the event after concussions. Many other riders at the top level of the sport have experienced concussions in competition or training.

Among the challenges faced by medical staff covering cycling events are the absence of sidelines, no timeouts, and no substitutions. When evaluating head injuries, including concussions, physicians cannot apply the standards of care common in most other sports. Clinical guidelines such as the Zurich Consensus Statement on Concussion outline a range of symptoms that should trigger careful evaluation and indicate specifically that "it was unanimously agreed that sufficient time for assessment and adequate facilities should be provided"² Such is not possible in professional cycling. On the side of the road, with the peloton racing away at 50 km/hour, medical personnel are required to make decisions in

Summary of the cycling-specific literature

- High index of suspicion for concussion after crash
- Withdraw from racing on basis of red-flags
- Presentations may be subtle
- Use SCAT to assess
- Management is physical and cognitive rest
- Generic advice - there is little published evidence to advise effective means of in-race assessment

Key points

Given that the literature is lacking, there is a need for the development of a valid in-race assessment that will consistently identify cases of concussion and exclude other conditions

We need to be able to assess riders to ensure their safety but without unduly penalising the rider or their team

What are other sports doing?

Consensus statement



Implementation of the 2017 Berlin Concussion in Sport Group Consensus Statement in contact and collision sports: a joint position statement from 11 national and international sports organisations

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Abstract

The 2017 Berlin Concussion in Sport Group Consensus Statement provides a global summary of best practice in concussion prevention, diagnosis and management, underpinned by systematic reviews and expert consensus. Due to their different settings and rules, individual sports need to adapt concussion guidelines according to their specific regulatory environment. At the same time, consistent application of the Berlin Consensus Statement's themes across sporting codes is likely to facilitate superior and uniform diagnosis and management, improve concussion education and highlight collaborative research opportunities. This document summarises the approaches discussed by medical representatives from the governing bodies of 10 different contact and collision sports in Dublin, Ireland in July 2017. Those sports are: American football, Australian football, basketball, cricket, equestrian sports, football/soccer, ice hockey, rugby league, rugby union and skiing. This document had been endorsed by 11 sport governing bodies/national federations at the time of being published.

What are other sports doing?

- Professional Rugby - Head Injury Assessment (HIA)
 - Player removed for 10 minute HIA based on possible concussion
 - 6 components: direct observation, symptom checklist, balance test/tandem gait, cognition (Maddock's questions & SAC), clinical judgement, video review
 - pre-HIA study: 58% of players who were diagnosed with concussion after a match, played on following their concussive impact
 - Post-introduction of HIA: <10% of concussed players remain on the field of play following their concussive impact
- Pitch-side salivary mRNA testing 2017-2018 season

What might a cycling assessment look like?

- Multi-modal assessment – varied presentation means no single test has high enough sensitivity
- Cycling specific tests to elicit signs
- Robust system for assessment that is both safe and fair
- Further assessment as race progresses – evolving nature of symptoms
- Appropriate baseline testing

Next steps: a call to action

- Consensus meeting
- UCI medical concussion group
- Internationally agreed, evidence-based concussion assessment protocol
- Return-to-riding protocol
- Multi-lingual
- Consider non-medical responders
- External evaluation of doctor's decision – to aid compliance
- Collection of data – web based app

Thank you for listening

Please email me if you're interested in
supporting this work:

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